

# BUTLER BAY/CREQUE DAM WATERSHED CHARACTERIZATION SUMMARY

August 2025 DRAFT



*Sediment plume in Butler Bay, likely resulting from steep dirt roads and inadequate drainage design (Ceiba Strategies)*

**Prepared by:**

Horsley Witten Group, Inc.

**Prepared for:**

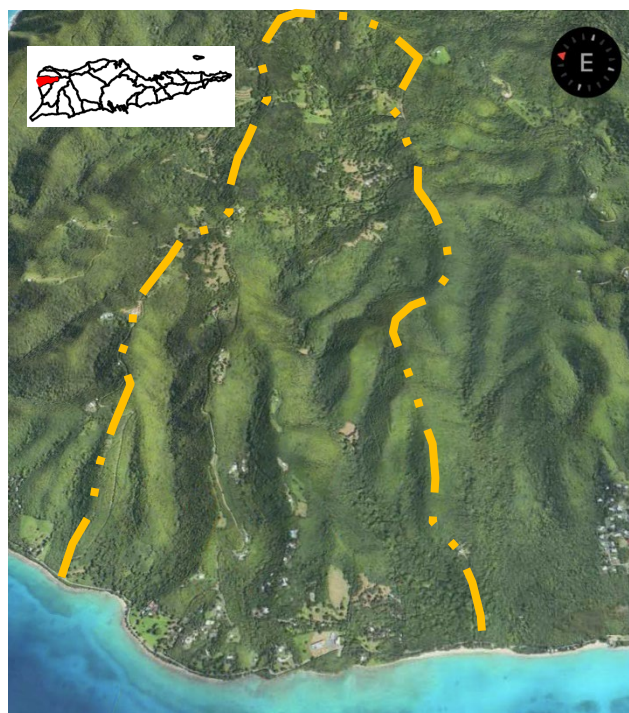
Ceiba Strategies, LLC. &  
VI Department of Planning and Natural Resources

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## PURPOSE

This report summarizes the general features of the Butler Bay/Creque Dam Watershed to inform preliminary watershed assessment and planning activities by the Horsley Witten Group (HW), Ceiba Strategies, Feather Leaf Inn, and the VI Department of Planning and Natural Resources (DPNR). This summary serves as a consolidated compilation of relevant mapping layers, hydrologic data, landcover, demographics, soils, infrastructure improvements, potential sources of pollution, and other readily available watershed information. This information will be used to identify remaining data gaps, identify potential locations for upcoming field investigations in September 2025, and generate input data for watershed modeling.



*Butler Bay/Creque Dam Watershed*

## THE WATERSHED

The 1,206-acre (1.9 sq mile) Butler Bay/Creque Dam Watershed is located in the northwest corner of St. Croix. The Butler Bay Watershed is mostly vegetated (<3% impervious), with steep slopes and higher rainfall levels than other parts of the island. In this report, the watershed will be referred to as "Butler Bay." The original DPNR delineated watershed was divided into three main subwatersheds and direct coastal drainages by HW based on surface topography and gut discharge locations (**Figure 1**). **Table 1** summarizes the basic subwatershed features.

*Table 1. Subwatershed Drainage Area Summary*

| Drainage Area   | Size (ac) | Road / Gut (mi) | Main Features                                                                                                                                                                                                                           |
|-----------------|-----------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Butler Bay Gut  | 185       | 1.6/1.2         | Mostly vegetated, steep slopes, bound by unpaved Prospect Hill Rd. and Prospect Hill Est. roads                                                                                                                                         |
| Central Gut     | 130       | 2.6/0.9         | Central feature is Mt. Washington Est Rd., which appears to be close to gut; the ruins in upper watershed from historic plantation and distillery; portions of Prospect Hill Est.; Spratt Hall Rd (or Mahogany Rd.?); Spratt Hall Beach |
| Creque Gut      | 714       | 6.0/3.2         | Mostly forested; Creque Dam Rd. (Hwy 58) and associated residential development; the dam and impoundment; agricultural areas in the upper watershed; horses                                                                             |
| Direct Drainage | 177       | 2.3/0           | Coastal road (Emancipation Dr/Hams Bluff/Hwy 63); Feather Leaf Inn; Villa Mill Pt.; Butler Bay Nature Preserve; National Guard                                                                                                          |
|                 | 1,206     |                 |                                                                                                                                                                                                                                         |

Date: 8/25/2025  
Data Sources: USVI Department of Planning and Natural Resources (DPNR), NOAA

This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes.

-  Watershed Boundary
-  Subwatersheds
-  Coral Restoration Sites (NOAA 2024)
-  Wetlands
-  Guts
-  Contours (100 ft)
-  Roads



**Figure 1** Butler Bay Watershed Map

## CLIMATE AND HYDROLOGY

Climate change has and is projected to lead to warming of air and ocean temperatures, increased severity of heavy rainstorms, sea level rise, and ocean acidification. Over the last 20 years, tropical storms and hurricanes have already increased in intensity, while there remains some ambiguity in terms of long-term trends. As temperatures continue to warm, increased hurricane wind speeds and rainfall rates are likely (USDA NRCS, 2022).

Although heavy rainstorms have become more common, shifting weather patterns have caused total rainfall to decrease in the Caribbean region. Total rainfall is likely to continue to decrease, especially during spring and summer. Warmer temperatures also reduce the amount of water available for use because they increase the rate at which water evaporates (or transpires) into the air from soils, plants, and surface waters.

### Precipitation

In general, the USVI is characterized by a tropical maritime climate. While rainfall patterns can be variable, there is generally a hot summer wet season (July – November) and cooler winter dry season (December – May), with a second wet season in May (Davey et al., 2007; Santiago-Rivera & Colon-Dieppa, 1986) (VI DPNR, 2022). When El Niño events occur, they cause cooler and wetter winter conditions and reduce the chance of hurricanes and tropical storms (USDA NRCS, 2022).

The average annual rainfall in the mountains of the Northwest District (i.e., corner) of St. Croix is up to 50 or more inches (Torres-Sierra, 1987) (Jordan, 1975). **Figure 2** is an excerpt from NOAA annual rainfall map showing close to 58 inches in the Butler Bay Watershed.

**Table 2** summarizes the 24-hr rainfall amounts for standard storm frequencies from [NOAA Atlas 14](#), Vol 5, Version 3 at the two nearest stations (**Figure 3**). Stormwater standards for the USVI suggest use of the Atlas 14+ method for stormwater sizing calculations.

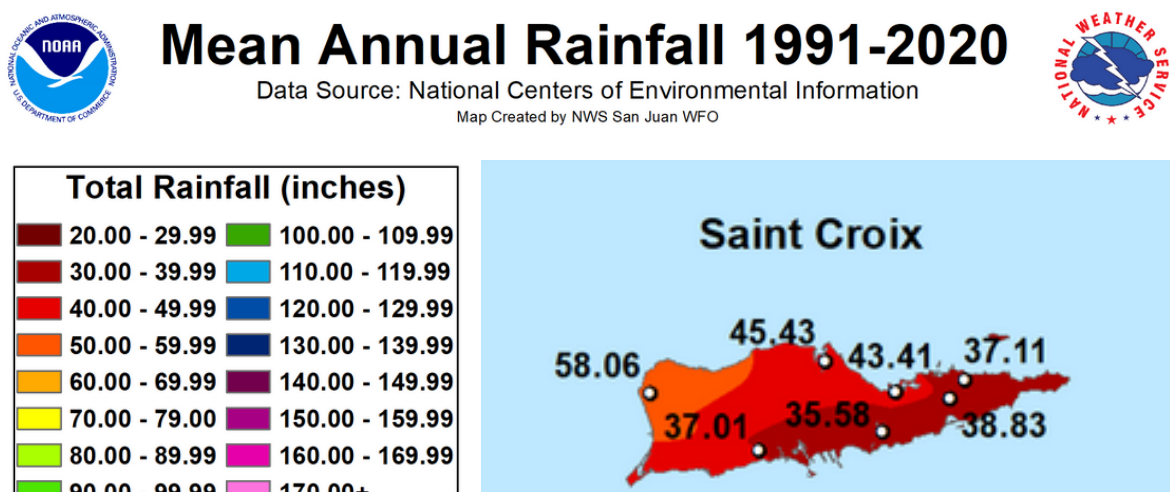


Figure 2. Annual Rainfall Measured between 1991-2020 (NOAA)



circulation patterns. Variations from these easterly trade winds come from the northerly Bermuda High and the southerly Equatorial Trough (USDA NRCS, 2022).

### **Evaporation and Recharge**

Evaporation rates in the USVI are high because of the steady flow of trade winds, warm temperatures, low percolation rates, and short-duration/high intensity events that leave moisture near the surface. Cosner (1972) reports evapotranspiration rates (evaporation plus plant transpiration) of 40 to 42 inches per year, which accounts for 90 to 95 % of the rainfall (Gomez-Gomez et al., 1985). Gómez-Gómez and Heisel (1980) estimated annual evapotranspiration rates for the USVI to average about 39 in/yr. Combined, evaporation and transpiration can create a soil-moisture deficiency for nine to eleven months of the year, according to studies conducted by J.M. Bowden (Santiago-Rivera & Colon- Dieppa, 1986). These evapotranspiration rates leave about 2-4 inches of the annual rainfall for groundwater and streams, with less than one inch entering the ocean from streamflow. However, if there are severe storms or back-to-back storms, surface runoff increases and may range from 20 to 75% of the rainfall (Cosner, 1972) (USDA NRCS, 2022).

Smith and Ajayi (1983) states that evapotranspiration rates are as high as 96% in central St. Croix. A 1975 study cited annual rainfall levels at 40 inches and evapotranspiration rates at 36-38 inches for St. Croix, consistent with those other USVI-wide studies (Jordan, 1975).

### **Guts, Wetlands, and Ponds**

In the USVI, streams known as “guts” are generally ephemeral or intermittent. While historic accounts indicate that these watercourses were once perennial—in some cases into the 1950s—today, there are virtually no perennial streams in the USVI. The western end of St. Croix is one particular location where perennial watercourses were once believed to exist. Regardless of historic changes, freshwater has always been scarce in the USVI. In the first half of the 20<sup>th</sup> century, Creque Gut and Jolly Hill Gut to the south (and possibly Caledonia to the north) were observed as perennial streams until the 1970s.

Creque Dam is a 45-ft high arched dam built in 1926 to serve Frederiksted water supply. With a capacity of 35,091 m<sup>3</sup>, it did not keep up with rising water demands, and other water supply approaches were eventually implemented (e.g., rainwater cisterns, desalination plants). A study from the 1970s cited the reservoir’s original capacity at roughly 10 million gallons and noted that by that time, the reservoir’s capacity had already been reduced by one third due to sediment accumulation. At the time of that study, the dam’s reservoir was used to supply cattle in the area. Today, the Creque Dam’s reservoir (sometimes referred to as Mt. Washington Reservoir or Frederiksted Reservoir) and Creque Gut are some of the few remaining freshwater areas (Jordan, 1975) (Torres-Sierra, 1987) (USDA NRCS, 2022) (Lancellotti and Hensley, 2024).

There are also several small ponds in the watershed, likely agricultural ponds.

 What is the current condition and use of these ponds?

The wetlands of the USVI are generally coastal wetlands, such as mangrove forests and salt ponds. As a result of steep terrain, small drainage basins, and limited rainfall, freshwater wetlands and open-water habitats are scarce (USDA NRCS, 2022). In total, wetlands and open water make up a very small portion of the Butler Bay Watershed (~2 acres and ~7 acres, respectively based on landcover data).

### **Surface Discharges and Groundwater**

The capacity of guts to manage peak runoff while maintaining ecological functions is not well understood in the USVI. Infiltration in guts has anecdotally been reported as extremely high in Coral Bay, St. John (per. com., Coral Bay Community Council, 2012). Rennis et al. (2006) summarizes previous gut studies and notes that because of the predominately steep slopes, the guts can see rapid flows during storm events. They go on to say that despite this, after the most frequent storms (smaller events), most of the rainfall evaporates and/or infiltrates into the ground rather than discharging as surface flow at the bottom of the watershed.

Furthermore, Cadmus (2011) states that the amount of runoff during more frequent, smaller storms shows extreme variability, due in part to the antecedent moisture conditions of soils. Surface soils generally have high permeability rates, which unless saturated, can allow for the infiltration of a high percentage of the small rainfall events. However, Cadmus (2011) also estimates that runoff response to large storm events often results in high volumes of surface runoff during and immediately after rainfall. Further study is needed to compare the hydrology of natural versus guts impacted by additional stormwater loads from surrounding development.

The hydrology of USVI is influenced by its geology and topography (Adams et al., 1996). Floodwaters rise and recede quickly because of the steep slopes, the thin, clayey soils, and impermeable underlying volcanic rock. Runoff is also controlled by several other factors, including soil moisture, local evaporation rates, and vegetation cover (Adams et al., 1996). During a year of average precipitation, annual runoff ranges from 2 to 8 % of the rainfall (Santiago-Rivera and Colon-Dieppa, 1986). However, runoff from individual storms exceeds 10% of the rainfall and can be as high as 30% when rainfall is intense and soil moisture demands are low (Adams et al., 1996) (USDA NRCS, 2022).

There are no active [USGS stream gauges](#) in the Butler Bay Watershed, but there are several inactive groundwater wells (**Figure 4**). The closet active groundwater well is to the south in Estate Prosperity ("Mahogany Road 4 Well"), while the closest active surface water site is to the southeast ("Gut 4.5 at Cane Valley").

Following the 2017 hurricanes, the Federal Emergency Management Agency (FEMA) conducted additional hydrologic and hydraulic analyses in the USVI, including in the Butler Bay Watershed (FEMA, 2018). Modeled discharge rates for four streams in Butler Bay are shown in **Figure 5** and summarized in **Table 3**.

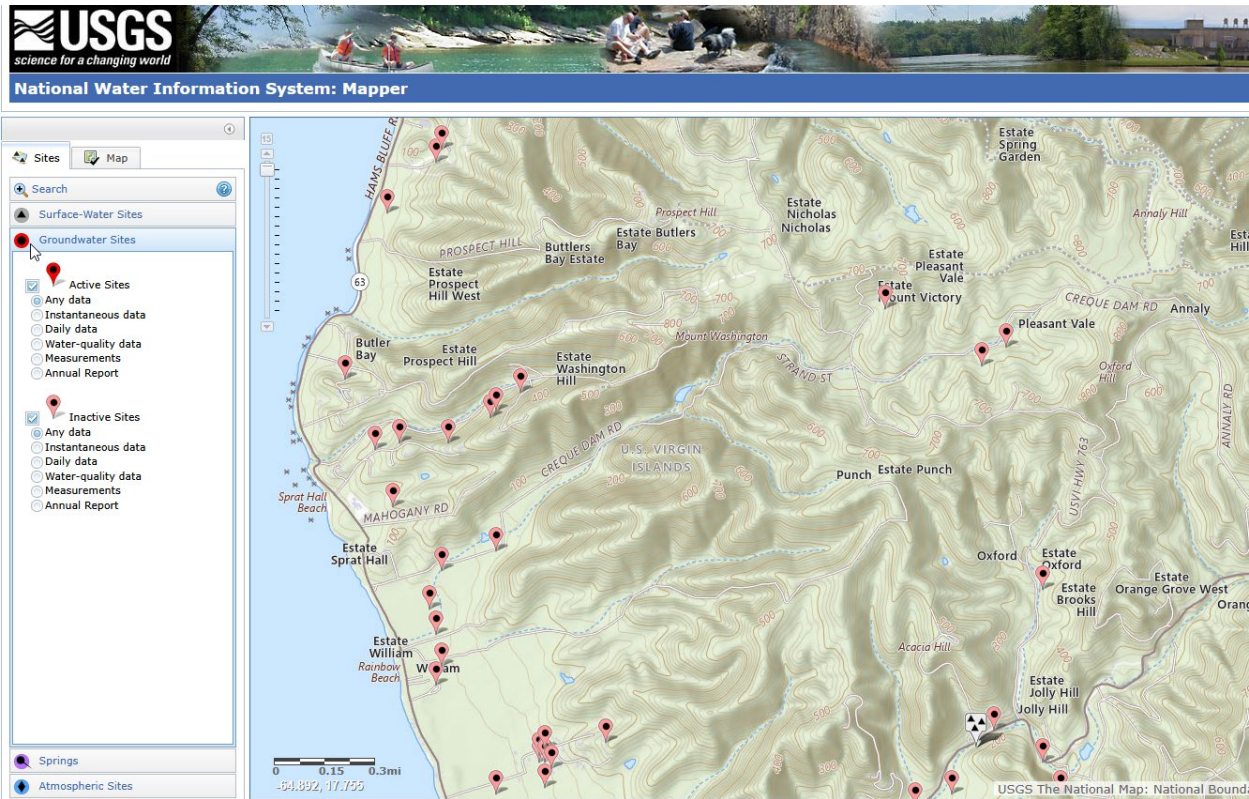


Figure 4. Inactive USGS groundwater gauges in the Butler Bay Watershed

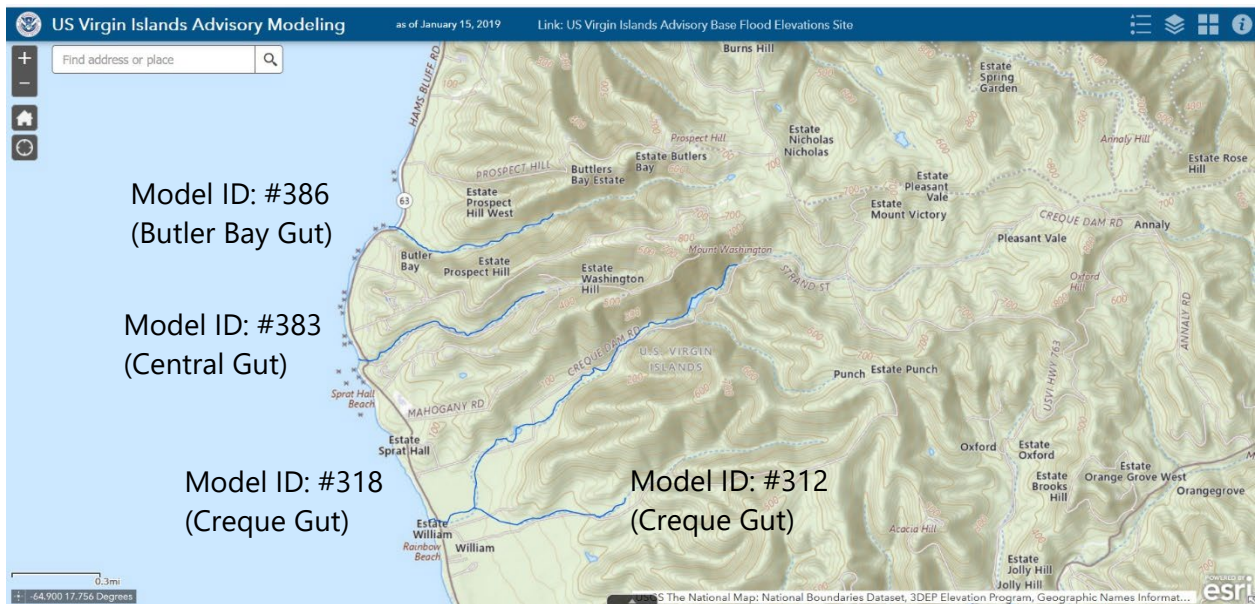


Figure 5. Guts studied by FEMA after 2017 hurricanes

✳ Review the U.S. Army Corps of Engineers report for Creque Dam for additional flow information. Groundwater elevation information may be available with USGS if needed; check DPNR well data also.

Table 3: FEMA modeled gut discharges

| Cross Section | Name                      | Ft above mouth | Location Description                                             | Discharge (cfs) |        |        |         |         |
|---------------|---------------------------|----------------|------------------------------------------------------------------|-----------------|--------|--------|---------|---------|
|               |                           |                |                                                                  | 10 Yr.          | 25 Yr. | 50 Yr. | 100 Yr. | 500 Yr. |
| 11545         | Unnamed Stream Model #386 | 5              | Downstream End above Confluence with Caribbean Sea               | 737             | 967    | 1,178  | 1,384   | 1,836   |
| 11578         | Unnamed Stream Model #386 | 3,310          | Upstream End at Limit of Study                                   | 611             | 781    | 945    | 1,080   | 1,383   |
| 11461         | Unnamed Stream Model #383 | 10             | Downstream End above Confluence with Caribbean Sea               | 620             | 794    | 961    | 1,101   | 1,414   |
| 11544         | Unnamed Stream Model #383 | 3,916          | Upstream End at Limit of Study                                   | 421             | 509    | 609    | 659     | 786     |
| 11134         | Creque Gut Model #318     | 15             | Downstream End above Confluence with Sea                         | 1,222           | 1,727  | 2,140  | 2,709   | 3,958   |
| 11206         | Creque Gut Model #318     | 8,347          | Upstream End at Limit of Study                                   | 897             | 1,212  | 1,486  | 1,797   | 2,476   |
| 11119         | Unnamed Stream Model #312 | 1,149          | Downstream End above Confluence with Creque Gut (STX Model #318) | 756             | 996    | 1,215  | 1,432   | 1,910   |
| 11133         | Unnamed Stream Model #312 | 3,941          | Upstream End at Limit of Study                                   | 672             | 869    | 1,056  | 1,223   | 1,595   |

<https://fema.maps.arcgis.com/apps/webappviewer/index.html?id=49ccda6ff96f43da822efd6f48e9b9f3>

Jordan (1975) provided the streamflow and discharge information for Creque Gut (above the dam) and Jolly Hill Gut to the south between 1963-1967 during a drought (see **Figures 6-8**). Findings include:

- Creque Gut's estimated discharge was roughly 9% of rainfall.
- Creque Gut basin is underlain by rocks with low permeability and small groundwater storage capacity with a larger sustained baseflow than the nearby and relatively comparable Jolly Hill Gut basin to the south. This difference was attributed to the Creque Gut basin being nearly 80% grassland with less transpiration than Jolly Hill Gut.
- Where Creque Gut enters the coastal plain, wells in the fractured rock under the coastal plain alluvium yielded up to 30,000 gpd, due in part to the thick overlying alluvium that provides recharge and temporary storage. This yield was contrasted with the approximately 1,000 gpd for bedrock wells in other coastal plain areas.
- The study estimated a potential groundwater yield of roughly 360,000 gallons per day for an average effective recharge of roughly 0.8 inch annually.
- The mouth of Creque Gut could yield ~ 60,000 gpd (100,000 gpd at Jolly Hill), with a potential to yield 70,000 gpd through development of mountain basins, reducing stream

base flow but not negatively affecting coastal plain recharge. It also noted that 30,000 gpd could be added to the potential yield through artificial recharge of water from the Creque Dam reservoir.

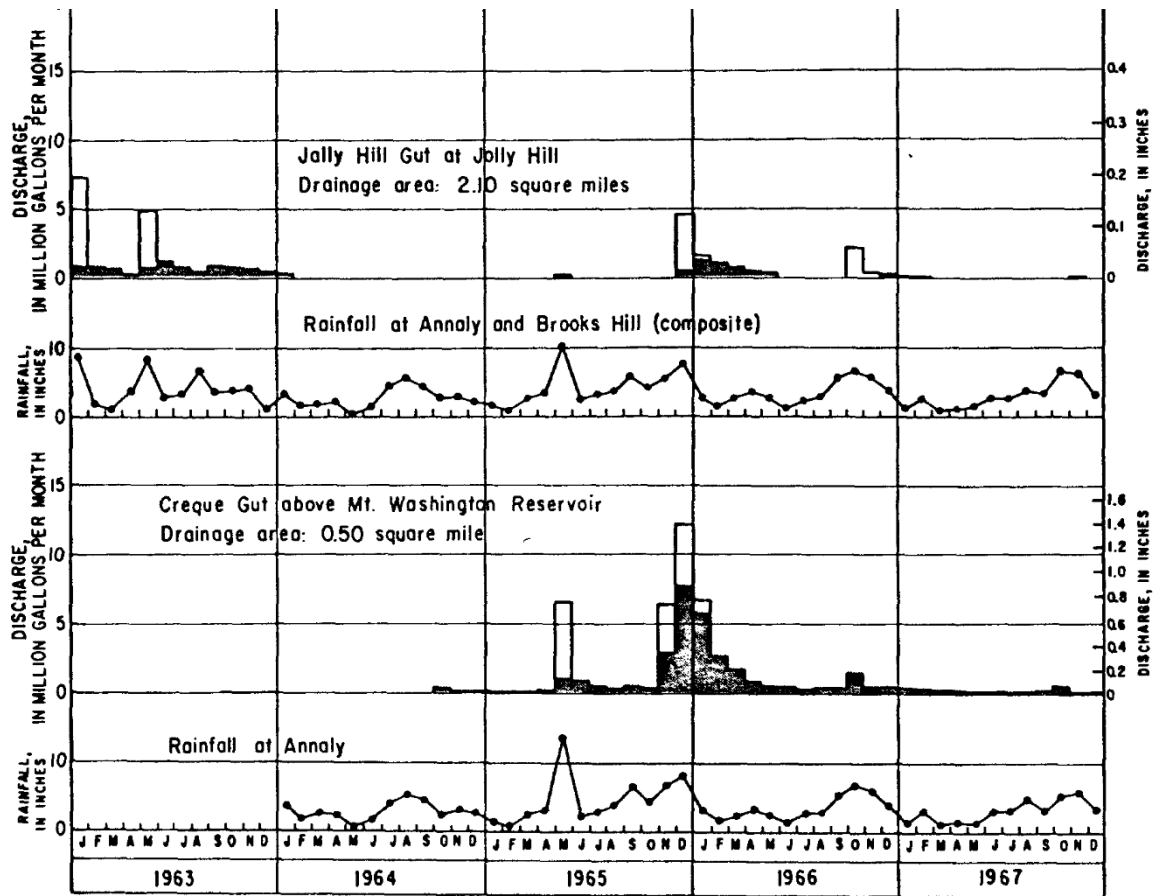


Figure 6. Monthly stream flow above Creque Dam and rainfall at Annaly 1963-1967 (Jordan, 1975)

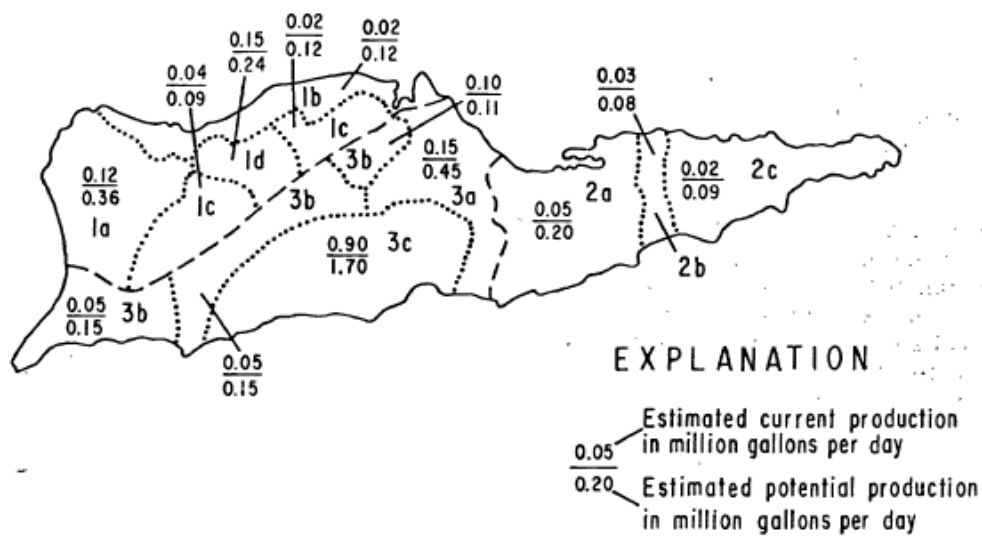


Figure 7. Estimated current production and potential yield from groundwater areas in 1967 (Jordan, 1975)

| Station number | Gaging station                                                        | Year | Rainfall, in inches | Discharge           |                  |                     |                       |                     |                       | Maximum flow recorded |                       |       |                     |                       |                      |
|----------------|-----------------------------------------------------------------------|------|---------------------|---------------------|------------------|---------------------|-----------------------|---------------------|-----------------------|-----------------------|-----------------------|-------|---------------------|-----------------------|----------------------|
|                |                                                                       |      |                     | Total annual        |                  | Minimum daily       |                       | Average daily       |                       | Maximum daily         |                       | Date  | Discharge           |                       | Gage height, in feet |
|                |                                                                       |      |                     | Millions of gallons | Inches of runoff | Millions of gallons | Cubic feet per second | Millions of gallons | Cubic feet per second | Millions of gallons   | Cubic feet per second |       | Millions of gallons | Cubic feet per second |                      |
| 3320           | River Gut at River<br>(Drainage area, 1.42 sq mi)                     | 1963 | 52.1                | 15.8                | 3.5              | 0.035               | 0.05                  | 0.235               | 0.36                  | 9.84                  | 15.2                  | 05/18 | 109                 | 169                   | 3.39                 |
|                |                                                                       | 64   | 27.2                | 15.6                | .6               | .004                | .01                   | .043                | .06                   | .16                   | .25                   | 09/22 | 1.36                | 2.1                   | 1.53                 |
|                |                                                                       | 65   | 47.7                | 17.8                | .7               | .004                | .01                   | .049                | .08                   | 2.63                  | 4.07                  | 05/24 | 7.61                | 11.8                  | 1.94                 |
|                |                                                                       | 66   | 32.8                | 5.4                 | .2               | 0                   | 0                     | .015                | .02                   | .10                   | .15                   | 10/14 | 4.11                | 6.4                   | 1.77                 |
|                |                                                                       | 67   | 33.6                | 1.4                 | .06              | 0                   | 0                     | .004                | .01                   | .029                  | .04                   | 06/20 | 8.57                | 13.3                  | 1.98                 |
| 3330           | River Gut at Golden Grove<br>(Drainage area, 5.16 sq mi)              | 1963 | 55.4                | 392                 | 4.4              | 0.025               | 0.04                  | 1.07                | 1.66                  | 78.5                  | 121                   | 05/18 | 304                 | 470                   | 9.03                 |
|                |                                                                       | 64   | 34.8                | 5.9                 | .07              | 0                   | 0                     | .016                | .02                   | .13                   | .20                   | 01/23 | .19                 | .3                    | 1.82                 |
|                |                                                                       | 65   | 49.3                | 14.2                | .16              | 0                   | 0                     | .039                | .06                   | 6.77                  | 10.5                  | 05/24 | 9.88                | 15.3                  | 2.62                 |
|                |                                                                       | 66   | 27.5                | 0                   | 0                | 0                   | 0                     | 0                   | 0                     | 0                     | 0                     | --    | 0                   | 0                     | 0                    |
|                |                                                                       | 67   | 35.2                | .9                  | .01              | 0                   | 0                     | .002                | .003                  | .91                   | 1.41                  | 10/31 | 11.1                | 17.2                  | 2.67                 |
| 3450           | Jolly Hill Gut at Jolly Hill<br>(Drainage area, 2.10 sq mi)           | 1963 | 47.1                | 22.5                | 0.62             | 0                   | 0                     | 0.062               | 0.10                  | 5.64                  | 8.73                  | 01/04 | 128                 | 198                   | 3.04                 |
|                |                                                                       | 64   | 32.2                | 2.1                 | .06              | 0                   | 0                     | .006                | .01                   | .01                   | .02                   | 01/20 | .01                 | .02                   | .44                  |
|                |                                                                       | 65   | 51.3                | 8.1                 | .22              | 0                   | 0                     | .022                | .03                   | 2.56                  | 3.96                  | 12/12 | 143                 | 221                   | 3.15                 |
|                |                                                                       | 66   | 40.6                | 9.0                 | .25              | 0                   | 0                     | .025                | .04                   | 2.34                  | 3.62                  | 10/14 | 19.2                | 29.7                  | 2.40                 |
|                |                                                                       | 67   | 35.1                | .2                  | .01              | 0                   | 0                     | .001                | .002                  | .05                   | .08                   | 11/20 | 1.46                | 2.3                   | 1.13                 |
| 3470           | Creque Gut above Mt. Washington Reservoir (Drainage area, 0.50 sq mi) | 1963 | 54.3                | 43.3                | 5.0              | --                  | --                    | .119                | .18                   | --                    | --                    | --    | --                  | --                    | --                   |
|                |                                                                       | 64   | 34.4                | 8.0                 | .92              | --                  | --                    | .022                | .03                   | --                    | --                    | --    | --                  | --                    | --                   |
|                |                                                                       | 65   | 57.0                | 28.0                | 3.2              | 0                   | 0                     | 0.077               | 0.12                  | 2.96                  | 4.58                  | 12/11 | 99.4                | 154                   | 3.77                 |
|                |                                                                       | 66   | 43.3                | 16.0                | 1.8              | .001                | .002                  | .044                | .07                   | 1.03                  | 1.59                  | 10/14 | 59.1                | 91.4                  | 3.30                 |
|                |                                                                       | 67   | 35.9                | 1.3                 | .15              | 0                   | 0                     | .004                | .01                   | .28                   | .43                   | 10/10 | 16.5                | 25.5                  | 2.59                 |

1/ Adjusted for diversions.

2/ Estimated.

Figure 8. Summary of stream flow at USGS gaging stations between 1963-1967 (Jordan, 1975)

## Flooding Hazards

Due to its location, St. Croix is vulnerable to hurricanes, which typically can occur between June and November. The southern and western ends of St. Croix were particularly devastated by Hurricane Maria in 2017.

**Figure 9** shows low-lying coastal areas and guts within the FEMA 100-year flood zone (Zone A, Zone AE).

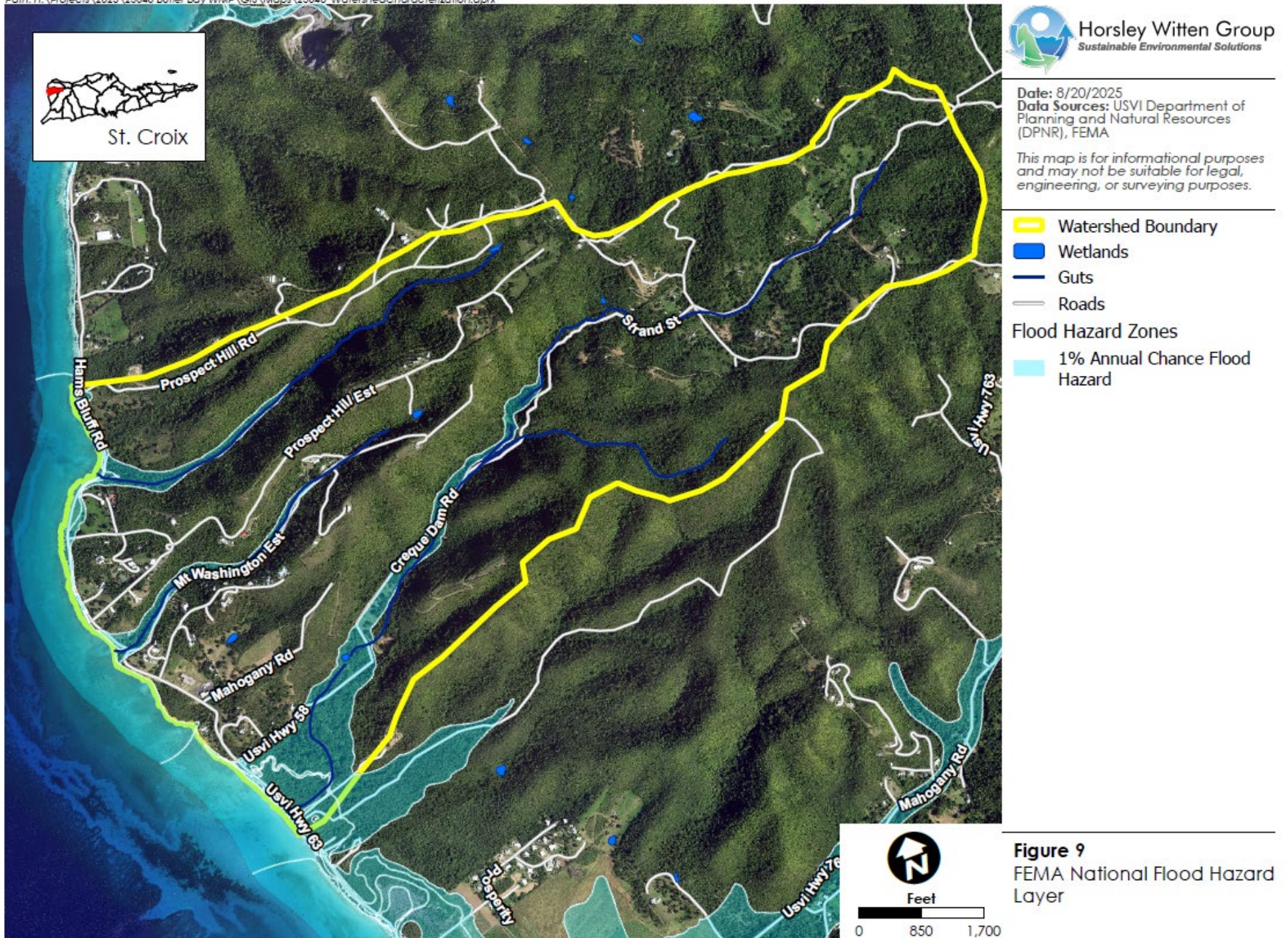
The U.S. Sea Level Rise Interagency Task Force's sea level rise scenarios provide sea level rise projections, relative to a 2000 baseline, for Lime Tree Bay, St. Croix, the closest available data location to the Butler Bay Watershed (**Table 4**). Sea level rise is not projected to dramatically impact the watershed, likely as a result of its steep slopes, although the length of the coastal road (USVI Highway 63/Emancipation Drive/Hams Bluff Road) and the southwest corner of the watershed are susceptible to sea level rise. **Figure 10** shows 10 feet of sea level rise for reference.

*Table 4: Sea level rise scenarios*

| Scenario     | 2030    | 2050    | 2100    |
|--------------|---------|---------|---------|
| Low          | 0.37 ft | 0.63 ft | 1.17 ft |
| Intermediate | 0.43 ft | 0.87 ft | 3.34 ft |
| High         | 0.48 ft | 1.31 ft | 6.76 ft |

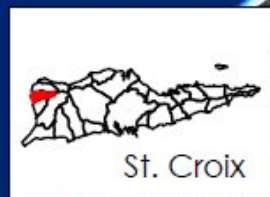
<https://sealevel.nasa.gov/task-force-scenario-tool/> or [https://coast.noaa.gov/slr/#/layer/slr/0/-7224233.128388021/2000543.0250863608/11.320/satellite/none/0.8/2050/interHigh/noAccretion/NOS\\_Minor](https://coast.noaa.gov/slr/#/layer/slr/0/-7224233.128388021/2000543.0250863608/11.320/satellite/none/0.8/2050/interHigh/noAccretion/NOS_Minor)

✳ Discuss road and other infrastructure vulnerability with DPW in portions.



Date: 8/20/2025  
Data Sources: USVI Department of Planning and Natural Resources (DPNR), NOAA

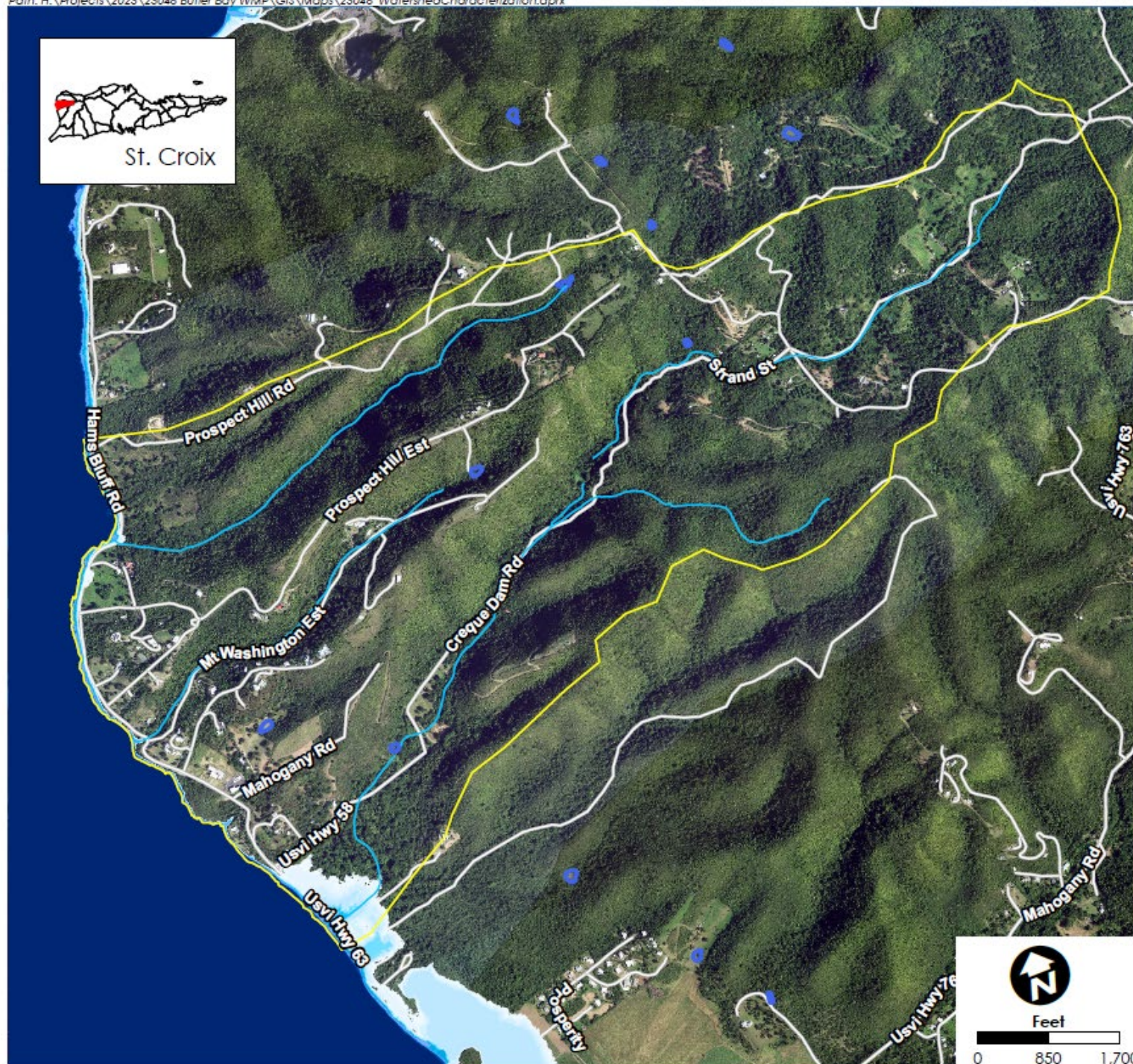
This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes.



-  Watershed Boundary
-  Wetlands
-  Guts

Sea Level Rise (NOAA 2017)

-  0ft
-  1ft
-  2ft
-  3ft
-  4ft
-  5ft
-  6ft
-  7ft
-  8ft
-  9ft
-  10ft

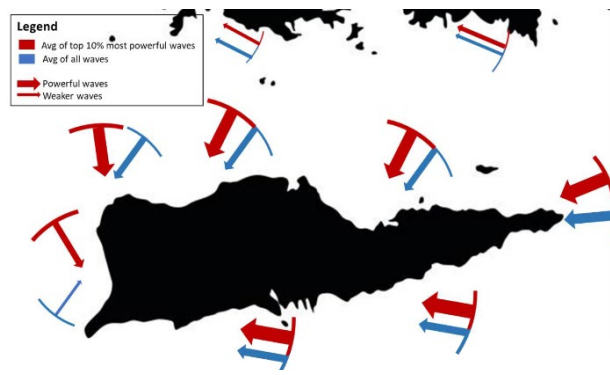


Feet  
0 850 1,700

**Figure 10**  
Sea Level Rise

## Ocean Circulation and Waves

As a watershed connected to an open ocean environment, adjacent watersheds and ocean circulation are important considerations for watershed planning for the Butler Bay Watershed. Local stakeholders have described ocean circulation along the western coast of St. Croix as generally from north to south. They note, however, that during storms the ocean circulation is generally from south to north. Because of these trends, adjacent watersheds have the potential to impact Butler Bay itself. In particular, there have been concerns raised that Frederiksted's stormwater and even sewage can impact Butler Bay, especially during storms.



*St. Croix Wave Climate (Guannel et al., 2022)*

Waves have been documented to be less powerful on the western coast of St. Croix than the eastern coast, due to some sheltering.

✳️ Research and review additional ocean circulation and wave information, as available.

## GEOLOGY AND SOILS

The U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) provides soil information on type (**Table 5**), hydrologic soil group (**Table 6**), erodibility, and landslide potential. Geologically, most of the watershed is comprised of weathered volcanic bedrock. An excerpt from the online soils report is provided in **Figure 11**.

HSG classifications are based on estimates of runoff potential and soils are classified according to the rate of water infiltration when the soils are unvegetated, are thoroughly wet, and receive precipitation from long-duration storms. The majority of the Butler Bay Watershed is categorized as HSG D, with areas of C along the lower part of guts (**Figure 12**). In general, the soils in Butler Bay are not good for infiltration.

Much of the watershed is characterized as “highly erodible” (**Figure 13**) and some of the watershed is susceptible to potential landslides, especially in the middle section of the watershed (**Figure 14**).

Table 5: Soil Types in the Butler Bay Watershed

| Soil Complex        | % of Watershed | Notes                                                                                                                                                                                                                                                                |
|---------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Annaberg-Cramer     | 76.5           | shallow, well drained, and moderately permeable soils.                                                                                                                                                                                                               |
| Glynn gravelly loam | 9.3            | deep, well drained, and slowly permeable soils. These soils are directly inland of the beaches and lining the guts close to the ocean.                                                                                                                               |
| Cramer-Victory      | 10             | shallow, well drained, and moderately permeable, usually found along steep volcanic slopes. These soils are present along the guts further upgradient than the Glynn soils, primarily along the Creque Gut and with a large pocket at the top of the Butler Bay Gut. |
| Victory-Southgate   | 3.5            | moderately deep, well drained, moderately permeable soils at the summit of volcanic hills and mountains. Accordingly, they are found at the peaks that encircle the entire watershed.                                                                                |
| --                  | <1             | Along the shoreline, the soil mostly consists of sandy beaches, with portions of stony soil and rock outcrops.                                                                                                                                                       |

Table 6: HSG classifications with the Butler Bay Watershed (USDA NRCS, 2022)

| HSG     | % of Watershed | Notes                                                                                                                                                                                                                                                                                                                                                                     |
|---------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Group A | 0              | high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.                                                                                                                                                         |
| Group B | 0              | moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.                                                                                                   |
| Group C | 13             | slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.                                                                                                                            |
| Group D | 87             | very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission. |





## Map Unit Legend

| Map Unit Symbol             | Map Unit Name                                                     | Acres in AOI | Percent of AOI |
|-----------------------------|-------------------------------------------------------------------|--------------|----------------|
| AcD                         | Annaberg-Cramer complex, 12 to 20 percent slopes, extremely stony | 30.6         | 2.5%           |
| AcE                         | Annaberg-Cramer complex, 20 to 40 percent slopes, extremely stony | 150.6        | 12.4%          |
| AcF                         | Annaberg-Cramer complex, 40 to 60 percent slopes, extremely stony | 434.8        | 35.9%          |
| AcG                         | Annaberg-Cramer complex, 60 to 80 percent slopes, extremely stony | 311.0        | 25.7%          |
| BrB                         | Beaches, rock outcrop                                             | 0.4          | 0.0%           |
| BsB                         | Beaches, sandy                                                    | 1.3          | 0.1%           |
| BitB                        | Beaches, stony                                                    | 0.6          | 0.0%           |
| CvD                         | Cramer-Victory complex, 12 to 20 percent slopes, very stony       | 34.3         | 2.8%           |
| CvE                         | Cramer-Victory complex, 20 to 40 percent slopes, very stony       | 83.7         | 6.9%           |
| CvF                         | Cramer-Victory complex, 40 to 70 percent slopes, very stony       | 3.3          | 0.3%           |
| GyA                         | Glynn gravelly loam, 0 to 2 percent slopes                        | 19.1         | 1.6%           |
| GyB                         | Glynn gravelly loam, 2 to 5 percent slopes                        | 43.8         | 3.6%           |
| GyC                         | Glynn gravelly loam, 5 to 12 percent slopes                       | 49.4         | 4.1%           |
| SrE                         | Southgate-Rock outcrop complex, 20 to 40 percent slopes           | 5.3          | 0.4%           |
| VsC                         | Victory-Southgate complex, 2 to 12 percent slopes, very stony     | 15.3         | 1.3%           |
| VsD                         | Victory-Southgate complex, 12 to 20 percent slopes, very stony    | 14.4         | 1.2%           |
| VsE                         | Victory-Southgate complex, 20 to 40 percent slopes, very stony    | 11.3         | 0.9%           |
| W                           | Water                                                             | 1.6          | 0.1%           |
| Totals for Area of Interest |                                                                   | 1,210.8      | 100.0%         |



Date: 8/25/2025

Data Sources: USVI Department of Planning and Natural Resources (DPNR), NRCS

This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes.

Watershed Boundary

Wetlands

Guts

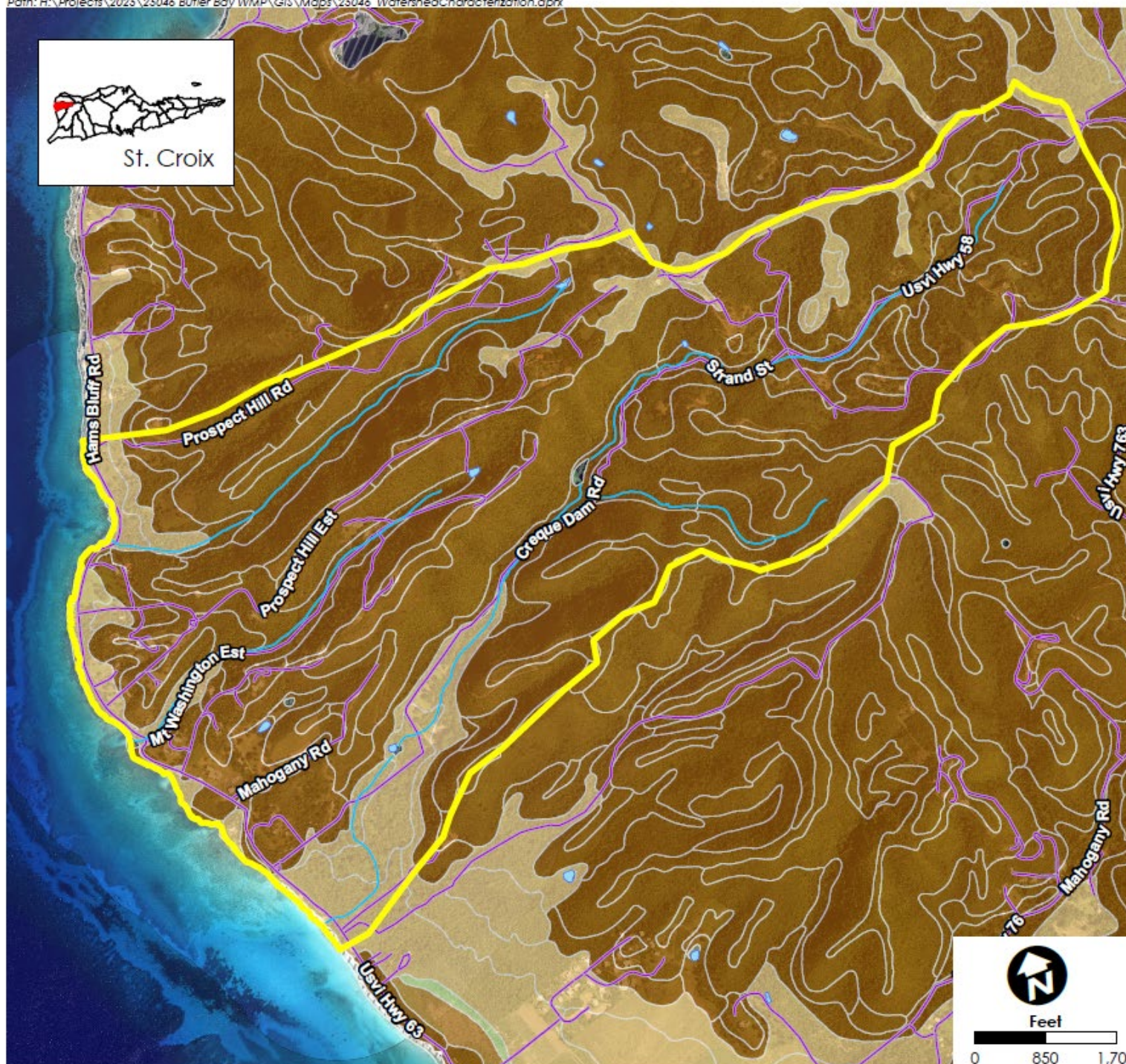
Roads

Hydrologic Soil Group

<Null>

C

D



Feet  
0 850 1,700

**Figure 12**  
NRCS Soils (HSG)

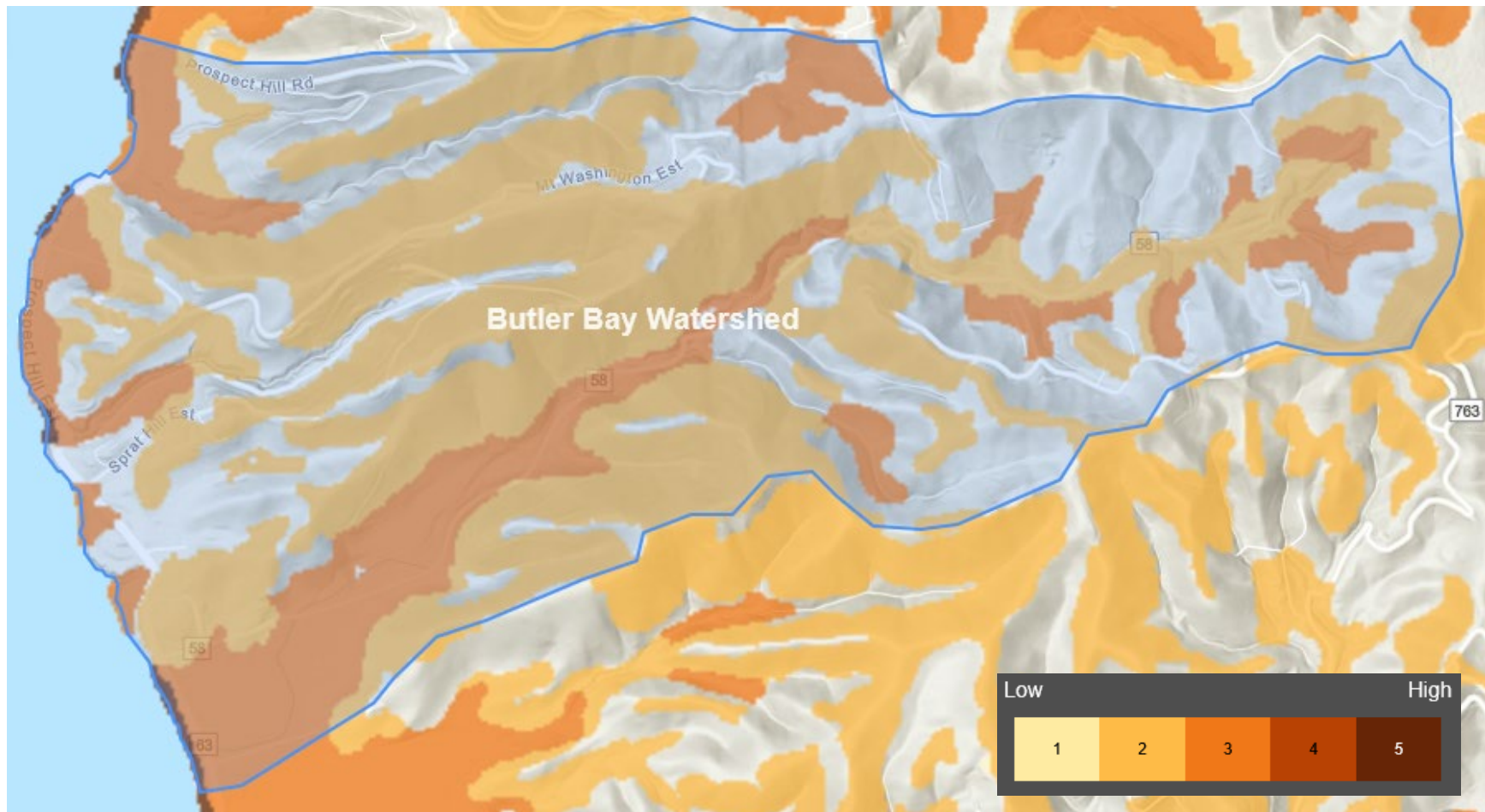
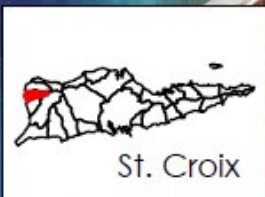


Figure 13. Soil Erodibility Map from the NFWF CREST Tool showing areas that contain soil characteristics that have a high susceptibility of soil particle detachment by water. This may include areas that have high silt content or migratory systems such as beaches and dunes. High values suggest that areas carry an increased potential for erosion due to flooding or heavy precipitation events. <https://resilientcoasts.org/AnalyzeProjectSites>.

✖ Check this against NRCS Soil Survey.



**Date:** 8/20/2025  
**Data Sources:** USVI Department of Planning and Natural Resources (DPNR), USVI Hazard Mitigation and Resilience Plan

This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes.

- Watershed Boundary
- Wetlands
- Guts
- Roads
- Landslide Hazard**
- Very Low
- Low
- Moderate
- High
- Very High



| Hazard Label | % Watershed Area |
|--------------|------------------|
| Very Low     | 8.9%             |
| Low          | 22.2%            |
| Moderate     | 31.0%            |
| High         | 23.3%            |
| Very High    | 13.9%            |
| no data      | 0.6%             |



Feet

0 850 1,700

**Figure 14**  
Landslide Hazard

## WATER QUALITY

The USVI Water Quality Management Program is managed by the DPNR Division of Environmental Protection (DEP) and is funded through the Clean Water Act Section 604(b) grant. DPNR regularly publishes an Integrated Water Quality Monitoring and Assessment Report that documents how well the territory's waters meet water quality standards under Section 305(b), and it also identifies impaired waters that require the development of Total Maximum Daily Loads (TMDLs) as mandated by Section 303(d). The official water quality standards are outlined in V.I.C. Title 12, Chapter 7, Subchapter 186, Sections 186-1 through 13.

### Surface Water Standards

Butler Bay is classified as Class B waters which are protected for the maintenance and propagation of desirable species of aquatic life, including threatened, endangered, and indigenous species, and for primary contact recreation, such as swimming, water skiing, and similar activities (VI DPNR, 2023). **Table 7** summarizes numerical criteria (VI DPNR, 2020).

Both the Butler Bay and Creque guts are located within the Butler Bay watershed and are listed in the "Guts of Interest" for St. Croix, which are protected watercourses. A watercourse is defined as "... any stream with a reasonable well-defined channel, and includes streams which have a permanent flow, as well as those which result from the accumulation of water after rainfall and which regularly flow through channels formed by the force of the waters" (VI DPNR, 2020).

*Table 7: USVI water quality and assessment criteria*

| Parameter        | Source Data Type | Criteria                                                                                                                                                                                                                                                                                                               |
|------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Enterococcus     | Ambient/Beach    | The 30-day geometric mean for enterococcus shall not exceed 30 colony-forming units/100 mL and no more than 10 percent of the samples collected in the same 30 days shall exceed 110 colony-forming units/100 mL                                                                                                       |
| Turbidity        | Ambient/Beach    | A maximum nephelometric turbidity unit (NTU) of three shall be permissible. For areas where coral reef ecosystems are located, a maximum NTU reading of one shall be permissible.                                                                                                                                      |
| Clarity          | Ambient/Beach    | <b>*For areas where coral reef ecosystems are located</b> , a maximum nephelometric turbidity unit reading of one (1) shall be permissible, and secchi disk reading of minimum of 1 meter.                                                                                                                             |
| Total Phosphorus | Ambient          | Shall not exceed 50 µg/l                                                                                                                                                                                                                                                                                               |
| pH               | Ambient          | Class A, B: Range shall not be outside 7.0 to 8.3 standard units<br>Class C: Range shall not be outside 6.7 to 8.5 standard units                                                                                                                                                                                      |
| Temperature      | Ambient          | Shall not exceed 32 degrees Celsius at any time, nor as a result of waste discharge to be greater than 1.0 °C above natural conditions.<br><b>*For areas where coral reef ecosystems</b> are located, shall not exceed 25-29°C at any time, nor as a result of waste discharge to be greater than 1.0°C above natural. |
| Dissolved oxygen | Ambient          | Class A, B: Shall be no less than 5.5 mg/L<br>Class C: Shall be no less than 5.0 mg/L                                                                                                                                                                                                                                  |

\*Areas that contain coral reef ecosystems are determined based on Benthic Habitat Mapping in Puerto Rico and the U.S. Virgin Islands

## Monitoring

The Virgin Islands Ambient Water Quality Testing Program includes two assessment units in Butler Bay: Sprat Hall Beach (VI-STC-06) and Creque Dam/Butler Bay (VI-STC-07). Sprat Hall Beach (VI-STC-06) was included in the 2022 303(d) list as impaired due to pH and nitrogen exceedances (DPNR 2023). As of August 2025, water quality monitoring at the Creque Dam/Butler Bay site (VI-STC-07) is inactive (pers. comm., Sylvester, 2025).

The DPNR Beach Monitoring Program includes one site in Butler Bay: Sprat Hall (STX-9 and STC-30). Parameters monitored at this location include turbidity and enterococcus bacteria, which are key indicators of recreational water safety.

**Figure 15** shows these assessment units and monitoring stations.

*Table 8: 2022 303(d) list Relevant to waters in the Butler Bay Watershed*

| AU ID     | AU NAME          | STATIONS             | PRIORITY | CLASS | IMPAIRMENT | YEAR FIRST LISTED | TENTATIVE YEAR OF TMDL COMPLETION |
|-----------|------------------|----------------------|----------|-------|------------|-------------------|-----------------------------------|
| VI-STC-06 | Sprat Hall Beach | STC-30, STX-9, STX-9 | Low      | B     | pH         | 2020              | 2028                              |
| VI-STC-06 | Sprat Hall Beach | STC-30               | Low      | B     | Nitrogen   | 2022              | 2028                              |

Sediment plumes have been observed near coral restoration sites in Butler Bay. The frequency, duration, and magnitude of sedimentation events in Butler Bay have not been measured but have been attributed to unpaved road erosion by local stakeholders. Sedimentation is known to negatively affect coral reefs by smothering coral tissue, reducing light availability, and impairing growth and reproduction.

✖ No assessment of turbidity levels is available from DPNR, so no baseline data is available. The objective of this watershed project is to reduce sedimentation into the adjacent coral restoration area, so a recommendation might be to add monitoring, even if citizen science.

## TPDES Permits

No Territorial Pollutant Discharge Elimination System (TPDES) permits were identified in Butler Bay (US EPAb).

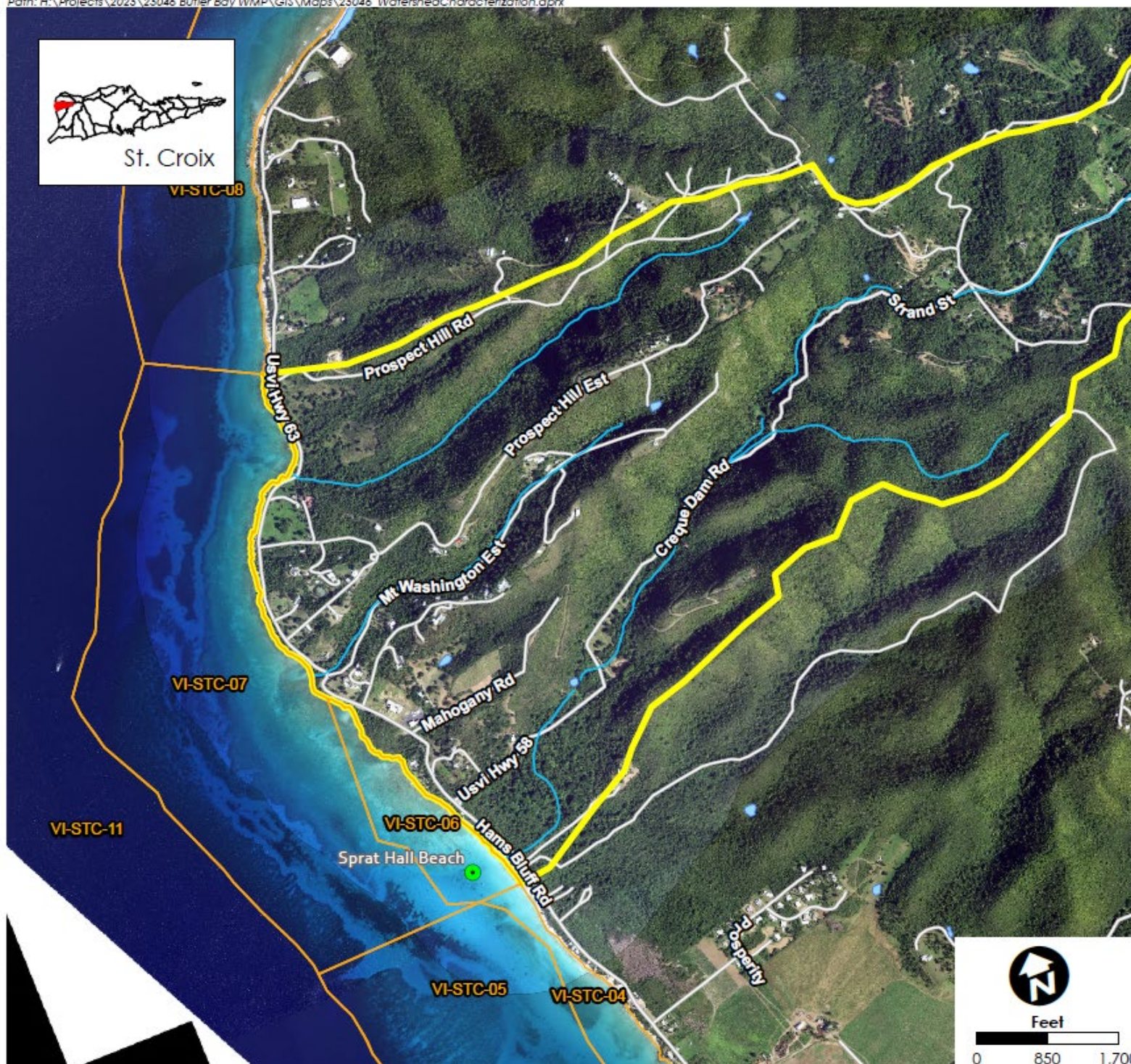


Date: 8/25/2025

Data Sources: USVI Department of Planning and Natural Resources (DPNR), NOAA

This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes.

- Watershed Boundary
- Assessment Units
- Monitoring Station



**Figure 15**  
Water Quality Monitoring

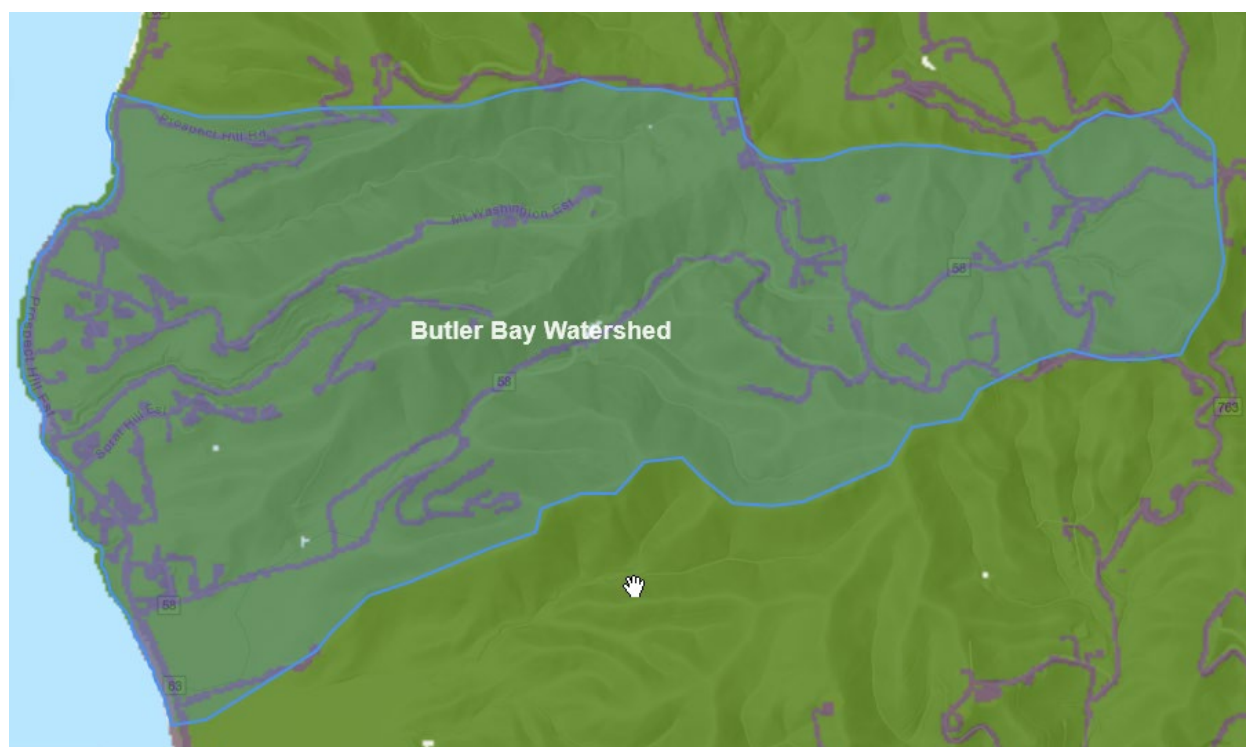
## LAND COVER, LAND OWNERSHIP, AND ZONING

### Land Cover

Guannel (2018) represents the most recent landcover mapping information (**Figure 17**). The vast majority of the watershed is characterized as Forest, with areas of Developed Medium Intensity and Developed Low Intensity in the lower (i.e., western) portion of the watershed (**Table 9**). Pockets of Shrub and Developed Open Space are also present, especially around development in the lower watershed. This landcover dataset may underrepresent agricultural uses in the watershed. The watershed has less than 3% impervious cover (33.5 acres) based on the CREST analysis (see **Figure 16**), which is an indicator of generally high quality watershed health.

*Table 9: Land cover in Butler Bay Watershed (2018)*

| Land Cover Type            | Watershed Area (acre) |
|----------------------------|-----------------------|
| Forest                     | 1022.2                |
| Shrub                      | 82.4                  |
| Developed open space       | 41.6                  |
| Rangeland                  | 19.5                  |
| Developed Low Intensity    | 19.4                  |
| Developed Medium Intensity | 12.7                  |
| Water                      | 6.8                   |
| Wetland                    | 2.3                   |
| <b>Total</b>               | <b>1206.9</b>         |



*Figure 16. Impervious Cover (NFWF CREST mapper) <https://resilientcoasts.org/AnalyzeProjectSites>*

## Land Ownership

A review of the parcel information indicates that ~32 acres are publicly owned (**Table 10**). The Government of the Virgin Islands owns the parcel around Creque Dam (5.62 acres). Homeowners along Prospect Hill road have provided additional information on which segments of the road are operated by various homeowners associations (HOAs), and this information will need to be teased out during field assessments.

*Table 10: Public land ownership*

| Owner                            | Area Owned in the Watershed (acres) |
|----------------------------------|-------------------------------------|
| Government of the Virgin Islands | 15.06                               |
| USA                              | 9.05                                |
| Dept of Navy US Govt             | 8.11                                |
| <b>Total</b>                     | <b>32.22</b>                        |

❗ Do we have a map of the public parcels?

## Zoning

Most of the watershed is zoned as R-1 Residential Low Density, with areas of A-1 Agricultural zoning in the middle-upper reaches of the watershed (**Table 11**). Several parcels zoned as R-3 Residential Medium Density and W-1 Waterfront Pleasure are located in the lower watershed along the coastal Hams Bluff Rd. There are also a limited number of parcels zoned as A-2 Agricultural or B-4 Business Residential in the upper watershed (**Figure 18**). The basic requirements for these districts are shown in **Table 12** (VI DPNRb).

No large, planned developments were identified in discussions with stakeholders around this report, but local stakeholders have noted potential development pressures, including subdivisions, within the largely forested watershed.

*Table 11: Zoning*

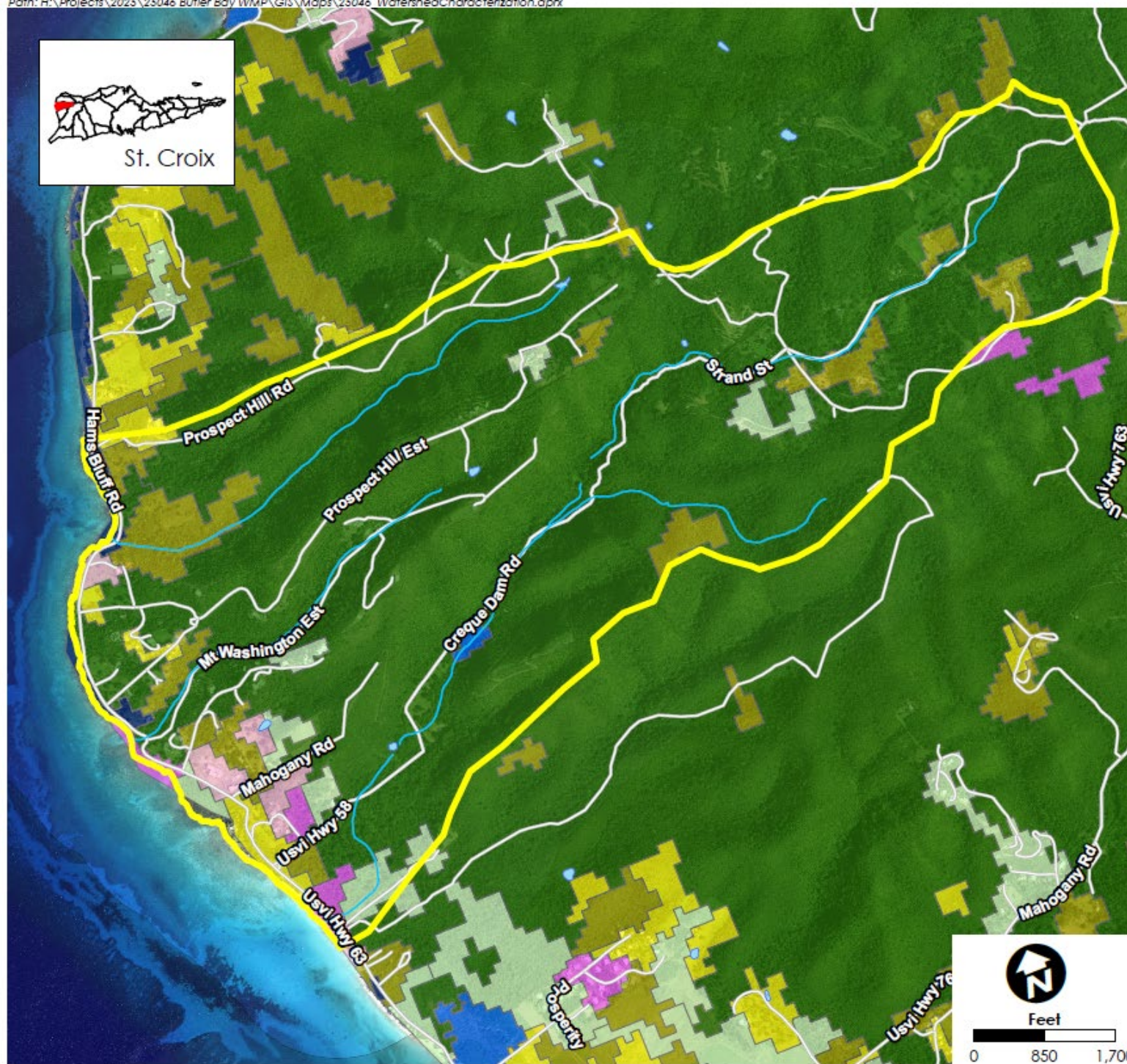
| Zoning District | Number of Parcels | Total Area (ac) |
|-----------------|-------------------|-----------------|
| A-1             | 23                | 308.92          |
| A-2             | 22                | 49.37           |
| B-4             | 2                 | 3.73            |
| R-1             | 149               | 712.03          |
| R-3             | 6                 | 75.90           |
| W-1             | 12                | 14.12           |
| <b>Total</b>    | <b>214</b>        | <b>1164.09</b>  |



Date: 8/20/2025

Data Sources: USVI Department of Planning and Natural Resources (DPNR), UVI GeoCAS

This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes.



Watershed Boundary

Wetlands

Guts

Roads

Landcover (G.Guannel 2018)

Developed Medium Intensity

Developed Low Intensity

Developed open space

Forest

Rangeland

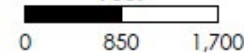
Shrub

Water

Wetland



Feet



**Figure 17**  
Land Cover

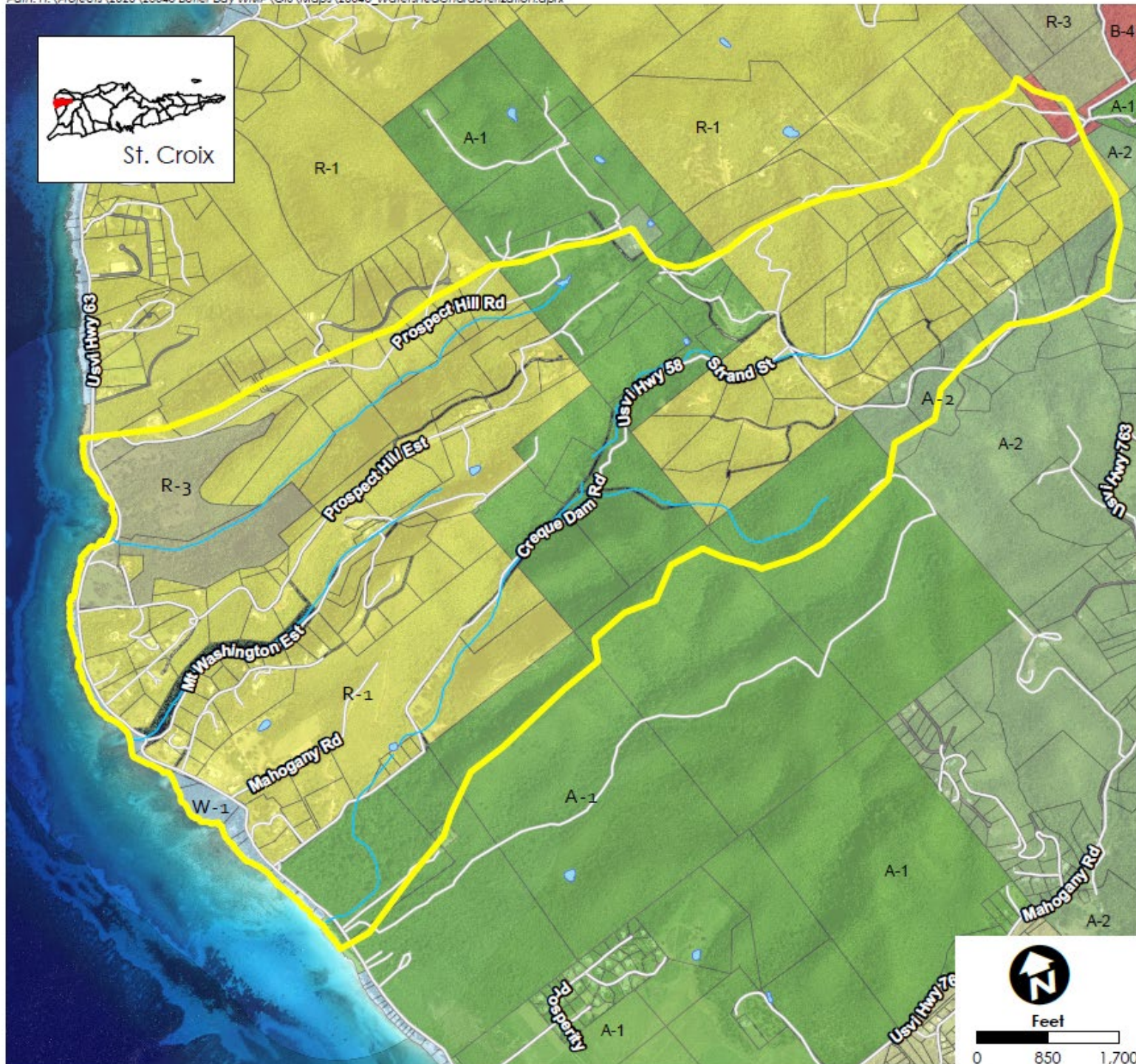
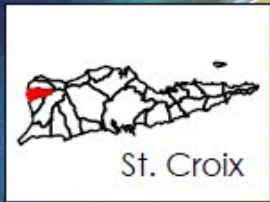


**Horsley Witten Group**  
Sustainable Environmental Solutions

Date: 8/20/2025

Data Sources: USVI Department of Planning and Natural Resources (DPNR)

This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes.



Watershed Boundary

DPNR Zoning

A-1

A-2

B-4

R-1

R-3

W-1



Feet

0 850 1,700

**Figure 18**  
Zoning

Table 12: Zoning requirements

| Zoning District                | Resid. Density (person/ac)         | Maximum Lot Occupancy (% Coverage)  | Minimum Lot Width (Ft)* | Maximum Height in Stories         | Minimum Set Back (In Feet)* |                                       |                                                                                         | Usable Open Space* | Minimum Lot Area                                                    |
|--------------------------------|------------------------------------|-------------------------------------|-------------------------|-----------------------------------|-----------------------------|---------------------------------------|-----------------------------------------------------------------------------------------|--------------------|---------------------------------------------------------------------|
|                                |                                    |                                     |                         |                                   | Front                       | Side                                  | Rear                                                                                    |                    |                                                                     |
| A-1 Agricultural               | 2 Dwelling Units                   | No Requir.                          | No Requir.              | Resid. Structures Incl. Hotel - 3 | 50                          | 100                                   | 100                                                                                     | No Requir.         | 40 Acres                                                            |
| A-2 Agricultural               |                                    |                                     |                         |                                   | 25                          | 50                                    | 50                                                                                      |                    | 2 Acres                                                             |
| R-1 Residential Low Density    |                                    | Resid. Structures Incl. Hotel - 25% | 100                     | Resid. Structures Incl. Hotel - 2 | 15                          | 15                                    | 15                                                                                      |                    | ½ Acre                                                              |
| R-3 Residential Medium Density | Resid. Structures Incl. Hotel (80) | Resid. Structures Incl. Hotel - 30% | No Requir.              | Resid. Structures Incl. Hotel - 6 | No Requirements             |                                       |                                                                                         | 35%                | 6,000 ft²                                                           |
| B-4 Business Residential       | Resid. Structures Incl. Hotel (80) | 50%                                 | 40                      | 2                                 | No Requir.                  | 5                                     | Resid. Structures Incl. Hotel: 5 Bus. Structures: 20 Adjacent to resid. use or district | No Requir.         | Varies by use (6,000 ft² or 10,000 ft² and 5% of Planned Res. Area) |
| W-1 Waterfront Pleasure        | 2 Dwelling Units                   | 40%                                 | 100                     | 3                                 | 25                          | 10 Adjacent to resid. use or district | 20 Adjacent to resid. use or district                                                   | 30%                | 10,000 ft²                                                          |

\* Affected by the substandard lot requirements of VIC, T. 29, Ch. 3, §226 (i)

[https://dpmr.vi.gov/wp-content/uploads/2022/11/Zoning-District-Requirements\\_rev062414-1.pdf](https://dpmr.vi.gov/wp-content/uploads/2022/11/Zoning-District-Requirements_rev062414-1.pdf)

With large areas of undeveloped land, especially in the upper watershed, there are potential development and associated population pressures in the watershed. For a simple, conservative approach to calculating a population maximum, one could assume:

- Maximum of two dwelling units/parcel for each of the 214 parcels in the watershed. Two dwelling units/parcel is by far the most common zoned residential density maximum with A-1, A-2, R-1, W-1 districts occupying 1084 of the 1164 zoned acres in the watershed (**Table 11**). While B-4 and R-3 districts allow different residential densities, given existing conditions in the watershed and the layout of parcels, two dwelling units per parcel is assumed for all parcels in order to develop a rough estimate of maximum potential population.
- 1.86 people/household, based on census data (**Table 15**), and “household” is equivalent to “dwelling unit,” for a total of 3.72 people/parcel.

In reality, this level of development would be unlikely to occur. This analysis does not take into account unbuildable land, land use controls, minimum lot sizes, or specific parcel conditions, so it could be quite conservative (i.e., overestimate population). With those assumptions, the total projected possible population of the watershed would be 796 (214 parcels \* 2 dwelling units/parcel \* 1.86 people/household).

Based on the zoning allowances, a rough potential maximum buildout calculation of maximum units and population was also estimated using a 2024 method of the Rhode Island Division of Statewide Planning, which follows a fairly common approach to buildout analyses (**Table 13**). This calculation also does not take into consideration specific land use controls, minimum lot sizes, unbuildable areas, or parcel-specific details, so it is quite conservative and likely high.

This approach uses some different assumptions than the population maximum approach described above, so the potential maximum population results are different and higher. For this estimate, the following was assumed:

- Again, 1.86 people/household, based on census data (**Table 15**), and “household” is equivalent to “dwelling unit.
- As a conservative factor commonly applied in land use analyses, 30 percent of the land area would not to be buildable and/or would be occupied by roads and other infrastructure, so 70 percent of land would remain for development.
  - For B-4 and R-3 districts, the 80 persons/acre maximum is applied to 70 percent of the land in those districts, and the maximum potential number of units and population are calculated accordingly based on 1.86 people/household.
  - For A-1, A-2, R-1, and W-1 districts, the 2 dwelling units/parcel maximum is applied to all land in those districts. From that value of total potential units on all land in those districts, a ratio of units/acre is calculated. That ratio is applied to 70 percent of the land in those districts to calculate the maximum potential number of units on 70 percent of the land in those districts. The population is then calculated accordingly based on 1.86 people/household (i.e., “dwelling unit”).

Based on these assumptions, the maximum number of units in the watershed would be 2,686, and the maximum population would be 4,996. Again, this level of development appears to be unlikely, especially given other land use requirements and current practices, and is for demonstration purposes.

Table 13. Preliminary Buildout Calculations

| Zoning Districts | Average household size | # of Parcels | Area (acres)   | 70% of area as buildable | B-4, R-3 max. density (pers./ac) | B-4, R-3 calcul. max. units/ac | A-1, A-2, R-1, W-1 max. density (units/parcel) | A-1, A-2, R-1, W-1 calcul. max. units on total area | A-1, A-2, R-1, W-1 calcul. max. units/ac on total area | Max. units  | Max. potent. pop |
|------------------|------------------------|--------------|----------------|--------------------------|----------------------------------|--------------------------------|------------------------------------------------|-----------------------------------------------------|--------------------------------------------------------|-------------|------------------|
| A-1              | 1.86                   | 23           | 308.92         | 216.25                   | N/A                              | N/A                            | 2                                              | 46                                                  | 0.15                                                   | 32          | 60               |
| A-2              |                        | 22           | 49.37          | 34.56                    | N/A                              | N/A                            | 2                                              | 44                                                  | 0.89                                                   | 31          | 57               |
| B-4              |                        | 2            | 3.73           | 2.61                     | 80                               | 43                             | N/A                                            | N/A                                                 | N/A                                                    | 112         | 209              |
| R-1              |                        | 149          | 712.03         | 498.42                   | N/A                              | N/A                            | 2                                              | 298                                                 | 0.42                                                   | 209         | 388              |
| R-3              |                        | 6            | 75.90          | 53.13                    | 80                               | 43                             | N/A                                            | N/A                                                 | N/A                                                    | 2285        | 4250             |
| W-1              |                        | 12           | 14.12          | 9.89                     | N/A                              | N/A                            | 2                                              | 24                                                  | 1.70                                                   | 17          | 31               |
| <b>Total</b>     | -                      | <b>214</b>   | <b>1164.09</b> | <b>814.86</b>            | -                                | -                              | -                                              | -                                                   | -                                                      | <b>2686</b> | <b>4996</b>      |

Note: Individual cells are rounded, so some sums and products may be affected by rounding errors.

❗ Can we refine this buildout analysis and assumptions to be more realistic and to provide input into model? The model needs to convert forest landcover into residential landcover.

## PEOPLE AND CULTURE

### Demographics

For U.S. census purposes, the Butler Bay Watershed is located in the “Northwest” subdistrict of St. Croix. Several estates (**Figure 19**) are within or overlap the Butler Bay Watershed: Annaly, Butlers Bay, Mount Victory, Nicholas, North Hall, Oxford, Pleasant Vale, Prospect Hill West, Punch, Rose Hill, Spratt Hall, Washington Hill, William. According to the U.S. Census Bureau, the USVI and St. Croix have experienced a population decrease between 2010 and 2020, with the Northwest subdistrict experiencing the largest population decrease by percentage of any geography on St. Croix and a larger decrease in percentage than the USVI as a whole (**Table 14**).

Table 14: St. Croix population trends 2010 – 2020 (U.S. Census Bureau, 2020)

| Geographic area                          | Population     |               | Change<br>(2020 less 2010) |              |
|------------------------------------------|----------------|---------------|----------------------------|--------------|
|                                          | 2010           | 2020          | Number                     | Percent      |
| <b>United States Virgin Islands.....</b> | <b>106,405</b> | <b>87,146</b> | <b>-19,259</b>             | <b>-18.1</b> |
| <b>Island and Subdistrict</b>            |                |               |                            |              |
| <b>St. Croix Island.....</b>             | <b>50,601</b>  | <b>41,004</b> | <b>-9,597</b>              | <b>-19.0</b> |
| Anna's Hope Village subdistrict.....     | 4,041          | 3,282         | -759                       | -18.8        |
| Christiansted subdistrict .....          | 2,626          | 1,866         | -760                       | -28.9        |
| East End subdistrict .....               | 2,453          | 2,336         | -117                       | -4.8         |
| Frederiksted subdistrict .....           | 3,091          | 2,303         | -788                       | -25.5        |
| Northcentral subdistrict .....           | 4,977          | 4,197         | -780                       | -15.7        |
| <b>Northwest subdistrict.....</b>        | <b>4,863</b>   | <b>3,431</b>  | <b>-1,432</b>              | <b>-29.4</b> |
| Sion Farm subdistrict .....              | 13,003         | 10,332        | -2,671                     | -20.5        |
| Southcentral subdistrict .....           | 8,049          | 7,415         | -634                       | -7.9         |
| Southwest subdistrict.....               | 7,498          | 5,842         | -1,656                     | -22.1        |
| Island subdivision not defined.....      | 0              | 0             | 0                          | X            |

The 2020 U.S. Census population breakdown of the estates within or overlapping the Butler Bay Watershed is included **Table 15**, along with the following summary information:

- Nearly half of the population is concentrated in two estates along the Hams Bluff Rd. (Prospect Hill West and Spratt Hall), reflecting more population in the lower watershed. The upper watershed estates tend to be less populated, with three estates (Nicholas, Punch, Rose Hill) with zero population reported.
- Several estates, including the ones with the largest populations (i.e., North Hall, Prospect Hill West, Spratt Hall) have median ages higher than that of St. Croix (45.2 years) and the USVI as a whole (45.9 years).
- Estate households are split roughly evenly between family and non-family households.
- Roughly half of watershed population identifies as “White, Not Hispanic or Latino.” In general, the estates in the lower (i.e., western) portion of the watershed, such as Prospect Hill West and Spratt Hall, have higher percentages of “White, Not Hispanic or Latino” than the watershed as a whole, in the estates in the upper watershed, or across the USVI (12.7%) and St. Croix as a whole (11.1%).
- The household incomes of these estates tend to be higher than those of the USVI (median household income: \$40,408; mean household income: \$57,599) or St. Croix as a whole (median household income: \$39,445; mean household income: \$57,325).

Table 15: Demographics (2020 US Census)

| Estate             | Total Pop. | Total # Households | Family Households | Non-Family Households | Average Household Size | Median Age | Racial Minority %* | Median Household Income | Mean Household Income |
|--------------------|------------|--------------------|-------------------|-----------------------|------------------------|------------|--------------------|-------------------------|-----------------------|
| Annaly             | 2          | 1                  | 1                 | 0                     | 2                      | 77         | 100%               | \$58,750                | \$59,100              |
| Butlers Bay        | 4          | 3                  | 0                 | 3                     | 1.33                   | 44.5       | 50%                | \$41,250                | \$50,667              |
| Mount Victory      | 7          | 3                  | 2                 | 1                     | 2.33                   | 66.3       | 100%               | \$46,250                | \$57,633              |
| Nicholas           | 0          | 0                  | -                 | -                     | -                      | -          | -                  | -                       | -                     |
| North Hall         | 11         | 5                  | 3                 | 2                     | 2.20                   | 47.5       | 54.5%              | \$51,250                | \$105,600             |
| Oxford             | 9          | 4                  | 2                 | 2                     | 2.25                   | 30.5       | 100%               | \$36,250                | \$57,800              |
| Pleasant Vale      | 6          | 4                  | 1                 | 3                     | 1.50                   | 57.5       | 83.3%              | \$46,250                | \$59,375              |
| Prospect Hill West | 19         | 11                 | 7                 | 4                     | 1.73                   | 68.5       | 21.1%              | \$48,750                | \$46,036              |
| Punch              | 0          | 0                  | -                 | -                     | -                      | -          | -                  | -                       | -                     |
| Rose Hill          | 0          | 0                  | -                 | -                     | -                      | -          | -                  | -                       | -                     |
| Spratt Hall        | 26         | 14                 | 7                 | 7                     | 1.86                   | 72.5       | 30.8%              | 52,500                  | \$91,221              |
| Washington Hill    | 8          | 4                  | 2                 | 2                     | 2                      | 30.5       | 62.5%              | 58,750                  | \$58,500              |
| William            | 3          | 2                  | 1                 | 1                     | 1.50                   | 35.5       | 33.3%              | 71,250                  | \$70,000              |
| Total              | 95         | 51                 | 26                | 25                    | 1.86                   | -          | 48.3%              | -                       | -                     |

\* Calculated as the % of residents who identify as any racial category other than "White, Not Hispanic or Latino."



**Horsley Witten Group**  
Sustainable Environmental Solutions

Date: 8/20/2025

Data Sources: USVI Department of  
Planning and Natural Resources  
(DPNR)

This map is for informational purposes  
and may not be suitable for legal,  
engineering, or surveying purposes.

- Watershed Boundary
- Estates



**Figure 19**  
Estates

## History and Culture

Humans have inhabited St. Croix since at least the year 1200 CE, with the Taino peoples present on St. Croix, or “Ay Ay” as it was known, from that time until 1500. Starting in 1493, various colonial exchanges of St. Croix took place between Spain, the Netherlands, England, France, the Knights of Malta, and finally Denmark in 1733 which controlled St. John, St. Thomas, and St. Croix as the Danish West Indies. These colonial powers established a plantation system with enslaved Africans providing labor. In particular, the Danish divided St. Croix into 250 plantations, which are reflected (but do not necessarily match perfectly) today’s estate boundaries. These plantations were typically 125-150 acres in size, including the Butler Bay Plantation, which was roughly 150 acres. Most of these plantations’ acreage (75%) was in cultivated sugar cane during the peak of sugar production on St. Croix in 1812-1814. Decline followed after that, although on St. Croix, plantations were consolidated into central factories, unlike in the rest of the Danish West Indies. Due to that consolidation, the sugar industry continued on St. Croix until World War I. In 1917, the U.S. purchased St. Croix, along with St. Thomas and St. John.

As of 1764, the Butler Bay Plantation (technically in Estate Prospect Hill West today) had large houses, typical of plantations of the era, slave quarters, overseer’s house, lumber house, “sickhouse,” pigeoncote, privy, sugar works with five boiling cauldrons, a distillery with 12 liquor casks, each 3,000 gallons in size, and two mills. Over 80 people were enslaved there at that time, with that number increasing to over 200 enslaved people during the 19<sup>th</sup> century. As many as three of the organizers of St. Croix’s 1848 Emancipation Revolt were enslaved in this area, one of whom cited the poor treatment of his daughter as one of his motivations (pers. com., Frandelle Gerard, 2025) (NPS, 1978) (Virgin Islands Professional Charter Association and the Virgin Islands Conservation Society, 2024) (Feather Leaf Inn, 2025) (Feather Leaf Inn 2025a).

Today, the Butler Bay Watershed has several historical and cultural features reflecting this history:

- The Butler Bay Watershed has a large number of heritage trees, including baobab trees, especially in the lower portion of the watershed and in gullies leading up slopes. Baobab trees originate from the African continent and are known as the “tree of life,” sacred in many African traditions that continue on St. Croix.
- The 1848 Emancipation Revolt has been commemorated at a sacred baobab tree in the area, including the recent 175<sup>th</sup> anniversary.
- There is a 13.63-acre National Register of Historic Places-Nominated site (part of a larger 51.8-acre site) in the lower portion of the watershed, overlooking Butler Bay. The 1977 nomination form refers to the site’s historic name as “Bottler’s Bay” and common name as “Estate Butler Bay,” although the site is technically in Estate Prospect Hill West today. The Feather Leaf Inn occupies much of this site currently. Some of the buildings have been repurposed for the inn, while others remain in ruins. Local stakeholders have noted that separate European and slave burial grounds are likely present on the site.
- In 2023, the National Park Service designated St. Croix as a whole as a National Heritage Area.

- Other plantation ruins are present in other areas of the watershed such as a site known as Estate Mount Washington in Estate Washington Hill. Signage at that site refers to a cotton plantation from 1750-1770s and a sugar plantation from 1779-1912, with a rum distillery and stills overlapping part of that time period (Google Maps).
- Butler Bay itself has been an important community gathering space, including a sandy beach that existed until the 2017 hurricanes.

❗ How much of the current Feather Leaf Inn (and other properties) overlap with the National Register of Historic Places-Nominated site(s) and what are the relevant implications?

Historic and cultural preservation efforts may present opportunities for land conservation, while subsurface conditions, such as the presence of archaeological features and burial grounds, may present limitations on disturbance that may be needed for interventions such as green stormwater infrastructure and other infiltrative practices.

## ECOLOGICAL COMMUNITIES

### Coastal and Benthic

According to The Nature Conservancy's 2021 Caribbean Benthic Habitat Map, Butler Bay contains a mix of habitat types, including sand, hardbottom, seagrass, and coral—including the threatened elkhorn coral, *Acropora palmata* (**Figure 20**). Coral restoration efforts are currently underway in Butler Bay, underscoring the importance of watershed protection in the area. Led by Ceiba Strategies LLC, the Butler Bay Coral Restoration Project leverages three key opportunities to scale up restoration at relatively low cost: increasing elkhorn coral biomass, relocating corals from a degraded "kill zone" to a designated restoration site, and enhancing genetic diversity through the sexual propagation of grooved brain coral (*Diplora labyrinthiformis*) during spawning events. These efforts are especially critical as grooved brain corals are among the species most affected by Stony Coral Tissue Loss Disease (SCTLD), a rapidly spreading condition that has devastated coral populations across the Caribbean (Schneider, 2023).



Threatened elkhorn coral (*Acropora palmata*) in Butler Bay. (Kynoch Reale-Munroe)

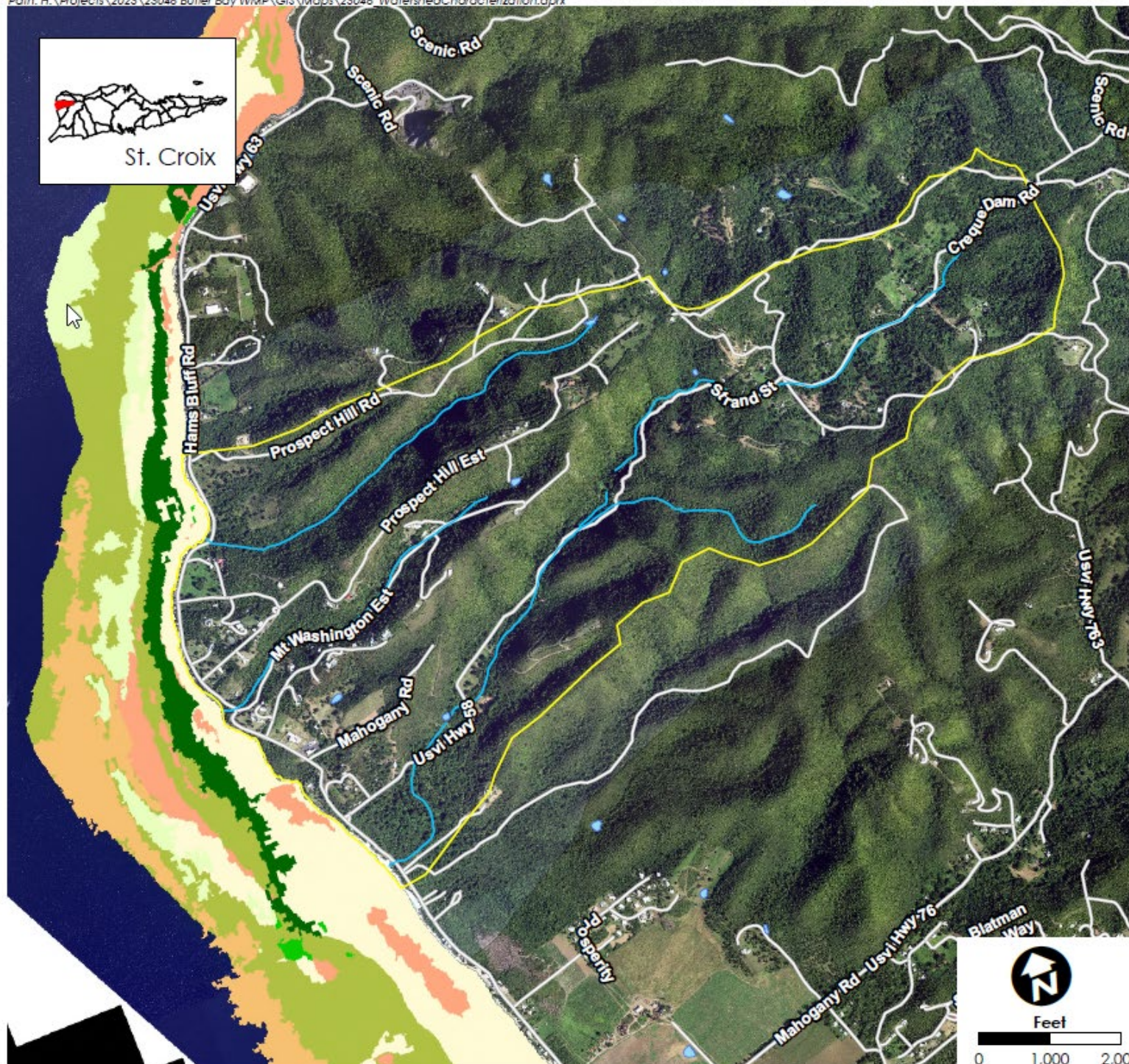
In the near shore waters of Butler Bay, one may find the five endangered species of coral. Threatened green and endangered leatherback and hawksbill sea turtles nest on sandy shores of St. Croix but are not likely found on the rocky beaches of Butler Bay.



Date: 8/20/2025

Data Sources: USVI Department of Planning and Natural Resources (DPNR), The Nature Conservancy

This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes.



Watershed Boundary

Benthic Activity (2021)

Coral/Algae

Spur and Groove Reef

Hardbottom Sparse Algae

Hardbottom Dense Algae

Sand

Sparse Seagrass

Dense Seagrass

Figure 20  
Benthic Cover

## Terrestrial

St. Croix is a subtropical climate with two ecological life zones (Ewel and Whitmore, 1973): subtropical moist forest and subtropical dry forest. The forest system in the Butler Bay Watershed is locally referred to as “rain forest” but is subtropical moist forest. The forest systems are shaped by the soils, rugged topography, and steep terrain around Butler Bay. The soils are well drained, often alkaline, with a thin organic layer and are prone to erosion.

The moist forest of Butler Bay has a multi-layered canopy comprised of mostly broadleaf evergreen trees up to 80 feet tall. Locust (*Hymenaea courbaril*), gri-gri (*Bucida buceras*) and ceiba (*Ceiba pentandra*) are among the largest tree species (Geographic Consulting, 2007). Native vines like wild passionfruit (*Passiflora laurifolia*) and epiphytes such as tilandsias (*Tilandsia utriculata*) and orchids add to the complexity and diversity of the canopy. The understory is comprised of more shade tolerant shrubs and small trees, including many species of *Eugenia* which produce small berries eaten by birds.

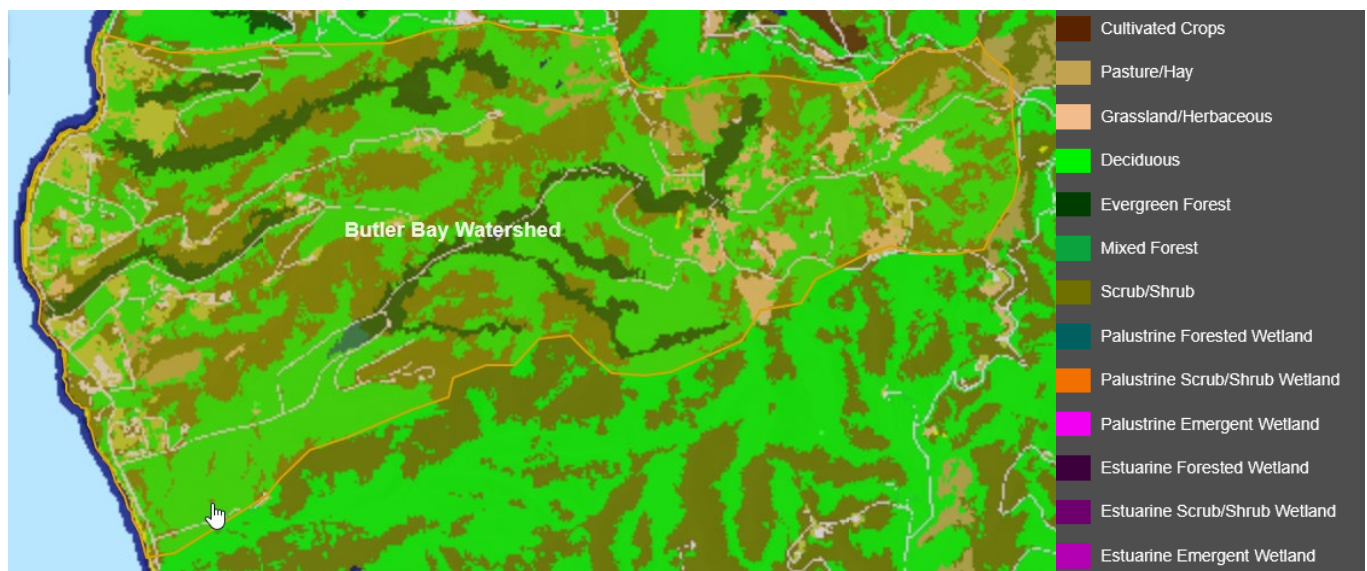


Figure 21. CCAP Data provides a breakdown of vegetative cover type for terrestrial and wetland areas. 49% of area is deciduous forest, 32% is scrub/shrub, 9% Evergreen forest, 5% urbanized, 3% grassland/herbaceous, and 2% hay. From the NFWF CREST mapping tool <https://resilientcoasts.org/AnalyzeProjectSites>.

As a Lesser Antillean Caribbean Island, St Croix has a relatively lower biodiversity when compared to the Greater Antilles or mainland. There are six native mammals, and all are bats. There are 138 bird species recorded for St Croix, and 62 of these are migrants. There are 18 species of reptiles and amphibians on St Croix. There are two federally endangered tree species in St. Croix (Geographic Consulting, 2013). Of these, Vahl's boxwood (*Buxus vahlia*) occurs on the west coast but is not known in Butler Bay, and *Catesbaea melanocarpa* is only known on the south shore of the island. The 18 species of reptiles and amphibians on St Croix include the endangered St Croix Ground Lizard (*Philodoscelsis polops*), which is not known to occur in Butler Bay, as it was extirpated from most of St. Croix by invasive mongoose (Geographic Consulting, 2012). Other invasive animals have become prominent part of the moist forests of St. Croix's

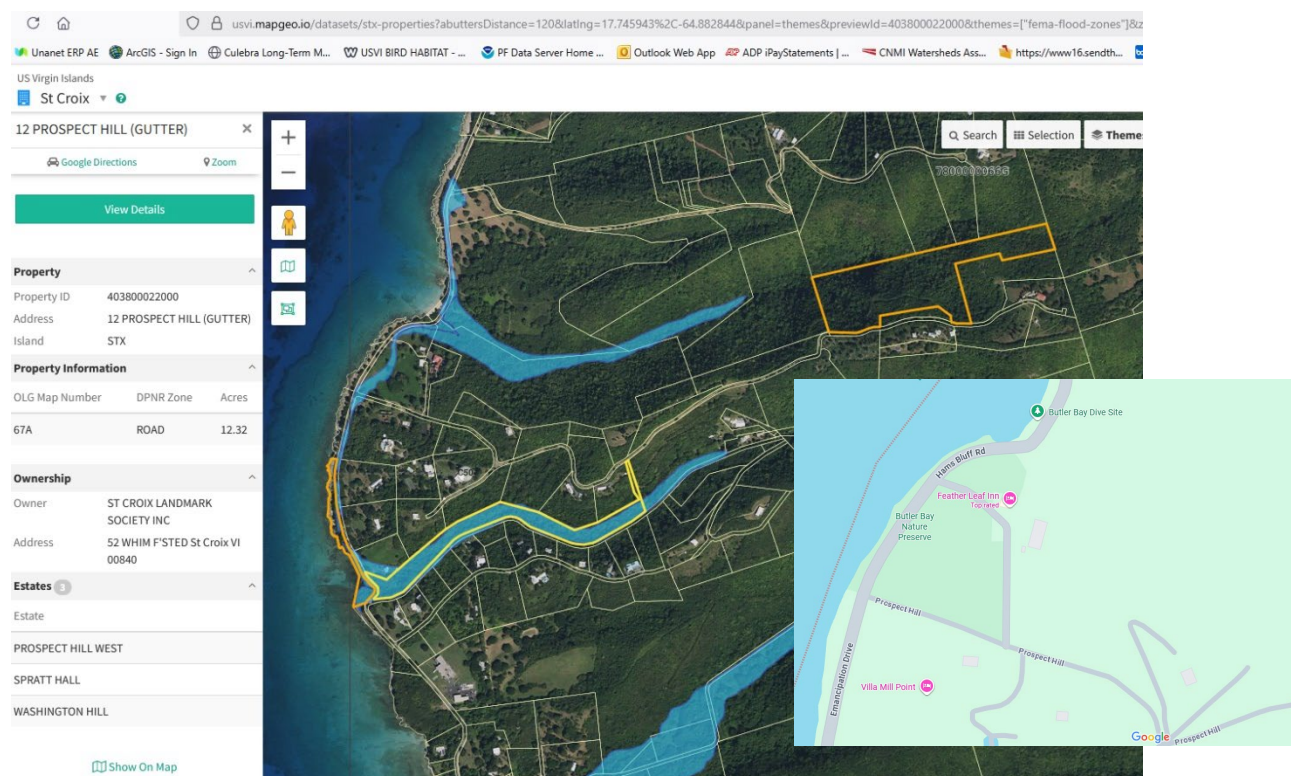
west end, including white tailed deer, green iguanas, and more recently there has been an explosion red tail boas.

🚨 Are there any recommendations from the updated Wildlife Action Plan? What about Heritage Tree designations?

## Conservation and Preservation

Butler Bay is a small community with relatively few landowners with a shared tradition of land conservation and stewardship. The Corradino family offers eco camping, guided hiking tours, and workshops on nature awareness and earth skills at the Mt. Victory Camp on Creque Dam Road. Management of the seven-acre property is guided by a Forest Stewardship Management Plan approved by the Virgin Islands Department of Agriculture. Further down the hill, the Merwin Family manages several large parcels that have been in the family for over 100 years. An estimated 100 acres of their property have also been managed in a Forest Stewardship Plan since 2015. Part of this plan is the creation of the Spratt Hall Nature Preserve, which includes a well-maintained network of trails for hiking and horseback riding. They also plant native trees and install educational signage. Further north in the watershed, the Feather Leaf Inn is an eco-certified business involved in land conservation as well as coral propagation and restoration.

🚨 Google Maps shows a Butler Bay Nature Preserve, is it real? Should we follow up on Forest Conservation Plans? Are there other conservation easements on private property such as the three owned by the St. Croix Landmark Society that are in or near guts or shorelines (see below)?



## INFRASTRUCTURE AND UTILITIES

### Regulatory Context

The USVI is governed by federal (i.e., U.S.) regulatory requirements, such as those in the federal Clean Water Act, and local USVI regulatory requirements in the Virgin Islands Code, such as those around zoning and development, waterbody buffers, erosion and sediment control, and infrastructure. **Table 16** lists the USVI agencies and other entities involved in infrastructure and their topic areas, summarizing descriptions provided in previous St. Croix watershed management plans (VI DPNR, n.d.a) (VI DPNR, 2022) (VI DPNR, 2023a).

*Table 16.: USVI agencies*

| Agency                                                          | Topic Areas                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Department of Planning & Natural Resources (DPNR)               | Natural resources (e.g., fish and wildlife, trees and vegetation), coastal zones, cultural and historical resources, water resources, regulatory oversight for drinking water (for drinking water systems, cisterns, water haulers, and well providers), regulatory oversight for wastewater and other point sources, regulatory oversight for stormwater, zoning and land development, land subdivision, building permits, code enforcement, earth change permits, comprehensive planning, boat registration, vessel mooring and anchoring, and dam safety.<br><br><u>Eleven divisions:</u> Building Permits, Environmental Enforcement, Environmental Protection, Libraries, Archives and Museums, State Historic Preservation Offices, Coastal Zone Management, Comprehensive & Coastal Zone Planning, Fish and Wildlife, Business & Administrative Services, Virgin Islands Council of the Arts, Territorial Parks & Protected Areas |
| Department of Agriculture (VIDA)                                | Agricultural lands soil conservation, including gut buffer zones, earth change activities on certain sites, Virgin Islands Conservation District (VICD) support.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Department of Public Works (DPW)                                | Infrastructure, including guts and gut cleaning (in coordination with DPNR and WMA), non-federal public roads and highways, stormwater drainage systems, public buildings, transportation systems, parking facilities, cemeteries, flood mitigation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Waste Management Authority (VIWMA)                              | Solid waste collection and disposal (including landfills, convenience centers, and bins) and public sewer system (including sanitary sewer overflows and combined sewer overflows).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Water and Power Authority (WAPA)                                | Electricity and public drinking water system (including wells and desalination plants). Dams?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Virgin Islands Territorial Emergency Management Agency (VITEMA) | Territorial liaison with FEMA.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

Development activities are designated as “major” or “minor,” with different associated permit processes. Tier 1 areas extend inland from the territorial sea to a boundary designated on a Coastal Zone Management (CZM) map, while Tier 2 areas cover the rest of each island, extending inland from Tier 1. Tier 1 Areas have a more stringent permitting process than Tier 2 Areas (VI DPNR, 2022).

## Wastewater

WMA manages a public sewer system on St. Croix that serves ~40% of households, mostly in and around Christiansted and Frederiksted. Sewer and drinking water infrastructure does not extend to Butler Bay, so wastewater is managed via onsite sewage disposal systems (OSDS) (i.e., septic systems) or package systems operated by larger hotels or businesses. **Table 17** provides a breakdown of sewage disposal methods reported during the 2020 US Census in the estates within or overlapping the Butler Bay Watershed. It is important to note that these values are self-reported by individuals responding to surveys across the entire estate and may include households outside the watershed boundary. HW also looked at watershed parcels and buildings and counted 68 parcels with at least one structure to estimate the number of OSDS.

These assessments found:

- An estimated 68 (HW)-86 (Census) OSDS in the watershed.
- Census household reporting indicates almost all systems are either septic tanks or cesspools.
- Cadmus (2011) evaluation of OSDS suitability shows a generally low suitability for conventional systems in the Bulter Bay area.
- We are unaware of any OSDS inventory for this part of St. Croix or number or type of larger systems used for multifamily or businesses.
- There are a number of unoccupied housing units (~40%) in these estates, which may be reflective of seasonal housing and/or other factors, such as part-time residents not being present for the 2020 Census, due to the COVID-19 Pandemic. Those unoccupied housing units may also be reflective of the wider trend of population decline since 2010 referenced earlier.

Of these 86 housing units, more than half of the structures were built before 1980 (**Figure 22**) (U.S. Census Bureau, 2020). Older OSDS may have less effective treatment technology and/or in need of maintenance and upgrades

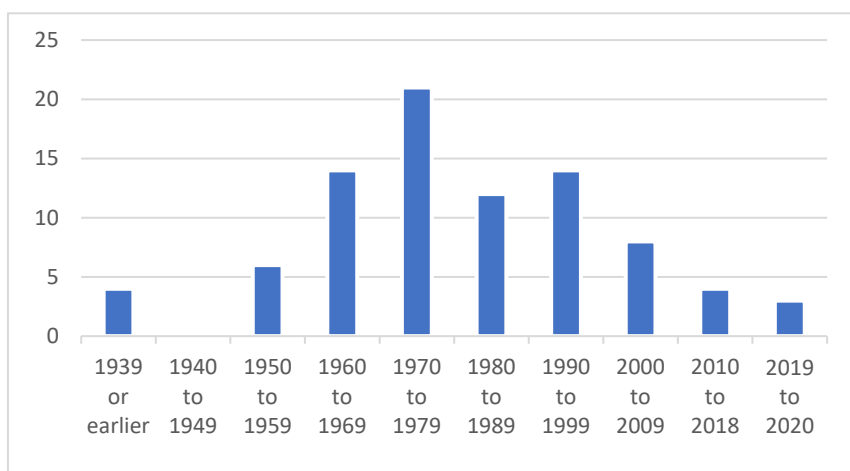


Figure 22. Butler Bay estates age of housing units

Table 17: Butler Bay estates sewage disposal methods and source of drinking water

| Estate             | Total Pop. | Total Housing Units | Total Occupied Housing Units | Method of Sewage Disposal |                         |             | Source of Drinking Water* |                          |                                |                               |              |
|--------------------|------------|---------------------|------------------------------|---------------------------|-------------------------|-------------|---------------------------|--------------------------|--------------------------------|-------------------------------|--------------|
|                    |            |                     |                              | Public Sewer              | Septic Tank or Cesspool | Other Means | Public System             | Cistern, Tanks, or Drums | Delivery Vendor or Water Truck | Super-market or Grocery Store | Other Source |
| Annaly             | 2          | 2                   | 1                            | -                         | 2                       | -           | -                         | 2                        | 1                              | 1                             | -            |
| Butler Bay         | 4          | 3                   | 3                            | -                         | 3                       | -           | -                         | 3                        | 1                              | 1                             | -            |
| Mount Victory      | 7          | 10                  | 3                            | 1                         | 9                       | -           | -                         | 10                       | -                              | -                             | -            |
| Nicholas           | -          | 1                   | -                            | -                         | 1                       | -           | -                         | 1                        | -                              | -                             | -            |
| North Hall         | 11         | 7                   | 5                            | 1                         | 6                       | -           | 1                         | 6                        | 1                              | 1                             | -            |
| Oxford             | 9          | 8                   | 4                            | -                         | 8                       | -           | -                         | 7                        | -                              | 1                             | 1            |
| Pleasant Vale      | 6          | 4                   | 4                            | -                         | 4                       | -           | -                         | 4                        | -                              | 3                             | -            |
| Prospect Hill West | 19         | 23                  | 11                           | -                         | 23                      | -           | -                         | 23                       | 1                              | 3                             | -            |
| Punch              | -          | -                   | -                            | -                         | -                       | -           | -                         | -                        | -                              | -                             | -            |
| Rose Hill          | -          | -                   | -                            | -                         | -                       | -           | -                         | -                        | -                              | -                             | -            |
| Spratt Hall        | 26         | 18                  | 14                           | -                         | 18                      | -           | 1                         | 17                       | 5                              | 6                             | -            |
| Washington Hill    | 8          | 7                   | 4                            | -                         | 7                       | -           | 1                         | 6                        | 2                              | 3                             | -            |
| William            | 3          | 3                   | 2                            | 1                         | 1                       | 1           | 1                         | 2                        | -                              | -                             | -            |
| <b>Total</b>       | <b>95</b>  | <b>86</b>           | <b>51</b>                    | <b>3</b>                  | <b>82</b>               | <b>1</b>    | <b>4</b>                  | <b>81</b>                | <b>11</b>                      | <b>19</b>                     | <b>1</b>     |

Some housing units may have multiple sources of water, so the sources of drinking water sums exceed the total number of housing units.

## Water

Many households in St. Croix use multiple sources for drinking water. WAPA provides public water service to ~ 40% of the St. Croix population, but roughly 70% of the St. Croix population, including those with WAPA service, uses rainwater harvesting cisterns. Even though the Creque Dam reservoir was originally used to provide water to Frederiksted, today's WAPA-operated public water system does not extend to the Butler Bay Watershed. Based on U.S. Census data, in the estates within or overlapping the Butler Bay Watershed (U.S. Census Bureau, 2020):

- Nearly all housing units use cisterns, catchment, tanks, or drums for water.
- A smaller number use “delivery vendor or water truck,” or “super-market or grocery store.”
- A very small number of households reported relying on the public water system, but those are all almost certainly residents outside the watershed, such as those closer to Frederiksted, residents purchasing water from WAPA to fill their own cisterns—which can be common during times of water stress—or other similar anomalies.

The full breakdown of source of water by household is provided in **Table 17**.

❗ Is it still correct that WAPA's water system does not extend north of USVI Highway 76/Mahogany Road?

❗ Who is the operational manager of the Creque Dam and what is its condition? WAPA? U.S. Army Corps of Engineers? VITEMA? DPNR? Next year it celebrates its 100-year birthday—how is it doing? How does the impoundment impact watershed functions? Mapping shows half a dozen other impoundments exist in the watershed.

## Roads

The Butler Bay watershed contains ~12.5 miles of mapped roads (**Table 18**). The current breakdown between paved and unpaved roads is unknown and will be field verified. Additionally, 24 culvert locations were preliminarily identified where roads appear to cross guts or drainage features. The current condition of many of these culverts and bridges is unknown and will be evaluated by HW in September.

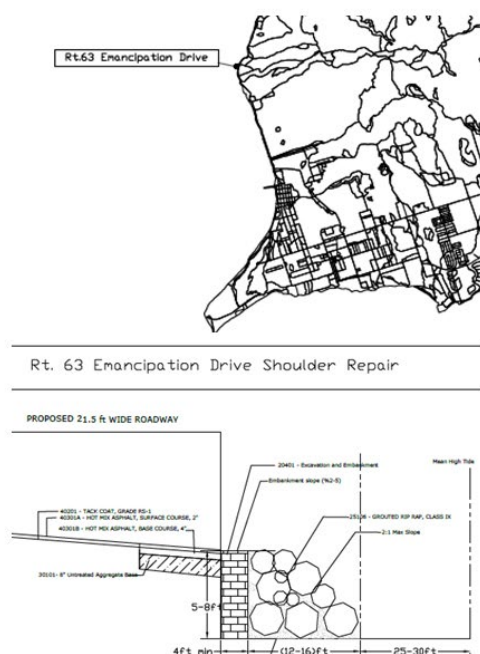
DPW is responsible for maintenance of public roads within the public right-of-way, as well as guts. Roads that have a route number are part of the Territorial Highway System (THS) and are public. Within the Butler Bay Watershed, Hams Bluff Road and Creque Dam Road are public. Just outside the watershed boundaries, USVI Highway 76/Mahogany Road is also public, while the smaller Mahogany Road within the watershed may be either public or private. Other roads in the watershed are either public or private and would have to be verified via field investigations and desktop research through the Lieutenant Governor's Office and/or DPW (Piotr Gajewski, pers. com., 2025).

❗ Confirm paved versus unpaved, ownership, and road names during field assessment week.

Table 18: Road Lengths in Butler Bay

| Drainage Area   | Road Length (Miles) | Stream Length (Miles) | Number Road/Stream Crossings |
|-----------------|---------------------|-----------------------|------------------------------|
| Butler Gut      | 1.6                 | 1.2                   | 1                            |
| Central Gut     | 2.6                 | 0.9                   | 4                            |
| Creque Dam Gut  | 6.0                 | 3.2                   | 15                           |
| Direct Drainage | 2.3                 | 0                     | 4                            |
| <b>Total</b>    | <b>12.5</b>         | <b>5.34</b>           | <b>24</b>                    |

DPW recently completed a shoreline and road stabilization project along approximately 300 linear feet of USVI Highway 63/Emancipation Dr., located within the Butler Bay Watershed (image below). According to communications with DPW, no additional infrastructure upgrades are currently proposed within the watershed (Piotr Gajewski, pers. com., 2025). Local residents have inquired about potential infrastructure upgrades, especially on roads, and reached out to engineering firms about solutions and to DPNR about funding.



Shoreline and road stabilization project along USVI Highway 63/Emancipation Drive completed by DPW in 2025

## Stormwater Infrastructure

An inventory of drainage structures has not been provided; therefore, HW will locate structures, document type and size, and evaluate conditions during field assessments in September. Much of the road network appears to be open drainage. Local stakeholders have noted concerns about stormwater management on roads, especially dirt roads and sediment plumes, as well as areas of increased impervious cover, such as a newly paved National Guard parking lot.

## Coastal Resilience

The National Fish and Wildlife Foundation (NFWF) and the National Oceanic and Atmospheric Administration (NOAA) coordinated to fund the U.S. Virgin Island Coastal Resilience Assessment. This GIS-based analysis combines spatial data related to land use protected areas, human community assets, flooding threats, and fish and wildlife resources in order to identify and prioritize Resilience Hubs (**Table 19, Figure 23**). The purpose is to identify areas where the implementation of nature-based features could maximize community resilience and wildlife benefits.

The assessment identified areas throughout the USVI that are not only exposed to a range of coastal flooding related threats but also contain higher concentrations of community assets. In addition, through the development of habitat extent and suitability models, the analysis identified terrestrial and nearshore marine areas with significant fish and wildlife resources. Together, the assessments revealed natural areas of open space and habitat ideal for the implementation of resilience projects that may be capable of supporting both people and wildlife. Along with the report, NFWF developed the Coastal Resilience Evaluation and Siting Tool (CREST), an accompanying GIS-based web tool that allows users to view, download, and interact with the inputs and results from the USVI (available at <https://resilientcoasts.org>). This data is meant to equip decision-makers and stakeholders with valuable tools and information to help them better plan for future flood and storm events.

*Table 19. CREST Parameters For Butler Bay (NFWF, 2020)*

| CREST PARAMETERS        |                                                                                                                                                                                                                                                                                                                                       | Value | Range |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| Resilience Hubs         | Areas of open lands and protected space that may be suitable for resilience-building efforts. Hubs are ranked by priority, given the level of exposure that nearby assets have to flood-related threats and the presence and abundance of fish and wildlife species within and surrounding the Hub. Parameter values range from 0-10. | 0.6   | 0-10  |
| Community Asset Index   | Community assets critical to the recovery of an area and human population. High values suggest areas with a higher, cumulative prevalence of community assets on the landscape. Parameter values range from 0-10.                                                                                                                     | 1.0   | 0-10  |
| Threat Index            | Index of flood-related datasets, including storm surge scenarios and landscape characteristics that exacerbate flood potential. High values in the Index represent those areas on the landscape where there are multiple high values of individual inputs. Values range from 0-10.                                                    | 2.9   | 0-10  |
| Community Exposure      | The product of the Asset and Threat Indices (above), which suggests areas on the landscape where community assets are potentially exposed to flood-related threats. Parameter values range from 0-10.                                                                                                                                 | 2.0   | 0-10  |
| Fish and Wildlife Index | Identifies valuable habitat for species of concern in both the terrestrial and marine environments. Higher values indicate more valuable habitat areas for both. Parameter values range from 0-6.                                                                                                                                     | 2.5   | 0-6   |
| Marine Index            | Higher values identify habitat areas that are most valuable for providing protection to nearby coastal communities and marine species.                                                                                                                                                                                                | 2     | 0-4   |
| Terrestrial Index       | Higher values identify habitat areas that are suitable to the most species of concern for that region, based on habitat preferences and potential threats identified by the IUCN Red List.                                                                                                                                            | 1.5   | 0-4   |

COASTAL RESILIENCE EVALUATION  
AND SITING TOOL (CREST)

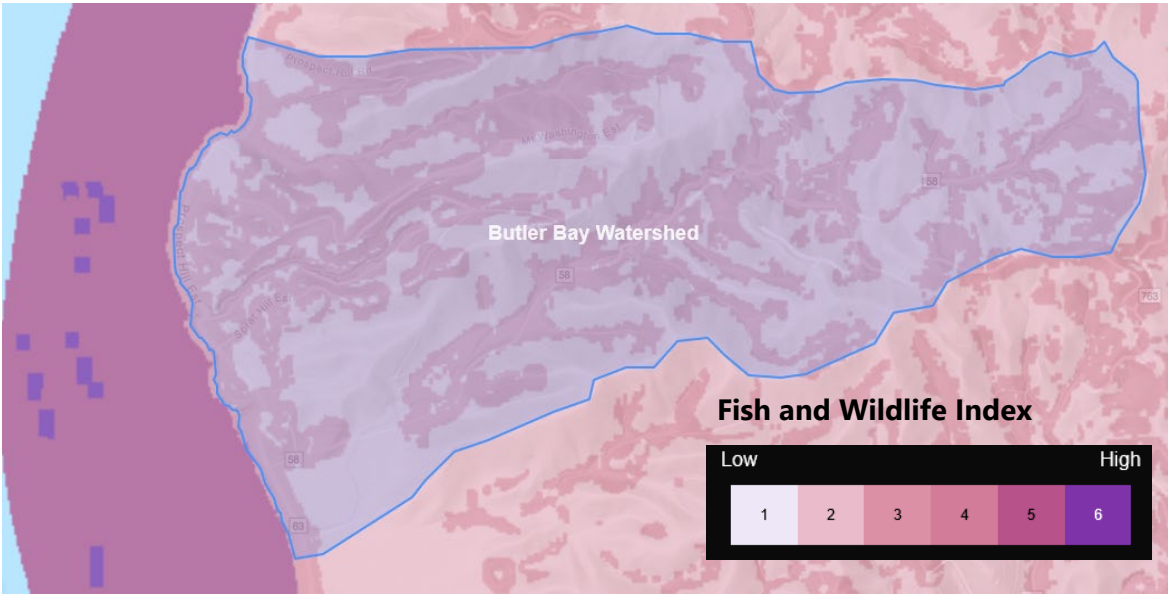
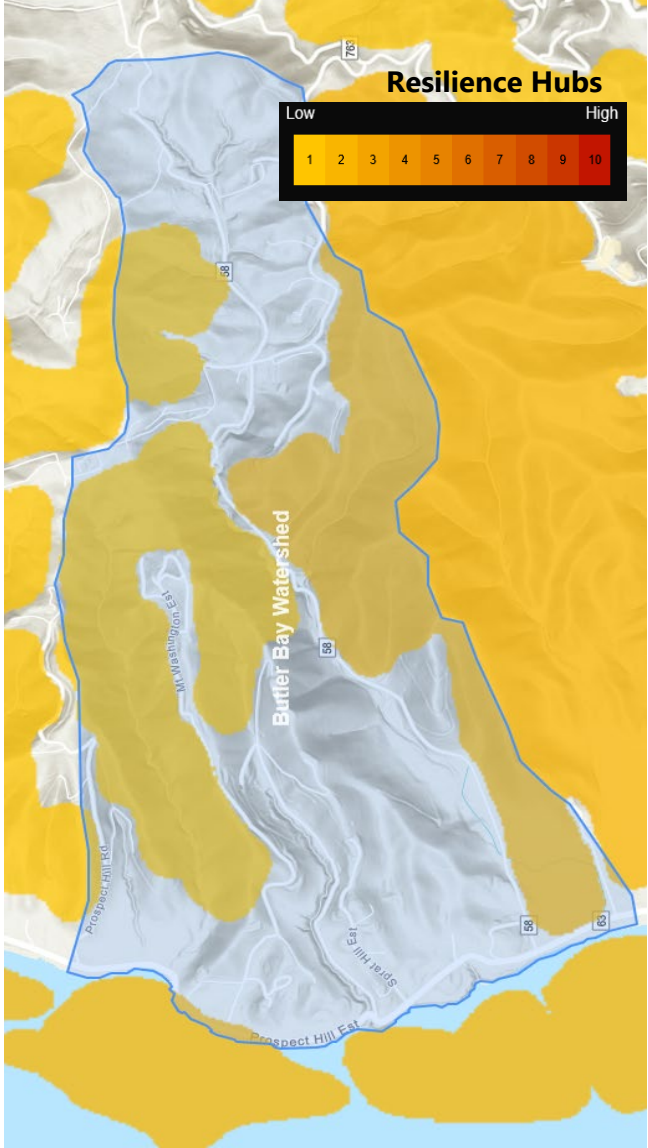


Figure 23. Results of CREST analysis overlaid onto Butler Bay Watershed

## PREVIOUS RECOMMENDATIONS & SITES OF INTEREST

Initial input from residents and other stakeholders were gathered regarding watershed issues and unique considerations, such as:

1. Inadequate drainage on residential driveways and unpaved roads is leading to erosion and sedimentation. When it rains, muddy runoff is observed at several discharge locations contributing to sediment plumes. Field assessment activities should prioritize looking at the road networks and identifying drainage improvements to reduce erosion and maintenance burden of property owners and DPW.
2. While much of the watershed currently consists of forested slopes, residential lots are for sale, slope clearing has occurred, and additional development is anticipated. Are there land conservation opportunities and best practices for small lot, steep slope development that can be implemented by land trusts, HOAs, and others to minimize the impact of new development in the upper watershed?
3. DPW recently took action to stabilize the coastal highway at an eroding shoreline location. Are there any other sections of shoreline or areas of gut bank erosion that should be addressed?
4. In addition to Creque Dam Reservoir, there are at least five ponds in the watershed, possibly more. What role do these surface waters play in watershed function and are they sustainable?
5. This area is known for its heritage trees, trails, and cultural ruins. Are there ways to integrate watershed restoration, recreation, and preservation objectives? Several large properties have developed forest conservation plans. Are these still viable and can they be models for other landowners?
6. What kind of OSDS are used in the watershed? Why does Butler Bay show up on the 303(d) list for nitrogen impairment?
7. What are the primary enforcement gaps observed in this watershed? Is there a unique approach to filling those gaps?

Several locations for conservation or restoration actions have been identified previously or through stakeholder input (**Table 20**). These sites and actions will be further explored during September 2025 field visits.

**Figure 24** is a screen grab showing potential points of interest from the public watershed mapper.

Table 20. Preliminary List of Sites for Field Investigations

| Drainage Area   | Sites of Interest                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Butler Bay Gut  | <ol style="list-style-type: none"> <li>1. Prospect Hill Rd. erosion and drainage issues. See maps and photos from Jodie Smolik with discussion of issue, ownership, specific locations, and suggestions. See concept design plan from Green Piece. Several pins on public mapper</li> <li>2. Confirm drainage boundary for watershed/subshed on northern slope</li> <li>3. Evaluate new development and land clearing activities</li> <li>4. Check out impoundment/dam just to north of watershed boundary (see mapper)</li> <li>5. Old well/catchment structures</li> <li>6. Hike gut if trail? Check out pond?</li> </ol>                                                                                                              |
| Central Gut     | <ol style="list-style-type: none"> <li>1. Evaluate drainage conditions and structures along Mt Washington Estate Rd.</li> <li>2. Confirm subwatershed boundary to account for northward drainage onto main hwy</li> <li>3. Check out ponds, look at gut at easy access locations</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Creque Dam Gut  | <ol style="list-style-type: none"> <li>1. Evaluate culverts and other drainage infrastructure, including location where gut crosses over road 3 times (see public map)</li> <li>2. Confirm watershed boundary/high point up past Mt Victory Rd intersection</li> <li>3. Old plantation ruins in upper watershed</li> <li>4. Agricultural landscape and ponds</li> <li>5. Creque Dam</li> <li>6. Verify road surfacing and land cover changes from aerial imagery</li> <li>7. Hike gut trail down from farm (Brian D)</li> <li>8. Review Merwin forestry stewardship plan (Brian)</li> <li>9. Horse operations</li> <li>10. Extent and impact of new development activities and subdivision roads</li> </ol>                              |
| Direct Drainage | <ol style="list-style-type: none"> <li>1. Prospect Hill Rd/Baobab Rd, Mahogany, and Spratt Hill Rds evaluation</li> <li>2. Confirm subwaters drainage boundaries</li> <li>3. Feather Leaf Inn drainage improvement plans from Island Design/VICS. Ryan discussed locations for stone in-ground catchment by tennis court and ideas to better control drainage across property; look at 3-4 sites marked by Ryan on mapper where drainage issues/solutions, include vetiver test plots</li> <li>4. Evaluate National Guard parking lot drainage improvements (how will we access this site)?</li> <li>5. Major culvert crossings under coastal HWY</li> <li>6. Shoreline stabilization at other locations along the shoreline?</li> </ol> |

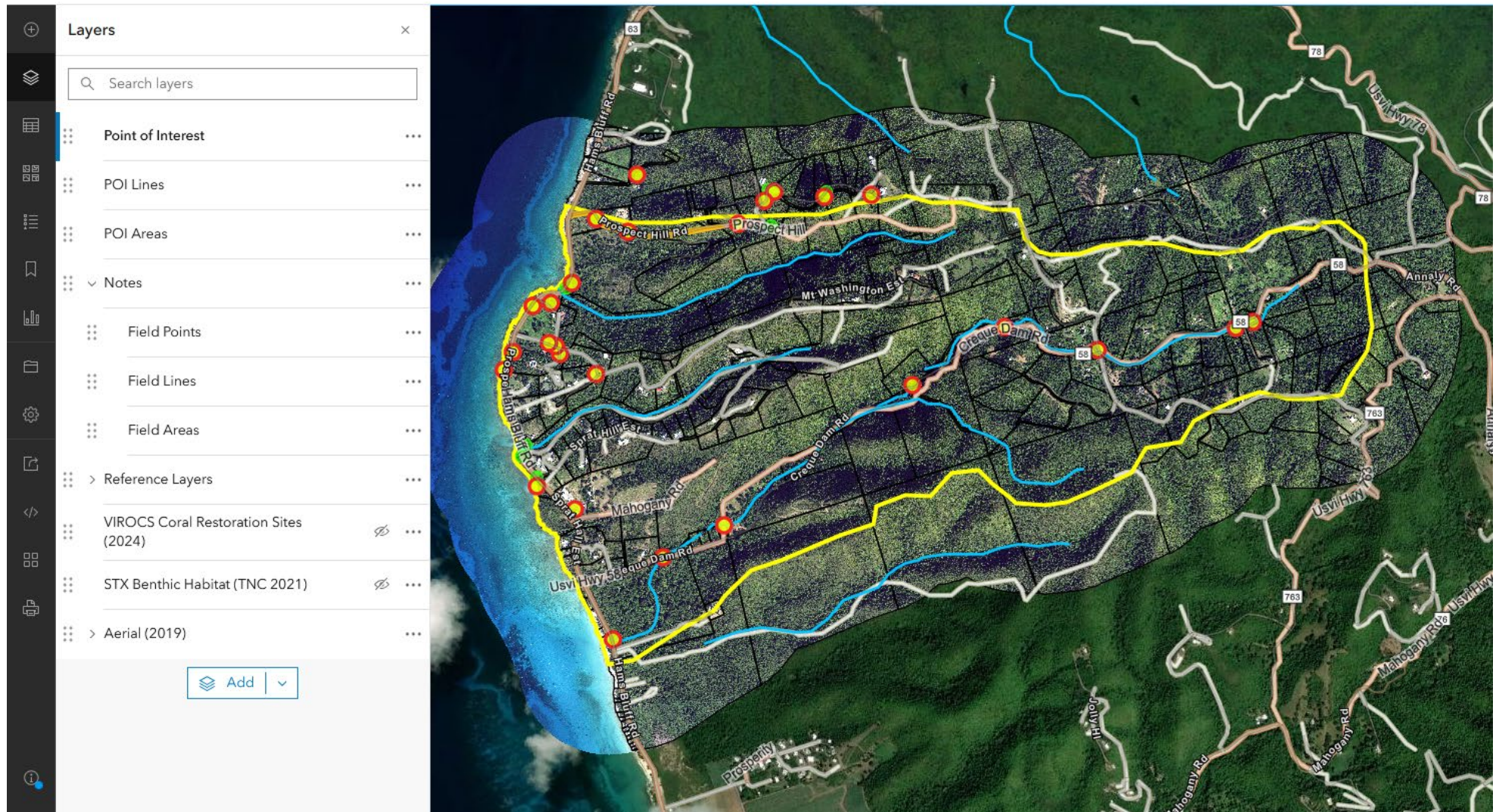


Figure 24. Public mapper showing locations of interest for field assessments

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