Coastal Zone Management
Major Land Permit Application

Waste Water Treatment Plant Installation
Plot 3-DH, Estate Salt River
9003 Gentle Winds, Christiansted
St. Croix, U.S. Virgin Islands

Submitted by:

Gentle Winds Condominium Association (GWCA))

Submitted to:

U.S. Virgin Islands
Department of Planning and Natural Resources

December 02, 2022

Prepared by:
Caritech Group, LLC
P.O. Box 5018
Kingshill, St. Croix, USVI, 00851

Major Land Coastal Zone Management Permit Application Environmental Assessment Report

For The

Gentle Winds Condominium Association (GWCA)

New Wastewater Treatment Plant Installation
Plot No. 3-DH, Estate Salt River,
Christiansted, St. Croix
U.S. Virgin Islands

Submitted to the:
Department of Planning and Natural Resources
Coastal Zone Management Division
St. Croix, U.S. Virgin Islands

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Caritech Group, LLC.
125Cotton Valley
P.O. Box 5018
Kingshill
St. Croix, USVI 00851

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

SECTION 1 – NAME AND ADDRESS OF APPLICANT

Full name: Gentle Winds Condominium Association(GWCA).
Registered office 9003 Gentle Winds, Christiansted, St. Croix, USVI 00820
Place of Registration St. Croix, U.S. Virgin Islands

Gentle Winds is a condominium complex located on very pristine property along the North Central Coast of St. Croix just west of Salt River Marine and north of North Shore Road (Route 80). The complex is comprised of nine (9) residential buildings with a total of 66 condominium units; a maintenance building; a back-up generator building; and office building, swimming pool and beach bar.

SECTION 2 – LOCATION OF PROJECT

The U.S. Virgin Islands are composed of three major islands, with a number of smaller islands and cays. The three major islands are St. Croix, St. John, and St. Thomas. Located approximately 40 miles to the south of St. Thomas and St. John, St. Croix is the largest of the islands with an area of 84 square miles. It lies between latitudes 17°47' N and 17°41' N, and longitudes 64°54' W and 64°34' W. The island extends some 19 miles from east to west and 6 miles from north to south.

The installation of a packaged Waste Water Treatment Plant (WWTP) and a new electrical power supply system to service the new WWTP are being proposed. These will be located within properties owned by the Gentle Winds Condominium Association (GWCA) at Estate Salt River, St. Croix, U.S. Virgin Islands.

The GCWA condominium complex is situated on approximately 45 acres of pristine coastal land located on the north-central coast of St. Croix. It is located approximately 5 miles north-west of the town of Christiansted and ½ mile west-north-west of the Salt River Bay National Historic Park and Ecological Preserve. The regional location of the GWCA property is displayed in **Figure 2-1**.

2.1 Location Map

Gentle Winds is located west-north-west of the Salt River Bay National Historic Park and just north of North Shore Road (Route 80). The layout of the residential community is depicted in Figure 2.2 The actual WWTP project site is identified in the south-western corner of that aerial map. The property was first developed in the1970s.

2.2 Property Ownership and Address

The land on which the proposed WWTP will be installed is leased by GWCA and owned by the Gentle Winds Management Corporation (GWMC). A copy of the lease agreement between GWCA and GWMC is included in Appendix A of this application. Also included in Appendix A are copies of the deeds for the properties in question. The address and legal descriptions of the two impacted properties, based on survey maps from the United States Virgin Islands (U.S.V.I.) Government Cadastral offices, are as follows:

Proposed Waste Water Treatment Plant Installation Site
Plot No. 3-DH
Parcel No. 201300013700
Estate Salt River, North Side "B" Quarter, St. Croix, U.S.V.I.
Latitude: 17° 46' 44" N Longitude: 64° 45' 57" W

Proposed WWTP Electric Service Installation Route
Plot No. Rem 3
Parcel No. 20130016500
Estate Salt River, North Side "B" Quarter, St. Croix, U.S.V.I.
Latitude: 17° 46' 38" N Longitude: 64° 45' 55" W

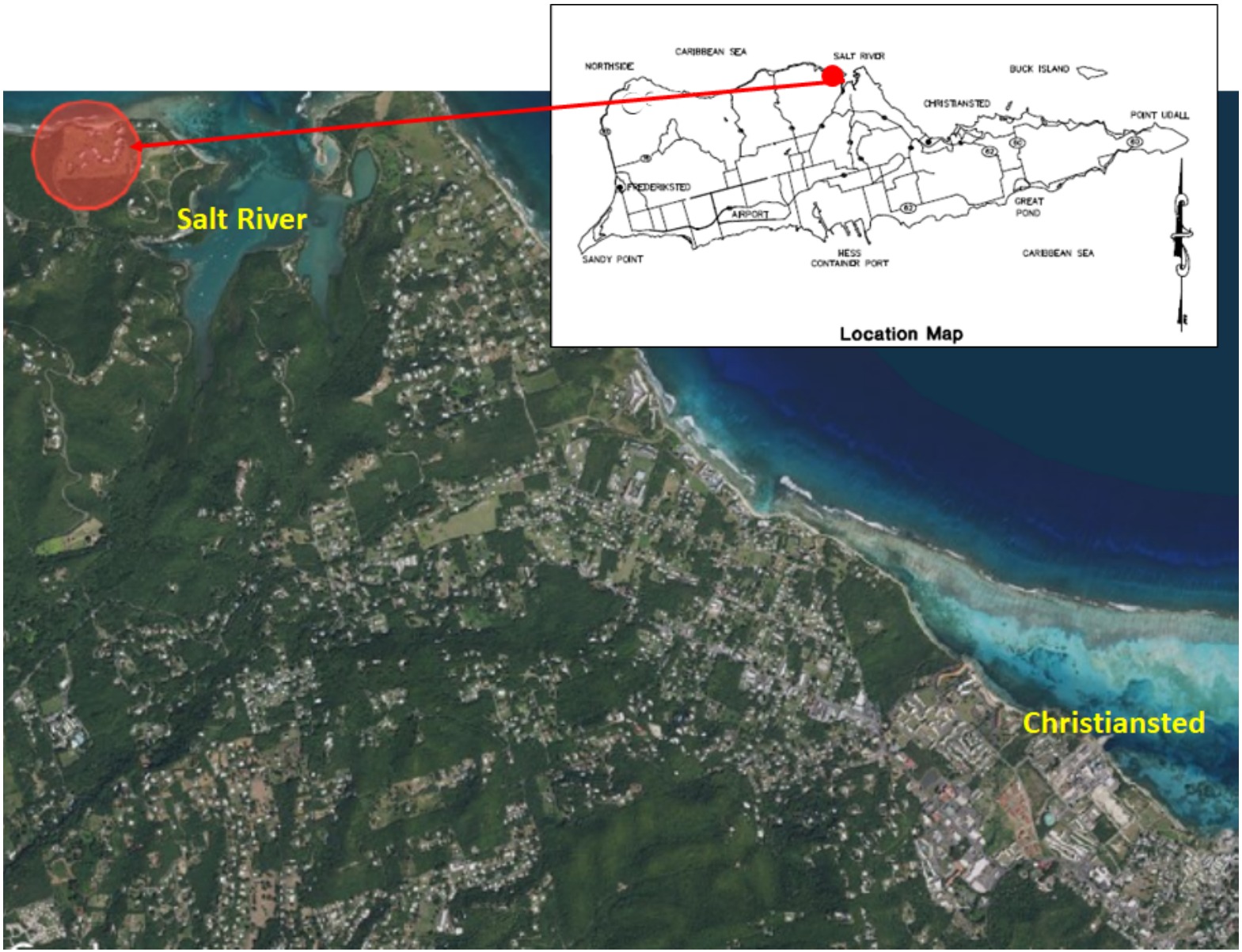

Figure 2.1 Regional Location of Gentle Winds Condominium Complex

Figure 2.2 WWTP Site Location

SECTION 3 – ABSTRACT

The Gentle Winds condominium complex, located at 9003 Gentle Winds, Christiansted, St. Croix, is served by an aging conventional activated sludge (CAS) wastewater treatment plant which was first installed when the complex was constructed back in the early 1970s. The plant is designed to process about 15,000 GPD of wastewater and the sewage treatment component consist of three activated sludge/aeration tanks where primary and secondary treatment steps are completed, followed by a sand filtration step and chlorination of the effluent water.

The GWCA is proposing to replace the existing WWTP with a 20,000 GPD Membrane Aerated Biological Reactor (MABR) Treatment Unit to be designed and constructed by Fluence Corporation. This state-of-the art treatment technology is a low energy advanced aerobic biological treatment system. The new WWTP will be assembled in a 40 ft shipping container overseas and transported to St. Croix for installation. The packaged plant is designed for fast installation and start-up. It consistently delivers high-quality effluent at a significantly lower electrical energy consumption than traditional wastewater treatment systems. In addition, the operation of this system requires minimal maintenance, resulting in lower operating costs.

The new wastewater treatment plant will be located on a parcel of land owned by the Gentle Winds Condominium Association which is Plot No. 3-DH, Estate Salt River, North Side "B" Quarter, St. Croix, U.S. Virgin Islands. This parcel of land is currently occupied by the existing WWTP and is approximately 0.16 acres in size. The property north of Rem. Plot No. 3 where the condominium buildings are located was first developed in the late 1970s Rem Plot 3 is currently undeveloped and is zoned for residential use (R-3).

A new electrical WAPA service will be installed to feed the new WWTP with 3-phase, 480V electrical power. This will require new pole-mounted, WAPA-provided transformers, a new power feed from the transformers at the entrance to Gentle Winds, on North Shore Road, to the Generator Building, and a branch electrical circuit from the Generator building to the WWTP control and power panel.

Alternatives for meeting the objectives of this project include the construction of a new WWTP (the proposed action), Replacement-in-kind or taking no action and continue using the existing WWTP. The only alternative that meets the project objectives and criteria is the proposed action. Continued use of the existing WWTP is not a viable option.

The installation of this new WWTP and power supply system will result in minimal impacts on the environment in the coastal zone. The proposed site for construction activities has been previously disturbed. An archeological survey of the area conducted a couple of years ago by a qualified archeologist did not produce any evidence of the presence of historical resources. The Director of VISHPO was contacted regarding this project and has since reaffirmed in recent email correspondence that a 2020 archaeological phase I A & B survey

can be used for their new wastewater treatment plant project because "it covers well the resources status of the site and because the area in question is highly disturbed". Recent email correspondence with the VISHPO and a copy of that 2020 "No Objection" Letter is included in Appendix B of this Environmental Assessment Report (EAR).

SECTION 4 – STATEMENT OF OBJECTIVES SOUGHT BY THE PROPOSED PROJECT

The primary objective of this project is to replace the existing, corroded, dilapidated CAS WWTP with a state-of-the-art 20,000 GPD MABR packaged treatment unit to meet the wastewater treatment needs of the Gentle Winds condominium complex This will require the installation of a new 3-phase WAPA service feed to power the 480V/277V, WWTP Control Panel.

The complex comprises of nine (9) condominium buildings, an office building, a beach bar, a swimming pool, a maintenance building and a building to house the back-up generator. The residential buildings consist of sixty-six (66) units comprising of a mix of 2-bedroom and 3-bedroom units broken down as follows:

Table 4.1- Gentle Winds condominium complex Infrastructure Data

Infrastructure	No. of Condo Units	Condo Building	No. of Units
Bldg. A	8	Bldg. I	10
Bldg. B	4	Bldg. J	8
Bldg. C	8	Bldg. K	8
Bldg. D	8	Bldg. L	4
Bldg. E	8	Office Bldg.	N/A
Maintenance Bldg.	N/A	Generator Bldg.	N/A
Swimming Pool	N/A	Beach Bar	N./A

The Civil/Site Scope of Work will encompass the following:

- Decommission 5,000 gallons and 10,000 gallons aeration/sludge tanks to make space for the new wastewater treatment packaged plant
- Construction of a 42’ x 10’ concrete pad for the 40’ container housing the new unit.
- Installation of solids, equalization and activated sludge tanks, each with a capacity of 5,000 gallons
- Connection of the new WWTP to existing wastewater feed & distribution system and new electrical supply line followed by commissioning and startup.
- Decommissioning of 20,000 gallons aeration/sludge tank and old sand filter system

The Electrical Scope of Work will encompass the following:

- Installation of a new electrical WAPA service to feed the new WWTP with 3-phase, 480V electrical power.
- This involves new pole-mounted, WAPA-provided transformers, a new power feed from the transformers at the entrance to Gentle Winds to the Generator Building and a branch electrical circuit from the generator building to the WWTP control & power panel.

- For expansion purposes, the new power feed trench will include additional conduits and in-ground boxes for a future 3-phase WAPA service for the entire property and a possible Solar PV array

SECTION 5 – DESCRIPTION OF PROJECT

5.1 Existing Site Conditions

The property is located in Estate Salt River on the north-central shores of the Island of St. Croix. The proposed WWTP will be sited on Plot No. 3-DH (Parcel No. 201300013700) which is a disturbed site and which currently has the existing WWTP. This parcel of land consists of an area of about 0.16 acres and is zoned R-3 (Residential).. It was cleared of vegetation and excavated back in in the early 1970s when the existing conventional activated sludge treatment plant was installed to serve the condominium complex.

An electrical power supply line that will be installed to provide power to the new WWTP will be installed underground along the western perimeter of the Rem of Plot No. 3 (**See Figure 5-1**). It is undeveloped and zoned R-3 (Residential). The part of that parcel of land is heavily wooded and has a ground surface elevation sloping from east to west of +60 to +50 feet Mean Sea Level (MSL). The route proposed for the installation of the underground electrical conduit is clear of thick vegetation and will run from an existing VIWAPA pole at the intersection of North Shore Road (Route 80) and Ocean View Road (Gentle Winds Drive Way) leading up to the condominium complex. This track of land consists of gentle rolling land ranging in elevation from 50 to 60 feet. The land slopes gently from the southeast to the northwest.

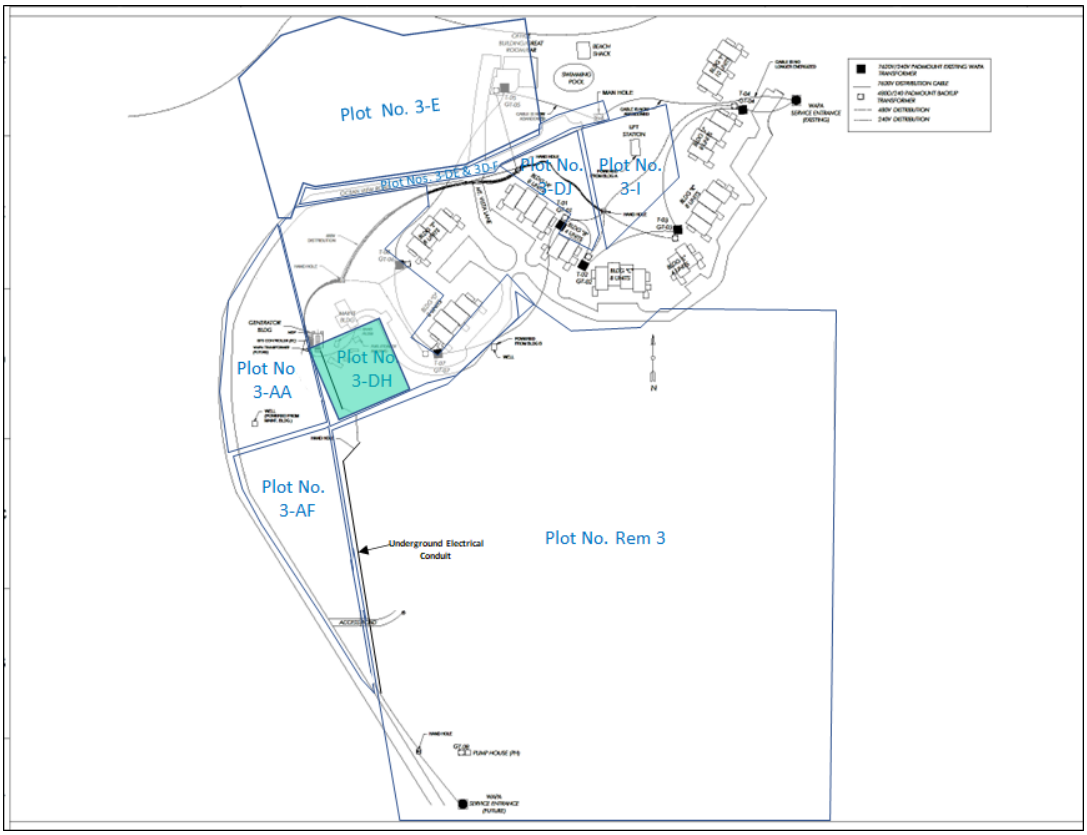

Figure-5-1 – Plot that will be impacted by the WWTP installation Project

5.2 Proposed Waste Water Treatment Plant

The GWCA is proposing to replace the existing Conventional Activated Sludge (CAS) WWTP with a 20,000 GPD Membrane Aeration Biological Reactor (MABR) tertiary treatment plant designed by Fluence Corporation. The current treatment plant is designed to process about 15,000 GPD and was originally constructed back in the 1970s and is in a general state of disrepair.

The new treatment plant is based on state-of-the-art technology and is a low-energy advanced aerobic biological treatment, based on the Membrane Aeration Biofilm Reactor (MABR) process. The new WWTP will be installed in a 40 ft Container off-site and shipped to St. Croix. This packaged wastewater treatment solution consistently delivers high-quality effluent water with a low energy consumption (up to 50% less than the traditional CAS technology). The packaged design is for fast installation and start up. Operation requires minimal maintenance, resulting in lower operating costs. Due to high technology reliability, maintenance is easy and maintenance costs are low. Due to high process efficiency of the MABR technology, the plant occupies a small footprint

After processing from the MABR reactor, the waste water will be sent to a clarifier where the effluent water will be separated from the activated sludge. The effluent water will then be sent through a fine screen to remove any additional suspend particles not separated in the clarifier and then sent through a sand filter system before being chlorinated and transferred to a 30,000-gallon cistern which is located under the maintenance building. The effluent water will be re-used for landscaping irrigation and flushing the toilets in the 66-units condominium complex. The design parameters for the MABR WWTP are listed in **Table 5.1** below:

Table 5.1 MABR WWTP Design Basis- Influent and Effluent Water Quality Parameters
Influent and Treated Effluent Wastewater Characteristics

Parameter	Units	Influent	Tertiary Effluent Quality
Minimum wastewater design temperature	ºC	25	
Biological treatment design flow	m^3/d	76 [20,000 GPD]	
pH range	-	6.5 – 8.5	
Chemical Oxygen Demand	mg/l	500	≤100
Biochemical Oxygen $Demand_5$	mg/l	250	≤10
Total Suspended Solids	mg/l	250	≤10
TKN (influent) / TN (effluent)	mg/l	55	≤25
TP	mg/l	15	≤1

A 3-D schematic of the Fluence Corporation Aspiral M1 MABR is shown in **Figure 5.2** below:

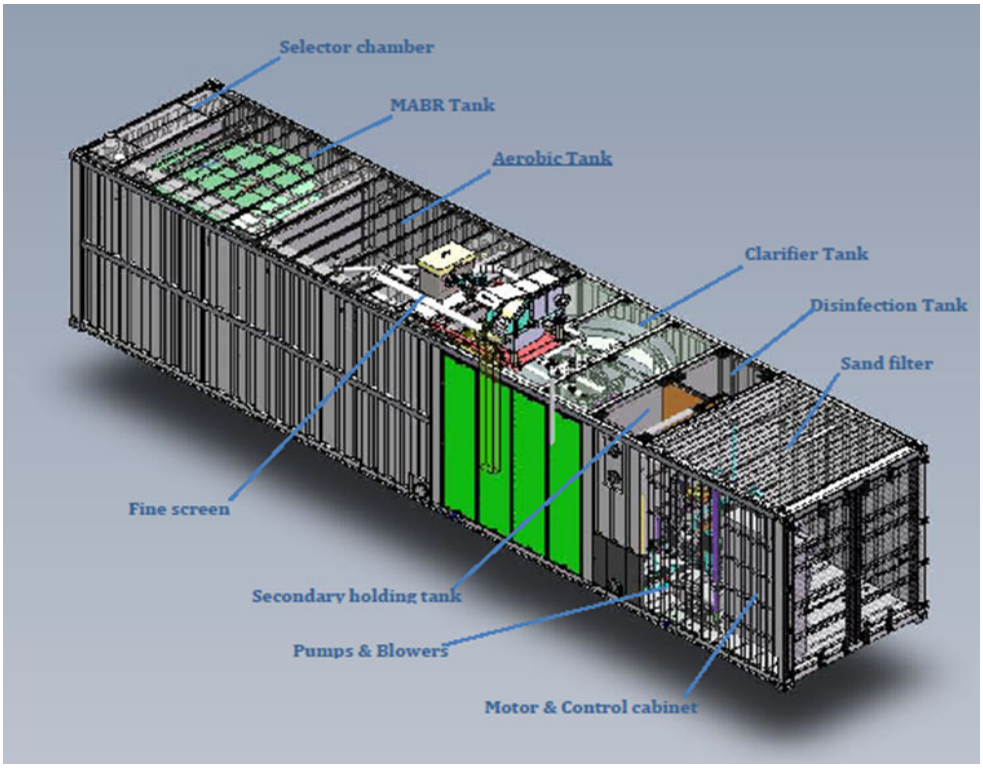

Figure 5.2 3-D Schematic of the Aspiral M1 MABR WWTP

A project site layout plan is depicted in **Figure 5.3** below. A complete set of project engineering drawings is included in Appendix E.

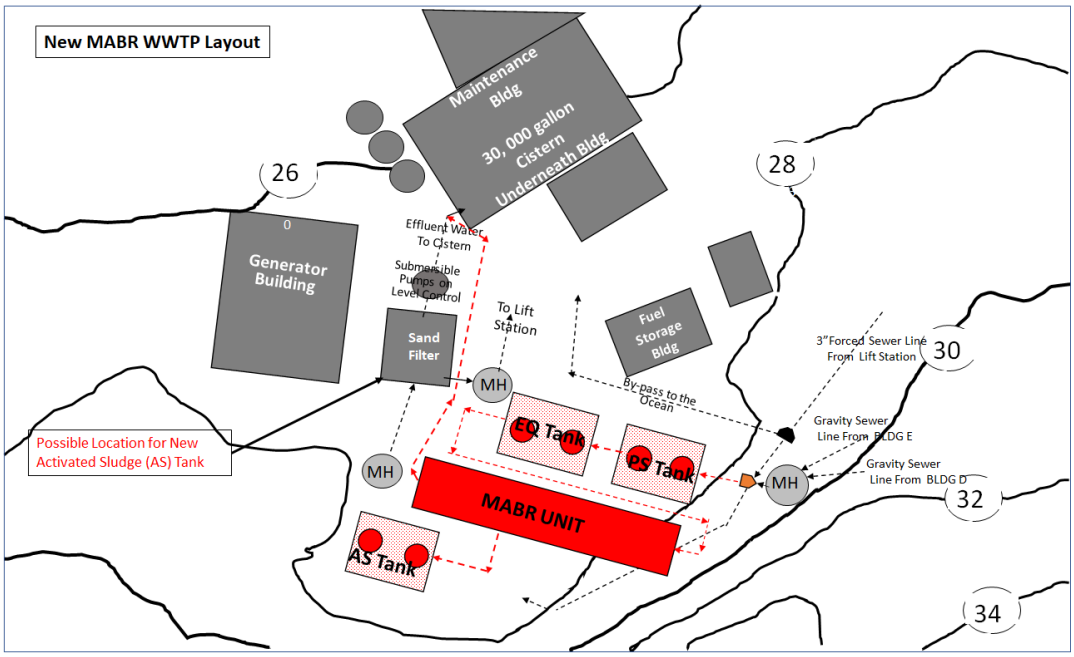

Figure 5.3 – New WWTP System Layout Plan

5.3 Project Work Plan

Project Schedule

GWCA proposes the following sequence of activities for the installation of the WWTP as outlined in **Table 5-2**.

Table 5-2. Proposed Project Schedule for WWTP Project

Date	Action
4th Quarter, 2022 to 1st Quarter, 2023	Submission of all Environmental & Construction Permit Applications to the DPNR
May/June, 2023	Mobilization Site Preparation Place erosion and sedimentation controls Construct Best Management Practices (BMPs) Install underground electrical power supply system
June/ July , 2023	Decommissioning of CAS Tank A & Tank B Excavation and Preparation for Primary Solids, Equalization & Activated Sludge tanks Installation of Primary Solids, Equalization & Activated Sludge Tanks Construction of Concrete Pad for MABR WWTP Container
July/September 2023	Commissioning, Start-up and Operation Decommissioning of CAS Tank C(20,000 gallons)

Construction Equipment

Major equipment to be utilized in the project will include a dump truck, a flatbed truck, a backhoe, excavator, and a small crane.

SECTION 6 – ENVIRONMENTAL SETTING AND PROBABLE PROJECT IMPACT ON NATURAL ENVIRONMENT

6.1 Climate and Weather

The climate throughout the U.S.V.I. is maritime tropical, generally consisting of fair weather and steady easterly trade winds. Mean air temperatures range between 76º and 82º Fahrenheit (F) throughout the year (NRCS 2002). The highest temperatures occur in August through September and the lowest are typically from January through February. The highest average daytime temperature in the warmest months is about 88º F, and in the coolest months is in the low 80s. Nighttime lows are usually in the mid-70s during the warmer months and in the high 60s during the cooler months (USGS 1996).

Rainfall amounts vary with topography and increase at higher elevations. The wettest period is generally from September to December, and the driest period is from January to June (USGS 1996). The average annual rainfall on St. Croix is approximately 42 inches, ranging from 30 inches toward the eastern end of the island to more than 50 inches at the higher elevations to the west. The Estate Salt River area receives about 35 inches of rainfall per year on average.

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

The official hurricane season is from June 1st to November 30th. Hurricanes occur most frequently between August and October with their peak activity occurring in September. Hurricane winds may easily exceed well over 74 miles per hour and significantly affect the area. Bowden, M.J. et. al., (1969) estimated the annual probability of a hurricane to be one every sixteen years. However, more recent computer simulations of future hurricane intensity and precipitation as a result of a CO_2-induced warming environment (global warming) predict increased intensity of rainfall (i.e., bigger storms that concentrate rain in time) for many areas of the world including the Atlantic basin (Knutson and Tuleya, 2004).

Since 1989, the Virgin Islands were significantly impacted by Hurricane Hugo in 1989, Hurricanes Luis and Marilyn in 1995 and Hurricanes Bertha and Hortense in 1996. In addition, Hurricane Georges passed directly over St. Croix on September 21, 1998 and Hurricane Lenny, a Category 4 hurricane, impacted St. Croix on November 17, 1999. Hurricane Lenny developed very late in the season and approached the island from the southwest. Minor Hurricanes Earl and Irene did some limited damage to the Virgin Islands in 2010 and 2011.

Most recently (2017), the U.S. Virgin Islands and the Central Caribbean were hit with Hurricanes Irma and Maria, two major category storms within two weeks of each other. Irma made a direct hit on St. John and St. Thomas and Maria made a direct hit on St. Croix causing widespread damage and devastation. Hurricane Irma passed over St Thomas, US Virgin Islands as a Category 5 storm on September 6, 2017, with peak winds of 180 miles per hour. Two weeks later, on September 20, 2017, Hurricane Maria hit St Croix, as a

Category 5 storm with sustained winds of 175 mph and then moved across Puerto Rico causing widespread destruction and devastation. The islands have made significant progress in recovering from these two devasting hurricanes.

The project will not have a measurable impact on climate or weather patterns but will significantly reduce the carbon footprint of the WWTP. **(See Section 7.3 Impacts on Public Services and Utilities)** Electricity consumption will be reduced by 50% or more.

The three tanks to be installed (primary solids separation, equalization & activated sludge tans) will be made of precast concrete and installed underground (below grade). The 40 ft container housing the MABR Unit will be anchored to a concrete pad using a twist lock mechanism. Ground plates will be bolted into the concrete foundation in locations where the four corners of the container will sit. Once installed, the container will be lowered onto the plates so that the corner castings align with the twist locks. When the levers are twisted into place, the container is secure.

All structures to be constructed on the site will be designed to meet hurricane standards and to withstand environmental conditions at the site.

6.2 Landform, Geology, Earthquakes and Soils

Landform

The project site is centrally located on a gently sloping plain that forms the northern-central coastal portion of that region of St. Croix. This track of land consists of gently rolling land ranging in elevation from 30 feet to 60 feet.

Geology

According to an article published by H. H. Hess et al (1966) in the Journal of the Geological Society of America, the bedrock of St. Croix is generally composed of volcanic uplands and sedimentary lowlands. Underlying the project site is part of a large layer of surficial deposits. This layer comprises the Caledonia formation, the Cane Valley Formation, and the Judith Fancy Formation. The oldest rocks exposed on St. Croix are the alternating dark and light-banded sedimentary rocks of the Caledonia Formation. These rock formations are tophaceous rock consisting of consolidated volcanic ash ejected from vents during a volcanic eruption. There are some igneous rocks located in Windsor in the Northside range and Recovery Hill in the East End Range.

The Caledonia formation is characterized by alternating layers of light-gray and bluish-black beds. The lighter colored rocks are sandstones and conglomerates. The darker colored rocks are either mudstones or silicified mudstones or chert. The Caledonia Formation grades laterally and vertically into a variety of other sedimentary rocks, including the Allandale Formation, the Cane Valley Formation, the East End Member (of the Caledonia Formation), and the Judith Fancy Formation. Although these rocks are variable in lithology, all contain tophaceous material or fragments of altered glass and crystals deposited originally as volcanic ash. The rocks are probably all of marine origin, and the sediments show signs of reworking by currents.

The GWCA property lies on the north central coast of St. Croix in the Coastal Plain (**see Figure 6-1**). The Coastal Plain, which is composed of sedimentary rocks of Tertiary age, occurs in a graben between the Northside and East End ranges. The Tertiary sediments are divided into two formations, the upper Kingshill Marl and the older Jealousy Formation. The Jealousy Formation was seemingly derived from reworked volcanic ash, while the Kingshill Marl is composed of reef limestone.

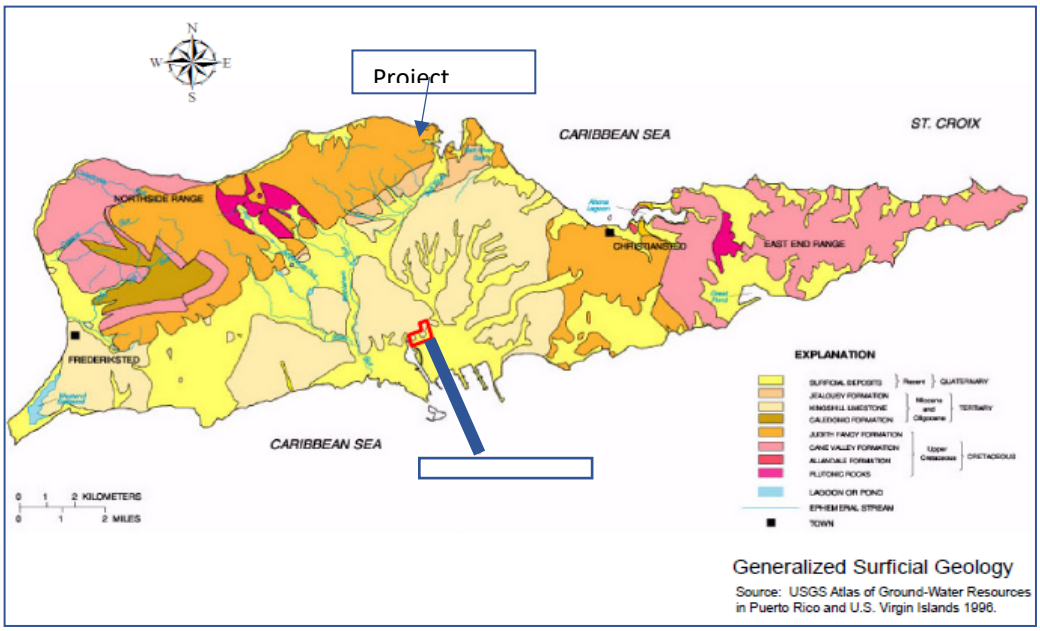

Figure 6.1 St. Croix Geology
Source: USGS Ground Water Resources

Earthquakes

The U.S.V.I. is susceptible to earthquakes and tsunamis (tidal waves) (Hays, 1984). The last major earthquake in the islands occurred in 1867. The earthquake probability map for St. Croix, produced by the University of the Virgin Islands (UVI) Conservation Data Center, is shown in **Figure 6-2**.

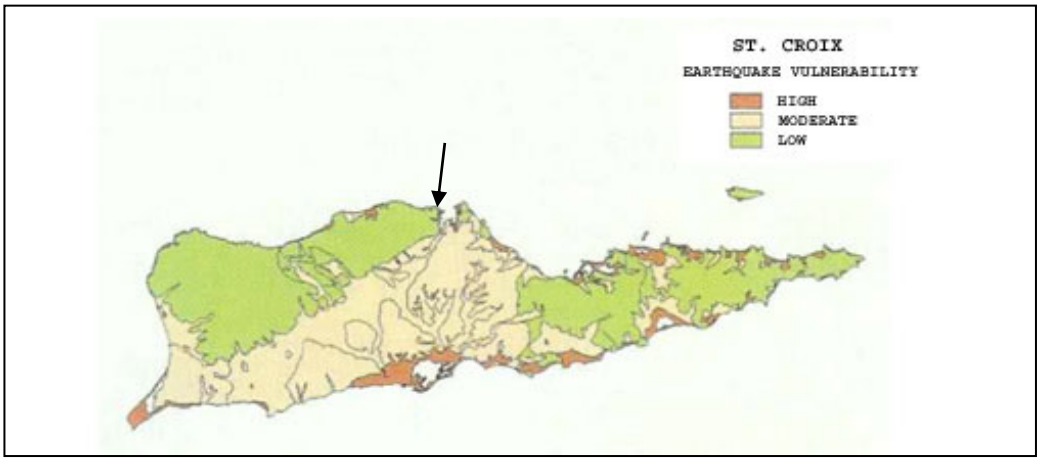

Figure 6.2- Earthquake Probability Map
Source: UVI Conservation Data Centre

Soils

The soils in the vicinity of the existing WWTP were mapped by the USDA Soil Conservation Service and published in the Natural Resources Conservation Service (NRCS 2008) reports. This survey reports that the soil type over the entire WWTP project site is comprised of Victory-Southgate Complex (VsC) 2 to 12 % slope. A brief description of this soil type is presented below and the approximate distribution on the site is depicted in **Figure 6-3**.

> **Victory-Southgate Complex (VsC),** 2 to 12 percent slopes, is described as a well-drained, very stony soil with moderate permeability. The typical soil profile is a brown gravelly loam from top soil to 6 inches , followed by a very dark yellowish brown gravelly loam layer followed by a pale brown very gravelly loam substratum layer and then bed rock. The soil has a low shrink-swell potential.

The soil types along the proposed route for the underground electrical supply line from the North Shore Road to the Generator Building are comprised of Cramer Victory Complex (CvC) and Cramer-Victory Complex (CvD . The descriptions of both soils are provided below:

> **Cramer-Victory Complex (CvC) – 2-12 % slope** . This soil is a well-drained, stony soil with a moderate to moderately slow permeability. There is a restrictive layer of bedrock at approximately 10 to 20 inches. The typical profile is gravelly clay loam to very gravelly loam with igneous bedrock encountered at a depth of 10 to 40 inches. The Cramer component of the soil has a high to very high organic content and the Victory component has a relatively low organic content
>
> **Cramer-Victory Complex (CvD) – 12-20% slope.** This soil is described as a well-drained very stony soil. It has a high to very high organic content with a moderate to moderately slow permeability. The typical profile is gravelly clay loam to very gravelly loam with igneous bedrock encountered at a depth of 10 to 40 inches and extending to a depth of about 60 inches.

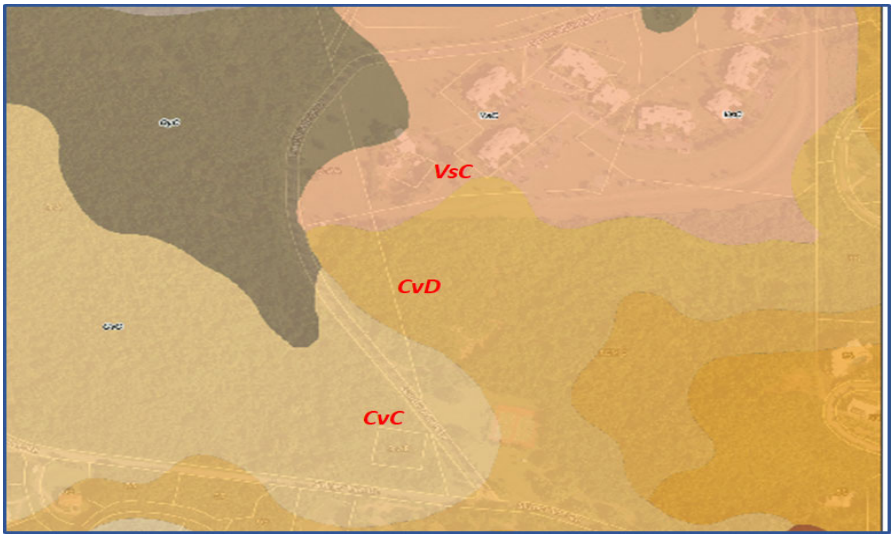

Figure 6.3-Approximate Distribution of NRCS Mapped Soil Units at Gentle Winds Site

6.3 Drainage, Flooding and Erosion Control

Drainage

The proposed WWTP installation site is a small parcel of land on Gentle Winds property, specifically at plot 3-DH, Estate Salt River, Christiansted, St. Croix. The site is located at an elevation between 28 and 30 feet above sea level with a gentle sloping to the north and west. The site is a disturbed site and is devoid of vegetation except grass. The vegetation in the adjoining areas of the proposed construction site consists of grasses, shrubs, and a few trees.

The existing site drainage generally flows from southeast to northwest away from the project area, eventually reaching into an earthen drainage ditch located adjacent to the main driveway of Gentle Winds approximately 250 feet from the project site. The stormwater continues to flow generally north for approximately another 450 feet before discharging into the Caribbean Sea.

Flooding

Flooding on St. Croix occurs in the guts at the lower elevations during high intensity rainfall as water drains from the steeper slopes of the mountainous areas in the northern part of the island (NRCS 2002). The project site is located outside the Federal Emergency Management Agency (FEMA) Flood Zones and is designated Zone X as shown in **Figure 6-4**.

A segment of the Gentle Winds property, about 50 feet inward from the shoreline where the office building, swimming pool and the beach bar are located, experienced some flooding during Hurricane Maria (2017). This area is in a FEMA Flood Zone AE. The typical waves and wave patterns that impact the shoreline at Gentle Winds would have no effect on the WWTP which is located about 30 feet above mean sea level (MSL) and about 700 feet inland from the shore line.

The proposed underground duct bank which will be installed to supply power to the WWTP will run from North Shore Road (Route 80)) alongside the western perimeter of Rem Plot No.3 which adjoins the Gentle Winds driveway. The proposed route is located in an area that is 50 feet above MSL and a FEMA Flood Zone X designation

Erosion Control

GWCA is sensitive to the protection and preservation of both the marine and terrestrial eco-systems. Effective sediment control requires effective erosion control. Preventing soil particles from entering storm water runoff is the most efficient way to prevent sediment from leaving the site. The project will be constructed using Best Management Practices (BMPs) in order to reduce erosion.

BMPs will be employed during construction and will include installation of a silt fence on the down-gradient (north and north-west corner) side of the site. The silt fence will be maintained until the end of construction. Additionally, a double silt fence will be installed up-gradient from the earthen storm drain located adjacent to the main driveway of Gentle Winds approximately 250 feet from the project site. The silt fences will be inspected

weekly and after every rain event that produces runoff within a 24-hour period and repaired or replaced, as necessary. Silt fencing will be cleaned out when sediments have reached 6 inches in depth.

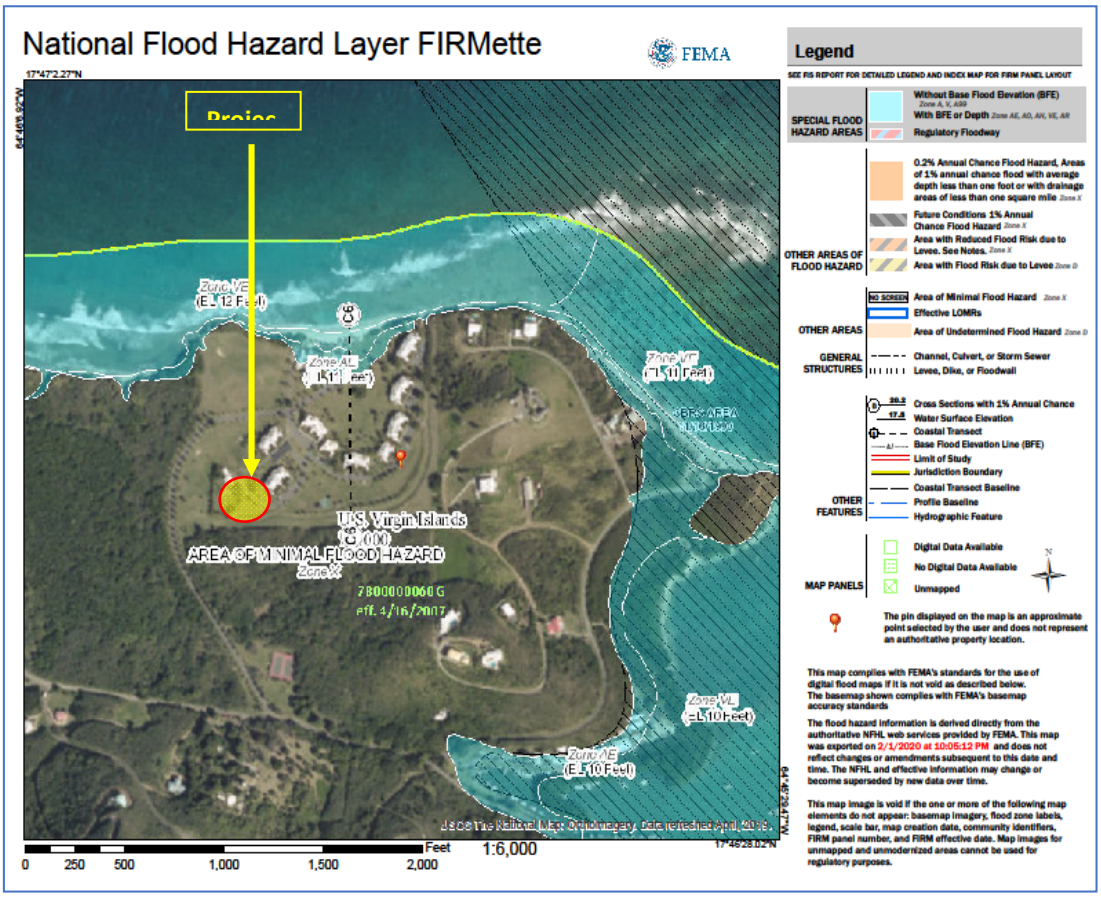

Figure 6.4 – FEMA Flood FIRM Map of Gentle Winds WWTP Project Site

Figure 6.5 – Gentle Winds Mapgeo USVI FEMA Flood Zones

6.4 Fresh Water Resources

Fresh water is a limited resource in the U.S.V.I. (DPNR 2000). The Kingshill Limestone formation of central St. Croix is the only ground water aquifer on the island. The closest natural perennial freshwater surface resource to Gentle Winds is Salt River Gut which flows into Sugar Bay which ultimately feeds into Salt River Bay approximately about ½ mile to the south-east of the Gentle Winds condominium complex. There are no fresh water ponds or surface water resources in close proximity to the project site.

The closest public water supply line from VIWAPA is located at the intersection of North Side Road and North Shore Road (Route 80). Potable water to the Gentle Winds condominium complex is supplied by a few wells on the property as well as the collection of rainwater from the roofs of the buildings which are stored in basement cisterns underneath each building. That water is treated via reverse osmosis.

6.5 Oceanography

Seabed Alteration

The proposed project is located inland and would not affect the marine benthic environment. The water quality requirements of effluent water from the WWTP will meet the TPDES permit limits set by DPNR . The effluent water will not be discharged into the ocean but will be stored in a 30,000-gallon cistern at the WWTP site and used for landscaping irrigation and flushing the toilets in the condominium complex.

Tides and Currents

The Virgin Islands coastal areas are not subject to significant tidal ranges or tidal currents. Due to the small size of the islands, the sea flows around the island, causing an average tidal height of only a few inches and maximum change of only a little over a foot. The mean tides range from 0.8 feet to 1.0 feet and the spring tidal ranges reach up to 1.8 feet (IRF 1977). Normal tidal ranges may be greatly exceeded during storm conditions, however, when a combination of lower barometric pressure at the ocean surface and storm winds amplify the tidal crest.

A. H. Gleen and Associates (1973) estimated the 10-year and 100-year storm tides for the project area to be 20 inches and 36 inches respectively offshore and four feet and seven feet respectively at the shoreline. The tides on the north coast of St. Croix are primarily diurnal in nature.

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. Currents off the north shore of St. Croix average around 0.7 knots. The dominant currents along the north coast of St. Croix run from east to west driven by easterly trade winds. In general, water flow parallels the coast from east to west, following the trend of bottom contours (**Figure 6-6**). Water currents are largely wind and wave driven with only a minor influence attributable to the small tides in this part of the Caribbean.

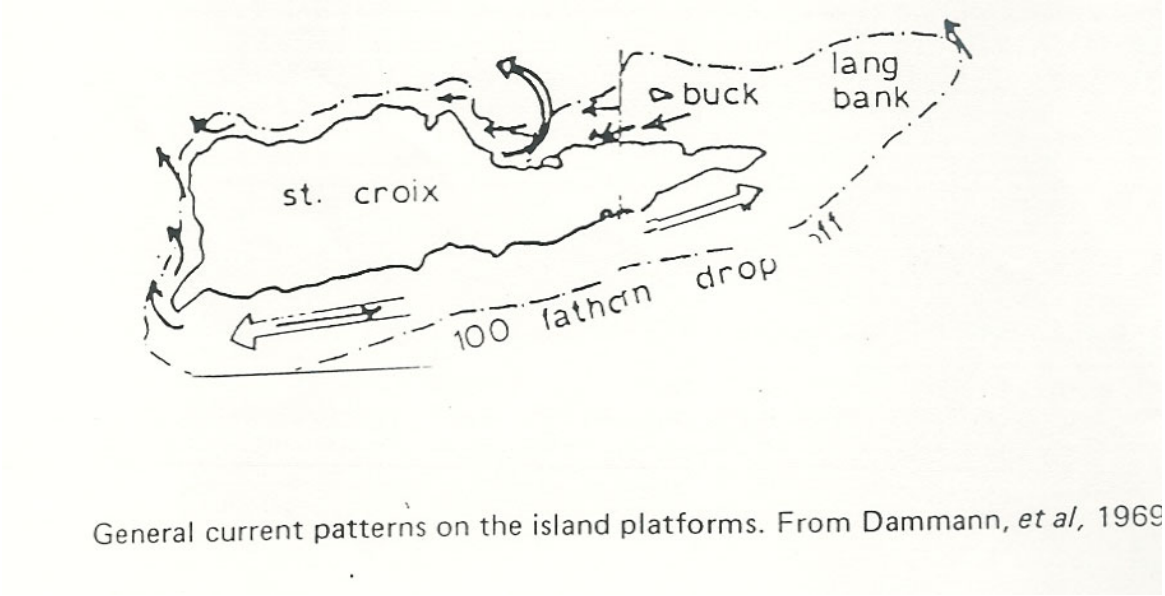

Figure 6-6 General Currents off St. Croix (IRF 1977)

Waves

The deep-water waves off St. Croix are primarily driven by the northeast trade winds that blow most of the year. Waves average from one to three feet from the east, 42 percent of the time throughout the year (IRF, 1977). For 0.6 percent of the time easterly waves reach twelve feet in height. The southeasterly swell with waves one to twelve feet high become significant in late summer and fall when the trade winds blow from the east or when tropical storms and hurricanes pass the islands at a distance to the south. During the winter months, the northern swells are larger than in the summer and develop to a height of one to five feet. Numerous studies have been conducted along the north shore in the Salt River Bay Area. These studies have determined that the wave amplitude ranges between two feet and six feet most of the time and that waves seldom exceed ten feet.

A. H. Glenn and Associates, through analysis of wave regime and submarine conformation of the area, have predicted that the maximum wave heights for the 10- and 100-year periods have crests of 27 feet and 40 feet above still water depth, respectively. The corresponding wave periods are 12 and 15 seconds, respectively. The National Hurricane Center's Storm Surge Group has determined that the maximum envelope of water - the height of water over mean sea-level - will occur at the site during a Category 5 storm from the north northwest, northwest or north, and will be 6.8 feet in height.

The proposed GWCA project will not affect wave action on the north central coast or Salt River Bay.

Marine Water Quality

Storm-water run-off from the Gentle Winds Property discharges into the Caribbean Sea immediately west of Salt River Bay. DPNR has water quality monitoring stations (STC-33A,B) in the vicinity of Gentle Winds that cover Salt River (Columbus Landing Beach) and

Gentle Winds (**See Figure 6-7**). Marine waters in that location has a water quality classification of B.

According to the USVI Integrated Water Quality Monitoring and Assessment Report (DPNR 2018), the coastal waters off St. Croix are primarily designated for Class B uses, which are of a quality sufficient for "propagation of desirable species of marine life and for primary contact recreation (swimming, water skiing, etc.)". The criteria for maintaining this class are defined by the Virgin Island Code of Rules and Regulations (VIR&R) Title 12, Chapter 7, Section 186-3(b), and are listed in **Table 6-1**. Class C waters require similar, but less stringent standards, and are limited to industrial areas and Class A waters are designated for the "preservation of natural phenomena" and are only found around Bucks Island.

Table 6-1 Water Quality Criteria

Parameter	Class B Criteria	Class C Criteria
Dissolved Oxygen	Not less than 5.5 mg/L	Not less than 5.0 mg/L
pH	7.0 – 8.3	6.7-8.5
Temperature	< 90 F	< 90 F
Bacteria	Not to exceed 70 fecal coliforms per /100 ml by MF or MPN count; Not to exceed a geometric mean of 35 enterococci per 100 ml; Not to exceed a single sample maximum of 104 per 100 ml at any time	Not to exceed 200 fecal coliforms per /100 ml by MF or MPN count; Not to exceed a geometric mean of 35 enterococci per 100 ml; Not to exceed a single sample maximum of 104 per 100 ml at any time
Phosphorus	< 50 mg/L	Same as Class B
Suspended, Colloidal, Settleable Solids	None from wastewater which would cause deposition or be otherwise deleterious	Same as Class B
Oil and Floating Substances	No residue attributable to waste water. No visible film; no globules of grease	Same as Class B
Radioactivity	Gross Beta: 1000 picocuries per liter, in the absence of Sr90 and alpha emitters Radium-226: 3 picocuries per liter Strontium-90: 10 picocuries per liter	Same as Class B
Taste and Odor	None in amounts to interfere with use for primary contact recreation, potable water supply or to render undesirable taste or odor to edible aquatic life	None in amounts to interfere with use for primary contact recreation, potable water supply or to render undesirable taste or odor to edible aquatic life
Color and Turbidity	A. A secchi disc shall be visible at a minimum depth of one meter. For waters where the depth does not exceed one (1) meter, the bottom must be visible. B. A maximum nephelometric turbidity unit reading of three (3) shall be permissible	A secchi disc shall be visible at a minimum depth of one meter.

MPN-most probable number
Source: DPNR, 2016

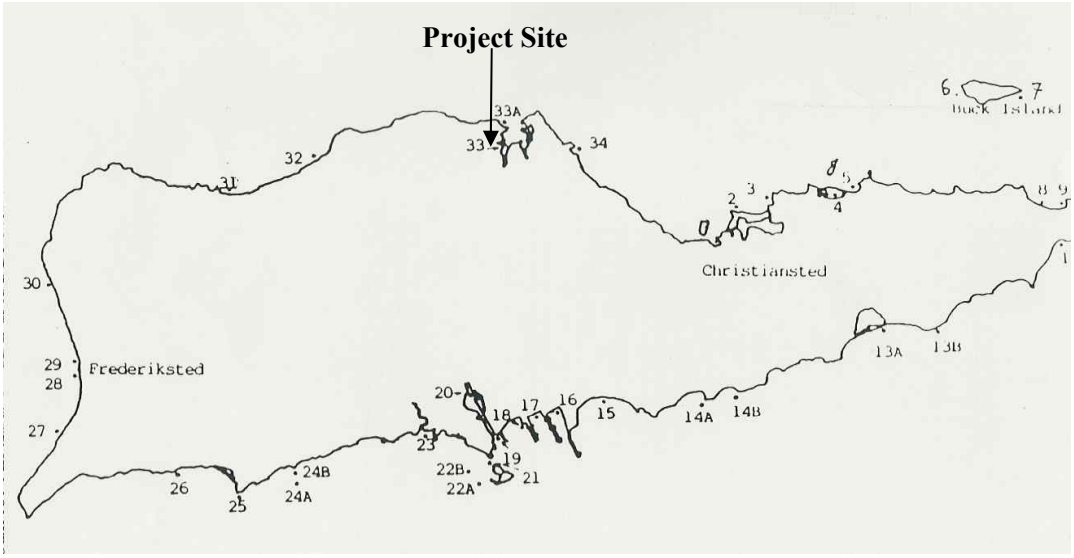

Figure 6-7 Location of DPNR Sampling Stations around St. Croix

6.6 Marine Resources

The proposed project site is located 700 feet upland of the coastal waters of the Caribbean Sea and ½ a mile west-north-west of the Salt River Bay National Historical Park and Ecological Preserve.

As both a historical park and ecological preserve, Salt River Bay National Historical Park and Ecological Preserve protects abundant archeological resources representing a mixture of cultural groups potentially dating as far back as 2,000 years as well as vital coastal habitats representative of the diverse ecological sites on St. Croix. The Salt River Watershed feeds into a bay populated with mangrove forests and protected by coral reefs. This ecosystem provides a habitat and sustains rare, threatened, and endangered plant and wildlife species. The existing estuarine bay flows into open marine waters and flows over the edge of a submarine canyon consisting of a shallow pavement shelf which empties into a 3-mile-deep basin, called the Virgin Islands Trough, just north of St. Croix. The shelf consists of scattered elkhorn, brain, fire, boulder, and staghorn corals, while the walls are dominated by lettuce leaf corals (Agaricia spp.), sponges, and other soft corals; the canyon floor consists of seagrasses and seaweed beds.

Given the location of the proposed site for the project and the proposed use of the effluent water, there will be no impact on any resources in the marine environment. Periodically, activated sludge collected from the treatment plant will be disposed by a contractor using environmentally safe and proven methods.

6.7 Terrestrial Resources

In 2020, a plant and wildlife animal expert from the University of the Virgin Islands Experimental Station conducted a flora and fauna field survey of the forested area on Rem. Plot No. 3 to the north of Plot No. 3-DH, the site which currently houses the WTTP. This survey was conducted to document terrestrial resources. Vegetation and wildlife were observed on that property and recorded.

The expert and two assistants did a thorough reconnaissance of the heavily forested areas. They measured the heights and diameters of all trees greater than 4" diameter to get a better understanding of species composition and forest structure. They did not encounter any rare or endangered plant or animal species and found evidence that the site was already highly disturbed area.

They discovered a highly impacted young secondary forest or thicket. A thicket being defined as "a very dense stand of trees or tall shrubs often dominated by one or a few species to the exclusion of all others." About fifty (50) percent of the area in question is already partially cleared and being used as compost site for green waste, such as palm fronds, coconuts, leaves, and cut branches that are the natural residues that come from maintaining the grounds of Gentle Winds. (Figure 6-8).

Figure 6-8 On the left, typical green waste, on the right notice the Tan-tan (L. leucocephala) immediately behind the green waste pile.

The spaces that are not occupied by green waste are dominated by Tan-tan, (*Leucaeana leucocephala*), along with White Manjack (*Cordia alba*) and Ginger-Thomas (*Tecoma stans*) and other early successional tree species. These trees are sometimes called pioneer species because they are the first tree species colonize cleared land. With the passing of years, and a lack of major disturbance, these early successional woods, thickets or shrublands would transition into a mature forest with a different suite of plant species.

The forested area was estimated to be about 20 years old. Most trees were under 20 feet (6m) tall and with a diameter at breast height of 4 inches (10 cm) or less. Below is a list of trees and the more common understory plants. The tree canopy is discontinuous and in sunlit openings. There are lots of Guinea grass (*Urochloa maxima*). This species is a tall grass originally from Africa. Guinea grass is considered an invasive exotic that displaces other native plant species (**see Figure 6.9**). Table 6.2 lists all the plant species that were encountered on the site which are primarily trees and bushes.

Figure. 6.9 - Guinea grass (Urochloa maxima), about 3-4 feet (1.2m) tall in lower right half of first photo . The right-hand photo shows a close up of Guinea grass in a sunlit forest clearing.

Table 6.2 -List of Trees and Shrubs plus some other common plants found on site

Family	**Scientific Name**	**National Common Name**	**STX Common Name**
Bignonaceae	*Tecoma stans* (L.) Juss. ex Kunth	Yellow Trumpet flower	Ginger Thomas
Boraginaceae	*Bourreria suculenta* Jacq.	Pigeonberry	Pigeonberry
Boraginaceae	*Cordia alba* (Jacq.) Roem & Schult.		White manjack
Boraginagaceae	*Cordia nitida* Vahl	Red manjack	Red manjack
Capparidaceae	*Cynophalla flexuosa* L. J.L. Pressl	Limber caper	White Caper
Capparidaceae	*Quadrella indica* L. Iltis & Cornejo	White Willow	White Caper
Celastraceae	*Schaefferia fructescens (Jacq)*	Florida Boxwood	Yellow Boxwood
Erythroxylaceae	*Erythoroxylon rotundifolium* (Lunan)	Brisselet	Brisselet
Euphorbiaceae	*Jatropha gossypiifolia* (L.)	Physick-nut	Physick-nut
Fababceae	*Acacia macranthra* Humb. & Bonpl.	Steel Acacia	Casha
Fababceae	*Acacia tortuosa* (L.)	Twisted Acacia	Casha
Fabaceae	*Chloroleucon* mangensis (Jacq.)		

	Britton & Rose		
Fabaceae	*Leucaena leucocephala* (Lam.) de Wit	white leadtree	tan-tan
Fabaceae	*Samanea saman* F. Muell	Raintree	Saman
Meliaceae	*Trichilia hirta*	Broomstick	Unknown
Nyctaginaceae	*Guapira fragrans(Dum. Cours.) Little*	black mampoo	black mampoo
Poaceae	*Urochloa maxima* (Jacq.) R. Webster	Guinea grass	Guinea grass
Verbenaceae	*Citharexylem fructicosum* L.	Florida fiddlewood	Fiddlewood

Wildlife

During the flora and fauna survey, various common species of birds associated with both woodlands and open areas were observed on the site. Numerous bird species congregated in the thicket/green waste storage site included: Smooth billed Anis (*Crotophaga ani)*, Gray Kingbirds (*Tyrannus dominicensis)*, Scaly Naped Pigeons (*Patagioenas squamosal)*, Zenaida Doves (*Zenaida aurita)*, Common Ground Doves (*Columbina passerine)*, and Black Faced Grassquits (*Tiaris bicolor).*

A noted absence was the Antillean Nighthawk (*Chordeiles gundlachaii)*, which is seasonally present on St. Croix. During the summer months, nighthawks soar over big grassy fields like the expansive lawn at Gentle Winds at dawn and at dusk, hunting for insects. During the day, nighthawks sleep in the woods. Antillean Nighthawks were not observed soaring over Gentle Winds simply because it is not summer time. Below on Table 6-3 is a list of common birds that would normally be expected to be seen perched on branches, flying amongst the trees, walking on the ground, or soaring overhead.

Table 6-3 List of Common Bird Species

Family	**Scientific Name**	**National Common Name**
Accipitridae	*Buteo jamaicensis*	Red-Tailed Hawk
Falconidae	*Falco sparverius*	American Kestrel
Phasianidae	*Gallus gallus*	Feral Chickens
Phasianidae	*Pavo cristatus*	Peafowl
Numididae	*Numida meleagris*	Guinea-Fowl
Charadriidae	*Charadrius vociferus*	Killdeer
Columbidae	*Columba leucocephala*	White-crowned Pigeon

Columbidae	*Patagioenas squamosa*	Scaly-Naped Pigeon
Columbidae	*Zenaida aurita*	Zenaida dove
Columbidae	*Zenaida asiatica*	White-winged Dove
Columbidae	*Columbina passerina*	Common Ground Dove
Cuculidae	*Crotophaga ani*	Smooth-billed Ani
Caprimulgidae	*Chordeiles gundlachaii*	Antillean Night Hawk
Trochildae	*Sericotes holoserriceus*	Green-throated Carib
Trochildae	*Orthorhyncus cristatus*	Antillean Crested hummingbird
Tyrannidae	*Tyrannus dominicensis*	Gray Kingbird
Mimidae	*Mimus polyglottus*	Northern Mockingbird
Mimidae	*Margarops fuscatus*	Pearly-Eyed Thrasher
Coerebidae	*Coereba flaveola*	Bannaquit
Plocedidae	*Tiaris bicolor*	Black-faced Grassquit

No mammals or reptiles were seen during the site reconnaissance but dog tracks were noted in the mud. St. Croix has a very limited suite of mammals, with the exception of various bat species. On a typical day one could expect to see feral dogs and cats, mongoose, and deer while walking around in a (semi) natural setting. Black Rats and Norwegian rats are most likely present but they are hard to see in a woodland setting.

Rare and Endangered Plant Species

Federal or territorial endangered plant species were not found on site. The three most important ones on St. Croix are Vahl's Boxwood (*Buxus vahlii*), and Tropical Thorn Lily, (*Catesbaea melanocarpa),* both which are federally endangered, and Lignumvitae (*Guaiacum officinale*). This last plant is considered endangered in the US Virgin Islands but not in the rest of its natural range.

6.8 Wetlands

There are no wetlands within or adjacent to the proposed WWTP site. However, the nearest watercourse resources and wetlands is the open ocean located less than a mile away to the north. Sugar Bay and Salt River Bay where there are extensive wetlands are located less than a mile to the south-east of the Gentle Winds Property and is part of the Salt River National Park and Eco-system. Mapped Wetlands Units in relation to the proposed WWTP site are depicted in **Figure 6-9**.

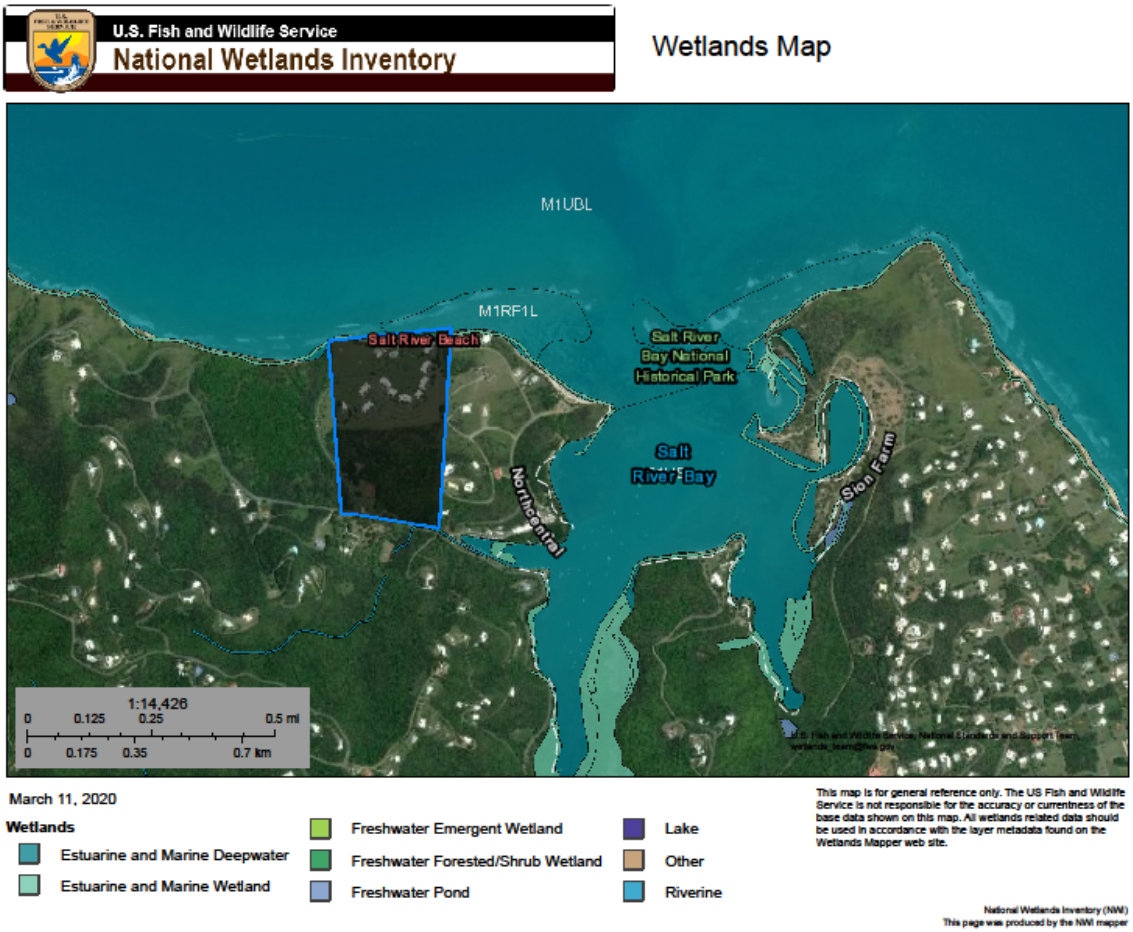

Figure 6.10 Location of Mapped Wetlands Units in relation to Project Site

(Source: U.S. Fish and Wildlife Service)

6.9 Rare and Endangered Species

While conducting the terrestrial resources survey various common species of birds associated with both woodlands and open areas were observed. The bird species seen in the thicket/green waste storage site were: Smooth billed Anis (*Crotophaga ani)*, Gray Kingbirds (*Tyrannus dominicensis)*, Scaly Naped Pigeons (*Patagioenas squamosal)*, Zenaida Doves (*Zenaida aurita)*, Common Ground Doves (*Columbina passerine)*, and Black Faced Grassquits (*Tiaris bicolor).*

A noted absence was the Antillean Nighthawk (*Chordeiles gundlachaii)*, which is seasonally present on St. Croix. During the summer months, nighthawks soar over big grassy fields like the expansive lawn at Gentle Winds at dawn and at dusk, hunting for insects. During the day, nighthawks sleep in the woods. Antillean Nighthawks were not seen soaring over Gentle Winds simply because it is not summer time. Above in Table 6-3 is a list of common birds that would be expected to see perched on branches, flying amongst the trees, walking on the ground, or soaring overhead.

Species listed by the U.S. Fish and Wildlife Service (USFWS) for St. Croix as endangered or threatened are listed in Table 6-4. No vegetation or wildlife species listed by the USFWS, or the Territory of the Virgin Islands as threatened or endangered were observed on the

proposed project site.

Table 6-4 U.S. Virgin Islands and U.S. Fish and Wildlife Service Endangered and Threatened Species List

Group	Common Name	Scientific Name	Status
Birds	Roseate tern	Sterna dougallii dougallii	Threatened
Flowering I	No common name	Agave eggersiana	Endangered
Flowering I	Vahl's boxwood	Buxus vahlii	Endangered
Flowering I	No common name	Catesbaea melanocarpa	Endangered
Reptiles	Hawksbill sea turtle	Eretmochelys imbricata	Endangered
Reptiles	Leatherback sea turtle	Dermochelys coriacea	Endangered
Reptiles	St. Croix ground lizard	Ameiva polops	Endangered
Reptiles	Virgin Islands tree boa	Epicrates monensis granti	Endangered

6.10 Air Quality

All of St. Croix is designated Class II by the EPA in compliance with the National Ambient Air Quality Standards. According to the Virgin Islands Rules and regulations (VIR&R), in Class II air quality regions, the following air pollutants are regulated: open burning, visible air contaminants, particulate matter emissions, volatile petroleum products, sulfur compounds, and internal combustion engine exhaust.

There may be a possibility of trace amounts of sulfur compounds such as hydrogen sulfide, (a byproduct of sewage), emitted from the operation of the waste water treatment plant but the plant operates under aerobic conditions and so that is highly unlikely. If the process became septic, the amount of hydrogen sulfide would be at an extremely low level.

Construction

Construction activities will be limited primarily to excavation and construction of a concrete pad to install the 40 ft container housing the new MABR WWTP. Any emissions from construction equipment will be temporary and limited in duration to the construction period. Temporary fugitive dust generated during the site preparation will be controlled by water spraying if necessary to keep dust to a minimum. Therefore, temporary air quality impacts to any residential areas would be non-existent to minimal.

SECTION 7 – IMPACTS ON THE HUMAN ENVIRONMENT

7.1 Land and Water Use Plans

This project complies with the requirements of the existing zoning code. The property (Plot No. 3-DH)) where the new WWTP will be installed is zoned R-3, Residential which is the site where the existing WWTP is located. The electrical power supply will be installed underground along the western perimeter of Rem. Plot. No 3 which is also zoned R-3 Residential. So, the use of both properties is consistent with the zoning requirements.

7.2 Visual Impacts

The GWCA Condominium Complex is located within a pristine upscale, private residential community on the north central coast of St. Croix that is exclusively zoned residential. Adjacent land uses include North Shore Road (Route 80) to the South and the Caribbean Sea to the North. To the immediate west are 43 acres of heavily forested undeveloped land (3-A Estate Salt River) zoned R-3 residential which is owned by the Salt River Association. To the east, is a mix of very expensive residential and undeveloped properties- mostly zoned R-1 residential.

The current location of the existing WWTP is setback 250 feet from the palm-tree lined access road (Ocean View Road) and is hidden from view by a backup generator building to the west; a maintenance building to the north-west, the fuel storage building to the north and a forested area which forms a vegetative buffer to the immediate east and south. The new WWTP will not create any adverse impacts to the aesthetics of the area.

7.3 Impacts on Public Services and Utilities

This project will have no impact on public services and utilities except for the electrical power supply which WAPA will provide. However, this minor impact will be a positive one because operation of the new WWTP will result in about a 50 percent reduction in electrical energy consumed.

Water Supply

The GWCA Condominium Complex is not served by the WAPA water distribution system. The water supply system for the complex consists of three drilled water wells. The ground water pumped from two of these wells is fed through a reverse osmosis (RO) unit to reduce the Totally Dissolved Solids (TDS) content of the water and the permeate from the RO is then transferred to the potable water system. The product water from the RO is supplemented with rain water collected from the roofs of the building complex. The Gentle Winds RO unit has a capacity of 12,960 gallons per day of product water and produces 23,040 gallons per day of brine water by-product. The two wells supporting the RO plant (the well out by the tennis courts and the well midway down the driveway) have a combined output capacity of 36,000 gallons per day. The proposed WWTP will not require nor have any impact on the WAPA public water supply system.

Sewage Treatment and Disposal

Wastewater (sewage) from the Gentle Winds condominium complex is currently collected and transferred to a 15,000 GPD CAS tertiary waste water treatment plant and the effluent water is used to flush the toilets in the buildings and for land irrigation. This existing system will be replaced with a state-of-the-art 20,000 GPD Membrane Aerated Biological Reactor (MABR) treatment plant. The effluent water from the new plant will be of much higher quality. This is a stand-alone WWTP and is not tied into the public sewer system. Hence the sewage treatment pant will not have any impact on the public wastewater distribution and treatment system.

Solid Waste Disposal

There will be some solid waste generated for disposal from the operation of WWTP. During construction of the facility, a small amount of construction debris and some excess excavated material maybe be generated and will be properly disposed of. Long term, the operation of the WWTP will generate sludge material which will be stored in an activated sludge tank. This will require pumping out and properly disposing of the sludge material in an environmentally sound manner every 2-3 months.

Roads, Traffic and Parking

GWCA's goal is to complete the project with very little or no effect on traffic, or access to Gentle Winds residential community. The operation of new waste water treatment plant will not have any impact (negative or positive) on the public road system, traffic and/or parking

Construction activities may cause a slight increase in vehicular traffic in the construction area site during the delivery of construction materials and other equipment. Construction workers commuting to the site will also add de minimis volume to the local roadway system.

Electricity

A new WAPA electrical power supply system will be installed to service the new WWTP with 3-phase, 480V electrical power. This will entail the installation of new pole mounted, WAPA provided transformers, a new underground power feed from the transformers at the entrance to Gentle Winds on North Shore Road (Rote 80) to the Generator Building, and a branch electrical circuit from the generator building to the WWTP power control panel.

This new power supply system will replace the current power supply which feeds the existing WWTP. Because of the advancements made over the last 50 years in wastewater treatment technology, the energy demand for operating the new treatment will be significantly less(less than 50%) than what is required to run the existing WWTP. A backup diesel-powered generator will serve to provide power to the residential community and the WWTP when WAPA experiences power outages .

Schools

The proposed project will have no impact on local schools.

Fire and Police Protection

There will be no change in the level of fire and police protection currently provided by local departments. The Fire Department will provide services to the site in the event of an emergency. There is an existing security fence along the eastern and northern perimeter of the WWTP property.

Public Health

This project will have no impact on the public health system. Construction activities will be planned and carried out in a safe manner over a short period of time with little disruption to residences. Operations of the WWTP will be done to not cause unacceptable noise, or odors.

7.4 Social Impacts

The proposed project will not have any adverse social impacts either in the immediate area or on the entire island. One positive social impact will be a small reduction in the carbon footprint of the condominium complex.

7.5 Economic Impacts

Overall, this project will provide employment opportunities for about 3-4 Virgin Islanders during construction/installation. Locally licensed contractors and subcontractors will do all electrical and civil site work. The employees at Gentle Winds who currently operate the existing WWTP will be trained and certified to operate the new WWTP which translates to the development of new skills for these employees. During operations of the new treatment plant, there will be periodic employment opportunities such as technical troubleshooting for the upkeep and maintenance of the system.

7.6 Impacts on Historical and Archaeological Resources

There are no visible aboveground historical resources on the site or its environs. An archeological survey of the area conducted a couple of years ago by a qualified archeologist did not produce any evidence of the presence of historical resources. Back then, the Virgin Islands State Historic Preservation Office (VISHPO issued a "No Objection" letter . The Director of VISHPO was contacted regarding this project and has since reaffirmed in a recent email correspondence that the VISHPO Senior Archaeologist, Mr. David M. Brewer, has concurred "the 2020 archaeological phase I A & B survey completed by CocoSol International Inc for the solar array at the Gentle Winds Condo property" can be used for the new wastewater treatment plant project because "it covers well the resources status of the site and because the area in question is highly disturbed". Recent email correspondence with the VISHPO and a copy of that 2020 "No Objection" Letter is included in Appendix B of this Environmental Assessment Report (EAR).

7.7 Recreational Use

The route where the underground electrical distribution system will be installed is part of a well-manicured and landscaped green space which is used as a chipping and putting green for owners and visitors alike. This project will not affect the recreational use of the area.

7.8 Waste Disposal

The facility will not generate any traditional waste such as office waste, process water or solid waste. The effluent water from the process will be 100 percent reused and the sludge material generated will be stored in an activated sludge tank. This will require pumping out and properly disposing of this waste material every two to three months.

7.9 Accidental Spills

Any accidental spills of sewage during startup and commissioning of the lant will immediately be treated with a disinfectant such as Clorox and washed down with clean, chlorinated potable water.

7.10 Unavoidable Potential Adverse Impacts

Construction activities associated with the proposed WWTP, will result in some very minor adverse effects during construction but these adverse systems will be temporary.

SECTION 8 – MITIGATION

The proposed project will not result in adverse impacts to the natural or human environments. Therefore, no mitigation is proposed. All construction activities will be conducted in accordance with the project work plan provided in **Section 5.3**. This will avoid and minimize impacts to the environment during installation of the facility. The long-term operation of the new WWTP will be conducted in accordance with all environmental permits secured and other regulatory requirements for this type of facility. In fact, completion of the project will result in positive impacts to the natural and human environment- much higher quality effluent water reuse within the Gentle Winds residential community and less electrical energy use to operate the plant.

8.1 Vegetation Management

A vegetative buffer that currently exists immediately west of the Generator Building and to the south and east of the wastewater treatment facility west will be maintained to block or soften views of the facility for the pedestrians and vehicular traffic utilizing the access road (Ocean View Road) and the residential community. Very little vegetation will be removed from the site during construction activities.

8.2 Best Management Practices

Stormwater best management practices have been incorporated into the construction activities to reduce the potential for erosion, sedimentation, and movement of pollutants into the surrounding natural environment. Silt fencing will be placed around the down gradient parts of the site before site clearing to prevent transport of sediment off site. Best management practices, including stormwater sedimentation basins will be the first elements of the project constructed. Areas where trenching activities will take will be backfilled and revegetated soon after such activities.

SECTION 9 – ALTERNATIVES TO THE PROPOSED PROJECT

The GWCA was faced with the problem of an aging WWTP that had been in operations for about 50 years. GWCA considered three alternatives with regards to addressing the issues pertaining to the WWTP. One such alternative was the **NO Action** Alternative; another was the **Replacement-in-Kind Alternative** and third was the installation of a new WWTP which was the **Preferred Alternative.** These alternatives are addressed below:

Existing WWTP is show in **Figure 9-1.**

Figure 9-1- Photograph of the Existing WWTP

9.1 No Action Alternative

The "No Action" Alternative meant maintaining the status quo and continuing to operate a waste water treatment plant that is in a state of disrepair and has reached its end-of-life cycle. This is not a viable option because of concerns of not meeting the effluent water quality standards as specified in the current DPNR TPDES permit which can lead to the issuance of Notice-Of-Violations (NOVs) and significant fines.

Figure 9-2.- Existing Conditions of WWTP Close-Up

9.2 Replacement-in-Kind Alternative

The "Replacement-in-Kind" option was also considered. This simply means replacing an existing piece of equipment with an identical piece of equipment so that the footprint of the plant would remain the same. "Replacement-in-Kind" could be considered a maintenance activity and as such environmental and construction permits would not be required. This was initially thought to be the most cost-effective approach. However, the primary drawback to this option is that the original manufacturer (Smith & Loveless) of the sludge-handling/aeration/clarification tanks stopped manufacturing these tanks a couple of decades ago. Some efforts were then pursued to identify local contractors who could fabricate the tanks but these efforts were fruitless and estimates obtained for fabricating the tanks in Puerto Rico or the U,S. Mainland became cost prohibitive. The other drawback is that the waste water treatment technology which was fifty years old would remain the same.

9.3 Preferred Alternative -Install a New WWTP at Same Location

The preferred option was to purchase and install a new WWTP with state-of-the-art technology and the preferred location was Plot No.3-DH where the existing waste water treatment plant is located and has been located for about 50 years. The plot is clearly a disturbed site and utilizing it means minimal modifications and construction activities to connect the WWTP existing wastewater distribution system.

The existing waste water treatment plant is some distance south of the residential buildings and out of the way. It is in a secluded area and surrounded by a building which

houses the emergency generator to the west, the maintenance building to the north-west, a tree-lined vegetation buffer zone to the east and south-east. This location by far would have the least environmental impact. Additionally, this location offers the most facile method to connect the new WWTP to the existing waste water conveyance and distribution system which currently serves the nine (9) residential buildings at Gentle Winds. The plant will not be visible from Ocean View Road or any of the residential buildings.

SECTION 10 – RELATIONSHIP BETWEEN SHORT-TERM AND LONG-TERM USES OF THE HUMAN ENVIRONMENT

The most important positive impacts on the environment, both in the short-term and long-term, will be twofold; a significant improvement in the effluent water quality and a significant savings in the cost of electricity in operating the WWTP plant to the owners and tenants residing at the Gentle Winds condominium complex.

Significant improvement in the quality of the effluent water discharge from the plant. Significant reduction of the amount of electrical energy (50% reduction) required to operate the plant Additionally, there will be a reduction in the carbon footprint of the complex because of significant savings in energy in running the plan

In the short-term and long term, there will be minimal negative impacts on the natural environment. Construction on the site will not require the clearing of any vegetation. Operation of the new WWTP will result in a significant improvement in the effluent water quality and reduction in the amount of activated sludge produced due to improved and more efficient aerobic microbial activity.

10.1 Natural and Social Environment

The proposed project will have no adverse social impacts either in the immediate area or on the entire island. The natural environment will continue to benefit from the recycled use of the effluent water as has been done in the past to irrigate the well-manicured lawns and flush the toilets in the residential units and common areas on the site.

10.2 Economic Environment

In the short term, this project will provide employment opportunities for 3-4 Virgin Islanders during construction activities. The general contractor and all subcontractors will be local companies with local labor. In the long term, during operations of the facility, there may be periodic employment opportunities for technical troubleshooting as well as for the upkeep and maintenance of the system.

SECTION 11 – REFERENCES

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