ST. CROIX EAST END WATERSHEDS RESTORATION STRATEGY 2023-2028

SEPTEMBER 2023

PREPARED FOR:
VI Department of Planning and Natural Resources
NOAA Coral Reef Conservation Program

PREPARED BY:
Horsley Witten Group, Inc

NOAA CORAL REEF CONSERVATION PROGRAM

Department of Planning & Natural Resources

Horsley Witten Group
Sustainable Environmental Solutions

TABLE OF CONTENTS

INTRODUCTION

The St Croix East End Marine Park (STXEEMP) is the U.S. Virgin Islands' first territorially designated and managed marine protected area. It encompasses nearly 39,000 acres of underwater habitats and is home to a variety of coral reefs, fish and invertebrates.[1] The park is a popular destination for residents and tourists who enjoy its natural beauty and recreational opportunities. However, the park's coral reefs continue to be threatened by land-based sources of pollution (LBSP), such as runoff from dirt roads, agricultural activities, and urban development. These pollutants can increase sedimentation, turbidity, nutrient, chemical, and pathogen levels in the water, which can harm the corals and reduce their resilience to other stressors. Addressing LBSP is challenging due to the islands' steep hillsides, thin soils, seasonally heavy rainfall, and the proximity of shallow coral reefs to the shore.[2] Implementing restoration projects to reduce LBSPs with targeted benefits to coral reef habitats in the STXEEMP is a priority for the conservation and sustainability of the park's marine resources.

NOAA's Coral Reef Conservation Program (CRCP) and the VI Department of Planning and Natural Resources (DPNR) sponsored development of the 2011 St. Croix East End Watersheds Management Plan (aka 2011 WMP) to evaluate conditions and restoration potential of six east end watersheds that discharge into the STXEEMP: Southgate, Solitude Bay, Teague Bay, Turner Hole, Madam Carty and Great Pond Bay (**Figure 1**).[3] The explicit management goals of the 2011 WMP were to:

1. Protect the marine resources of St. Croix's East End Marine Park from the negative impacts of land-based sources of pollution and maintain the rural character of the East End.
2. Engage local residents and businesses in watershed stewardship activities.
3. Demonstrate restoration actions that can be applied throughout the USVI.

The WMP identified over 50 site-specific structural, as well as a dozen watershed-wide programmatic management actions to reduce LBSP impacts to the STXEEMP. While comprehensive implementation of those watershed recommendations has not occurred, several projects were advanced over the past 10 years, such as headcut stabilization, neighborhood unpaved road drainage planning, culvert and road drainage improvements, wastewater treatment upgrades, watershed education efforts, unpaved road paving, and wetland restoration

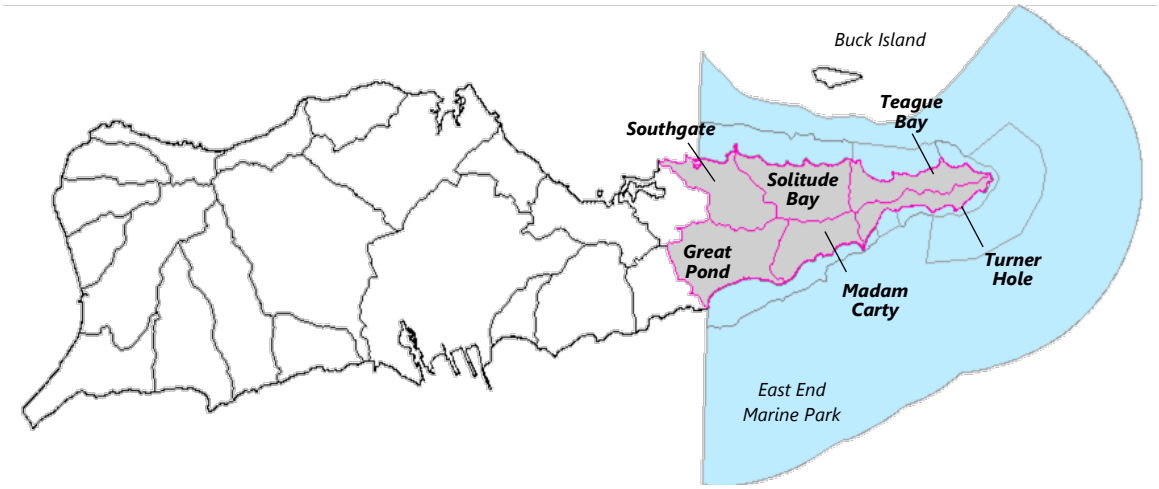

Figure 1. St Croix's six watersheds (in grey) that drain to the East End Marine Park (in blue)

[1] National Oceanic and Atmospheric Administration (2014) New Ridge-to-Reef Study of St. Croix East End Marine Park Supports Local Watershed Management Actions. Accessed August 12, 2023.

[2] National Oceanic and Atmospheric Administration (2020) Coral Reef Condition: A Status Report for the U.S. Virgin Islands. Accessed August 12, 2023.

[3] Horsley Witten Group (2011) St. Croix East End Watersheds Management Plan. Accessed August 1, 2023.

assessments, to name a few. Despite these efforts, DPNR's ambient and beach monitoring indicates that water quality conditions in the STXEEMP have continued to degrade over the past decade. **Table 1** summarizes the 303(d) impaired waters on the east end from the 2020 Integrated Waters Report—19 impairments have been added since 2010, including pH and temperature in the Buck Island unit (technically outside the STXEEMP). **Figure 2** shows the location of impaired assessment units as of 2020 reporting.

Table 1. Summary of 2020 303(d) Impaired Waters (adapted from 2020 USVI Integrated Water Quality Report)

Watershed	AU ID	AU Name	Associated Monitoring Stations	Priority	Class	Impairment	Years impaired
Southgate	VI-STC-33	Punnett Bay	VI610321	High	B	Enterococcus	2018, 2020
						Turbidity	2010, 2012, 2014, 2016, 2018, 2020
	VI-STC-34	Punnett Point, east	STC-4	Low	B	Dissolved oxygen, Enterococcus, pH, Turbidity	2020
	VI-STC-35	Tamarind Reef Lagoon (Southgate Lagoon)	STC-5	High	B	Dissolved oxygen, pH, Transparency/Clarity, Enterococcus	2020
	VI-STC-36	Green Cay Beach	VI563397	High	B	Enterococcus	2010, 2012, 2014, 2018, 2020
						Turbidity	2010, 2012, 2014, 2016, 2018, 2020
	VI-STC-37	Southgate Subwatershed, Offshore	STC-5	High	B	Dissolved Oxygen	2010, 2014, 2016, 2018, 2020
						Enterococcus, Turbidity	2010, 2014, 2016, 2020
Teague Bay	VI-STC-39	Teague Bay	STC-8, STC-9, VI381319, UVI-Supp	High	B	pH	2010, 2012, 2014, 2020
	VI-STC-40	Teague Bay Backreef	STC-10	High	B	Dissolved oxygen	2020
			STC-10, VI351774	High	B	pH	2010, 2012, 2014, 2020
	VI-STC-41	Buck Island Backreef	STC-7	Medium	A	pH	2020
			STC-6, STC-7	Medium	A	Temperature	2018, 2020
Turner Hole	VI-STC-46	Grapetree Bay	STC-11B	High	B	pH	2020
	VI-STC-47	Turner Hole Backreef	STC-12	High	B	Dissolved oxygen, pH	2020
			VI297470	High	B	Enterococcus	2010, 2012, 2014, 2016, 2018, 2020
Madam Carty	VI-STC-49	Madam Carty Backreef	STC-13B	High	B	Dissolved oxygen, pH	2020
Great Pond Bay	VI-STC-52	Great Pond Bay	STC-13A	High	B	Dissolved oxygen, pH	2020

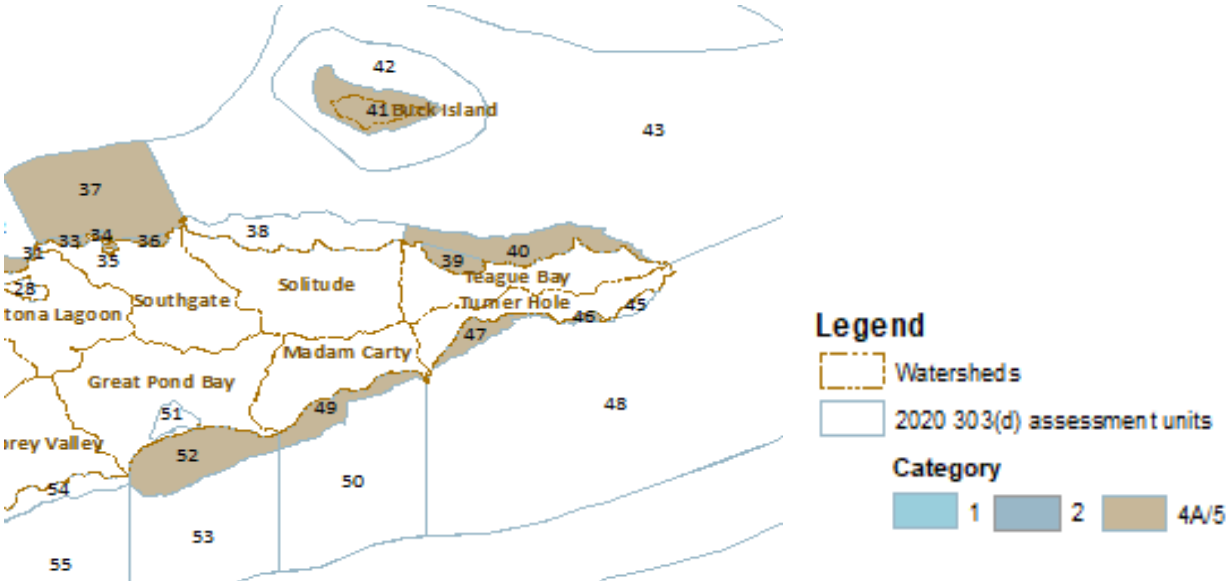

Figure 2. Impaired waterbodies (shaded brown) from 2020 VI Integrated Waters Report.

In 2014, NOAA conducted a benthic habitat assessment in the STXEEMP to inform park management planning. They classified LBSP threat levels by contributing watershed based on a GIS analysis of land cover and unpaved road density. When watershed characterizations were compared to benthic coverage, they found that percent cover of coral and colonized hardbottom was lower in areas associated with high watershed LDI and unpaved road density (**Figure 3**). Watershed impact maps overlain with sensitive species presence and Acropora sp. maps, are shown in **Figure 4** as examples.

Similar to the 2011 WMP, the study suggested focusing LBSP management in areas with priority marine communities (i.e., ESA-listed Acroporid corals, diverse coral reef, areas with high potential to recover to diverse coral reefs) as follows:

- Areas with high density of dirt roads should be managed specifically to limit and reduce sediment run-off as it negatively impacts corals and seagrass communities.
- Areas with high land development index (LDI) should be managed to limit the further development of impervious surfaces.
- Areas up-slope of the watershed impact zones which are identified as containing sensitive species should be managed to ensure that conditions in these environments are sustainable for sensitive species.

This last recommendation is particularly relevant since coral farming and outplanting efforts have taken place in Solitude Bay since 2011. While not on the current 303(d) list, this area is subject to high LBSP threats from the contributing watershed. TNC is restoring 300 acres of this reef, so managing LBSP here is critical.

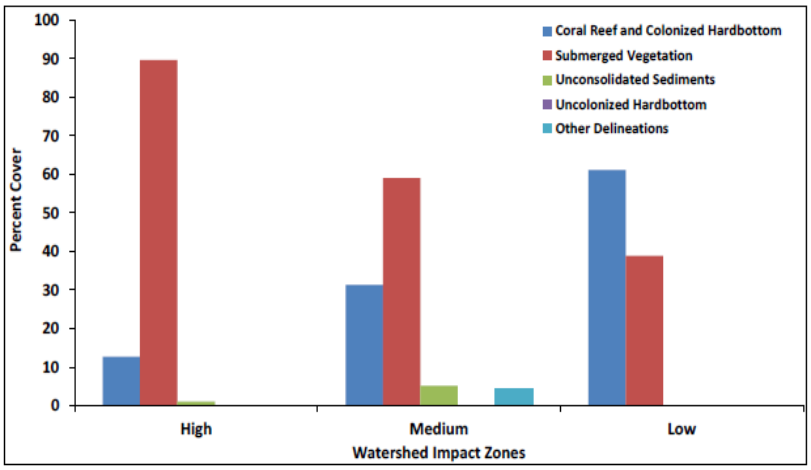

Figure 3. Percent Benthic Cover in STX EE Watershed Impact Zones (NOAA 2014)

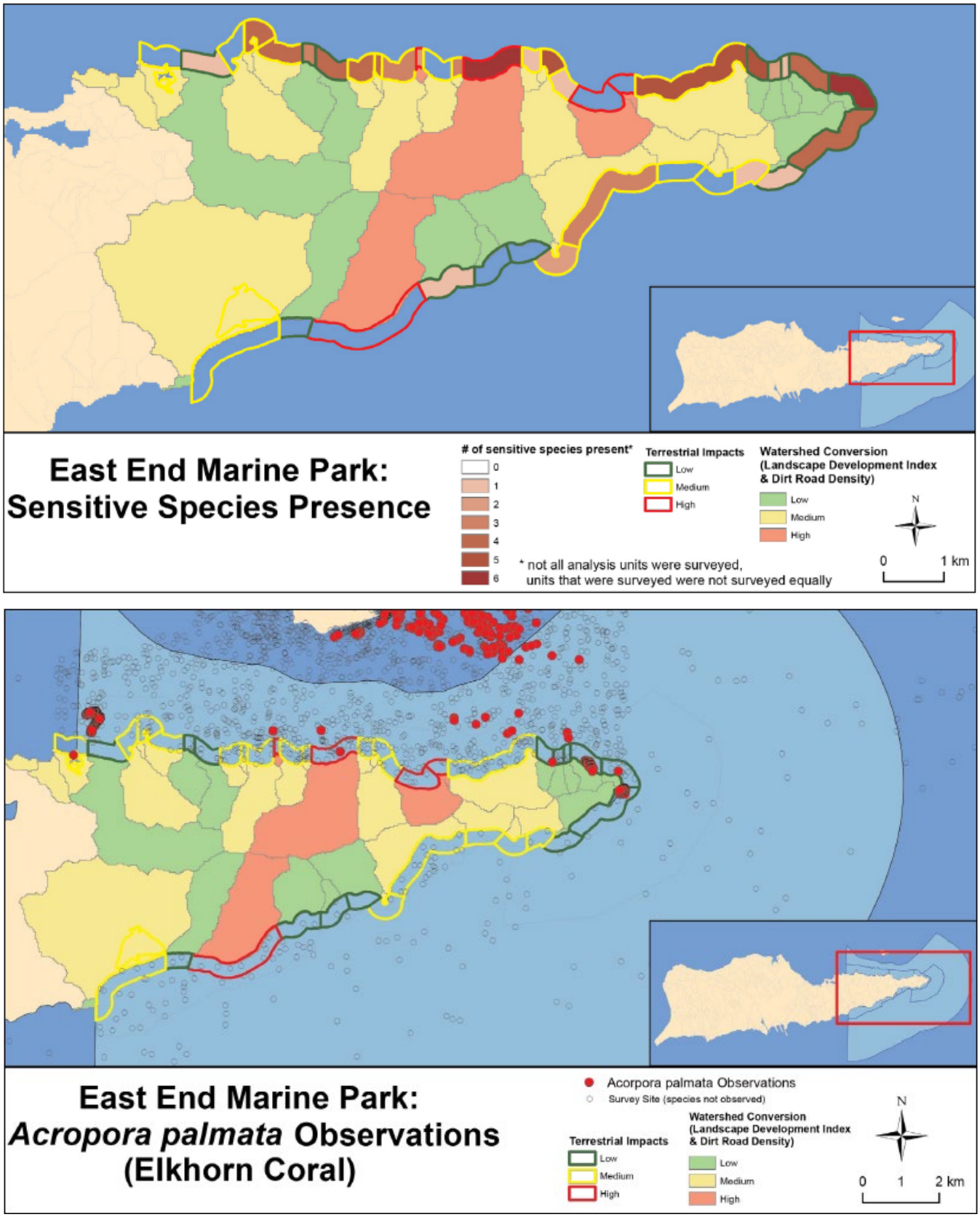

Figure 4. Watershed impact units and presence of sensitive species (top) and elkhorn coral (bottom) in the STXEEMP.

The 2016 St. Croix East End Marine Park Management Plan (currently being updated) highlights the importance of watershed restoration actions. Several very high and high priorities of the plan were allocated $1.2-1.7M over the projected 5-yrs budget include:

- Great Pond mangrove habitat restoration
- Unpaved road stabilization
- Other watershed restoration actions
- Gut restoration activities

Figure 5 shows that $1.2-$1.7M was allocated to watershed restoration and mangrove habitat enhancement priorities over the projected 5-yr planning horizon. Despite this, most of the park's efforts to date have focused on education and in-water activities within the STXEEMP. Watershed restoration activities have primarily been led by other agencies and organizations.

Functional Area	Priority	Strategy	2016	2017	2018	2019	2020	Estimated Costs
RESOURCE MANAGEMENT AND PROTECTION	VERY HIGH	Great Pond Restoration Phase 1; study						$140,000
		Great Pond Restoration Phase 2; engineering plans						$20,000
		Great Pond Restoration Phase 3; restoration						$400,000
		Great Pond Restoration Phase 4; wildlife enhancement						$100,000
		Restoration of Reef-forming Stony Coral (*Acropora*)						$50K-$100,000 (TNC)
		Day Use Moorings						$50,000-$150,000
		Address Dirt Roads						$50,000-$500,000
		Increase Effectiveness of Prosecutions						$500-$1500
		Increase Effectiveness of Enforcement						$200,000
		(Estimated costs for very high priority strategies: $1,010,500-$1,612,000)						
	HIGH	Watershed Activities						$250,000
		Ghut Restoration						$250,000
		Sea Turtle Citizen Science Day Patrol						$5,000
		Lionfish Hunting						$300
		Lionfish Derbies						$1,000
		Public notice of infractions						minimal
		(Estimated costs for high priority strategies: $506,000)						
Total expected costs for Resource Management and Protection (range over five years)								$1,516,800-$2,118,000

Figure 5. Management and Protection Strategies Timeline and Estimated 5-yr Costs (from 2016 STXEEMP Management Plan)

PURPOSE OF THIS REPORT

In 2022, NOAA CRCP provided funding to evaluate implementation progress of the 2011 WMP and re-establish LBSP management priorities over the next five years to enhance the resilience of coral reefs and other marine resources in the STXEEMP. This restoration strategy is not intended to be a comprehensive update to the 2011 WMP; rather, it provides a more focused framework for implementing a handful of actions by local partners over the next few years leveraging existing NOAA financial support (in hand) and identifying future grants and partnership opportunities.

Ideally, this strategy will be integrated with other relevant agency and non-government organization initiatives that may include:

1. CZM's updated STX EEMP Management Plan.
2. DPNR's restoration evaluation and design charette for Great Pond.
3. Land acquisition and project support through NOAA Community Climate Challenge Grant through DPNR's Territorial Parks office.
4. TNC's continued efforts at reef building on the north shore of Solitude and Teague Bay and management of conservation lands in the east end.
5. DPW's drainage infrastructure improvement plans and multi-purpose pathway planning through the southern watersheds.
6. SEA's ongoing stewardship efforts in Southgate.
7. DFW's bird habitat restoration designs (at least for water quality improvements) for other wetlands in the STX East End (i.e., Southgate, Coakley, and Robin Bay).
8. EPA and VIDPNR Non-point Source Program initiatives.
9. NRCS assistance programs to farms related to pond water supply and LBSP reduction
10. VICS small site development practices technical assistance program through NOAA.
11. Continued onsite improvements of private landowners, resorts, and homeowner's associations.

WHAT'S IN THE STRATEGY?

This report is organized as follows:

Restoration Priorities—this section summarizes the watershed goals and priorities moving forward based on field observations, an evaluation of what remains to be accomplished from the 2011 WMP, and what stakeholders agree are the priority locations for LBSP interventions moving forward.

Implementation Strategy—this section includes a suggested schedule and budget breakdown over the next five years of where CRCP and others could expend implementation dollars designing, permitting, and constructing key projects.

Appendix A—contains the 2023 evaluation of progress towards implementing the management recommendations and site-specific projects identified in the 2011 WMP.

Appendix B— documents findings from the 2022 field reconnaissance for St. Croix east end watersheds.

Appendix C—includes notes from stakeholder input meetings.

Appendix D— is a compilation of concept plans that have already been developed for priority sites. Existing concept plans that have already been developed for priority sites.

RESTORATION PRIORITIES

In 2022-2023, CZM and Horsley Witten conducted field assessments and virtual stakeholder meetings to identify current watershed issues, evaluate implementation status of the 2011 WMP, and solicit input on where implementation actions should focus moving forward. From these evaluations, updated management goals and priority restoration projects were identified to frame this strategic plan.

These efforts were facilitated with an interactive mapping tool using the ESRI Field Map App accessed at https://horsleywitten.maps.arcgis.com/apps/instant/sidebar/index.html?appid=b8125107fcbf4f289a7f68319e2a42f0. The map includes watershed boundaries, parcels, and other basic reference layers, as well as restoration sites and infrastructure locations from the 2011 WMP, additional points of interest identified by stakeholder, and an updated layer for 2023 priority sites (**Figure 6**).

Figure 6. Field Map App. Potential restoration sites in the east end watersheds.

STATUS ASSESSMENT

An evaluation of the continued relevance and implementation status of 2011 WMP goals, recommendations, and specific actions was conducted with resource managers and project partners. **Appendix A** includes a listing of each of the recommended actions and site specific projects that were identified in the watershed plan, their implementation status (completed, in progress, no action taken) and an assessment as to whether they are still relevant moving forward.

Between 2022 – 2023, a field reconnaissance was conducted with STXEEMP staff to evaluate current watershed conditions, the status of implementation projects, and any emerging watershed concerns. Infrastructure mapping from 2011 was not updated to reflect current conditions as part of this effort. An initial list of potential LBSP reduction projects was developed based on observations and discussions for each watershed (see **Appendix B** field memo). A series of virtual and in-person meetings occurred between HW and STXEEMP resulted in additional site visits to verify status of potential projects.

Two virtual stakeholder meetings were held in June of 2023 to further inform and develop a prioritized list of sites for potential restoration. Sixty individuals from the wider community of natural resource specialists, agencies, and non-government organizations, businesses, and interested residents were invited. There was a 38% participation rate (23 individuals) who worked together to further discuss and identify priority projects in watersheds of the STXEEMP. The interactive online watershed map was created to identify and facilitate communications of site-specific locations among stakeholders. Sites that were identified as high, medium and low priorities in the 2011 WMP were overlaid as reference points. Stakeholders were encouraged to identify additional sites and provide commentary directly on the map (purple diamonds). Sites that were added to the map were noted and included as potential sites for restoration. Notes from the stakeholder meetings are in **Appendix C.**

LBSP MANAGEMENT GOALS

The goals and objectives of this Restoration Strategy are to:

1. Protect the coral, sea grass, and mangrove habitats of the STXEEMP from the negative impacts of land-based sources of pollution.

    Objective 1.1 Stabilize priority unpaved roads, beach trailheads, and off road scars in Solitude and Teague Bays.

    Objective 1.2 Install green stormwater infrastructure to provide water quality treatment for urban runoff and to demonstrate sustainable site development practices.

    Objective 1.3 Restore gut and wetland functions to support coastal ecosystem improvements and infrastructure resilience.

2. Build partnerships and capacity of local agencies, non-government organizations, and environmental professionals to reduce LBSP in the VI.

    Objective 2.1 Include multiple (and diverse) partners in funding proposals for implementation projects.

    Objective 2.2 Include on-island engineers, designers, contractors, and landscape professionals in construction projects.

    Objective 2.2 Incorporate training and education opportunities in implementation projects.

3. Engage watershed residents and businesses equitably in watershed stewardship activities.

    Objective 3.1 Commit to implementing at least one LBSP mitigation project on private property with support of HOA association or commercial business.

    Objective 3.2 Provide opportunity to engage the community in design, installation, and maintenance aspects of LBSP projects.

    Objective 3.3 Improve community accessibility and recreational opportunities in LBSP implementation project designs.

SITE-SPECIFIC ACTIONS

There are 24 sites that have been identified for restoration focus moving forward. Table 2 summarizes sites, the type of project, and primary implementation partners. Project types include unpaved road stabilization, culvert replacement/gut or pond restoration, stormwater retrofits, and wetland function and shoreline restoration. A description of sites where concept designs or current initiatives exist is noted. **Figure 7** shows the online ESRI Field Map that shows where these sites are located. See **Appendix D** for a consolidated set of existing design plans.

Table 2. LBSP Priority Actions in the STX East End Watersheds

Watershed	Potential projects (ID from 2011 WMP or newly assigned)	Project Type				Partners	Existing Plan or Initiative (see Appendix D for compilation)
		Unpaved Road	Culvert/ Gut	GSI Retrofit	Wetlands & Shoreline		
Southgate	1. Reconnect flows under dirt road (Southgate beach access (DFW-1)). Potential designated parking area.	●	●		●	SEA, DFW	Yes, 2023 DFW habitat project public conceptual designs; 2023 33% design plan
	2. Green Cay gut headcut stabilization and restoration (SG-G-2)		●		●	Owner, NOAA, NRCS	Yes, 2016 Phase I construction plan and 2018 repair plan and Phase II downstream layout plan memo
	3. Culvert replacement @ Chenay (SG-RC-21)		●			DPW, VI Paving	Yes, 2022 DPW plan. In process of construction.
	4. Chenay Bay gut buffer enhancement and parking lot retrofit-(SG-R-20)		●	●	●	Owner	Yes, Concept in 2011 WMP Appendix C
	5. Green Cay Marina sustainable practices support (SG-R-3)			●		Owner	Some sketches and notes from 2011 assessment, this would be a redo
	6. Cheeseburgers Renovation/Redevelopment opportunity to support (SG-R-1)			●			Some sketches and notes from 2011 assessment, this would be a redo
Great Pond	1. Culverts along Hwy 624 to restore flows and provide pretreatment (GP-RC-1, 2, 3)		●			DPW	Yes, Concept in 2011 WMP Appendix C
	2. Explore Great Pond habitat restoration (GP-R-1)		●		●	DFW, CZM	Yes, 2023 DFW habitat project public conceptual designs; 2023 33% design plan; Current CZM design charette project; DPW multimodal pathway
	3. Demonstrations at EEMP Visitor Center (green infrastructure, tree canopy, stormwater, shoreline/trailhead stabililzation) (GP-R-2 and R-3)			●		CZM	Some sketches and notes from 2011 assessment, this would be a redo.
	4. Manage remaining unpaved roads Union/Mt. Washington (GP-RC-33)	●				DPW	Yes, Concept in 2011 WMP Appendix C
Madam Carty	1. South Shore Road culverts near Grassy Point (downslope stabilization) (MC-1)		●				No.

Watershed	Potential projects (ID from 2011 WMP or newly assigned)	Project Type				Partners	Existing Plan or Initiative (see Appendix D for compilation)
		Unpaved Road	Culvert/ Gut	GSI Retrofit	Wetlands & Shoreline		
	2. Robin Bay Wetland and Shoreline (CZM-1)	●			●	DFW, owner	No.
Solitude Bay	1. Hope and Carton Hill/Pony Club/Yellow Cliff unpaved roads (SB-RC-2, 3, 4, & 8)	●		●		Neighborhood association, TNC, NOAA	Yes, Road drainage master plan from 2013; 2014 DOI Tap grant; would need updated assessment.
	2. Fire station and WMA dumster site (SB-H-2 and SB-R-1)			●	●	WMA, VITEMA, TNC	Yes, concept from 2011 WMP and revised proposal with TNC (in 2018)
	3. Coakley Bay Salt Pond (DFW-2)	●	●		●		Yes, 2023 DFW habitat project public conceptual designs; 2023 33% design plan
	4. Coakley Bay Condos retrofits and desal discharge, beach access (SB-R-5 & 6)	●		●		owner	Some sketches and notes from 2011 assessment, this would be a redo
	5. Stabilize unpaved roads near Bajamar Rd (SB-RC-1)	●					Some sketches and notes from 2011 assessment, this would be a redo
Teague Bay	1. Boiler Bay trail and parking lot stabilization and guardrail (TB-R-1)	●		●		NOAA, DPNR Parks	Concept developed for NOAA in 2023
	2. Revegeation of off-roading scars (multiple) (CZM-2)	●				NOAA	No.
	3. Goat Hill Rd stabililzation (TB-RC-4)	●				NOAA, TNC	Yes, Concept in 2011 WMP Appendix C
	4. Cramer Park upgrades and GSI demo, offshore monitoring, signage			●	●	NOAA, Sports, Parks & Rec or DPNR Parks	Upgrades under construction, TNC signage
	5. The Reef – drainage/RO/trash/gravel areas (TB-R-3)		●	●		Owner	Concept developed in 2011 WMP
Turner Hole	1. Divi retrofits and South Ridge Rd stabilization (TH-R-2, TH-R-3, CZM-3)	●		●		NOAA, Owner, maybe DPNR Parks	Yes, Concept in 2011 WMP Appendix C for Divi; 2023 sketch for S. Ridge Road
	2. Grape Tree redevelopment opportunities to support sustainable practices (TH-R-4)			●		owner	No.

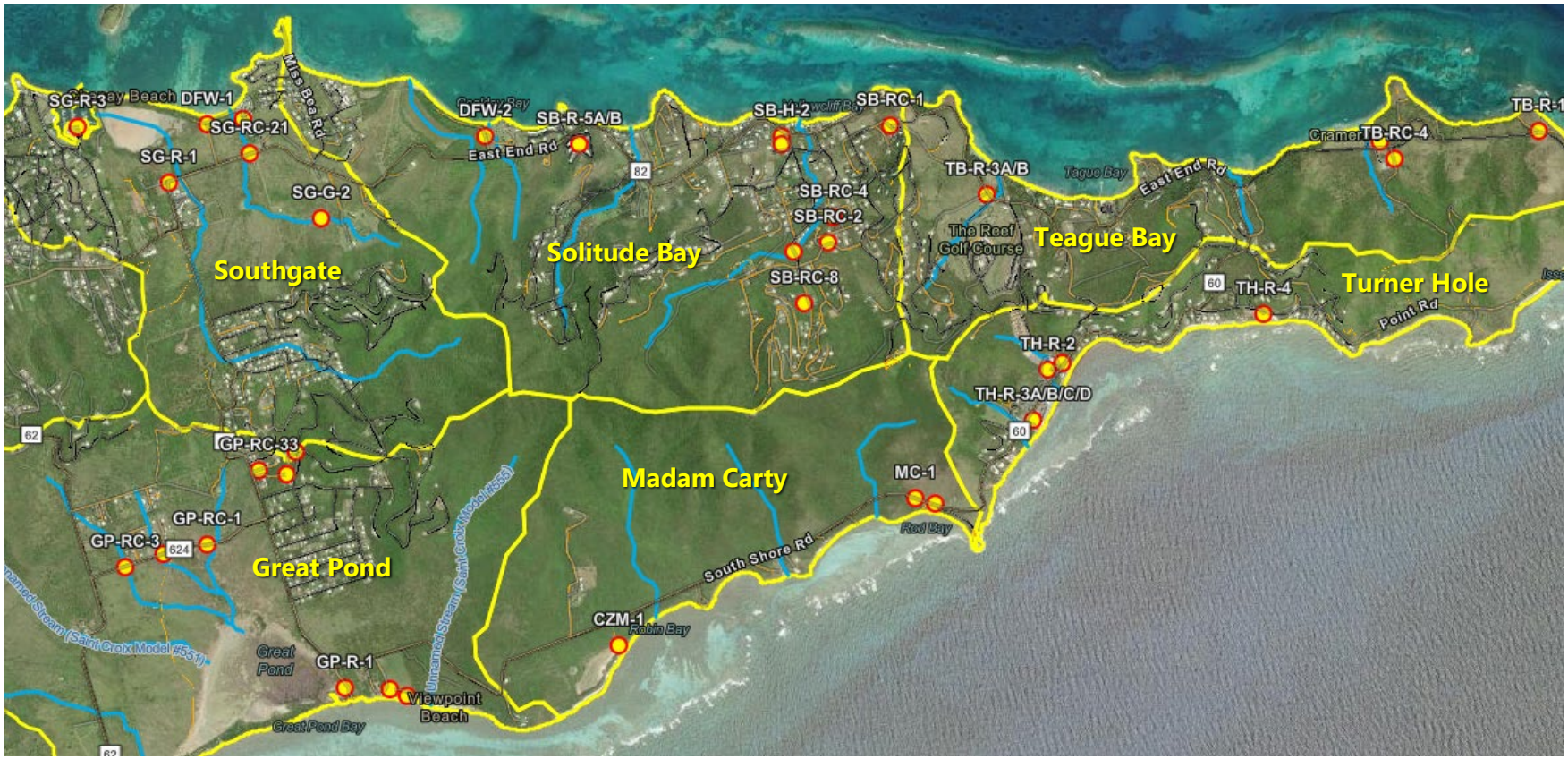

Figure 7. Screen shot of ESRI online mapper showing location of the 2023 Restoration Priorities.

5-YR IMPLEMENTATION STRATEGY

Table 3 summarizes a proposed strategy for implementing 2-3 LBSP management projects in 2023-2025 using $388,000 of NOAA CRCP funds that are currently in hand. These projects are primarily related to reducing erosion and sedimentation from unpaved roads in Teague and Solitude Bay watersheds where sensitive marine species are present, where coral restoration activities are concentrated, and where stakeholders have rallied around potential watershed restoration projects of interest.

Table 3. Implementation Plan for LBSP Activities

Activity	Partners	Funding (in hand)	Action Cost Estimate (thousands of $)		
			2023-2024	2025-2026	2027-2028
1. Implementation oversight and grant writing team	DPNR (Parks, DEP, CZM); TNC; HW	$10k (NOAA CRCP FY 23)	Apply for funding for LBSP projects (see Table 4) $10,000		Revisit implementation strategy
2. Boiler Bay (TB-R-1) parking lot and trailhead stabilization	DPNR Territorial Parks & CZM, NOAA	$188,000 (NOAA CRCP FYI 22)	Design & Permits $25,000 Construction $153,000 Community engagement $10,000	Inspection and maintenance follow up with owners	
3. Goat Hill Rd TB-RC-4 stabilization & revegetation;	TNC, NOAA	$95k (NOAA CRCP FY 23)	Goat Hill Rd. Design/Permitting $20,000	Goat Hill permitting and construction. $60,000 (cost share with TNC to free up funds for other road segments) Unpaved Road Training and Education $15,000	Inspection and maintenance follow up with owners
4. Unpaved_road inventory (30 miles); update Hope and Carton plan and other unpaved road concepts; including off road	VICS, HW, NOAA	$105k in hand (NOAA CRCP FY 23) VICS Residential Retrofit Program ($5,000)	Inventory of unpaved road condition across STXEE; planning for Hope & Carton/ Yellow Cliffs $30,000	Revegetate off-road scars $15,000 Design and permitting for 2-3 road projects (TBD) $60,000	Construction ($250,000 in additional funds needed from NOAA CRCP FY24)
Total		$388,000	$238,000	$140,000	($250,000)

There are several new federal grant opportunities available this fall and early 2024 that could be pursued for supporting unpaved road stabilization, green infrastructure, and other improvements related to climate change, underserved communities, and recreation and beach access. The VI is well positioned to go after these opportunities, including:

- **Coastal Habitat Restoration and Resilience Grants for Tribes and Underserved Communities, Under the BIL and IRA** - this competition will provide nearly $45M for projects that will advance the coastal habitat restoration and climate resilience priorities of tribes and underserved communities, including through capacity building and science support. Proposals can request between $75K - $3M. The competition closes December 19th.
- **Transformational Habitat Restoration and Coastal Resilience -** this competition will provide nearly $240M to prioritized high-value, high-impact habitat restoration projects that advance resilience. The competition closes November 17th. Applicants can request between $1M - $25M.
- **Restoring Fish Passage through Barrier Removal Grants Under the BIL and IRA -** this national fish passage competition will provide nearly $175M to fish barrier removal projects for native migratory fish. The competition closes October 16th. Applicants can request $1M - $20M.
- **NOAA Climate Resilience Regional Challenge**—provides Approximately $575 million is available for projects that build the resilience of coastal communities to extreme weather (e.g., hurricanes and storm surge) and other impacts of climate change, including sea level rise and drought. Funding was made possible by the Inflation Reduction Act, a historic, federal government-wide investment that is advancing NOAA's efforts to build Climate-Ready Coasts. The USVI has submitted a letter of intent through DPNR Territorial Parks, but it is unlikely that sites in the STXEEMP are on the targeted project list currently. Full proposals are due February, 13, 2024.

There are also the more typical funding sources that are posted annually, including but not limited to:

- EPA Non-Point Source program planning and implementation grants,
- NPS LWCF outdoor recreation grants,
- NRCS support programs for farms through EQIP and other mechanisms
- NFWF coastal resiliency planning and implementation grants,
- FEMA HMGPs for flood mitigation projects.

Table 4 includes a secondary list of implementation priorities that assume grant awards or leveraging of currently funded initiatives through DPNR CZM and DFW to advance design efforts.

Table 4. Projects in need of funding

Activity	Partners	Funding	Action Cost Estimate (thousands of $)		
			2023-2024	2025-2026	2027-2028
4. Great Pond culverts and gut flow restoration; parking lot retrofits; habitat restoration; land acquisition, multipurpose path	DPW, CZM, DFW, DPNR Parks, VI Trail Alliance	CZM funding for charette (in hand); DFW bird habitat project (in hand); DPW capital improvement budget; NOAA Challenge grant or transformational habitat grant (TBD)	Planning (includes research) & Design. $500,000 (portion in hand)	Land acquisition (TBD, $Ms) Permitting various elements $100,000	Construction (TBD, $Ms))
5. Southgate or Coakley access road retrofit	SEA, DFW, CZM	DFW bird habitat project (in hand); NFWF or LWCF grants	Planning and Design $25,000 (potentially in hand)	Permitting $10,000 Construction (TBD, $200,000)	Construction (TBD, $200,000)
6. Green Cay Gut Restoration	Owner, NRCS	USDA, DOI, or EPA Grants	Planning and fund raising	Design & Permitting	Construction

Activity	Partners	Funding	Action Cost Estimate (thousands of $)		
			2023-2024	2025-2026	2027-2028
			$25,000	$50,000	(TBD, $500,000)
7. Private commercial sites such as Divi, Chenay Bay, Reef Golf Course, GrapeTree, Green Cay Marina	Owners, DPNR DEP, CZM	EPA Non-Point Source, NFWF, or other Green Infrastructure grants through FEMA	Planning and fundraising with interested partners $10,000	Design and Permitting $50,000	Construction (TBD)
Total			$560,000	$400k (excludes land acquisition)	$700k-$5M