MAJOR WATER PERMIT APPLICATION

Environmental Assessment Report

Applicant: Government of the US Virgin Islands – Dept. of Public Works
Project: VI ST ER STX(003): Storm Damage Repair to Roadways, Culverts, Embankments, Bridges, and Other Roadway Features on St. Croix, USVI

Site: Route 7532 - MP 0.02 Altona Lagoon Box Culvert

JULY 2022

Prepared by: Tysam Tech, LLC

Tysam Tech, LLC

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1.00 NAME AND ADDRESS OF APPLICANT

Government of the US Virgin Islands
Department of Public Works

Mailing Address:
6002 Annas Hope
Christiansted, VI 00820

Physical Address:
6002 Annas Hope
Christiansted, VI 00820

2.00 LOCATION OF PROJECT

The project is located at the following physical address:

Route 7532 - MP 0.02, Altona Lagoon Bridge
Christiansted, VI 00820

The Route 7532 Altona Lagoon Box Culvert project is located in Christiansted, St. Croix, in the area known as the Altona Lagoon Bridge, separating Estate Altona (Fort Louise Augusta) and Estate Mount Welcome. The site is positioned at 17°44'59.4"N, 64°41'45.4"W, just off of Rt 753, Mt. Welcome Road. Figures 2.00.1 and 2.00.2 below are a Location and Agency Review Map and Vicinity Map, respectively.

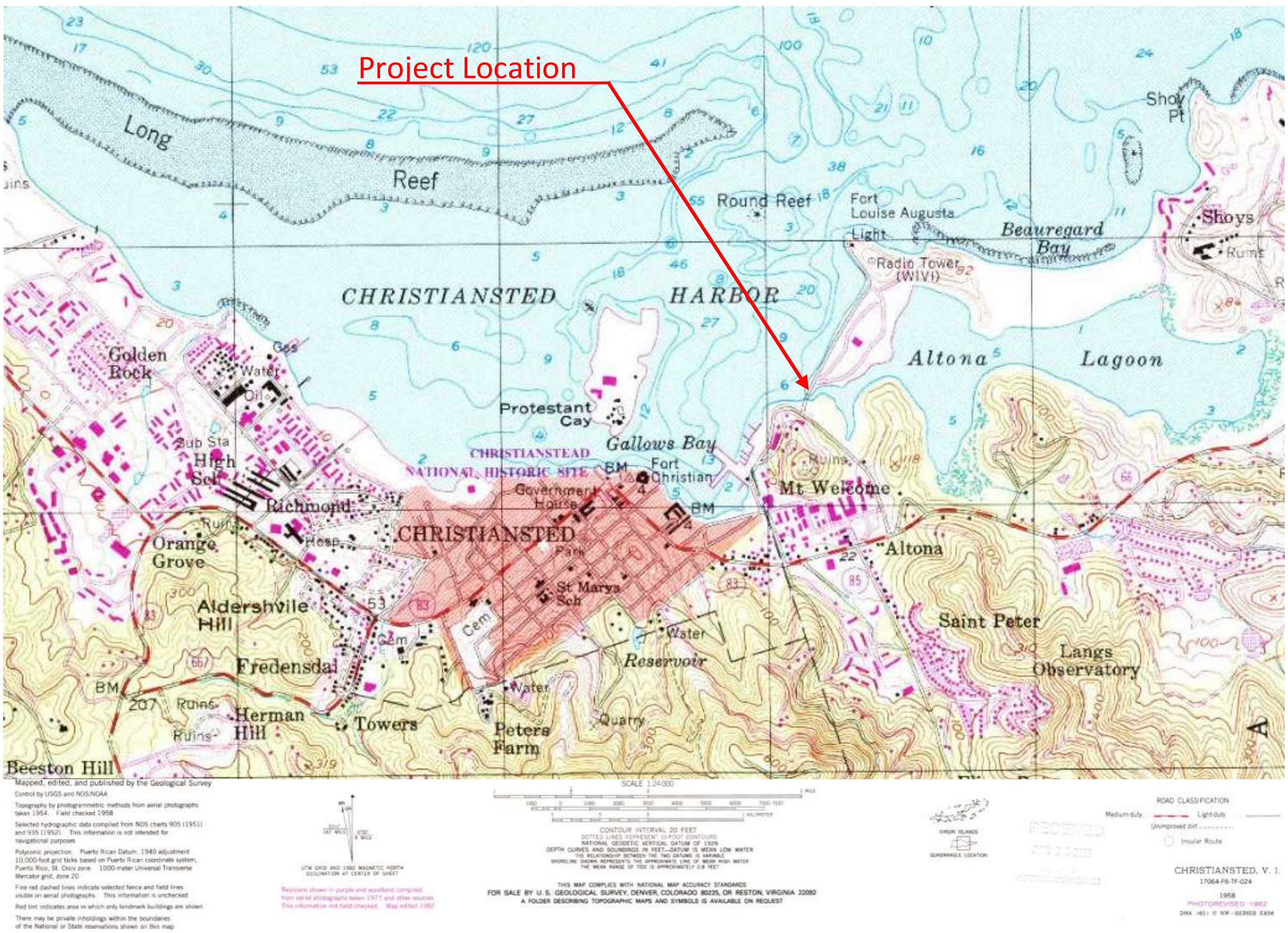

Figure 2.00.1 – Location and Agency Review Map (USGS Quadrangle Map, Christiansted, VI, 1958, 1988 ed.)

Figure 2.00.2 –Vicinity Map Showing Location of Facility (Google Earth).

3.00 ABSTRACT

SUMMARY OF WORK FOR ALL 15 SITES

Significant damage to roads, gut crossings and bridges occurred as a result of the landfall of Hurricane Maria in 2017 to the island of St. Croix, USVI. To provide the necessary repair to the damaged infrastructure, the USVI Department of Public Works (DPW) has contracted VI Paving, Inc. (VIP) to undertake the repairs at 15 different sites around St. Croix. These sites consist of different types of rehabilitation work and different project scale. Of the 15 sites, three are bridge rehabilitations, seven are culvert rehabilitations, and the remaining five are strictly roadway rehabilitations. This project is funded through the US Department of Transportation (USDOT), Federal Highway Administration, Eastern Federal Lands Highway Division and is in partnership with the USVI Department of Public Works (DPW).

The project involves the removal of damaged asphalt and concrete pavement, pipe culverts, bridges, guardrails, retaining walls, embankment material, utility lines and poles, and other debris. The damaged infrastructure will be replaced by new culverts, bridges, headwalls, guardrails, rip rap and gabion baskets, concrete retaining walls, embankment stabilization materials, drainage inlets, aggregate base, asphalt pavement, and concrete pavement. Also included in the scope of work is the clearing and cleaning of existing drainage structures and the reconditioning of shoulders and ditches. The aforementioned activities will restore the proposed project areas to full and improved function and prevent similar damage to occur during future storm events.

ROUTE 7532 - MP 0.02, ALTONA LAGOON BRIDGE

For this particular site under project VI ST ER STX(003), 175 linear feet of roadway will be replaced after existing box culverts are removed and replaced with a pre-cast bridge. The culverts are currently located between Altona Lagoon to the east and the Caribbean Sea to the west. These culverts will not be replaced as the inlet is proposed to remain open. A precast concrete bridge deck will be installed, supported by cast in place concrete footings on top of steel piles driven into either side of the Lagoon inlet. Sidewalks, guardrails, and handrails on both sides of the bridge will also be installed to meet minimum federal DOT requirements.

Since the site is located at a lagoon entrance and is in close proximity to shoreline with aquatic habitat and protected species, special attention will be placed towards the environmental managing to ensure minimal disturbance to the surrounding ecosystem and supported habitats.

Project Assurances

- Employees' and the public's health and safety are protected with the best available systems and technologies.
- Environmental impact is considered at all times.
- No significant negative impact to environment.
- Air quality is protected.
- Stormwater quality is protected.
- Water quality is protected.

4.00 STATEMENT OF OBJECTIVES SOUGHT BY THE PROPOSED PROJECT

VIP seeks to remove the existing box culverts connecting Estate Mt. Welcome and Estate Fort Louise Augusta that were damaged as a result of Hurricane Maria and replace them with a pre-cast bridge structure. This work will include removal and replacement of the roadway which bridges the Altona Lagoon inlet and connects the two landmasses. Adjacent to the roadway, new sidewalks, handrails and guardrails will be installed on both sides of the road. These improvements will prevent further degradation of the road structure and will greatly improve functionality, future storm resiliency and aesthetic appeal of the infrastructure.

5.00 DESCRIPTION OF PROJECT

5.01 SUMMARY OF PROPOSED ACTIVITY/PROPOSED DATES OF CONSTRUCTION

Construction is scheduled to commence March 2022 and be completed by June 2022.

a) Purpose of Project

This 175-foot section of roadway was damaged by Hurricane Maria landfall in 2017. The purpose of the project is to improve lagoon inlet drainage and flushing by removing the existing damaged box culverts and replacing the current bridge roadway with a precast concrete bridge deck, supported by a concrete cast-in-place footing with driven piles. Existing ground level will be raised along with bridge height to increase the cross-sectional area under the crossing and prevent storm damage. Once the bridge deck is installed, improved associated pedestrian infrastructure will be installed and the road will be repaved.

b) Presence and Location of any Critical Areas and Possible Trouble Spots

The project area is directly adjacent to connecting waterbodies, Altona Lagoon and the Caribbean Sea. The lagoon is essentially an enclosed embayment with a single point of connection to the sea, maintained as a permanent connection by a concrete box culvert structure. This lagoon is an ecologically productive site, providing habitats for a range of fish and bird species, including migratory species of birds. Unimpeded flushing, drainage and aquatic life movement is essential to the ecosystem health and prevention of environmental impact.

This project will entail the removal of existing box culverts and replacement of this crossing with a pre-cast bridge structure, placed on cast-in-place concrete foundations atop steel pilings. Installation of temporary Detour Lagoon Crossing Road will be required to ensure continuous access to the site and dock launch site.

Essential to the project approach is ensuring a continuous and adequately sized cross-sectional area through the lagoon channel opening. A failure to provide this would result in significant negative impact to the lagoon habitat, including potentially large fish kills.

Prevention of closing off or restriction on this channel will take precedence and will be actively managed by onsite Project Managers. Road crossings, demo work and piling installation will be done in a manner that maintains maximum flushing conditions.

Due to the nature of the project, there exists potential for sedimentation during project activities. Sedimentation can cause several harmful outcomes if unmitigated and must be minimized. Appropriate protective Best Management Practices (BMPs) to include Type II Turbidity Curtains will be employed through the entire project timeline in accordance with minimum requirements of the VI Environmental Protection Handbook (2002). The proposed mitigation methods are discussed below in Section 5.01.e.

There are several endangered and threatened species in the area which are further outlined in Sections 6.06 and 6.07. There are species both in the vicinity of the project area, as well as within the lagoon itself, and while the project activities have the potential to affect these protected species and their habitat, the project work will actively avoid and protect those plants and animals potentially affected for the duration of the construction activities. The project does not anticipate any displacement, reduction, or other negative impact to these species.

In review of the 2018 VI DPNR Integrated Report, water quality in the area has been designated as Class B and C. The waters of Altona Lagoon are Class B while the waters of the Caribbean Sea adjacent to project area are Class C. Specific identifiers of these classes are further discussed in Section 6.05.d. No long-term impacts to water quality in the area are anticipated, through full application of appropriate BMPs, consistent site monitoring during in-water or near water work, and careful operations during the full build schedule.

c) Proposed Method of Construction

This project will entail the following core tasks as part of the entire build schedule:

- Installation of temporary Detour Lagoon Crossing Road
- Existing damaged box culvert removal and embankment shoring
- Steel Pile Driving into both embankments
- Cast-in-place Concrete Foundation installation
- RipRap and Scouring Protection installation

- Pre-Cast Bridge Structure installation
- Backfill, compaction and roadway construction
- Removal of temporary Detour Lagoon Crossing Road

Installation of the temporary Lagoon Crossing Road to act as a detour will be required as the Altona Lagoon dock is one of the most commonly used landing sites for local fishermen, and restricting access to this landing site would hinder local fishermen from normal daily operation and impact their business.

Installation of this structure is provided in the detail drawings, and entails the placement of a temporary bridge, spanning the approximately 75 feet to provide an access route for vehicle traffic. The bridge will be double lane with 12-foot width for each lane.

Type II Turbidity Curtains will be employed for this road installation and bridge replacement, and all work in water will be monitored to ensure sediment plume control and maintenance of water quality in accordance with the provided Water Quality Monitoring Plan.

During removal of the existing box culverts, the project area will be on the border of the Lagoon water and open Christiansted Harbor. Turbidity Curtains will be an essential protection device, and diligent monitoring of water quality and potential aquatic life, to include mammals and sea turtles, will be employed during the entire culvert removal process.

After removal of all existing material and structure, pilings will be installed on both embankments, above mean-high tide water lines. Turbidity curtains will be used if necessary, to prevent sediment plume migration, but activity will be performed carefully to ensure no agitation of water or sediment occurs during pile driving. Riprap and scour protection will be installed around the foundation pilings and base, for permanent long-term protection of the bridge, lagoon mouth and channel.

These pilings, when set in place, will be used for creating forms to pour cast-in-place concrete foundation walls as the base for a pre-cast concrete bridge. The pre-cast concrete bridge will be brought in via barge and trucked into the site, where it will be put in place by crane.

After confirming appropriate placement of the bridge, and foundation stability, the surrounding roadway will be built up and compacted to meet the new bridge elevation, applying a 24 inch aggregate base, and the roadway paved with 6 inches of asphalt across its thirty (30) foot width. Five (5) foot Concrete sidewalks, curbs and FDOT Handrails will be installed on either side of the road, providing for a bridge forty (40) foot in total width.

Removal of the temporary Lagoon Crossing Road will be done when the bridge is completed and operational and done so in a manner to prevent sediment plumes, restriction in lagoon flushing and discharge, and any impact to aquatic species and their habitat.

d) Provisions to Limit Site Disturbance

In order to limit site disturbance, proposed work timeline will be the minimum time required to perform each task, as not to cause undue disturbance to surrounding areas. The project will stay almost exclusively within the existing footprint of the existing culverts, bridge and along the 175-foot length of the existing roadway, with the exception of installation and removal of the temporary Lagoon Crossing Road to the east of the existing bridge.

As the work entails demolition and installation of structures in or adjacent to water line, site disturbance will be both minimized and carefully performed where required. Any disturbance will be monitored at all times and a Water Quality Monitoring Plan will be implemented during any in-water activities. After each stage of site disturbance, stabilization and scour protection will be implemented immediately.

A Storm Water Pollution Prevention Plan (SWPPP) complying with the Department of Planning and Natural Resources' Construction General Permit requirements will be implemented during project activities, to ensure all site disturbance activities are minimized and BMPs appropriate to the location are in place.

e) Sediment Control Devices to be Implemented

The following Best Management Practices (BMPs) will be implemented on the site to control runoff and protect natural resources:

Turbidity Curtain – Due to the culvert removal work performed within the waterbody, a turbidity curtain will be used minimize sedimentation during deconstruction. These curtains are flexible, impermeable barriers which are weighted at the bottom to ensure that sediment does not travel underneath and are supported at the top through a flotation system.

Silt Fence – Due to working in a drainage route and close proximity to two water ponds, silt fencing shall be used to protect the downstream pond and vegetated areas and control runoff and sediment loss on both the east and west sides of the road. The proposed location for silt fencing placement is indicated in the attached Erosion Control Plan figure.

Containment Berms – A containment berm will be constructed, if needed, to support the silt fencing in containing stormwater and retaining sediment.

Design of these BMPs will follow the minimum standards of the VI Environmental Protection Handbook (2002).

f) Schedule for Construction and Implementation of Sediment Control Measures

No earth change activities will take place until the BMPs are installed at the site. Erosion and sediment control for the project construction include:

1. Ensure turbidity curtains and other BMPs are setup before work begins.

2. Minimize earth work in the installation of temporary access road, and subsequent removal of the existing concrete box culverts.

3. Drive pilings into embankments, and installation of concrete cast-in-place foundation walls.

4. Complete installation of precast bridge prior to removing turbidity curtains.

5. Install silt fencing and slope stabilization during shore work.

6. Minimize time for completion of sidewalks, handrails, and guardrails.

7. Minimize time for aggregate base installation, compaction, and asphalt paving of road.

8. Compact and re-asphalt the road, and remove temporary access road, using Type II turbidity curtains for sediment plume control.

g) Maintenance of Sediment and Siltation Control Measures

Turbidity curtains, and silt fencing will be inspected daily during in-water work, with additional monitoring of performance during storms or increased flow and/or wind events. Any visible plume of cloudy water passing beyond the curtain from the construction area will constitute inadequate performance of the curtain, and cessation of work until the faulty portion of the curtain can be modified, adjusted, or repaired to correct the inadequacy.

Inspections will be performed weekly and after any rain event greater than 0.5 inches in a 24-hour period, to ensure silt fencing and curtains are operating correctly and not damaged. Any deficiency noted will be recorded and addressed within seven (7) days of discovery.

The site will be cleaned on a daily basis of litter, debris and materials such as paper, wood, concrete, etc. to prevent discharge into the water.

5.02 SITE PLANS (See Attached Drawings)

5.02.01 Lot Layout (See Attached Engineer/Surveyor drawings)

5.02.02 Road Layouts (See Attached Engineer/Surveyor drawings)

5.02.03 Position of Structures (See Attached Engineer/Surveyor drawings)

5.02.04 Septic System/wastewater Treatment (Not Applicable)

5.02.05 Stormwater Drainage (See Attached Engineer/Surveyor drawings)

5.02.06 Stormwater Facilities (See Attached Engineer/Surveyor drawings)

5.02.07 Erosion and Sediment Control Plan (See Attached Spec Sheets)

5.02.08 Landscaping Plan (Not Applicable)

5.02.09 Other Required Drawings (See Attached Engineer/Surveyor drawings)

5.02.10 Required Maps (See Attached: Official Zoning Map, Parcel Map, FIRM)

5.03 PROJECT WORKPLAN

The project is proposed to be performed as 4 Phases, in sequential order with some overlapping tasks. It will entail Site preparation and mobilization, demolition and earth work, construction and finally demobilization and cleanup.

Phase 1 – Site Preparation

This phase will consist of mobilization and initial survey and staking as well as temporary access road installation. After establishing the layout, Erosion & Sediment control will be set up, to include turbidity curtains. Installation of the temporary Lagoon Crossing Road will be performed, setting up safety barriers and access routes. Mobilization of machinery and equipment will follow proper site setup for safety and protection of workers and environment.

Approximate Timeline –112 days

Phase 2 – Demolition

This phase will begin with initial site clearing and basic grubbing to prepare for demolition. Vegetation will be removed and sent to the WMA Transfer station for green waste. Flagged and protected mangroves will not be removed, and a protective barrier placed around each identified plant, marked for protection throughout the entire project.

A temporary rerouting of utilities will follow, to ensure uninterrupted utility services.

Demolition of the box culverts, headwall and existing road structure will occur next, with C&D waste disposed of in the Anguilla Landfill via permitted dump trucks. After full demolition and removal of C&D waste, preparation work will begin for new bridge construction.

Approximate Timeline – 17 days

Phase 3 – Foundation and Bridge Construction

This phase will entail foundation construction and placement of pre-cast bride structure. To prepare for the new bridge, the site will require steel pile driving, concrete cast-in-place foundation construction, and riprap and other scour protection installation. After foundation installation and base stabilization, the new bridge unit will be put in place by crane.

Approximate Timeline – 40 days

Phase 4 – Roadway Construction

This final phase will focus on roadway construction and profile. Aggregate base will be laid over newly installed infrastructure. New safety guardrails and concrete sidewalks will be installed according to included site plan drawings, and new permanent utility infrastructure will be installed. After compaction and final grading is complete, final asphalt layers will be applied per road construction specifications, to provide correct profile for safe driving conditions and to allow for proper drainage and storm resistance. Finally, installation of signage and pavement markings will complete the construction work, and the site will be stabilized and closed through any necessary landscaping and site cleanup as required by environmental standards and regulation. Removal of the temporary access road will be performed carefully and with continued installation of turbidity curtains.

Approximate Timeline – 13 days

All work on this road project will follow Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects, as well as local building, environmental and safety regulations.

Total estimated time for construction completion is estimated at 172 days.

6.00 SETTING AND PROBABLE PROJECT IMPACT ON THE NATURAL ENVIRONMENT

6.01 CLIMATE AND WEATHER

Prevailing Winds

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

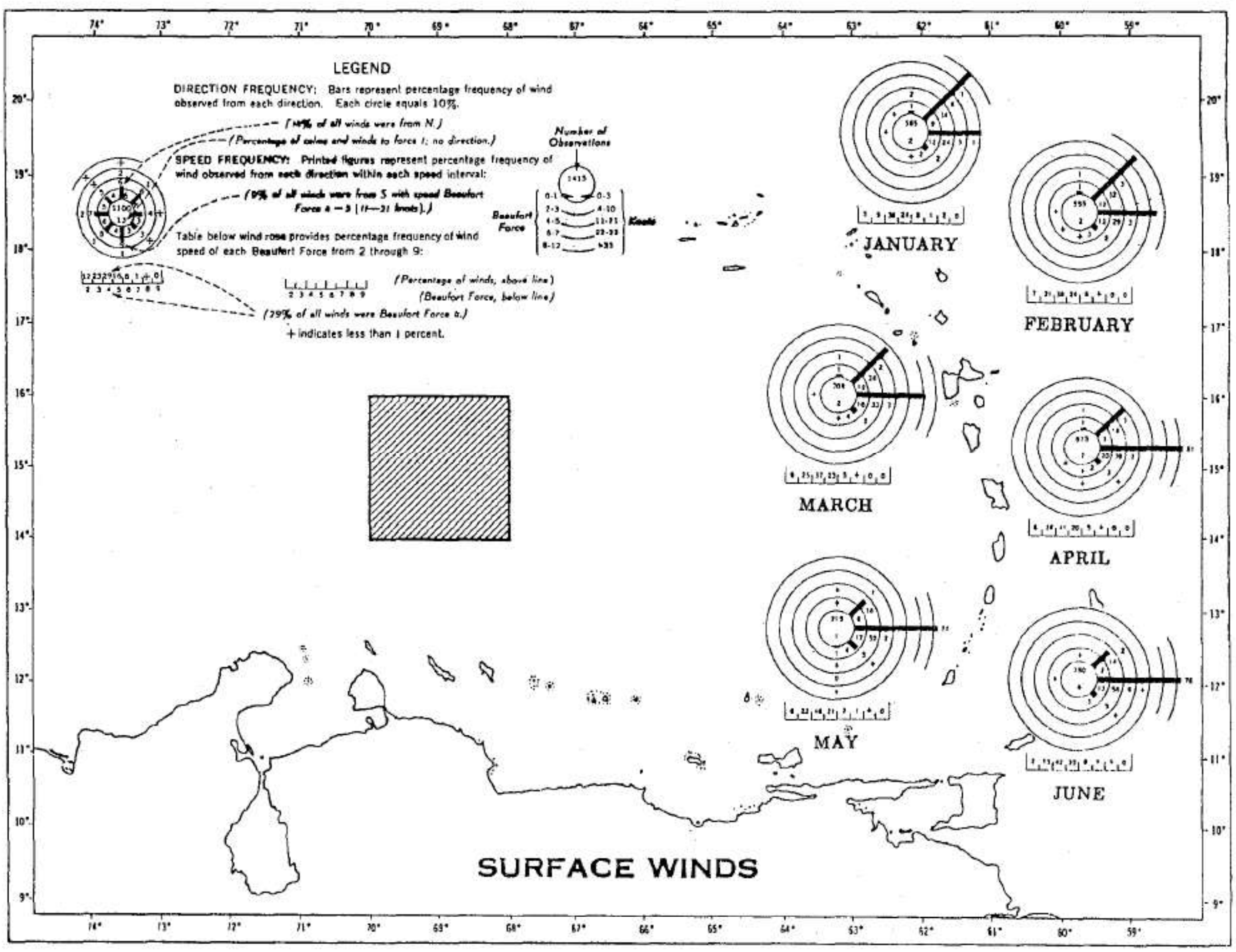

Figure 6.01.1 –Wind Direction and Speed Frequency, Central Caribbean, January - June.

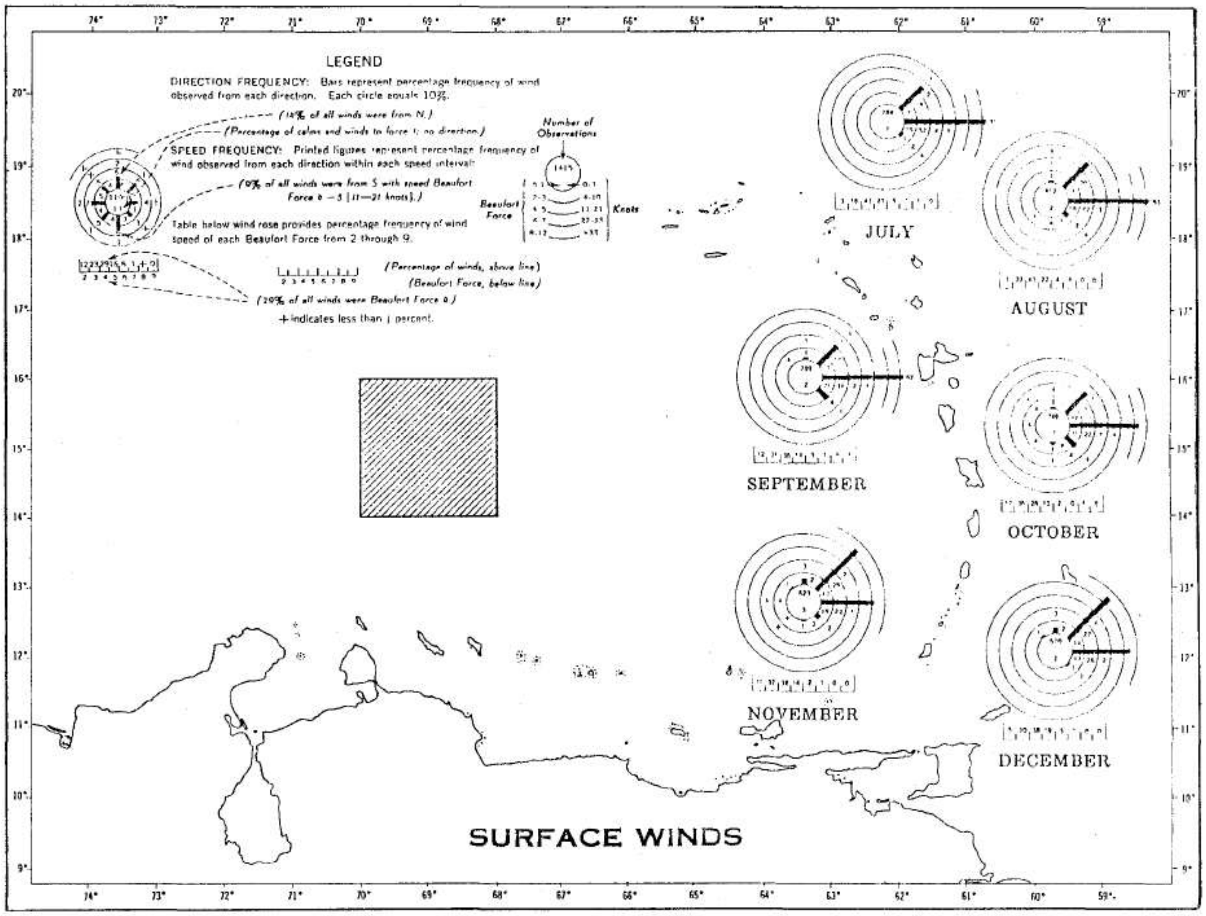

Figure 6.01.2 –Wind Direction and Speed Frequency, Central Caribbean, July - December.

December – February

During the winter, the trade winds reach a maximum and blow with great regularity from the east-northeast. Wind speeds range from 11 to 21 knots about sixty percent of the time in January. This is a period when the Bermuda High is intensified with only nominal compensation pressure changes in the Equatorial Trough. The trade winds during this period are interrupted by “Northerners” or “Christmas Winds,” which blow more than twenty knots from a northerly direction in gusts from one to three days. Such outbreaks average about thirty each year. They are created by strengthening of high-pressure cells over the North American continent, which, in turn, allow weak cold fronts to move southeastward over the entire Caribbean region. These storms are accompanied by intermittent rains, clouds and low visibility.

March – May

During the spring, the trade winds are reduced in speed and blow mainly from the east. Winds exceed 20 knots only thirteen percent of the time in April. The change in speed and direction is the result of a decrease of the Equatorial Trough.

June – August

Trade winds reach a secondary maximum during this period and blow predominantly from the east to east-southeast. Speeds exceed 20 knots twenty-three percent of the time during July. The trend for increasing winds results from the strengthening of the Bermuda High and a concurrent lowering of the pressure in the Equatorial Trough. Trade winds during this period are interrupted by occasional hurricanes.

September – November

During the fall, winds blow mainly from the east or southeast and speeds reach an annual minimum. Only seven percent of the winds exceed 20 knots in October. The low speeds result from a decrease in the Equatorial Trough. During this period, especially during late August through mid-October, the normal trade wind regime is often broken down by easterly waves, tropical storms and hurricanes.

Storms and Hurricanes

There are numerous storm events each year, from squalls and thunderstorms to hurricanes. Standard rain events occur most frequently during the summer, lasting only a few hours and causing no pronounced change in the trade winds.

A tropical cyclone, whose winds exceed 74 miles per hour, is termed a hurricane in the northern hemisphere. These hurricanes can range in strength from causing little to no damage to destroying infrastructure. These hurricanes occur most frequently between August and mid-October with their peak activity occurring in September.

Figure 6.01.3 depicts NOAA data on historic Hurricanes and Tropical Storms in the vicinity of St. Croix.

Figure 6.01.3 – Historic Tracks of Hurricanes and Tropical Storms for St. Croix

Climate

The climate of St. Croix, as well as that of the entire territory, is characterized by generally fair, tropical weather with usually consistent wind speed and direction. Temperature swings are narrow, both seasonally and diurnally.

The closest weather station to the facility is Christiansted Ft. Climate data from this station is found below in Table 6.01.1.

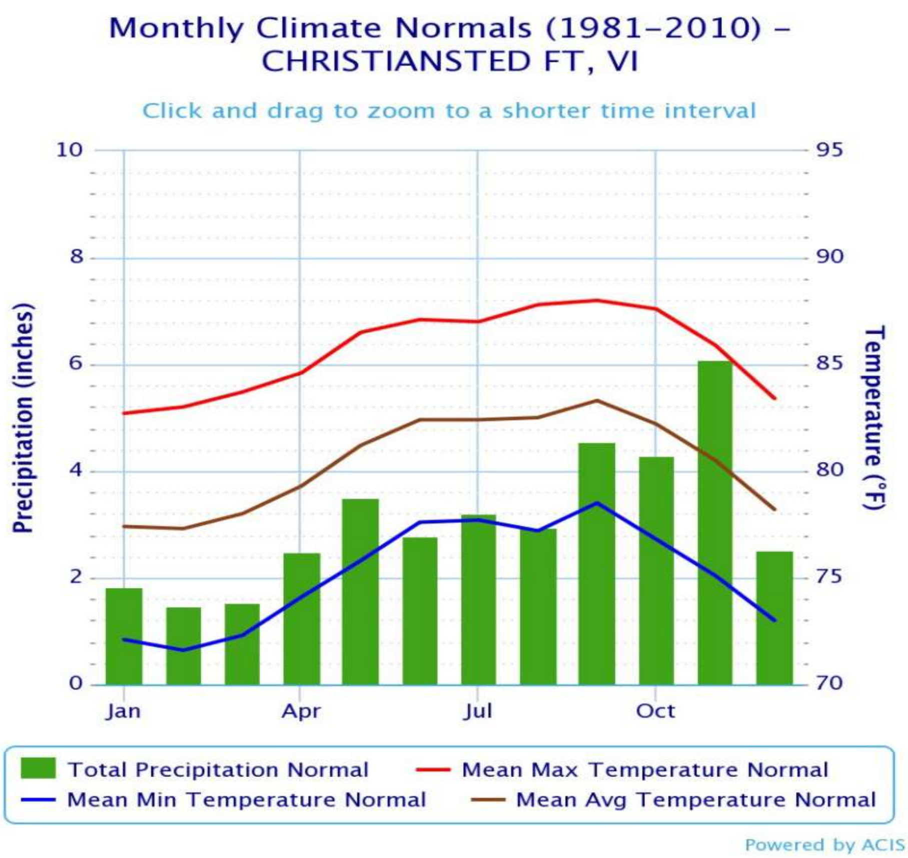

Table 6.01.1 –Average Temperatures in Christiansted, St. Croix

The nearest NOAA National Ocean Service Weather Station is located in Christiansted Harbor, St. Croix (Station CHSV3 – 9751364; ndbc.noaa.gov/station_page.php?station=chsv3). Climate data from this station is found below in Tables 6.01.2 and 6.01.3 below.

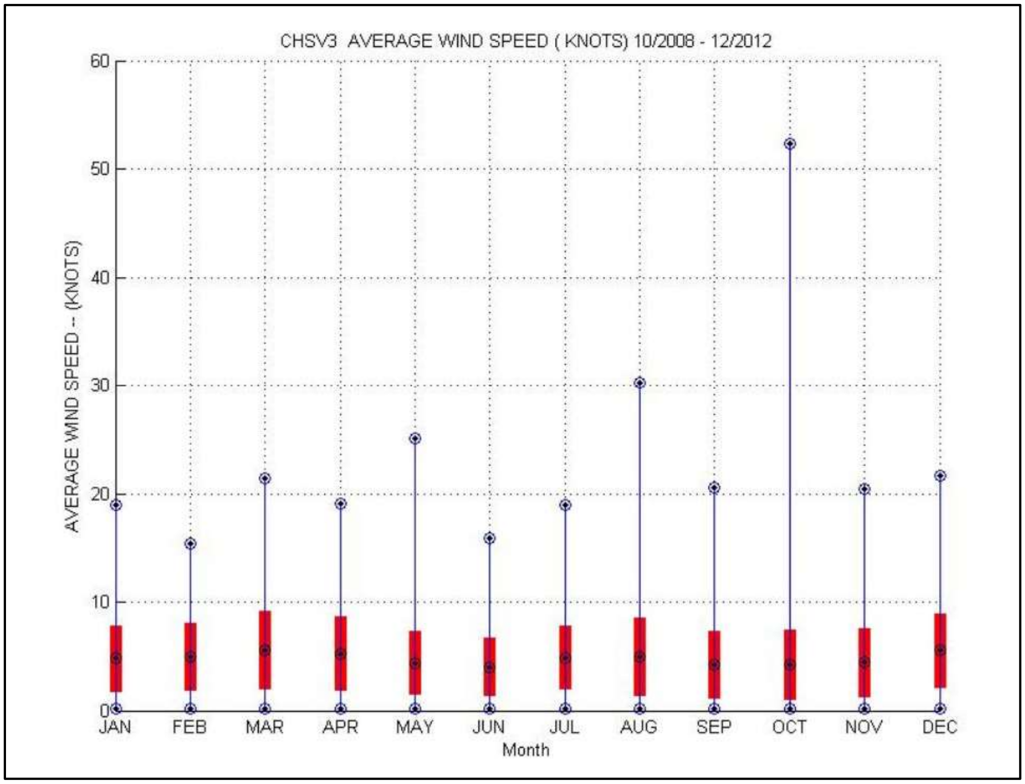

Table 6.01.2 – Average Wind Speed, St. Croix

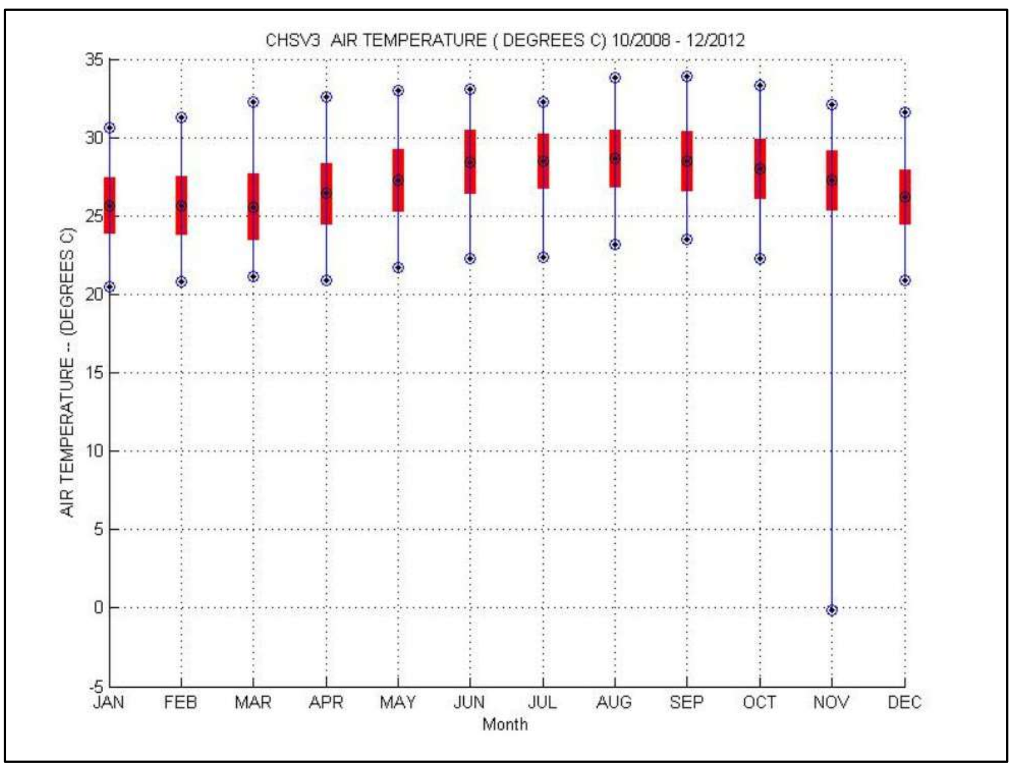

Table 6.01.3 – Average Air Temperature, St. Croix

The average annual rainfall on St. Croix is about 40 inches, ranging from about 30 inches in the east to more than 50 inches in the mountains of the northwest. Average annual temperature is a moderate 79°F, with an average low in winter of 76°F and an average high in summer of 84°F; temperatures are 2 to 3 degrees lower at altitudes of 800 to 1,000 feet. Occasionally, maximum daily temperatures will exceed 90°F and minimum temperatures will be less than 70°F. Prevailing wind direction is from the east or northeast.

Rain generally occurs in brief, intense showers of less than a few tenths of an inch. Rains exceeding 1 inch in 48 hours occur about 7 or 8 times a year in the central part of the island; they are slightly more frequent in the mountains of the northwest and less frequent in the eastern part. February and March are the driest months and September is the wettest. Nearly half the average annual rain falls from August through November. Large storms can occur in any month although more likely during July to November, the hurricane season. (Jordan, 1975).

Impact on the Proposed Project

The applicant has carefully analyzed both climate and weather. The project, including precast bridge and road rehabilitation, have been designed to withstand Category V hurricane events and prevailing climate.

6.02 LANDFORM, GEOLOGY, SOILS AND HISTORIC LAND USE

Geology of St. Croix

St. Croix is the southernmost island of the U.S. Virgin Islands, lying 40 miles south St. Thomas and separated from it by an ocean trench 3,600 meters deep. It lies about 95 miles southeast of San Juan, Puerto Rico. St. Croix is the largest island in the USVI, with a total area of 82 square miles. The island is approximately 22 miles long, east to west and is about 7 miles in width. St. Croix is geographically located in the Lesser Antilles and lies completely within the Caribbean Sea.

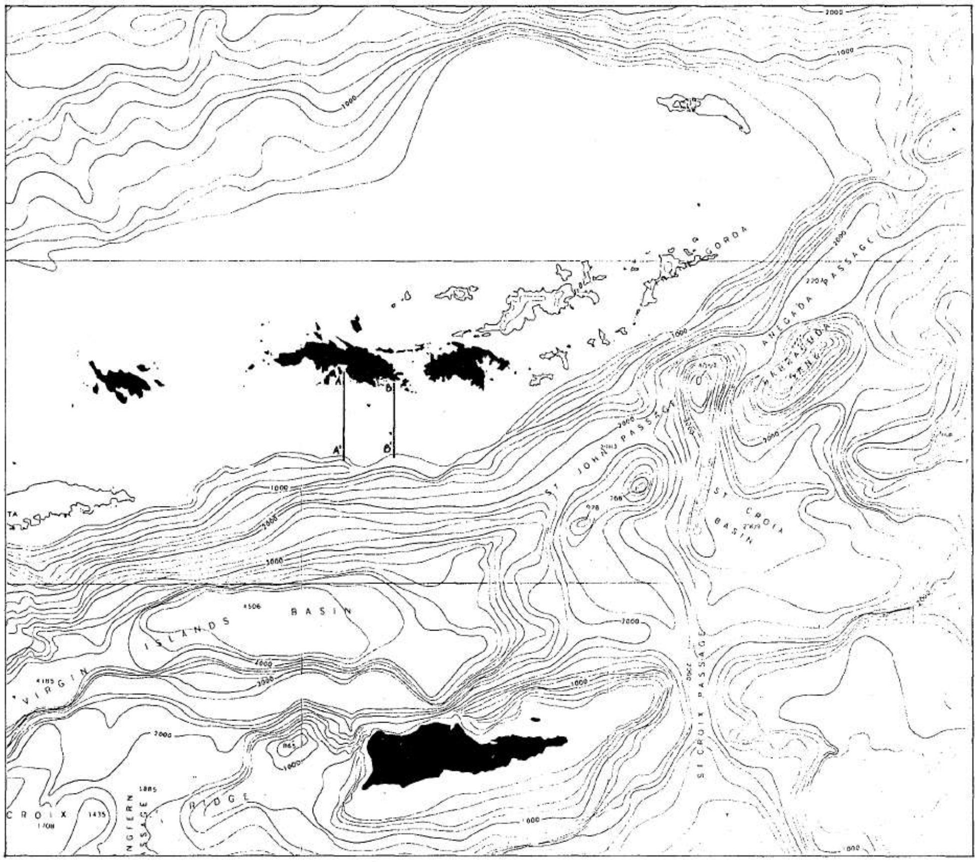

Figure 6.02.1 – Bathymetry of USVI basins and plateaus. From van Eepoel, et al, 1971.

The Virgin Islands are near the northeastern corner of the present Caribbean Plate, a relatively small trapezoidal-shaped plate which is moving eastward relative to the North and South American continents carried on the American Plate. The arc of the Lesser Antilles is an active volcanic arc above a subduction zone in which Atlantic oceanic crust of the American Plate is carried downward under the Caribbean Plate. The Caribbean Plate is sliding past North and South American plates along east-west trending northern and southern boundaries. The western boundary is a subduction zone in which the Cocos Plate is being driven northeastward and down under the edge of the Caribbean Plate west of Central America (Rogers, 1988).

St. Croix lies on a somewhat isolated, submerged ridge separated from the Puerto Rico Bank by the Virgin Islands Basin. Geologically it is related to the islands of the Puerto Rico Bank. If St. Croix was ever connected to the northern Virgins, it may have been separated from that group by either block (Meyerhoff 1927, Whetten 1966) or shear faulting (Adey 1977, Turner 1971).

The oldest rocks exposed on St. Croix are epiclastic volcanic sandstone and mudstone of the Caledonia Formation (Whetten 1966). These weakly metamorphosed, uplifted, folded and faulted rocks were derived from volcanic and other narrow-trench sediments originally deposited by turbidity currents on the deep ocean floor about 70 to 80 million years ago (Adey 1977). Buck Island is an emergent part of the St. Croix shelf.

Somewhat later in the Cretaceous, one or more volcanoes formed on the sea floor to the south or southeast of St. Croix. Volcanic debris was shed northward to form the Judith Fancy formation, composed of tuffaceous sedimentary rocks, which occur on St. Croix but not on Buck Island.

St. Croix was uplifted above sea level in the Oligocene (Whetten 1974), originally as two islands. The East End Range (including proto-Buck Island) and the Northside Range were separated by a trough several miles wide. The trough was subsequently filled in by the deposition of the Kingshill marl formation. There then followed a period of mild deformation, post-Miocene uplift, and erosion to form the present-day topographic features (Rogers and Teytaud, 1988). Therefore, the island of St. Croix consists geologically of two predominant mountainous areas (the North side and the East End ranges), with a central sediment filled valley in between.

The limestone and marls that overlay the Jealousy formation are known as the Kingshill formation. After these formations were deposited, the area underwent another period of uplifting, the two islands became connected by the newly emergent filled-in area, and the island of St. Croix was formed. Since that time, geologic activity has been limited primarily to the erosion of sediments and the formation of ponds, beaches, reefs, and beach rock coast.

Two large basins, the Virgin Islands Basin and the St. Croix Basin, separate St. Croix from the other Virgin Islands. Within the distance between St. Croix and St. Thomas, about 40 nautical miles, hydrographic charts show that the ascent from the sea floor north of St. Croix is as much as 70º. Frasetto and Northrop (1057) indicate that this northern topographic slope extends downward to the Virgin Islands Basin at a gradient up to 43º. There is an ascent of 13,656 feet within a horizontal distance of 25,800 feet, terminating with the steep north coast in the vicinity of Hams Bluff. The area has been described as the south side of the Anegada Trough and its related fault scarp (Taber 1922). Meyerhoff (1927) suggested that this block faulting took place during the late Pliocene or early Pleistocene, prior to which St. Croix was physically attached to the northern Virgin Islands.

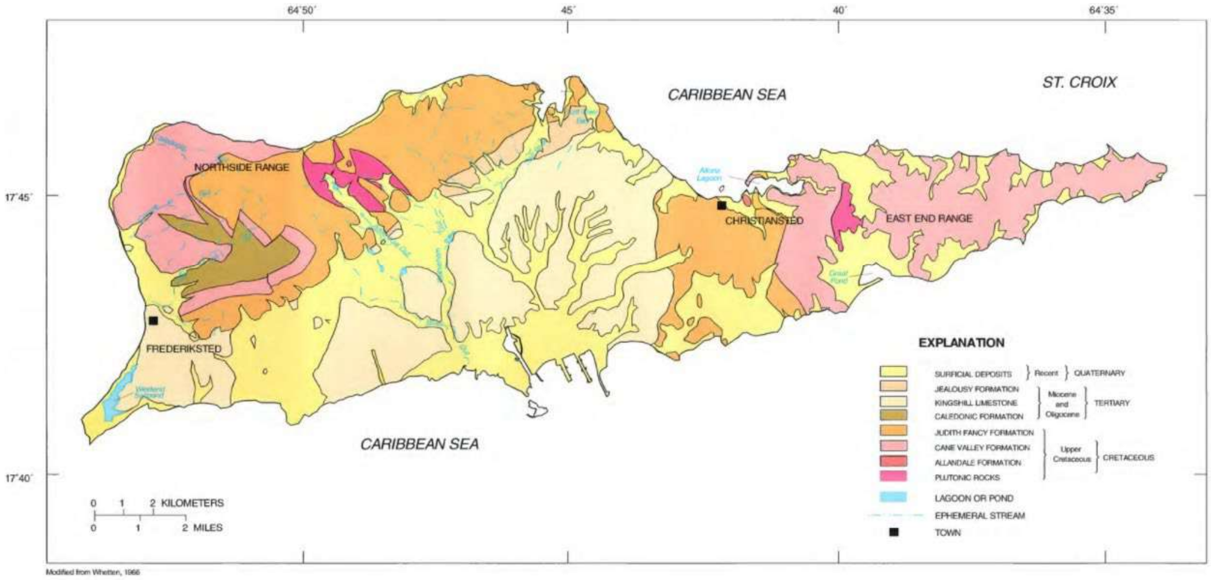

Figure 6.02.2 – General Geological formations of St. Croix (Atlas of Ground-Water Resources in Puerto Rico and the U.S. Virgin Islands)

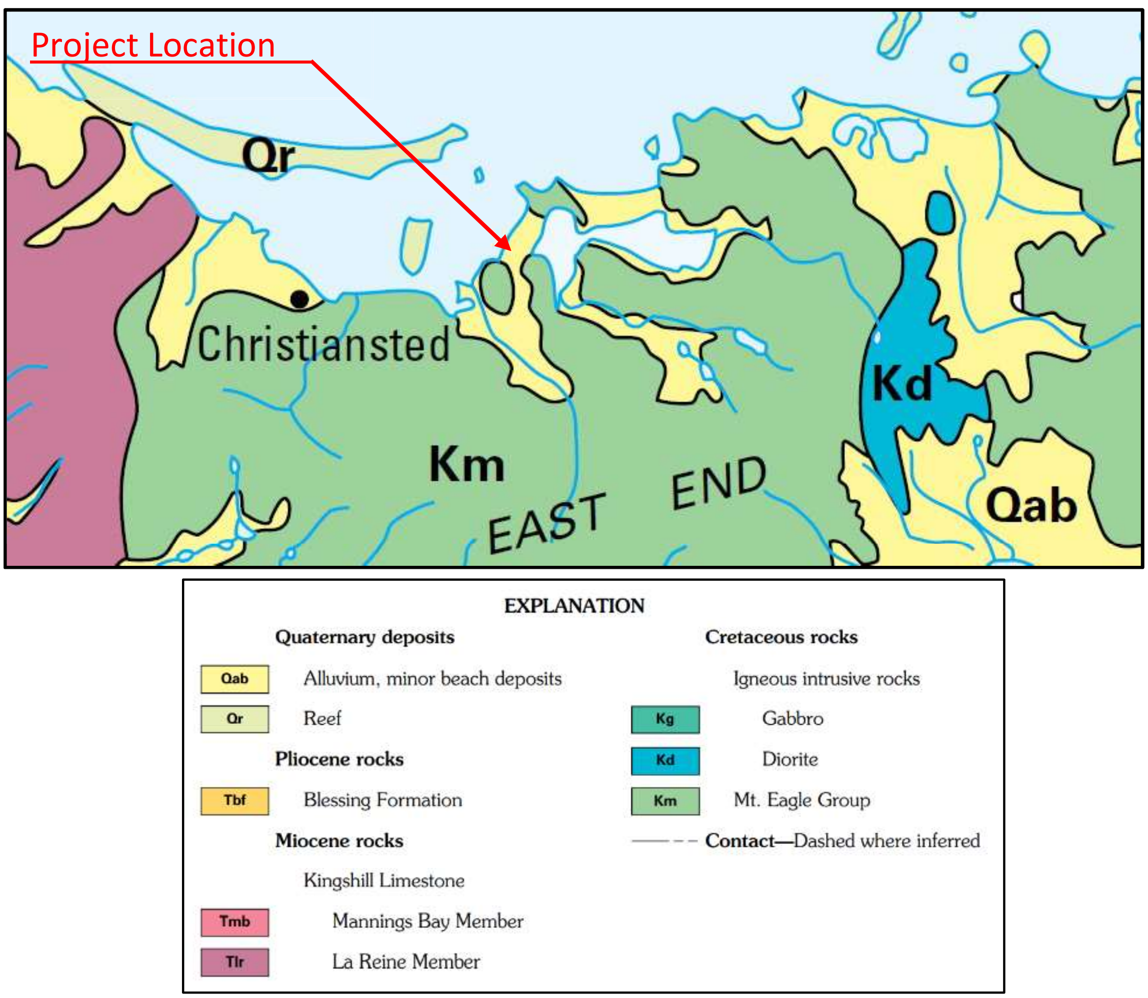

Figure 6.02.3 –Geological formations in vicinity of project site, St. Croix. Donnelly, 1959.

Geology of the Facility/Site

The project site is located at 17°44'59.4"N, 64°41'45.4"W, along Route 7532, Altona Lagoon Trail. The Custom Soil Survey by the National Resource Conservation Service (NRCS) identifies the soil type for the project area as Solitude gravelly fine sandy loam (SoA) and Ustorthents (Us).

Solitude gravelly fine sandy loam soils are classified as somewhat poorly drained with slow permeability, causing frequent flooding. They are typically in areas that are adjacent to saline marches, flats, and salt ponds of mixed, terrestrial and marine sediments (USDA Soil Survey of the United States Virgin Islands). SoA slopes are 0 to 2 percent.

Ustorthents describe an area that has been altered from its natural state by human activities. These include terrestrial, constructed areas along the seacoast. Due to a wide range of characteristic variability at these locations, a typical profile cannot be determined without onsite investigation. Us slope is mainly 2 to 20 percent, but it ranges from 0 to 90 percent.

For partial project activities, elevation is at sea level. Roadway is less than 10 feet above sea level.

Figure 6.02.4 – MapGeo Soil Type Map

Historic Use

The Altona Lagoon site has been historically used as a fishing and boating hub, using the existing dock for launching of boats and as a general recreational area. Historically, during colonial times, the site was used for the construction of an earthwork fort, Fort Louise Augusta, from which the Estate gets its name.

The land within the project boundary has been used as a transportation parcel for as long as records have been kept on historic uses.

Seismic Activity

The project will be built to meet or exceed the Standard Specifications for the Construction of Roads and Bridges on Federal Highway Projects requirements for Risk Category IV.

The Puerto Rico/Virgin Islands region is located at the northeastern corner of the Caribbean plate where motions are complex. The westward-moving North American plate is being driven under the Antilles Arc where volcanism is active. On the north side of the plate corner, the North American plate slides past the Caribbean but irregularities in the plate boundaries cause stresses that result in a complicated under thrusting of plate fragments. The interaction of plates causes the volcanism of the Antilles Arc on the eastern boundary of the Caribbean plate and creates major stresses all along the northern boundary (Nealon & Dillon, 2001).

Since the 1867 Virgin Islands Tsunami cause by a magnitude 7.5 earthquake in the Anegada trough (USC Tsunami Research Center), there has been continuous low intensity activity all below 6.0 Richter. Over the last several years, numerous minor tremors have been felt on the island. This increased activity is associated with the volcanic eruptions that have been occurring to the southeast on the island of Montserrat.

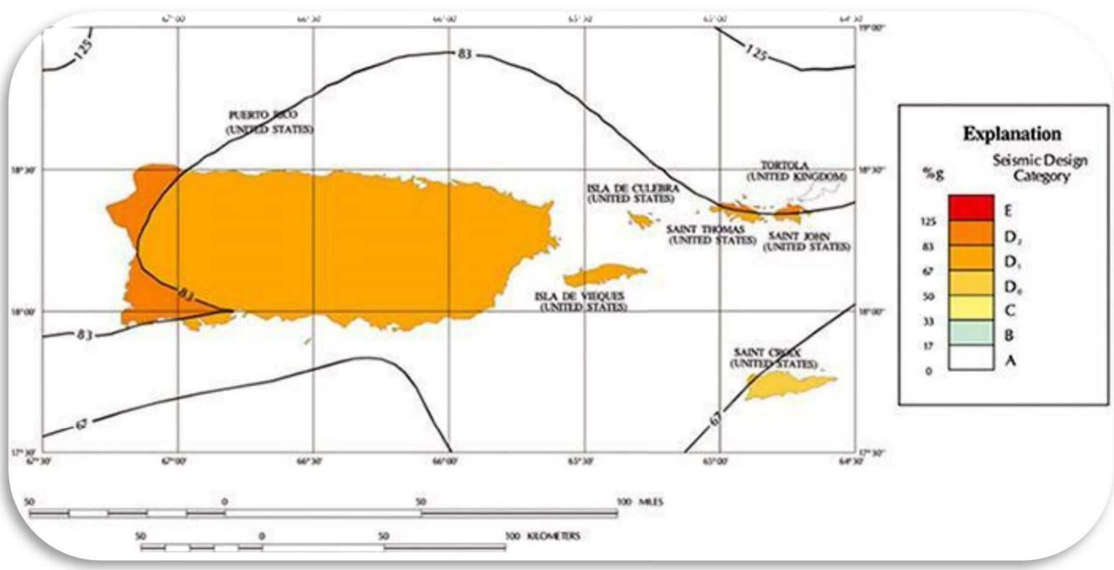

Figure 6.02.5 – FEMA Seismic Design Category Map

Impact of Geology on Proposed Project

The applicant has carefully considered landform, geology, soils and historic land use. The project has been designed to be consistent with these conditions, to improve the landform as it exists now and to cause minimal to no impact on the surrounding area and geology.

6.03 DRAINAGE, FLOODING, AND EROSION CONTROL

a) Impacts of Terrestrial and Shoreline Erosion

The project is located in direct contact with the shoreline, along the inlet of Altona Lagoon. However, the shoreline is not projected to be altered in any way as part of this project. The proposed development will not alter the existing drainage patterns of the site. The only change to drainage is an increase in cross-sectional area below the Altona Lagoon Bridge for water to pass through will be increased as a result of removing the current concrete box culverts to replace it with a pre-cast bridge structure.

Sediment and siltation control devices (turbidity curtains) will be implemented when performing any site work and will be maintained as discussed in Section 5.01(g). Permanent BMPs shall be maintained by DPW according to standard practices on a regular schedule and after storm events.

There are no anticipated negative impacts to terrestrial and shoreline erosion as a result of this proposed work.

b) Relationship to Coastal Flood Plain

Review of Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) for U.S. Virgin Islands Index indicate that the project area is within the flood zone rated Zone VE. See below in Figure 6.03.2 which is a portion of FIRM Panel 0072G, increased in size for clarity, depicting exact site location (red star icon) relative to flood zones. This area is known as a coastal flood zone with velocity hazard (wave action) and a base flood (100-year flood) elevation of 13 feet. Adjacent zones are VE, to the west of the roadway, with a base flood elevation of 16 feet and Zone AE, towards the lagoon, with a base flood elevation of 11 feet.

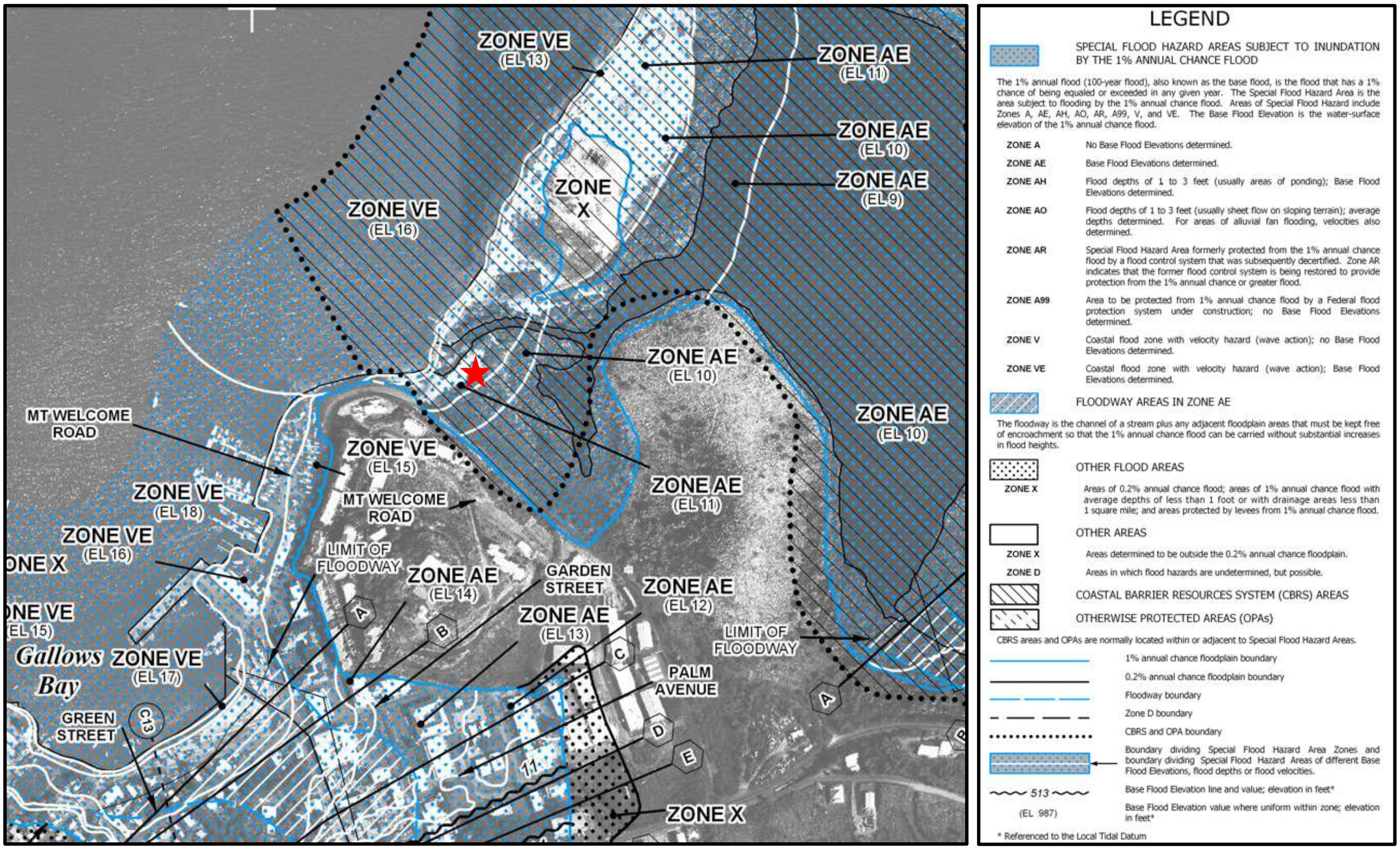

Figure 6.03.2 – Section of Flood Insurance Rate Map (FIRM) Panel 0072G, 72 of 94. April 16, 2007

a) *Peak Stormwater Flow Calculations*

The purpose of the project is solely to replace the existing box culvert bridge with a much more reinforced and stabilized pre-cast bridge, mounted within the previous road conditions, profile and footprint.

A hydrologic and hydraulic study (H&H Study) was performed for this project site to support the engineering design of these infrastructures. Peak storm flow calculations and other calculations relevant to the H&H Study are attached.

b) *Existing Stormwater Disposal Structures*

The only existing stormwater disposal structures are the existing box culverts. All existing structures will be removed in their entirety before being replaced by the new pre-cast bridge.

c) *Proposed Stormwater Control Facilities*

The proposed pre-cast bridge will provide some greater cross-sectional area to provide increased flow through the channel; however, no dredging, modification or contouring of the channel itself is proposed for this project. Scour protection around the bridge foundations will be installed, along with riprap for storm protection.

d) *Impacts to Terrestrial and Shoreline Erosion*

Sediment and siltation control devices (turbidity curtains) will be implemented when performing any site work and will be maintained as discussed in Section 5.01(e). Permanent BMPs shall be maintained by DPW according to standard practices on a regular schedule and after storm events.

A Water Quality Monitoring plan will be implemented during work to ensure water quality in the area is maintained, and all BMPs are in place and working correctly. The project will only be restricted to working in the existing footprint of existing infrastructure, and will not dredge, damage or impact surrounding land, shoreline or seabed.

The proposed pre-cast bridge structure has been designed for long-term resiliency and erosion resistance, and no impact to shoreline erosion or habitat is anticipated.

6.04 FRESH WATER RESOURCES

St. Croix, USVI is limited in the number of freshwater resources to a few wells located around the island and mostly intermittent and ephemeral streams and ponds which dry up during periods of limited rainfall. Some perennial streams and freshwater ponds/basins do exist, but not as a reliable source of freshwater. The majority of potable water is either captured by rooftops and stored in cisterns or is desalinated seawater. The project will use freshwater only for grading, compaction and general dust control needs. The portion of waterbody in which the project is located is not a freshwater source. Therefore, the project will have no negative impact on the availability of freshwater resources.

6.05 OCEANOGRAPHY

a) *Seabed Alteration*

Proposed bridge footings will be installed on the adjacent embankments above mean high tide water line, not into the seabed. Removal of the box culvert will require removal of the section embedded in the lagoon channel, however, there are no anticipated changes to the seafloor, and removal will be done carefully and with minimal impact to the channel floor.

As such, no impact to the existing seabed is anticipated as part of this project and operation.

b) Tides and 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 (Figure 6.05.2). These currents change very little from season to season with the currents coming more from the south during the summer months. Because of the shallowness of the Caribbean basin, less than 3200 feet, mainly surface water from the Atlantic flows through the islands (Figure 6.05.1). Currents have been observed at Christiansted Harbor ranging between 1 and 3 knots, depending on weather conditions (IRF 1977).

St. Croix's tides typically exhibit two (bi-modal) 'peaks' during the diurnal period (24-hour day), with the second (lesser) 'peak' with relatively small ebbs and flows. The mean tides range from 0.8 feet to 1.0 feet and the spring tidal ranges reach up to 1.3 feet (IRF 1977).

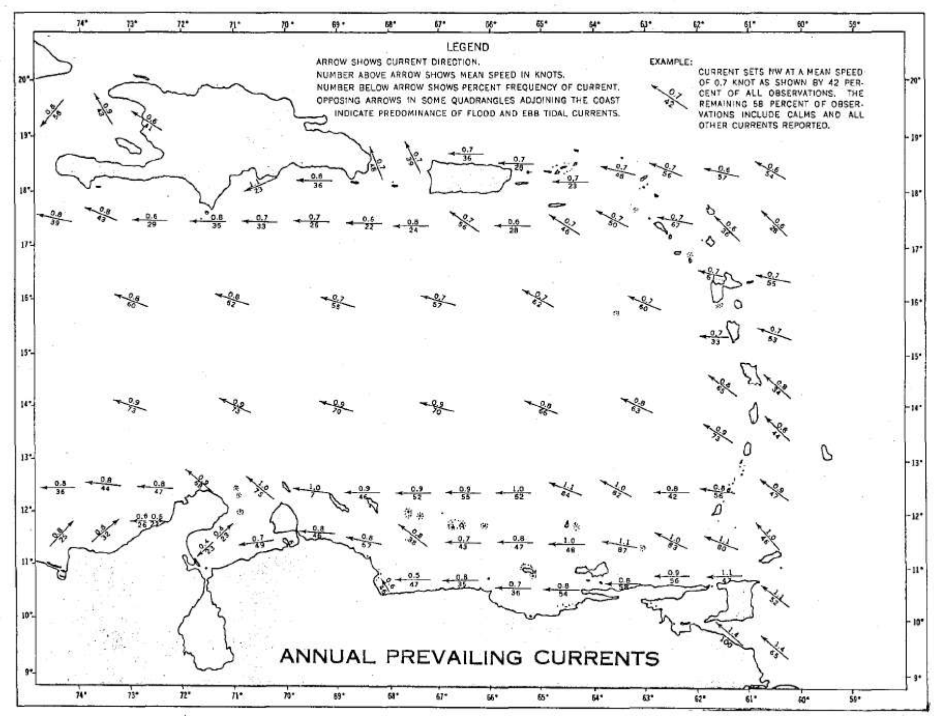

Figure 6.05.1 – Annual prevailing currents in the Caribbean. US Naval Oceanographic Office (1963)

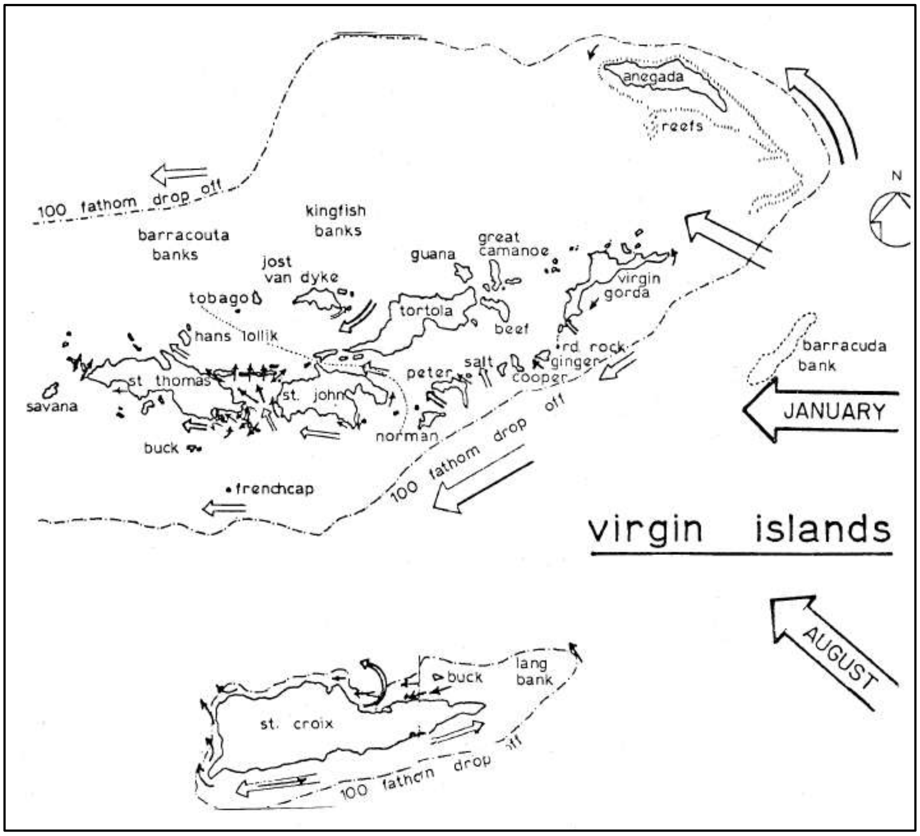

Figure 6.05.2 – General current patterns on the island platforms. From Dammann, et al (1969)

In the Virgin Islands, tidal ranges and tidal currents, except in some inshore localities, are not significant. The small islands, lacking complex shoreline physiography, do not restrict changes in water level. The sea flows around the islands relatively unimpeded, resulting in tidal fluctuations of only a few inches to a foot. Further, the steep slopes of the islands rising out of the water means that the intertidal zone – the part of the shoreline regularly covered and uncovered by the tides - is very narrow. Therefore, there are no large areas of tidal flats uncovered at low tides as in other places in the world, especially along continental coastal zones.

One of the consequences of this small tidal action is that water exchange in bays due to tidal action is usually very small. For example, it is estimated that 24 to 40 tidal cycles alone would be necessary to exchange all the water in the main part of St. Thomas harbor (Percious, et al, 1972). Fortunately, waves, swells and oceanic currents are generally successful at flushing most bays. However, these forces are considerably reduced by the time they reach the heads of deep embayments.

As a result, circulation may be poor in the inner reaches of some larger embayments. The innermost portions of the mangrove lagoon on St. Thomas, Salt River of St. Croix and Coral Bay of St. John are examples of this. To a lesser extent, similar conditions have been observed at the head of Vessup Bay (Redhook), St. Thomas and Cruz Bay, St. John, and most likely occur in other similar locations (IRF, 1977).

Figure 6.05.3 below depict available current information for the site-specific area and point to the variety of circulation patterns which can be encountered locally (Island Resources Foundation. 1977).

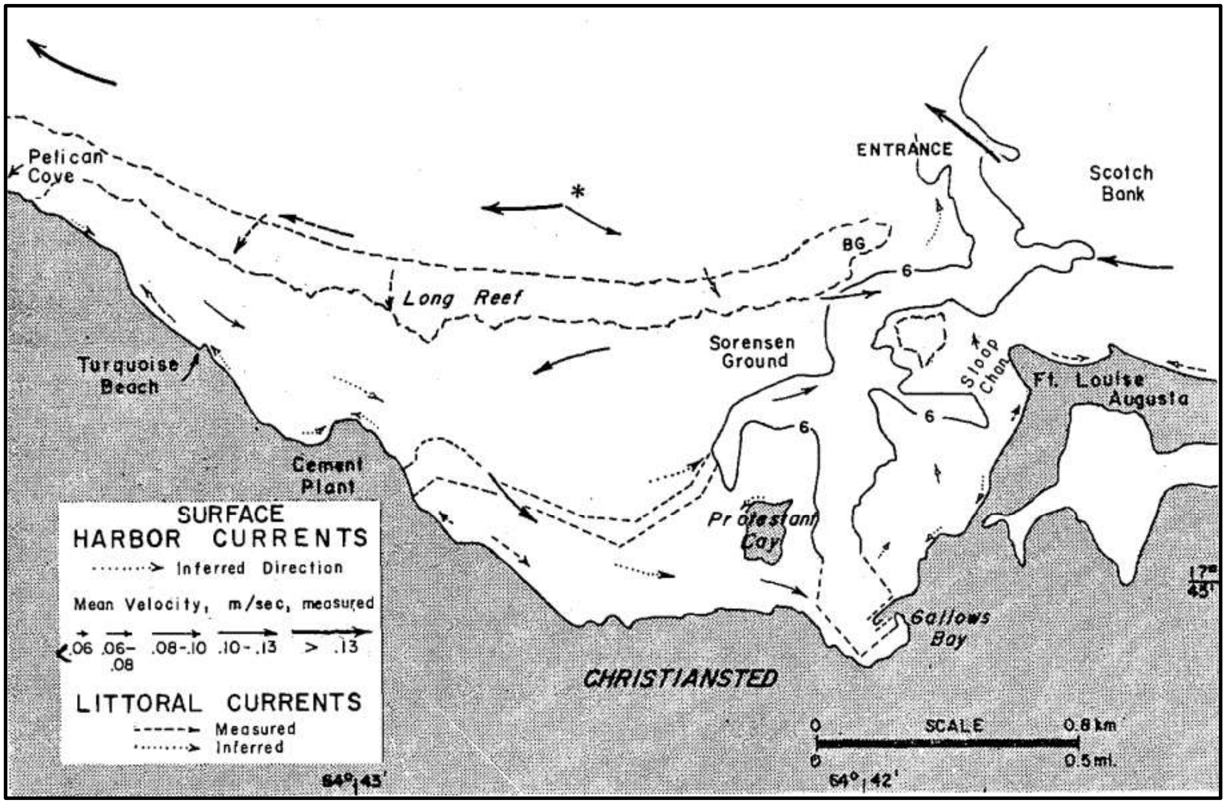

*Figure 6.05.3 – Mean surface current, speed and direction for harbor currents and for littoral currents August 1971. Length and width arrows indicate speed in meters per second. Harbor currents based on anchor station measurements; littoral currents on dye patch measurements. * indicates two alternating predominant directions. From Nichols, et. at, 1972.*

The closest NOAA tidal station is located in Christiansted Harbor, St. Croix, VI and is Station ID: 9751364. The NOAA tidal station is located at Latitude: 17° 44.9' N and Longitude: 64° 41.9' W. The mean range is 0.69 ft. and the diurnal range is 0.74 ft. Tidal data from the station is shown below.

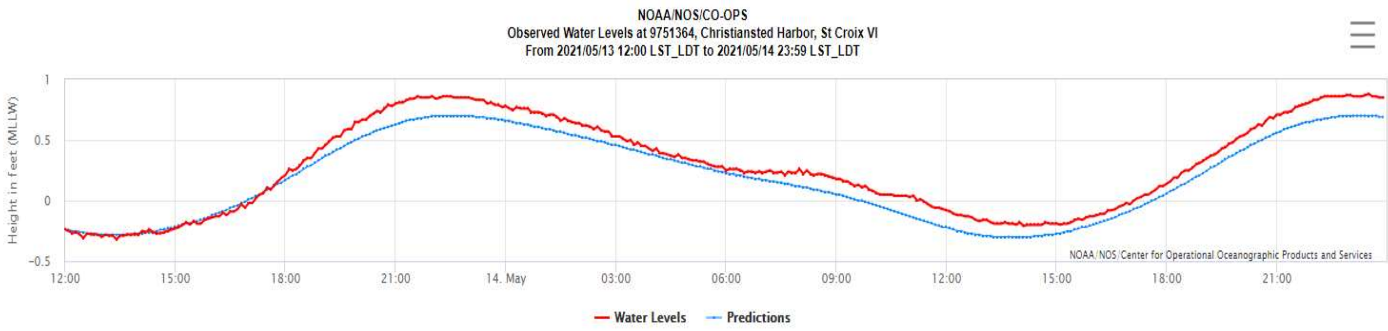

Table 6.05.1 – Observed Water Levels in Christiansted, St. Croix

c) Wave and Wind Impacts

The deep water wave regime of offshore waters is driven by the northeast trade winds most of the year. On the average, wave heights of one to three feet approach from the east 42 percent of the time throughout the year. For short periods, 0.6 per cent of the time, these easterly waves reach 12 feet. In addition to the normal easterly swell that affects the windward coasts of the islands, there are two seasonal modes of wave approach that affect leeward coasts: a southeasterly chop and swell and a northern swell. The southeasterly swell with waves one to twelve feet high becomes significant in late summer and fall when the trade winds blow from the east or when tropical storms and hurricanes pass the islands at a distance to the south. The east-southeasterly wind and wave regime is associated with the doldrum belt located over the interior of Venezuela and with an intensive high-pressure area over Bermuda. By contrast, during winter when the doldrum belt is located farther south along the equator and the Bermuda High is weak, a long length and long period northern swell develops. Although the swell offshore is only one to five feet high and occurs only four percent of the time, it is significant because it gains heights of ten to twelve feet nearshore.

Waves tend to straighten the north coast of St. Croix by erosion of headlands and deposition of sand in the bays. Straightening along the north coast of St. Thomas and St. John is opposed by the variations in resistance to erosion of different rock types. Commonly, on the north coasts, waves approach the shore from two principal directions. Short period waves and chop approach from the east and northeast, and, at the same time, long period swells approach from the north. However, in the winter, from November through March, the northern swells are larger than in summer, and they are refracted and redirected more around points and islands.

Around islands like Dutchcap Cay, St. Thomas and Buck Island, St. Croix, the two wave types produce very complicated patterns of crossing sea and swell which can be observed on aerial photographs. Along coasts fronted by partly submerged reefs, waves play a significant role in circulating back reef water. As demonstrated in Christiansted harbor (Nichols, van Eepoel, Grigg, et al 1972), the mass transport of waves breaking over Long Reef drives a harbor-wide circulation (Figure 6.05.3) that flushes most of the harbor water through the entrance in about fourteen hours. Consequently, the response of waves to reefs and nearshore bathymetry is significant in reducing pollution and improving water quality. (Island Resources Foundation. 1977)

Figure 6.05.5 below show current wind speed data from the Christiansted Harbor NOAA tidal station referenced in Section 6.05.b.

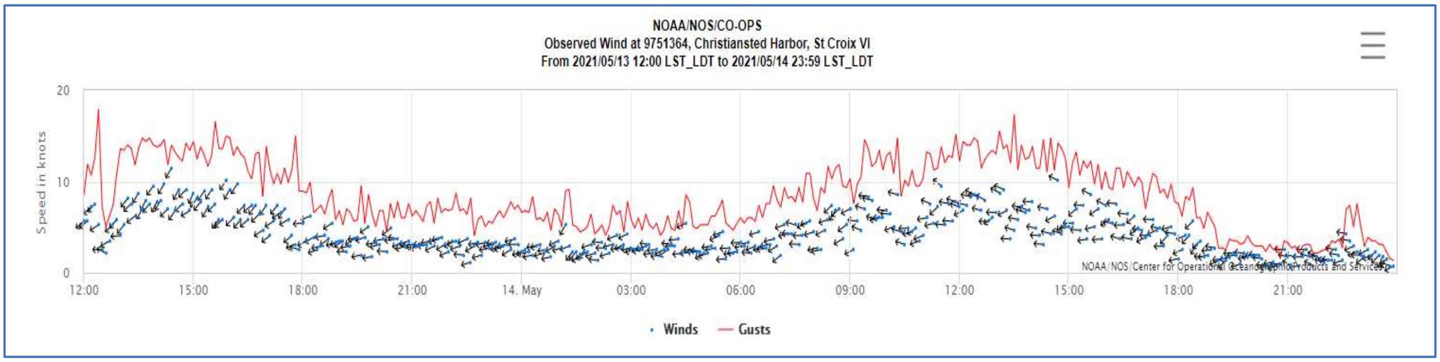

Table 6.05.2 – Observed Wind in Christiansted, St. Croix

d) Marine Water Quality

The project site has two distinct waterbodies in direct vicinity. Altoona Lagoon, to the east, is classified as Class B water while the Caribbean Sea, to the west, is classified as Class C waters. For VI DPNR identification purposes, the referenced section of the Caribbean Sea is indicated as Christiansted Harbor, east.

As specified in the Amended V.I. Water Quality Standards of 12VIRR186, Class B waters have a designated use of propagation of desirable species of wildlife and aquatic life and primarily contact recreation such as swimming, fishing, etc. Water quality criteria include dissolved oxygen not less than 5.5 mg/l, exception if cause is natural forces. The pH must not vary by more than 0.1 pH unit from ambient, and at no time may the pH be less than 7.0 or greater than 8.3. Bacteria (enterococci) cannot exceed 30 CFU/100ml (30-day geometric mean), turbidity readings cannot exceed 3 NTUs, and clarity may not exceed a level where a Secchi disc cannot be visible at a minimum depth of one meter.

Class C waters designated use only vary in regard to industrial supplies, shipping, and navigation. Water quality criteria include dissolved oxygen not less than 5.0 mg/l, exception if cause is natural forces. The pH must not vary by more than 0.1 pH unit from ambient, and at no time may the pH be less than 6.7 or greater than 8.5. The following thresholds are equal to Class B waters: Bacteria (enterococci) cannot exceed 30 CFU/100ml (30-day geometric mean), turbidity readings cannot exceed 3 NTUs, and clarity may not exceed a level where a Secchi disc cannot be visible at a minimum depth of one meter.

VI DPNR performs routine water quality measurements at the following Water Quality Monitoring Stations:

Waterbody	Location	Sample Station Number
VI-STC-28	Altona Lagoon	None
VI-STC-29	Christiansted Harbor, east	STC-39, STC -1

According to VI DPNR's 2018 Integrated Report (IR), which entails CWA Section 305(b) water status report and the CWA 303(d) list, the VI-STC-28 waterbody, Altona Lagoon, shows no available water quality data and therefore, the status of the water quality at the site is Unknown.

The referenced VI DPNR report lists the Christiansted Harbor, east as impaired for pH and turbidity.

Impact of the Proposed Project

The applicant has carefully considered operations onsite and how oceanography could affect them. Since proposed use will remain the same as existing use, and all infrastructure is designed to withstand possible weather conditions, there are no concerns that would affect the current design of the project. Existing operations has been setup carefully to control stormwater runoff from the site, and direct all of it to regulated and controlled discharge points. Proposed operations will do the same, and control turbidity and sediment plumes with silt fencings and turbidity curtains.

A stringent sedimentation control plan will be implemented and monitored during the life of the project as well as operations.

6.06 MARINE RESOURCES AND HABITAT ASSESSMENT

Altona Lagoon is connected to the sea by a small channel located just east of the Gallows Bay marina. This Lagoon is fringed by healthy mangroves, providing significant habitat for birds and mangrove oysters; however, drainage and circulation for the lagoon is poor as a result of frequent obstructions in this narrow channel. Altona Beach, the filled land adjacent to the lagoon, has been partially developed for recreation; however, it does not receive heavy use except for special holidays and large scale gatherings (Dept. of Commerce, 1979).

Altona Lagoon is home to a prominent mangrove system, primarily red mangrove (*Rhizophora mangle*) which have a well-developed permanently submerged prop-root system that provides potential nursery habitat (Tobias, 1996). Many of the mangroves of St. Croix are associated with salt ponds because of the lack of permanent rivers and the high evaporation rate relative to rainfall. A well-developed mangrove forest also fringes the shoreline of Salt River (Tetra Tech 1992).

Altona Lagoon is an enclosed mangrove lagoon on the northeast coast of St Croix. Formerly an open estuary, the gradual deposition of calcium carbonate sands of biogenic origin over geologic time have formed a baymouth bar to the north, connecting rocky headlands and separating the lagoon from the Caribbean Sea. The lagoon is connected to the Christiansted Harbor back reef area by a single narrow channel <10 m wide. To provide ingress and egress to Fort Louis Augusta and beaches to the north, the Department 6f Public Works installed three 1.8 m diameter culverts at the Altona Lagoon channel entrance into Christiansted Harbor and added a paved road. Sand buildup in the three culverts further restricts water exchange in Altona Lagoon. Maximum depth of the lagoon is 3.5 m. Red mangroves cover the entire shoreline of the lagoon.

The lagoon has been impacted by past dredge and fill activities in Christiansted Harbor. Previously open to Christiansted Harbor, the mangrove-lined western border of Altona Lagoon was filled with dredge spoil to create fast land in the early 1960's. Development on adjacent properties includes a moderately traveled dirt road on the northern edge of the lagoon, a hotel (The Buccaneer Hotel) and golf course to the east of the lagoon, and a public boat access facility on the western edge of the lagoon (adjacent to the channel entrance). Recreational fishing is conducted in Altona Lagoon, Altona Lagoon channel and the shoreline where the channel enters Christiansted Harbor (Tobias, 1996).

Residential developments are found in the upland watershed which is comprised of approximately 62 hectares (BCRE/ CH2M Hill, 1979).

Based on aerial photographs. Altona Lagoon is approximately 37 hectares in size. A continuous band of live red mangroves fringe the 4,910 linear meters of shoreline. Due to its more sheltered location, hurricane impacts were not as severe as more exposed locales.

Site surveys performed by Tobias, et. al in 1996 show that out of a total of 12,405 individuals caught in traps in Altona Lagoon, representing 22 species and 14 families, the family Gerridae had the highest abundance (93.7%), represented by three species, *Gerres emereus*, *Eucinostomus jonesi* and *Eucinostomus argenteus*. The family Lutjanidae was second in family abundance (2.8%), represented by five species. *Lutjannis apodus* represented 95.1% of the Lutjanids. Pomadasyidae was third in family abundance (2.6%), represented by two species and all other families each had a relative abundance of <0.3%.

While fish abundance was noted in Altona Lagoon, larval recruitment into Altona Lagoon is likely less than Salt River, another mangrove ecosystem on St. Croix, due to the poor exchange of water through the narrow entrance channel and the greater distance the lagoon entrance is from the marine ecosystems inhabited by adult fish. The abundance of juvenile fishes in trap and visual transects in Altona Lagoon supports the hypothesis that the fringing red mangrove prop root community serves as important nursery habitat (Tobias, 1996).

Immediate and long-term threats to the existing nursery habitat in Salt River and Altona Lagoon include non-point source and point source pollution, coastal development, permitted water-dependent activities, land-based recreational activities and natural disasters. The upland watersheds of Salt River and Altona Lagoon are primarily in the second tier of the Coastal Zone Management system, where development guidelines are less stringent than those in the first tier. The improper installation of erosion and sedimentation control features or the lack thereof during construction, continues to allow vast quantities of terrestrial sediments to enter the marine environment during major rainfall events.

Heavy rainfall events saturate soils and allow septic tank leachate to flow into inshore waters. Typically, public sewer collection systems are stressed at this time and also have the potential to overflow into coastal embayments (Tobias, 1996).

Over the years, NOAA and DPNR have established Christiansted as an Area of Particular Concern (APC). Figure 6.06.1 below depicts APCs of St. Croix, including the Christiansted area (#8).

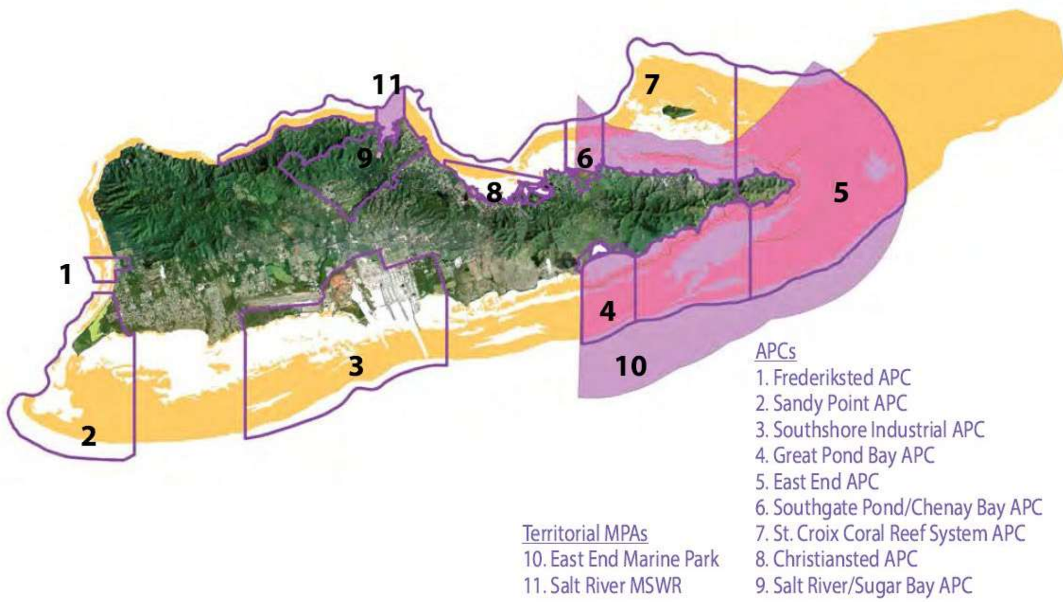

Figure 6.06.1 – Map of Area of Particular Concern (APC, purple outline) and Territorial MPAs (solid purple) of St. Croix. Brown shading represents shallow (<35 m) hard bottom substrate. MSWR = Marine Sanctuary and Wildlife Reserve (NOAA Technical Memorandum NOS NCCOS 187, October 2014)

There are several marine species that inhabit Altona Lagoon. These species are illustrated in the Environmental Sensitivity Index Map below (Figure 6.06.1). A portion of this map, VI-2, has been enlarged to easily identify the project site and the potentially affected species within that area.

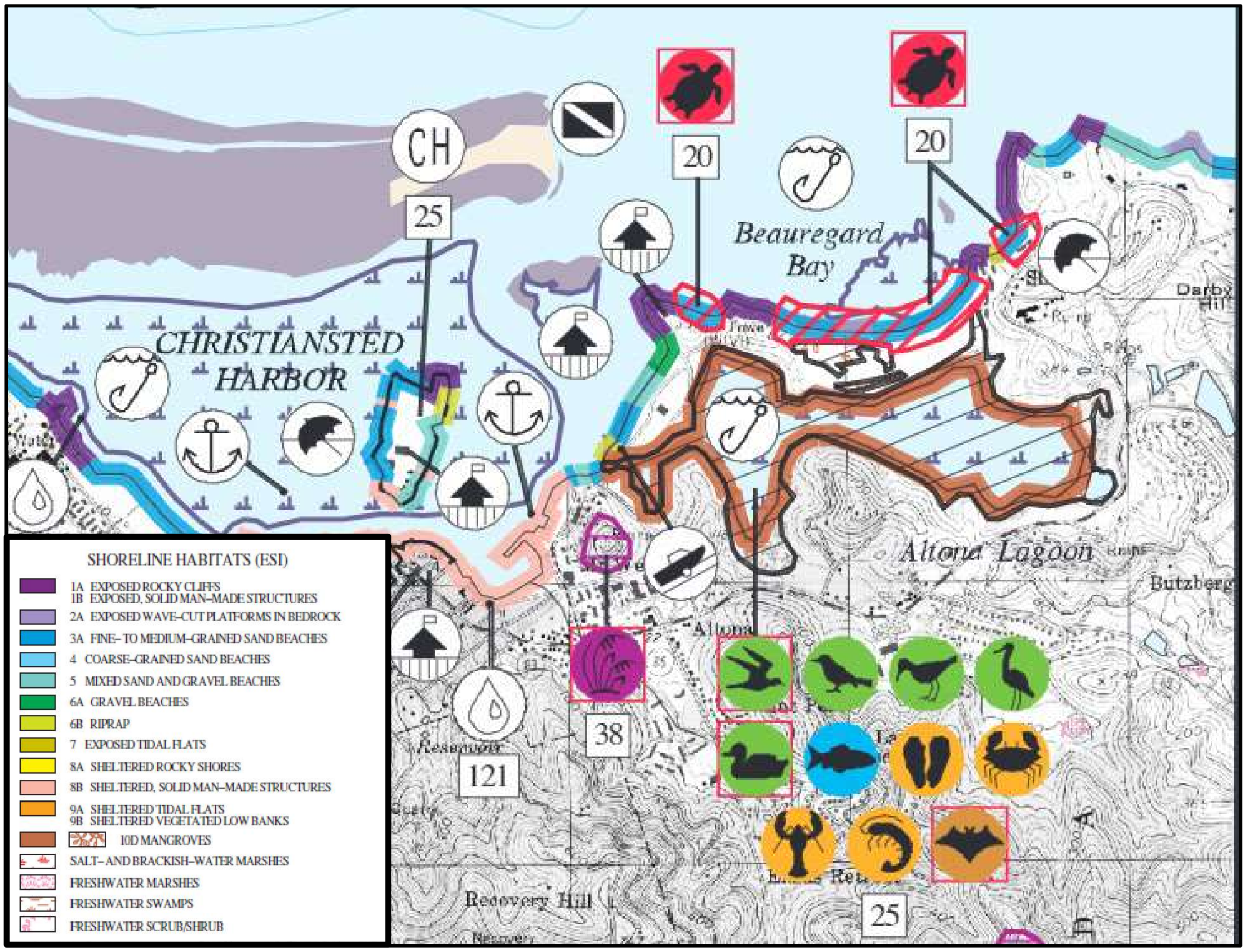

Figure 6.06.2 – Portion of Environmental Sensitivity Index Map VI-2, St. Croix, USVI.

Bird species within Altona Lagoon include the blue-winged teal, brown pelican, gulls, least tern, magnificent migrants, royal tern, shorebirds, terns, wading birds, white-cheeked pintail, and Wilson's plover. Of these, the brown pelican, least tern, and the white-cheeked pintail are listed as endangered on the state (USVI) list and the brown pelican is listed on both the state and federal (U.S.) list. Concentration estimates which would indicate the abundance of the referenced species is not available.

Fish species include the common snook, great barracuda, grunts, jacks, mojarras, mullet, nursery fish, and snappers. None of these species are classified as threatened nor endangered. Invertebrate species include bivalves, blue crabs, Caribbean spiny lobster, and southern pink shrimp. None of these species are classified as threatened nor endangered. While surveys have been performed in previous years (see Tobias, 1996), updated concentration estimates are not available.

It should be noted that the Environmental Sensitivity Index Map does not indicate the presence of sea turtles in the vicinity of the project area. However, the U.S. Fish & Wildlife Information for Planning and Consultation (IPaC) website tool indicates that the hawksbill sea turtle (*Eretmochelys imbricata*) and the leatherback sea turtle (*Dermochelys coriacea*) have been spotted swimming in the waters directly adjacent to the project area. These species are listed as endangered on both the state and federal lists. In addition, IPaC indicates that the West Indian Manatee (*Trichechus manatus*), a threatened species, has been found in the waters near the project site as well (Conservation Data Center, 2010).

The wetland is comprised of basically four general areas; (i) the main lagoon, which is said to vary in depth from 1-5 feet, (ii) a small area of open water in the southeastern corner, separated from the main lagoon by an earthen dyke, (iii) small mudflats, and (iv) a riparian forest. Fresh water enters the lagoon by way of several guts, and as sheet flow (un-channeled surface runoff) from the surrounding hills. The riparian forest varies in width from approximately 20-60 feet, with greater depths along guts. The riparian forest is dominated by red, white, and black mangroves, though seaside mahoe, sea grape, pink poui, almond, and button mangrove are dispersed throughout. There is a species and height gradation in most of the areas of the riparian forest.

Red mangroves dominate the inner fringe (on the lagoon side), while black and white mangroves are found mainly on the outer edge of the stand. The height of the trees in the riparian forest varies from approximately 10 feet along the inner edge on the northern side to 30-40 feet in the south-east corner (near the Buccaneer Hotel). The submerged vegetation includes Turtle Grass (*Thalassia testudinum*), Manatee Grass (*Halodule wrightii*), Eel Grass (*Syringodium filiforme*), and green algae. Associated wetland grasses found at the site are primarily Sporobulus, Batis Maritima, Sesuvium, and Ipomea (Conservation Data Center, 2010).

A review of the 2002 NOAA Benthic Habitat Maps (Figure 6.06.2 below) shows the western shoreline habitat is comprised of reef/colonized bedrock and seagrass (70-90% coverage) in the zone identified as Lagoon. The habitat to the east of the bridge is comprised of mangroves and seagrass (70-90%) within the Lagoon and Shoreline Intertidal zones.

This project does not anticipate any displacement, habitat reduction, nor decimation of any aquatic organisms due to demolition or construction activities to be performed. It is anticipated that organism habitat and lagoon flushing will ultimately be increased due to a smaller footprint of the supporting steel piles compared to the existing box culvert as well as increased passable cross-sectional area.

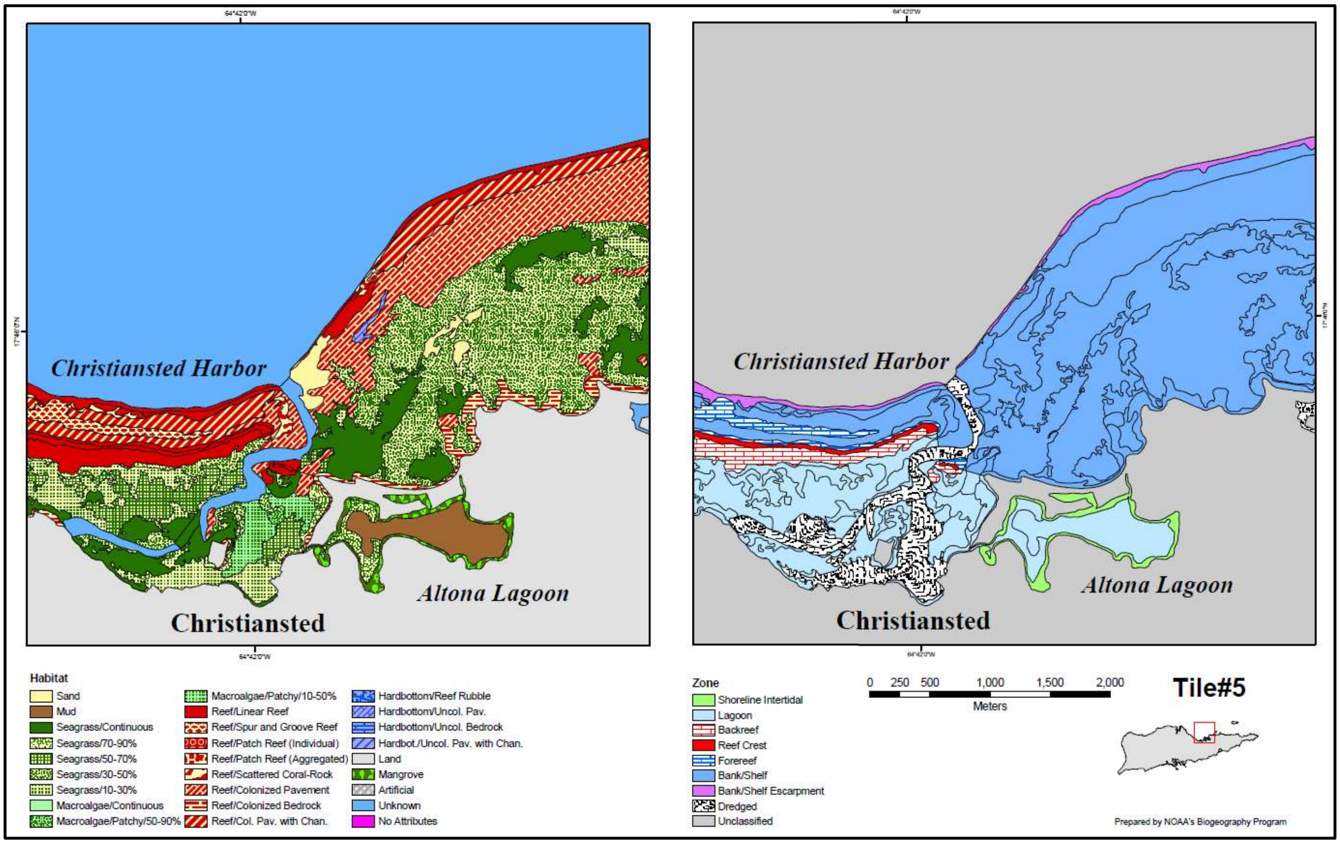

Figure 6.06.3 – 2002 NOAA Benthic Habitat Maps, Christiansted Harbor, St. Croix, USVI.

It should be noted that Altona Lagoon is one of only seven bioluminescent bays in the Caribbean, two of which are in St. Croix (St. Croix, Wikipedia). Altona Lagoon inhabits the micro-organism dinoflagellate (*Pyrodinium bahamense*) which creates the illuminating effect.

6.07 TERRESTRIAL RESOURCES

As seen in Figure 6.06.2, the only terrestrial animal of particular sensitivity noted in the project vicinity is the fisherman bat. This species is indicated as endangered on the state list.

In addition, an assessment was performed at the project site by Horsley Witten's Senior Ecologist which indicates red mangrove plants in three separate locations on the east side of the existing bridge. It is noted that one of the trees may need to be removed to complete work but anticipates simply pruning may suffice. Any issues concerning the presence of this or any other species that arise during project activities will be brought to the attention of VIDPNR Fish & Wildlife Division as well as USFWS.

The project site is mainly a bridge and roadway for transportation uses. Besides the above-mentioned mangroves in the area, the remaining land has already been altered from its natural state to create the current infrastructure.

Impact of the Proposed Project

VIP will minimize the footprint of work to the greatest extent possible and is not expected to extend farther than 10 feet beyond the proposed temporary access road, existing bridge, culverts, and road shoulder.

The site will see no expansion beyond the existing footprint. As compliance with both stormwater and air pollution permits will be ensured throughout the life of the project, there are no anticipated negative impacts to these species or their habitat, neither in the nearshore waters nor on land.

6.08 WETLANDS

The U.S. Army Corps of Engineers defines wetlands as "those areas that are periodically inundated or saturated by surface or groundwater at a frequency and duration sufficient to support and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, bogs, marshes and similar areas." (U.S. Army Corps of Engineers (ACOE), 1986).

While the Altona Lagoon exhibits wetland features at its fringes and there are wetland areas adjacent to the main lagoon body, the lagoon is not defined as wetlands by ACOE definition.

Due to the in-water work required as part of this project, a CZM federal consistency determination and ACOE 404 dredging permit has been applied for as a joint application.

6.09 RARE AND ENDANGERED SPECIES

Marine and terrestrial endangered species are outlined in Sections 6.06 and 6.07. They include the brown pelican (state and federal), least tern (state), the white-cheeked pintail (state), fisherman bat (state), hawksbill sea turtle (state and federal), and the leatherback sea turtle (state and federal). In addition, the West Indian Manatee is a threatened species within the project area.

Red Mangroves are in Least Concern (LC) status under Lower Risk on the ESA list, and it is anticipated that only one red mangrove plant may require pruning as part of the project. Any pruning required will be done only after obtaining a mangrove pruning permit from DPNR-DFW.

The construction and use of the roadway and related infrastructure will have no anticipated impact on rare or endangered species. As such, the permitting of this project will not displace any rare, endangered, or threatened species from any critical habitat.

VIP will minimize the footprint of work to the greatest extent possible and is not expected to extend farther than 10 feet beyond the temporary access road, road shoulder and culvert location. This will ensure minimal to no impact to the nearshore and any potential species in the area.

6.10 AIR QUALITY

No air quality issues are anticipated for this project. A minimum of soil exposure and earth movement will occur at the site by repairing and replacing the roadway. Stockpiling will be protected and kept to a minimum. If work is done during particularly dry and/or windy conditions, a water truck can be used to wet down the area to prevent fugitive dust from leaving the site. Dust control measures to ensure no air quality issues arise are outlined in the Storm Water Pollution Plan for this project.

7.00 IMPACT OF THE PROPOSED PROJECT ON THE HUMAN ENVIRONMENT

7.01 LAND AND WATER USE PLANS

The property is a Right of Way (ROW) zoned plot, designated for transportation, which permits the rehabilitation project proposed for this site.

The project will not change the current use of the property as an ROW.

7.02 VISUAL IMPACTS

Currently, the guardrails are aging and in poor condition, the concrete sidewalks are cracking, and the roadway is degrading due to the severe undermining of the box culverts as a result of the 2017 Hurricane Maria.

Along with the new sidewalks, guardrails and handrails greatly improving driver and pedestrian safety in this area, the proposed pre-cast bridge structure will provide visual assurance for travelers while driving or walking. The new roadway will improve contour and quality in this section. The project will not change the visual character specific to the Altona Lagoon area.

7.03 IMPACTS ON PUBLIC SERVICES AND UTILITIES

Water

As noted in Part 6.04, the project will not use nor affect significant amounts of water, either from public supply or otherwise. The project will have no negative impact on the availability of freshwater resources.

Sewage Treatment and Disposal

There will be no flow to the municipal sewerage system or required sewer disposal resulting from this project's implementation. As previously referenced, project sewage management will be limited to maintaining portable restrooms.

Solid Waste Disposal

Domestic solid waste will be managed with onsite waste bins. It will be trucked out by VIP as necessary and disposed of in accordance with solid waste requirements.

Roads, Traffic and Parking

The project will affect traffic across the bridge, to Altona Lagoon Park, as the scope of work is to remove the exiting culverts, replace the bridge, and rehabilitate 175-feet of roadway. The roadway will be shut down during this time and work schedule will be minimized to return the roadway to full use as quickly as possible. To minimize traffic and prevent restriction of access to the Altona Lagoon area, a temporary access road will be installed before the existing culvert bridge is closed off to traffic and will remain in place until the new bridge is functional.

Electricity

Any electric demand to complete the proposed project will be met by portable generators brought to the site during construction. This project does not require any ongoing electric source once completed.

Schools

There are no anticipated adverse effects on the local educational system during project implementation. Ultimately, there will be no effect to the schools in the long term.

Fire and Police Protection

Any nighttime work will provide adequate lighting for worker safety. In the case there is an emergency, Fire Chief Herbet L. Canegata Fire Station is located two miles from the project site and the Virgin Islands Police Department is located less than two miles from the project site. On-site there is a large parking lot, southeast of the bridge, for any emergency vehicles, if needed.

Public Health

The project will not have any adverse effects on public health, nor increase the use of public health facilities.

7.04 SOCIAL IMPACTS

There are no anticipated negative social impacts to the area. This project will address damages caused in 2017 and make this structure and roadway safer and more efficient for vehicle and pedestrian transport and access to Altona Lagoona Park. Improved bridge amenities will ensure safe travel by pedestrians and consistent travel through the area and beaches, which are used consistently for recreational purposes.

7.05 ECONOMIC IMPACTS

There are no anticipated economic impacts.

7.06 IMPACTS ON HISTORICAL AND ARCHAEOLOGICAL RESOURCES

This project site shows no indication of historical resources or any historical structures. A clearance was provided to the USDOT by DPNR-SHPO for this and 14 other project sites as part of this overall project scope and found that no impact to historical resources was anticipated, based on the proposed scope of work and rehabilitation methods.

7.07 RECREATIONAL USE

The Altona Lagoon Park and surrounding area is a popular spot for recreational activities, including fishing, swimming, camping and picnicking. The project is within 50 feet of a boat ramp and recreational fishing occurs in Altona Lagoon (as seen in Figure 6.06.1) As such, current use will be returned to normal as quickly as possibly minimizing the project timeline to the greatest extent possible.

Once the project is completed, residents and tourists will be more likely to return to using this area for recreation given the improvements made to safety and aesthetics.

7.08 WASTE DISPOSAL

Domestic solid waste will be managed with onsite waste bins. It will be trucked out by VIP as necessary and disposed of in accordance with solid waste requirements.

Chemicals inherent to the asphalt and road construction business will be used daily on site. They will be kept in protected areas and any hydrocarbons will be kept within secondary containment (such as hydraulic or motor oil for machinery).

Any unused or contaminated chemicals or materials, including oily rags or contaminated material, will be disposed of in accordance with waste handing regulations.

The project will have no significant impact on solid waste disposal.

7.09 ACCIDENTAL SPILLS

Spills are not anticipated during construction; however, any spills onsite will be cleaned up immediately. A spill kit will be kept on site during work hours, and any contaminated soil will be put into approved containers for disposal by a licensed waste handler.

7.10 POTENTIAL ADVERSE EFFECTS WHICH CANNOT BE AVOIDED

The project does not involve any potential adverse effects that may not be avoided. The project has been designed to avoid sensitive areas to the greatest extent possible. Potential impacts have been minimized through the development of a stringent sedimentation control plan which will be implemented during construction and during the life of the site operations.

8.00 MITIGATION PLANS

No mitigation plans are needed for this project and operation. If removal of the red mangrove closest to the project site is required, mitigation in the form of replacement or relocation will be proposed and performed after approval by DPNR.

9.00 ALTERNATIVES TO PROPOSED ACTION

If the operation does not move forward, the existing bridge and related infrastructure, as well as the road length, will continue to degrade and create unsafe conditions for drivers and pedestrians. This will eventually inhibit access to Altona Lagoon Park and its recreational facilities altogether.

There is no alternative location option, as the damaged roadway and related infrastructure in this area must be repaired and replaced and there is no other road access to Altona Lagoon Park.

If the damaged culverts remain and only the roadway is rehabilitated, the next large storm event could completely destroy the culverts and cause the bridge to collapse. The funds expended to rehabilitate only the section of roadway would be lost and a much larger sum would be required to replace the entire infrastructure system at that point.

10.00 RELATIONSHIP BETWEEN SHORT & LONG TERM USES OF MAN'S ENVIRONMENT

The infrastructure replacements and reparations proposed in this project will not require any additional resources in the long term nor commit future generations to any uses that were not already in place. Any minor potential impacts in the short term associated with this project are far outweighed by the environmental and economic benefits provided in the long-term to replacing the bridge in its current state and repairing this section of road.

11.00 REFERENCES

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