

5.0 Teague Bay Watershed

This section summarizes baseline information specifically for the Teague Bay Watershed and includes a description of the unique watershed features, a summary of existing water quality conditions, descriptions of potential restoration sites investigated during field assessments, and neighborhood descriptions. Table 5.1 summarizes basic watershed features.

Appendix A contains a basemap of the Teague Bay watershed depicting locations of water quality impairments, roads, hydrology, topography, and potential restoration sites.

5.1 General Description


The Teague Bay watershed is in the northeastern portion of the East End watersheds and Point Udall is considered the eastern-most point in the U.S. Atlantic coast and the most arid region of St. Croix. Annual rainfall for this part of the island is less than 30 inches/year. The East End was designated as an Area of Particular Concern in 1979.

Land Use

The watershed's main access road is the East End Rd. (Rt. 82), which runs east/west along the northern coast to Point Udall. Most of the watershed is steep terrain, except for the northwestern coast. Land use in the western portion of the watershed consists of a large goat farm, low density residential areas, the St. Croix Yacht Club, and the Reef golf course. There are two distinct condominium units in the golf course. Much of the eastern portion of the watershed is park/open space including Cramer Park and the lands associated with Point Udall and East End Bay. The southern ridge line is shared with Turner Bay. There are a number of impoundments in the watersheds, three at Skov goat farm and three on the golf course.

There are several single family neighborhoods in the watershed: Hilltop Circle, the residences along Maggie Hill Rd., the Mooring Rd. neighborhood, and a portion of Catherina's Hope. There are two multi-family condominiums: the Reef Golf Condos (Section 1 and Section 2) and the

Table 5.1. Watershed Summary

	
Drainage area¹	1021 acres; 1.6 sq miles
Length of guts²	0.8 miles
Road length²	10.4 paved miles; 6.6 unpaved miles
# Road culverts²	25 mapped culverts
Impervious Cover³	84 acres; 8%
Dominant land use %⁴	Undeveloped: 44%
	Park/Open Space: 34%
	LDR: 12%
Area within 100-yr floodplain⁵	165 acres; 16% of watershed
# Small ponds⁴	7 (this includes 3 unmapped ponds on the golf course)
# Mapped wells⁶	9 (plus a rain gauge)
Watershed erosion potential⁷	Vulnerability: High
	Road-based: High
	Mean Relative: High
2010 WQ Impairments⁸	2 of 3 assessment units impaired

¹ IRF/UVI/USGS 2001 watershed boundaries

² HW revised/or created, 2011

³ NOAA CSC, CCAP data, 2005

⁴ UVI-CDC data 2003 (land use) and 2001 (ponds)

⁵ DPNR, dated 2005

⁶ Received from DPNR Feb, 2011

⁷ WRI/NOAA, 2005

⁸ DPNR, 2010 Integrated Waters Report

Villa Madeline. Commercial properties of interest include Reef Golf, Duggan’s Restaurant, and St. Croix Yacht Club. Like the rest of the East End, there are no central sewer lines located in the watershed; therefore residential and small commercial areas rely on individual on-site septic systems, with small package plants used at resorts and condos, as at Reef Golf.



Figure 5.1. Overlooking Teague Bay and the St. Croix Yacht Club (left); Point Udall view of Buck Island (right).

Water Quality

Of the three ambient water quality assessment units associated with this watershed, two are listed in the 2010 Integrated Waters Report (DPNR, 2010) as impaired. UVI is conducting sedimentation studies at Boiler Bay.

Table 5.2: Water Quality Impairments (derived from DPNR, 2010)

Assessment Unit ID/Name	Monitoring Station Name	Impairment	Source of Impairment	TMDL (Priority)
VI-STC-39 / Teague Bay (STC-8 Reef Club Beach; STC-9 St. Croix Yacht Club Beach;	VI11381319 Teague Bay/Reef)	Dissolved Oxygen, Turbidity, pH, Fecal Coliform	Highway/Road/Bridge Runoff (Non-construction Related)	Low/2027
VI-STC-40 / Teague Bay Backreef	STC-10 Cramers Park; VI351774 Cramers Park	Turbidity, pH, Fecal Coliform	Highways, Roads, Bridges, Infrastructure (New Construction), Marina/Boating Sanitary On-vessel Discharges	Low/2027
VI-STC-43 / Solitude & Teague Bay subwatersheds, offshore	(N/A)	(N/A)	(N/A)	(N/A)

5.2 Potential Watershed Restoration/Project Sites

A number of specific sites were identified by project partners, local residents, and field assessment teams as potential sources of pollution or as drainage improvement opportunities. Table 5.3 summarizes candidate projects to be considered during the watershed planning process. A more detailed description of existing conditions and potential opportunities at these sites is provided below.

Table 5.3. Summary of Candidate Restoration/Project Sites

Project ID/Site Name ¹	Description	Initial Ranking
Gut/Pond Restoration		
Gut at Reef Golf (TB-GR-1)	Gut on western boundary of fairway has significant bank failure and downcutting; source of sediment to downstream culverts and waters.	High
Road Improvements		
Ridge Rd. at Rte. 82 (TB-RC-3)	Large gullies and erosion observed on first segment of roadway; significant source of sediment accumulating at base of road. Candidate for paving.	High
Goat Hill Rd./TNC (TB-RC-4)	Install water bars along road to avoid sheet flow and direct stormwater to swale along Route 82. Create breaches in dirt berm on roadside.	High
Stormwater Retrofits		
East End Beach Parking (TB-R-1)	Unrestricted vehicle access to beach causing erosion and gullying and is source of sediment to beach. Install vehicle barrier to limit to foot traffic.	High
St. Croix Yacht Club (TB-R-2)	Stormwater sheet flows over parking, boat storage, and operational areas. High erosion and source of sediment to nearshore waters. Construct swales and rain garden.	Medium
Reef Golf Course (TB-R-3)	Gut erosion has occluded downstream culverts. Replace culverts, construct micropools, low flow channels, and a wetland marsh system/ area to receive water from gut.	High
Culvert Maintenance and Repair		
Duggan's Entrance (TB-RC-1)	Culvert crossing entry drive is occluded. Replace with larger box culvert.	Medium
Culvert at Reef Admin. Building bisecting Rte. 82 from gut to Duggan's (TB-RC-2)	Culvert inlet/headwall completely buried from gut sediment and outlet completely crushed and rusted. Relocate and replace with larger box culvert.	High
¹ ID matches basemap locations and field sheets in the Appendix		

Skov Goat Farm Ponds (TB-ID)

The Skov property is undeveloped, except for the houses/structures at the top of the driveway and barns/sheds housing the goats. The issues identified for this property consisted of accelerated erosion from a gut draining into the upper pond (see Figure 5.2). In addition, while

the vegetation on the property is clearly affected by the grazing of the goats, erosion of the property itself appeared to be minimal. The farm ponds have limited capabilities to hold water, with the down-gradient pond being more permeable the up-gradient pond. Future management would require installation of either a clay or synthetic liner. There has been previous discussion on techniques to better manage erosive hillside runoff from Buena Vista Rd. by stabilizing drainage outlets and installing erosion control checks along the flow path.



Figure 5.2. Skov farm ponds. The pond on the left is leaking, the one on the right is receiving sediment from hillside erosion.

Reef Golf Course (TB-R-3, TB-GR-1, TB-RC-1, TB-RC-2)

Reef Golf is located along East End Rd. (Route 82) at Teague Bay. The property currently supports a nine-hole golf course, driving range, two sections of condominiums, a winding series of paved curbed roadways, administrative building, small clubhouse, and parking. A series of three water features are located on the fairway, which collect all roof runoff via piping from the gutters that run beneath the golf course. These ponds also receive a portion of stormwater collected by a large catch basin semi-enclosed with a headwall and flared concrete wingwalls located in the fairway southeast of the ponds as well as sheet runoff from Maggie Hill Rd. and the condominium areas. The ponds are connected to one another via culverts and spillways and provide a source of water for irrigating the fairways, greens, and landscaping. The lowest pond in the series also receives treated wastewater effluent from the Reef's treatment facility which is discharged via irrigation waters onto the golf course.

A gut along a steep valley wall on the western boundary of the fairway flows north to a culvert beneath East End Rd., immediately west of the Reef administrative building. The drainage area to this gut is comprised of agricultural lands (from the Skov farm) as well as residential neighborhoods. The culvert inlet (24" CMP; TB-RC-2) and headwall at East End Rd. have been completely buried by sediment conveyed through the gut and outlet of this culvert is also rusted and crushed and needs to be replaced. The gut is severely eroded along the right bank and significant downcutting was also observed. The average channel width was three to four feet along the base and eight to twelve feet along the top with an average riparian width of less than 25 feet. If this gut continues to erode, it will pose a threat to the surrounding property

and Reef Golf infrastructure. The erosion and sediment loading have already resulted in the failure and total impairment of the culvert downstream that crosses East End Rd. If the right (east) bank of this gut were breached, it would flow onto the fairways and greens of Reef Golf.

In order to prevent further erosion of the gut and sediment loading down-gradient, the banks of the gut could be regraded and stabilized with soil amendments and suitable vegetation that would establish within the arid soil. The installation of a series of check dams within the channel would decrease the velocity of flow through the channel, thereby reducing the potential for further erosion and sedimentation. Flows up-gradient from the current erosion area could also be diverted to a new water feature within the western fairway. The culvert beneath East End Rd. will also need to be replaced and relocated slightly and will flow into a potential constructed wetland (see description below Figure 5.3).



Figure 5.3. One of three golf course ponds (top left) covered in highly invasive water hyacinth; eroded gut along western edge of Reef property (top right); potential location for constructed wetland retrofit (bottom left); and parking lot retrofit location at Duggan's (bottom right).

Duggan's Restaurant Entrance Rd. Culvert (TB-RC-1)

A 22-inch, single-barreled, ductile iron culvert is located beneath the entry drive at Duggan's Restaurant. The culvert is in a state of disrepair and needs to be replaced. The culvert is partially filled with sediment and is causing problems both upstream and downstream. There is

evidence of sediment deposition along with a downstream scour hole and failing embankments. Potential steps to restore this failing culvert include replacing the existing pipe and headwall with a much larger box culvert and constructing micropools at the inlet and outlet of the culvert. A low flow meandering wetland channel is also proposed.

St. Croix Yacht Club (TB-R-2)

The St. Croix Yacht Club is located on the north side of Route 82 on Teague Bay. A clubhouse and storage shed are located along the beach front. The paved entry drive leads to four paved parking bays, all with turf parking spaces. The areas surrounding the clubhouse and parking lot are designated for boat storage and maintenance activities and are primarily in turf with eroded, unimproved dirt roadways. Stormwater currently drains from the roadway and other up-gradient areas over-land through the boat storage and parking space to a channel immediately west of the clubhouse. Trash, debris, and significant erosion exposed soils were observed. The eroded areas and exposed soils could be restored and stabilized with soil amendments or gravel (Figure 5.4). The construction of a road-side swale would facilitate the flow of runoff into a proposed sediment forebay structure adjacent to the existing gut channel. The sediment forebay would increase the on-site stormwater storage capabilities and greatly improve water quality by reducing the amount of sediment and marine/boat associated toxins and debris reaching the nearshore waters.



Figure 5.4. Drainage from a large portion of the watershed comes through this swale (top left); Stormwater flows overland across unvegetated/muddy boat storage/parking areas (top right and bottom photos).

East End Rd. Beach Parking (TB-R-1)

This area provides informal unpaved parking and beach access at Boiler Bay. A series of rusted guardrails were originally installed to restrict vehicular access for two paths to the beach. The eastern path (Figure 5.5) no longer has a vehicular barrier and serves as a roadway in lieu of a footpath. Vehicles have widened and compacted the soils over time, significantly increasing erosion and sediment delivery to the nearshore waters. This source of sediment could be easily remediated through the installation of a new guardrail or other barrier at the entrance to the eastern access way. Some of the existing eroded ruts and gullies could be backfilled with a suitable soil or gravel.



Figure 5.5. Open guardrail off East End Rd.

Cramer Park

No significant drainage problems or obvious pollution sources were observed at Cramer Park, though project partners mentioned the potential to test an alternative septic system at park restrooms. A concrete stormwater swale bisects East End Rd. and conveys stormwater along the eastern end of Cramer Park, but was not deemed an erosion or sediment source. At the time of the field reconnaissance, no trash or debris were observed. Trash receptacles were present in multiple locations at the park.

Goat Hill Rd./TNC (TB-RC-4)

Goat Hill Rd. is located along the south side of East End Rd. (Rt. 82) across from Cramer Park and immediately east of the base array telescope located on lands owned by The Nature Conservancy (TNC). Goat Hill Rd. begins at the base of the hill on East End Rd. and traverses up the hill through a series of switchbacks up and over the ridge line. The road is an unimproved dirt roadway. The base of the road is owned by the Department of Housing, Parks, and Recreation and the remainder (after the first hill break) is owned by TNC. Unauthorized road maintenance and access improvements were conducted by others in the fall of 2010. This resulted in substantial widening of the road to nearly twice its previous width and the creation of a dirt/gravel berm on the valley side of the roadway. This berm prevents stormwater from flowing off the road and instead directs it within the graded area of the road. Large portions of the road are highly eroded with deep ruts and gullies. At the base of the road, stormwater generally flows west into a shallow swale and then into a concrete swale that crosses East End Rd. to Cramer Park. This road may serve as a primary source of sediment into Cottongarden Bay (Figure 5.6).

A series of minor, low maintenance improvements could be conducted along Goat Hill Rd. Multiple water bars and outlets (i.e., breaches in the dirt berm on the road shoulder) would

reduce the velocity of the water and redirect flows into the forested valley for infiltration and sediment attenuation. This would also alleviate the potential for flooding and pooling at the base of Goat Hill Rd. along East End Rd.



Figure 5.6. View of Cottogarden Bay from the Goat Hill Rd. (left); the base of Goat Hill Rd. (photo courtesy of TNC and UVI) (right).

Ridge Rd. at East End Rd. (TB-RC-3)

The lower portion of Ridge Rd. immediately off East End Rd. (east of Reef Golf) is unpaved and severely eroding along the first segment of road up to the first switchback (Figure 5.6). Sediment was observed to be accumulating at the base of Ridge Rd. at East End Rd. This section of Ridge Rd. is a candidate for paving to alleviate erosion. The remainder of Ridge Rd. (up-gradient) is paved. The installation of water bars or paving are options to control the flow of runoff and reduce erosion.



Figure 5.7. Gullying and erosion observed along Ridge Rd.

5.3 Neighborhood Summaries

A summary of general neighborhood conditions is provided below in order to identify which neighborhoods are likely to generate pollutants of concern, what the common sources are, and which areas/sources should be targeted for watershed stewardship activities. Unless otherwise noted, it is assumed that neighborhoods consist of single-family, detached residences, with cisterns, on-site septic systems, and open section/drainage roads (without curb and gutter). Table 5.4 is a comparative summary of each neighborhood, and more detail is provided below. Pollution source is determined by number of observed pollutants (1-2=Medium; >2 = High).

Table 5.4. Summary of Neighborhood Restoration Opportunities

Name	Road/ Driveway Condition	% Lots Un- developed	Pollution Source	Potential Stewardship Activities
Hilltop Circle (TB-RES-1)	Mixed, Mostly Paved/Good Condition	<50%	Low	No Action
Reef Condos (TB-RES-2)	Paved, Curbed/Good Condition	0%	Low	No Action
Catherina’s Hope (TB-RES-3)	Mixed, Mostly Paved/Good Condition	<60%	Low	Single, residential construction site management

Hilltop Circle/Hummingbird Rd. (TB-RES-1)

The Hilltop Circle/Hummingbird Rd. neighborhood (approximately 55 acres) is the eastern-most neighborhood within the Teague Bay watershed. One portion of the neighborhood is accessed either by Hummingbird Rd. on East End Rd. or from Rt. 60 to the south. The remaining residences are located on Hilltop Circle, accessed by Ridge Rd. via Rt. 60. The neighborhood sits atop a steep hilly area, reaching up to about 380 feet in elevation at the steepest points. About 50% of the neighborhood is developed, and many homes are gated and set back from the street. Roadways within the neighborhood are a mix of pavement (40%) and dirt/gravel (60%) and driveways are mostly paved. Hilltop Cir. and Hummingbird Rd. are open section, with some water bars, and at least three identified culverts. The paved roads are in good condition and the dirt roads were observed to be very stable with little to no erosion.

Reef Golf Condominiums (TB-RES-2)

The Reef Bay Condominiums are comprised of both Section 1 and Section 2 condo units (approximately 6 acres and 9 acres, respectively) located above the golf course. The Section 1 condo units are one-bedroom residences, located in the southeast corner of the property, immediately below Maggie Hill Rd. The Section 2 condos are two-bedroom units and are located immediately south of the fairway atop a small hill. This condominium community is the only one entirely within the Teague Bay watershed. This residential area is accessed via a small gatehouse and private drive off East End Rd.

Roadways within the condominium complexes are entirely paved and curbed and in good condition. Road runoff is diverted through gutters and catchments to the ponds within the fairway, along with all roof runoff, which is piped from the gutters through an underground drainage network to the ponds. There is a small gravel parking area at the outdoor pool at the Section 2 condos. Average lot cover is approximately 20% turf, 25% landscaping, 40% rooftop, and 15% driveway and walkways. All sewage is directed to an on-site small package treatment plant located on the north side of East End Rd., immediately east of Duggan’s Restaurant. This residential community is not a source of pollutants and/or sediment and no recommendations are suggested.



Figure 5.7. View of Section 2 condos from golf fairway.

Catherina’s Hope (TB-RES-3)

The Catherina’s Hope neighborhood (approximately 90 acres) is the western-most neighborhood within the Teague Bay watershed, and is also partially located within the Solitude watershed. The neighborhood is accessed either by Sierra Verde Rd. or East End Rd./Rt. 82. The neighborhood sits on a steep hilly area, and reaches about 5000 feet in elevation at the steepest points. About 40% of the neighborhood is developed, and many homes are gated and set back from the street.

Roadways within the neighborhood are a mix of paved and dirt/gravel. The majority of the main access roadway is in the process of being paved with concrete. The roads are open section, with no identified water bars or culverts. The paved roads are in good condition; minimal erosion was observed for the dirt roads.