DEPARTMENT OF PLANNING AND NATURAL RESOURCES DIVISION COASTAL ZONE MANAGEMENT

ENVIRONMENTAL ASSESSMENT REPORT FOR MINOR PROJECTS IN COASTAL WATERS

Instructions for Completing this Report: Applicant must complete this form. Use back of page and/or attach additional sheets if more spaces are needed to complete any response - be sure to give the appropriate question number. If all information is not accurate and complete. the application will be rejected until such deficiencies are corrected.

Section I. Applicant

1. Name, mailing address. email address and telephone number of Applicant.

Coakley Bay Plantation LLLP, David Johnson
P.O. Box 26225, Christiansted VI 00824
djohnson@canebayvi.com
404-814-6418

2. Name, address, email address and telephone number of owner of upland property and of developer (if different from Applicant).

Same as above

Section II. Project Objectives and Description

In this section give a brief description of the proposed development, including all structures on submerged lands, coastal waters or shorelines. The relationship of the development to applicable items below should be explained fully. Attach additional sheets if necessary.

3. Briefly describe what the project is intended to achieve (e.g. private pier for sailboats, etc.)

Design and installation of ocean water intake and brine discharge lines (pipes) for RO system at at Coakley Bay Plantation, LLLP at 14 Estate Coakley Bay, St. Croix, USVI. Pipelines will be used to draw seawater for production of potable water for use at the property, and brine will be discharged back into Coakley Bay.

EXHIBIT

4. Will the development extend into or adjoin any beach or shoreline area? Explain.

The pipe route will be approximately 180ft along the property bordering the shoreline, then routed into Coakley Bay from a shoreline transition point, and run approximately 224ft into Coakley Bay.

5. Will the development maintain. enhance, or conflict with public access to the shoreline and along the coast? Explain.

The proposed pipe path will be buried until into 2 feet of water into the Bay, and from there will be surface laid in the Bay until the end of the proposed pipe route at 6-7 feet deep waters in sand where the bottom nearby rises sharply and becomes a thick seagrass area. This development will require minimal maintenance once installed and will not enhance or conflict with public access to the shoreline and along the coast.

6. Describe the construction methods to be used.

Pipeline will be 3 inch PVC, buried to the shoreline transition point from the existing RO units. Transition to beach line will be by burying and/or riprap protection and stabilization, then buried at beach to 2 feet of water, after which it will be surface laid with weights to 6-7 feet of water and installed in sandy area with weighted intake structure and discharge diffuser unit.

7. Describe procedures to be used in controlling environmental impacts.

Shoreline work will entail silt fencing to contain small amount of trench work. Riprap will control erosion at shoreline transition point, and careful in-water work following Section 404 permit and 401 WQC conditions to prevent impact to marine life during install. Pipeline will be carefully installed by hand through sandy areas and avoid benthic life to prevent damage, destruction or displacement of any species, protected or otherwise.

8. Describe reasonable alternatives to the project. or to its location, which could feasibly attain the basic objectives. and why they were rejected in favor of the ultimate choice.

Continued draw of water from brackish wells (current conditions). This would lead to potential seawater infiltration. Purchasing water from private sellers would be too expensive, and no municipal water is available in the area. Discharge of brine on land, underground or on the shoreline may lead to increased salinity in the aquifer, damage to nearshore area due to poor mixing. Discharge in bay will improve mixing and meet water quality.

Section III. Description of the Existing Environment Without the Project

(Information supplied must be current: if obtained from other studies. give name. year and authorship of publication.)

9. Give a qualitative description of the bottom sediments in the immediate vicinity of the project. State color, odor, and use the following terms to describe grain size: boulders, cobblestones, gravel, coarse sand. muddy sand. mud, beachrock coral rock.

Bottom sediments include sand or sand/rubble bottom with the exception of a 12-foot-long section of primarily turtle grass growing over beachrock.

The depth at the end of the proposed pipe route is 6-7 feet deep and in sand where the bottom nearby rises sharply and becomes a thick seagrass area.

No specific odor was identified and the grain size includes coarse sand and beachrock coral rock.

10. Check the boxes which best describe the types of coastal submarine habitats existing within the immediate project area. and within 1/4 mile (1,320 ft.) from the project boundaries:

- ☒ corals, including soft corals
- ☒ seagrass or algal beds
- ☒ hard, rocky bottom
- ☒ sand bottom
- ☐ muddy bottom
- ☐ mangroves
- ☐ salt ponds
- ☒ rocky shore
- ☒ sand beach
- ☐ cobble beach
- ☐ developed or urbanized waterfront
- ☐ other (describe)

0001

Section IV. Environmental Effects

11. List any anticipated adverse environmental effects resulting from implementation of this project and any measures that will be taken to minimize these.

Potential sediment runoff from shoreline trenching. Will be protected with silt fencing around trench area.

Potential plume and sediment suspension during pipeline install at shoreline transition and in-water work.

Mitigated through careful hand placement during calm weather and Section 404/401WQC Permits. Potential damage from structure from extreme weather.

Mitigated through weights and burying of pipeline over time. Potential WQ issues from brine, mitigated through diffuser discharge structure and TPDES Permit

Section V. Preparation of EAR and Person(s) Consulted

12. Person(s). firm or agency preparing the EAR, by contract or other authorization:

Benjamin Keularts		
Name (Print)	(Signature)	Date
9139 Castle Coakley Bay 7 Suite 1		00820
Address		Zip
benjamin.keularts@tysamtech.com		(340) 514-1888
Email Address		Telephone Number

13. Person(s) or agencies consulted:

Seven Seas Ltd. - Henry Tonnemacher, Marine Survey Specialist

VITEST Engineers - Donald S. Law, P.E., Civil Engineer and Geologist

MINOR LAND&WATER PERMIT APPLICATION

Environmental Assessment Report

Applicant: Coakley Plantation, LLLP
Project: Ocean Water Intake and Brine Discharge Pipeline Project
14 Coakley Bay

APRIL 2023

Prepared by: Tysam Tech, LLC

Tysam Tech, LLC

INTENTIONALLY LEFT BLANK

Table of Contents

Table of Figures

1.00 NAME AND ADDRESS OF APPLICANT

COAKLEY PLANTATION, LLLP

Mailing Address:
P.O. Box 26225
Christiansted, VI 00824

Physical Address:
14 Estate Coakley Bay
Christiansted, VI 00820

2.00 LOCATION OF PROJECT

The project is located at the following physical address:

14 Estate Coakley Bay
Christiansted, VI 00820

The Coakley Bay Ocean Water Intake and Brine Discharge Pipeline Project is located in St. Croix, on the shoreline of Coakley Bay and Carden Bay. The project site is located in Estate Coakley Bay at 17°45'32.5"N 64°38'29.4"W, along Route 82. The Location and Agency Review Map is presented in Figure 2.00.1 which establishes the areas of Coastal Zone Management (CZM) first tier jurisdiction (red line).

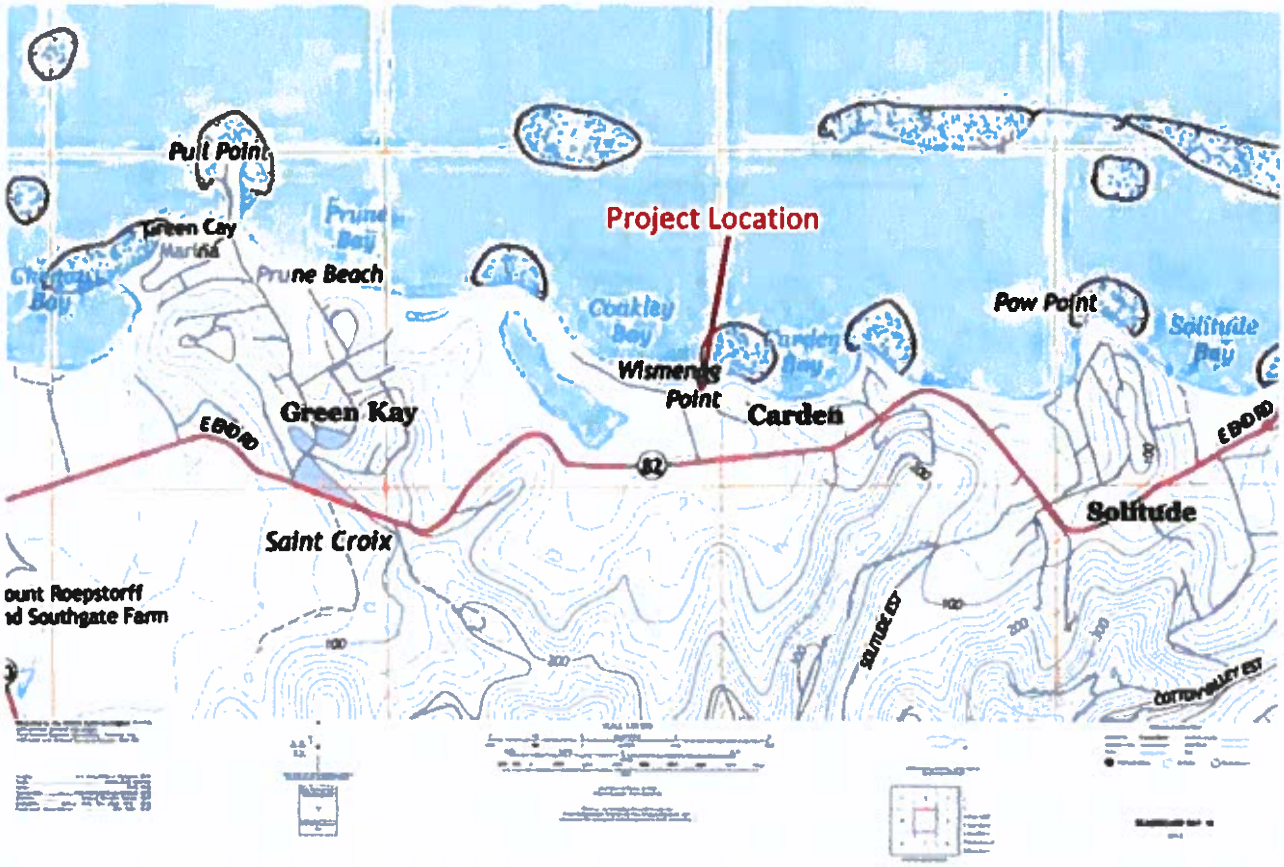

Figure 2.00.1 – Location and Agency Review Map (USGS Quadrangle Map, Beauregard Bay, 2013)

Figure 2.00.2 –Vicinity Map Showing Location of Project (Google Maps, Basemap: USGS, 2006)

3.00 ABSTRACT

The proposed project area is located within 14 Estate Coakley Bay, a gated private residence located in Estate Coakley Bay along the shoreline of Carden Bay and Coakley Bay. The project seeks to construct an ocean water intake and brine discharge pipeline off the shoreline of the property at 14 Estate Coakley Bay that will yield a consistent 200 gallons per minute (GPM) and provide up to 115,000 gallons per day (GPD) of potable water, and result in a discharge of a maximum of 172,500 GPD of brine.

A pipeline route 224 feet into Coakley Bay from the shoreline has been determined from a benthic survey used to identify the presence/absence of seagrasses, coral, hard-bottom, benthic communities, and fisheries resources that may be impacted by the pipeline installation. The 2022 investigation involved specifically looking for staghorn (*Acropora cervicornis*) and elkhorn (*Acropora palmata*) corals and the five EPA coral species listed as threatened in the Caribbean in 2014 which includes *Dendrogyra cylindrus*, *Orbicella annularis*, *Orbicella faveolata*, *Orbicella franksi*, and *Mycetophyllia ferox* (NOAA, 2014). In addition, the invasive seagrass Halophila stipulacea was also looked for. This same area was surveyed in May and June of 2017 as part of a much larger surveyed area. None of the above identified species were observed at that time. Site visits in the same area on October 7 and 18, 2022 also found none of the above-named species.

Anticipated start date of this project is July of 2023. The proposed pipeline path follows a mostly rubble and sandy route for the first 110 feet, navigates over a small section of hardbottom in approximately 3 feet of water, then routes over sandy bottom with scattered rubble and seagrass. The final location for discharge structure as well as intake structure are in sandy areas surrounded by thicker seagrass vegetation. The depth at the end of the proposed pipeline route is approximately 6-7 feet deep and in sand where the bottom nearby rises sharply and becomes a thick seagrass area. The project approach will be to develop the pipeline route and installation according to safe and environmentally protective methods and requirements, ensuring during construction that any impact to nearshore waters or air quality is minimized. Long-term design of the entire development will ensure the lines installed in the bay will not only provide the desired water source flow rate, but also be resilient for long-term use, normal coastal and extreme weather conditions, and prevent any negative environmental impact to the shoreline or Coakley Bay waters.

A project plan layout as well as a schedule of construction is provided with this document.

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.
- Nearshore water quality is protected.

4.00 STATEMENT OF OBJECTIVES SOUGHT BY THE PROPOSED PROJECT

Coakley Plantation, LLLP (CP) intends to shift to a more sustainable and environmentally friendly way of producing water by moving from onsite wells to water draw from the adjacent Coakley Bay. CP will in turn be able to expand upon the existing capacity of water generated for household consumption for the gated private residence at Estate Coakley Bay, increasing the yield of water intake to provide 115,000 gallons of potable water per day.

5.00 DESCRIPTION OF PROJECT

5.01 SUMMARY OF PROPOSED ACTIVITY

a) Purpose of Project

The purpose of the project is to increase yield of water intake and supply at No. 14 Estate Coakley Bay via an in-ocean intake design to draw water and transport it to the desalination plant onshore and install an in-ocean discharge structure to limit impact to the coastline. This will also be more sustainable and protective of the existing aquifer as it will reduce potential impacts from seawater encroachment.

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

The project area is adjacent to a somewhat populated shoreline section in northeast St. Croix, along the shoreline abutting Carden Bay and Coakley Bay. An existing condominium housing complex is directly adjacent to the shoreline to the East.

Site slope is between 0-5%. Elevation varies on-site from approximately 0 to 42 feet above sea level.

Due to the close proximity to open water, the clearing of the project site and any new construction for pipeline installation will be controlled and managed so as to not impact the surrounding areas, shoreline or wildlife.

A review of Endangered Species in the area, using the USFWS Information for Planning and Consultation (IPaC) Tool, indicates there are no endangered terrestrial species within the proposed project site but identifies three federal endangered sea turtle species that are known to swim in the offshore waters, approximately 200 feet north of the project area. These species include the following: hawksbill turtle (*Eretmochelys imbricata*), Green Sea Turtle (*Chelonia mydas*) and leatherback turtle (*Dermochelys coriacea*). In addition, the West Indian Manatee (*Trichechus manatus*) has also been found in the offshore waters and are a threatened species.

The permanent BMPs proposed for the site would provide protection of the environment and protection and control of stormwater to ensure no downstream negative impacts to the nearshore or species of wildlife that inhabit them.

4.00 STATEMENT OF OBJECTIVES SOUGHT BY THE PROPOSED PROJECT

Coakley Plantation, LLLP (CP) intends to shift to a more sustainable and environmentally friendly way of producing water by moving from onsite wells to water draw from the adjacent Coakley Bay. CP will in turn be able to expand upon the existing capacity of water generated for household consumption for the gated private residence at Estate Coakley Bay, increasing the yield of water intake to provide 115,000 gallons of potable water per day.

5.00 DESCRIPTION OF PROJECT

5.01 SUMMARY OF PROPOSED ACTIVITY

a) Purpose of Project

The purpose of the project is to increase yield of water intake and supply at No. 14 Estate Coakley Bay via an in-ocean intake design to draw water and transport it to the desalination plant onshore and install an in-ocean discharge structure to limit impact to the coastline. This will also be more sustainable and protective of the existing aquifer as it will reduce potential impacts from seawater encroachment.

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

The project area is adjacent to a somewhat populated shoreline section in northeast St. Croix, along the shoreline abutting Carden Bay and Coakley Bay. An existing condominium housing complex is directly adjacent to the shoreline to the East.

Site slope is between 0-5%. Elevation varies on-site from approximately 0 to 42 feet above sea level.

Due to the close proximity to open water, the clearing of the project site and any new construction for pipeline installation will be controlled and managed so as to not impact the surrounding areas, shoreline or wildlife.

A review of Endangered Species in the area, using the USFWS Information for Planning and Consultation (IPaC) Tool, indicates there are no endangered terrestrial species within the proposed project site but identifies three federal endangered sea turtle species that are known to swim in the offshore waters, approximately 200 feet north of the project area. These species include the following: hawksbill turtle (*Eretmochelys imbricata*), Green Sea Turtle (*Chelonia mydas*) and leatherback turtle (*Dermochelys coriacea*). In addition, the West Indian Manatee (*Trichechus manatus*) has also been found in the offshore waters and are a threatened species.

The permanent BMPs proposed for the site would provide protection of the environment and protection and control of stormwater to ensure no downstream negative impacts to the nearshore or species of wildlife that inhabit them.

In review of the 2020 VI Department of Planning and Natural Resources (VIDPNR) Integrated Report, water quality in the specific waterbody Assessment Unit has been designated as currently "Unknown" due to lack of sampling stations in the area.

A 2022 in-water benthic survey was conducted to identify the presence/absence of seagrasses, coral, hard-bottom, benthic communities, and fisheries resources that may be impacted by the pipeline installation. The 2022 investigation included, but was not limited to, looking for staghorn (*Acropora cervicornis*) and elkhorn (*Acropora palmata*) corals and the five EPA coral species listed as threatened in the Caribbean in 2014 which includes *Dendrogyra cylindrus, Orbicella annularis, Orbicella faveolata, Orbicella franksi*, and *Mycetophyllia ferox* (NOAA, 2014). In addition, the invasive seagrass Halophila stipulacea was also surveyed.

This same area was previously surveyed in May and June of 2017 by the same benthic specialist as part of a much larger surveyed area. None of the above identified species were observed at that time andthe surveys for this project conducted on October 7 and 18, 2022 also found none of the above-named species.

Due to the nature of the project's scope of pipeline installation, there exists potential for sedimentation and erosion during project earth movement activities at the near shoreline. Appropriate protective Best Management Practices (BMPs) will be employed through the entire project timeline in accordance with design standards of the VI Environmental Protection Handbook (VIEPH) (2002). Stormwater will be appropriately managed as discussed in subsequent sections below.

c) *Plans for Topsoil and Site Disturbance Provisions*

Topsoil and site disturbance will be minimized during the construction timeline. The project will focus within the footprint of the proposed pipeline route along the shoreline and into the bay as depicted in the site drawings.

Very little topsoil will be disturbed for this project, and will almost exclusively be done with hand tools and small equipment (e.g. trencher, skid steer). No stockpiles are anticipated to be created. However, silt fencing will still be installed on the downslope of the pipeline trench to protect sediment loss from the site disturbances.

d) *Erosion and Sediment Control Devices to be Implemented*

The following BMPs will be implemented on the site to control runoff and protect natural resources:

Silt Fence – Due to the close proximity to the shoreline, silt fencing shall be used to protect the shoreline and surface water from runoff and sediment loss. These will be implemented before any pipeline trenching begins.

e) *Schedule for Earth Changing Activities & Implementation of Erosion/Sediment Control Measures*

No earth change activities will take place until BMPs are installed at the site.

Erosion and sediment control schedule for the Site Project construction entails the following:

1. Ensure silt fencing and other BMPs are setup before work begins.

2. Trench the shoreline portion of the pipeline, and install pipeline sections immediately at the start of the project. Backfilling of line after plumbing inspection to return grade to normal topography and stabilize the shoreline area.

3. Begin installation of seaward section after shoreline section has been stabilized.

f) Maintenance of Erosion and Sediment Control

Sediment control devices, including silt fencing, berms, swales, sedimentation ponds and outlets, will be inspected routinely and after heavy rainfall events. If defects or damage are noted in the measures, the defect or damage will be immediately repaired. Measures proven to be inadequate to control erosion will result in the optimization of the design and the addition of mitigations as necessary.

Worn, torn or otherwise damaged silt fencing will be fixed or replaced.

The site will be cleaned on a daily basis of litter, debris and materials such as paper, wood, concrete, etc.

g) Stormwater Management

Management of stormwater for the duration of the project will be focused on minimizing discharge of contaminated stormwater from the site boundaries, and prevention of erosion of project areas through controlled release from discharge points.

Project activities will, during construction, minimize the premature concentration of stormwater flow by controlling trenching and minimizing exposed soils.

h) Maintenance Schedule of Stormwater Facilities

Sediment control devices, including silt fencing, berms, swales, catchment basins and outlets, will be inspected every workday before work begins and after any heavy rainfall event. If defects or damage are noted in the measures, the defect or damage will be immediately reported and repaired. If the measures prove to be inadequate to control erosion, changes will be made to the design and additional measures will be added as necessary.

Worn, torn or otherwise damaged silt fencing will be fixed or replaced. The site will be cleaned on a daily basis of litter, debris and materials such as paper, wood, concrete, etc.

i) Sewage Disposal

Project sewage management during construction will be implemented to maintain portable restrooms on-site, and ensuring they are emptied by a qualified waste management company at an appropriate frequency to minimize spills or discharges at the site.

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, and the predominant winds are usually from the east- northeast and east (IRF, 1977). These trade winds vary seasonally and are broadly divided into 4 seasonal modes: 1) December to February; 2) March to May; 3) June to August; and 4) September to November. Below are the characteristics of these modes as taken from Marine Environments of the Virgin Islands Technical Supplement No. 1 (IRF, 1977), and based on U.S. Naval Oceanographic Office data.

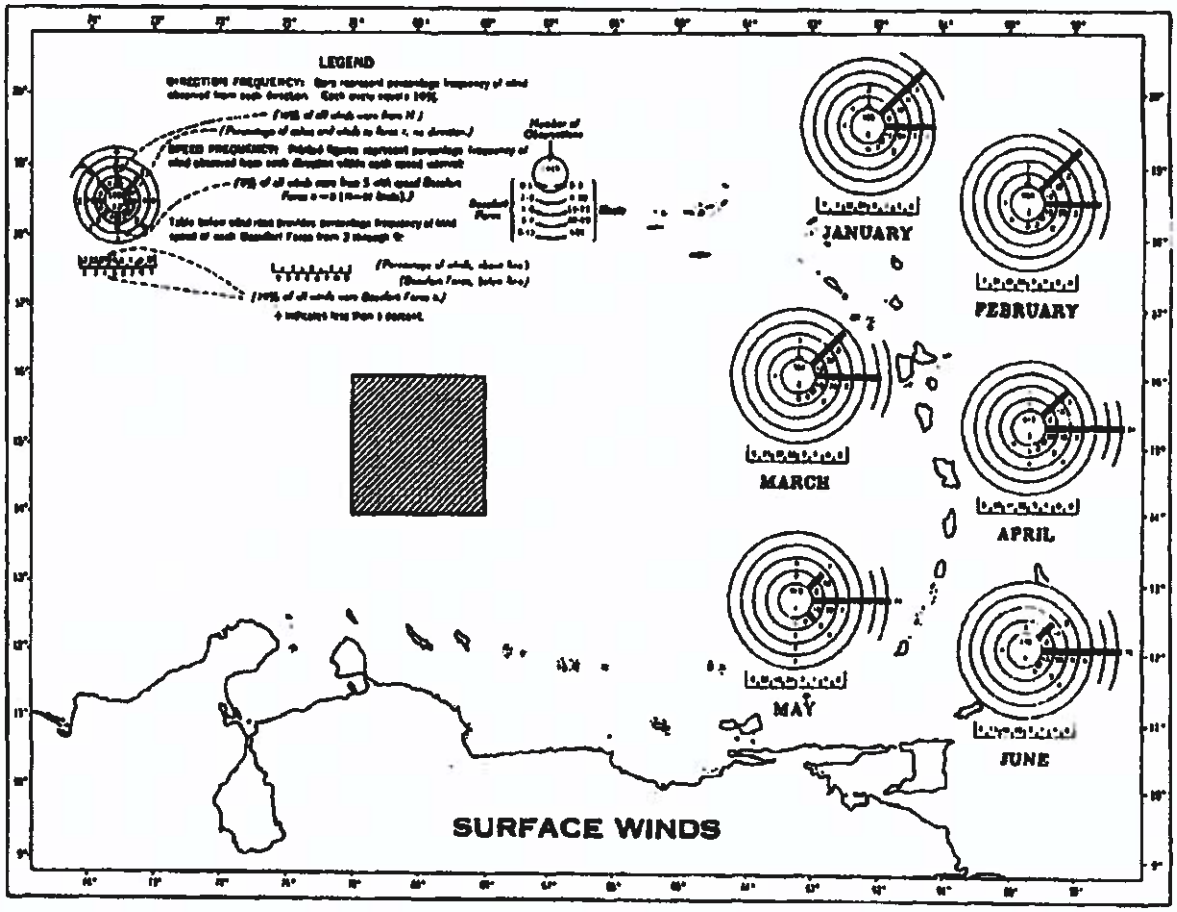

Figure 6.01.1 –Wind Direction and Speed Frequency, Central Caribbean, January - June.

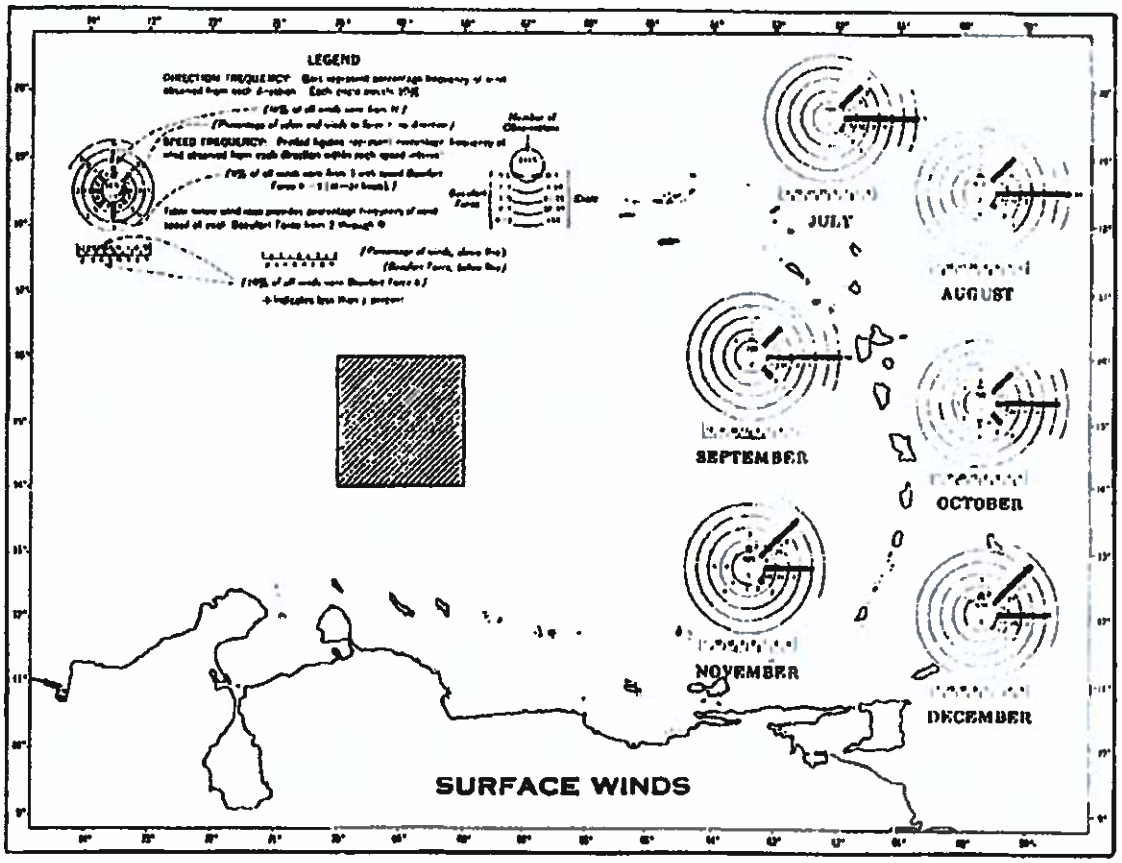

Figure 6.01.2 –Wind Direction and Speed Frequency, Central Caribbean, July - December.

December – February

During the winter, the trade winds reach a maximum and blow with great regularity from the east-northeast. Wind speeds range from eleven to twenty-one knots about sixty percent of the time in January. This is a period when the Bermuda High is intensified with only nominal compensation pressure changes in the Equatorial Trough. 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 twenty knots only thirteen percent of the time in April. The change in speed and direction is the result of a decrease of the Equatorial Trough.

June – August

Trade winds reach a secondary maximum during this period and blow predominantly from the east to east-southeast. Speeds exceed twenty knots 23% 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 7% of the winds exceed twenty knots in October. The low speeds result from a decrease in the Equatorial Trough. During this period, especially during late August through mid-October, the normal trade wind regime is often broken down by easterly waves, tropical storms and hurricanes.

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 and can range in strength from causing little to no damage, to destroying. 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.

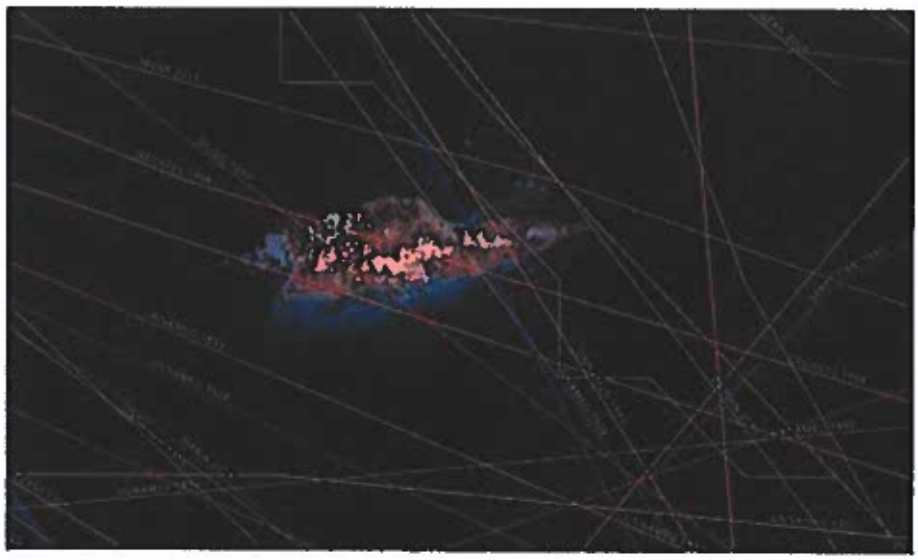

Figure 6.01.3 – Historic Tracks of Hurricanes and Tropical Storms for St. Croix

Climate

The climate of St. Croix, as well as that of the 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 Fort. Climate data from this station is found below in Table 6.01.1.

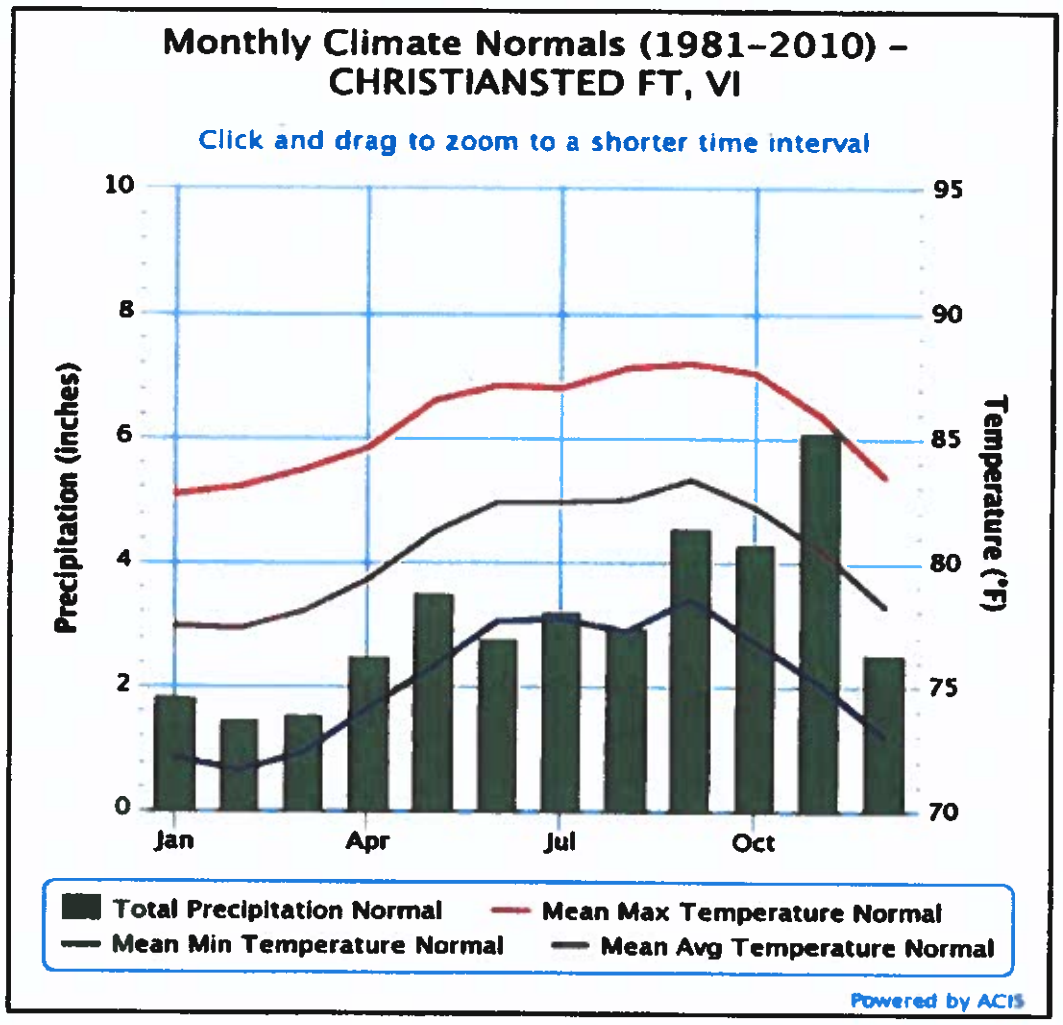

Table 6.01.1 –Average Temperatures in Christiansted, St. Croix

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.

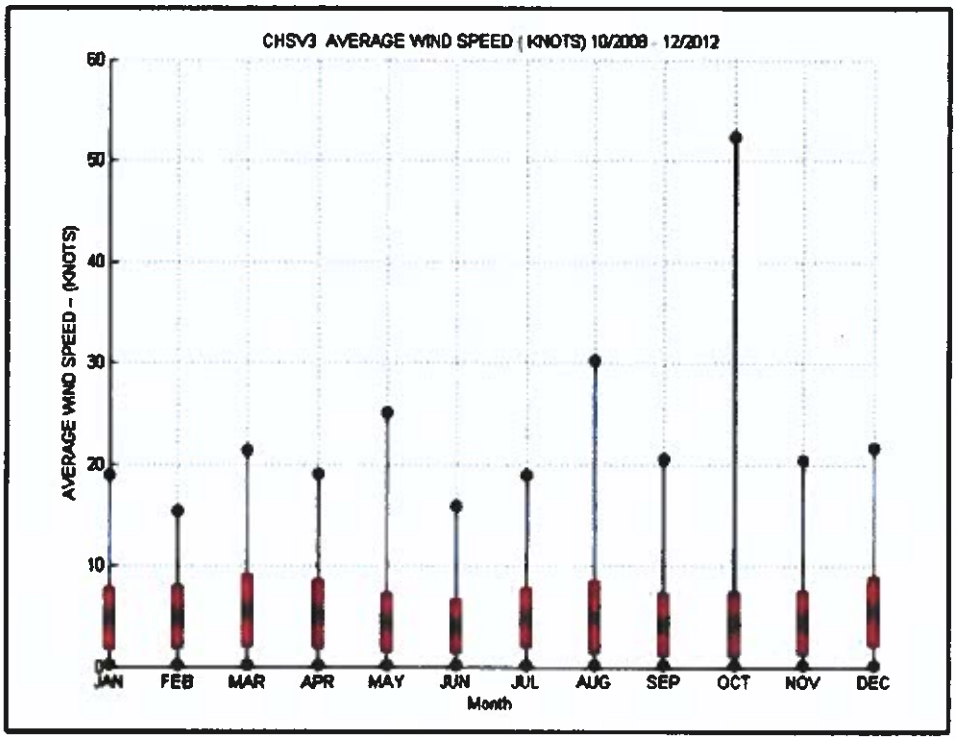

Table 6.01.2 – Average Wind Speed, St. Croix

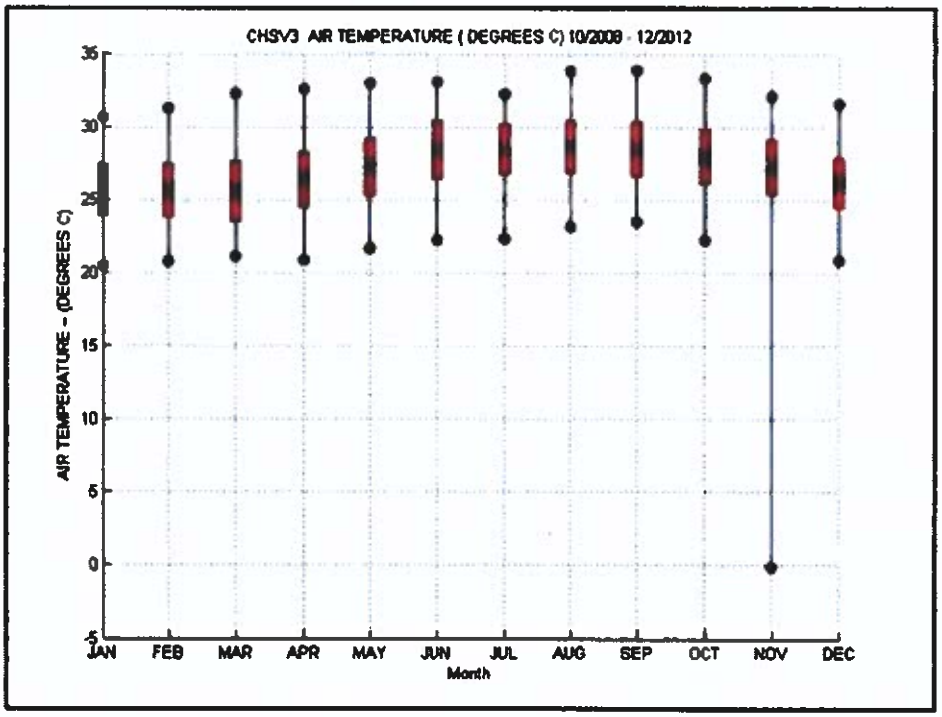

Table 6.01.3 – Average Air Temperature, St. Croix

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 proposed pipeline has been designed to have structural stability to withstand wave stresses and current forces on the intake head and outfall structure during adverse sea conditions, and according to codes outlined in Title 29 V.I.C. Chapter 21. It is not anticipated that there will be any impact from climate or weather on the proposed design, neither from routine events nor extreme weather events such as hurricanes. As the pipeline profile will follow the sea floor contours, and the outfall and intake structures will not extend farther than typical natural contour bumps, no provisions for the structural design are needed to ensure safe navigation of seafaring vessels.

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.

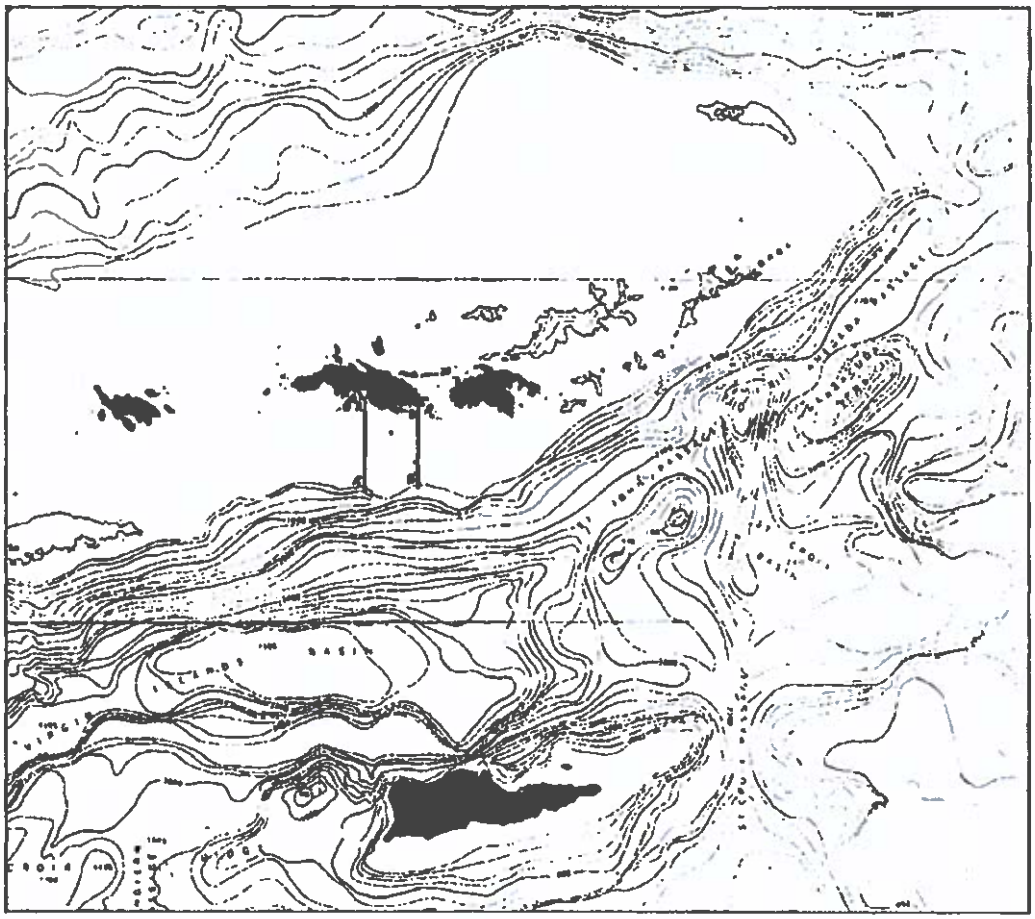

Figure 6.02.1 – Bathymetry of USVI basins and plateaus. From van Eepoel, et al, 1971.

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.

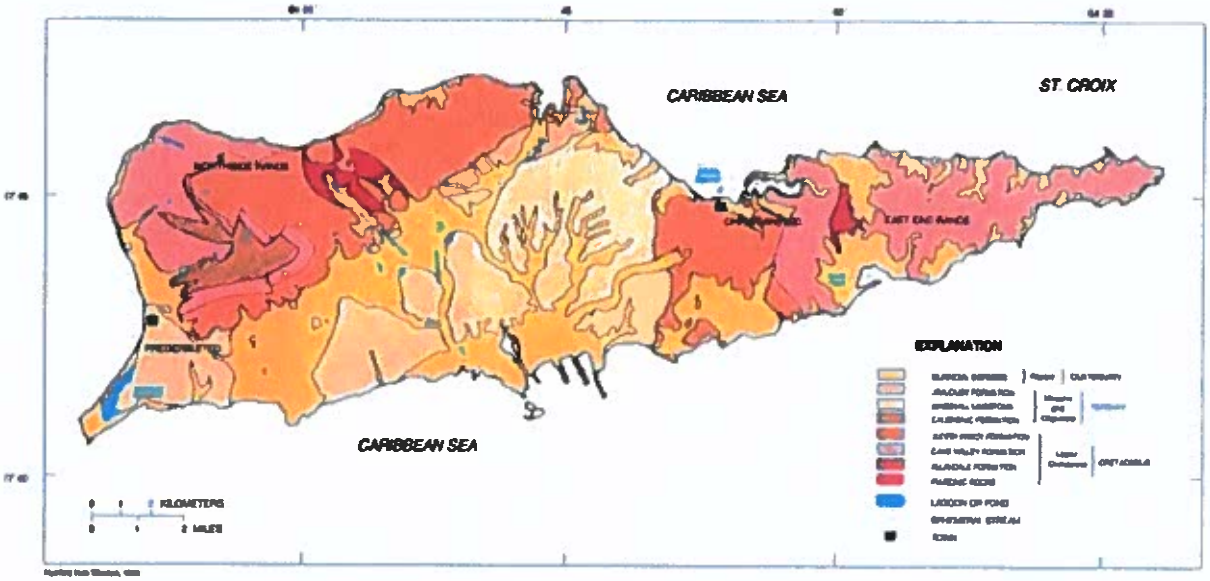

Figure 6.02.2 – General Geological formations of St. Croix (Atlas of Ground-Water Resources in Puerto Rico and the U.S. Virgin Islands)

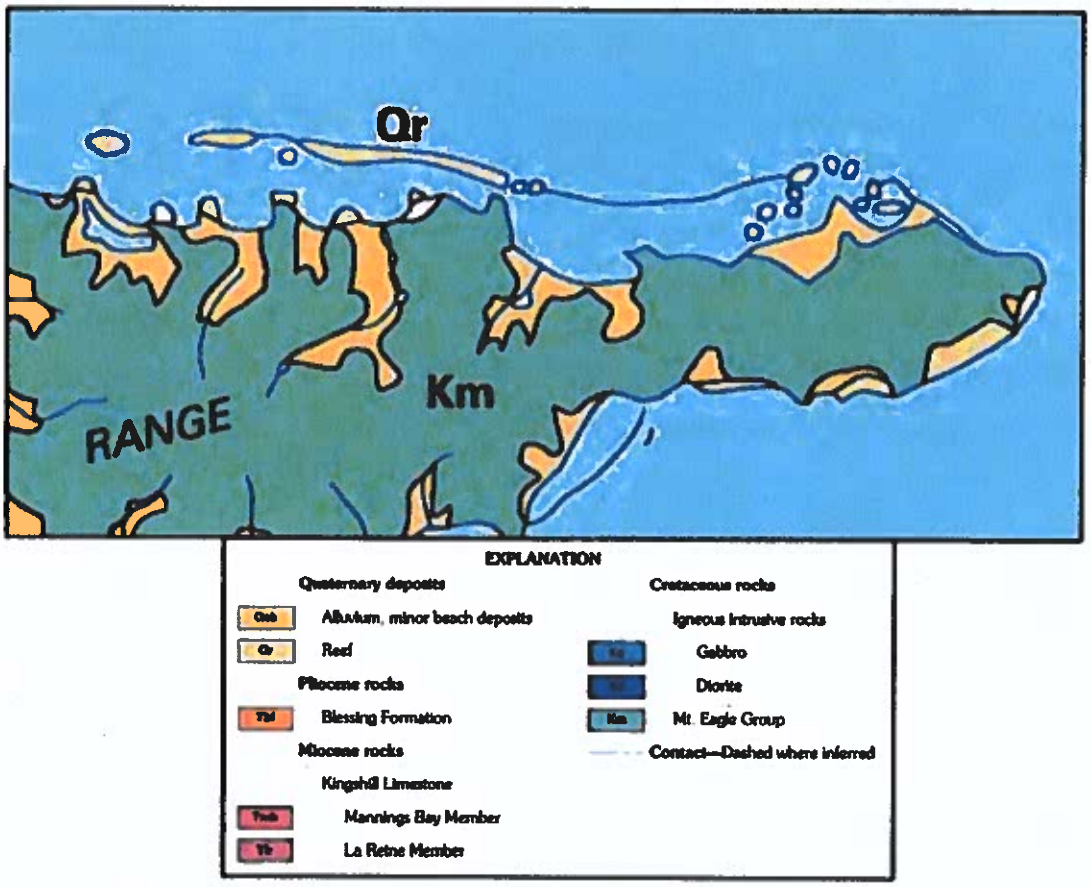

Figure 6.02.3 –Geological formations in vicinity of project site, St. Croix. Donnelly, 1959.

Geology of the Facility/Site

The proposed project lies at 17°45'32.3"N, 64°38'30.2"W, along Route 82, within the private residence at Plot No. 14 Estate Coakley Bay. The Custom Soil Survey by the National Resource Conservation Service (NRCS) identifies the main soil types for the project area as Jaucas Sand (JaB) and Beaches, Sandy (BsB).

Jaucas Sand are excessively-drained soils and are made up sand through the soil profile. JaB slopes vary from 0 to 5 percent.

Beaches, Sandy (BsB) are poorly drained beach sand usually directly adjacent to the shoreline and mean high tide line.

Elevation at the project site varies from 0 to approximately 42 feet above sea level. Seaward elevations start at sea level and go down to approximately 6-7 feet BSL.

Figure 6.02.4 – NRCS Soil Type Map

Historic Use

The land has been used as a personal residence since development began in approximately year 2003.

Figure 6.02.5 – 2002 Historical Photo, Coakley Bay and Carden Bay, Source: Google Earth

Historical use of the site, during the colonial period, included a developed plantation and mill, with associated support structures such as slave quarters and agricultural land. A historical survey of the area was conducted by MAAR in 1987. Findings from that study showed areas of mill and housing remnants, as well as location of slave dwellings and scatters of 18th century artifacts. This survey, conducted for the construction of condominiums and housing to the East, found specific historically relevant artifacts and structures in the proposed development areas, as shown in the below excerpt from this archaeological study.

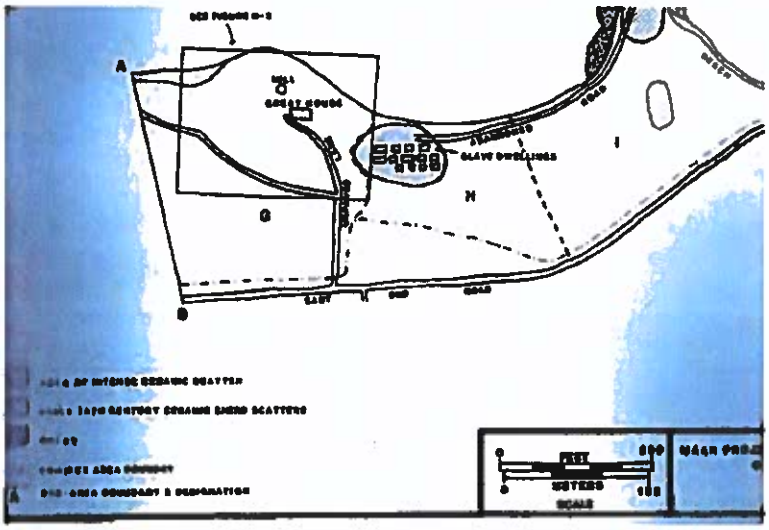

Figure 6.02.6 – Historical Findings, Carden Beach, MAAR, 1987.

There are major structures both above and below ground in the area, including burial grounds. These structures have been documented and evaluated since the MAAR study, most particularly during recent CZM permitting for other work at this Facility.

This project will minimize below ground excavation, and in areas previously dug, so no encounters with historical material is anticipated. However, should workers observe or suspect they encountered any historically significant findings when excavating by hand, they will cease excavation and contact SHPO to evaluate.

Seismic Activity

The project will be built to meet or exceed earthquake load requirements referenced in 29 V.I.C § 311.

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 quake, 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.

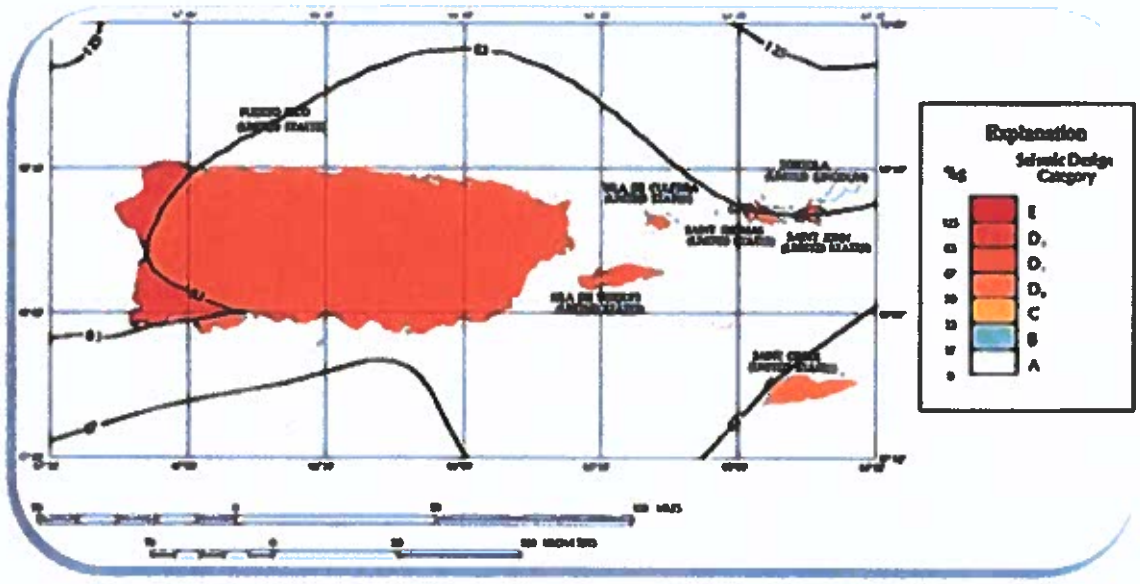

Figure 6.02.5 – FEMA Seismic Design Category Map

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 and uses, and to have minimal impact on the surrounding area and geology.

6.03 DRAINAGE, FLOODING, AND EROSION CONTROL

a) Drainage Patterns

The site is a single large plot abutting the shoreline, and is comprised of 4 different flood zone areas, Zone X, A, AE and VE. The proposed project will run through Zone A, AE, and VE. Stormwater flows for the site are primarily sheet flow. Most of the contributing watershed run-on from upstream is caught by Route 82 and is channelized down the beach access road (Coakley Bay Drive) abutting the West border of No. 14 Estate Coakley Bay.

Sheet flow runs generally from the East-Southeast to the Northwest, and some small flow channelization that does occur flows to the Southwest of the project location.

Project activities will, during construction, minimize any change to stormwater flow and prevent increased channelization through BMP controls and short earth movement timelines. Pre- and post-construction contours will be unchanged.

b) Proposed Alterations to Drainage Patterns

There will be no changes to drainage patterns as a result of this project.

c) Relationship of Project to Coastal Floodplain

Review of Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) for U.S. Virgin Islands Index indicate that the project area itself is within three flood zone areas (Zone A, AE, and VE). See below in Figure 6.01.1 which is a portion of FIRM Panel 0074G, depicting exact site location relative to flood zones.

Figure 6.03.1 – Section of Flood Insurance Rate Map (FIRM) Panel 0074G, 74 of 94, for Project Area. 2018

d) Peak Stormwater Flow Calculations

No changes to hydrology are anticipated for this project.

e) Existing Stormwater Disposal Structures

No specific site controls exist for the project area as it relates to stormwater management, with the exception of the natural grade and minor slopes of the project area. The shoreline has a short rocky bluff where stormwater drains into the nearby shoreline but has no distinct outfalls or drainage structures.

f) Proposed Stormwater Control Facilities

The transition from the shoreline pipeline route to the in-water routing will require transitioning the pipeline down the rocky bluff. This will be done by hand with reinforcement of riprap and potentially small concrete mattress weights to provide protection of the pipeline as well as preventing erosion of the bluff.

The rest of the pipeline structure will be buried or laid on the ocean floor, and no other stormwater control facilities are proposed.

More detailed drawings and layout is provided in drawings as part of Section 5.02.06.

g) Maintenance Schedule for Stormwater Facilities

During construction, silt fencing will be inspected every workday and after heavy rain events. If defects or damage are noted in the measures, the defect or damage will be immediately reported and repaired. The designs of any measures that prove to be inadequate to control erosion, will be changed and additional measures will be added as necessary.

Accumulated sediment will be removed when it reaches 40% of the height of the silt fencing. Worn, torn or otherwise damaged silt fencing will be fixed or replaced. The site will be cleaned on a daily basis of litter, debris and materials such as paper, wood, concrete, etc.

After construction is complete, the site will be stabilized and kept vegetated, so primary concern would be to manage the regrowth of vegetation.

h) Proposed Method of Land Clearing

The project will minimize earth work during installation and require earth movement only through hand tools and small equipment.

Before initial clearing, silt fencing will be installed in accordance with the VIEPH. No brush or vegetation will need to be cleared, and all mangroves or other shoreline plants will not be touched, cut or removed. Pipeline installation will work around existing vegetation and not cause harm to existing specimens.

i) Critical Areas and Possible Trouble Spots

The project area is adjacent to a somewhat populated shoreline section in northeast St. Croix, along the shoreline abutting Carden Bay and Coakley Bay. An existing condominium housing complex is directly adjacent to the shoreline to the East.

Site slope is between 0-5%. Elevation varies on-site from approximately 0 to 42 feet above sea level.

Due to the close proximity to open water, the clearing of the project site and any new construction for pipeline installation will be controlled and managed so as to not impact the surrounding areas, shoreline or wildlife.

A review of Endangered Species in the area, using the USFWS Information for Planning and Consultation (IPaC) Tool, indicates there are no endangered terrestrial species within the proposed project site but identifies three federal endangered sea turtle species that are known to swim in the offshore waters, approximately 200 feet north of the project area. These species include the following: hawksbill turtle (*Eretmochelys imbricata*), Green Sea Turtle (*Chelonia mydas*) and leatherback turtle (*Dermochelys coriacea*). In addition, the West Indian Manatee (*Trichechus manatus*) has also been found in the offshore waters and are a threatened species.

The permanent BMPs proposed for the site would provide protection of the environment and protection and control of stormwater to ensure no downstream negative impacts to the nearshore or species of wildlife that inhabit them.

In review of the 2020 VI Department of Planning and Natural Resources (VIDPNR) Integrated Report, water quality in the specific waterbody Assessment Unit has been designated as currently "Unknown" due to lack of sampling stations in the area.

A 2022 In-water benthic survey was conducted to identify the presence/absence of seagrasses, coral, hard-bottom, benthic communities, and fisheries resources that may be impacted by the pipeline

installation. The 2022 investigation included, but was not limited to, looking for staghorn (*Acropora cervicornis*) and elkhorn (*Acropora palmata*) corals and the five EPA coral species listed as threatened in the Caribbean in 2014 which includes *Dendrogyra cylindrus, Orbicella annularis, Orbicella faveolata, Orbicella franksi,* and *Mycetophyllia ferox* (NOAA, 2014). In addition, the invasive seagrass Halophila stipulacea was also surveyed.

This same area was previously surveyed in May and June of 2017 by the same benthic specialist as part of a much larger surveyed area. None of the above identified species were observed at that time andthe surveys for this project conducted on October 7 and 18, 2022 also found none of the above-named species.

Due to the nature of the project's scope of pipeline installation, there exists potential for sedimentation and erosion during project earth movement activities at the near shoreline. Appropriate protective Best Management Practices (BMPs) will be employed through the entire project timeline in accordance with design standards of the VI Environmental Protection Handbook (VIEPH) (2002). Stormwater will be appropriately managed as discussed in subsequent sections below.

In review of the 2020 VI Department of Planning and Natural Resources (VIDPNR) Integrated Report, water quality in the specific waterbody Assessment Unit has been designated as currently "Unknown" due to lack of sampling stations in the area.

Due to the nature of the project scope of construction, there exists potential for sedimentation and erosion during project earth movement activities. However, appropriate protective BMPs will be employed through the entire project timeline in accordance with requirements of the VIEPH. Stormwater will be appropriately managed as discussed in subsequent sections below.

j) *Erosion and Sediment Control Devices to be Implemented*

The following BMPs will be implemented on the site to control runoff and protect natural resources:

Silt Fence – Due to the close proximity to the shoreline, silt fencing shall be used to protect the shoreline and surface water from runoff and sediment loss. These will be implemented before any site earth movement is done and will be reinforced where needed along steeper sloped areas.

Design of these BMPs will follow the minimum standards of the VI EPH (2002).

k) *Maintenance of Erosion and Sediment Control Devices*

Sediment control devices, including silt fencing, berms, swales, sedimentation ponds and outlets, will be inspected every workday and after heavy rain events. If defects or damage are noted in the measures, the defect or damage will be immediately reported and repaired. Measures proven to be inadequate to control erosion will result in optimization of the design and the addition of mitigations as necessary.

Accumulated sediment will be removed when it reaches 40% of the height of the silt fencing or volume of sedimentation pond. Worn, torn or otherwise damaged silt fencing will be fixed or replaced.

The site will be cleaned on a daily basis of litter, debris and materials such as paper, wood, concrete, etc.

l) *Impacts to Terrestrial and Shoreline Erosion*

This project will not alter impervious surfaces to the site or change topography or contours for the site. The potential impacts to terrestrial and shoreline erosion will be mitigated through the burying of the pipeline for the majority of the route and stabilizing the shoreline transition point with riprap to control erosion points.

The proposed development will not alter the existing drainage patterns of the site. All standard sediment and erosion control devices and BMPs will be implemented when performing any site work and will be maintained throughout the life of the facility.

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 exist but are not a reliable source of freshwater. Existing wells in the area include two brackish wells at the Coakley Plantation Facility. Groundwater pulled from these wells is used by Coakley Plantation for potable water and is treated by existing salt water RO units at the site. These wells have had reduced yield over the recent past and have become increasingly saline.

The purpose of the project is to eliminate drawing from existing freshwater resources, and instead use seawater as the source of potable water, which will not only have no negative impact on the availability of freshwater resources but improve groundwater recharge. Groundwater recharge in the area is somewhat limited, as the soils are of Hydrologic Group C & D. Group D waters have very little groundwater recharge while Group C soils have some conductivity of water and will provide some recharge. The project will allow for greater recharge of aquifers by focusing on water draw from the ocean.

6.05 OCEANOGRAPHY

a) Seabed Alteration

No major alteration or impact to the existing seabed is anticipated as part of this project and operation. The proposed pipeline path is primarily sandy or sandy/rubble bottom with the exception of a 12-foot-long section comprised of only hard bottom along the entire route. The depth at the end of the proposed pipe route is 6-7 feet deep and in sand where the bottom nearby rises sharply and becomes a thick seagrass area.

Pipeline will be placed directly on seabed and weighed down with concrete mattress weights to protect and assist with settling of the pipeline on the bay floor. Natural wave action will allow the pipeline to self-bury, and the discharge and inlet structures will be weighted to allow for no movement. All anchor points will be by direct weight, and no cutting, bolting, drilling or removal of seafloor elements will be required for this project.

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.a-F.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).

As the tide range is not significant, currents will govern the hydraulics discharge at the outfall structure, such as the dispersion and transport of the effluent plumes. Design of the effluent mixing structure incorporates diffuser ports to effectively use the typical currents of the project area in mixing effluent brine with surrounding sea water and minimizing the saline plume.

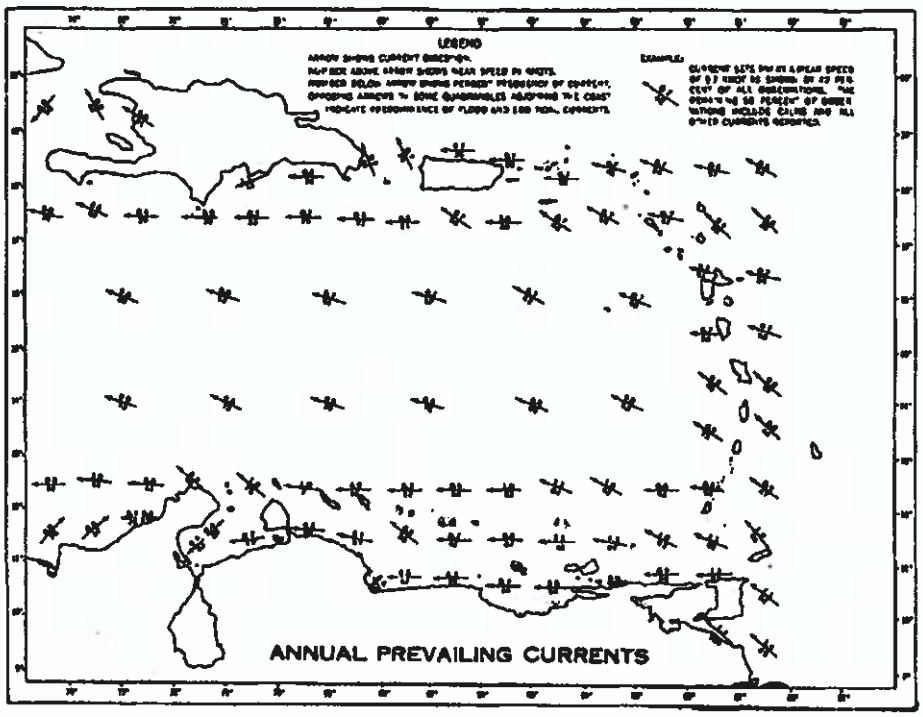

Figure 6.05.1 – Annual prevailing currents in the Caribbean. US Naval Oceanographic Office (1963)

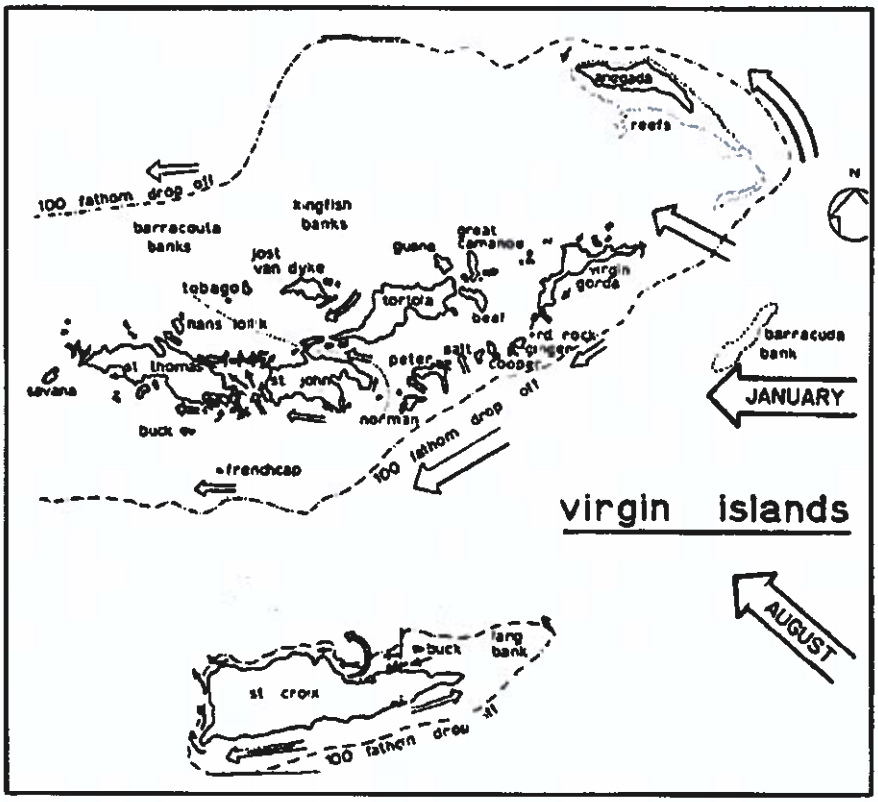

Figure 6.05.2 – General current patterns on the island platforms. From Dammann, et al (1969)

In the Virgin Islands, tidal ranges are not great, 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. Furthermore, 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. We therefore do not have 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 usually do a good job of 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 of our larger embayments. The innermost portions of the mangrove lagoon on St. Thomas, of Salt River, St. Croix and of Coral Bay, St. John are like 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 probably occurs in other similar locations (IRF, 1977).

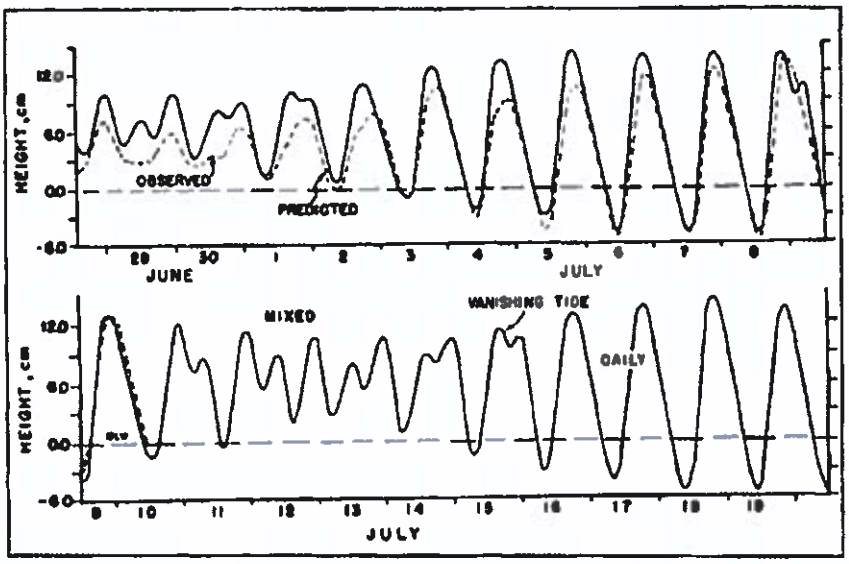

Figure 6.05.3 – Variations in the character of the tide displayed in time height curves, from predicted tables and from observed tides in Christiansted harbor, June 29 - July 19, 1971. From Nichols, et. at, 1972.

At this project site, both Carden Bay and Coakley Bay do not have significantly deep or complex bay delineation, and therefore would be expected to see better circulation than others, and current are anticipated to provide better flushing in these shallower bays.

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. A snapshot of tidal data from the station is shown below.

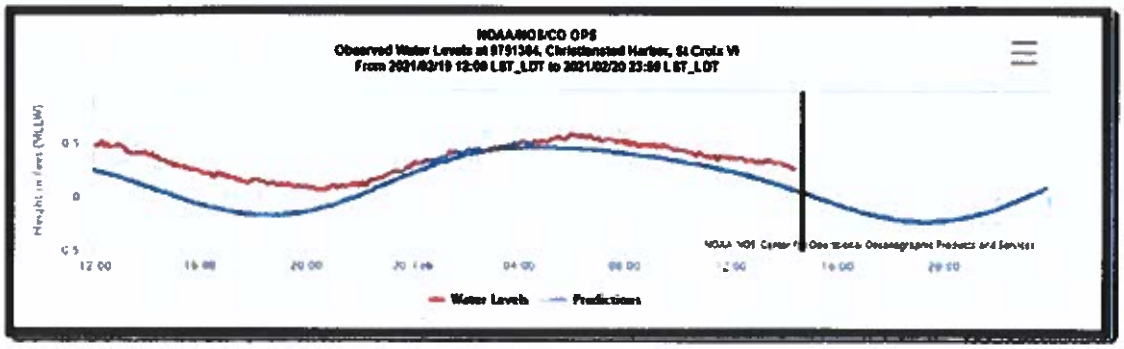

Figure 6.05.4 – Observed Water Levels in Christiansted, St. Croix

c) Wave and Wind Impacts

Due to the nature of the project entering the bay, there are anticipated wave and wind impacts for this project during construction. Pipeline will be place by hand by a dive team, with some assistance from small watercraft to place weights and larger structures. Increased wave or winds will force the dive team to work harder during install and may create increased turbulence and sediment plumes. Installation will be scheduled during calm weather and low wind days to maximize efficiency, diver safety and prevention of any sediment plumes. This will minimize impact from wave and wind during the installation/construction phase.

The pipeline will be installed to self-bury over time, and will be weighted to ensure that during operation, wave and wind impacts, even during severe weather, will not impact the pipeline or intake/effluent structures. The profiles are designed to be in line with currents and minimal to prevent interference by heavy wave action, even in the shallow depths of the bay.

d) Marine Water Quality

The water surrounding the site, the Solitude Backreef waterbody, is classified as Class B which includes uses such as the propagation of desirable species of marine life and primarily contact recreation such as swimming, water skiing, etc.

The project site is located in the Coakley Bay waterbody. Water quality criteria, noted in 12 VIRR §186, include:

- Dissolved oxygen not less than 5.5 mg/l from other than natural conditions.
- 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.

VI DPNR performs routine water quality measurements at up to 138 Water Quality Monitoring Stations. However, for the Solitude Backreef Waterbody Assessment Unit (AU), no known sample stations currently exist or are sampled.

Waterbody	Location	Sample Station Number
VI-STC-38	Solitude Backreef	none

In VI DPNR's 2020 Integrated Report (IR), which entails CWA Section 305(b) water status report and the CWA 303(d) list, the subject waterbody shows no available water quality data and therefore, the status of the water quality at the site is "Unknown". Additionally, no Total Maximum Daily Load (TMDL) has been established for this waterbody to date.

The project will entail in-water work seaward of the Mean High Tide Line (MHTL) and therefore will require application for and obtaining a US Army Corps of Engineers (ACOE) Clean Water Act (CWA) Section 404 permit as well as a Water Quality Certificate under CWA Section 401 from DPNR-DEP.

The project, as designed, is anticipated to meet the requirements of these programs and their regulatory requirements.

Additionally, operation of the pipeline, including intake as well as brine effluent discharge, will meet water quality requirements by applying for and obtaining a Territorial Pollutant Discharge Elimination System (TPDES) permit for the use of this pipeline. This permit will require the sampling, testing and reporting of effluent water quality for the life of the pipeline operations, in order to ensure water quality is maintained at all times.

Impact of the Proposed Project

The applicant has carefully considered how installation as well as long-term operation would affect water quality. The construction and installation phase will be carefully executed in order to protect the nearshore and in-water environment. Discharge effluent will be controlled to prevent impact to the environment during long-term operations and the system adheres to the appropriate environmental guidelines, regulations, and legislation. An Erosion and Sediment Control (E&SC) plan will be implemented and monitored during the life of the project.

Permanent controls will be setup to prevent future erosion or sediment loss from the site as well as downstream topographical watershed elements.

Conditions and process of incoming water to the desalination facility will be monitored as in any other treatment facility, for the purposes of informing plant operation and maintenance decisions. Constituents would include pH salinity, temperature, and suspended solids.

The Clean Water Act (CWA) mandated Territorial Pollutant Discharge Elimination System (TPDES) permit program requires discharges of process water into Waters of the USVI to be permitted and monitored. This project will install a discharge line for brine from processed seawater, and a TPDES permit will be applied for 180 days before anticipated discharge into the bay. Discharge will be carefully monitored to ensure it complies with the issued permit and Water Quality Standards (WQS).

6.06 MARINE RESOURCES AND HABITAT ASSESSMENT

Existing shoreline near the site is a majority of rock face mixed with short sandy sections. General water depth near-shore is shallow, allowing for rocky substrate to develop coral and benthic habitat in sections and short strips, with a majority of the sandy bottom having developed seagrass beds in relatively high density.

Existing development along the shoreline consists of consecutive condominium buildings, several private homes to the east, and a partial dock with access point. The project site is located on the northeastern shore of the island of St. Croix, which is more rural, with lower development and fewer anthropogenic sources of pollution.

NOAA and DPNR have established the area as the St. Croix East End Marine Park (STXEEMP), which includes the water body directly adjacent to the project site, as a Coral Reef System Area of Particular Concern (APC) and designated for management intervention in the 2020-2025 United States Virgin Islands' Coral Reef Management Priorities document. Figure 6.06.1 below indicates the sites prioritized for protection and management.

According to the most recent STXEEMP Watershed Management Plan (September 2016, v1), the primary threats to this managed marine area are anthropogenic sources of pollution coming from trash, soil erosion and overfishing. This project will mitigate the effects of soil erosion and sedimentation with the proposed improvements to the site and anticipates no negative effect from the project activities or long-term design.

During construction, Coakley Bay Plantation LLLP will mitigate the effects of soil erosion, sedimentation and trash by following an E&SC Plan addressing those issues and will ensure no negative effect during the work schedule.

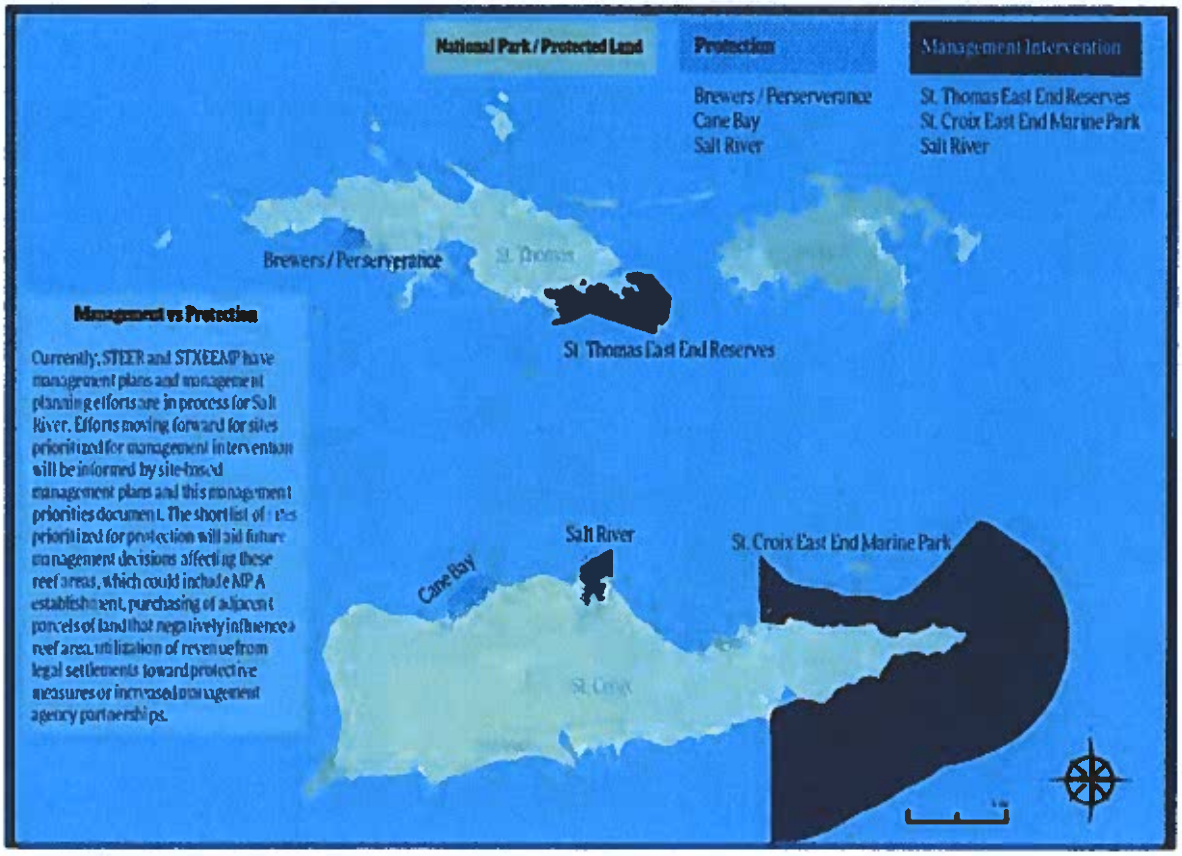

Figure 6.06.1 – Prioritized Sites for Intervention and Protection, United States Virgin Islands' Coral Reef Management Priorities 2020-2025

A review of the 2002 NOAA Benthic Habitat Maps shows the majority of the shoreline at Coakley Bay (between Prune Bay and Solitude Bay in Figure 6.06.2) is Reef/Colonized Bedrock with Seagrass/Continuous further from the shore.

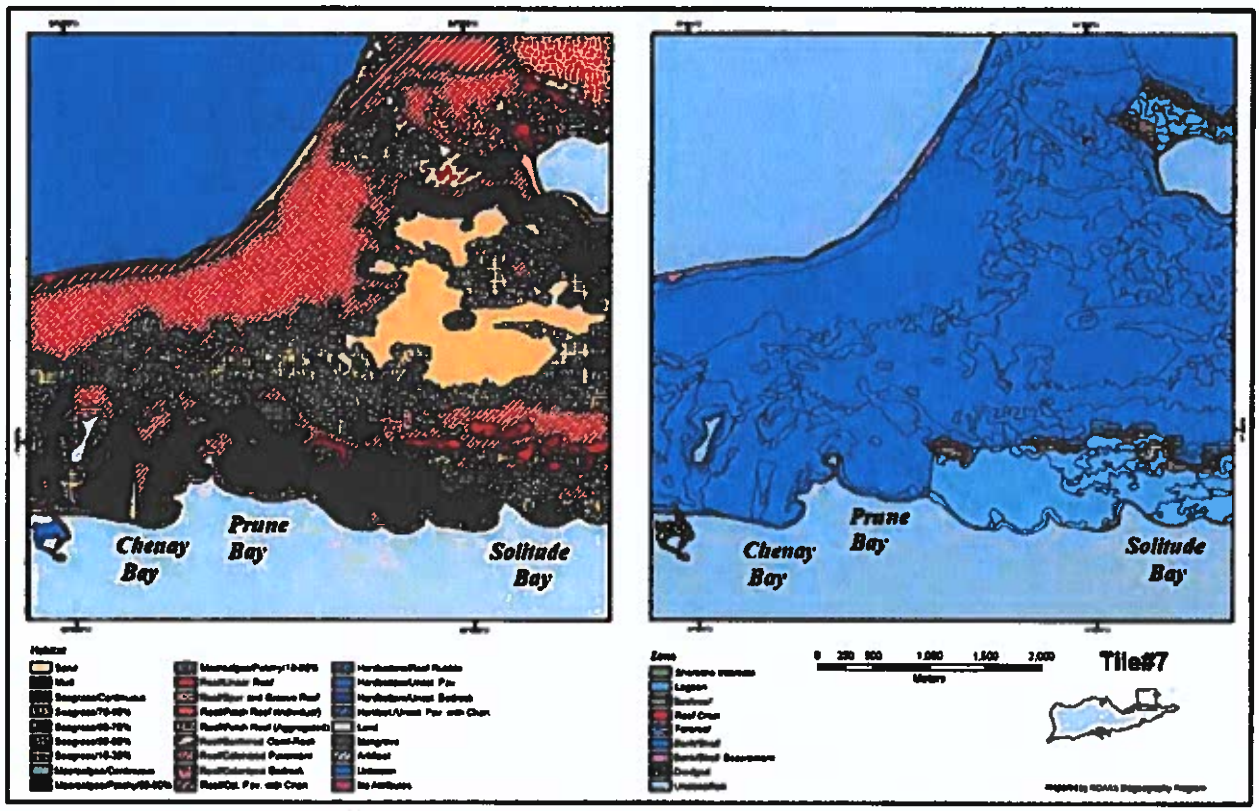

Figure 6.06.2 – 2002 NOAA Benthic Habitat Maps, North Shore St. Croix, USVI.

A review of Endangered Species in the area, through the IPaC Tool, indicates there are no endangered terrestrial species within the proposed project site but identifies three federal endangered sea turtle species that are known to swim in the offshore waters, less than one hundred feet north of the project area. These include: hawksbill (*Eretmochelys imbricata*), Green Sea Turtle (*Chelonia mydas*) and leatherback (*Dermochelys coriacea*) turtles. In addition, the West Indian Manatee (*Trichechus manatus*) has also been found in the offshore waters and are a threatened species.

A 2022 in-water benthic survey was conducted to identify the presence/absence of seagrasses, coral, hard-bottom, benthic communities, and fisheries resources that may be impacted by the pipeline installation. The 2022 investigation included, but was not limited to, looking for staghorn (Acropora cervicornis) and elkhorn (Acropora palmata) corals and the five EPA coral species listed as threatened in the Caribbean in 2014 which includes Dendrogyra cylindrus, Orbicella annularis, Orbicella aveolate, Orbicella franksi, and Mycetophyllia ferox (NOAA, 2014). In addition, the invasive seagrass Halophila stipulacea was also surveyed.

This same area was previously surveyed in May and June of 2017 by the same benthic specialist as part of a much larger surveyed area. None of the above identified species were observed at that time and the surveys for this project conducted on October 7 and 18, 2022 also found none of the above-named species.

A proposed pipeline route was evaluated and marked starting from shore at GPS location 014 and traveling seaward to the proposed end at GPS 018 (see figure 6.06.3). A tape measure was then laid starting at GPS 014 and passing through GPS points 015-017 then terminating at GPS 018. The distances from shore through to final end point at GPS 018 is approximately 224 feet. The entire route was documented with both video and photographs with the measuring tape in place and in view throughout each video. Some photo locations documenting benthic habitat findings are noted in Figure 6.06.3 as well.

Figure 6.06.3 – Five proposed Pipe Route GPS locations (014-018) and five photo locations (DSCN3459-DSCN67) to windward of the proposed route Coakley Bay, St. Croix, USVI.

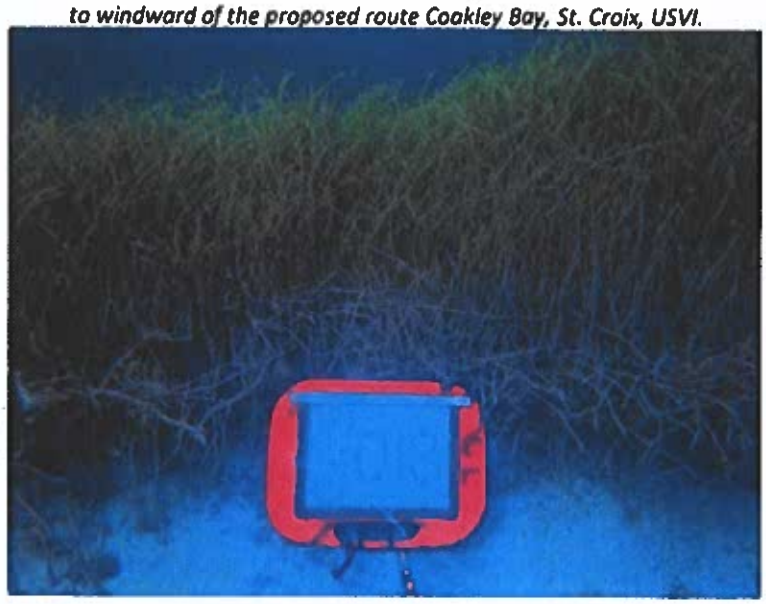

Figure 6.06.4 – Seagrasses at north end of the sand area near pipe end location at GPS 018, Coakley Bay, St. Croix, USVI.

Section 1 of the pipe route from shore (GPS 014) to GPS 015 includes a 52-foot-long area dominated by a thin sand layer with scattered cobble. No significant fish or invertebrate habitats are in the area. Algae and seagrasses are thinly scattered, and wave influence is significant at depths from 0-4feet. Section 2 of the pipe route from GPS 015 to GPS 016 runs from 52 feet to 102 feet from shore. This 50-foot-long section is also primarily sand with algae and seagrasses scattered over a thin sand layer. The seagrass Syringodium sp. is more prominent here than in Section 1.

At the 75 feet tape mark and 102' tape mark (GPS 016) are embedded pieces of wood which are of no archeological or habitat significance. Empty conch shells (Strombus gigas) are found in the area and bare the marks of discarded cleaned out shells. No live Strombus gigas were observed anywhere. GPS 016 also marks the eastern end of a series of ledges running to the west that provide ample fish habitats.

Section 3 of the pipe route is approximately 13 feet running from 102 feet to 115 feet and is the only hard bottom along the entire route. It is primarily turtle grass (Thallasia testudinum) growing over beachrock. Since significant marine life habitat is provided by the extensive ledges ending at GPS 016, this short section is sparsely populated.

Lastly, Section 4 from GPS 017 to GS 18 is the final 50-foot section running from 115 feet to 165 feet of primarily uninhabited sand with little significant habitat. The absence of the invasive seagrass Halophila stipulacea (which has taken over vast sand areas on St. Croix's west end) is particularly noticeable. Surrounding this large sand area are dense areas of manatee grass (Syringodium filiforme) and turtle grass (Thalassia testudinum) providing various habitats for a variety of marine life, particularly juvenile fish.

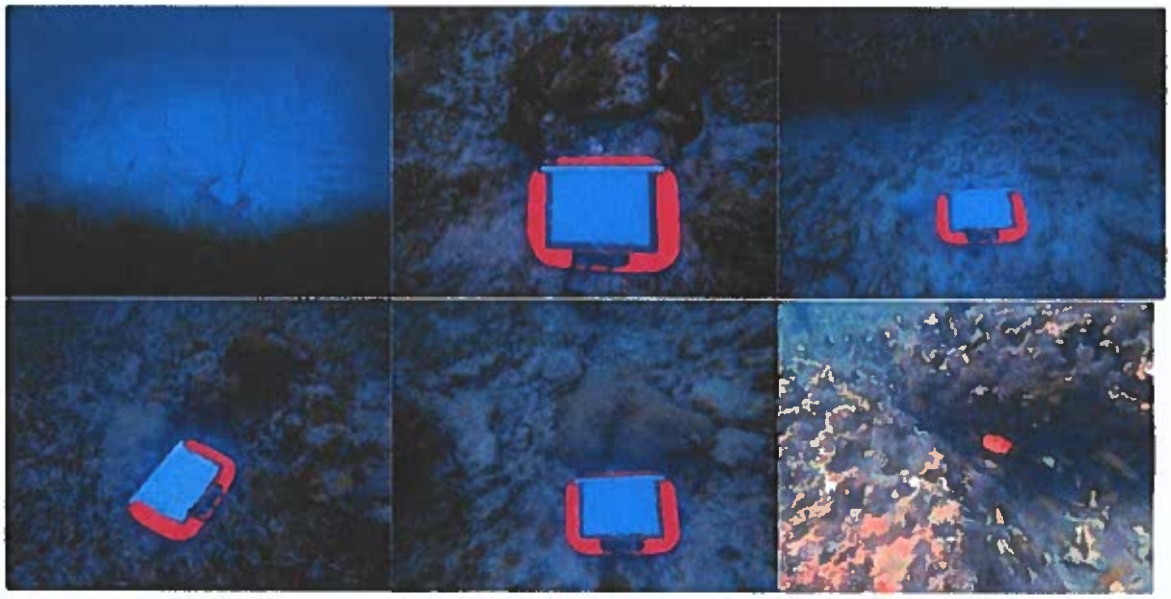

Figure 6.06.5 – GPS points of proposed pipe sections and surrounding benthic habitat (a) DSCN3459, GPS 018, proposed pipe end view looking south toward shore, (b) DSCN3461, (c) DSCN3463, (d) DSCN3465 (e) DSCN3467, (f) frame grab from video, Ledge West of GPS 016.

Pipeline will be place by hand by a dive team, with some assistance from small watercraft to place weights and larger structures. Increased wave or winds will force the dive team to work harder during install and may create increased turbulence and sediment plumes. Installation will be scheduled during calm weather and low wind days to maximize efficiency, diver safety and prevention of any sediment plumes. This will minimize impact from wave and wind during the installation/construction phase.

The pipeline will be installed to self-bury over time, and will be weighted to ensure that during operation, wave and wind impacts, even during severe weather, will not impact the pipeline or intake/effluent structures. The profiles are designed to be in line with currents and minimal to prevent interference by heavy wave action, even in the shallow depths of the bay.

To minimize interference with the benthic communities, the project construction will entail placement of pipeline by hand by a dive team, with some assistance from small watercraft to place weights and larger structures. Increased wave or winds will force the dive team to work harder during install and may create increased turbulence and sediment plumes. Installation will be scheduled during calm weather and low wind days to maximize efficiency, diver safety and prevention of any sediment plumes. This will minimize impact from wave and wind during the installation/construction phase.

Placement of the pipeline will be routed to travel through sandy bottom areas that would be as far from habitable sections as possible, and avoid having to remove, damage or cut seagrass to place sections of pipeline.

The pipeline will be installed to self-bury over time, and will be weighted to ensure that during operation, wave and wind impacts, even during severe weather, will not impact the pipeline or intake/effluent structures. The profiles are designed to be in line with currents and minimal to prevent interference by heavy wave action, even in the shallow depths of the bay. This will prevent breakage or movement of the structures in the water that would otherwise risk damaging benthic habitat or causing negative water quality conditions.

The project will entail in-water work seaward of the Mean High Tide Line (MHTL) and therefore will require application for and obtaining a US Army Corps of Engineers (ACOE) Clean Water Act (CWA) Section 404 permit as well as a Water Quality Certificate under CWA Section 401 from DPNR-DEP. The project, as designed, is anticipated to meet the requirements of these programs and their regulatory requirements.

Design of intake structure will include measures to prevent impingement and entrainment associated with direct intake systems to avoid marine life trapped in or against the intake screens in the intake openings due to the velocity and force of the water flowing through them and ensure any microscopic organisms (e.g. phytoplankton, zooplankton, eggs and larva) are not pulled through the screens and into the pipeline intake.
Additionally, the brine effluent discharge structure is designed to discharge the dense saline brine up and into the water column to maximize mixing and minimize the mixing zone radius. This will ensure the water conditions will meet water quality requirements at the edge of the mixing zone. Testing will be conducted, and compliance will be shown by applying for and obtaining a Territorial Pollutant

Discharge Elimination System (TPDES) permit for the use of this pipeline. This permit will require the sampling, testing and reporting of effluent water quality for the life of the pipeline operations, in order to ensure water quality is maintained at all times.

6.07 TERRESTRIAL RESOURCES

A site assessment through the IPaC Tool provided by USFWS showed no specific species or habitat of particular concern, though any issues concerning presence of species that arise during work will be brought to the attention of VIDPNR Fish & Wildlife Division as well as USFWS.

The Environmental Sensitivity Index (ESI) Map for the St. Croix island notes no specific habitat of particular sensitivity in the area, as show in Figure 6.07.1 below.

Britton and Wilson (1923, p. 156) reported the endangered species, *Agave eggersiana,* having habitat in hillsides and plains in the eastern dry districts of St. Croix but did not provide population estimates. A site survey did not reveal any specimens in the project areas.

Installation of the pipeline through the terrestrial portion of the pipeline route will be done in a way to avoid all vegetation and requirements to cut, remove or damage plants in any way. All pipelines will be installed by hand through careful navigation of the shoreline transition point.

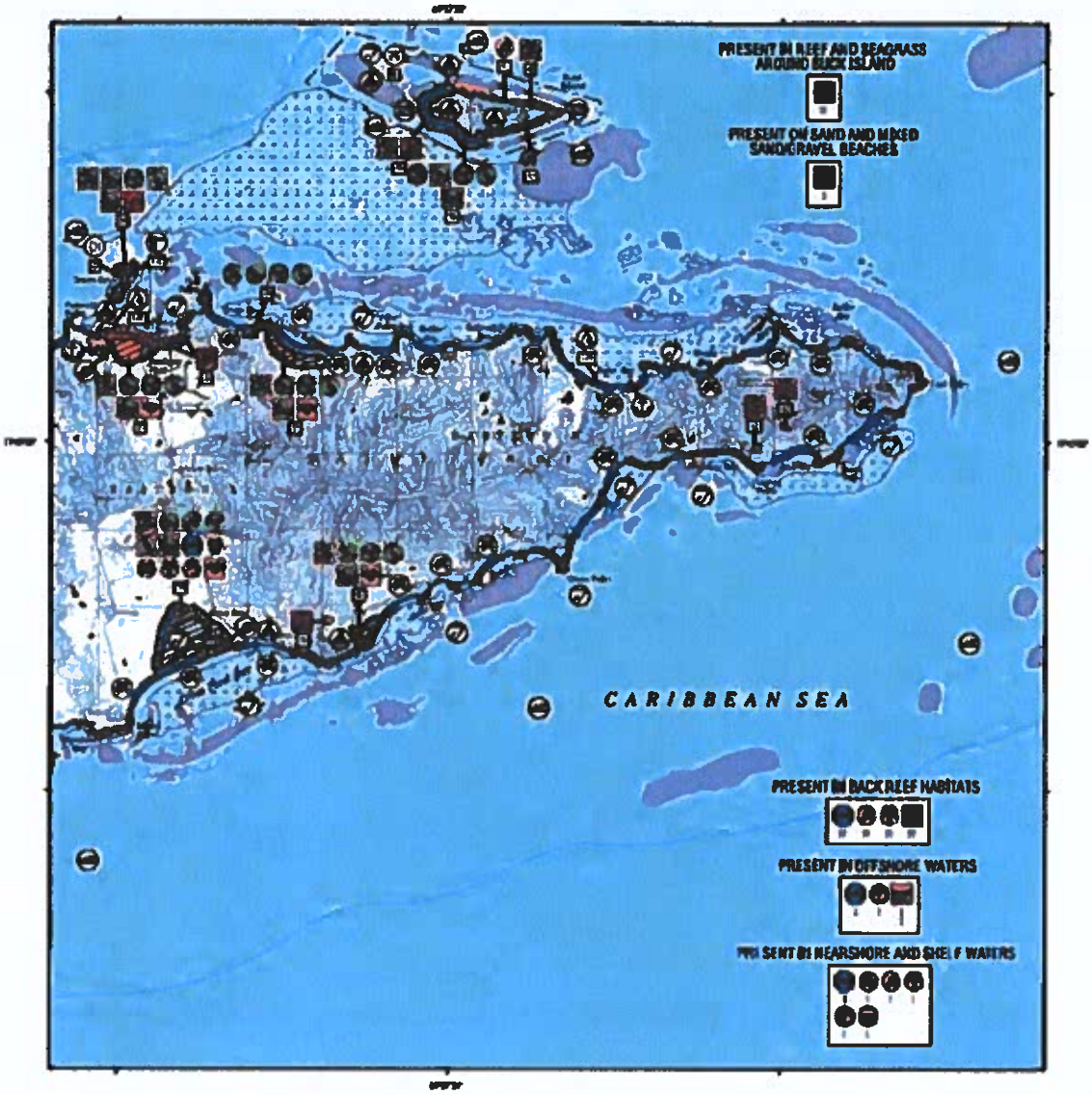

Figure 6.07.1 – Environmental Sensitivity Index Map, St. Croix, USVI.

Impact of the Proposed Project

The site has seen previous clearings and activities in the area. Clearing of the area and project activities will be limited to minor grassy sections.

Coakley Bay Beach Plantation LLLP will minimize the footprint of work to the greatest extent possible and will ensure protection of all vegetation, marine life and water quality through careful design, installation and operation of the entire pipeline system.

6.08 WETLANDS

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

Per the National Wetlands Inventory Maps, the shoreline border between land and marine waters constitutes Estuarine and Marine Wetland habitat (M2RS1N).

Figure 6.08.1 – USFWS National Wetlands Inventory Map, St. Croix, USVI.

The project will also entail in-water work seaward of the Mean High Tide Line (MHTL) and will require application for and obtaining a US Army Corps of Engineers (ACOE) Clean Water Act (CWA) Section 404 permit as well as a Water Quality Certificate under CWA Section 401 from DPNR-DEP.

The project, as designed, is anticipated to meet the requirements of these programs and their regulatory requirements.

6.09 RARE AND ENDANGERED SPECIES

Britton and Wilson (1923, p. 156) reported the endangered species, *Agave eggersiana* (Egger's Century Plant), having habitat in hillsides and plains in the eastern dry districts of St. Croix but did not provide population estimates. A site survey did not reveal any Century Plant specimens in the project areas.

There were no rare or endangered species observed on the site, though the waters directly offshore from the site are noted in IPaC as navigation routes for the threatened turtle species hawksbill (*Eretmochelys imbricata*), Green Sea (*Chelonia mydas*), and leatherback (*Dermochelys coriacea*). These turtle species do travel in waters off-shore of the site, but no rare and endangered species use Coakley nor Carden Bay as an exclusive habitat. The permitting of this facility will not displace any rare, endangered, or threatened species from any critical habitat.

A 2022 in-water benthic survey was conducted to identify the presence/absence of seagrasses, coral, hard-bottom, benthic communities, and fisheries resources that may be impacted by the pipeline installation. The 2022 investigation included, but was not limited to, looking for staghorn (Acropora cervicornis) and elkhorn (Acropora palmata) corals and the five EPA coral species listed as threatened in the Caribbean in 2014 which includes Dendrogyra cylindrus, Orbicella annularis, Orbicella aveolate, Orbicella franksi, and Mycetophyllia ferox (NOAA, 2014). In addition, the invasive seagrass Halophila stipulacea was also surveyed.

This same area was previously surveyed in May and June of 2017 by the same benthic specialist as part of a much larger surveyed area. None of the above identified species were observed at that time and the surveys for this project conducted on October 7 and 18, 2022 also found none of the above-named species.

6.10 AIR QUALITY

No air quality issues are anticipated for this project.

7.00 IMPACT OF THE PROPOSED PROJECT ON THE HUMAN ENVIRONMENT

7.01 LAND AND WATER USE PLANS

No negative effects are expected for water-use plans for the area. There will be a net improvement to water use in the area. The purpose of the project is to eliminate drawing from existing freshwater resources, and instead use seawater as the source of potable water, which will not only have no negative impact on the availability of freshwater resources but improve groundwater recharge. Groundwater recharge in the area is somewhat limited, as the soils are of Hydrologic Group C & D. Group D waters have very little groundwater recharge while Group C soils have some conductivity of water and will provide some recharge. The project will allow for greater recharge of aquifers by focusing on water draw from the ocean.

7.02 VISUAL IMPACTS

There are no changes visual impacts anticipated for this project. The pipeline will be buried along terrestrial portions and remain underwater along the seabed for the remainder. It will only be visible to swimmers in the immediate area.

7.03 IMPACTS ON PUBLIC SERVICES AND UTILITIES

Water

The residence produces its own water for personal use and this project will not change the use, only the source of water. No public water utilities are used.

Sewage Treatment and Disposal

There is no existing municipal sewage system infrastructure in the area. No sewage treatment or disposal is anticipated for this project, nor changes to the residential processing of waste.

Solid Waste Disposal

There will be no anticipated disposal or discharge of solid waste from the pipeline installation. Typical municipal solid waste generated during the construction phase will be disposed of through bins set up at the site and disposed of at the VI WMA Anguilla landfill.

Roads, Traffic and Parking

As part of the project, no supporting infrastructure is proposed for the roads and parking availability. No changes to roads, traffic patterns or increase need for parking is anticipated for this project.

Electricity

There are no proposed electrical systems required for the pipeline install. All existing RO units and pumps are already existing for the site.

Schools

There are no anticipated adverse effects or burden on the local educational system as a result of this project.

Fire and Police Protection

The project will be not have any anticipated dangers in need of fire or police protection.

The pipeline install will be in a gated residence, with 24-hr security and monitoring systems in place. Video monitoring and house alarm systems will ensure protection of the residents and minimize burden on fire and police.

Health

The property will not have any adverse effects on the public health, nor increase the use of public health facilities. The facility will follow all air permit requirements to ensure air pollution is minimized and does not affect any neighboring properties or businesses. Compliance with a TPDES permit will ensure maintenance and protection of the bay water quality for public use.

7.04 SOCIAL IMPACTS

The project is not expected to bring any social impacts.

7.05 ECONOMIC IMPACTS

The development will have little to no impact on either water or power municipal grids, minimal to no impact on traffic, solid waste removal or schools, police and fire services, or any other economic component of the island.

7.06 IMPACTS ON HISTORICAL AND ARCHAEOLOGICAL RESOURCES

As noted in Section 6.02, the historical use of the site, during the colonial period, included a developed plantation and mill, with associated support structures such as slave quarters and agricultural land. A historical survey of the area was conducted by MAAR in 1987. Findings from that study showed areas of mill and housing remnants, as well as location of slave dwellings and scatters of 18th century artifacts.

The project boundaries will be restricted to only areas that have already been evaluated and found to contain no notable archaeological resources or findings, and therefore is not expected to have any negative impact on Historical or Archaeological resources of the USVI. Should any suspected or known resources or artifacts be discovered during the development of the site, the developers will immediately notify the State Historical Preservation Offices to evaluate the findings.

7.07 RECREATIONAL USE

The project will have no adverse impact on the recreational activities within the area.

Beach access will continue to be provided for along the adjacent road, and no blocking or prevention of beach or existing residential unit access will be enforced on any residents of current condominiums.

7.08 WASTE DISPOSAL

Any and all construction debris will be collected in appropriate roll-off containers to be transported and disposed of by a licensed waste-hauler, in accordance with solid waste requirements.

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

7.09 ACCIDENTAL SPILLS

Spills are not anticipated during construction as the developer will follow a strict E&SC Plan for management of materials and wastes on-site; however, any spills during the construction of this project will be cleaned up immediately. Any contaminated soil will be cleaned up and put into approved containers for disposal by a licensed waste handler.

A spill kit will be kept on-site in accessible locations for daily construction staff.

7.10 POTENTIAL ADVERSE EFFECTS WHICH CANNOT 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 Erosion and Sediment Control (E&SC) plan which will be implemented during construction and during the life of the site operations.

As the project lies at the end of the watershed, any downstream flooding is mitigated as no structures, properties or features sit downstream of the discharge points except for the stormwater easements. Therefore, no flooding issues are expected for this area due to the development.

8.00 MITIGATION PLANS

No mitigation plans are anticipated to be needed for this project. There will be no negative impact to flora, fauna or neighboring properties or resources.

9.00 ALTERNATIVES TO PROPOSED ACTION

An alternative to the proposed construction would be not to proceed with development, however, as discussed within this report, the development will not cause short-term nor long-term negative impacts on the area.

If this project does not proceed, the facility will continue to draw water from brackish wells, which would further increase the potential for seawater intrusion and further salination of the aquifer.

The facility could attempt to connect to a municipal water source; however, no water source is close to the facility and connection to the municipality would be exorbitantly expensive.

Trucking in water from private sellers is also an option; however, such a method of purchasing water would also be too expensive to be feasible.

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

The residence is designed to be self-sufficient, relying very minimally on resources outside of the area. It has an existing green power system with solar and battery storage and intends to provide potable water for personal use from a similar renewable natural resource in the area. Through careful installation and operation of a seawater intake and discharge structure system, the facility can ensure safe and environmentally protective use of this resource and allow for continued long-term enjoyment by the public of the bay area at the same time.

The use of this source instead of the existing wells will help move to long-term recovery of the existing aquifer and improve future uses of these water resources.

11.00 REFERENCES

Island Resources Foundation. 1977. Marine environments of the Virgin Islands. Technical Supplement No.1 1976. Prepared for the Virgin Islands Planning Office.

Rogers, Caroline. 1988. Marine and Terrestrial Ecosystems of the VI National Park & Biosphere Reserve US Dept. of the Interior, Island Resources Foundation Biosphere Reserve Report No. 29.

Jordan, D.G. 1975. A Survey of the Water Resources of St. Croix, Virgin Islands. Caribbean District Open-File Report. US Dept. of the Interior.

Renken R., Ward W.C., Gomez F., Martinez J. 2002. Geology and Hydrogeology of the Caribbean Islands Aquifer System of the Commonwealth of Puerto Rico and the U.S. Virgin Islands. U.S. Department of the Interior, U.S. Geological Survey Regional Aquifer-System Analysis, Professional Paper 1419

NOAA National Ocean Service Management & Budget Office. 2009. Coral Reef Habitat Assessment for U.S. Marine Protected Areas: U.S. Virgin Islands

Nealon & Dillon, 2001 Earthquakes and Tsunamis in Puerto Rico and the U.S. Virgin Islands USGS Fact Sheet FS–141–00, April 2001

National Cooperative Soil Survey, 1998: Official Series Description – GLYNN Series (usda.gov)

USDA, Soil Survey of the United States Virgin Islands: Soil Survey of the United States Virgin Islands (usda.gov)

FEMA Earthquake Hazard Maps: https://www.fema.gov/emergency-managers/risk-management/earthquake/hazard-maps

CARICOOS Nearshore Model (Version 7.0 – last updated April 2016) https://www.caricoos.org/

NOAA Historical Hurricane Tracks https://coast.noaa.gov/hurricanes

FEMA Flood Map Service Center: https://msc.fema.gov/portal/home

NOAA Tides and Currents: https://tidesandcurrents.noaa.gov/map/index.shtml?id=9751364

U.S. Annual/Seasonal Climate Normals (1981-2010) NCEI Climate Data Online Data Search https://www.ncei.noaa.gov/metadata/geoportal

NOAA National Data Buoy Center https://www.ndbc.noaa.gov/

2020-2025 United States Virgin Islands' Coral Reef Management Priorities, USVI DPNR-CZM

NOAA Technical Memorandum NOS NCCOS 187: Marine Protected Areas of the US Virgin Islands, Ecological Performance Report, October 2014

NOAA Center for Coastal Monitoring and Assessment, Biogeography Team. 2002. Benthic Habitat Atlas of Puerto Rico and the U.S. Virgin Islands

NOAA Office of Response and Restoration, Environmental Sensitivity Index Maps.

U.S. Fish & Wildlife Service Information for Planning and Consultation IPaC tool: https://ecos.fws.gov/ipac/

CARICOOS Nearshore Model (Version 7.0 – last updated April 2016) https://www.caricoos.org/

VI Environmental Protection Handbook (2002).

List of U.S. Virgin Islands locations by per capita income (2010):
https://en.wikipedia.org/wiki/List_of_U.S._Virgin_Islands_locations_by_per_capita_income

Virgin Islands Code Unannotated:

https://advance.lexis.com/container/?pdmfid=1000516&crid=15320b3f-532a-42c7-97043977ff33515c&config=024453JABiMWFjOTk0OS1hNTVlLTQ1MdctYmZkOS1mNGRkY2I0ZTg2YzQKAFBvZENhdGFsb2fNaUTUAugmXPqNctTcuqLy&ecomp=L5n_k&prid=0d954570-202a-4fef-9268-b4f97ae4228c

St. Croix East End Marine Park, ESRI, ArcGIS:
https://www.arcgis.com/apps/MapJournal/index.html?appid=9a963174e35c4c24aeec0b7b77410a7e

SEAWATER INTAKE & BRINE OUTFALL SYSTEMS (DESIGN OF LARGE SCALE)

https://epcmholdings.com/seawater-intake-brine-outfall-systems/

Department of the Army U.S. Army Corps of Engineers Washington, DC 20314-1000 EM 1110-2-3001 30 April 1995 Engineering and Design PLANNING AND DESIGN OF HYDROLECTRIC POWER PLANT STRUCTURES