ENVIRONMENTAL ASSESSMENT REPORT

Application for the Renewal of a Major Water Permit
d/b/a Independent Boat Yard, St. Thomas
United States Virgin Islands

Applicant
SVB 155 Spring LLC
d/b/a Independent Boatyard and Marina
6249 Estate Frydenhoj #49
St Thomas, USVI 00802

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August 19, 2020
ENVIRONMENTAL ASSESSMENT REPORT
Application for Major Coastal Zone Management Permit Renewal

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d/b/a Independent Boat Yard and Marina
St. Thomas, United States Virgin Islands

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Prepared on behalf of SVB 155 Spring LLC
d/b/a Independent Boatyard and Marina

by

Elizabeth Kadison, Environmental Consultant
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ENVIRONMENTAL ASSESSMENT REPORT FOR THE RENEWAL OF A MAJOR WATER PERMIT INDEPENDENT BOAT YARD AND MARINA, ST. THOMAS US VIRGIN ISLANDS

1.00 NAME AND ADDRESS OF THE APPLICANT

SVB 155 Spring LLC
d/b/a Independent Boatyard and Marina
6249 Estate Frydenhoj #49, St. Thomas, USVI 00802

2.00 LOCATION OF PROJECT

The location of Independent Boat Yard and Marina is on the eastern end of the island of St. Thomas, U.S. Virgin Islands, on the northeastern corner of Benner Bay (18.3215° N Latitude, 64.8667° W Longitude) (Figure 2.00.1). This is in the Estate Frydenhoj area. The boat yard and marina are on the south side of Red Hook Road (Route 32), (Figure 2.00.2), approximately 0.8 miles west of the town of Red Hook and 3.5 miles east of Charlotte Amalie (Figure 2.00.3). The Cyril E. King Airport is 6.7 miles west of the project area. The property is zoned W-1, Waterfront Pleasure, and is within the boundary of the Tier 1 Jurisdiction of the Department of Planning and Natural Resources Division of Coastal Zone Management (Figure 2.00.4).

Figure 2.00.1 Regional review map, showing project location in the U. S. Virgin Islands.
Figure 2.00.2 Vicinity map showing the project area in relation to Red Hook Road and Benner Bay.

Figure 2.00.3 Vicinity map showing Independent Boat Yard in reference to other St. Thomas island features.
3.00 ABSTRACT

The property on which Independent Boat Yard in St. Thomas, US Virgin Islands, lies has been used as a boatyard and marina since the 1960’s. The property is on the northeast corner of Benner Bay, a mangrove lined lagoon that has been lending protection from the wind and waves to mariners for many years. Initially a wetland and estuary, the property has been filled and altered over the decades, and now supports a thriving marine business that includes a full service marina, a haul out boatyard with repair shops and chandlery, and a restaurant and bar. Several environmental challenges have faced the boatyard and marina including weather (i.e. tropical cyclones) and topography (i.e. steep hills to the north and west with low lying land to the east and southeast), however Independent Boat Yard has documented site improvements over the past few years and professes to be constantly progressing into a safer and more successful marina and boatyard enterprise. The Coastal Zone Management Major Water Permit for the property was originally issued in 2000 and Independent Boat Yard is currently seeking to renew the permit. This document represents an Environmental Assessment Report prepared in their behalf.
4.00 STATEMENT OF OBJECTIVES SOUGHT BY PROPOSED PROJECT

Continued Occupancy and Usage of Independent Boat Yard

The objectives sought by the Applicant of this permit renewal include:

1) Continue to provide vessel haul out services to mariners and boatowners in the U.S. Virgin Islands, thereby bringing to, and retaining money within the territory.

2) Continue to provide boat slips and marina facilities to permanent and seasonal boat residents, as well as boat owners storing their vessels.

3) Continue to provide jobs to local residents in the marine and service industry by maintaining a multi-business marina that requires a variety of skills and personnel.
5.00 DESCRIPTION OF PROJECT

5.01 SUMMARY OF PROPOSED ACTIVITY

Continued occupancy, operation and usage of Independent Boatyard

5.02 SITE PLANS

5.02.01 Lot Layout

The Independent Boat Yard site is an active marina and boat yard. The property is on the northeast corner of Benner Bay, south of Route 32. On the southern edge of the property, built above a bathroom/shower facility, an office serves both the boat yard and marina. A marine chandlery, *Budget Marine*, a restaurant and bar, *Carigas*, several repair shops, a wastewater treatment facility, and a reverse osmosis plant are built on the periphery of the property, surrounding the open gravel boat storage area (Figure 5.02.01.1-4). Additionally, the boatyard has a 50 ton travel lift, 35 ton Grove crane, 35 ton Hostar hydraulic yard trailer and a self-propelled manlift (Figures 5.02.01.5). Three generators are on property; one an older 3 phase 200 KVA generator now used by the carpentry shop and the machine shop (Figure 5.02.01.3), the second a single phase GENSET used by *Budget Marine*, the marina office and *Carigas* (Figure 5.02.01.6), and the third (a new 40 KVA three phase) currently in storage but will shortly replace the larger three phase generator. There are four currently used above ground fuel storage tanks, three installed within the vicinity of the generators and another in the large equipment staging area. The oldest of these tanks is slated will be removed with the removal of the older three phase generator. There have been recent replacements of the other three fuel tanks, and each observed was in good condition and within concrete containments (Figure 5.02.01.7). No leaking or spilled fuel was seen near the above ground tanks.

![Figure 5.02.01.1](image)

*Figure 5.02.01.1* The boatyard/marina office is built above the showers and restrooms on the southern edge side of the property.
**Figure 5.02.01.2** A privately operated chandlery (*Budget Marine*) and restaurant and bar (*Carigas*) are located on Independent Boat Yard property.

**Figure 5.02.01.3** Workshops for paint, fiberglass, carpentry and machines line the periphery of the Independent Boat Yard property.

**Figure 5.02.01.4** A reverse osmosis pump house producing 9000 gallons per day is located next to the water on the southeast corner of the property and a tertiary sewage treatment plant is located behind *Budget Marine.*
Figure 5.02.01.5 Equipment located on the Independent Boat Yard property include a 50 ton travel lift, 35 ton Grove crane, 35 ton Hostar hydraulic yard trailer and a self-propelled manlift.

Figure 5.02.01.6 Generators housed at Independent boatyard include a three phase 200 KVA used by the carpentry and machine shop and a single phase Genset used by the Budget Marine chandlery, Carigas Restaurant and Bar and the Independent Boat Yard and Marina office.
Figure 5.02.02.7 Four above ground fuel storage tanks (three 280g, one 150g) are located near generators and the equipment staging area. The white tank (top left photo) is slated to be removed after hurricane season, with the removal of the old three phase generator. The other three tanks are new, in good condition and inside concrete fuel containment enclosures.

On the southern edge of the boatyard property, adjacent to Benner Bay, a slipway for hauling vessels up to 17.5ft’ in beam is located and a working dock extends into the bay next to the slip for in-water boatyard projects (Figure 5.02.02.8). A gravelly beach extends east of the work dock to accommodate dinghies for boatyard workers and marina residents (Figure 5.02.02.9).

The boatyard and marina support 93 vessels in slips on four docks that extend up to 400 ft seaward into Benner Bay. Each slip is equipped with electricity and water (Figure 5.02.02.10). Water depth beneath the docks varies from 4-6.5 ft and both power and sailing vessels of various sizes and description are berthed along them.
**Figure 5.02.02.8** A slipway for hauling vessels is located on the seaward side of the property, with a work dock beside it.

**Figure 5.02.02.9** A gravelly beach allows beaching of dinghies for boatyard workers and marina residents and boat owners.

**Figure 5.02.02.10** Four docks extend into Benner Bay from Independent Boat Yard supporting both power and motor yachts.
5.02.02 Road Layout

The property is located off Redhook Road, Route 32. The property is accessed by a concrete drive at the northeastern corner and separated by a chain link fence along the remainder of the road perimeter (Figure 5.02.02.1). The driveways, parking area and boatyard areas are gravel. There is a Budget Marine chandlery on the northeastern edge of the property with an asphalt drive and parking area.

Figure 5.02.02.1 A Chain link fence separates the property from Redhook Road (Rt 32) on the northern edge of the property.

5.02.03 Position of Structures

Figure 5.02.03.1 shows the position of structures on the Independent Boatyard property. Budget Marine chandlery is located on the northeastern edge of the property. The building is of masonry construction. The sewage treatment plant is directly behind it, on the southeastern end. A generator servicing the sewage treatment plant, the marina office, Budget Marine, and Carigas is located near the plant, under a wooden shed. There is a 280g diesel above ground fuel tank in a concrete containment there which serves the GENSET. A two story office and bathhouse building is located to the south, in front of the “B Dock”, with a masonry first floor and wooden second floor. Next to the office is reverse osmosis pump housed in a wooden structure. No municipal water is supplied to Independent Boatyard so all fresh water is now supplied by the desalination plant. To the west of the office is an open-air wooden restaurant, Carigas. Small wooden repair shops line the southern periphery of the property, and a metal building near the center of the yard serves as a carpentry shop. There is a small wooden building on the northwestern edge of the yard, next to the slipway, that serves as a storage area. A filtration system and small gray water cistern sit next to this shed and a metal building is just northeast, serving as both storage and protection for a large generator and 150g above ground fuel storage tank in a concrete containment. A large gravel lot sits in the center of the property, for vessel storage or repair, and car parking. Six docks extend from the property seaward including 4 large wooden docks for marina residents and boat owners (A-D Dock), a smaller work dock next to the haul out slipway, and a small dingy dock adjacent to the parking area.
5.02.03.1 A figure of Independent Boat Yard property showing location of structures.

5.02.04 Septic System/Wastewater Treatment

There is a tertiary treatment wastewater treatment plant east of Budget Marine on the northern edge of the property, designed and built in accordance with the Virgin Islands On-site Sewage Disposal System Rules and Regulations Title 12, Chapter 21, Amendments to Subchapter 902 and 910. Gray water from Independent Boat Yard sewage plant is piped via gravity feed downstream to the Compass Point Marina Inc. sewage treatment plant which is tested for regulation compliance.

There is also a filtering system that collects the wash water from boats as they are pressure washed immediately after being hauled from the sea. There wash water collects in a sump and goes through a water/oil separator before it is pumped into a settlement system and finally into a gray water cistern (Figure 5.02.04.2). Water from this tank is used to irrigate the landscaping along the roadside. The oil/water separator is pumped out every few months as it becomes full.
Figure 5.02.04.1 Wastewater treatment plant at Independent Boat Yard. Fuel tanks in front are empty and not in use currently. Treated wastewater is piped to the Compass Point Marina Inc. sewage treatment plant.

Figure 5.02.04.2 Sump at haul out area collects fresh rinse water from pressure washed boats which goes through oil/water separation and a settlement system before being pumped into a gray water cistern and finally used for irrigation.
5.02.05 Stormwater Drainage

Stormwater from the marina is drained primarily via curb and gutter systems which connects to the existing stormwater drainage systems and empty into the salt pond east of the property. The boatyard currently complies with the requirements of a TPDES V.I. General Permit for Stormwater Discharge from Construction and a Stormwater Pollution Prevention Plan (SWPPP).

5.02.06 Stormwater Facilities

A storm water diversion with a concrete swale covered by cast iron grates is installed across the entrance road into the boatyard. This storm water runoff diversion stops rainwater runoff from the steeper properties to the north of the highway at the entrance of the boatyard and guides it to the salt pond east of the property to settle. This swale is inspected and periodically cleared of all stormwater debris by Independent Boat Yard to facilitate compliance to SWPPP.

5.02.07 Erosion and Sediment Control Plan

The boatyard is an urban landscape with a gravel lot so little erosion occurs at the site. The eastern and southeastern boundaries grade into mangrove wetlands. Most of the sediment on property washes into this mangrove and wetland area that line the eastern periphery of the property. A concrete swale constructed by Independent Boat Yard reduces sediment running into the yard from the surrounding hillside. It is cleaned periodically to reduce blockage and overflow.

5.02.08 Landscaping Plan

There is currently minor landscaping at the boatyard due to the nature of the business. No further landscaping is proposed for the Permit Renewal.

5.02.09 Other Required Drawings

No floor plans, foundations/footings, or project elevation views are necessary for the Permit Renewal. No buildings or structures are proposed.

5.02.10 Required Maps

No maps are necessary for the Permit Renewal. No buildings or structures are proposed.

5.03 PROJECT WORKPLANS

Continued Occupancy and Usage of Independent Boat Yard
6.00 SETTING AND PROBABLE IMPACT ON THE NATURAL ENVIRONMENT

6.01 CLIMATE AND WEATHER

Winds

The Virgin Islands are in a location that lies in the path of what is referred to as the “trade wind belt”. The trade winds can also be referred to as the “Easterlies”, meaning the dominant winds come from the east and move toward the west. Therefore, most of the time the dominant wind direction around and on the island of St. Thomas is from the east. However, there is seasonality to the strength and direction of the winds impacting the island (Figure 6.01.1). Winter is described here as the period from December to February and is the time of the strongest winds. This is the time frame when the Bermuda High intensifies and increases the wind speeds around the Virgin Islands. It is also the period when the winds are highest from the east-northeast. The wind frequency diagram (Figure 6.01.2) shows that winds during winter were greater than 8.8 m/s about 2.9% of the time, which is higher than any other time period. The average wind speed in winter is 4.75 m/s. Between March and May, the period of spring in the figures, the dominant wind direction is from the east with lower wind speeds than winter, and an average wind speed of 4.72 m/s. During June to August, summer period, the average wind speed is 4.79 m/s, the strongest average of all periods. The winds during this period are very dominantly coming from the east with some change of direction to east-southeast. The period from September to December is, in contrast, the period with the weakest winds. Wind speed average during this period is 4.15 m/s, and only 1.6% of the time does wind speed exceed 8.8 m/s.
Figure 6.01.1. Average wind speed in m/s at St. Thomas airport (18.33730 N - 64.97336 W) from January 2008 to June 2018 for Winter (December to February), Spring (March to May), Summer (June to August), and Fall (September to November).
Temperature and Rainfall

St. Thomas has a tropical savanna climate with dry winters. Due to the island's location on earth, close to the equator, as well as the moderating influence of the surrounding ocean, the mean high and low temperature varies only 5 to 9 degrees from the coldest month (January) to the warmest (August). The mean high in January from 1974 through 2018 at the Cyril E. King Airport was 84.2˚ F, and in August was 89.6˚ F. Mean low temperature during that same period was 73.4˚ in January, and 84.1˚ F in August (NOAA, 2019). Mean cloud cover is 21% (mostly clear) and does not vary substantially over the year.

Average annual rainfall in St. Thomas is approximately 45 inches. Although there is not a sharply defined wet season, rainfall does vary throughout the year, and the months of September through November receive significantly more rainfall than December through August (NOAA, 2019). There is also variation across the island; the eastern “windward” end of St. Thomas receives less precipitation than the higher, wetter west end. Over the entire year, the most common type of precipitation on St. Thomas is light rain (47%) followed by moderate rain (26%) and heavy rain (21%). During August through November, some thunderstorm activity (5%) occurs. Rain events are generally short and drop less than a few tenths of an inch of water.

Hurricanes

The Atlantic hurricane season runs officially from 1 June to 30 November. Hurricanes have occurred outside of these six months, but these dates were selected to encompass over 97% of tropical activity. June 1st has been the traditional start of the Atlantic hurricane season for decades however the end date has been slowly shifted outward, from October 31st to November 30th. The Atlantic basin shows a very peaked season from August through October, with 78% of the tropical storm days, 87% of the minor hurricane days (Saffir-Simpson Scale categories 1 and 2; Table 6.01.1), and 96% of the major hurricane days (Saffir-Simpson categories 3, 4 and 5) occurring then (Figure 6.01.2). Once in a few years a tropical cyclone occurs "out of season", primarily in May or December.

Category 3, 4, and 5 hurricanes are collectively referred to as major (or intense) hurricanes. These major hurricanes cause over 83% of the damage in the USA even though they account for only 21% of tropical cyclone landfalls. Major hurricanes have substantially different climatological characteristics compared to the weaker tropical cyclones in the Atlantic basin. On an intra-seasonal time scale, major hurricane activity experiences a much sharper temporal peak than that of weaker storms with over half of all major storms occurring during September alone (Landsea 1993). Recent intense hurricanes in the US Virgin Islands include Hugo (1989) Luis and Marilyn (1995), George (1998), Lenny (St. Croix, 1999), Earl (2010), Irma (2017) and Maria (2017). Less intense hurricanes
and tropical storms, with wind speeds from 39-110 miles per hour, have caused extensive damage over the years in the US Virgin Islands, mainly with rainfall produced flooding.

**Table 6.01.1. Saffir/Simpson Hurricane Scale (Simpson and Riehl, 1981)**

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<td>945-965</td>
<td>111-130</td>
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<td>4</td>
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<tr>
<td>5</td>
<td>&lt;920</td>
<td>&gt;155</td>
<td>&gt;18</td>
<td>Catastrophic</td>
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**Figure 6.01.2** Major hurricanes, minor hurricanes and tropical storms from 1851-2009 in the Atlantic Ocean and Caribbean Sea over 12 months of the year. Peaks in all categories occur in late August and early September, although events stretch from April through December.

**IMPACTS OF WEATHER AND CLIMATE ON INDEPENDENT BOAT YARD**

Independent Boat Yard is a business that is highly sensitive to hurricanes and hurricane preparedness. Not only is a relative fortune of monetary assets potentially at risk during a tropical cyclone, but human lives are in danger as well. Many boats owners haul and store their vessels in Independent Boat Yard through the hurricane season, and many others rent a slip in the relatively protected waters of inner Benner Bay. Historically Independent Boat Yard has been largely
successful in keeping boats in the marina waters safe from storms, and to a lesser extent, on the boatyard property. A strenuous hurricane plan goes in to effect when a named storm approaches the territory. Mandatory dock lines utilizing specified materials, schemes and techniques are attached to under dock and pelican pole pilings, and a heavy 4’ diameter floating line is deployed across the marina entrance to prevent boats from entering late and neglecting to tie in or anchor correctly, thereby putting other vessels in danger (Figure 6.01.3). In the boatyard, extra stands are erected under the standing boats. Boat stands are custom made and chained together in pairs both at the top and bottom. Steel 24” stakes are used on each stand to secure them to the ground.

Figure 6.01.3 In preparing for hurricanes a heavy 4” floating line is pulled across the marina entrance to prevent vessels from entering late and failing to tie in correctly, thereby endangering other vessels. These floating lines are also stretched across to Compass Point Marina Inc. where vessels use them to tie off.

6.02 LANDFORM, GEOLOGY, SOILS AND HISTORIC LAND USE

The U.S. Virgin Islands are part of the Leeward Islands and are located on the eastern edge of the Caribbean Sea, forming the northeastern boundary between the Caribbean and the Atlantic Ocean. The major islands are volcanic in origin and are part of a submarine mountain range which includes the larger islands of the Greater Antilles (Puerto Rico, Hispaniola, Jamaica and Cuba), the Virgin Islands and the Lesser Antilles. This chain begins in Cuba and ends in Trinidad, off the coast of Venezuela. There are still several potentially active volcanoes in the chain, the closest to St. Thomas being Saba, 160 km to the southeast. The arc of the Lesser Antilles is an active volcanic arc above a subduction zone in which the oceanic crust of the American Plate is being carried downward under the Caribbean Plate. The earliest stages of island building occurred 100 million years ago, in the Cretaceous period, underwater. These first volcanic flows were later uplifted and exposed. The long period of undersea mountain building and uplift were interspersed with explosive volcanism.
alternating with centuries of coral reef deposits and changing sea levels. This produced the stratified volcanic rocks with minor limestone layers that we see today in St. Thomas.

The island of St. Thomas is underlain by andesitic volcanic and volcanclastic rocks of the Louisenhoj Formation. These are believed to have been deposited in a relatively short time spanning 10 to 15 million years, approximately 100 million years ago. The center of the Louisenhoj Formation is in Pillsbury Sound, and the formation changes from a coarse thin unit near the volcanic source to a finer grained thick unit on the west side of St. Thomas. The Louisenhoj Formation crops outs in a broad belt from Savana Island across central St. Thomas to northwestern St. John and also underlies Hans Lollik Island. It is as thick as 2 kilometers on St. Thomas but thins to perhaps 0.5 kilometer at Leinster Bay, St. John. A brief interval of volcanic quiescence followed the Turonian to late Santonian (Late Cretaceous) with deposition of the Outer Brass Limestone, which includes clean calcite limestone (now marble), calc-silicate rocks, and conglomerate with calcareous cement and clasts of marble and/or andesite. The Outer Brass Limestone is 100 to 200 meters thick and crops out in a discontinuous belt broken by faults from Outer Brass Island across northeastern St. Thomas reappearing in northern St. John, between Maho Bay and Waterlemon Bay. Volcanism resumed in the Late Cretaceous, as indicated by the deposition of volcanicleastic turbidites and rare pyroxene basalt to andesite lava flows in the overlying Tutu Formation. This is the youngest layered deposit on St. Thomas. The topography of St. Thomas is rugged, steep and irregular. It is bordered by bays with small coastal islands. Fresh water lakes and coastal plains are completely absent.

SOILS OF ESTATE FRYDENHOJ

Four soil types have been identified in the area around Independent Boat Yard. These are shown on Figure 6.02.01 and listed below:

**Sandy Point and Sugar Beach:** These areas consist of tidal marshes and salt flats. Slopes range from 0 to 2% and are frequently flooded and ponded. The soil is saline and very poorly drained. Water table is at 0 in. Parent material is marine sediments that overlies herbaceous plant remains.

**Solitude gravelly fine sandy loam:** These areas also consist of tidal marshes and salt flats. Slopes range from 0 to 2% and areas are frequently flooded. The areas are poorly drained and the restrictive layer is greater than 80in deep. The water table is 12-30 in beneath the surface. The soil is slightly saline to very saline. Parent material is alluvial or marine sediments.

**Cinnamon Bay gravelly loam:** Found on alluvial fans and terraces. The slope ranges from 5-12%. Thick grayish brown gravelly loam that is occasionally flooded has a parental material of alluvium.

**Southgate Rock Outcrop:** Well drained, brown gravelly loam and bedrock occurring on steep to very steep summits and side slopes of volcanic hills. Parent material is weathered mineral.
**Historic Land Use**

The property at Independent Boatyard has been used as a boat yard and marina since the 1960’s (based on historical photos). Prior to that it was undeveloped estuary and wetlands. During the early development in the 1960’s the site was at least partially filled, and by 1967 had at least 4 structures. The property was transferred between several owners between 1960 and 1990, and in 1989 the filled area expanded with dredge spoil as a result of the Army Corps of Engineers dredging of the channel into Benner Bay. More structures were added during that time.

**Figure 6.02.01** Soils of Estate Frydenhoj around Independent Boat Yard identified in the 2020 USDA Soil Survey of the U.S. Virgin Islands.

**IMPACT OF SITE CONDITIONS ON INDEPENDENT BOAT YARD**

Independent Boat Yard is located on a low lying piece of land surrounded primarily by water (Benner Bay) and, to the east and southeast, mangrove wetlands. The site has been filled and highly altered from its natural state for the creation of the marina and boatyard. The roadway to the north sits at an elevation of approximately 10 ft above sea level and steep hills of alluvium and mineral deposits rise to the north and west. The highest elevation on the Independent Boat Yard property is around the chandlery Budget Marine, with a fill elevation of 7 ft. Most of the property is at approximately 5 ft above sea level. Flooding is common during major storms so drainage and
erosion controls are important factors in protecting both the environment and the vessels and equipment stored on property. See Section 6.03 below.

6.03 DRAINAGE, FLOODING AND EROSION CONTROL

Figures 6.03.01 and 6.03.02 show the watersheds and wetland area of Benner Bay. The property is in the Jersey Bay watershed and is adjacent to a mangrove shrubland and mangrove forest to the southeast, which lead into a large salt pond. The Frydenhoj/Compass Point ghut empties into the wetland and salt pond.

Figure 6.03.01 Wetlands of Benner Bay watershed. Image from the 2013 STEER Watershed Existing Condition Report.

Figure 6.03.02 Wetlands surrounding Independent Boat Yard.
The property lies in zone A as delineated on the Flood Insurance Rate Map (FIRM) created by the Federal Emergency management Agency (FEMA). Zone A8 are areas where the 100 year base storm elevation has been determined to be 6 ft.

Figure 6.04.03 FEMA flood map around the project area.

6.03a Impact of terrestrial and shoreline erosion

Independent Boat Yard sits on a filled, highly urbanized property covered in asphalt and gravel, and no further erosion is anticipated. The eastern and southeastern boundaries grade into mangrove wetlands. Sediment on property currently is channeled to the mangrove and wetland area. A concrete swale constructed by Independent Boat Yard with a grant from the Virgin Islands Department of Natural Resources (DPNR) and National Oceanographic and Atmospheric Administration (NOAA) reduces both stormwater and sediment running into the yard from the surrounding hillside by diverting it into the salt pond to the southeast of the property.

6.04 FRESH WATER RESOURCES

There are no freshwater resources that are affected by the Independent Boat Yard.

6.05 OCEANOGRAPHY

6.05a Sea Bed Alteration

There will be no seabeed alteration with the continued occupancy and use of Independent Boatyard.
6.05b Tides and Currents

Ocean currents around the Virgin Islands are primarily dominated by the North Equatorial Current that comes up and into the Caribbean Sea moving toward the west. In the Caribbean Sea this part of the North Equatorial current is called the Caribbean Current. The Caribbean Current then flows north-west to join the Gulf Stream, which hugs the east side of Florida and flows north along the continental United States.

The physical forcing that sets up the coastal current patterns of St. Thomas, USVI is a combination of wind-driven currents and tidal-driven currents. These forces are modified by the Coriolis effect. South of St. Thomas is an upwelling system and north of St. Thomas is a downwelling system. Figure 6.05.1 shows the direction of the predominant trade winds, the location of the Independent Boat Yard and Marina in Benner Bay, and water movement. This shows the nature of the upwelling system on the south side of the island.

The local tidal currents around St. Thomas are not very significant in terms of fluctuation, however they are complex in regard to the type of tidal influences occur on the north and south side. The Atlantic Ocean, on the north side of St. Thomas, has a semi-diurnal cycle with two high and low tides a day. The Caribbean Sea, on the south side of St. Thomas, has a diurnal tidal cycle with one high and low tide daily. Benner’s Bay is located on the south side of St. Thomas and experiences a diurnal tidal cycle (Figure 6.05.2).

Figure 6.05.1 Direction of the predominant trade winds, the location of the proposed project in Benner Bay, and water movement.
Figure 6.05.2 Tidal Data collected in Charlotte Amalie, VI from the NOAA station displayed in feet. Tides for the month of a) May 2012, and b) February 2012. Note that tides are diurnal. Data obtained from the NOAA tide and currents website http://tidesandcurrents.noaa.gov
6.05c Waves

Surface waves around the north and south sides of St. Thomas are primarily driven by the winds, particularly the predominant trade winds as discussed in section 6.01 blowing from the east northeast. A data buoy located approximately four miles south of St. John, USVI, collects meteorological and oceanographic data in real time. It was deployed in April 2011 and has been collecting and transmitting data since that time. The average wave height from May 23, 2012 to June 23, 2012 is 1.01 meters. The maximum wave height recorded during this period was 3.37 meters and the minimum was 0.67 meters. Figure 6.05.3 displays the time series of wave height, maximum wave height, and wave direction.

Independent Boat Yard is located in the northeastern corner of Benner Bay, and except in very severe tropical storms is protected from heavy wave action by mangrove islands and wetlands, and an outer coral reef. The lagoon is relatively small, and wind swell is kept minimal with little fetch.

Figure 6.05.3. Wave data collected from a real-time data buoy located four miles south of St. John.
6.05d Marine Water Quality

Water quality parameters measured in the Benner Bay on March 25, 2020 are listed in Table 6.05.1. Results were similar across the survey sites and control sites were not particularly abnormal considering the limited flushing of the lagoon and the high density of businesses and vessels located on the body of water. Turbidity was moderately high, however dissolved oxygen was also high and temperature, salinity, and pH were normal. Fecal coliform was moderate to high at three sites including one control site (F) outside of the survey area.

Table 6.05.1. Sites for water quality parameters measured in Benner Bay at Independent Boat Yard. Sites E-G were outside of the survey area and used as control sites.

<table>
<thead>
<tr>
<th>Site</th>
<th>Location</th>
<th>Temp. (°C)</th>
<th>Salinity (ppt)</th>
<th>pH</th>
<th>Dissolved Oxygen (mg/l)</th>
<th>Turbidity (NTUs)</th>
<th>Chlorophyll (μg)</th>
<th>Fecal coliform CFU/100 ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>18° 19.255’, 64° 51.998’</td>
<td>26.70</td>
<td>36.62</td>
<td>7.60</td>
<td>7.28</td>
<td>5.37</td>
<td>0.01</td>
<td>41</td>
</tr>
<tr>
<td>B</td>
<td>18° 19.205’, 64° 51.984’</td>
<td>26.56</td>
<td>36.58</td>
<td>7.46</td>
<td>7.07</td>
<td>3.11</td>
<td>0.55</td>
<td>10</td>
</tr>
<tr>
<td>C</td>
<td>18° 19.178’, 64° 51.958’</td>
<td>26.51</td>
<td>36.61</td>
<td>7.46</td>
<td>7.30</td>
<td>3.41</td>
<td>0.44</td>
<td>70</td>
</tr>
<tr>
<td>D</td>
<td>18° 19.198’, 64° 51.033’</td>
<td>26.55</td>
<td>36.60</td>
<td>7.52</td>
<td>7.37</td>
<td>4.50</td>
<td>0.59</td>
<td>20</td>
</tr>
<tr>
<td>E</td>
<td>18° 19.203’, 64° 52.033’</td>
<td>26.72</td>
<td>36.62</td>
<td>8.54</td>
<td>7.29</td>
<td>4.38</td>
<td>0.31</td>
<td>10</td>
</tr>
<tr>
<td>F</td>
<td>18° 19.165’, 64° 51.966’</td>
<td>26.59</td>
<td>36.83</td>
<td>7.51</td>
<td>7.45</td>
<td>1.62</td>
<td>0.19</td>
<td>75</td>
</tr>
<tr>
<td>G</td>
<td>18° 19.170’, 64° 52.036’</td>
<td>26.00</td>
<td>36.06</td>
<td>7.62</td>
<td>7.21</td>
<td>1.03</td>
<td>0.17</td>
<td>10</td>
</tr>
</tbody>
</table>

6.06 MARINE RESOURCES AND HABITAT ASSESSMENT

A marine benthic survey was conducted on March 25, 2020 in Benner Bay at Independent Boat Yard as a requirement of the USVI Department of Natural Resources Coastal Zone Management Program for a Major Water Permit renewal. The report is included in this application. The survey was conducted within the northeastern tip of Benner Bay, extending from the shoreline up to 500’ seaward (Figure 6.06.1). Water quality parameters including temperature, salinity, pH, turbidity, dissolved oxygen and chlorophyll a were taken in situ using a calibrated YSI at four replicate sites in the survey area, as well as three control sites outside. Water samples were collected in sterilized bottles at these seven sites and taken to the University of the Virgin Islands Water Resources
Laboratory to be tested for fecal coliform bacteria (Figure 6.06.1). Depth was recorded across the survey area using a plumb line and GPS, and two benthic grabs were taken in the survey area at the proposed ramp footprint to determine sediment type, color and odor.

The benthos was surveyed using an Olympus underwater video camera mounted to a weighted frame that was towed slowly across the site in long continuous transects between the marina docks. The survey was approximately one hour in duration. Afterwards the video was viewed and still photos taken from it. In addition, a diver, skin diving, photographed habitat types around pier pilings and mangrove roots. All plants and animals observed during the survey were recorded along with cover and abundance. Any notable changes from the June 2010 Environmental Assessment Report filed by Compass Point Marina Inc., the property adjacent to Independent Boat Yard and Marina (Figure 6.06.1), were noted.

Figure 6.06.1. Site map with marine benthic survey area. Five replicate sites used for water quality parameters are also shown.
The boat yard is in a still, protected area with relatively little water circulation via currents or wind. It is approached from the south via a channel marked with navigational buoys. The eastern edge of the survey site is lined with red mangroves (Rhizophora mangle), reaching prop roots into murky water (Figure 6.06.2). Smaller private skiffs are anchored along parts of this mangrove shoreline. Five finger piers extend from the shoreline of the Independent Boat Yard property up to 350’ into the bay. At the northeastern end of the marina the mangroves give way to a developed shoreline of boat yard workshops, a haul out slip, and shored inflatables and small tenders (Figure 6.06.3). The water was dark throughout the marina and visibility through the water column very limited (<1ft) during the survey on March 25, 2020. The substrate at the bottom of the bay at the survey site near shore was a layer of fine silt and mud on top of slightly coarser brown sand with shell fragments. The center of the site had an entirely silt/mud bottom. There was no unusual odor associated with the mud/sand samples collected during the survey (Figure 6.06.4).

![Figure 6.06.2 The eastern edge of the survey site is lined with red mangroves (Rhizophora mangle), reaching prop roots into murky water.](image1)

![Figure 6.06.3 At the north end of the marina the mangroves give way to a developed shoreline.](image2)
The near shore substrate at the bottom of the bay at the survey site was a layer of fine silt and mud mixed with shell fragments. The center of the site was fine silt and mud.

The bottom of the bay at Independent Boat Yard and Marina was covered in borrow holes, presumably from worms and bivalves (Figure 6.04.4). No grass was observed in the survey area, nor benthic algae except in very shallow water along the shoreline. The mud silt bottom was uninterrupted from the mangrove shoreline to the main channel of the lagoon. Wooden marina pier pilings supported very limited sponges as well as more prolific macro-algae (Figure 6.04.5). Mangrove roots and stumps along the eastern shoreline also supported a limited variety of macro and turf algae. Visibility was extremely poor, and except for the very rare jellyfish, fish and marine invertebrates were not observed in the water during the survey. On the surface, tarpon were seen rolling near the bar and restaurant, undoubtably drawn by scraps from the Carigas kitchen. A lone white egret (Ardea alba) was noted resting in the mangroves on the southeast edge of the property.

Dock pilings were covered in macro algae with very few sponges.
Table 6.06.01. Plants and Algae observed in Benner Bay at the Independent Boat Yard survey site.

<table>
<thead>
<tr>
<th>Phylum</th>
<th>Family</th>
<th>Species</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorophyta</td>
<td>Caulerpaceae</td>
<td>Caulerpa macrophysa</td>
<td>green grape alga sp.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Caulerpa sertulariodes</td>
<td>green feather alga</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Caulerpa spp</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Halimedaceae</td>
<td>Halimeda incrassate</td>
<td>three finger leaf alga</td>
</tr>
<tr>
<td>Phaeophyta</td>
<td>Dictyotaceae</td>
<td>Dictyota caribaea</td>
<td>y branched alga sp.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dictyota delicatula</td>
<td>y branched alga sp.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Padina sanctae-cricis</td>
<td>leafy rolled-blade alga</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lobophora variegata</td>
<td>fan leaf alga</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sargassum fluitans</td>
<td>sargassum seaweed</td>
</tr>
<tr>
<td>Rhodophyta</td>
<td>Galaxauraceae</td>
<td>Galaxaura obtusata</td>
<td>tubular thicket alga sp.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Galaxaura rugosa</td>
<td>tubular thicket alga sp.</td>
</tr>
<tr>
<td>Angiospermae</td>
<td></td>
<td>Rbizophora mangle</td>
<td>red mangrove</td>
</tr>
</tbody>
</table>

Table 6.06.02 Marine organisms observed and their relative abundance in Benner Bay at the Independent Boat Yard survey site.

<table>
<thead>
<tr>
<th>Family</th>
<th>Species</th>
<th>Common Name</th>
<th>1</th>
<th>2-10</th>
<th>11-100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scyphozoa</td>
<td>Cassiopea frondosa</td>
<td>upsidedown jellyfish</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cassiopea xamachana</td>
<td>mangrove upsidedown jellyfish</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demospongiae</td>
<td>Tedania ignis</td>
<td>fire sponge</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ulosa ruetzleri</td>
<td>orange lumpy encrusting sponge</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Independent Boat yard is an urbanized property developed on fill and covered in gravel and asphalt. The primary purpose of most of the property is to hold vessels and vehicles. Plants are rare in the yard, and except in the southeast corner where red mangroves grow, are limited primarily to the periphery of the northern side of the property and around the Budget Marine chandlery. Upland plants observed were mostly exotic, invasive species (Figure 6.07.1) (Table 6.07.1). No changes in the terrestrial resources are expected with continued occupancy and usage of the property.

**Figure 6.07.1** The upland plants on the periphery of Independent Boat Yard are limited to exotics.

**Table 6.07.1** A list of terrestrial vegetation found on and around Independent Boat Yard.

<table>
<thead>
<tr>
<th>Order</th>
<th>Family</th>
<th>Species</th>
<th>Common Name</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fabales</td>
<td>Fabaceae</td>
<td><em>Antigenon leptopus</em></td>
<td>coralita vine</td>
<td>invasive</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Leucaena leucocephala</em></td>
<td>tan tan</td>
<td>aggressively invasive</td>
</tr>
<tr>
<td>Asparagales</td>
<td>Asparagaceae</td>
<td><em>Sansevieria trifasciata</em></td>
<td>mother in law tongue</td>
<td>aggressively invasive</td>
</tr>
<tr>
<td>Arecales</td>
<td>Areaceae</td>
<td><em>Cocos nucifera</em></td>
<td>coconut palm</td>
<td>exotic</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Chamaedorea selfrigii</em></td>
<td>bamboo palm</td>
<td>exotic</td>
</tr>
<tr>
<td>Rhizophorales</td>
<td>Rhizophoraceae</td>
<td><em>Rhizophora mangle</em></td>
<td>red mangrove</td>
<td>native</td>
</tr>
<tr>
<td></td>
<td>Combreataceae</td>
<td><em>Laguncularia racemosa</em></td>
<td>white mangrove</td>
<td>native</td>
</tr>
<tr>
<td></td>
<td>Myrtales</td>
<td><em>Conocarpus erectus</em></td>
<td>buttonwood</td>
<td>native</td>
</tr>
<tr>
<td>Caryophyllales</td>
<td>Petiveriaceae</td>
<td><em>Tribeugia octandrum</em></td>
<td>hoop vine</td>
<td>native</td>
</tr>
<tr>
<td>Cyperales</td>
<td>Poaceae</td>
<td><em>Pennisetum clandestinum</em></td>
<td>kikuyu grass</td>
<td>aggressively invasive</td>
</tr>
</tbody>
</table>
6.08 WETLANDS

The U.S. Army Corps of Engineers defines wetlands as “those areas that are periodically inundated or saturated by surface or ground water 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 surround the property to the east and southeast. This wetlands include a mangrove shrubland, salt flats and a mangrove forest along the shoreline. A large salt pond lies east of the mangrove shrubland and salt flat. It receives fresh water from the Frydenhoj/Compass Point ghut.

![Figure 6.03.02 Wetlands surrounding Independent Boat Yard.](image)

6.09 RARE AND ENDANGERED SPECIES

No protected species of vertebrate or invertebrate life was observed during the marine survey in Benner Bay at Independent Boat Yard. Corals are not present in this area due to high turbidity, high nutrient loads, and the unconsolidated benthic substrate. The exotic seagrass *Halophila stipulacea* was present at a very low density just outside the site however no native seagrasses were found nor sea turtles. The main species of concern at the site is the red mangrove, *Rhizophora mangle*, a protected species that is extremely valuable for protecting saltwater marshes due to its ability to trap sediments and sink excess nutrients and pollutants. Red mangrove trees were significantly damaged in Benner Bay during the hurricanes of 2017 (Irma and Maria) and in some areas across the bay have not completely recovered. It is unknown why new growth has not returned in some areas. The continued occupancy and use of Independent Boat Yard are not expected to affect the mangrove forest.
Figure 6.09.1 Red mangrove line the bay on the east side of Independent Boat Yard and Marina. Some areas of mangrove trees have not recovered from severe loss during the devastating hurricanes of 2017.

6.10 AIR QUALITY

All of St. Thomas is designated Class II by the Environmental Protection Agency. In Class II Air Quality Regions the following air pollutants are regulated: open burning, visible air contaminants, particulate matter emissions, volatile petroleum products, sulfur compounds, and internal combustion engine exhaust (Virgin Islands Code Rules and Regulations). Independent Boat Yard currently complies with these regulations and the continued occupancy and use of the property will not involve any such activities.

7.00 IMPACTS ON THE HUMAN ENVIRONMENT

7.01 Land and Water Use Plans

Land and water use plans will remain the same with continued occupancy and usage of Independent Boat Yard.

7.02 Visual Impact

The visual impact will remain the same with continued occupancy and usage of Independent Boat Yard.
7.03 Impact on Public Services and Utilities

There will be no impact on public services and utilities with the continued occupancy and usage of Independent Boat Yard.

7.03a Water

There will be no change on water demand with the continued occupancy and usage of Independent Boat Yard. Currently the boat yard produces all water for the facility.

7.03b Sewage Treatment and Disposal

The continued occupancy and usage of Independent Boat Yard will have no impact on the current sewage treatment and disposal because it will continue operation as is.

7.03c Solid Waste Disposal

There will be no change on solid waste disposal demand with the continued occupancy and usage of Independent Boat Yard. Solid waste is collected in a large public dumpster that is serviced regularly by a private waste hauler.

7.03d Roads, Traffic and Parking

There will be no change in the roads, traffic or parking with the continued occupancy and usage of Independent Boat Yard.

7.03e Electricity

There will be no additional impact on electrical usage with the continued occupancy and usage of Independent Boat Yard.

7.03f Schools

The nearest school to the property is Ivanna Eudora Kean High School, two miles away. There will be no impact on this or any schools with the continued occupancy and usage of Independent Boat Yard.

7.03g Fire and Police Protection

There will be no impact on fire and police protection with the continued occupancy and usage of Independent Boat Yard.
7.03h Health

There will be no impact health with the continued occupancy and usage of Independent Boat Yard.

7.04 Social Impacts

Continued occupancy and usage of Independent Boat Yard will produce positive social impacts by providing mariners and boat owners a safe and cost effective place to store and repair boats on the island of St. Thomas. Currently there is no other facility of this type on the island. In addition, the marina creates a neighborhood that supports a social structure for year round boat residents and seasonal visitors. The bar and restaurant, Carigas, is very popular with both tourists and locals, and draws likeminded people together who are comfortable in a very casual, relaxed setting, surrounded by boat activity.

7.05 Economic Impacts

The continued occupancy and usage of Independent Boat Yard will have very positive economic impacts on St. Thomas and the territory of the US Virgin Islands. Currently no other self-service boat yard exists on St. Thomas, and no other of its size in the US Virgin Islands. Without the operation of Independent Boat Yard, a haul out and repair or storage of local or visiting vessels would necessitate a sail to Puerto Rico or the British Virgin Islands, taking millions of dollars from the St. Thomas economy. During the last 3 months, with the closing of borders around the Caribbean and world, the importance of a local boatyard has become even more clear. In addition, Independent Boat Yard keeps many people employed full time, and has done so throughout the Corona virus pandemic. Lastly, the products purchased by clients for vessel maintenance and repair while in the boatyard and marina, either on site or off, contribute to the local merchants and economy, creating a ripple effect of spending throughout the island.

7.06 Impacts on Historical and Archeological Resources

The continued occupancy and usage of Independent Boat Yard will have no impact on historical or archeological resources. The yard is built on fill that covers mangrove wetland.

7.07 Recreational Use

The continued occupancy and usage of Independent Boat Yard will have positive impacts on recreation in St. Thomas. The boatyard and marina are used by personal, recreational vessels as well as commercial vessels participating in recreational ventures (i.e. charter fishing boats, commercial dive boats, tour boats, charter sailboats).
7.08 Waste Disposal

The continued occupancy and usage of Independent Boat Yard will not impact waste disposal. Solid waste is collected in a large public dumpster that is serviced regularly by a private waste hauler.

7.09 Accidental Spills

The possibility of an accidental spill is always present in a boatyard setting with above ground fuel tanks and heavy equipment. The Applicant uses a commercial fuel supplier that has appropriate spill booms and diapers on site, as well as a developed emergency spill action plan. In case of a large accidental spill, Independent Boat Yard has a 600 ft boom that can be deployed to contain contaminants. This is stored at Compass Point Marina Inc. and is used by both companies.

7.10 Potential Adverse Effects that Cannot be Avoided

Adverse effects that cannot be avoided with continued occupancy and usage of Independent Boat yard include nutrient effluent discharged by vessel liveaboards, noise created by the repair and construction businesses on site, and traffic in and around the boatyard.

8.00 MITIGATION

Mitigation for continued occupancy and usage is not deemed necessary.

9.00 ALTERNATIVES TO PROPOSED ACTION

Do not continue occupancy and usage of Independent Boat Yard

The Applicant believes that not continuing the occupancy and usage of Independent Boat Yard would be detrimental to boat owners and the marine community of the US Virgin Islands, as well as to the overall territorial economy. Independent Boat Yard provides storage and repair services for yachts and small vessels, as well as providing a safe marina community for both liveaboard and non-liveaboard boat owners. In addition, it provides a workplace for various trades in the marine and service industry. There are currently no boatyards and services for larger vessels on the east end of St. Thomas and no other “self-service” yards on St. Thomas. Vessels in need of haul out and boat yard services would be forced to travel to the British Virgin Islands or Puerto Rico if Independent Boatyard discontinued the business, and money otherwise spent and remaining in the USVI would leave the territory.
10.00 RELATIONSHIP BETWEEN SHORT AND LONG TERM USES OF MAN’S ENVIRONMENT

The property at Independent Boat Yard has been in usage as a boatyard and marina for over 50 years. The location of the property provides better protection from storms than arguably any other in the territory. Although it has been drastically altered from its original state, the quiet estuarine area of upper Benner Bay has been instrumental in developing the marine industry of St Thomas. That said, Benner Bay and the adjacent mangrove lagoon also represents an important nursery habitat for marine fish and invertebrates. Although the site at Independent Boat Yard has obviously been environmentally compromised over the last several decades, with wetland filling and continued high density human occupation, it is important for the boatyard to remain diligent in following US Virgin Islands codes and regulations, and to utilize design and technology to minimize continued environmental abuse. The owners and managers of Independent Boat Yard have made improvements on the property in the last 20 years to this end, including the removal and/or replacement of old above ground fuel tanks and waste oil tanks, discontinued storage of old batteries, improvement of stormwater drainage across the property, and hurricane preparedness. The Applicant appears to be in compliance with standards set for the territory.

11.00 REFERENCES


