Programmatic Environmental Assessment

U.S. Virgin Islands–Stormwater Improvement Projects

St. Croix, St. Thomas, and St. John

January 2025

U.S. Department of Homeland Security
Federal Emergency Management Agency Region 2
26 Federal Plaza, NY, NY 10278

TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

LIST OF ABBREVIATIONS AND ACRONYMS

ACHP	Advisory Council of Historic Preservation
ADA	Americans with Disabilities Act
APE	Area of Potential Effects
BFE	Base Flood Elevation
BMP	Best Management Practice
CAA	Clean Air Act
CATEX	Categorical Exclusion
CBRA	Coastal Barrier Resources Act
CBRS	Coastal Barrier Resources System
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CLWUP	Comprehensive Land and Water Use Plan
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Plan
DFW	Department of Planning and Natural Resources: Division of Fish and Wildlife
DHS	U.S. Department of Homeland Security
DNL	Day-night-average sound level
DOH	Department of Health
DPNR	Department of Planning and Natural Resources
DPW	Department of Public Works
EA	Environmental Assessment
EFH	Essential Fish Habitat
EFLHD	Eastern Federal Lands Highway Division
EIS	Environmental Impact Statement
EMS	Emergency Medical Services
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act

FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FHWA-PR/USVI	Federal Highway Administration Puerto Rico and U.S. Virgin Islands Division
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
GHG	Greenhouse Gas
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
IPAC	Information for Planning and Consultation
LWC	Low-Water Crossing
MBTA	Migratory Bird Treaty Act
MOA	Memorandum and Agreement
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSD	Marine Safety Detachment
MSE	Mechanically Stabilized Earth
NAAQS	National Ambient Air Quality Standards
NEHA	National Environmental Health Association
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollution Discharge Elimination System
NPS	National Park Service
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
OSHA	Occupational Safety and Health Administration
PA	Public Assistance
PEA	Programmatic Environmental Assessment
PSD	Prevention of Significant Deterioration

RCRA	Resource Conservation and Recovery Act
REC	Record of Environmental Consideration
ROI	Region of Influence
ROW	Right-of-Way
RSS	Reinforced Soil Slopes
SEA	Supplemental Environmental Assessment
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SOW	Scope of Work
SWPPP	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
TPDES	Territorial Pollutant Discharge Elimination System
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USVI	U.S. Virgin Islands
V.I.C.	Virgin Islands Code
VIEMS	Office of Emergency Medical Services
VIPA	Virgin Islands Port Authority
VISHPO	Virgin Islands State Historic Preservation Office
VITEMA	Virgin Islands Territorial Emergency Management Agency
VITRAN	Virgin Islands Public Transit System
VIWMA	Virgin Islands Waste Management Authority
WAPA	Virgin Islands Water and Power Authority
WOTUS	Waters of the United States
°F	degrees Fahrenheit

1.0 INTRODUCTION

The Federal Emergency Management Agency (FEMA) makes federal assistance available to State, Local, Tribal, and Territorial governments, and certain private nonprofit entities under the Public Assistance (PA) and Hazard Mitigation Assistance (HMA) Programs. In September 2017, hurricanes Irma and Maria caused significant damage to the U.S. Virgin Islands (USVI). President Donald Trump issued one disaster declaration (DR-4335-VI) for Irma on September 7 and another one (DR-4340-VI) for Maria on September 20, both of which encompassed the entire Territory. The declarations authorized federal assistance to affected communities and certain nonprofit organizations under the PA and HMA Programs in accordance with the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1974 (42 United States Code [U.S.C.] Part 5172), as amended.

The mission of FEMA is to help people before, during, and after disasters. FEMA programs work to reduce the loss of life and property and protect institutions from all hazards by leading and supporting the nation in a comprehensive, risk-based emergency management program of mitigation, preparedness, response, and recovery. FEMA's Hazard Mitigation Grant Program (HMGP) fosters the protection of health, safety, and welfare of citizens; assists communities in mitigating damages caused by disasters; and reduces future losses resulting from natural disasters. The mission of FEMA's PA Program is to provide assistance to State, Territorial, Tribal, and local governments, and certain types of private nonprofit organizations, so that communities can quickly respond to and recover from major disasters or emergencies declared by the President.

This Programmatic Environmental Assessment (PEA) is prepared in accordance with Section 102 of the National Environmental Policy Act (NEPA) of 1969, as amended; the Regulations for Implementation of the National Environmental Policy Act (40 Code of Federal Regulations [CFR] §§ 1500–1508); the Council on Environmental Quality (CEQ) regulations implementing NEPA (50 CFR §§ 1500–1508); the U.S. Department of Homeland Security (DHS) Instruction Manual 023-01-001-01, Revision 01, *Implementation of the National Environmental Policy Act*; FEMA Directive 108-1: *Environmental Planning and Historic Preservation Responsibilities and Program Requirements*; and FEMA Instruction 108-1-1: *Instruction on Implementation of the Environmental Planning and Historic Preservation Responsibilities and Program Requirements.* The Virgin Islands Territorial Emergency Management Agency (VITEMA) is FEMA's grant recipient, and multiple agencies may be subrecipients for specific projects.

FEMA is aware of the November 12, 2024, decision in Marin Audubon Society v. Federal Aviation Administration, No. 23-1067 (D.C. Cir. Nov. 12, 2024). To the extent that a court may conclude that the CEQ regulations implementing NEPA are not judicially enforceable or binding on this agency action, FEMA has nonetheless elected to follow those regulations at 40 CFR Parts 1500–1508, in addition to DHS and FEMA's procedures implementing NEPA found in DHS Directive 023-01-01, DHS Instruction 023-01-001-01, FEMA Directive 108-1, and FEMA Instruction 108-1-1to meet the agency's obligations under NEPA, 42 U.S.C. §§ 4321 et seq.

1.1 Use of This Programmatic Environmental Assessment

This PEA facilitates compliance with NEPA for FEMA-funded actions that include stormwater and drainage improvements projects in the USVI, regardless of the FEMA funding program. This PEA streamlines the review of proposed stormwater infrastructure projects that exceed existing thresholds in FEMA's categorical exclusion (CATEX). This PEA may be used in conjunction with other CATEX for projects where other elements of the project scope meet CATEX thresholds, conditions, and requirements. This PEA can be applied to qualifying projects under any PA and HMA (disaster and pre-disaster) Programs in USVI throughout the active term of the PEA.

Regulations 40 CFR §§ 1500–1508 encourage the development of program-level NEPA documents and tiering to eliminate repetitive discussions and to focus on the issues specific to the proposed action. The analysis presented in this PEA does not address individual site-specific impacts or impacts arising from other unconsidered elements of a proposed scope of work (SOW). FEMA will prepare a Record of Environmental Consideration (REC) for each proposed action that may be tiered off this PEA. The REC will refer to the PEA in its analysis, address site-specific conditions, evaluate impacts relating to other project components, and document compliance with applicable environmental and historic preservation laws.

If a project is consistent with the scope, impacts, and mitigation described in the PEA, then FEMA will only prepare a REC. If the project is consistent with the scope described in this PEA but creates impacts not described herein; creates impacts greater in magnitude, extent, or duration than described herein; or requires mitigation measures to minimize impacts that have not been described in this PEA, then FEMA will prepare an Environmental Assessment (EA) tiered from this PEA. "Thresholds for Preparing a Tiered EA" in Section 9 of this PEA summarizes resource-specific thresholds and triggers for tiering. The tiered EA will contain an appropriate level of analysis to determine the significance of impacts that exceed those described in this PEA. After a public notice and 30-day comment period, FEMA will determine whether to issue a Finding of No Significant Impact (FONSI) or to prepare an Environmental Impact Statement (EIS) for the specific action. Projects that are materially inconsistent with the actions evaluated in this PEA may require a project-specific EIS, a stand-alone project-specific EA, or a tiered EA.

2.0 PURPOSE AND NEED

The purpose of the proposed activities evaluated in this PEA is to mitigate future rain and storm surge-induced flood hazards by increasing the resiliency and functionality of stormwater management systems along roadways to allow for safe public transit, promoting consistently reliable access to emergency services (e.g., police and fire protection services) by various actions including stabilizing and elevating roadways to reduce the frequency and intensity of roadway flooding, and protecting structures and property through the more efficient collection and conveyance of stormwater. The proposed activities are needed because roadways within the USVI have a history of flooding during storm events, causing them to become impassible and thus inhibiting access to emergency services and exposing the public to undue hardship and health risks. Similarly, rain-induced landslides have generated debris and excessive sediment that have blocked roads and, in some instances, threatened the foundations of residential homes. This PEA is further needed to complete review of multiple current and future FEMA-funded projects to improve stormwater management and conveyance along roadways within the USVI.

3.0 BACKGROUND

The USVI comprises three main islands: St. Croix, St. Thomas, and St. John (in the Lesser Antilles and dozens of other surrounding minor islands and cays) (**Appendix A, Figure 1 through Figure 3**). St. Croix, the largest of the three islands, is approximately 28 miles long and 7 miles at its widest point and is home to an estimated 56,200 people. St. Thomas supports a population of approximately 54,000 people and is approximately 14 miles long and 3 miles at its widest point. The smallest island, St. John, is approximately 9 miles long and 5 miles wide and supports a population of approximately 4,400.[1] There are more than 350 miles of roads across all three islands, many of which exist within or connect to infrastructure within the 100-year floodplain.[2, 3] Although some of the minor islands and cays have been developed, such as Water Island, most of them are undeveloped and do not feature roadways or other infrastructure.

Historically, hurricanes have been the primary natural hazard affecting USVI.[4] All three islands are susceptible to rain-induced flooding resulting from tropical storms and hurricanes that occur primarily during the summer months. Climate change has caused the intensity of tropical storms and hurricanes within the USVI to increase over the past 20 years.[5] Most recently, in 2017, Hurricane Maria (Category 5) brought catastrophic rainstorms and extremely strong winds to the USVI, causing record-breaking flooding throughout all three islands. Strong floodwaters eroded and undermined many areas within the USVI, resulting in significant damage to roadways and associated infrastructure servicing neighborhoods. Although saturated and damaged, the roadways were then subject to high levels of traffic from emergency vehicles that were traveling to various locations to implement emergency repairs of other infrastructure. Many of these roadways could not withstand the heavy traffic and were irreparably damaged or destroyed by the flooding and associated response activities. In addition to damage caused by oversaturation, many roadways were damaged, destroyed, or put out of service from rain-induced landslides following major hurricane or tropical storm events. Presently, U.S. Virgin Islands Department of Public Works (USVI DPW) has submitted 13 PA projects and 34 HMGP projects that meet these parameters.

Climate change and the continuous development of water-resistant surfaces are expected to perpetuate the occurrence of inland flooding and associated roadway damage. Precipitation from heavy rainstorms has increased by 33 percent since 1958 in nearby Puerto Rico, and similar trends

---

[1] USVI Department of Tourism. 2024. Accessed April 3, 2024, https://dot.vi.gov/our-islands/general-information/.

[2] USVI DPW. 2023. Department of Public Works, USVI Home Page. Accessed April 4, 2024, https://dpw.vi.gov/.

[3] Resilient Virgin Islands. 2024. Hazard Mitigation and Resilience Plan: Riverine Flooding in the U.S. Virgin Islands. Accessed April 4, 2024, https://resilientvi.org/.

[4] Beck, N. 2023. History of Hazards in the USVI. *Caribbean Green Technology Center.* Accessed April 4, 2024, https://cgtc-usvi.org/blog/history-of-hazards-in-the-usvi.

[5] EPA. 2016. What Climate Change Means for the U.S. Virgin Islands. Accessed April 4, 2024, https://19january2017snapshot.epa.gov/sites/production/files/2016-11/documents/climate-change-usvi.pdf.

have been recorded in the USVI.[6] [7] Although future changes regarding total precipitation in the USVI are uncertain, extreme precipitation and the associated intensity and frequency of flooding are expected to increase.[8] Increased development of water-resistant surfaces has reduced the availability of permeable surfaces that direct water into the ground, thus resulting in the accumulation and slow drainage of storm runoff in low-lying areas.[9] [10] Therefore, the risk of rain-induced flooding in the USVI is expected to continue to increase if left unmitigated.

[6] EPA. 2016. What Climate Change Means for the U.S. Virgin Islands. Accessed April 4, 2024, https://19january2017snapshot.epa.gov/sites/production/files/2016-11/documents/climate-change-usvi.pdf.

[7] U.S. National Weather Service. 2020. "PR and USVI Normals". Accessed November 21, 2024, https://www.weather.gov/sju/climo_pr_usvi_normals.

[8] Runkle, J., K.E. Kunkel, L.E. Stevens, S.M. Champion, D.R. Easterling, A. Terando, L. Sun, B.C. Stewart, G. Landers, and S. Rayne. 2022. *Puerto Rico and the U.S. Virgin Islands State Climate Summary 2022*. NOAA Technical Report NEDIS 150-PR. NOAA/NESDIS, Silver Spring, MD, 5pp.

[9] Resilient Virgin Islands. 2024. Hazard Mitigation and Resilience Plan: Riverine Flooding in the U.S. Virgin Islands. Accessed April 4, 2024, https://resilientvi.org/.

[10] EPA. 2016. What Climate Change Means for the U.S. Virgin Islands. Accessed April 4, 2024, https://19january2017snapshot.epa.gov/sites/production/files/2016-11/documents/climate-change-usvi.pdf.

4.0 ALTERNATIVES

In accordance with 40 CFR 1502.14, this section evaluates a range of reasonable alternatives that meet the purpose and need for the proposed project. Also known as the "Future Without Federal Project Condition," a No Action alternative is included in the analysis. The No Action alternative and feasible action alternatives that would satisfy the purpose and need are discussed. The range of reasonable alternatives represents classes of actions that a subrecipient may implement individually or collectively. A single proposed action is not specified in this document because not all alternatives would be reasonable at all project locations.

4.1 Alternative 1: No Action

Under the **No Action** alternative, no federal action by the lead agency (FEMA) would be taken to fund or implement the proposed activities evaluated in this PEA. Routine maintenance and infrastructure improvements undertaken by USVI DPW or other local agencies would still occur as necessary under the **No Action** alternative. Thus, there could be a range of possible outcomes if FEMA funding is not provided, depending on the amount of available alternative funding and other funding distribution priorities. Because of the broad range of communities and conditions within the USVI, it is impossible to predict how each community's actions would unfold, the time frames in which they would be implemented, and the standards to which they would be completed. Therefore, to provide a consistent basis for comparison to the alternatives evaluated, it is considered for the basis of analysis that damaged facilities would either remain in a state of disrepair (i.e., they would not be repaired or replaced) or that stormwater mitigation projects would be implemented via improvised efforts that may not include suitable engineering or a focus on long-term resilience and hazard mitigation. As a result, this PEA considers that existing and failing stormwater management and drainage structures would be incapable of reducing and/or conveying stormwaters. Thus, rain-induced flooding would continue to adversely affect transportation within some portions of the USVI and thereby pose related public health hazards and safety risks.

4.2 Alternative 2: Repair, Replace, and Construct New Roadways and Related Infrastructure

Alternative 2 would use FEMA-provided funds to repair, replace, or improve roadways and associated infrastructure and utilities subject to rain-induced flooding. Proposed activities generally fall into two categories: (1) strengthening and resurfacing damaged roadways or (2) constructing low-water crossings (LWCs).

Typical work associated with these projects may include completing Phase I planning activities, such as conducting hydrological analyses, creating project designs that meet the U.S. Department of Transportation's Federal Highway Administration's (FHWA's) standards and other applicable construction codes and standards, and designing mitigation measures and best management practices (BMPs). Typical work may also include installing temporary traffic control measures (e.g., concrete barriers, alternating traffic signals, flaggers, and detours), removing existing asphalt

pavement and/or milling existing asphalt pavement, excavating the existing road base, grading, removing vegetation, and laying new asphalt pavement.

Projects under **Alternative 2** may require coordination with the USVI DPW and both the FHWA Puerto Rico and USVI Division (FHWA-PR/USVI) and the Department of Transportation FHWA Eastern Federal Lands Highway Division (EFLHD), in accordance with the Memorandum and Agreement (MOA) between these agencies for engineering and construction services for Federal-Aid Highway and Bridge Projects on the Islands of St. Thomas, St. Croix, St. John, and Water Island.[11] Should project work affect roadside utilities such as electrical lines, coordination with the appropriate utility company would be required.

4.2.1 Strengthening and Resurfacing Roadways

Proposed activities in this category include strengthening pavement and resurfacing roadways. Strengthening the pavement would generally be accomplished by removing the existing pavement down to the subbase, which would require ground disturbance up to 1 foot deep; replacing existing unpaved roads with flexible asphalt pavement; and adding geotextile fabric beneath the subbase. Geotextile fabric is permanent industrial fabric that prevents fine subgrade soils from mixing with the engineered aggregate support layer, which can strengthen roadways by preventing early deterioration.[12] Resurfacing damaged roadways would involve restoring only the surface of the pavement (generally the top 2 inches) to improve the road texture, profile, and/or skid resistance by milling the existing road surface and laying new asphalt on top of the existing roadway. Construction equipment to strengthen or resurface roadways includes both diesel- and/or gasoline-powered, tracked, and wheeled heavy equipment (approximately less than 30 tons), including excavators, dozers, graders, rollers, asphalt mixers, compactors, skid steer loaders, backhoes, boring machines, drill rigs, dump trucks, and support equipment (e.g., compressors and towed generators).

Removing segments of roadways to strengthen them may also require the removal and reinstallation/relocation of other existing infrastructure, such as storm drains, sidewalks, and streetlights. Coordination with USVI DPW and electrical companies may be required if the proposed road work affects utility infrastructure. Vegetation removal may also be required. Additionally, as described in Section 4.2, implementation of these projects would require temporary traffic controls such as signs, traffic cones and drums, and detours. Improvements to stormwater management and drainage infrastructure to reduce the damaging effect of saturated subgrade soils on road stability may accompany pavement-strengthening and roadway-resurfacing

[11] USVI Office of the Governor. 2013. MOA between the Government of the Virgin Islands Department of Public Works, and the Department of Transportation – Federal Highway Administration Puerto Rico and Eastern Federal Lands Highway Division. Agreement No. DTFH71-13-X-50049. August 12, 2013.

[12] Geosynthetic Materials Association. 2016. Geotextiles Enhance Road Performance. Accessed March 12, 2024, https://geosynthetics.textiles.org/wp-content/uploads/sites/10/2016/06/geotextiles_road_performance.pdf.

activities. Section 4.3 describes proposed project activities associated with roadside drainage structures and stormwater management systems in more detail.

4.2.2 Constructing Low-Water Crossings

LWCs are stream-crossing structures designed to be inundated by high stream flows. When LWCs are inundated, the roadway must close and alternative routes must be used; however, these structures are generally inexpensive to construct and useful to allow vehicular travel across seasonal streams and ghuts, especially along rural roadways that are not regularly used.[13] Types of LWCs that may be constructed under **Alternative 2** include concrete-slab fords, precast concrete planks, cable concrete blocks, or other concrete construction types.[14] Construction means and methods would be finalized following Phase I planning and design work. Heavy equipment and concrete mixers (approximately less than 35 tons) would likely be required to construct LWCs. Work associated with this project type would be conducted only during the dry season or when precipitation and subsequent stormwater runoff are not forecast.

4.3 Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

Alternative 3 would use FEMA-provided funds to improve, replace, and construct new roadside drainage structures and stormwater management systems to mitigate rain-induced flood hazards along roadways. Proposed activities are generally categorized as one of the following:

- Repairing, upsizing, or constructing new roadside culverts
- Repairing, upsizing, or constructing new roadside and under-road drainage features
- Repairing, upsizing, or constructing new underground stormwater lines and maintenance holes
- Upsizing or constructing new detention areas, catch basins, and retention ponds

Typical activities associated with these projects include removing any existing infrastructure that would be replaced or modified, installing and maintaining soil and sediment control measures as required, installing and removing temporary traffic control measures, installing new infrastructure, replanting and restoring disturbed areas as necessary, and reconstructing or repairing roadways as required. Projects implemented under **Alternative 3** may require hydraulic/hydrologic analyses to evaluate potential changes to upstream and downstream flow rates and to determine whether additional action components are needed to address any changes in hydraulics and hydrology

[13] Gautam, S., and R. Bhattarai. 2018. "Low-Water Crossings: An Overview of Designs Implemented along Rural, Low-Volume Roads." *Environments*, 2018, 5, 22. doi:10.3390/environments5020022.

[14] U.S. Forest Service. 2006. Low-Water Crossings: Geomorphic, Biological, and Engineering Design Considerations. "Chapter 5: Low-Water Crossing Types: Pros, Cons, Idiosyncrasies, and Anecdotes." Accessed March 19, 2024, https://www.fs.usda.gov/eng/pubs/pdf/LowWaterCrossings/.

outside of the project area. As with **Alternative 2**, coordination with utility companies may be required. Any excavated materials/debris would be disposed of in accordance with applicable federal, state, and local regulations. Projects under **Alternative 3** may require in-water work; for these projects, the subrecipient would obtain any required local, state, and federal permits. Work would be conducted in compliance with the conditions in these permits. Projects under **Alternative 3** would require the use of heavy equipment (as defined in Section 4.2.1).

4.3.1 Repairing, Upsizing, or Constructing New Roadside Culverts

Culverts are structures that convey water beneath or along roadways or other types of infrastructure. Culverts are typically constructed from corrugated metal pipes, reinforced concrete pipes, reinforced box culverts, or other materials. Three-sided box culverts or half-moon pipes may be used to allow for more natural stream bed conditions to carry through into the constructed culverts. Under this alternative, existing culverts would be replaced to repair damage caused from previous storms and flooding events or to increase the capacity of the culvert to reduce the risk of erosion or roadway overtopping from future flooding in the surrounding area. Project activities associated with the repair, upsizing, or installation of new culverts (up to 80 feet long) may include conducting preliminary inventories and analyses of existing culverts within the project area, developing design plans, excavating trenches to remove existing culverts and/or install new culverts, and constructing the designed infrastructure. Activities covered by this alternative may also including adding features (e.g., headwalls, discharge aprons, riprap) to reduce the risk of erosion or damage to a culvert via scour. All work performed under this alternative would comply with all applicable FHWA and American Association of State Highway and Transportation Officials standards and requirements. The repairs, upsizing, and construction work will necessitate the use of heavy equipment (as previously described).

4.3.2 Repairing, Upsizing, or Constructing New Roadside Drainage Features

Roadside drainage features—including natural swales, earthen channels, French drains, and paved waterways—would be repaired, upsized, or constructed to reduce flood hazards along roadways. New drainage features would be constructed within and around flood-prone areas to convey stormwater flows. Existing channels and swales may be widened through excavation and grading to increase stormwater conveyance capacity. Existing or newly constructed channels and swales may be vegetated or armored with concrete or rock riprap to prevent erosion. Native species would be prioritized for planting.

Work on existing drainage features would be conducted to the extent possible from the top of the bank, minimizing in-water work as much as possible. However, owing to the nature of the proposed work under this alternative, many activities would require in-water work and the use of equipment within or directly adjacent to waterways. Generally, work on existing channels and swales would be conducted during the dry season, to the extent practicable. If necessary, pipes, secondary channels, turbidity curtains, and/or check dams would be used to divert water during

construction. In-water work would be conducted in accordance with applicable federal, state, and local regulations, and only after necessary permits are obtained.

Construction associated with new or existing drainage features may require excavation and vegetation removal to increase conveyance capacity. Vegetation would likely be removed by hand or with heavy equipment.

4.3.3 Repairing, Upsizing, or Constructing New Underground Stormwater Lines and Maintenance Holes

Underground stormwater conveyance infrastructure and associated maintenance holes would be repaired, upsized, or constructed to restore infrastructure damaged by previous storms or to reduce the risk of future flooding by increasing stormwater conveyance capacity. Expected activities associated with these projects include conducting assessments of existing stormwater drainage systems and hydrologic and hydraulic studies within the project area, designing drainage system improvements, implementing point repairs or replacements of underground stormwater lines and maintenance holes, excavating and removing existing infrastructure, constructing new stormwater lines and maintenance holes, and reconstructing roadways following construction of stormwater infrastructure. Equipment required to perform these activities may include hand equipment (for saw cutting and breaking up damaged pavement), heavy equipment, and other machinery including, but not limited to, pipe pullers and pipelining machines.

4.3.4 Upsizing or Constructing New Detention and Retention Ponds

Detention ponds temporarily store stormwater runoff to reduce rain-induced flood risks. They are typically dry and only retain water during and immediately following precipitation events. Retention ponds store water year-round; stormwater collected in retention ponds generally dissipates slowly through evaporation, infiltration, or outlet pipes/channels. Water released through infiltration or outlet infrastructure is generally of higher quality than the water that entered the pond because pollutants and sediments were allowed to settle to the bottom of the pond before water was released from it. Under this alternative, both detention and retention ponds would be created or upsized to increase stormwater storage capacity and reduce the potential for roadway flooding. Stormwater chamber infiltration systems and associated inlet/outlet control structures, pump systems, check dams, and related infrastructure may also be installed under this alternative. Soil borings and other preliminary environmental studies may be required before conducting the work.

Implementation of projects under this alternative would generally require excavation and vegetation removal to create new ponds or enlarge existing ponds. Any excavated materials and organic debris would be disposed of in accordance with relevant federal, state, and local regulations. Following excavation, erosion control measures such as vegetation and/or rock riprap would be installed around the edges of detention/retention ponds. Native species would be prioritized for planting.

4.4 Alternative 4: Construct Slope Stabilization Systems

Alternative 4 would use FEMA-provided HMA and PA funds to implement actions to mitigate the risk of landslides and slope erosion resulting from stormwater runoff. Proposed projects generally include following:

- Constructing concrete, brick, or gabion retaining walls
- Constructing mechanically stabilized earth (MSE) walls and reinforced soil slopes (RSS)
- Implementing other slope stabilization systems

Typical work associated with these projects would include conducting slope and erosion rate analyses to identify areas needing slope stabilization activities and installing temporary traffic control measures (e.g., concrete barriers, alternating traffic signals, flaggers, and detours). Typical work world also include installing and maintaining soil erosion and sediment control measures as required, removing affected portions of the roadway, installing slope stabilization systems, and reconstructing the roadway following slope stabilization system installation. Like projects under **Alternative 2**, projects under **Alternative 4** may require coordination between the USVI DPW, FHWA-PR/USVI, and EFLHD, in accordance with the MOA.[15] Should project work affect roadside utilities such as electrical lines, coordination with the appropriate utility company would also be required. Projects under **Alternative 4** would require the use of heavy equipment (as defined in Section 4.2.1).

4.4.1 Constructing Concrete, Brick, or Gabion Retaining Walls

Alternative 4 covers projects that would construct retaining walls along roadways. Retaining walls prevent slope erosion, manage stormwater drainage, and protect downhill structures and property from landslides and flooding. Retaining walls constructed under **Alternative 4** could be made of rock or concrete (i.e., masonry) or gabion (i.e., wire cages filled with rock) and are expected to vary in height from 2 to 30 feet and in length from 20 to 2,300 feet. It is anticipated that retaining walls would be constructed according to the general design and construction details presented in **Appendix B, Illustrations 1 through 3** (i.e., drainage pipes would be installed to allow stormwater to flow downhill through the retaining wall). Drainage pipes would be placed at intervals no greater than 10 feet, and the drains on the uphill side of each retaining wall would be constructed of clean broken stone or gravel placed to allow free drainage. Geotextile fabric may also be placed around the perimeter of the drain to prevent fill from washing away. Construction activities that would be required to install retaining walls include earthen and rock excavation,

[15] USVI Office of the Governor. 2013. MOA between the Government of the Virgin Islands Department of Public Works, and the Department of Transportation – Federal Highway Administration Puerto Rico and Eastern Federal Lands Highway Division. Agreement No. DTFH71-13-X-50049. August 12, 2013.

demolition and reconstruction of roadway segments, and installation and maintenance of soil erosion and sediment control measures.

4.4.2 Constructing Mechanically Stabilized Earth Walls and Reinforced Soils Slopes

MSE walls are constructed by alternating layers of soil reinforcement elements and compacted backfill, fixed to wall facing, and finished by installing facing materials on the outer surface.[16] Soil reinforcement elements typically used in MSE walls are steel or geosynthetic strips or ladders. Generally considered to be cost-effective, MSE walls provide alternatives in areas where reinforced concrete or gravity-type walls have traditionally retained soil. MSE walls are flexible and capable of tolerating deformations because of poor subsoil foundation conditions. **Appendix B, Illustration 4** shows a basic illustration of an MSE wall cross section.

MSE walls require facing systems. The types of facing elements that can be used in different MSE walls improve the aesthetics of the wall, provide protection against backfill sloughing and erosion, and may provide drainage paths in certain cases. A variety of facing materials may be used to construct MSE walls, including segmental precast concrete panels, dry case modular block wall units, welded wire mesh, gabions, geosynthetic reinforcements, and vegetation.

RSS comprise a type of MSE wall that incorporates planar reinforcing elements (typically geosynthetics or soil nails) in constructed earth-sloped structures with face inclinations of less than 70 degrees. RSS are distinguished from MSE walls mostly by the slope of the face inclination; MSE walls typically have steeper inclines than 70 degrees. Additionally, RSS do not require a structural slope facing; they are often vegetated to blend in with natural environments.

The type and size of MSE wall or RSS would be determined following slope analyses in each project area and the development of detailed construction plans and material specifications. Construction activities associated with these project types are expected to include clearing vegetation and other debris, placing soil and reinforcements, constructing the facing system or planting vegetation on the outer surface of the MSE wall or RSS, and installing drainage features. Native species would be prioritized for planting to increase slope stability.

4.4.3 Implementing Other Slope Stabilization Systems

Soil stabilization methods include (1) installing geotextiles, which are permanent fabric materials that can reinforce, filter, separate, drain, and/or protect soils; (2) laying sod, which is composed of grass and a small part of the soil beneath it that is held together by the root system; (3) installing vegetation buffer strips, which are vegetated surfaces that slow stormwater velocities flowing from adjacent surfaces, filter out sediment and other pollutants, and provide some infiltration into underlying soil;[17] (4) preserving mature vegetation, the root systems of which assist in reducing

[16] Reinforced Earth. 2024. Mechanically Stabilized Earth (MSE) Retaining Walls. Accessed March 11, 2024, https://reinforcedearth.com/products/retaining-walls/mechanically-stabilized-earth-mse-retaining-walls/.

[17] EPA. 2021. Stormwater Best Management Practice: Vegetated Filter Strip. Accessed March 12, 2024, https://www.epa.gov/system/files/documents/2021-11/bmp-vegetated-filter-strip.pdf.

the potential for soil movement and erosion; and (5) slope armoring or installing riprap or welded wire mesh facing to reduce the potential for soil movement and erosion. These soil stabilization methods may involve construction activities such as clearing vegetation, using heavy equipment to install geotextiles or other facing materials, and planting vegetation. Native species would be prioritized for planting to increase slope stability.

Other slope stabilization methods that may be used include (1) decreasing slope angles by adding or removing fill; (2) soil nailing, which involves excavating soil in small-diameter holes, inserting tension-resisting steel bars to create a gravity retaining wall, installing a drainage system on the exposed face, and then installing a wall facing;[18] and (3) rock anchoring, which is like soil nailing except it involves installing steel bars or other anchors directly into stable rock instead of soil to stabilize a slope.

4.5 Alternative 5: Combination of the Action Alternatives

This alternative includes some combination of **Alternatives 2 through 4**, as described in Section 4.2 through Section 4.4. Under this alternative, FEMA and the subrecipient would determine which activities described in those sections should be implemented at a given project site to yield the safest, most comprehensive, and cost-effective flood mitigation solution. For example, a segment of roadway that has been damaged from periodic rain-induced flooding within the study area may be repaired or replaced (**Alternative 2**) and may also require slope stabilization activities (**Alternative 4**) to provide the most comprehensive flood hazard mitigation solution. This alternative would provide the subrecipient with the greatest flexibility to mitigate flood hazards along roadways within the USVI.

4.6 Summary of Alternatives

The PEA considers the following alternatives:

1) **Alternative 1**: No Action
2) **Alternative 2**: Repair, Replace, and Construct New Roadways and Related Infrastructure
3) **Alternative 3**: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems
4) **Alternative 4**: Construct Slope Stabilization Systems
5) **Alternative 5**: Combination of the Action Alternatives

The following sections discuss the potential environmental impacts and proposed mitigation measures associated with the **No Action** alternative and the feasible action alternatives. When possible, FEMA considers quantitative information to establish potential impacts; the potential qualitative impacts are evaluated based on the criteria listed in **Table 5.1**.

[18] Keller Group. 2024. Soil Nailing. Accessed March 12, 2024, https://www.keller-na.com/expertise/techniques/soil-nailing.

5.0 AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

This section discusses the potential impacts of the **No Action** alternative and the feasible action alternatives on environmental resources. When possible, FEMA considers quantitative information to establish potential impacts. FEMA also evaluates the potential qualitative impacts based on the criteria listed in **Table 5.1**, and Section 5.21 discusses the potential cumulative environmental impacts.

Table 5.1 Impact Significance and Context Evaluation Criteria for Potential Impacts

Impact Scale	Criteria
No Impact	The resource area would not be affected and there would be no impact.
Negligible	The resource area would not be affected, or changes or benefits would be either nondetectable or, if detected, would have impacts that would be slight and local. Impacts would be well below regulatory standards, as applicable.
Minor	Changes to the resource would be measurable, but the changes would be small and localized. Adverse impacts would be within or below regulatory standards, as applicable. Mitigation measures would be implemented, as necessary, to reduce the potential for adverse impacts.
Moderate	Changes to the resource would be measurable and have either localized or regional scale impacts. Adverse impacts would be within or below regulatory standards, but historical conditions would be altered on a short-term basis. Mitigation measures would be necessary, and the measures would reduce any potential adverse impacts.
Major	Changes to the resource would be readily measurable and would have substantial consequences on regional levels. Adverse impacts would exceed regulatory standards. Mitigation measures to offset the adverse impacts would be required to reduce impacts, though long-term changes to the resource would be expected.

NEPA defines “effects” or “impacts” as “changes to the human environment from the proposed action or alternatives that are reasonably foreseeable” (40 CFR 1508.1 [g]). The action causes direct effects when they occur at the same time and place. The action causes indirect effects when the result is manifested later in time or further away from the action.

Cumulative effects result from incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions. They can be individually minor but collectively significant over time.

The terminology used in the analysis will include the impact scale terms indicated in **Table 5.1** and will determine whether the impact will be temporary, short-term, or long-term, as defined in **Table 5.2**.

Table 5.2 NEPA Time Scale

Terminology	Definition
Temporary	Impacts and recovery occur only during the construction period.
Short-Term	Impacts and recovery occur during a limited, predictable amount of time up to three years.
Long-Term	Impacts and recovery occur over time longer than three years but into a reasonably foreseeable future.

FEMA is omitting the following three environmental resource topics because they do not require a detailed analysis or they do not apply to the project as covered by this EA (**Table 5.3**).

Table 5.3 Eliminated Resource Topics

Topic	Reason
Bald and Golden Eagle Protection Act	Bald and Golden Eagles are not found in the USVI.[19]
Sole Source Aquifers (Safe Drinking Water Act)	There are no aquifers being used as a sole source of drinking water in the USVI.[20]
National Wild and Scenic River System	There are no designated wild and scenic rivers in the USVI.

5.1 Geology, Topography, and Soils

5.1.1 Existing Conditions

The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey provides current classifications of soils. Soils in the project area were identified using the USDA NRCS Web Soil Survey.[21] Soils in the project area are primarily composed of Victory soils, formed in weathered volcanic and volcaniclastic rocks from the Cretaceous and Tertiary periods, along with some carbonates and near-surface intrusive rocks. These soils are

[19] U.S. Fish and Wildlife Service. 2024b. Information for Planning and Consultation. Accessed May 2, 2024, https://ipac.ecosphere.fws.gov/.

[20] EPA. 2024a. Sole Source Aquifers Mapper. Accessed May 15, 2024, https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=9ebb047ba3ec41ada1877155fe31356b.

[21] NRCS. 2024. Web Soil Survey. Accessed May 10, 2024, http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm.

found on volcanic hills and mountains and are mainly used for rangeland and pasture. The soil profile typically includes a topsoil of brown loam and a subsoil of various shades of brown loam to very gravelly loam.[22] Most of St. Thomas is urban, a large part of St. Croix is urban, and while the urban area of St. John is small, much of the remainder of the island is National Park Service (NPS) land (**Appendix A, Figure 4 through Figure 6**).

St. Croix is the largest island, with an area of 84 square miles, St. Thomas encompasses 32 square miles, and St. John is the smallest, at 19 square miles. Topography varies from shoreline to the highest mountainous peak existing in St. Thomas (Crown Mountain) at 1,555 feet above sea level. All three islands contain features such as ridges, mountain slopes, hillslopes, terraces, and alluvial fans. According to USDA NRCS soil survey data, bedrock is located between 10 and 80 inches at St. Croix, 10 to 20 inches at St. Thomas, and 10 to 40 inches at St. John (**Appendix A, Figure 7 through Figure 9**).

The USVI is in a seismically active area, with small, undetectable-to-most earthquakes (occurring often on land and in the surrounding ocean waters), with no recent associated tsunamis.[23] The islands are situated along the active plate boundaries between the North American plate and the northeast corner of the Caribbean plate, and the potential for larger, more disruptive seismic activity does exist.[24] It is difficult to fully understand the geology and to assess seismic and tsunami hazards because the active region is predominantly in the ocean depths surrounding the islands.

In accordance with Virgin Islands Code (V.I.C.) Title 12, Part 533 [2019], the Earth Change permitting program is the primary mechanism to locate and address all ground-disturbing activities territory-wide for residential and commercial development. The USVI Department of Planning and Natural Resources (DPNR) will require an Earth Change permit before any ground disturbance.

5.1.2 Potential Impacts and Proposed Mitigation

In the analysis that follows, actions were determined to have an impact on geology, topography, or soils if the action would (1) require ground disturbance associated with new construction, grading, and conversion of existing pervious area (well-drained soils) to impervious area (compacted soils or pavement) that leads to changes in topography and potential alteration of stormwater flow; (2) have the potential for excavation of soils at depth; (3) have the potential to

[22] Ibid.

[23] USGS. 2018. Caribbean Tsunami and Earthquake Hazards Studies. Woods Hole Coastal and Marine Science Center. August 21. Accessed on June 11, 2024, https://www.usgs.gov/centers/whcmsc/science/caribbean-tsunami-and-earthquake-hazards-studies#overview.

[24] NPS. 2020. Geology: Transform Plate Boundaries. Robert J. Lillie, Emeritus Professor of Geosciences, Oregon State University. February 11. Accessed on June 11, 2024, https://www.nps.gov/subjects/geology/plate-tectonics-transform-plate-boundaries.htm.

convert prime farmland to nonfarm usage; or (4) cause erosion/sediment redistribution or increase the potential for erosion.

Alternative 1: No Action

Under the **No Action** alternative, FEMA would not undertake or fund any stormwater mitigation work. Therefore, there would be no short-term impacts from construction or other ground-disturbing activities.

In the absence of FEMA-funded stormwater mitigation, the risk of flooding and slope failures in the study area would not be mitigated. Although flooding is not expected to affect the geology or seismicity within the project areas, future flood events would continue to destabilize soils, causing erosion and minor changes in topography. If an area that has experienced soil erosion remains untreated, the size of the disturbed area could increase as storm events further erode the substrate. Although it may occur at a slower rate, and possibly not in the same locations, natural revegetation could minimize the long-term adverse impacts from eroding soil.[25] Therefore, the No Action alternative would have a minor-to-moderate, long-term adverse impact on soils and topography.

Alternative 2: Repair, Replace, and Construct New Roadway and Related Infrastructure

Projects under **Alternative 2** would require the use of heavy equipment during construction, which would compact soils in staging and work areas and subsequently result in small changes in topography, potentially altering stormwater flow within those areas. Should equipment be operated on unimproved surfaces, the potential for soil loss via dust or wind would increase. The potential for short-term impacts would be avoided or reduced by implementing the BMPs presented in Section 6 and adhering to permitting requirements under the National Pollution Discharge Elimination System (NPDES). The NPDES permit conditions require that a Stormwater Pollution Prevention Plan (SWPPP) be developed and implemented, that soil or debris stockpiles be managed, disturbance to erodible slopes be minimized, native topsoil be preserved, and soil compaction and erosion be reduced. Thus, with the implementation of these BMPs and adherence to an SWPPP, projects under **Alternative 2** would have negligible-to-minor, short-term adverse impacts on soils and topography. Although it is anticipated that the footprint of the **Alternative 2** roadway repair projects would remain largely within the previous right-of-way (ROW), projects requiring new roadway and LWC construction activities would result in permanent changes to topography from grading, permanent soil compaction, and the placement of concrete or pavement over previously pervious land. Therefore, **Alternative 2** could have long-term minor-to-moderate adverse impacts on soils and topography, depending on the size and number of new roadways and LWCs constructed.

[25] Furniss, M.J. 1989. Stabilization of Landslides for the Improvement of Aquatic Habitat. USDA Forest Service Gen. Tech. Rep. PSW-110.

Given the small percentage of soils that may qualify as prime or unique farmland within the study area, and the large percentage of that land that has been identified as an urban landscape, FEMA expects that there would be no impacts on prime or unique farmlands, both short- and long-term. If it is determined that a project would require permanent conversion of prime or unique farmland, FEMA would develop a supplemental EA to address the potential for impacts on prime or unique farmland. Additionally, FEMA would consult with the NRCS and incorporate any necessary mitigation measures applicable to the respective site before work.

There would be no impacts to geology or seismicity, either short- or long-term.

Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

Projects under **Alternative 3** would require grading and extensive excavation (to create drainage channels/swales, retention/detention basins, and install other stormwater management infrastructure). These ground-disturbing activities would increase the potential for erosion to occur during construction. Additionally, as described under **Alternative 2**, the use of heavy equipment would compact soils in staging and work areas and therefore result in small changes in topography, potentially altering stormwater flow within those areas. Should equipment be used on unimproved soils, the potential for soil loss via dust or wind would increase. The potential for short-term impacts would be avoided or reduced by implementing the BMPs presented in Section 6 and adhering to permitting requirements under the NPDES. The NPDES permit conditions require that an SWPPP be developed and implemented and that soil or debris stockpiles be managed, disturbance to erodible slopes be minimized, native topsoil be preserved, and soil compaction and erosion be reduced. Thus, with the implementation of these BMPs and adherence to an SWPPP, projects under **Alternative 2** would have negligible-to-minor, short-term adverse impacts on soils and topography.

Following construction, disturbed soils would be replanted using native plant species appropriate for roadside planting such as catch and keep (*Acacia retusa)* and hand leaf (*Anthurium cordatum*).[26] The installation of concrete channels or other impervious structures could have adverse impacts, as existing pervious surfaces would be replaced with impervious surfaces. Projects requiring in-water work, such as the installation of new culverts, detention areas, catch basins, retention ponds, and bioswales may require the removal of sediment from waterbodies. Although these adverse impacts may occur in localized areas within the study area, it is expected that the implementation of **Alternative 3** would reduce the risk of flooding throughout the study area, which would reduce the risk of erosion via floodwaters. Thus, activities under **Alternative 3** are expected to have negligible-to-minor, long-term beneficial impacts throughout the study area from reducing erosion.

[26] U.S. National Park Service. 2021. “Virgin Islands Native Plants”. Accessed November 21, 2024, https://www.nps.gov/viis/learn/nature/vi-native-plants.htm.

Given the small percentage of soils that may qualify as prime or unique farmland in the study area and the large percentage of that land that has been identified as an urban landscape, FEMA expects that there would be no impacts on prime or unique farmlands, both short- and long-term. If it is determined that a project would require permanent conversion of prime or unique farmland, FEMA would develop a supplemental EA to address the potential for impacts on prime or unique farmland. Additionally, FEMA would consult with the NRCS and incorporate any necessary mitigation measures applicable to the respective site before work.

There would be no impacts to geology or seismicity, either short or long-term.

Alternative 4: Construct Slope Stabilization Systems

Under **Alternative 4**, slope stabilization activities would require a wide range of ground-disturbing activities with heavy equipment, depending on the project type. Bioengineering and riprap placement projects are likely to be less invasive in the context of soil disturbance, whereas hard-engineered projects (i.e., the projects described in Section 4.4.2) are likely to require more ground disturbance and thus have a higher potential to impact soils and topography. Hard-engineered projects under **Alternative 4** would likely require the placement of concrete or another fill material over, above, and below an existing hazardous slope. Because of steep slopes and limited roadways, the process of accessing and remediating landslides may require additional ground disturbance outside existing ROWs and on either side of the current landslide face. The installation of site access and staging areas in locations where no previously disturbed lands occur would be limited to the most extent possible. However, if heavy machinery is operated on previously undisturbed soils, there is potential for erosion via dust or wind to occur. Additionally, heavy machinery used on undisturbed soils would compact soils, slightly changing a site's existing topography and altering stormwater drainage/flows. For projects equal to or over one acre, the NPDES program requires an NPDES permit and the development of SWPPP that would limit the impacts of erosion and sedimentation. Additionally, the conservation measures presented in Section 6.0 of this PEA would apply to all applicable projects. The implementation of slope stabilization techniques would result in short-term, negligible-to-minor adverse impacts, depending on the type of slope stabilization project.

The purpose of projects under **Alternative 4** is to reduce the risk of erosion and soil loss from slopes within the study area. This would be accomplished either through planting native vegetation to stabilize topsoil, placing riprap, or installing other erosion and sedimentation control systems. Therefore, projects under **Alternative 4** would have minor-to-moderate, long-term beneficial impacts on soils and topography.

Given the small percentage of soils that may qualify as prime or unique farmland in the study area and the large percentage of that land that has been identified as an urban landscape, FEMA expects that no impacts would occur upon prime or unique farmlands, both short- and long-term. Determining that a project would require permanent conversion of prime or unique farmland, FEMA would develop a supplemental EA to address the potential for impacts on prime or unique

farmland. Additionally, FEMA would consult with the NRCS and incorporate any necessary mitigation measures applicable to the respective site before work.

There would be no impacts to geology or seismicity, either short- or long-term.

Alternative 5: Combination of the Action Alternatives

Alternative 5 assumes that the subrecipient would execute part or all of the activities from **Alternative 2** through **Alternative 4**. The potential impacts of **Alternative 5** encapsulate the range of possible impacts that could result from **Alternative 2** through **Alternative 4**, which the preceding subsections evaluate. Based on the previous analysis, it is expected that the short-term adverse impacts of **Alternative 5** could range from negligible to moderate, depending on the extent of ground disturbance required. In the long term, **Alternative 5** is expected to have negligible-to-moderate beneficial impacts resulting from reduced erosion risks within the project areas.

As described in the preceding subsections, FEMA anticipates that no impacts on prime or unique farmland would occur. Should a project proposal require permanent conversion of prime or unique farmland, the federal funding agency will consult with the NRCS for any necessary mitigation measures applicable to the respective site and FEMA would develop a Supplemental Environmental Assessment (SEA) to address the potential impacts of the project on prime or unique farmland soils.

5.2 Air Quality

The Clean Air Act (CAA) of 1970 (42 U.S.C. 7401–7661 [2009]), as amended, is a comprehensive federal law that regulates air emissions from area, stationary, and mobile sources. The act authorized EPA to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment. The NAAQS include standards for six criteria air pollutants: lead, nitrogen dioxide, ozone, carbon monoxide, sulfur dioxide, and particulate matter (including both particulate matter less than 10 micrometers in diameter and fine particulate matter less than 2.5 micrometers in diameter). Areas where the monitored concentration of a criteria pollutant exceeds the applicable NAAQS are designated as being in nonattainment of the standards; while areas where the monitored concentration of a criteria pollutant is less than the standard are classified as in attainment.

Federally funded actions in nonattainment and maintenance areas are subject to EPA conformity regulations (40 CFR §§ 51 and 93), which ensure that emissions of air pollutants from planned federally funded actions would not affect the state's ability to meet the NAAQS. Section 176(c) of the CAA requires that federally funded actions conform to the purpose of the State Implementation Plan (SIP), meaning that federally funded activities would not cause any violations of the NAAQS, increase the frequency or severity of NAAQS violations, or delay timely attainment of the NAAQS or any interim milestone.

An EPA-approved SIP implements the USVI's air quality regulations and is located in the Virgin Islands Laws and Rules and Regulations on Air Pollution Control, Title 12, Chapter 9, Subchapters

201–204 and 206. The Air Pollution Control Program of the Division of Environmental Protection of the USVI DPNR manages the USVI air quality program.

Permitting for the CAA in the USVI is the shared responsibility of EPA Region 2 and the Air Pollution Control Program of the Division of Environmental Protection of the USVI DPNR. Region 2 EPA issues Prevention of Significant Deterioration (PSD) permits, and USVI DPNR issues all other permits for emissions.

In accordance with V.I.C. Title 12, Chapter 9, Part 206–220, any "building, erecting, altering or replacing any article, machine, equipment" that may cause air emissions must obtain an "Authority to Construct Permit" and a "permit to operate" before construction. An application form is located on the USVI DPNR website.[27]

The emissions from construction activities are subject to air conformity review, unless they are shown to be below the applicable de minimis levels.

5.2.1 Existing Conditions

EPA designates air quality for a geographic area as being in attainment or nonattainment. The EPA Green Book, last updated September 30, 2022, reports current nonattainment counties for all NAAQS priority pollutants. The Green Book only reports nonattainment areas; therefore, the list does not include attainment areas. The three islands of the USVI are not on the current list and are therefore attainment areas. General conformity and de minimis thresholds do not apply.[28]

5.2.2 Potential Impacts and Proposed Mitigation

In the analysis that follows, actions were determined to have an impact on air quality if the action would (1) increase criteria and noncriteria pollutants, (2) increase dust, or (3) create a new permanent source of air emissions.

Alternative 1: No Action

Under the **No Action** alternative, FEMA would not undertake or fund any stormwater mitigation work. Therefore, the No Action alterative would have no short-term impacts on air quality.

In the absence of FEMA-funded stormwater mitigation, the risk of flooding and slope failures in the study area would not be mitigated. The **No Action** alternative would not create a new permanent source of emissions. However, there may be a negligible-to-minor, adverse long-term impact on air quality because, by not improving roadways and flood hazard infrastructure, the

[27] USVI DPNR. 2024. Permits and Forms. Accessed on July 1, 2024, https://dpnr.vi.gov/.

[28] EPA. 2024b. "Green Book: Current Nonattainment Counties for All Criteria Pollutants." Accessed May 2024. www3.epa.gov/airquality/greenbook/ancl.html.

repeated use of fossil-fuel powered vehicles and backup generators (to respond to storm-related damage) would continue to release pollutants into the air periodically.[29]

Alternative 2: Repair, Replace, and Construct New Roadway and Related Infrastructure

Under **Alternative 2**, the construction and replacement of roadways and related infrastructure would require the use of heavy equipment to complete the associated projects. Emissions from construction vehicles, generators, and other equipment may temporarily increase the levels of some criteria and noncriteria pollutants within the project vicinity. Temporary ground-disturbing activities and off-road driving may result in the production of fugitive dust. Projects would incorporate the mitigation measures and BMPs listed in Section 6, as necessary; these include using only ultralow sulfur diesel fuel to power heavy equipment and implement dust control measures. Thus, with the implementation of mitigation measures and BMPs, short-term adverse impacts on air quality are not expected to exceed a minor level.

Alternative 2 would introduce new permanent sources of emissions. Therefore, projects under **Alternative 2** would not reduce flood damage or slope instability, future damage flood- and erosion-related damage may occur. However, because roadways would be repaired or replaced under this alternative, it is expected that these roadways would require less frequent repairs even after being subject to flooding or erosion. Thus, **Alternative 2** is expected to slightly reduce the frequency at which construction equipment would be used to repair damaged roadways. In this way, **Alternative 2** would have a negligible-to-minor, long-term beneficial impact on air quality.

Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

Under **Alternative 3**, construction activities would require the use of heavy construction equipment to complete the associated projects. Emissions from heavy equipment, generators, and other equipment may temporarily increase the levels of some criteria and noncriteria pollutants within the project vicinity. Temporary ground-disturbing activities and off-road driving may result in the production of fugitive dust, creating a short-term minor adverse impact that would cease with the conclusion of construction activities. Projects would incorporate the mitigation measures and BMPs listed in Section 6, as necessary; these include using only ultralow sulfur diesel fuel to power heavy equipment and implement dust control measures. Thus, with the implementation of mitigation measures and BMPs, short-term adverse impacts on air quality are not expected to exceed a minor level.

In the long term, projects under **Alternative 3** would reduce the risk of flooding within the project area. Thus, **Alternative 3** would have a negligible-to-minor, long-term beneficial impact on air

[29] International Finance Corporation. 2019. *The Dirty Footprint of the Broken Grid*. Accessed November 7, 2024, https://www.ifc.org/en/insights-reports/2010/dirty-footprint-of-broken-grid.

quality by reducing the need for increased vehicle and generator use after hurricanes and other storms with damaging floodwaters.

Alternative 4: Construct Slope Stabilization Systems

Under **Alternative 4**, construction activities would require the use of heavy construction equipment to complete the associated projects. Emissions from construction vehicles, generators, and other equipment may temporarily increase the levels of some criteria and noncriteria pollutants within the project vicinity. Temporary ground-disturbing activities and off-road driving may result in the production of fugitive dust, creating a short-term minor adverse impact that would cease with the conclusion of construction activities. Projects would incorporate the mitigation measures and BMPs listed in Section 6, as necessary; these include using only ultralow sulfur diesel fuel to power construction equipment and implement dust control measures. Thus, with the implementation of mitigation measures and BMPs, short-term adverse impacts on air quality are not expected to exceed a minor level.

In the long term, projects under **Alternative 4** would reduce the risk of slope failures and landslides within the study area. Thus, **Alternative 4** would have a negligible-to-minor, long-term beneficial impact on air quality by reducing the need for increased vehicle and generator used to repair damage after landslide events.

Alternative 5: Combination of the Action Alternatives

Alternative 5 assumes that the subrecipient would execute part or all of the activities described under **Alternative 2** through **Alternative 4**. The potential impacts of **Alternative 5** encapsulate the range of possible impacts that could result from **Alternative 2** through **Alternative 4**, which the preceding subsections evaluated. Based on the previous analysis, **Alternative 5** would result in minor short-term adverse impacts on air quality from the use of construction equipment. Because flood mitigation activities performed under **Alternative 2** through **Alternative 4** would reduce the need for future repair work along roadways, **Alternative 5** is expected to result in negligible-to-minor, long-term beneficial impacts.

5.3 Climate Change

Climate change refers to changes in Earth's climate caused by a general warming of the atmosphere. Its primary cause is emissions of greenhouse gases (GHGs), including carbon dioxide and methane. Climate change can affect species distribution, temperature fluctuations, and weather patterns.[30]

Executive Order (EO) 13990, Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis, directed federal agencies to review and address regulations that

[30] EPA. 2024d. Climate Change Indicators: Greenhouse Gases. Accessed November 3, 2024, https://www.epa.gov/climate-indicators/greenhouse-gases.

conflict with national objectives, such as reducing GHG emissions, strengthening climate resilience, and prioritizing environmental justice and public health. CEQ's NEPA Guidance on Consideration of Greenhouse Gas Emissions and Climate Change was published in the Federal Register on January 9, 2023. The new guidance provides best practices for climate change analyses, including actions such as considering GHG emissions and climate change impacts during the identification of alternatives, quantifying a proposed action's projected GHG emissions or reduction using the best available data, and providing social cost of GHG estimates to translate climate impacts into a more accessible metric of dollars. Social cost of GHG estimates represent the societal value or cost of GHG emissions changes resulting from actions that impact cumulative global emissions in a small or marginal way. For more than a decade, federal agencies have been applying the social cost of GHG metrics when estimating the impacts of their actions on the climate.[31]

5.3.1 Existing Conditions

USVI contains three major islands—St. Croix, St. Thomas, and St. John—in the Lesser Antilles within the Caribbean Sea (**Appendix A, Figure 1 through Figure 3**). St. Croix, the largest of the three islands, is home to an estimated 56,200 people. St. Thomas supports a population of approximately 54,000 people. The smallest island, St. John, supports a population of approximately 4,400.[32] There are more than 350 miles of roads throughout all three islands, much of which exist within or connect to infrastructure within the 100-year floodplain.[33] [34]

Presently, the USVI have an average temperature of approximately 83 degrees Fahrenheit (°F).[35] However, with the ongoing effects of climate change, surface temperatures within the lower atmosphere have increased by approximately 1°F in the past 50 years, with air temperatures projected to continue to increase.[36] Concurrently, since 1901, waters around the USVI have increased in temperature by nearly 2°F, on track to increase at a similar pace over the next century. At the same time, sea levels since 1901 have increased by about 1 inch every 10 years, with a rise of 1 to 3 feet in the next century also estimated.[37]

---

[31] Environmental and Energy Law Program. 2022. "Social Cost of Greenhouse Gas Estimates." Accessed on December 21, 2023. Available at: https://eelp.law.harvard.edu/2022/10/social-cost-of-greenhouse-gas-estimates/.

[32] USVI Department of Tourism. 2024. Accessed April 3, 2024, https://dot.vi.gov/our-islands/general-information/.

[33] USVI DPW. 2023. Department of Public Works, USVI Home Page. Accessed April 4, 2024, https://dpw.vi.gov/.

[34] Resilient Virgin Islands. 2024. Hazard Mitigation and Resilience Plan: Riverine Flooding in the U.S. Virgin Islands. Accessed April 4, 2024, https://resilientvi.org/.

[35] National Centers for Environmental Information. 2024. Official website. Past Weather. Accessed June 2024. https://www.ncei.noaa.gov/access/past-weather/USVI.

[36] EPA. 2016. What Climate Change Means for the U.S. Virgin Islands. Accessed April 4, 2024, https://19january2017snapshot.epa.gov/sites/production/files/2016-11/documents/climate-change-usvi.pdf.

[37] Ibid.

Historically, hurricanes have been the primary natural hazard affecting the USVI.[38] All three islands are susceptible to rain-induced flooding resulting from tropical storms and hurricanes that occur primarily during the summer months. Climate change has caused the intensity of tropical storms and hurricanes within the USVI to increase over the past 20 years.[39] Most recently, in 2017, Hurricane Maria (Category 5) brought catastrophic rainstorms and extremely strong winds to the USVI, causing record-breaking flooding throughout all three islands. Strong floodwaters eroded and undermined numerous large areas, resulting in significant damage to roadways and associated infrastructure servicing neighborhoods. Although saturated and damaged, the roadways were then subject to high levels of traffic from emergency vehicles that were traveling to various locations to implement emergency repairs of other infrastructure. Many of these roadways could not withstand the heavy traffic and were further damaged or even destroyed by the storm event and associated response activities. In addition to damage caused by oversaturation, many roadways were damaged, destroyed, or put out of service from rain-induced landslides following the hurricane.

Climate change and continued development of impervious surfaces are expected to increase the occurrence of inland flooding and associated roadway damage. Precipitation from heavy rainstorms has increased by 33 percent since 1958 in nearby Puerto Rico, and similar trends have been recorded in other Caribbean areas.[40] Increases in development and impervious surfaces have reduced the availability of surfaces that allow water to permeate into the ground, thus resulting in storm runoff that accumulates in low-lying areas and drains slowly.[41] [42] Therefore, the risk of rain-induced flooding in the USVI is expected to continue to increase if left unmitigated.

---

[38] Beck, N. 2023. History of Hazards in the USVI. *Caribbean Green Technology Center.* Accessed April 4, 2024, https://cgtc-usvi.org/blog/history-of-hazards-in-the-usvi.

[39] EPA. 2016. What Climate Change Means for the U.S. Virgin Islands. Accessed April 4, 2024, https://19january2017snapshot.epa.gov/sites/production/files/2016-11/documents/climate-change-usvi.pdf.

[40] EPA. 2016. What Climate Change Means for the U.S. Virgin Islands. Accessed April 4, 2024, https://19january2017snapshot.epa.gov/sites/production/files/2016-11/documents/climate-change-usvi.pdf.

[41] Resilient Virgin Islands. 2024. Hazard Mitigation and Resilience Plan: Riverine Flooding in the U.S. Virgin Islands. Accessed April 4, 2024, https://resilientvi.org/.

[42] EPA. 2016. What Climate Change Means for the U.S. Virgin Islands. Accessed April 4, 2024, https://19january2017snapshot.epa.gov/sites/production/files/2016-11/documents/climate-change-usvi.pdf.

5.3.2 Potential Impacts and Proposed Mitigation

In the analysis that follows, actions were determined to have an impact on climate if the action would (1) release GHGs or (2) introduce a new source of permanent GHG emissions.

Alternative 1: No Action

Under the **No Action** alternative, FEMA would not undertake or fund any stormwater mitigation projects. Therefore, the **No Action** alternative would have no short-term impacts on GHG emissions or climate.

In the absence of FEMA-funded mitigation, the risk of flooding and slope failure within the study area would not be reduced. Climate change could increase the potential for adverse flood-related impacts on people and property, depending on the extent of increased precipitation. Increased occurrences or severity of flood damages could result in the use of gas- or diesel-powered equipment for repair construction work or personal generators for many homes. However, these repair activities are not expected to increase GHG emissions to the extent that the regional climate would be affected. No permanent sources of GHG emissions would be created under this alternative. Thus, the **No Action** alternative could have negligible-to-minor, long-term adverse impacts from small periodic increases in GHG emissions resulting from ongoing infrastructure repairs.

Alternative 2: Repair, Replace, and Construct New Roadway and Related Infrastructure

Under **Alternative 2**, multiple forms of improvements would be made to existing roadways and related infrastructure, including strengthening and resurfacing roadways and constructing LWCs. The use of heavy equipment to construct these roadway improvements would incrementally increase the amount of GHG released into the atmosphere; therefore, activities under **Alternative 2** would have negligible short-term adverse impacts related to GHG emissions during construction.

Activities under **Alternative 2** would not create new long-term sources of GHG emissions. These activities would not increase or exacerbate climate impacts on people or property in the study area in the long term. Periodic flooding is still expected to occur in the study area and may increase in frequency and intensity because of climate change. However, projects under **Alternative 2** are expected to improve the quality of roadways, which would reduce the frequency at which construction equipment is needed to conduct roadway repairs in the future. Therefore, **Alternative 2** is expected to have negligible long-term beneficial impacts on climate by reducing the frequency at which GHGs are emitted.

Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

Under **Alternative 3**, construction efforts would take place, including the repairing, upsizing, or construction of new roadside culverts, drainage features, underground stormwater lines and

maintenance holes, and detention basins. The use of heavy equipment to construct these roadway improvements would incrementally increase the amount of GHG released into the atmosphere; therefore, activities under **Alternative 3** would have negligible short-term adverse impacts related to GHG emissions during construction.

All projects implemented under **Alternative 3** would aim to mitigate rain-induced flood hazards along roadways, which would reduce the need for future use of GHG-emitting equipment for repair activities following a disaster. Thus, projects under **Alternative 3** could have negligible long-term beneficial impacts related to reduced GHG emissions.

Alternative 4: Construct Slope Stabilization Systems

Alternative 4 would implement projects targeted toward mitigating the risk of landslides and slope erosion caused by stormwater runoff. The construction of projects under **Alternative 4** would require the use of heavy equipment; thus, projects under **Alternative 4** would have negligible short-term adverse impacts related to GHG emissions. Because projects under **Alternative 4** are expected to reduce the occurrence and severity of slope erosion events that could result in infrastructure damage, **Alternative 4** is expected to slightly reduce the need for heavy equipment to perform future roadway repairs. Thus, projects under **Alternative 4** could have negligible long-term beneficial impacts resulting from reduced GHG emissions.

Alternative 5: Combination of the Action Alternatives

Alternative 5 assumes that the subrecipient would execute part or all of the activities described under **Alternative 2** through **Alternative 4**. The potential impacts of **Alternative 5** encapsulate the range of possible impacts that could result from **Alternative 2** through **Alternative 4**, which are evaluated in the preceding subsections. Based on the previous analysis, it is expected that **Alternative 5** would result in negligible short-term adverse impacts related to GHG emissions from the use of construction equipment. However, the incremental increases in GHGs in the atmosphere caused by projects under **Alternative 5** would not result in local or regional climate effects. In the long term, projects under **Alternative 5** are expected to reduce the need for future repair work along roadways, resulting in negligible long-term beneficial impacts.

5.4 Water Quality

Congress enacted the Federal Water Pollution Control Act in 1948 which was later reorganized and expanded in 1972 and became known as the Clean Water Act (CWA) in 1977. The CWA regulates discharge of pollutants into water with sections falling under the jurisdiction of the U.S. Army Corps of Engineers (USACE) and EPA.

Section 401 of the CWA requires that a subrecipient for a federal license or permit provide a certification that any discharges from the facility would comply with the act, including state-established water quality standard requirements.

Section 402 of the CWA establishes the NPDES. The NPDES allows EPA to regulate both point (end of a factory pipe) and nonpoint (sheet flow fertilizer from farmlands) pollutant sources, including stormwater and stormwater runoff, requiring that an SWPPP be prepared. V.I.C. Title 12 requires stormwater permitting for construction activities under the Territorial Pollutant Discharge Elimination System (TPDES) program, construction general permit (Permit No. VIGSA0000). Discharges define the runoff as any pollutants into waters of the USVI from areas where ground-disturbing activities occurred, such as clearing, grading, or excavation.

Section 404 of the CWA establishes the USACE permit requirements for discharging dredged or fill materials into Waters of the United States (WOTUS) and traditional navigable waterways. Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. Part 401 et seq.) authorizes USACE regulation of construction activities in or near any navigable WOTUS.

Under the NPDES, EPA regulates both point and nonpoint pollutant sources, including stormwater and stormwater runoff.

Section 1424(e) of the Safe Drinking Water Act of 1974 [Public Law 93–523] authorizes EPA to designate an aquifer for special protection under the sole source aquifer program if the aquifer is the sole or principal drinking water source for an area and if its contamination would create a significant hazard to public health. The sole or principal source is defined as supplying 50 percent or more of the drinking water for a particular area. There are no sole source aquifers located in USVI.

5.4.1 Existing Conditions

The waters within the jurisdiction of the USVI include all harbors, bays, streams, lakes, ponds, reservoirs, marshes, channels, waterways, wells, springs, irrigation systems, drainage systems and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private, situated wholly or partly within or bordering upon USVI, including the territorial seas, contiguous zones, and oceans.[43]

There is an absence of large freshwater resources and perennial streams within the study area. Virtually all freshwater ponds within the USVI are relatively small and human-made.[44] Watershed management is based on natural or artificial channels and narrow coastal water bodies. Relatively small salt ponds are also scattered across the three main islands. Because of the impermeable underlying volcanic rocks, floodwaters accumulate and recede rapidly, generally in less than 1 day. During a year of average precipitation, annual runoff ranges from about 2 to 8 percent of the

[43] EPA. 2020. “The 2020 USVI Integrated Water Quality Monitoring & Assessment Report.” Accessed May 7, 2024, https://dpnr.vi.gov/wp-content/uploads/2022/10/2020-USVI-Integrated-Report-FINAL.pdf.

[44] USVI DPNR DFW. 2018b. United States Virgin Islands Wildlife Action Plan Volume 2: Habitats and Species. Accessed on May 13, 2024, https://dpnr.vi.gov/wp-content/uploads/2022/10/VI-WAP-Vol-2-Habitats-Species.pdf.

rainfall, which is about 0.5 to 2 inches, depending on conditions in a particular basin. Topography, soil moisture, local evaporation rates, and vegetation cover controls runoff.[45]

V.I.C. Title 29, Part 308 (2019) requires self-sustaining water supply systems that typically consist of a well or rainwater collection and a cistern. If a dwelling has access to the potable water system and the appropriate USVI Water and Power Authority (WAPA) officials verified it when service was installed, no cistern would be required.

Construction activities are an inherent source of potential nonpoint source pollution and erosion. Nonpoint source pollution is the major source of surface water contamination in the USVI because of improper erosion control and stormwater mitigation. Nonpoint source pollution sources diffuse in nature with two causes that should be addressed during the implementation of the proposed alternatives: (1) failure to properly install effective silt control devices during construction and (2) failure to contain stormwater runoff from unpaved roads.

The USVI DPNR ranked the waters on its 2020 303(d) list as high, medium, or low priority for improving water quality and identified total maximum daily loads (TMDLs) for that body of water. TMDLs are a calculation of the maximum amount of a pollutant that a water body can accept and still meet water quality standards for public health and healthy ecosystems. USVI DPNR developed USVI-specific TMDLs in accordance with the CWA for all the waters identified on their Section 303(d) list of impaired waters, according to their priority ranking on that list.[46]

5.4.2 Potential Impacts and Proposed Mitigation

In the analysis that follows, actions were determined to have an impact on water quality if the action would (1) increase the amount of impervious surface compared to existing conditions, (2) result in the discharge of pollutants, (3) increase the potential for sedimentation to occur within waterways, or (4) violate established federal, state, or local laws or regulations that currently protect and manage water quality.

Alternative 1: No Action

Under the **No Action** alternative, FEMA would not undertake or fund any stormwater mitigation projects; thus, no short-term impacts on water quality would occur.

In the absence of FEMA-funded stormwater mitigation, the risk of flooding and slope failures in the study area would not be mitigated. Because flood hazards would not be sufficiently mitigated under this alternative, floodwaters would continue to inundate roadways during large storm events, transporting pollutants from roadways into nearby waterways. Additionally, erosion would continue to occur unmitigated, resulting in subsequent sedimentation and damage to roadways and

[45] USGS. 1996. "U.S. Virgin Islands Wetland Resources, National Water Summary-Wetland Resources (p. 369-374)." D. Briane Adams, and John M. Hefner. Accessed May 1, 2024, https://pubs.usgs.gov/wsp/2425/report.pdf.

[46] USVI DPNR. 2020. "Fact Sheet on the U.S. Virgin Islands 2020 Impaired Waters List." Accessed May 1, 2024, https://www.epa.gov/sites/default/files/2021-01/documents/usvi_2020_ir_fact_sheet_final.pdf.

other facilities. The periodic use of vehicles and heavy equipment to repair damage caused by flooding and erosion could result in the inadvertent release of pollutants, which could be carried into nearby waterways via stormwater runoff. Therefore, the **No Action** alternative would have minor-to-moderate, long-term adverse impacts on water quality in the study area.

Alternative 2: Repair, Replace, and Construct New Roadway and Related Infrastructure

Under **Alternative 2**, surface-level ground disturbance is expected to occur from the use of construction equipment and vehicles on previously undisturbed soils and from grading actions. Thus, there is potential for adverse impacts on water quality to occur in the short term from construction-related erosion and subsequent sedimentation. Additionally, the use of heavy equipment and vehicles could result in the inadvertent release of pollutants, such as oils and lubricants, that could be carried into nearby waterways via stormwater runoff. To reduce the potential for impacts on water quality resulting from erosion and pollution, the subrecipient will implement erosion control measures by creating and adhering to an SWPPP, obtaining the applicable NPDES permits, and complying with all relevant local regulations to reduce the risk of hazardous leaks and spills, as detailed in Section 6. The construction of new LWCs or other work within seasonal ghuts would be conducted during the dry season to reduce the potential for impacts on water quality. With the implementation of these measures, projects under **Alternative 2** are expected to have negligible-to-minor, short-term adverse impacts on water quality.

Although it is expected that many projects under **Alternative 2** would consist only of repairing or resurfacing existing roads, it is possible that existing roads could be widened or new LWCs could be constructed. Thus, there is potential for impacts to occur resulting from the conversion of existing pervious landscape to impervious hardscape through the introduction of water-resistant material, such as asphalt and concrete. However, only a small percentage of the available pervious landscape is expected to be impacted by projects under **Alternative 2**. Therefore, **Alternative 2** would have negligible-to-minor, long-term adverse impacts on water quality.

Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

Projects under **Alternative 3** (such as excavation to create new detention basins) are expected to require extensive ground disturbance; therefore, projects under **Alternative 3** could result in construction-related erosion and sedimentation. Additionally, the use of heavy equipment and vehicles could result in the inadvertent release of pollutants, such as oils and lubricants, that could be carried into nearby waterways via stormwater runoff. Some projects under **Alternative 3**, such as the installation or repair of culverts and other stormwater management systems, may require work within ghuts or other waterbodies. Work would be conducted during the dry season to the greatest extent practicable; however, there is the potential for in-water work to be required. Before construction, the subrecipient would coordinate with USACE and USVI DPNR to obtain any required CWA permits. The potential for erosion and sedimentation would be minimized by

following all conditions prescribed by required CWA or NPDES permits and by adhering to an SWPPP. Thus, projects under **Alternative 3** would have minor-to-moderate, short-term adverse impacts on water quality within portions of the study area because of construction-related erosion.

Projects under **Alternative 3** would install erosion control measures along the periphery of newly created structures, as necessary, which would include vegetation, concrete, or stone riprap. Additionally, stormwater retention basins created under this alternative would provide long-term stormwater filtration by allowing pollutants and sediments to settle at the bottom of the basins before water is released. Vegetated channels and swales created under this alternative may filter out pollutants and sediments from stormwater, which could improve water quality. **Alternative 3** is expected to reduce the occurrence of roadway flooding in some portions of the study area, which would reduce the amount of pollutants and sediments that would be transported into nearby waterways via stormwater runoff. Thus, projects under **Alternative 3** would have minor-to-moderate, long-term beneficial impacts on water quality.

Alternative 4: Construct Slope Stabilization Systems

Under **Alternative 4**, ground disturbance is expected to occur from the use of heavy equipment and vehicles on previously undisturbed soils and from grading actions. Projects under **Alternative 4** may also require fill materials to be transported and placed at the project site. Thus, there is potential for adverse impacts on water quality to occur in the short term from construction-related erosion and subsequent sedimentation. Additionally, the use of construction equipment and vehicles could result in the inadvertent release of pollutants such as oils and lubricants that could be carried into nearby waterways via stormwater runoff. To reduce the potential for impacts on water quality resulting from erosion and pollution, the subrecipient will implement erosion control measures by creating and adhering to an SWPPP, obtaining the applicable NPDES permits, and complying with all relevant local regulations to reduce the risk of hazardous leaks and spills, as detailed in Section 6. No in-water work is expected to occur under **Alternative 4**. Thus, projects under **Alternative 4** are expected to have negligible-to-minor, short-term adverse impacts on water quality.

The purpose of projects under **Alternative 4** is to reduce slope erosion in the long term. Slope stabilization infrastructure under **Alternative 4** would be designed and constructed in a manner that would increase slope stability and thereby reduce the potential for erosion and subsequent sedimentation. Thus, projects under **Alternative 4** would produce minor-to-moderate, long-term beneficial impacts on water quality within portions of the project area, as erosion-related soil runoff resulting from stormwater would be substantially mitigated.

Alternative 5: Combination of the Action Alternatives

Alternative 5 assumes that the subrecipient would execute part or all of the activities described under **Alternative 2** through **Alternative 4**. The potential impacts of **Alternative 5** encapsulate the range of possible impacts that could result from **Alternative 2** through **Alternative 4**, which

are evaluated in the preceding subsections. Based on the previous analysis, **Alternative 5** would result in negligible-to-moderate, short-term adverse impacts on water quality from construction-related erosion and sedimentation. Construction work would adhere to an SWPPP and any applicable permit conditions. In the long term, work associated with **Alternative 2** alone is expected to have negligible-to-minor adverse impacts. However, since these **Alternative 2** projects would be paired with projects under **Alternative 3** or **Alternative 4**, **Alternative 5** is expected to have minor-to-moderate, long-term beneficial impacts from a reduction in pollutants and sediments being transported into waterways via stormwater runoff.

5.5 Wetlands

EO 11990 Wetlands Management requires federal agencies to avoid funding activities that directly or indirectly support occupancy, modification, or development of wetlands whenever there are practicable alternatives, and it requires the proposed action to include all practicable measures to minimize harm to wetlands that may result. FEMA uses the eight-step decision-making process to evaluate potential effects on, and mitigate impacts to, wetlands and floodplains, in compliance with EO 11990 and EO 11988. FEMA's regulations for conducting the eight-step decision-making process are in 44 CFR § 9.

USACE, through its permit program, regulates the discharge of dredged or fill material into WOTUS, including wetlands, pursuant to Part 404 of the CWA or Section 10 of the Rivers and Harbors Act (33 U.S.C. 403). In addition, EPA has regulatory oversight of the USACE permit program, allowing the agency, under Section 404C, to veto USACE-issued permits where there are unacceptable environmental impacts. In addition, 33 CFR Section 328.3 provides a definition of WOTUS that includes a broad scope of surface waters. WOTUS currently includes categorically jurisdictional waters, and certain waters that may be jurisdictional WOTUS if they can be shown on a case-by-case basis to exhibit a "significant nexus" with a "traditionally navigable water."

The USVI DPNR defines a wetland as "an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands in the USVI generally include watercourses, marshes, swamps, artificial ponds and impoundment, salt ponds, lagoons, shallow seagrass beds, and other similar areas."[47] Many WOTUS in the USVI are unvegetated and thus are excluded from the USACE/EPA definition of wetlands, although they may still be subject to CWA regulation.

5.5.1 Existing Conditions

FEMA uses the National Wetlands Inventory (NWI), state-specific mapping tools, and on-site surveys to identify wetlands. According to the USFWS NWI, the USVI are surrounded by more

[47] USVI DPNR. 2010. "Wetlands of the U.S. Virgin Islands." Accessed June 2022, https://www.ncei.noaa.gov/data/oceans/coris/library/NOAA/CRCP/other/other_crcp_publications/Watershed_USVI/steer_exisiting_studies/USVIWetlandsdraft2.pdf.

than 370,000 acres of estuarine and marine deep-water wetland habitat. Closer to the shoreline, areas of subtidal marine habitats (characterized by an aquatic bed with a large array of vascular plant species) are mapped by NWI. This includes habitats dominated by plants that grow principally on or below the surface of the water for most of the growing season in most years. Rooted vascular species may occur at all depths of the photic zone, commonly called grass flats. Significant portions of coastal wetland habitat also include coral reefs.

Other coastal and inland aquatic environments include emergent and forested/shrub freshwater wetland habitats, riverine, lacustrine, and other aquatic habitats. Areas of forested wetland are also mapped by NWI, characterized by woody vegetation, such as red mangroves *(Rhizophora mangle)*.

Wetlands in the USVI occupy less than 3 percent of the land area (**Appendix A**, **Figure 10 through Figure 12**). The following are the types of wetlands systems that occur in the USVI:

- Inland, containing ocean-derived salts in concentrations of less than 0.05 percent and nontidal situated on a river or riverbank
- Coastal, containing water that is more salty than fresh with one or more rivers or streams flowing into it, with a free connection to the open sea
- Saltwater wetlands exposed to waves, currents, and tides in an oceanic setting, with coral reefs, sea grass, and/or kelps

Because of steep terrain, small drainage areas, and limited rainfall, freshwater wetlands and deep-water habitats are scarce on the USVI. Most streams on the islands last for a very short time; therefore, wetlands located near or on riverbanks appear as channels of streams, typically flowing during the wet season.

The USFWS NWI indicates that most of the USVI mapped wetlands for St. Croix, St. John, and St. Thomas are located in one of three environments: (1) where fresh water meets saltwater, (2) marine and ocean deep water, or (3) freshwater emergent, which is where plants grow in standing water or in areas that experience periodic standing water.[48] **Appendix A**, **Figure 10 through Figure 12,** presents maps of wetlands within the study area.

5.5.2 Potential Impacts and Proposed Mitigation

In the analysis that follows, actions were determined to have an impact on wetlands if the action would (1) reduce wetland water or vegetative quality, (2) require construction or fill within a wetland, (3) increase the potential for sedimentation to occur within wetlands, or (4) violate established federal, state, or local laws or regulations that currently protect and manage wetlands.

For projects that have the potential to impact wetlands, FEMA would conduct the eight-step decision-making process before funding a project. This process requires that FEMA consider how its actions affect a floodplain and/or wetlands to comply with relevant EOs. In addition, before the

[48] U.S. Fish and Wildlife Service. 2024a. National Wetlands Inventory. Accessed July 3, 2024, https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/.

start of construction, the subrecipient would verify and mark the boundaries of wetland areas to be preserved; no disturbance would occur within these areas.

Alternative 1: No Action

Under the **No Action** alternative, FEMA would not undertake or fund any stormwater mitigation projects. Therefore, the **No Action** alternative would have no short-term impacts on wetlands.

Because flood hazards would not be sufficiently mitigated under this alternative, slope erosion and deterioration of roadway infrastructure would continue to occur because of stormwater damage. The periodic use of vehicles and heavy equipment to repair damage caused by flooding and slope failure could result in the inadvertent release of pollutants, which could be carried into nearby wetlands via stormwater runoff. Continued slope erosion could result in sedimentation within nearby wetlands. Therefore, the **No Action** alternative would have minor-to-moderate, long-term adverse impacts on wetlands in the study area.

Alternative 2: Repair, Replace, and Construct New Roadway and Related Infrastructure

Projects under **Alternative 2** have the potential to impact wetlands if they occur within the vicinity of a wetland habitat. All work areas would be investigated for wetlands before the onset of construction, and formal wetland delineations would be conducted if there is potential for wetlands to be present in the project area. It is likely that most roadway repair/replacement projects would occur within existing road footprints/ROWs, which are unlikely to support wetlands. However, conducting ground-disturbing work outside of wetlands could still result in construction-related erosion and subsequent sedimentation into nearby wetlands, if any are present. USVI DPNR specifies that any activity that may affect wetlands or alter surface water flows may be subject to Section 404 of the CWA. Thus, if a project has the potential to impact wetlands, FEMA and the subrecipient would obtain any necessary CWA permits. Project activities would adhere to any conditions in the CWA permits, SWPPP, and any NPDES permit conditions. Thus, activities under **Alternative 2** are expected to have negligible-to-minor, short-term adverse impacts on wetlands.

Projects that would create new roadways or widen existing roads could infringe on existing wetland habitat. Additionally, projects to construct new LWCs are likely to occur within or near existing wetlands. Therefore, FEMA and the subrecipient would obtain any necessary CWA permits for all project activities that occur near any wetland. FEMA would complete the eight-step decision-making process to evaluate any potential impacts on wetlands.

Following the construction of projects under **Alternative 2**, the frequency of roadway flooding is expected to remain the same as under the **No Action** alternative. Therefore, impacts on wetlands resulting from the transportation of pollutants and sediments from roadways into nearby wetlands via stormwater would continue to occur. Long-term adverse impacts could also occur if wetland vegetation were to be cleared or if any wetland were to be permanently filled to facilitate LWC construction. Therefore, projects under **Alternative 2** would have negligible-to-minor, long-term adverse impacts on wetlands within portions of the study area.

Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

All work areas would be investigated for wetlands before beginning construction, and formal wetland delineations would be conducted if there is potential for wetlands to be present in the project area. Wetlands are likely to be found in areas where drainage is already occurring or where stormwater is currently collecting, which are likely to be the areas in which projects under **Alternative 3** would occur. If wetlands occur within a project area, excavation/vegetation removal could result in an impact, depending on the extent of activities proposed to occur in specific project areas. If a project has the potential to impact wetlands, FEMA and the subrecipient would obtain any necessary CWA permits. Project activities would adhere to any conditions in the CWA permits and an SWPPP and any NPDES permit conditions. Thus, activities under **Alternative 3** are expected to have minor-to-moderate, short-term adverse impacts on wetlands.

The installation or modification of existing detention and retention ponds may overlap with existing wetland areas. There is potential for newly constructed detention/retention ponds to inadvertently reduce the amount of water occurring in downstream wetlands; however, conducting hydraulic/hydrologic analyses during the project planning/design stage would allow subrecipients to determine if redirecting water to a detention pond would have negative impacts on existing wetlands. Based on the results of these hydraulic/hydrologic analyses and FEMA's eight-step decision-making process, the subrecipient could determine a better location for detention/retention ponds, if necessary, or implement additional mitigation measures to reduce adverse impacts on existing wetlands.

Because newly constructed detention/retention ponds would be intended to store water year-round, wetlands may form within or near these constructed ponds. Projects under **Alternative 3** would include revegetation with native plant species, as necessary, which may encourage the formation of more stable, higher quality wetland habitats. Additionally, the implementation of **Alternative 3** would reduce the risk of flooding in the study area, which would reduce the potential for pollutants and sediments to be transported into nearby wetlands via floodwaters. Therefore, projects under this alternative are expected to have a minor-to-moderate, long-term beneficial impact related to the creation of new wetlands.

Alternative 4: Construct Slope Stabilization Systems

All work areas would be investigated for wetlands before beginning construction, and formal wetland delineations would be conducted if there is potential for wetlands to be present in the project area. Because projects under **Alternative 4** would occur on or near steep slopes, the project areas are unlikely to support wetlands; however, conducting ground-disturbing work outside of wetlands could still result in construction-related erosion and subsequent sedimentation into nearby wetlands, if any are present. It is also possible that areas at the base of a slope may support drainages/wetlands, in which case staging and access areas may occur within wetlands. If a project has the potential to impact wetlands, FEMA and the subrecipient would obtain any necessary CWA

permits. Project activities would adhere to any conditions in the CWA permits and an SWPPP and any NPDES permit conditions. Thus, activities under **Alternative 4** are expected to have negligible-to-minor, short-term adverse impacts on wetlands.

Because activities under **Alternative 4** would occur on slopes, which are unlikely to support wetlands, projects under **Alternative 4** are unlikely to permanently alter wetlands. In the long term, slope stabilization activities are expected to reduce or prevent future slope erosion and the associated sedimentation into wetlands during future rain events. Therefore, **Alternative 4** would have minor-to-moderate, long-term beneficial impacts on wetlands in portions of the study area, depending on the magnitude and location of activities.

Alternative 5: Combination of the Action Alternatives

Alternative 5 assumes that the subrecipient would execute part or all of the activities described under **Alternative 2** through **Alternative 4**. The potential impacts of **Alternative 5** encapsulate the range of possible impacts that could result from **Alternative 2** through **Alternative 4**, which are evaluated in the preceding subsections. Based on the previous analysis, **Alternative 5** would result in negligible-to-moderate, short-term adverse impacts on wetlands from construction-related erosion and sedimentation into wetlands. Construction work would adhere to an SWPPP and any applicable permit conditions. In the long term, **Alternative 5** is expected to have negligible-to-moderate, long-term beneficial impacts resulting from a reduction in pollutants and sediments being transported into wetlands via stormwater runoff.

5.6 Floodplains

EO 11988, Floodplain Management, requires that a federal agency avoid direct or indirect support of development within the floodplain whenever there is a practicable alternative. FEMA uses Flood Insurance Rate Maps to identify the floodplains for the National Flood Insurance Program. Federal actions within the 100-year floodplain require the federal agency to conduct an eight-step decision-making process. This process, like NEPA, requires the evaluation of alternatives before finding the action. FEMA's regulations on conducting the eight-step decision-making process are contained in 44 CFR § 9.

A floodway is the area of the floodplain where floodwater usually flows faster and deeper. The 1-percent floodplain is the minimal area for floodplain impact evaluation. FEMA defines a 1-percent-annual-chance floodplain, known as the 100-year floodplain, as an area subject to an overabundance of water from a flood that has a 1-percent chance of being equaled or exceeded in a given year. This area defined in flood maps is also known as the special flood hazard area. The elevation of surface water resulting from a flood that has a 1-perent chance of equaling or exceeding that level in any given year is known as the base flood elevation (BFE).

The USVI Division of Building Permits is responsible for enforcing the Virgin Islands Building Code and the floodplain management regulations in V.I.C. Title 3, Section 22. The floodplain management regulations comprise a combination of the USVI DPNR February 2021 amended

Flood Damage Prevention Regulations–Rules and Regulations and the flood provisions of the USVI Building Code. The floodplain management regulations and building code apply to all proposed developments in established flood hazard areas. The USVI Building Code V.I.C. Title 29, Section 5 includes certain provisions that apply to the design and construction of structures in flood hazard areas.

5.6.1 Existing Conditions

As mapped by FEMA in February 2022, the USVI contains zones VE, AE, A, AO, X (**Appendix A, Figure 13 through Figure 15**). Zone VE is mapped primarily along the shorelines, and Zone A (with or without elevation) is mapped primarily inland. Any new construction and substantial improvements in the V-Zone requires structure elevation on pilings, posts, piers, or columns so that the bottom of the lowest horizontal structural member of the lowest floor (including pilings or columns), is level with or above the BFE. This protects new, substantially improved, or substantially damaged buildings from damage by the base flood.

5.6.2 Potential Impacts and Proposed Mitigation

In the analysis that follows, actions were determined to have an impact on floodplains if the action would (1) decrease the natural value and quality of floodplain functions, including water quality, vegetative quality, and floodplain capacity; (2) require construction or fill within a floodplain; (3) increase the potential for sedimentation to occur within floodplains; or (4) violate established federal, state, or local laws or regulations that currently protect and manage floodplains.

For projects that have the potential to impact floodplains, FEMA would conduct the eight-step decision-making process before funding a project. This process requires that FEMA consider how its actions affect a floodplain and/or wetlands to comply with relevant EOs.

Alternative 1: No Action

Under the **No Action** alternative, FEMA would not undertake or fund any stormwater mitigation projects; therefore, no short-term impacts within the floodplain would occur.

In the long term, roadways would continue to be vulnerable to rain-induced flooding in the absence of stormwater management actions. Stormwater passing over inundated roadways would continue to transport pollutants and sediments into waterways and the surrounding floodplain areas, altering the natural value and function of floodplains by reducing water quality. Therefore, there would be a minor, long-term adverse impact from uncontrolled stormwater runoff in floodplain areas.

Alternative 2: Repair, Replace, and Construct New Roadway and Related Infrastructure

Work to repair or replace existing roadways or construct new roadways and LWCs would require surface-level ground disturbance and the use of heavy equipment, which could cause soil and pollutants to be released into the floodplain if the activities were to occur within or near a floodplain. However, these impacts would be minimized to the greatest extent possible by adhering to all relevant permit conditions and implementing erosion and sediment control BMPs.

Furthermore, the subrecipient would be required to comply with local floodplain and floodway regulations, including coordination with their local floodplain manager, to reduce impacts on floodplains to the greatest extent possible. Therefore, work under **Alternative 2** would have negligible-to-minor, short-term adverse impacts on floodplains in portions of the study area.

Although most of work anticipated under **Alternative 2** is expected to occur within existing roadways, the construction of new LWCs or widening of existing roadways could require the new impervious surface being placed within the floodplain. This would permanently alter the natural value and function of the floodplain by increasing the flow velocity in nearby streams and reducing the capacity of the floodplain to filter out pollutants and sediments before reaching streams or other waterbodies. Therefore, projects under **Alternative 2** are expected to have minor-to-moderate, long-term adverse impacts on floodplains in portions of the study area. FEMA will apply the eight-step decision-making process to consider site-specific impacts of proposed projects before approval to consider alternatives and mitigation measures.

Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

Work to improve or construct new roadside drainage structures and stormwater management systems would require the use of heavy machinery within or near floodplains, which could result in the deposition of pollutants if the project area were to be located within a floodplain. Projects under **Alternative 3** are expected to require significant ground disturbance (e.g., excavation to create detention basins). Thus, there is potential for erosion and sedimentation to occur during construction. However, these impacts would be minimized to the greatest extent possible by adhering to all relevant permit conditions and implementing erosion and sediment control BMPs. Furthermore, the subrecipient would be required to comply with local floodplain and floodway regulations, including coordination with their local floodplain manager, to reduce impacts on floodplains to the greatest extent possible. Therefore, work under **Alternative 3** would have negligible-to-minor, short-term adverse impacts on floodplains in some portions of the study area.

In the long term, projects under **Alternative 3** would increase stormwater conveyance and storage capacity, reducing future occurrences of roadway flooding. A reduction in roadway flooding would result in a reduction in sediments and pollutants deposited into the floodplain by stormwater runoff traveling over inundated roadways. Additionally, the creation of natural swales/vegetated drainage features would filter out pollutants and sediments from stormwater runoff and allow for stormwater to infiltrate soils. The construction of new detention basins would function similarly, filtering out sediments and pollutants by allowing them to settle to the bottom of the basin. In these ways, projects under **Alternative 3** could increase the natural value and function of floodplains. Therefore, projects under **Alternative 3** are expected to have moderate, long-term beneficial impacts on floodplains within and surrounding the project areas. As discussed under **Alternative 2**, FEMA will apply the eight-step decision-making process to consider site-specific impacts of proposed projects before approval to consider alternatives and mitigation measures.

Alternative 4: Construct Slope Stabilization Systems

The use of heavy machinery within or near floodplain areas during construction could result in the inadvertent release of pollutants into that floodplain. Projects under **Alternative 4** are expected to require excavation and other ground-disturbing work; thus, there is potential for construction-related erosion and sedimentation in waterways and surrounding floodplain areas to occur. However, these impacts would be minimized to the greatest extent possible by adhering to all relevant permit conditions and implementing erosion and sediment control BMPs. Furthermore, the subrecipient would be required to comply with local floodplain and floodway regulations, including coordination with their local floodplain manager, to reduce impacts on floodplains to the greatest extent possible. Therefore, work under **Alternative 4** would have negligible-to-minor, short-term adverse impacts on floodplains in some portions of the study area.

In the long term, projects under **Alternative 4** would reduce the occurrences of slope erosion caused by rain events and the associated stormwater runoff. Reduced slope erosion in portions of the study area is expected to reduce the amount of sediment deposition within floodplain areas, thereby preserving the natural value and function of the floodplains. Therefore, projects under **Alternative 4** are expected to have minor-to-moderate beneficial long-term impacts on floodplains within and surrounding the project areas. FEMA will apply the eight-step decision-making process to consider site-specific impacts of proposed projects before approval to consider alternatives and mitigation measures.

Alternative 5: Combination of the Action Alternatives

Alternative 5 assumes that the subrecipient would execute part or all of the activities described under **Alternative 2** through **Alternative 4**. The potential impacts of **Alternative 5** encapsulate the range of possible impacts that could result from **Alternative 2** through **Alternative 4**, which are evaluated in the preceding subsections. Based on the previous analysis, it is expected that **Alternative 5** would result in negligible-to-moderate, short-term adverse impacts on wetlands from construction-related sediment and pollutant depositions into floodplains. Construction work would adhere to an SWPPP and any applicable permit conditions. In the long term, **Alternative 5** is expected to have an overall minor-to-moderate, long-term beneficial impact resulting from a reduction in pollutants and sediments being transported into floodplains via stormwater runoff.

5.7 Coastal Resources

The National Oceanic and Atmospheric Administration (NOAA) administers the Coastal Zone Management Act (CZMA). States and territories with coastal shorelines administer the CZMA to manage coastal development with a Coastal Zone Management Plan (CZMP). Federal agencies must evaluate actions within designated coastal zones to ensure they are consistent with the CZMP. The USVI is divided into two tiers of the coastal zone, encompassing the entire territory, which is administered by the USVI DPNR. Actions receiving federal assistance must follow the procedures outlined in 15 CFR 930.90–930.101 for federal coastal zone consistency determinations. Coastal

resources typically protected under the CZMA include barrier islands, intertidal shorelines, beaches, salt marshes, fresh and saltwater wetlands, aquatic habitat, and any culturally significant or historic resources occurring in those areas, such as shipwrecks and archaeological sites.

The Coastal Barrier Resources Act (CBRA) of 1982 designated relatively undeveloped coastal barriers along the Atlantic and Gulf coasts as part of the John H. Chafee Coastal Barrier Resources System (CBRS) and made these areas ineligible for most new federal expenditures and financial assistance. The CBRA encourages the conservation of hurricane-prone, biologically rich, coastal barriers by restricting federal expenditures. Congress primarily designates mapped areas, called system units, for wildlife refuge, sanctuary, recreational, or natural resource conservation purposes. The CBRA was amended by the Coastal Barrier Improvement Act of 1990, which added the new designation, "otherwise protected areas," to identify mapped areas where only the federal flood insurance is restricted.

USVI DPNR advises on applications for substantial improvement that are located in any unit of the CBRS established by the CBRA, and when federal flood insurance is not available on such construction. CBRS boundaries are maintained by USFWS and are identified through FEMA National Flood Hazard Layer Viewer.

NOAA approved the USVI Coastal Management Program in 1979. NOAA established the USVI CZMP to manage, enhance, protect, and preserve coastal resources, while reducing conflict between competing land and water uses. USVI DPNR administers the USVI CZMP. USVI DPNR is required to assess all proposed development in the first tier of the USVI (i.e., areas along the shoreline). USVI DPNR ensures that activities undertaken within the first tier are consistent with the goals and policies of the Virgin Islands CZMA (which include preserving and improving the overall environment and water quality in coastal zones). USVI DPNR also minimizes adverse impacts to the coastal resources, ensures that development will not interfere with the public's right of access to the sea, and ensures that development will be adequately supervised to comply with permit conditions.

5.7.1 Existing Conditions

The entire USVI is designated as coastal zone and is currently divided into two tiers: the first tier comprises coast systems nearer to the shore, and the second tier comprises systems more inland. As shown in the USFWS online CBRS Mapper, each island contains areas defined as a system unit or as an otherwise protected area. St. John also includes a CBRS Buffer Zone contained by Route 20, North Shore Road, and Route 10.

5.7.2 Potential Impacts and Proposed Mitigation

In the analysis that follows, actions were determined to have an impact on coastal resources if the action would (1) reduce the habitat or water quality within coastal areas, (2) interfere with the

public's access to the sea, or (3) violate established federal, state, or local laws or regulations that currently protect and manage coastal resources.

Alternative 1: No Action

Under the **No Action** alternative, FEMA would not undertake or fund any stormwater mitigation projects. As such, there would be no short-term impacts on coastal zones.

In the absence of comprehensive flood mitigation actions, FEMA anticipates that periodic, rain-induced flooding will continue to damage roadway infrastructure and cause slope erosion. The use of vehicles and heavy equipment to repair damage from flooding could result in the inadvertent release of pollutants within coastal areas, which could be transported into nearby coastal environments via stormwater runoff, reducing habitat and water quality. Continued slope erosion in coastal areas may result in sedimentation in marine environments. Additionally, periodic road closures to repair damage caused by slope failure and erosion could reduce public access to coastal areas. Therefore, the **No Action** alternative would have negligible-to-minor, long-term adverse impacts on coastal zone.

Alternative 2: Repair, Replace, and Construct New Roadway and Related Infrastructure

Construction to repair, replace, or construct new roadways would require surface-level ground disturbance and temporary road closures. Thus, there would be potential for erosion and sedimentation to occur during construction and result in reduced water quality. Construction work could also result in temporary noise and human activity disturbances, which could temporarily reduce habitat quality for terrestrial species in coastal areas. Road closures associated with construction may also temporarily reduce access to recreational areas. For activities occurring in Tier 1 coastal areas, FEMA and the subrecipient would consult with USVI DPNR to obtain any required permits. Similarly, activities occurring in CBRA units would require consultation with USFWS. Favorable determinations of consistency with the CZMA and CBRA and compliance with state, federal, and local permits are expected to reduce the potential short-term adverse impacts on coastal resources to a negligible-to-minor level.

In the long term, projects under **Alternative 2** would not reduce flooding in the study area. Roadway improvements constructed under this alternative would increase access to recreational areas within coastal zones and would reduce the occurrences of periodic repair activities that could require heavy machinery and result in the inadvertent release of pollutants into coastal zones. Therefore, projects under **Alternative 2** would have negligible-to-minor, long-term beneficial impacts on coastal zones.

Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

Projects under **Alternative 3** are likely to require invasive ground-disturbing work, such as excavation and trenching to construct new drainage structures and stormwater management

systems; thus, there is potential for erosion to occur and result in sediments being transported into coastal areas. Construction work could also result in temporary noise and human activity disturbances, which could temporarily reduce habitat quality for terrestrial species in coastal areas. Road closures associated with construction may also temporarily reduce access to recreational areas. Any activities occurring in Tier 1 coastal zones would require consultation with USVI DPNR, and activities occurring in CBRA units would require consultation with USFWS. Favorable determinations of consistency with the CZMA and CBRA and compliance with state, federal, and local permits are expected to reduce the potential short-term adverse impacts on coastal resources to a negligible-to-minor level.

The repair and construction of stormwater management systems would reduce occurrences of flooding in the study area, which would reduce the likelihood of sediments and pollutants being transferred from inundated roadways into waterways and coastal zones. Reduced roadway flooding would also increase the reliability of access to recreational areas in coastal zones. The creation of natural swales and detention basins could improve water quality, as described in Section 5.4.2, and may function to create additional habitat for coastal wildlife.[49] Therefore, projects under **Alternative 3** would have negligible-to-minor, long-term beneficial impacts on coastal zones.

Alternative 4: Construct Slope Stabilization Systems

Like **Alternative 3**, projects under **Alternative 4** have the potential to require invasive ground-disturbing work. Thus, there is potential for erosion and sedimentation into marine areas to occur if projects are implemented in the coastal zone. Because of this, **Alternative 4** could result in negligible-to-moderate, short-term adverse impacts on coastal resources from construction activities. Any activities occurring in Tier 1 coastal zones would require consultation with USVI DPNR, and activities occurring in CBRA units would require consultation with USFWS. Favorable determinations of consistency with the CZMA and CBRA and compliance with state, federal, and local permits are expected to reduce the potential, short-term adverse impacts on coastal resources to a negligible-to-minor level.

In the long term, projects under **Alternative 4** would reduce slope erosion. Therefore, the potential for erosion and sedimentation into marine areas to occur following storm events would be reduced. Reduced slope erosion would also reduce the amount of roadway damaged caused by debris flows from neighboring slopes following rain events, which would result in fewer road closures and therefore facilitate more reliable access to recreational areas in coastal zones. Thus, projects under **Alternative 4** would have negligible-to-minor, long-term beneficial impacts on coastal zones.

[49] USVI DPNR DFW. 2018b. United States Virgin Islands Wildlife Action Plan Volume 2: Habitats and Species. Accessed on May 13, 2024, https://dpnr.vi.gov/wp-content/uploads/2022/10/VI-WAP-Vol-2-Habitats-Species.pdf.

Alternative 5: Combination of the Action Alternatives

Alternative 5 assumes that the subrecipient would execute part or all of the activities described under **Alternative 2** through **Alternative 4**. The potential impacts of **Alternative 5** encapsulate the range of possible impacts that could result from **Alternative 2** through **Alternative 4**, which are evaluated in the preceding subsections. Based on the previous analysis, it is expected that **Alternative 5** would result in negligible-to-minor, short-term adverse impacts on coastal areas resulting from construction-related erosion and sedimentation and road closures. Construction work would adhere to an SWPPP and any applicable permit conditions. Any activities occurring in Tier 1 coastal zones would require consultation with USVI DPNR, and activities occurring in CBRA units would require consultation with USFWS. In the long term, **Alternative 5** is expected to have negligible-to-minor beneficial impacts from a reduction in flood-induced erosion and sedimentation and road closures.

5.8 Vegetation

EO 13112, Invasive Species, requires federal agencies, to the extent practicable, to prevent the introduction of invasive species, to provide for their control, and to minimize the economic, ecological, and human health impacts that invasive species cause. Invasive species prefer disturbed habitats and generally possess high dispersal abilities, enabling them to outcompete native species. The USVI DPNR has developed an Invasive Species Action Plan that describes the current status of invasive species response in the USVI and identifies planning and implementation needs for establishing a coordinated response initiative for the management of invasive species.[50]

The Community and Heritage Tree Law (Title 12 of the V.I.C., Chapter 3A) promotes the conservation and preservation of existing trees on public lands in the USVI. The act requires a permit to be issued for activities maintaining and removing trees larger than 5 inches in diameter on public land. Tan-tan trees (*Leucaena leucocephala*) may be removed without a permit. Permits are issued under the Department of Agriculture. Title 12 of the V.I.C. also restricts impacts on riparian vegetation by prohibiting the removal or damage of any tree or vegetation within 30 feet of the center of any natural watercourse or within 25 feet of the edge of such watercourse, whichever is greater, without written permission from the Commissioner of Conservation and Cultural Affairs.

5.8.1 Existing Conditions

Vegetation refers to all plants and trees that occur within the study area. Vegetation composition varies greatly between areas and microhabitats depending on environmental conditions (e.g., precipitation frequency and intensity, soil type, temperature, and sunlight exposure). Like many other Caribbean areas, the vegetation in the USVI has been heavily affected by efforts to grow sugarcane and cotton, and to support livestock. It is estimated that more than 90 percent of the

[50] USVI DPNR. 2016. U.S. Virgin Islands Invasive Species Action Plan. Accessed May 10, 2024, https://invasives.vi.gov/wp-content/uploads/2021/11/USVI_Invasive_Species_Action_Plan.pdf.

native USVI vegetation has been removed.[51] As of 2007, only 3 percent of the USVI forests are fully mature, while the vast majority are secondary transitional forests.[52]

The vegetation and general habitats occurring within the USVI can be described according to the Holdridge system of ecological life zones.[53] Life zones are broad and encompass a variety of soils, vegetation, microclimates, and land use patterns. Two life zones occur within the USVI—(1) the subtropical dry forest and (2) subtropical moist forest. Although both life zones occur on all three islands, the subtropical dry forest life zone dominates St. Croix and St. John and the subtropical moist forest life zone dominates St. Thomas.[54]

The subtropical dry forest zone generally includes deciduous trees shorter than 50 feet tall, which form broad, flattened crowns. Many portions of the subtropical dry forest zone in the USVI feature complete grass coverage and support a savanna-woodland ecosystem. Typical plant species in these areas include, but are not limited to, turpentine tree (*Bursera simaruba*), mesquite (*Prosopis juliflora*), giant woolly torch (*Cephalocereus royenii*), *Pictetia aculeata*, black olive (*Bucida buceras*), and Lignum vitae (*Guaiacum officinale*).[55]

The subtropical moist forest zone includes areas that were historically forested but have mostly been deforested at some point to allow for agricultural or other nonforest land uses. Species that may occur in the subtropical moist forest zone include black mangroves (*Avicennia germinans*) and sea purslane (*Sesuvium portulacastrum*). Species that may occur in coastal salt pond and salt flat areas include Puerto Rico royal palm (*Roystonea borinquena*), white cedar (*Tabebuia heterophylla*), and laurels (*Nectandra* spp. and *Ocotea* spp.).[56]

Based on a review of the citizen science observation database iNaturalist, some of the plants most commonly observed in the USVI include sea grape (*Coccoloba uvifera*), portia tree (*Thespesia populnea*), white manjack (*Cordia dentata*), noni (*Morinda citrifolia*), *Pilosocereus armatus*, and coconut palm (*Cocos nucifera*).[57] Most of these species are capable of establishing in disturbed areas and are often planted as ornamentals; thus, it is likely that these species may occur along roadways in the study area.

---

[51] U.S. Fish and Wildlife Service. 2019. Saving rare plants in the U.S. Virgin Islands. Accessed May 13, 2024, https://www.fws.gov/story/2021-07/saving-rare-plants-us-virgin-islands.

[52] USVI DPNR DFW. 2018a. United States Virgin Islands Wildlife Action Plan Volume 1: Management Framework. Accessed May 13, 2024, https://dpnr.vi.gov/wp-content/uploads/2022/10/VI-WAP-Vol-1-Management-Framework.pdf.

[53] Ewel, J.J., and J.L. Whitmore. 1973. *The Ecological Life Zones of Puerto Rico and the U.S. Virgin Islands.* Forest Service Research Paper ITF-18. Institute of Tropical Forestry, Rio Piedras, Puerto Rico.

[54] Ibid.

[55] Ibid.

[56] Ibid.

[57] iNaturalist. 2024. "Observations." Accessed May 10, 2024, https://www.inaturalist.org/observations?place_id=97315&view=species&iconic_taxa=Plantae.

Invasive species of concern in the USVI include mother-in-law tongue (*Sanseveria trifasciata*), tan-tan, Chinaberry (*Melia azedarach*), sweetlime (*Triphasia trifolia*), and water hyacinth (*Eichhornia crassipes*).[58] Invasive plant species typically establish in disturbed areas; since the study area is focused along roadways, the likelihood of invasive plant species occurring in the disturbed areas along roadways in the study area is relatively high.

5.8.2 Potential Impacts and Proposed Mitigation

In the analysis that follows, actions were determined to have an impact on vegetation if the action would (1) require vegetation removal or disturbance, (2) reduce the quality or adversely alter the composition of vegetation communities, or (3) introduce or promote the spread of invasive plant species.

Alternative 1: No Action

Under the **No Action** alternative, FEMA would not undertake or fund any stormwater mitigation projects; therefore, there would be no short-term impacts from this alternative.

In the absence of stormwater mitigation projects, rain-induced flooding, erosion, and sedimentation are expected to occur unabated throughout the project area. Sedimentation and siltation resulting from erosion along roadways could cause accumulations of exposed soils to form in terrestrial habitats, which could smother existing vegetation and provide strata for invasive species to establish. Runoff from flooded roadways could transfer pollutants, such as oil, from the roadways into terrestrial environments, thereby decreasing the quality of plant habitat and potentially killing or injuring existing plants. Therefore, the **No Action** alternative could cause long-term, minor-to-moderate adverse impacts on vegetation within the study area.

Alternative 2: Repair, Replace, and Construct New Roadway and Related Infrastructure

Projects under **Alternative 2** may include repairing existing roadways or constructing new LWCs. Construction of projects under either of these categories may require vegetation disturbance or removal resulting from excavation and the use of heavy machinery. Equipment and vehicles used during construction could disturb existing vegetation and compact soils; however, it is expected that almost all construction work under **Alternative 2** would occur in previously disturbed areas. Certain activities associated with the construction of new LWCs may require small amounts of riparian (relating to wetlands) vegetation removal. However, when practicable, disturbed areas would be reseeded or replanted with native vegetation to mitigate any long-term impacts from construction disturbances. Project work would adhere to USVI's applicable invasive species management regulations, and all construction vehicles and equipment would be free of dirt and debris before entering and exiting the project areas (to control the introduction and spread of

[58] USVI DPNR. 2016. U.S. Virgin Islands Invasive Species Action Plan. Accessed May 10, 2024, https://invasives.vi.gov/wp-content/uploads/2021/11/USVI_Invasive_Species_Action_Plan.pdf.

invasive species). As such, **Alternative 2** is expected to have short-term negligible-to-minor adverse impacts on vegetation from construction.

Although there is potential for some vegetation to be permanently removed in service of constructing or repairing roadways, the vegetation that would be affected is generally expected to be ruderal (growing in an area disturbed by humans) and/or invasive because of its expected location within or adjacent to presumably previously disturbed areas along existing roadways/infrastructure. As described in the preceding paragraph, temporarily impacted areas would be replanted following construction with native plants, which would support the successful long-term growth of native flora and fauna communities within the study area. Therefore, **Alternative 2** is expected to result in negligible, long-term beneficial impacts on vegetation within the study area in cases where existing invasive plants are replaced with native plants.

Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

Alternative 3 includes projects to repair, upsize, or construct new roadside culverts, drainage features, underground stormwater lines and maintenance holes, and detention/retention areas. Short-term impacts on vegetation would likely occur under **Alternative 3** from ground-disturbing activities such as excavation and vegetation removal to construct detention/retention basins and other stormwater management systems. Ground-disturbing activities increase the potential for invasive species to establish and the potential for sediment to be deposited on existing nearby plants. Heavy equipment and vehicles used during construction could disturb existing vegetation and compact soils. However, most of the project activities under **Alternative 3** would occur in previously disturbed areas, and areas temporarily disturbed by construction would be reseeded or replanted with native vegetation when practicable. Additionally, project work would adhere to USVI's applicable invasive species management regulations and BMPs would be implemented during construction to reduce the risk of introducing or spreading invasive plant species. As such, projects implemented under **Alternative 3** are expected to have short-term, minor-to-moderate adverse impacts on vegetation from construction.

The potential for permanent vegetation removal is greater under **Alternative 3** compared to **Alternative 2** because the projects under **Alternative 3** would require more excavation/ground-disturbing work outside of existing roadways. However, projects under **Alternative 3** would still occur in the somewhat disturbed areas along existing roadways; therefore, the affected existing vegetation is generally expected to be part of a ruderal and/or invasive community. Additionally, vegetation removal is expected to be localized, comprising only a small part of the existing vegetation within the study area. Projects to create natural swales and earthen channels (described in Section 4.3.2) have the potential to increase the quality and amount of vegetation within the study area, as native species would be prioritized for planting. Temporarily impacted areas would be replanted following construction with native species. The increase in native species within the project area—resulting from the construction of natural swales and earthen channels and the

restoration of temporarily disturbed areas—would be expected to support the successful long-term growth of native flora and fauna communities within the study area. Projects to repair or construct new roadside drainage structures and stormwater management systems are expected to reduce rain-induced runoff, erosion, and sediment accumulations along roadways, which would improve the conditions for vegetation growth. Therefore, **Alternative 3** is expected to result in negligible-to-minor, long-term beneficial impacts on vegetation within the study area.

Alternative 4: Construct Slope Stabilization Systems

Alternative 4 includes projects to construct slope stabilization systems. Equipment and vehicles used during construction could disturb existing vegetation and compact soils, and certain construction activities could require vegetation removal. However, disturbed areas would be reseeded or replanted with native vegetation when practicable. Additionally, project work would adhere to USVI's applicable invasive species management regulations and BMPs would be implemented during construction to reduce the risk of introducing or spreading invasive plant species. As such, projects implemented under **Alternative 4** are expected to have short-term, minor-to-moderate adverse impacts on vegetation from construction.

Projects under **Alternative 4** are likely to require permanent vegetation removal along roadways in service of constructing slope stabilization measures. Areas where permanent vegetation removal would occur near roadways are likely those that have experienced previous disturbances and are currently dominated by ruderal and/or invasive species. Additionally, vegetation removal is expected to be localized, comprising only a small part of the existing vegetation within the study area. Some projects under **Alternative 4** are expected to use bioengineering methods to stabilize slopes using vegetation (detailed in Section 4.4.3). These projects have the potential to increase the quality and amount of vegetation within the study area because native species would be prioritized for use by these projects. Temporarily impacted areas would be replanted following construction with native species. The increase in native species within the project area—resulting from the construction of bioengineered slope stabilization measures and the restoration of temporarily disturbed areas following construction—would be expected to support the successful long-term growth of native flora and fauna communities within the study area. Projects to construct slope stabilization measures are expected to reduce rain-induced runoff, erosion, slope failure, and sedimentation within the study area, which would improve the conditions for vegetation growth. Therefore, **Alternative 4** is expected to result in negligible-to-minor beneficial impacts on vegetation within the study area.

Alternative 5: Combination of the Action Alternatives

Alternative 5 assumes that the subrecipient would execute part or all of the activities described under **Alternative 2** through **Alternative 4**. The potential impacts of **Alternative 5** encapsulate the range of possible impacts that could result from **Alternative 2** through **Alternative 4**, which are evaluated in the preceding subsections. Based on the previous analysis, it is expected that

Alternative 5 would result in negligible-to-moderate, short-term adverse impacts from construction-related vegetation removal and disturbances. In the long term, **Alternative 5** is expected to have negligible-to-minor beneficial impacts on vegetation because areas restored after construction would be replanted with native species.

5.9 Wildlife and Fish

Fish and wildlife include any species that occupy, breed, forage, rear, rest, hibernate, or migrate through the study area. Regulations relevant to fish and wildlife include EO 13112, Invasive Species, and the Migratory Bird Treaty Act (MBTA). Threatened and endangered species are evaluated separately in Section 5.10.

As described in Section 5.8, EO 13112, Invasive Species, requires federal agencies to prevent the introduction of invasive plant and animal species and to provide for their control to minimize the economic, ecological, and human health impacts that invasive species cause. The USVI DPNR has developed an Invasive Species Action Plan that describes the current status of invasive species response in the USVI and identifies planning and implementation needs for establishing a coordinated response initiative for the management of invasive species.[59]

The MBTA of 1918 provides a program for the conservation of migratory birds that fly through lands of the United States. The lead federal agency for implementing the MBTA is the USFWS. The law requires federal agencies to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any migratory birds or result in the destruction or adverse modification of designated critical habitat of such species. The law makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or their parts, feathers, nests, or eggs. USFWS defines the term "take" as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.[60]

5.9.1 Existing Conditions

The Caribbean, including the USVI, supports a vast diversity of ecosystems and wildlife species. However, nearly all natural habitats in the USVI have been reduced, degraded, or fragmented because of the development of sugarcane plantations and nonnatural uses.[61] These habitat changes have affected wildlife from nearly every taxonomic group, including marine life. Habitat loss and

[59] USVI DPNR. 2016. U.S. Virgin Islands Invasive Species Action Plan. Accessed May 10, 2024, https://invasives.vi.gov/wp-content/uploads/2021/11/USVI_Invasive_Species_Action_Plan.pdf.

[60] U.S. Fish and Wildlife Service. 2022. Endangered Species Act. Accessed November 21, 2024, https://www.fws.gov/laws/endangered-species-act/section-3#:~:text=(19)%20The%20term%20%22take,geographical%20context%2C%20includes%20all%20States.

[61] USVI DPNR DFW. 2018a. United States Virgin Islands Wildlife Action Plan Volume 1: Management Framework. Accessed May 13, 2024, https://dpnr.vi.gov/wp-content/uploads/2022/10/VI-WAP-Vol-1-Management-Framework.pdf.

degradation remain some of the largest threats to wildlife and fish species in the USVI.[62] The habitats and species described below are those that generally occur in the USVI as a whole. However, there is local variation between and within the different islands, so not every habitat or species described below is expected to occur in every part of the USVI.[63]

Terrestrial and Freshwater Aquatic Resources

Forests are the predominant habitat type across the larger islands in the USVI. Forest areas support a large diversity of birds, amphibians, reptiles, and invertebrates. Examples of species from the taxa that occur in forested areas include the bridled quail-dove (*Geotrygon mystacea*), red-eyed coqui (*Eleutherodactylus antillensis*), crested anole (*Anolis cristatellus*), and Tetrio sphinx (*Pseudosphinx tetrio*). There are six species of bats native to the USVI; these are the only native terrestrial mammals on the islands.[64] [65] Another terrestrial habitat type found in the USVI is shrubland/grassland, which comprises low, bushy habitats found in harsh environments, including those that are subject to strong winds and salt spray and those that have been disturbed by agriculture or land use changes. Shrubland and grassland habitats are likely to be the predominant habitats present immediately surrounding existing roadways within the USVI. Fewer species of wildlife occur in these areas than in forests, owing to the lower plant diversity, although common species such as the Zenaida dove (*Zenaida aurita*) do occur.[66]

The USVI supports several different kinds of wetlands, including salt ponds and salt flats, freshwater ponds, and ghuts (seasonal streams). Salt ponds and salt flats are described further in the marine resources subsection. Ghuts support a variety of freshwater shrimp and migratory fish, and semiaquatic amphibians and reptiles. Vegetated ghuts also provide important habitat corridors for wildlife, especially in urbanized areas. Freshwater ponds, which are generally human-made, are often stocked with fish (generally tilapia [*Oreochromis mossambicus*]). Freshwater ponds also provide important habitat for migratory birds, such as the least grebe (*Tachybaptus dominicus*), blue-winged teal (*Spatula discors*), white-cheeked pintail (*Anas bahamensis*), and green heron (*Butorides virescens*). Bats, including the greater bulldog bat (*Noctilio leporinus*) and the Antillean fruit-eating bat (*Artibeus jamaicensis*), also rely on freshwater ponds as a water source.[67]

---

[62] Ibid.

[63] USVI DPNR DFW. 2018b. United States Virgin Islands Wildlife Action Plan Volume 2: Habitats and Species. Accessed on May 13, 2024, https://dpnr.vi.gov/wp-content/uploads/2022/10/VI-WAP-Vol-2-Habitats-Species.pdf.

[64] NPS. 2017. Virgin Islands Animals. Accessed May 13, 2024, https://www.nps.gov/viis/learn/nature/animals.htm.

[65] USVI DPNR DFW. 2018b. United States Virgin Islands Wildlife Action Plan Volume 2: Habitats and Species. Accessed on May 13, 2024, https://dpnr.vi.gov/wp-content/uploads/2022/10/VI-WAP-Vol-2-Habitats-Species.pdf.

[66] USVI DPNR DFW. 2018b. United States Virgin Islands Wildlife Action Plan Volume 2: Habitats and Species. Accessed on May 13, 2024, https://dpnr.vi.gov/wp-content/uploads/2022/10/VI-WAP-Vol-2-Habitats-Species.pdf.

[67] Ibid.

Neotropical migratory birds breed in North America and overwinter in the USVI from November to April, while the summer resident seabirds occur in the USVI from April to November.[68] Of the more than 200 bird species recorded in the USVI, only 60 are resident breeders; most are migrants and breed in other areas.[69]

Terrestrial and freshwater aquatic invasive species of concern that may occur within or near the study area include, but are not limited to, black rats (*Rattus* spp.), Cuban treefrogs (*Osteopilus septentrionalis*), small Indian mongoose (*Herpestes auropunctatus*), cane toads (*Rhinella marina*), tiger mosquito (*Aedes aegypti*), and feral cats (*Felis catus*).[70] [71]

Marine Resources

The USVI also features marine habitats, including salt ponds and salt flats, beach and shoreline habitats, mangroves, seagrass beds, coral reefs, and more. Salt ponds and salt flats provide important feeding and breeding sites for shorebirds, including the least tern (*Sternula antillarum*) and Wilson's plover (*Anarhynchus wilsonia*), and habitat for the great land crab (*Cardisoma guanhumi*) and fiddler crabs (*Uca* spp.). Beach and shoreline habitats, which comprise unique assemblages of plants that can tolerate high levels of salt and wind, support nesting sea turtles and migratory seabirds. Petrels and shearwaters (*Procellariidae*), storm petrels (*Hydrobatidae*), tropic birds (*Phaethontidae*), and jaegers, gulls, and terns (*Laridae*) that occur in USVI coastal areas are generally migratory and occur in the USVI only when breeding.[72]

Four species of sea turtles, all of which are federally listed as endangered and described further in **Appendix C**, forage and nest in the USVI area: leatherback sea turtle (*Dermochelys coriacea*), hawksbill sea turtle (*Eretmochelys imbricata*), green sea turtle (*Chelonia mydas*), and loggerhead sea turtle (*Caretta caretta*). These species forage in the ocean and coastal areas around USVI and nest on sandy beaches in late summer and fall.

Mangroves are forested coastal wetlands that are seasonally flooded along low wave-energy shorelines. They support terrestrial species, such as white-crowned pigeons (*Patagioenas leucocephala*), and marine species, such as the Caribbean spiny lobster (*Panulirus argus*). Seagrass beds, which occur in shallow bays with calm waters, support a multitude of aquatic

---

[68] NPS. 2021a. St. John History Timeline. Accessed June 6, 2024, https://www.nps.gov/viis/learn/timeline.htm.

[69] Corven, J. n.d. U.S. Virgin Islands. Bristol Community College. Accessed May 13, 2024, https://datazone.birdlife.org/userfiles/file/IBAs/CaribCntryPDFs/virgin_islands_(to_usa).pdf.

[70] USVI DPNR DFW. 2018a. United States Virgin Islands Wildlife Action Plan Volume 1: Management Framework. Accessed May 13, 2024, https://dpnr.vi.gov/wp-content/uploads/2022/10/VI-WAP-Vol-1-Management-Framework.pdf.

[71] USVI DPNR. 2016. U.S. Virgin Islands Invasive Species Action Plan. Accessed May 10, 2024, https://invasives.vi.gov/wp-content/uploads/2021/11/USVI_Invasive_Species_Action_Plan.pdf.

[72] USVI DPNR DFW. 2018b. United States Virgin Islands Wildlife Action Plan Volume 2: Habitats and Species. Accessed on May 13, 2024, https://dpnr.vi.gov/wp-content/uploads/2022/10/VI-WAP-Vol-2-Habitats-Species.pdf.

vegetation and marine invertebrates such as the queen conch (*Strombus gigas*) and long spine urchin (*Diadema antillarum*).

Coral reef habitats in the USVI comprise at least 57 species of corals, some of which are federally listed as endangered and are described further in **Appendix C. Table 1**. Coral reefs support a large diversity of marine life, including other invertebrates such as the long spine urchin and marine fish. Common marine fish that occur in the USVI include bonefish (*Albula vulpes*), barracuda (*Sphyraena* spp.), bar jack (*Caranx ruber*), and Atlantic blue marlin (*Makaira nigricans*).[73] [74] Some marine fish that occur in the USVI waters are federally listed and described further in **Appendix C, Table 2**.

Marine invasive species of concern that may occur within or near the study area include, but are not limited to, seagrass (*Halophila stipulacea*) and lionfish (*Pterois* spp.).[75] [76]

5.9.2 Potential Impacts and Proposed Mitigation

In the analysis that follows, actions were determined to have an impact on wildlife or fish species if the action would (1) kill, injure, or otherwise directly impact an animal; (2) disturb an individual to the point of altering its normal behaviors; (3) reduce or degrade habitat used by wildlife or fish species; (4) result in take of migratory birds, as defined in the MBTA; or (5) introduce or promote the spread of invasive species.

Alternative 1: No Action

Under the **No Action** alternative, FEMA would not undertake or fund any stormwater mitigation projects; therefore, this alternative would have no short-term impact on wildlife and fish in the study area.

In the absence of stormwater mitigation actions, stormwater runoff from flood events could carry pollutants and sediments from roadways into terrestrial and aquatic habitats and cause erosion and sedimentation—potentially reducing the quality of terrestrial and aquatic habitats and adversely affecting the wildlife that rely on those habitats. Erosion and sedimentation could degrade existing aquatic and wetland habitats and alter the composition of vegetation communities in terrestrial

---

[73] USVI DPNR DFW. 2018b. United States Virgin Islands Wildlife Action Plan Volume 2: Habitats and Species. Accessed on May 13, 2024, https://dpnr.vi.gov/wp-content/uploads/2022/10/VI-WAP-Vol-2-Habitats-Species.pdf.

[74] Virgin Islands Now. 2024. Virgin Islands: Fishing Guide. Accessed May 14, 2024, https://www.vinow.com/general_usvi/fishing-guide/#:~:text=The%20primary%20target%20of%20shallow%20water%20fishing%20and,catch%20and%20release%20only.%20Snook%20are%20caught%20occasionally.

[75] USVI DPNR DFW. 2018a. United States Virgin Islands Wildlife Action Plan Volume 1: Management Framework. Accessed May 13, 2024, https://dpnr.vi.gov/wp-content/uploads/2022/10/VI-WAP-Vol-1-Management-Framework.pdf.

[76] USVI DPNR. 2016. U.S. Virgin Islands Invasive Species Action Plan. Accessed May 10, 2024, https://invasives.vi.gov/wp-content/uploads/2021/11/USVI_Invasive_Species_Action_Plan.pdf.

habitats by creating a disturbed area conducive to establishment by invasive species. The degradation of aquatic and terrestrial habitats within and near the study area could make those areas generally less suitable for many wildlife and fish species. Therefore, the **No Action** alternative is expected to have minor, long-term adverse impacts on fish and wildlife species reliant on aquatic and terrestrial habitats in and near the study area.

Alternative 2: Repair, Replace, and Construct New Roadway and Related Infrastructure

Projects under **Alternative 2** would involve the repair/replacement of existing roadways and the construction of new LWCs. During construction, the use of vehicles and equipment could result in the injury or death of individuals present during project implementation. Project-related disturbances could result in altered or disrupted foraging, breeding, or resting behaviors that could affect the health of species and populations. However, the duration of each project activity in any one location would be limited. Additionally, projects that would be implemented under **Alternative 2** are likely to occur in developed areas. Thus, any wildlife species (including migratory birds) choosing to inhabit project areas are likely to be acclimated to human noise and activities.[77] Implementing appropriate measures such as preconstruction surveys and installing exclusionary fencing when deemed necessary could reduce the potential for harm.

Construction activities requiring ground disturbance could result in erosion and subsequent sedimentation within nearby freshwater and marine aquatic habitats, which could adversely affect fish and wildlife species that rely on those habitats. To the maximum extent practicable, the construction of new LWCs over seasonally inundated waterways would occur during the dry season. Should in-water work be required, impacts on aquatic species may be minimized or mitigated through the implementation of construction BMPs, including installation of silt fences or cofferdams to decrease runoff and turbidity (a measure of particle levels in a body of water). Project work would also adhere to any relevant conditions prescribed in project-specific permits or agency consultations.

To minimize the potential impacts resulting from vehicle and equipment use on nesting birds protected by the MBTA, BMPs would be implemented during construction. BMPs would require vehicles and equipment to access project areas using existing roads whenever possible.

Project activities, especially any vegetation removal, should avoid the breeding season whenever possible. Projects would have minor-to-moderate impacts on nesting migratory birds if vegetation removal or other work with the potential to alter/disturb nests were to occur during nesting seasons. Should a project require work during times when migratory birds are nesting, preconstruction surveys are recommended to determine whether nests are present. If a nest is found, a buffer area with a specified radius around the nest would be established so that disturbance or intrusion would

[77] Duquette, C.A., S.R. Loss, and T.J. Hovick. 2021. *A meta-analysis of the influence of anthropogenic noise on terrestrial wildlife communication strategies*. J Appl Ecol. 2021; 58: 1112–1121. Accessed November 7, 2024, https://doi.org/10.1111/1365-2664.13880.

not be allowed until the young have fledged and left the nest. The size of the buffer would vary depending on species and local conditions (e.g., the presence of busy roads) and would be based on the professional judgment of a monitoring biologist. Subrecipients would be responsible for consulting with USFWS on MBTA compliance and for obtaining any necessary take permits. With the implementation of the measures described above, there is potential for short-term, negligible-to-moderate adverse impacts on fish and wildlife species, including migratory birds.

Projects to repair or replace existing roadways are unlikely to result in any long-term reduction in habitat availability for fish and wildlife, as almost all work is expected to occur within previously disturbed roadways and the adjacent disturbed habitats. Temporarily disturbed areas would be replanted with native vegetation, when practicable, following construction, which is expected to support the development of native flora and fauna communities. The construction of new LWCs would result in the permanent alteration of seasonally inundated freshwater ghut habitats; however, these permanent alterations are expected to occur only within a small segment of a given ghut. Adding impermeable surfaces within an seasonal ghut may reduce the quality of the habitat by restricting future vegetation growth in that part of the ghut and may increase the amount of stormwater runoff and accompanying pollutants that may be deposited in the ghut, which could have negligible-to-minor, long-term adverse impacts on freshwater aquatic habitats, and the wildlife and fish species that rely on them, within and downstream of project areas.

Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

Alternative 3 includes projects that would repair, upsize, or construct new roadside culverts, drainage features, underground stormwater lines and maintenance holes, and detention/retention areas. Short-term impacts on wildlife and fish species, including migratory birds, that would occur under **Alternative 3** would be like those described under **Alternative 2**. Construction activities could result in the injury or death of individuals, disruption of their normal behaviors, and/or the temporary reduction in quality of the terrestrial and aquatic habitats they depend on. Projects under **Alternative 3** would be implemented in developed areas; thus, it is likely that any wildlife species, including migratory birds, choosing to inhabit the project areas are likely to be acclimated to human noise and activities. Measures to avoid or minimize impacts on wildlife and fish species, such as conducting preconstruction surveys or adhering to seasonal work restrictions, would be implemented as necessary.

Activities under **Alternative 3** are likely to require ground disturbance and vegetation removal. Ground-disturbing activities could result in erosion and sedimentation that could reduce the quality of nearby freshwater and marine aquatic habitats, which could adversely affect the fish and wildlife species that rely on those habitats. Work within or near aquatic features (such as work related to culverts) would occur during the dry season to the maximum extent practicable. Should in-water work be required, impacts on aquatic species may be minimized or mitigated through the implementation of construction BMPs, including installation of silt fences or cofferdams to

decrease runoff and turbidity. Project work would adhere to any relevant conditions prescribed in project-specific permits or agency consultations.

The construction BMPs described under **Alternative 2** to reduce impacts on migratory birds would be applied as necessary to projects under **Alternative 3**. The subrecipients would be responsible for consulting with USFWS on MBTA compliance and for obtaining any necessary take permits. It is anticipated that projects would have minor-to-moderate impacts on nesting migratory birds if vegetation removal or other work with the potential to alter/disturb nests were to occur during nesting season. Therefore, with the implementation of the measures described above and under **Alternative 2**, the short-term adverse impacts on fish and wildlife, including migratory birds, would range from negligible to moderate.

Projects under **Alternative 3** are likely to require excavation/ground-disturbing work outside of existing roadways. Permanent habitat impacts are expected to occur predominantly within previously disturbed habitat areas along roadways that are unlikely to provide high-quality terrestrial habitat for wildlife species. The revegetation of temporarily disturbed areas with native species and the creation of natural swales and earthen channels under some **Alternative 3** projects may increase the quality of terrestrial habitat within the project area, which may have negligible-to-minor beneficial impacts on terrestrial species that rely on those habitats.

The creation of new freshwater ponds (detention/retention basins) would increase the amount of available freshwater habitat within the study area, benefitting species of migratory inland birds that require freshwater sources. Projects to repair or construct new roadside drainage structures and stormwater management systems are expected to reduce rain-induced runoff, erosion, and pollution deposition in nearby aquatic habitats. **Alternative 3** is expected to result in minor-to-moderate, long-term beneficial impacts on aquatic habitats within and near the study area.

Alternative 4: Construct Slope Stabilization Systems

Alternative 4 includes projects that would construct slope stabilization systems. Construction activities could result in the injury or death of individuals, disruption of their normal behaviors, and/or the temporary reduction in quality of the terrestrial and aquatic habitats they depend on. Projects under **Alternative 4** would be implemented in developed areas; thus, it is likely that any wildlife species, including migratory birds, choosing to inhabit the project areas are likely to be acclimated to human noise and activities. Measures to avoid or minimize impacts on wildlife and fish species, such as conducting preconstruction surveys or adhering to seasonal work restrictions, would be implemented as necessary.

Projects under **Alternative 4** are likely to require permanent vegetation removal along roadways in service of constructing slope stabilization measures. Ground-disturbing and vegetation removal activities could result in erosion and sedimentation that could reduce the quality of nearby freshwater and marine aquatic habitats, which could adversely affect the fish and wildlife species

that rely on those habitats. Project work would adhere to any relevant conditions prescribed in project-specific permits or agency consultations.

The construction BMPs described under **Alternative 2** to reduce impacts on migratory birds would be applied as necessary to projects under **Alternative 4**. The subrecipients would be responsible for consulting with USFWS on MBTA compliance and for obtaining any necessary take permits. It is anticipated that projects would have minor-to-moderate impacts on nesting migratory birds if vegetation removal or other work with the potential to alter/disturb nests were to occur during nesting season. With the implementation of the measures described under **Alternative 2**, the short-term adverse impacts on fish and wildlife, including migratory birds, resulting from **Alternative 4** would range from negligible to moderate.

Projects under **Alternative 4** are likely to require ground-disturbing and vegetation removal work outside of existing roadways. However, many of the slope stabilization projects are expected to incorporate bioengineering methods that would involve replanting slopes with native vegetation. These actions are expected to increase the quality of the terrestrial habitat in the project areas, which would have negligible-to-minor beneficial impacts on the terrestrial wildlife species that rely on the habitat areas. In the long term, slope stabilization projects are expected to reduce the frequency and severity of slope erosion and landslides, protecting nearby aquatic habitats from being degraded by erosion and sedimentation. Therefore, **Alternative 4** is expected to have minor-to-moderate, long-term beneficial impacts on aquatic habitat and the fish and wildlife species that rely on them within and near the study area.

Alternative 5: Combination of the Action Alternatives

Alternative 5 assumes that the subrecipient would execute part or all of the activities described under **Alternative 2** through **Alternative 4**. The potential impacts of **Alternative 5** encapsulate the range of possible impacts that could result from **Alternative 2** through **Alternative 4**, which are evaluated in the preceding subsections. Based on the previous analysis, it is expected that **Alternative 5** would result in negligible-to-moderate, short-term adverse impacts from construction-related disturbances that alter important habitats or alter animals' behaviors. In the long-term, **Alternative 5** is expected to have negligible-to-moderate beneficial impacts on fish and wildlife species from a reduction in the transportation of pollutants and sediments into important habitats via stormwater runoff and the creation of terrestrial and aquatic habitats vegetated with native species.

5.10 Threatened and Endangered Species

The Endangered Species Act (ESA) of 1973 provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The lead federal agencies for implementing ESA are the USFWS and the NOAA National Marine Fisheries Service (NMFS). The law requires federal agencies to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction

or adverse modification of designated critical habitat of such species. The law also prohibits any action that causes a taking of any listed species of endangered fish or wildlife. The ESA defines the term "take" as "to harass, harm, pursue, shoot, wound, kill, capture, or collect, or attempt to engage in such conduct."

5.10.1 Existing Conditions

Based on a review of the USFWS Information for Planning and Consultation (IPAC) tool and NMFS list of threatened and endangered species in the USVI, which was conducted in May 2024, there are 28 federally listed species with the potential to occur within the study area covered by this PEA.[78] [79] Of these 28 species, 12 are under USFWS jurisdiction and include mammals, birds, reptiles, and plants; 12 are under NMFS jurisdiction and include marine mammals, fish, sharks, rays, and marine invertebrates; and 4 are under the joint jurisdiction of USFWS and NMFS and include reptiles (for example sea turtles). The study area overlaps with or is surrounded by proposed or final critical habitat for 14 species. These species and their habitat requirements are summarized in **Appendix C, Table 1**.

Because the study area comprises mostly areas within or directly adjacent to existing roadways, the potential for the species described in **Appendix C** to occur within the study area varies based on the species' habitat requirements. For example, coral species would not occur within the study area; however, they may occur in the larger action area for a given project, since the action area encompasses the farthest-reaching effects of an action (which may include erosion, sedimentation, or pollution into nearby aquatic habitats). Terrestrial species, including plants and birds, may have higher potential to occur within the study area.

5.10.2 Potential Impacts and Proposed Mitigation

In the analysis that follows, actions were determined to have an impact on threatened and endangered species if the action would (1) result in take of a federally listed species, as defined by the ESA; (2) reduce or degrade habitat or designated critical habitat for federally listed species; or (3) introduce or promote the spread of invasive species that would adversely affect federally listed species.

Alternative 1: No Action

Under the **No Action** alternative, FEMA would not undertake or fund any stormwater mitigation projects; therefore, there would be no short-term impacts on federally listed species or their critical habitats.

---

[78] U.S. Fish and Wildlife Service. 2024b. Information for Planning and Consultation. Accessed May 2, 2024, https://ipac.ecosphere.fws.gov/.

[79] NMFS. 2024a. Threatened and Endangered Species List U.S. Virgin Islands. Accessed May 2, 2024, https://www.fisheries.noaa.gov/southeast/consultations/threatened-and-endangered-species-list-us-virgin-islands.

The long-term impacts on federally listed species are generally expected to be like those described in Section 5.8.2 and Section 5.9.2. Ongoing flooding could increase erosion, sedimentation, and the transportation of pollutants via stormwater runoff, which may impair the quality and availability of suitable habitat and/or critical habitat for listed marine and terrestrial species. Areas disturbed by erosion and flooding could be readily colonized by invasive plant species, which may outcompete listed plants and reduce the quality of terrestrial habitat for other listed species. Therefore, the **No Action** alternative could have long-term, negligible-to-minor adverse impacts on federally listed species and/or designated critical habitat from ongoing rain-induced flooding and associated local stormwater mitigation actions.

Alternative 2: Repair, Replace, and Construct New Roadway and Related Infrastructure

Projects to repair, replace, and/or construct new roadways and related infrastructure under **Alternative 2** have the potential to affect listed species and critical habitat, as federally listed species and their habitats are expected to be subject to the same impacts as those described in Section 5.8.2 and Section 5.9.2. Before implementing any project under **Alternative 2**, FEMA would analyze the project location, habitat conditions, USFWS's IPAC Tool, and any other available and relevant species occurrence information. Based on the review, FEMA would determine whether there is potential for the project to affect federally listed species and/or critical habitat. Although the magnitude of the potential effects is expected to vary based on specific project activities and locations, short-term adverse impacts would not exceed a moderate level because construction activities would be limited by permitting conditions and any recommendations from USFWS resulting from informal or formal consultation.

FEMA would consult with USFWS under Section 7(a)(2) of the ESA for all projects that would result in a finding other than a No Effect determination and would seek concurrence for findings of "may affect, but not likely to adversely affect," and would conduct a formal consultation for findings of "may affect and is likely to adversely affect." If a proposed project is "likely to adversely affect" a federally listed species, the issuance of a biological opinion and incidental take permit by USFWS would be required before project implementation.

Threatened and endangered species are expected to be subject to the same long-term, project-specific impacts as other fish and wildlife species; therefore, projects under **Alternative 2** would have negligible-to-minor, long-term adverse impacts on threatened and endangered species, as described in 5.8.2 and Section 5.9.2.

Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

Under **Alternative 3**, projects to improve, replace, and construct new roadside drainage structures and stormwater management systems have the potential to affect listed species and critical habitat (like **Alternative 2**). Although the magnitude of potential impacts on species is expected to be variable between individual projects, federally listed species are expected to be subject to the same

project-specific impacts as other fish and wildlife species; therefore, the impact evaluations for the **Alternative 3** projects presented in Section 5.8.2 and Section 5.9.2 are generally expected to apply to federally listed species as well. Thus, projects under **Alternative 3** would have negligible-to-moderate, short-term adverse impacts and minor-to-moderate, long-term beneficial impacts on federally listed species. The same process described under **Alternative 2** would occur for projects under **Alternative 3**; FEMA would analyze the project location, habitat conditions, USFWS's IPAC tool, and any other available and relevant species information. Based on their review, FEMA would make effect determinations for the federally listed species with the potential to occur in or near the project area and would proceed with informal or formal consultation with USFWS and/or NMFS, as appropriate. A tiered SEA would be developed for any proposed projects with findings of "may affect and is likely to adversely affect."

Alternative 4: Construct Slope Stabilization Systems

Like **Alternative 2** and **Alternative 3**, projects under **Alternative 4** to construct slope stabilization systems have the potential to affect listed species and critical habitat. Although the magnitude of potential impacts on species is expected to be variable between individual projects, federally listed species are expected to be subject to the same project-specific impacts as other fish and wildlife species; therefore, the impact evaluations for the **Alternative 4** projects presented in Section 5.8.2 and Section 5.9.2 are generally expected to apply to federally listed species as well. Thus, projects under **Alternative 4** would have negligible-to-moderate, short-term adverse impacts and negligible-to-moderate, long-term beneficial impacts on federally listed species. The same process described under **Alternative 2** and **Alternative 3** would occur for projects under **Alternative 4**; FEMA would analyze the project location, habitat conditions, and relevant online data sources to make effect determinations for the federally listed species with the potential to occur in or near the project area. Based on those effect determinations, FEMA would proceed with informal or formal consultation with USFWS and/or NMFS, as necessary. A tiered SEA would be developed for any proposed projects with findings of "may affect and is likely to adversely affect."

Alternative 5: Combination of the Action Alternatives

Alternative 5 assumes that the subrecipient would execute part or all of the activities described under **Alternative 2** through **Alternative 4**. The potential impacts of **Alternative 5** encapsulate the range of possible impacts that could result from **Alternatives 2** through **4**, which are evaluated in the preceding subsections. As described under **Alternative 2** through **Alternative 4**, FEMA would analyze the project location, habitat conditions, and relevant online data sources to make effect determinations for the federally listed species with the potential to occur in or near the project area. Based on those effect determinations, FEMA would proceed with informal or formal consultation with USFWS and/or NMFS, as necessary. A tiered SEA would be developed for any proposed projects with findings of "may affect and is likely to adversely affect." As described in the previous analysis, the effects of **Alternatives 2** through **4** on federally listed species are expected to be the same as the effects described in Section 5.9; thus, **Alternative 5** would have

negligible-to-moderate, short-term adverse impacts and negligible-to-moderate, long-term beneficial impacts on federally listed species.

5.11 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act of 1976 (P.L. 109-479) (MSA) requires federal agencies to assess the potential impacts of actions on Essential Fish Habitat (EFH). An EFH includes "those waters and substrate necessary for federally managed species to spawn, breed, feed, or grow/mature." Much like the ESA, the MSA requires federal agencies to consult with NMFS when the government plans federally funded projects and/if the action is determined to have the potential to adversely affect an EFH.

5.11.1 Existing Conditions

Based on a review of the NMFS EFH mapper,[80] the study area is within designated EFHs for multiple species, as summarized in **Table 5.4**. All species are managed by the Secretarial Management Council and are covered under Amendment 10 to the 2006 Consolidated Atlantic Highly Migratory Species Fishery Management Plan.

Table 5.4 Essential Fish Habitat Within the Study Area

Species	USVI Island Designated	Life Stage Found at Location
Caribbean reef shark *Carcharhinus perezi*	St. Croix, St. John, and St. Thomas	All (all three islands)
Longbill spearfish *Tetrapturus pfluegeri*	St. John and St. Thomas	All (all three islands)
Swordfish *Xiphias gladius*	St. Croix, St. John, and St. Thomas	Juvenile (St. Croix only) Spawning, Eggs, Larvae (all three islands)
White marlin *Kajikia albida*	St. Croix, St. John, and St. Thomas	Juvenile (all three islands)

Source: NMFS 2024b

The open ocean areas surrounding the islands are designated as EFH for a total of 57 species. **Appendix C, Table 2** presents the EFH report generated from the oceanic areas surrounding the USVI.

[80] NMFS. 2024b. Essential Fish Habitat Mapper. Accessed May 14, 2024, https://www.habitat.noaa.gov/apps/efhmapper/efhreport/.

5.11.2 Potential Impacts and Proposed Mitigation

In the analysis that follows, actions were determined to have an impact on EFH if the action would alter the quality and/or quantity of designated EFH areas, either directly or indirectly.

Alternative 1: No Action

Under the **No Action** alternative, FEMA would not undertake or fund any stormwater mitigation projects; thus, this alternative would have no short-term impact on EFH.

In the absence of stormwater mitigation actions, stormwater runoff could carry pollutants and sediments from roadways into EFHs and unmitigated stormwater flows could cause slope erosion and subsequent sedimentation within EFHs. The implementation of periodic activities to repair roadway damaged caused by flooding could require ground-disturbing activities, which would likely induce short-term soil erosion during rain events. Ground disturbance in areas within identified EFHs has the potential to disturb, destroy, or compromise them without proper assessment and implementation of erosion control measures. Therefore, the **No Action** alternative is expected to have minor, long-term adverse impacts on the quality of EFH within and adjacent to the study area.

Alternative 2: Repair, Replace, and Construct New Roadway and Related Infrastructure

Projects implemented under **Alternative 2** would repair or replace existing roadways and construct new LWCs. Construction activities associated with these projects would likely include ground disturbance within and adjacent to existing roadways, which is expected to induce short-term erosion during rain events. Ground disturbance in areas within identified EFHs has the potential to disturb, destroy, or compromise EFHs. As described in Section 5.4.2, projects under **Alternative 2** would manage erosion control by following an SWPPP and obtaining applicable NPDES permits. These measures are expected to reduce the potential for adverse impacts on EFH. To the maximum extent practicable, the construction of new LWCs over seasonally inundated waterways would occur during the dry season. Should in-water work be required, impacts on aquatic species may be minimized or mitigated through the implementation of construction BMPs including installation of silt fences or coffer dams to decrease runoff and turbidity. Project work would also adhere to any relevant conditions prescribed in project-specific permits or agency consultations.

For projects proposed within EFH areas, FEMA would perform an assessment to determine the likelihood of impact. Additional avoidance and minimization measures may be prescribed following this assessment. It is anticipated that, with the implementation of erosion control BMPs and the performance of an EFH assessment when deemed necessary, projects under **Alternative 2** would have negligible-to-minor, short-term adverse impacts on the quality of EFH.

The repair/replacement of existing roadways is not expected to result in long-term impacts on EFH. The construction of new LWCs would result in the permanent alteration of seasonally

inundated freshwater ghut habitats; however, these permanent alterations are expected to occur only within a small segment of a given ghut. Nonetheless, adding impermeable surfaces within a seasonal ghut may reduce the quality of the habitat by restricting future vegetation growth in that part of the ghut and may increase the amount of stormwater runoff and accompanying pollutants that may be deposited in the ghut, which could have negligible-to-minor, long-term adverse impacts on the quality of EFH within and downstream of project areas.

Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

Projects implemented under **Alternative 3** would replace, upsize, or construct new roadside culverts, drainage features, underground stormwater lines and maintenance holes, and detention/retention areas. These projects, especially those that include the creation of detention/retention areas, are expected to require significant ground disturbance. As described under **Alternative 2**, ground disturbance is expected to induce short-term erosion during rain events and could adversely affect EFH within the project areas. Subrecipients implementing projects under **Alternative 3** would be responsible for following an SWPPP and implementing appropriate erosion control BMPs, as necessary. Work within or near aquatic features (such as work related to culverts) would occur during the dry season to the maximum extent practicable. Should in-water work be required, impacts on aquatic species may be minimized or mitigated through the implementation of construction BMPs, including installation of silt fences or cofferdams to decrease runoff and turbidity. Project work would adhere to any relevant conditions prescribed in project-specific permits or agency consultations.

As with **Alternative 2**, an assessment would be performed to determine the likelihood of impact on EFH if a proposed project is located near an area that may potentially serve as an EFH. Additional avoidance and minimization measures may be prescribed after this assessment. The impacts of projects under **Alternative 3** on EFH are generally expected to be more significant than those expected under **Alternative 2** because projects under **Alternative 3** are more likely to require more significant levels of ground disturbance. It is anticipated that, with the implementation of erosion control BMPs and the performance of an EFH assessment, when deemed necessary, projects under **Alternative 3** would have minor-to-moderate, short-term adverse impacts on EFH.

In the long term, the creation of vegetated natural channels/drainageways is expected to increase water quality within those channels, and subsequently in downstream EFH, because the presence of vegetation increases the filtration of pollutants and sediments from the water and decreases the risk of channel bank erosion. Additionally, projects under **Alternative 3** are expected to reduce rain-induced runoff, erosion, and pollution deposition in nearby aquatic habitats through the introduction/improvement of stormwater conveyance measures; therefore, **Alternative 3** is expected to result in minor-to-moderate, long-term beneficial impacts on EFH within and near the study area.

Alternative 4: Construct Slope Stabilization Systems

Projects under **Alternative 4** would construct slope stabilization systems. These projects are expected to require significant levels of ground disturbance within and adjacent to existing roadways. As described under **Alternative 2** and **Alternative 3**, ground disturbance is expected to induce short-term erosion during rain events and could adversely affect EFH within or near the project areas. Subrecipients implementing projects under **Alternative 4** would be responsible for following an SWPPP and implementing appropriate erosion control BMPs, as necessary. Work near aquatic features would be conducted during the dry season to the maximum extent practicable. In-water work is not expected to be required for most of the projects under **Alternative 4**. However, should in-water work be required, impacts on aquatic species may be minimized or mitigated through the implementation of construction BMPs, including installation of silt fences or cofferdams to decrease runoff and turbidity. Project work would adhere to any relevant conditions prescribed in project-specific permits or agency consultations.

As with **Alternative 2** and **Alternative 3**, FEMA would perform an assessment to determine the presence of EFH and the likelihood of impact if a proposed project is located near an area that may potentially serve as an EFH. Additional avoidance and minimization measures may be prescribed following this assessment. The impacts of projects under **Alternative 4** on EFH are generally expected to be like those expected under **Alternative 3**. FEMA anticipates that, with the implementation of erosion control BMPs and the performance of an EFH assessment, when deemed necessary, projects under **Alternative 4** would have negligible-to-minor, short-term adverse impacts on EFH.

In the long term, slope stabilization projects are expected to reduce the frequency and severity of slope erosion and landslides, protecting the quality of nearby EFH from being degraded by erosion and sedimentation. Additionally, many of the slope stabilization projects under **Alternative 4** are expected to incorporate bioengineering methods that would involve replanting slopes with native vegetation. The presence of vegetation on slopes is expected to increase downstream water quality by filtering pollutants and sediments out of the water. Therefore, **Alternative 4** is expected to have minor-to-moderate, long-term beneficial impacts on EFH within and near the study area.

Alternative 5: Combination of the Action Alternatives

Alternative 5 assumes that the subrecipient would execute part or all of the activities described under **Alternative 2** through **Alternative 4**. The potential impacts of **Alternative 5** encapsulate the range of possible impacts that could result from **Alternative 2** through **Alternative 4**, which are evaluated in the preceding subsections. Based on the previous analysis, it is expected that **Alternative 5** would result in negligible-to-moderate, short-term adverse impacts from construction-related ground disturbance and associated erosion and sedimentation. Before construction, FEMA would perform an assessment to determine the presence of EFH and the likelihood of an impact if the proposed project is located near an area that may serve as an EFH. Additional avoidance and minimization measures may be prescribed following this assessment

and would be adhered to during construction. In the long term, **Alternative 5** is expected to have negligible-to-moderate beneficial impacts resulting from reduced sedimentation and erosion into EFH areas.

5.12 Cultural Resources

FEMA must consider the potential effects of its funded actions upon cultural resources before engaging in any undertaking in accordance with Section 106 of the National Historic Preservation Act (NHPA), as amended and implemented by 36 CFR § 800. NHPA established a national policy for protecting historic buildings and archaeological sites and created a process for historic preservation (16 U.S.C. 470 et seq.). Section 106 of the NHPA (16 U.S.C. 470) requires federal agencies to consider the impact of their actions on historic resources, including historic properties and resources listed in or eligible for listing in the National Register of Historic Places (NRHP). To implement this requirement, the Advisory Council of Historic Preservation (ACHP) has established a review process that is defined in 36 CFR § 800, "Protection of Historic Properties" (36 C.F.R. Part 800). As defined in the Section 106 review process, federal agencies are required to begin consultation with the State Historic Preservation Officer (SHPO) and any Indian tribe that attaches religious and cultural significance to the properties. Section 106 also gives the ACHP, interested parties, and the public the chance to weigh in before a final decision is made.

NHPA (54 U.S.C. § 300308) defines historic resources are defined as prehistoric or historic archaeology sites, historic standing structures, historic districts, sites, objects, artifacts, cultural properties of historic or traditional significance—referred to as Traditional Cultural Properties—that may have religious or cultural significance to federally recognized tribal nations or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. If the federal agency determines there is a potential adverse effect, SHPO, the tribes, or both would consult with the federal agency to identify necessary measures to avoid impacts on historic and archaeological resources, to minimize the potential impact if refinement of the SOW is not possible or to mitigate effects. Mitigation measures would be identified and implemented to offset any impacts that could not be avoided. Under the NHPA a significant property is a historic resource listed in or determined eligible for listing in the NRHP. Eligibility for listing in the NRHP rests on twin factors of significance and integrity: a property must have both significance and integrity to be considered eligible. Eligibility criteria for listing a property in the NRHP are detailed in 36 CFR § 60.

In accordance with the USVI Code for Conservation and Preservation of Historic Cultural Assets (USVI Code 2019), until plans are submitted to and acted upon by the Virgin Islands Historic Preservation Commission, no building or structure, including stone walls, fences, paving, and steps, may be erected, reconstructed, altered, restored, moved, or demolished within any Historic and Architectural Control District or affecting any building, site, or place listed in the Virgin Islands Registry of Historic Buildings, Site, and Places.

Pursuant to 36 CFR 800.4(a)(1), the Area of Potential Effects (APE) is defined as the geographic area(s) within which the undertaking may directly or indirectly affect historic resources. FEMA evaluates impacts to historic resources before the undertaking for both standing structures (aboveground resources) and archaeology (below-ground resources) within the APE.

5.12.1 Existing Conditions (Historic Resources)

The three islands of the USVI territory, were originally solely inhabited by the Ciboney, Caribs, and Arawaks people until 1493 when Christopher Columbus landed on the islands during his second voyage to the New World. Over the next 100 years, Spain's colonial population on the nearby Puerto Rico Island devastated the native population through the introduction of disease and forced labor.[81] Starting in the early 1600s, many European countries took an interest in establishing colonies on the three islands with individual areas settled under Spain, England, Holland, France, Denmark, and the Knights of Malta flag. To improve military positioning during World War I, the United States purchased the islands from the Danish in 1917. Today, the USVI is under the jurisdiction of the federal government of the United States and the residents are U.S. citizens, although the federal government transferred the islands to a territorial government in 1996.

The most influential legacy in the historic architecture of the islands is evident in the colonial-era agricultural land use and in the Danish naming convention of streets, towns, and areas, which is derived from the 251-year Danish reign that started in 1685 and lasted until the islands were sold to the United States in 1917. Additionally, the decades of the transatlantic slave trade, which was finally abolished in 1803, along with the continued institution of slavery until 1848, left a record of unique histories and rich cultural traditions transplanted from other countries. Since becoming a territory of the United States, the historic heritage is based on U.S. policies and historical periods related to community planning and development, the Civil Rights Movement, early historic preservation efforts, and the current status of ecotourism.

According to the NRHP, accessed on April 25, 2024, there are five national parks, one national heritage area, 20 NRHP historic districts, 91 NRHP individual listings, five National Historic Landmarks, seven National Natural Landmarks, and 204 archaeological districts and recorded sites across the three islands.

St. Croix

Largest of the three islands, St. Croix contains the historic towns of Christiansted to the northeast and Frederiksted to the southwest with an industrial area and airport in Limetree Bay on the central south shore. The island was uninhabited by native population by the 1590s and remained abandoned until the early 1600s when multiple European countries engaged in warfare over the island for the next 200 years. The first occupation was in 1625 when Dutch, English, and French refugees settled in a small colony. The English expelled the Dutch and French settlers and were,

[81] Government of the Virgin Islands. n.d. *Our History*. Accessed June 5, 2024, https://bvi.gov.vg/content/our-history.

in turn, evicted from Puerto Rico in 1650 by a Spanish invasion. Almost immediately, the French attacked and established a colony, and the island was ruled by the Knights of Malta from 1651 to 1664. The island was then transferred to the French West India Company until 1695 when a war between the English and Dutch left the island uninhabited and abandoned for 38 years. The Danish West India Company purchased the island in 1733 from France and it remained under Danish rule until the United States purchased it in 1917.[82]

As of April 5, 2024, there are 41 historic properties listed in the NRHP on the island of St. Croix. The properties are categorized as aboveground structures (18), historic districts (6), individual sites (7) and archaeological sites (9). Historically significant cultural resources that are also tourist attractions include Buck Island National Monument protected by the NPS northeast of the main island, Salt River Bay National Historical Park and Ecological Preserve, St. George Village Botanical Gardens, and the Estate Whim Museum.

St. Thomas

The most urban, and second largest of the three islands, St. Thomas contains the capital city of the USVI, Charlotte Amalie, which contains historic residences, commerce, industry, and monuments. The Dutch West India Company established a post on the island in 1657 with Denmark colonizing the island in 1672. The first slave ships arrived in 1673, and St. Thomas became a slave market. The British occupied the island on two separate occasions with the longest occupation between 1807 and 1815. The island remained under Danish rule through two British occupations in the first decades of the 1800s, until 1917 when it was purchased by the United States.[83]

As of April 5, 2024, there are 21 historic properties listed in the NRHP on the island of St. Thomas. The properties are categorized as aboveground structures (14), historic districts (2), individual sites (1) and archaeological historic districts (4). Historically significant cultural resources that are also tourist attractions include Plantation Crown and Hawk Botanical Garden and Bluebeard's Castle.

St. John

The smallest and most natural of the three islands, St. John contains a 9,500-acre terrestrial and underwater reserve, which encompasses approximately two-thirds of the island and is protected by the NPS. A Danish sailing vessel first raised a flag in 1672, with the Danish Governor Jorgen Iverson of St. Thomas, formally claiming the island in 1675. However, occupation by Europeans did not occur until 1718, when 20 Danish planters, 8 soldiers, and 18 slaves came over from St. Thomas. The island remained under Danish occupation until the 1917 purchase by the United States.[84]

---

[82] Wikipedia. n.d. Saint Croix. Accessed June 5, 2024, https://en.wikipedia.org/wiki/Saint_Croix.

[83] Wikipedia. n.d. St Thomas. Accessed June 5, 2024, https://en.wikipedia.org/wiki/Saint_Thomas,_U.S._Virgin_Islands.

[84] NPS. 2021. St. John History Timeline. Accessed June 6, 2024, https://www.nps.gov/viis/learn/timeline.htm.

As of April 5, 2024, there are 26 historic properties listed on the NRHP on the island of St. John. The properties are categorized as aboveground structures (11), historic districts (12), individual sites (2), and archaeological sites (1). Other historically significant cultural resources include Annaberg Sugar Mill Ruins, downtown Cruz Bay, and Coral Bay, which contains the highest elevation in the USVI. Also on St. John is the historic Catherineberg Sugar Mill Ruins, which are ruins are remnants of an 18th-century sugar and rum factory. The site includes a windmill, a still, a factory, a horse mill, a stable, and other structures.

5.12.2 Potential Impacts and Proposed Mitigation to Standing Historic Structures

In the analysis that follows, actions were determined to have an impact on historic resources if the action would (1) physically alter, damage, or destroy all or part of a resource or introduce visual, audible, or atmospheric elements that are out of character with the resource or alter its setting; or (2) alter the characteristics of the surrounding environment that contributes to the resource's significance or neglect the resource to cause deterioration or complete destruction.

Once the subrecipient identifies the proposed action locations, FEMA would assess the locations of direct and indirect impacts.

Pursuant to 36 CFR § 800.14(b), FEMA, in consultation with Virgin Islands State Historic Preservation Office (VISHPO) and VITEMA, developed a Programmatic Agreement that provided a strategy for achieving and expediting compliance with Section 106 of the NHPA. This includes exemptions from Section 106 review of certain activities having limited or no effect on historic properties, identification and evaluation of historic properties, and methods of resolving adverse effects. FEMA, VISHPO, and State Emergency Management Agency executed the Programmatic Agreement on July 14, 2016, and was extended on, June 20, 2023. FEMA would use all these tools to meet compliance requirements under Section 106 of the NHPA.

The proposed action alternatives could alter or impact NRHP-listed or NRHP-eligible historic properties. To determine the effect(s) and opportunities to avoid or minimize any adverse effects, FEMA would follow the standard project review as outlined in Stipulation II.D. of the amended Programmatic Agreement. FEMA would analyze the SOW to determine if the proposed action(s) fall under a programmatic allowances or stipulation outlined in the amended programmatic agreement. If the SOW meets a programmatic allowance or stipulation, the project would be compliant with Section 106 and the review process would be complete.

If the proposed SOW does not meet an allowance or stipulation, FEMA would initiate Section 106 consultation with VISHPO. If FEMA finds, and VISHPO concurs, that the proposed action would have an adverse effect on a historic property, FEMA would work with VISHPO, the recipient, subrecipient, and other identified consulting parties to avoid or minimize the adverse effect. If the adverse effect is unavoidable, FEMA would follow the process set forth in Stipulation II.D.6 of the amended Programmatic Agreement. FEMA would memorialize the outcome of this consultation using either the Abbreviated Consultation Process or through the development of a Memorandum of Agreement. FEMA may elect to develop a Project-Specific Programmatic

Agreement, if an MOA was not appropriate, that would provide a specialized Section 106 compliance strategy designed to meet the specific compliance needs of those projects.

Alternative 1: No Action

Under the **No Action** alternative, FEMA grant funding would not be provided and the local government of the USVI would have to fund permanent projects from other funding sources. If no action occurs to restore and improve the USVI stormwater management systems, then damaged roadways would remain in their current condition, which often are ineffectual. The **No Action** alternative would have the potential for minor short-term adverse impacts to the surrounding viewshed and would potentially limit access to historic resources with the possibility of additional damages being sustained from future storm events. Impacts to historic properties because of no action would result in long-term, minor adverse impacts to any resources.

Alternative 2: Repair, Replace, and Construct New Roadway and Related Infrastructure

The repair and reconstruction of existing roadway sections, stabilization of eroding areas, and replacement of gravel or asphalt pavement would have a negligible short-term adverse impact on the historic integrity of aboveground resources. For each project location, FEMA would review the SOW and location to identify potential impacts to historic resources. FEMA would consult with VISHPO in cases where a project has the potential to adversely affect a historic resource. Therefore, it is not anticipated that there will be long-term adverse impacts to aboveground resources. With the repair of the island's infrastructure, thereby allowing for continued access to historic resources and the mitigation of future flood events and associated damage, it is anticipated that **Alternative 2** would have a minor-to-moderate, long-term benefit on aboveground resources.

Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

As with **Alternative 2**, the improvement to the stormwater management systems by the addition of new culverts, increasing the size of existing culverts, construction of roadside ditches and drainage, and constructing or modifying a water detention facility would cause minor-to-moderate, short-term adverse impacts on aboveground resources in certain project areas. Mitigation measures would be required to offset any adverse effects to reduce impacts. Improving the stormwater infrastructure would have a minor-to-moderate, long-term benefit on aboveground resources through the added protection against future flood events. Consultation with VISHPO would occur in those cases with the potential to adversely affect historic resources.

Alternative 4: Construct Slope Stabilization Systems

As with **Alternative 2** and **Alternative 3**, the repair of areas that have experienced landslides—the construction of control measures along roadways to stabilize slopes and the implementation of soil erosion control measures along the roadways—would have a negligible short-term adverse impact on aboveground resources and a minor long-term benefit on aboveground resources

through continued access to historic sites. Consultation with VISHPO would occur in those cases with the potential to adversely affect historic resources.

Alternative 5: Combination of the Action Alternatives

Alternative 5 assumes that the subrecipient would execute part or all of the activities described under **Alternative 2** through **Alternative 4**. Based on the previous analysis, it is expected that the short-term adverse impacts of **Alternative 5** could range from negligible to moderate. Long-term beneficial impacts of **Alternative 5** are expected to range from minor to moderate, caused by direct and indirect impacts on potential aboveground historic properties. Consultation with VISHPO would occur in those cases that with the potential to adversely affect historic resources.

5.12.3 Existing Conditions–Archaeological Resources

Prehistoric populations were the Ciboney, Caribs, and Arawaks, who used seasonal camps to harvest conch and to fish and forage in reef environments and along the wetlands of the coast and the interior forests. Prehistoric archaeological sites in the USVI consist primarily of indigenous village sites. These archaeological districts include former village, fishing, and ceremonial sites and prehistoric ceramic scatter dating from 1100 BC to 1492 AD.

During Danish reign from 1685 to 1917, more than 97 percent of forests were destroyed for agriculture concentrated on sugar cane and rum produced by enslaved African laborers and, later, exploited descendants of formerly enslaved communities. Historic archaeological sites in the USVI relate to remnant rock shelters, historic encampment foundations, port facilities, shipwrecks, and “slave villages” and burials, dating from 1600 to 1864.

The processes of new roadway construction, infrastructure improvements, and slope stabilization include ground disturbance and, therefore, could adversely affect archaeological resources. All action alternatives have the potential to disturb archaeological resources because of excavation, construction staging, and site access that could disturb previously undisturbed soils. Actions that include significant ground-disturbing activities may adversely affect archaeological resources if they are present. Before ground disturbance occurs for any action alternatives, the subrecipient would conduct research to determine if any archaeological resources exist in the APE. Criteria used to determine impacts include an evaluation of NRHP eligibility for known and previously identified archaeological sites. Transportation requirements or mitigating action may occur to determine site boundaries, assess eligibility, and ensure protectiveness.

5.12.4 Potential Impacts and Proposed Mitigation, Archaeological Resources

In the analysis that follows, actions were determined to have an impact on archaeological resources if the action would have the potential to disturb archaeological resources because of excavation, construction staging, and site access that disturbs previously undisturbed soils. Actions that include significant ground-disturbing activities may adversely affect archaeological resources if they are present. Before ground disturbance occurs because of any action alternatives, the subrecipient

would conduct research through the VISHPO office to determine if any archaeological resources exist in the APE.

Criteria used to determine impacts include NRHP eligibility of identified archaeological sites. Construction practices or mitigating action may occur to determine site boundaries, assess eligibility, and ensure protectiveness.

Alternative 1: No Action

Under the **No Action** alternative, FEMA would not undertake or fund projects that would restore or improve the USVI roadway infrastructure that includes repair and construction, stormwater detentions systems, and slope stabilization. Damaged infrastructure would remain in its current state, which often remains nontraversable. The **No Action** alternative would have no impact on archaeological historic resources because no construction disturbance would occur. However, failure to implement alternative actions would continue to leave unknown archaeological resources vulnerable to erosion and flood risks, thus exposing or washing away historic artifacts.

Alternative 2: Repair, Replace, and Construct New Roadway and Related Infrastructure

The repair and reconstruction of existing roadway sections, stabilization of eroding areas, and replacement of gravel or asphalt pavement, if not located within a known cultural site, would likely have a negligible short- and long-term adverse impact depending on the integrity of archaeological resources, should they exist within the APE. If archaeological resources are identified within the APE, any ground-disturbing activities will require mitigating measures to offset adverse impacts to archaeological resources. For each project location, FEMA would review the SOW and location to identify potential impacts to historic resource sites. FEMA would consult with VISHPO in cases where a project has the potential to adversely affect a historic resource.

Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

The development of new stormwater management systems and drainage structures in **Alternative 3** could be in areas with undisturbed ground. If archaeological resources are determined to be present within the APE, it would likely have moderate adverse, short- and long-term impacts on those resources because of the significant ground-disturbing construction impacts. Any ground-disturbing activities that occur, if archaeological resources are present, would trigger regulatory and possibly mitigating measures in accordance with the VISHPO. The subrecipient would consider regulatory requirements before selecting the locations and type of system proposed; additionally, the subrecipient will avoid locations containing below-surface archaeological resources, if possible. FEMA would consult with VISHPO in cases where a project has the potential to adversely affect a historic resource.

Alternative 4: Construct Slope Stabilization Systems

As with **Alternative 2**, the repair of areas that have experienced landslides—the construction of control measures along roadways to stabilize slopes and the implementation of soil erosion control measures along the roadways, if not located within a known archaeological site—would likely have a negligible adverse impact depending on the integrity of archaeological resources, should they exist within the APE. If the landslide occurred within an area of previously undisturbed ground, like **Alternative 3**, and archaeological resources were determined to be present within the APE, it would likely have short- and long-term, moderate adverse impacts on those resources because of the ground-disturbing construction-related impacts. FEMA would consult with VISHPO in cases where a project has the potential to adversely affect a historic resource.

Alternative 5: Combination of the Action Alternatives

Alternative 5 assumes that the subrecipient would execute part or all of the activities described under **Alternative 2** through **Alternative 4**. Based on the previous analysis, it is expected that the short-term adverse impacts of **Alternative 5** could range from minor to moderate, depending on the extent of ground disturbance required. Long-term impacts of **Alternative 5** are expected to range from negligible-to-moderate adverse impacts (caused by disturbing previously undisturbed soils). FEMA would consult with VISHPO in cases where a project has the potential to adversely affect a historic resource.

5.13 Aesthetic Resources

FEMA does not have specific guidance for assessing impacts on visual and aesthetic resources within a cultural landscape. Visual resource impact methodologies have been developed by some federal agencies, and these may be applied to specific projects if potential impacts on aesthetic quality is a concern. Visual impacts of a project are generally related to whether the project would obstruct desirable views (e.g., views within a beach or park, of a historic monument or site) and the degree of contrast the project may introduce to a view (e.g., nonnatural features such as a metal sheet pile wall in a natural landscape with no other human-made elements visible).

5.13.1 Existing Conditions

The USVI is a group of islands and inlets in the Caribbean Sea with numerous beaches and historic architecture that support a robust tourism industry. Viewsheds and aesthetic resources vary across the islands and include national monuments and sites, botanical gardens, and ocean views. On St. Croix, the Buck Island Reef National Monument, Christiansted National Historic Site, and Salt River National Historic Park and Ecological Preserve are nationally recognized visual and aesthetic resources.[85] The St. George Botanical Garden of St. Croix contains 16 acres of Caribbean

[85] NPS. 2024. Virgin Islands. Accessed April 20, 2024, https://www.nps.gov/state/vi/index.htm.

and pantropical plants.[86] St. John includes the Virgin Islands National Park and the Virgin Islands Coral Reef National Monument.[87] St. John is also known for its white sand beaches and unspoiled terrestrial habitats.[88] Documentation of specific aesthetic resources was not found for St. Thomas; however, this does not necessarily indicate a lack of aesthetic quality. Although USVI does not have scenic byways designated under the National Scenic Byway Program, there are numerous recognized roads with scenic value including the East End, North Shore, and Heritage Trail in St. Croix.[89]

5.13.2 Potential Impacts and Proposed Mitigation

In the analysis that follows, actions were determined to have an impact on aesthetic resources if the action would (1) alter the existing viewshed in a negative way; (2) obstruct existing views of significant parks, beaches, roads with scenic value, national monuments, or national historic sites; or (3) inhibit access to significant parks, beaches, roads with scenic value, national monuments, or national historic sites.

Alternative 1: No Action

Under the **No Action** alternative, FEMA would not undertake or fund any stormwater mitigation projects. Thus, there would be no short-term impact on aesthetic resources.

Because periodic roadway flooding would continue to occur, there would be impacts on visual resources (depending on a viewer's location) from flood-related damage and degradation and reduced access to scenic resources. Currently damaged roadways would remain in a state of disrepair, which would likely be perceived as a reduction of aesthetic quality. Landslides and erosion resulting from flooding could reduce the visual quality of beaches, areas along roadways, and parks/gardens. Therefore, the **No Action** alternative would have negligible-to-minor, long-term adverse impacts on visual resources in the study area.

Alternative 2: Repair, Replace, and Construct New Roadway and Related Infrastructure

The construction of projects under **Alternative 2** could obstruct views along roadways (owing to construction equipment and personnel), require vegetation removal, or otherwise temporarily reduce the quality of the viewshed within the project area. However, temporary visual degradation would occur near the work and is not expected to degrade visually significant sites such as national

[86] St. George Village Botanical Garden. 2024. Welcome to the St. George Village Botanical Garden. Accessed April 20, 2024, https://www.thegardenstcroix.org/.

[87] Ibid.

[88] USVI. 2024. The United States Virgin Islands. Accessed April 20, 2024, https://www.visitusvi.com/.

[89] Trip Advisor. 2024. Scenic Drives in U.S. Virgin Islands. Accessed April 20, 2024, https://www.tripadvisor.com/Attractions-g147400-Activities-c47-t74-U_S_Virgin_Islands.html.

monuments, historic sites, parks, or beaches. Therefore, **Alternative 2** would result in negligible-to-minor, short-term adverse impacts on visual resources.

In the long term, the repair, replacement, and construction of new roadways and related infrastructure would likely be perceived as a visual improvement compared to existing infrastructure degraded from flood-related damage. Reducing the risk of flooding would minimize inundation of, and damage to, roadways, thereby maintaining access to visual resources. Therefore, projects under **Alternative 2** would have negligible-to-minor, long-term beneficial impacts on visual resources.

Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

Under **Alternative 3**, temporary visual degradation associated with construction would occur near the work and would not be expected to degrade visually significant sites, such as national monuments, historic sites, parks, or beaches. Therefore, projects under **Alternative 3** would have negligible-to-minor, short-term adverse impacts on visual resources from construction-related degradation of views or temporary road and lane closures limiting access to visual resources.

In the long term, impacts of projects under **Alternative 3** would vary depending on the type and location of the project. For example, the installation of a culvert or a concrete drainage could be perceived as reducing the overall aesthetics of the site, as it could take away from the natural appearance of a ghut. However, the accompanying reduction in flood risk would minimize visual degradation caused by scattered debris and sediment transported through receding flood waters and flood-related damage to infrastructure such as cracks in the road. Additionally, many of the projects that would be implemented under **Alternative 3** would use bioengineering methods, which would likely be perceived as an improvement to the existing condition. Underground stormwater lines would not be visible; therefore, no long-term adverse impact would occur. Upsizing or constructing new retention and detention ponds would likely require vegetation removal and would alter the existing topography of the project site; however, disturbed areas would be revegetated following construction. Repairing, upsizing, and constructing drainage structures and stormwater management systems would likely be perceived as a visual improvement from existing degraded infrastructure. Therefore, this alternative would have negligible-to-minor, long-term beneficial impacts on aesthetic resources.

Alternative 4: Construct Slope Stabilization Systems

Under **Alternative 4**, temporary visual degradation associated with construction would occur near the work and would not be expected to degrade visually significant sites, such as national monuments, historic sites, parks, or beaches. Therefore, projects under **Alternative 4** would have

negligible-to-minor, short-term adverse impacts on visual resources from construction-related degradation of views or temporary road and lane closures limiting access to visual resources.

In the long term, the construction of slope stabilization systems would change the visual appearance of slopes within the project area, which could be perceived as improvements or deteriorations. Some projects implementing slope stabilization systems that use concrete or brick may disturb the natural appearance of the landscape. However, the use of brick, gabion walls, sod, or vegetated buffers may be considered more visually appealing. All projects implemented under **Alternative 4** would reduce the risk of landslides and slope destabilization, which would improve the area's overall appearance by reducing erosion-induced debris and infrastructure damage. Therefore, projects under **Alternative 4** are expected to result in negligible-to-moderate, long-term beneficial impacts.

Alternative 5: Combination of the Action Alternatives

Alternative 5 assumes that the subrecipient would execute part or all of the activities described under **Alternative 2** through **Alternative 4**. The potential impacts of **Alternative 5** encapsulate the range of possible impacts that could result from **Alternative 2** through **Alternative 4**, which are evaluated in the preceding subsections. Based on the previous analysis, it is expected that **Alternative 5** would result in negligible-to-minor, short-term adverse impacts from construction-related visual disturbances. In the long term, **Alternative 5** is expected to have negligible-to-moderate beneficial impacts resulting from a reduction in flood damages and an increase in bioengineered stormwater mitigation infrastructure.

5.14 Environmental Justice

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires federal agencies to identify and address disproportionately high and adverse human health effects of its programs, policies, and activities on minority populations and low-income populations. DHS Directive 023-04, Subsection 1-101 establishes policy related to integrating environmental justice into FEMA programs, policy, and activities. FEMA also follows EPA's guidelines to assess disproportionately high and adverse human health or environmental effects.

EO 14008, Tackling the Climate Crisis at Home and Abroad, directs agencies to make achieving environmental justice part of their missions by developing programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related, and other cumulative impacts on disadvantaged communities, and the accompanying economic challenges of such impacts. The EO also established the Justice40 Initiative, a whole government effort to ensure that federal agencies work with states and local communities to deliver at least 40 percent of the overall benefits from federal investments in climate and clean energy to disadvantaged communities.

5.14.1 Existing Conditions

The University of the Virgin Islands conducts population studies that include community surveys as recent as 2015. However, U.S. Census data are the most recent complete data set, available for 2020, which indicates the percentage of families and people with income below the poverty level ranges from approximately 14 to 21 percent across the USVI (**Table 5.5**). The percentage of minority population ranges from approximately 50 to 74 percent (**Table 5.6**).

Table 5.5. Population, Households, and Income Characteristics

Location	Population	Number of Households	Median Household Income	Percentage of Families and People with Income Below Poverty Level
St. Croix	41,004	18,083	$39,445	20.7%
St. Thomas	42,261	19,705	$40,464	16.9%
St. John	3,881	1,854	$50,352	14.2%
USVI	87,146	39,642	$40,408	18.6%

Source: U.S. Census Bureau 2020

Table 5.5 Minority Characteristics

Location	Black/African	White	Other
St. Croix	71.0%	12.0%	17.0%
St. Thomas	73.6%	12.6%	13.8%
St. John	50.3%	35.2%	14.5%
USVI	71.4%	13.3%	15.3%

Source: U.S. Census Bureau 2020

Determining a project's potential for impacting these populations disproportionately is highly location- and project-dependent. Therefore, FEMA would evaluate environmental justice concerns on a project-by-project basis. To conduct environmental justice analyses, FEMA typically uses the EPA EJScreen tool to evaluate the presence of environmental justice communities, and associated impacts at the project scale. EPA recommends using a 0.5-to-1-mile radius from a project location to identify environmental justice impacts.

In accordance with FEMA's EO 12898 Environmental Justice: Interim Guidance for FEMA EHP Reviewers (September 2023), a minority or low-income population exists if people of color and/or low-income populations equals or exceeds 50 percent of the total population. According to EJScreen, low-income and minority populations are present on all three islands and dispersed

across the islands.[90] Although FEMA typically also relies on the Environmental Justice Indexes published by EJScreen to determine the presence of minority and low-income populations, EJScreen has not published Environmental Justice Index data for the USVI as of August 2024.

5.14.2 Potential Impacts and Proposed Mitigation

In the analysis that follows, actions were determined to have an impact on environmental justice populations if the action would have disproportionately high and adverse impacts on environmental justice populations compared to nonenvironmental justice populations.

Alternative 1: No Action

Under the **No Action** alternative, FEMA would not undertake or fund any stormwater mitigation projects; therefore, this alternative would have no short-term impacts on environmental justice populations.

In the absence of flood mitigation measures, stormwater management and conveyance along roadways would not be improved. During flood events, inundated roadways would become impassible and impede access to emergency services, thereby exposing all populations, including environmental justice populations, to hardship and health risks. Rain-induced landslides would continue to generate debris and sediment that threatens the foundation of residential homes. Low-income populations may be particularly burdened by the cost of repairs and recovery. Therefore, there could be minor-to-moderate, long-term adverse impacts on environmental justice populations from the continued risk of flooding and associated loss of access and/or damage to roadways and homes. Disproportionately high and adverse impacts on environmental justice populations could occur depending on the location and severity of flood damage.

Alternative 2: Repair, Replace, and Construct New Roadway and Related Infrastructure

Under **Alternative 2**, negligible-to-minor, short-term adverse impacts on all populations, including environmental justice populations, could occur during the construction of individual projects. Construction would result in temporary increases in noise and air quality emissions from the use of heavy equipment. Temporary road closures or lane closures may be required. Detours are expected to be provided; access to residences and community facilities is expected to be maintained. Projects tiered from this PEA would include an assessment for site-specific considerations related to environmental justice. For each project location, FEMA would consider the SOW and location to identify potential impacts to identified environmental justice communities. FEMA would consult with EPA in cases where a project has the potential to adversely impact an environmental justice community. Therefore, FEMA anticipates that impacts

[90] EPA. 2024c. EJScreen. Accessed April 20, 2024, https://ejscreen.epa.gov/mapper/.

on environmental justice populations would not be disproportionately high or adverse compared to the impacts nonenvironmental justice populations.

In the long term, **Alternative 2** would result in minor-to-moderate beneficial impacts to all populations, including environmental justice populations, by improving existing roadways and constructing new roadways, which would facilitate continued access to residences, community facilities, and emergency response services.

Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

Under **Alternative 3**, negligible-to-minor, short-term adverse impacts would occur to all populations, including environmental justice populations, from the use of equipment and associated noise and air quality emissions. Temporary road closures or lane closures may be required; however, detours are expected to be provided and access to residences is expected to be maintained. Projects tiered from this PEA would include an assessment for site-specific considerations related to environmental justice. For each project location, FEMA would consider the SOW and location to identify potential impacts to identified environmental justice communities. FEMA would consult with EPA in cases where a project has the potential to adversely impact an environmental justice community. Therefore, FEMA anticipates that impacts on environmental justice populations would not be disproportionately high or adverse compared to the impacts nonenvironmental justice populations.

In the long term, **Alternative 3** would result in minor-to-moderate beneficial impacts to all populations, including environmental justice populations, by reducing the risk of flooding from damaged or inadequate drainage and stormwater management systems. Reduced flooding would ensure continue access to residences, community facilities, and emergency response services.

Alternative 4: Construct Slope Stabilization Systems

Under **Alternative 4**, negligible-to-minor, short-term adverse impacts could occur to all populations, including environmental justice populations, from the use of equipment and associated noise and air quality emissions. Projects tiered from this PEA would include an assessment for site-specific considerations related to environmental justice. For each project location, FEMA would consider the SOW and location to identify potential impacts to identified environmental justice communities. FEMA would consult with EPA in cases where a project has the potential to adversely impact an environmental justice community. Therefore, FEMA anticipates that impacts on environmental justice populations would not be disproportionately high or adverse compared to the impacts nonenvironmental justice populations.

In the long term, **Alternative 3** would result in minor-to-moderate beneficial impacts to all populations, including environmental justice populations, by reducing the risk of flood-related landslides and erosion and associated debris that threatens the foundation of residential homes.

Alternative 5: Combination of the Action Alternatives

Alternative 5 assumes that the subrecipient would execute part or all of the activities described under **Alternative 2** through **Alternative 4**. The potential impacts of **Alternative 5** encapsulate the range of possible impacts that could result from **Alternative 2** through **Alternative 4**, which are evaluated in the preceding subsections. Based on the previous analysis, it is expected that **Alternative 5** would result in negligible-to-minor, short-term adverse impacts from temporary, construction-related air quality and noise impacts. However, these impacts would affect all populations near the project area equally; therefore, disproportionately high and adverse impacts on environmental justice populations are not expected to occur. In the long term, **Alternative 5** is expected to have minor-to-moderate beneficial impacts resulting from repairing flood damages and improving the reliability of safe transportation along roadways in the study area.

5.15 Land Use and Planning

FEMA considers local comprehensive plans, land use plans and zoning code, including federal, state, and local overlay environmental and historic districts, when building in local jurisdictions. When the subrecipient defines a specific action area, additional research would be required as it relates to land use and planning requirements for that jurisdiction. In the interim, overviews of land use and planning are based on current aerial photography and USVI government profiles and encyclopedic data for each island.

5.15.1 Existing Conditions

The USVI government identifies St. Croix as a cultural destination, St. John as a natural destination, and St. Thomas as a cosmopolitan destination.[91] As of 2018, 95.7 percent of the population of USVI lived in urban areas, where public housing is historically concentrated, and 4.3 percent lived in rural areas, owing to historical land conservation efforts.[92] Based on the economy, land use has evolved from a forested landscape during prehistoric occupation, to the removal of 97 percent of the forest for sugarcane plantations and rum distilling businesses during the historic period from the 18th to 20th century, which led to the development of urbanized, agricultural, and industrial pockets among large areas of land that have been conserved for wildlife and tourism.[93] In the late 20th century, more-diversified crops, including mangoes, bananas, papayas, avocados, tomatoes, and cucumbers, and fields for cattle, goats, sheep, and pigs, replaced sugarcane plantations.[94]

---

[91] FEMA. 2022. Programmatic Environmental Assessment U.S. Virgin Islands Housing Actions St. Croix, St. John, and St. Thomas, USVI. 4340-VI. December.

[92] Ibid.

[93] FEMA. 2022. Programmatic Environmental Assessment U.S. Virgin Islands Housing Actions St. Croix, St. John, and St. Thomas, USVI. 4340-VI. December.

[94] Ibid.

St. Croix's land is one-fifth in farmland production, with mountains to the north, rolling-to-level plains to the south, low-density resort communities interspersed throughout these areas, and the historic towns of Christiansted to the northeast and Frederiksted to the southwest capping the ends of the island. Infrastructure includes a government-constructed dam, paved roads with bus service and ferries, an international airport, a former oil refining plant, and two deep-water ports (one in Frederiksted for tourism and one in Limetree Bay for container ships in the industrial center to the south).[95]

St. John has rugged mountainous terrain with the Virgin Islands National Park comprising two-thirds of the island. Much of the rest of the island is utilized for resorts, including two urban areas—Cruz Bay to the southwest and Coral Bay to the east. Infrastructure on the island includes paved roads with bus service and interisland ferries between St. John and St. Thomas.

St. Thomas has rugged mountainous terrain with low-density resort communities interspersed. Infrastructure includes a government-constructed dam, paved roads with bus service, interisland ferries, an international airport, and a deep-water port in Charlotte Amalie that serves as the USVI capital.

5.15.2 Potential Impacts and Proposed Mitigation

In the analysis that follows, actions were determined to have an impact on land use and planning if the action would have the potential to change currently designated land uses or limit the capacity of an area to be used in the way it is currently designated.

Alternative 1: No Action

Under the **No Action** alternative, FEMA would not undertake or fund any stormwater mitigation projects; thus, this alternative would have no short-term impact on land use and planning.

Because the risk of flooding and erosion would not be mitigated under this alternative, future flooding and erosion may interfere with the long-term implementation of existing land use plans. Therefore, the **No Action** alternative would have negligible, long-term, adverse impacts on land use, planning, and zoning.

Alternative 2: Repair, Replace, and Construct New Roadway and Related Infrastructure

Under **Alternative 2**, the improvement of existing infrastructure systems and construction of new roadways would occur. This would include upgrades to the existing system allowing greater protection against future natural disasters. **Alternative 2** would not disrupt the existing land use and supporting infrastructure that remains undamaged because strategies would be put in place to mitigate the construction phase. Therefore, projects under this alternative would have no short-term impact on land use and planning.

[95] Ibid.

The implementation of projects under **Alternative 2** are not expected to require changes in zoning within project areas. Projects under **Alternative 2** would improve roadways and transportation within the study area. As such, **Alternative 2** is expected to have negligible-to-minor, long-term beneficial impacts on land use and planning.

Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

Under **Alternative 3**, the construction and improvement of new drainage structures and stormwater management systems would occur. As is anticipated under **Alternative 3**, construction and alteration of culverts, channels, swales, and other areas of water storage or conveyance would incorporate new upgrades that would assist in mitigating future storm events. It is also anticipated that **Alternative 3** would not disrupt the existing land use and supporting infrastructure that remains undamaged because strategies would be put in place to mitigate the construction phase (as identified in Section 5.17 and Section 5.19). Therefore, projects under **Alternative 3** would have no short-term impact on land use and planning.

The implementation of projects under **Alternative 3** are not expected to require changes in zoning within project areas. Projects under **Alternative 3** would redirect water from high-risk flood areas and providing long-term solutions for periodic flooding events. As such, **Alternative 3** is expected to have negligible-to-minor, long-term beneficial impacts on land use and planning.

Alternative 4: Construct Slope Stabilization Systems

Alternative 4 would have similar impacts as **Alternative 2** and **Alternative 3**, as projects under **Alternative 4** would not disrupt the existing land use and supporting infrastructure that remains undamaged because strategies would be put in place to mitigate the construction phase (as identified in Section 5.17 and Section 5.19). Therefore, projects under this alternative would have no short-term impact on land use and planning.

The implementation of projects under **Alternative 4** are not expected to require changes in zoning within project areas. Projects under **Alternative 4** would reduce hazards related to slope failures. As such, **Alternative 4** is expected to have negligible-to-minor, long-term beneficial impacts on land use and planning.

Alternative 5: Combination of the Action Alternatives

Alternative 5 assumes that the subrecipient would execute part or all of the activities described under **Alternative 2** through **Alternative 4**. The potential impacts of **Alternative 5** encapsulate the range of possible impacts that could result from **Alternative 2** through **Alternative 4**, which are evaluated in the preceding subsections. Based on the previous analysis, it is expected that **Alternative 5** would result in no short-term impacts. In the long-term, **Alternative 5** is expected

to have negligible-to-minor beneficial impacts resulting from the implementation of hazard mitigation activities.

5.16 Noise

The Noise Control Act of 1972, 42 U.S.C. Part 4901, et seq. regulates noise levels at the federal level. The act defines noise as an undesirable sound. Noise standards developed by EPA (1974) provide a basis for state and local governments' judgments in setting local noise standards. Local governments often implement noise ordinances that limit excessive noise, such as time limits on construction work.

Sound levels are typically measured in decibel units on the A-weighted scale (a scale based on the range of sounds that the human ear can hear). This scale is expressed in units known as dBA. The day-night-average sound level (DNL) is an average measure of sound for a 24-hour period expressed in dBA and takes into account the volume of each sound incident, the number of times each incident occurs, and the time of day each incident occurs (nighttime sound being weighted more heavily because it is assumed to cause a higher level of disturbance to the community). Federal agencies accept the DNL descriptor as a standard for estimating sound impacts and establishing guidelines for compatible land uses.

Sounds that disrupt normal activities or otherwise diminish the quality of the environment are considered noise. Noise events that occur during the night (e.g., 10 p.m. to 7 a.m.) are more annoying than those that occur during regular waking hours (e.g., 7 a.m. to 10 p.m.). Assessment of noise impacts includes consideration of the proximity of the noise sources to sensitive receptors. A sensitive receptor is defined as an area of frequent human use that would benefit from a lowered noise level.

Typical sensitive receptors in developed areas include residences, schools, churches, hospitals, and libraries. In more sparsely developed areas, noise-sensitive receptors would include recreational developments, such as parks, campgrounds, water access sites, trails, historic properties, and properties of religious and cultural significance. Recreational areas are areas that rely on quiet settings as an essential part of their character. Typical noise sources in residential or recreational areas are associated with climatic conditions (wind, rain), transportation (traffic on roads, airplanes), and life sounds (people talking, children playing, yard maintenance).

5.16.1 Existing Conditions

Primary sources of ambient noise, or background sound, in the USVI include transportation such as vehicular traffic and intermittent construction activities. The study area encompasses a wide range of noise environments and individual project areas may include noise sensitive receptors such as libraries, schools, parks, or residential areas. Because the purpose of the projects would be to reduce hazards that threaten structures and infrastructure, there would likely be some human use near each project area.

5.16.2 Potential Impacts and Proposed Mitigation

In the analysis that follows, actions were determined to have a noise impact if the action would (1) increase ambient noise levels in the project area, (2) increase the duration of elevated noise levels, or (3) increase nighttime noise levels.

Alternative 1: No Action

Under the **No Action** alternative, FEMA would not undertake or fund any stormwater mitigation projects. Therefore, this alternative would have no short-term impact on noise levels in the study area.

In the absence of stormwater mitigation activities, damage to existing infrastructure would persist because of storms and floodwaters. Thus, elevated noise levels during repeated repair efforts after major storm events would continue to negatively impact residents long term. Therefore, the **No Action** alternative would have negligible-to-minor, long-term adverse impacts.

Alternative 2: Repair, Replace, and Construct New Roadway and Related Infrastructure

Under **Alternative 2**, construction and repair activities would temporarily increase ambient noise levels within and around the construction sites. To mitigate noise, the subrecipient would implement BMPs, including both engineering and administrative controls, to isolate sensitive receptors from the noise hazard and ensure workers have an optimized work schedule to lessen noise effects while they are carrying out the construction activities. For example, engineering controls may include the use of low-noise machinery, effectively maintaining said machinery, and strategically placing noise barriers between construction activities and sensitive noise receptors. Additionally, administrative controls may include the operation of noisy machinery only during specific daytime hours and establishing dedicated quiet areas where project workers may take their scheduled breaks. With the implementation of these BMPs, projects under **Alternative 2** are expected to result in negligible-to-minor, short-term adverse impacts.

In the long term, road repairs performed under this alternative are expected to reduce the frequency at which future road repairs are required. Thus, projects under **Alternative 2** are expected to have negligible-to-minor, long-term beneficial impacts related to noise since the use of heavy machinery associated with roadway repairs would occur less frequently.

Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

Like **Alternative 2**, improving, replacing, and constructing new roadside draining structures and stormwater management systems would temporarily increase ambient noise levels in and around the construction sites. Noise mitigation measures would be the same as those described in **Alternative 2**; it is anticipated that the construction activities would have negligible-to-minor, short-term adverse noise impacts. In the long term, flood hazards would be reduced and therefore

less damage would occur to roadways and other infrastructure. The reduction in frequency of repair activities is expected to result in negligible-to-minor, long-term beneficial impacts related to noise.

Alternative 4: Construct Slope Stabilization Systems

Constructing slope stabilization systems and erosion control systems would temporarily increase ambient noise levels in and around the construction sites, as described under **Alternative 2** and **Alternative 3**. Noise mitigation measures would be the same as those described in **Alternative 2** and **Alternative 3**; it is anticipated that the construction activities would have negligible-to-minor, short-term adverse noise impacts. In the long term, erosion hazards would be reduced and therefore less damage would occur to roadways and other infrastructure. The reduction in frequency of repair activities is expected to result in negligible-to-minor, long-term beneficial impacts related to noise.

Alternative 5: Combination of the Action Alternatives

Alternative 5 assumes that the subrecipient would execute part or all of the activities described under **Alternative 2** through **Alternative 4**. The potential impacts of **Alternative 5** encapsulate the range of possible impacts that could result from **Alternative 2** through **Alternative 4**, which are evaluated in the preceding subsections. Based on the previous analysis, it is expected that **Alternative 5** would result in negligible-to-minor, short-term adverse impacts from construction-related noise increases. In the long term, **Alternative 5** is expected to have negligible-to-minor beneficial impacts resulting from a reduction in the frequency of construction to repair flood/erosion damage.

5.17 Transportation

The USVI DPW is mandated to plan, construct and maintain the territory's public roads, highways, storm drainage systems, public transportation systems, public parking facilities, public buildings, and public cemeteries. The DPW's Division of Public Transportation promotes public transit, has the responsibility for transportation planning, highway research, planning, and oversight of the VI Public Transit System (VITRAN), public parking lots, and all traffic control devices, such as pavement markings, signs, and traffic signals. The Virgin Islands Port Authority (VIPA) is an autonomous agency that owns and manages the two airports and most of the public seaports in the USVI. The VIPA also maintains the harbors in the territory but does not control the mooring and anchoring of vessels, which is under the jurisdiction of the USVI DPNR.

5.17.1 Existing Conditions

Roadways, vehicles, sidewalks, parking, ferries and car barges, trails, and airports comprise the transportation system for the USVI. There are no railways, and walking and cycling infrastructure is extremely limited because of topography. Public bus transport, which is often unreliable, taxis, shuttle services, and personal vehicles support transportation activity within each island. Primarily sea and air transportation carry supplies and daily necessities. Air and sea links also serve as crucial escape routes before major hurricanes for those who want to evacuate.

Roads: The USVI road network includes 1,230 miles of roads—340 miles classified as federal routes, 410 local, and 480 private roads.[96] In the USVI, highways that begin with the numbers one and two are located on the island of St. John; three and four are located on St. Thomas; and five, six, seven, and eight are located on St. Croix. Because of the terrain, roads are often narrow and steep with sharp turns.

Most federal routes and local public roads are two-lane roadways paved with asphalt or concrete, mostly without shoulders. Some street signage exists, and ghuts, which is the common term for watercourse, culverts, inlets, and swales that provide drainage. Retaining walls on steep slopes are common strategies to help to prevent road collapse and landslides. Many of the public roads suffer from deferred maintenance owing to planning, lack of resources, and difficult procurement processes.[97] This leads to deterioration of the roadways, potentially making it difficult for emergency services or equipment to use them effectively. This deferred maintenance applies to both federal routes and private multihousehold roads that are typically unpaved, semipaved, or poorly built. Most residents access their homes via private multihousehold roads.

Cycling and Walking: Designated bike lanes do not exist, but the DPW has approved the proposed 15-mile bike lane for St. Croix.[98] Pedestrian access is limited or dangerous; however, St. Thomas does have historical "step streets" that allow quick access up steep hills between streets in the historic Charlotte Amalie district. Most pedestrians walk on the side of the road, owing to limited sidewalks.

Public Transportation: A public bus system, provided by VITRAN, is available on all three islands. Taxis are available as shared-ride multipassenger taxis, open-air safari taxis, and private taxis. VITRAN services local residents, cruise ship tourists, and provides transport to or from the airports.

The following sections discuss seaports, ferries, car barges, and airports, which are also available in the USVI along with additional details about major roads in the territory.

St. Croix

There are two airports operated by the VIPA on St. Croix:

- Henry E. Rohlsen Airport, Christiansted, is a primary airport in the USVI. It provides commercial services of more than 10,000 passenger boardings, or enplanements, each year. In 2019, there were a total of 212,812 enplanements.
- The Svend Aaage Ovesen Jr. Seaplane Terminal, located in the water ghut, in Christiansted. offers daily service to downtown Charlotte Amalie, St. Thomas. Flights are also available

[96] USVI Hurricane Recovery and Resilience Task Force. 2018. USVI Hurricane Recovery and Resilience Task Force: Report.

[97] Ibid.

[98] Ibid.

to San Juan Puerto Rico with connections to the British Virgin Islands via interisland ferries.[99]

There are three cargo and ferry terminals operated by the VIPA in St. Croix:

- The Gallows Bay Dock in Christiansted is a vital link for small cargo vessels serving St. Croix and other Caribbean islands. It accommodates mini-cruise vessels, small inter-island sloops, ferries, private yachts, cargo and U.S. Coast Guard vessels.
- The Gordon A. Finch Molasses Pier in Krause Lagoon is under construction. It provides docking space for cable vessels, cable storage, molasses, and aggregate vessels. Current VIPA plans are to shift cargo operations from Gallows Bay Marine Facility to this Pier.
- The Wilfred "Bomba" Allick Port and Transshipment Center in Krause Lagoon, is locally known as "The Containerport." This port is the hub for commercial and industrial marine activity on St. Croix and serves as a transshipment center to other locations.

St. John

There are no major airports on St. John. Private ferries and car barges offer passenger services between the islands. Two private franchises—Varlack Ventures and Transportation Services of St. John—operate the most common passenger ferry route between Red Hook on St. Thomas and Cruz Bay on St. John. There is also a car barge on St. John operated by.[100] There are three cargo and ferry terminals on St. John:

- The Loredon Lawrence Boynes Sr. Dock in Cruz Bay is the main port of entry to St. John. Ferry service runs to Red Hook and the Charlotte Amalie Harbor in St. Thomas.
- The Theovald Eric Moorehead Dock and Terminal at Enighed Pond is now a cargo facility, has 650 lineal feet of berthing space, 6 acres for cargo handling and storage, and a channel and turn-around area for vessels up to 175 feet in length. An administration building is also here and houses the VIPA dock master's office and public restrooms.
- The Victor William Sewer Marine Facility, also known locally as "The Creek," allows for the berthing of passenger ferries, charters, and tenders. All vessels that require federal inspection must use this facility.

USVI residents refer to Highway 10 as Center Line Road and runs from Cruz Bay at Highway 20 east–west through the center of the island intersecting the Virgin Islands National Park and ends near Round Bay. There are three auxiliary routes—Highway 104, Highway 107, and Highway 108.

St. Thomas

There are two airports in St. Thomas:

[99] VIPA. 2024. Official website. Accessed April 2024, https://www.viport.com.
[100] Ibid.

- Cyril E. King Airport in Charlotte Amalie is a primary airport in the USVI. It offers commercial service of more than 10,000 passenger enplanements each year. In 2019, there were a total of 417,871 enplanements.
- The Charles F. Blair Seaplane Terminal in Charlotte Amalie offers service to St. Croix, San Juan, Puerto Rico, and connections to the British Virgin Islands via inter-island ferries.[101] There are private ferries and car barges operating out of St. Thomas. The most common passenger ferry route is between Red Hook on St. Thomas and Cruz Bay on St. John. DPW subsidizes the operations and maintenance of the private ferries.

There are four cargo and ferry terminals in St. Thomas:

- The Edward Wilmoth Blyden IV Marine Terminal in Charlotte Amalie's waterfront that supports passenger vessels traveling between St. Thomas, St. John, and Tortola. Recent upgrades make it compliant with the Americans with Disabilities Act (ADA) and includes an elevator and renovated restrooms within the terminal.
- The Charlotte Amalie Waterfront accommodates yachts and other luxury vessels, mini-cruise ships, and cruise ship tenders.
- The Crown Bay Cargo Port is vital to the USVI economy and receives most of its foods, materials, and other goods.
- The Urman Victor Fredericks Marine Terminal in Red Hook supports passenger travel between St. Thomas and St. John, and to and from the British Virgin Islands. Cruise ships arrive either at the VIPA-operated Austin "Babe" Monsanto Marine Facility or the West Indian Company Ltd. dock across the harbor in Havensight.

Highway 30 is a major road on St. Thomas. It begins in the western part of the island where it is also called Fortuna Road and provides access to Cyril E. King Airport via Highway 302. Part of Highway 30 road runs along the Caribbean Sea and to the vicinity of Charlotte Amalie. After Charlotte Amalie, it becomes one of the busiest roads on the island and is prone to traffic jams near Havensight, which is a large shopping center. Beyond Havensight, it transitions into a residential road, with many houses on either side, and meets with Highway 32 in the town of Nadir, where it ends. Major intersections include Highways 301, 302, 33, 313, and 32, where it terminates.

5.17.2 Potential Impacts and Proposed Mitigation

In the analysis that follows, actions were determined to have a transportation impact if the action would disrupt transportation because of increased construction-related traffic or if the action has potential to cause detours from normal routes.

Alternative 1: No Action

Under the **No Action** alternative, FEMA would not undertake or fund any stormwater mitigation projects; therefore, this alternative would have no short-term impacts on transportation.

[101] VIPA. 2024. Official website. Accessed April 2024, https://www.viport.com.

In the absence of stormwater mitigation activities, nearby transportation infrastructure would continue to be at risk for erosion-induced damage. Landslides and future storm events may cause further deterioration of the USVI's roadway transportation system. Road closures and traffic diversions may be required if slopes fail. Island communities that rely on ferry service, marinas, or heliports and airports for access to the mainland may experience major impacts if this infrastructure is damaged or closed. Other transportation impacts may include longer commute times, increased wear and tear on vehicles, increased cost in product delivery, longer delivery routes, and increased fuel consumption. Without permanent repairs and upgrades to roadway and stormwater infrastructure (and depending on the extent of future damage), FEMA anticipates that the further deterioration of roadways expected to occur under this alternative would result in moderate long-term adverse impacts on traffic and transportation.

Alternative 2: Repair, Replace, and Construct New Roadway and Related Infrastructure

Under **Alternative 2**, projects would repair or replace damaged roadway sections and construct new roadways and related infrastructure on the existing roadway network. Construction-related impacts may include temporary road closures, detours, and lane restrictions. During construction, at least one vehicle lane would always remain open, where possible. There may be times when certain roads would be closed to all but local traffic, and rerouting of through traffic to alternate roads might become necessary in the proposed action area only. Depending on the specific project location, various possibilities for detours and other traffic accommodations also would be available. In addition, the contractor would be responsible for handling all traffic control and warning, in accordance with the Manual of Uniform Traffic Control Devices,[102] including placing signs and signals in advance of construction activities to alert pedestrians and motorists of the upcoming work and traffic pattern changes (e.g., detours or lanes dedicated for construction equipment egress). The existing transportation network would be used to haul the construction debris to a permitted landfill site or associated recycling facility. Work executed under the **Alternative 2** would be performed in such a way as to create minor work-related impacts to traffic flow. Even so, a temporary increase in construction-related traffic would be expected. Therefore, minor short-term adverse impacts to transportation facilities are expected during the implementation of projects under **Alternative 2**.

Under **Alternative 2**, damaged transportation features would be repaired or replaced. Once complete, the various individual projects would result in improved road possibility, greater safety, and reduced traffic congestion. It is not anticipated that activities would contribute to major changes in local transportation capacities or traffic patterns because of **Alternative 2**. Therefore, moderate to major long-term beneficial impacts on transportation are expected, depending on the location and extent of activities.

[102] FHWA. 2023. *Manual on Uniform Traffic Control Devices for Streets and Highways* (11th ed.). U.S. Department of Transportation. Accessed June 11, 2024, https://mutcd.fhwa.dot.gov.

Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

Under **Alternative 3**, impacts to the USVI transportation system would be like **Alternative 2** for the construction and post-construction phases. Some traffic may need to be temporarily rerouted during construction activities. Specifically, this would occur in areas where new culverts and roadside drainage structures are within or intersect transportation ROWs. During construction, at least one vehicle lane would always remain open, where possible. Depending on the specific project location, various possibilities for detours and other traffic accommodations also would be available. There may be times when certain streets would be closed to all but local traffic and rerouting of through traffic to alternate roads might become necessary.

In addition, the contractor would be responsible for handling all traffic control and warning in accordance with the *Manual of Uniform Traffic Control Devices*, including placing signs and signals in advance of construction activities to alert pedestrians and motorists of the upcoming work and traffic pattern changes (e.g., detours or lanes dedicated for construction equipment egress). The contractor would be expected to consult and notify impacted populations and businesses of a traffic control schedule before commencing construction and temporary changes in traffic patterns. By limiting actions to similarly purposed roadside drainage structures, **Alternative 3** would not adversely increase construction-related traffic congestion. Therefore, it is anticipated that there would be minor short-term adverse impacts to transportation facilities from traffic delays during the implementation of projects under **Alternative 3**.

It is anticipated that the construction and/or enhancement of culverts and roadside drainage structures would support the infrastructure's capacities to reduce rain and flood damage to roadways and adjacent systems. By designing and constructing these facilities to current codes and standards, culverts and stormwater management systems would be more resilient to future storm events. Traffic would be expected to return to normal, with benefits like those of **Alternative 2**. Under **Alternative 3**, it is expected that a moderate to major long-term beneficial impact would result from new culverts and that roadside drainage structures would be more resilient and less likely to cause disruptions to the USVI transportation network.

Alternative 4: Construct Slope Stabilization Systems

Under **Alternative 4**, there would be direct impacts to the transportation system from temporary construction delays, road closures, and the rerouting of traffic near landslide prevention and soil erosion control project areas as described in **Alternative 2** and **Alternative 3**. The establishment of construction zones to manage traffic may cause localized short-term minor adverse impacts to traffic patterns as materials and equipment are mobilized to the project sites. The subrecipient would be responsible for consulting and notifying impacted populations and businesses of temporary changes in traffic patterns.

It is anticipated that the post-construction phase of **Alternative 4** actions would minimize landslides and soil erosion, and the associated damage and closure of transportation infrastructure caused by this event. As such, the USVI roadway transportation system would derive a moderate to major long-term beneficial impact as landslides and soil erosion become smaller and less impactful.

Alternative 5: Combination of the Action Alternatives

Alternative 5 assumes that the subrecipient would execute part or all of the activities described under **Alternative 2** through **Alternative 4**. The potential impacts of **Alternative 5** encapsulate the range of possible impacts that could result from **Alternative 2** through **Alternative 4**, which are evaluated in the preceding subsections. Based on the previous analysis, it is expected that **Alternative 5** would result in minor short-term adverse impacts from construction-related road closures and detours. In the long-term, **Alternative 5** is expected to have moderate to major beneficial impacts resulting from a reduction in the frequency and intensity of roadway flooding and from the implementation of roadway repairs.

5.18 Public Services and Utilities

Public services and utilities refer to the generation and transmission of potable water, sanitary wastewater and stormwater, electricity generation and natural gas transmission and communications infrastructure, and the management of solid waste. Analyses of the utility conditions addresses the existing infrastructure, such as wells, water systems, cisterns, and wastewater treatment plants, current utility use, and any pre-defined capacity or limitations set forth in permits or regulations.

In addition to complying with local zoning regulations and applicable ordnances, other major regulatory requirements and policies anticipated to apply to utility improvements, demolition, and/or construction activities include:

- Federal CWA
- Title V of the CAA
- USVI Air Pollution Control Act Rules and Regulations–V.I.C. Title 12, Part 9 (2019) and the 1995 Rules and Regulations of the USVI Air Pollution Control Act
- V.I.C. Title 19, Part 51 (2019) pertaining to the Safe Drinking Water Act, pursuant to Act No. 6433, October 9, 2001
- V.I.C. Title 19, Part 51 (2019) Part VI: Regulatory Provisions Concerning Public Health, Chapter 56 of the V.I.C. pertaining to Solid and Hazardous Waste Management
- V.I.C. Title 29, Part 5 (2019) pertaining to Building Code: Public Planning and Development, Subchapter VIII–Water Supply Part 308: water supply, cisterns, gutters, downspouts, wells
- USVI TPDES, which regulates the discharge of pollutants into waters of the USVI

- USVI Underground Storage Tank Act

5.18.1 Existing Conditions

The regulatory body within the USVI DPNR is the Division of Environmental Protection. This Division collaborates with other USVI DPNR divisions and is responsible for environmental protections and enforcement of USVI environmental laws, regulations, and certain national environmental laws, as delegated by EPA. The Region of Influence (ROI) for potable water, wastewater, stormwater, electrical, natural gas, and communications is composed of the existing infrastructure and utilities on the USVI. The ROI for solid waste includes the entire USVI and surrounding cays.

Electricity: The USVI WAPA is an independent agency of the USVI government—it produces and distributes electricity and drinking water to residential and commercial customers within the territory.[103] WAPA produces electrical power at plants located on St. Thomas and St. Croix and distributes electrical service through smart grids to customers on St. Croix, St. John, and St. Thomas.

The two generating units on St. Thomas and St. Croix include combustion and steam turbines powered with fuel oil or propane, and some solar power facilities owned by independent power producers and residents with rooftop solar panels. More than half of the USVI's petroleum-fueled generating units are older than 25 years. WAPA is replacing some of its older generators with combinations of smaller units for more efficient balancing with renewable energy sources. The two separate island grids maintain their own backup generation. USVI is shifting from fuel oil to propane to generate electricity and produce public drinking water.[104]

Power systems transmit electricity through feeder power lines. Feeder transmits power from generating station or substation to the distribution points. During the back-to-back hurricanes in September 2017, 80 to 90 percent of the USVI transmission and distribution systems were damaged or destroyed.[105] To mitigate future disruption of the islands' grids, WAPA added backup generating units that include battery storage.

The WAPA's Strategic Transformation plan includes making the existing electrical grids far more resilient to major hurricanes, including extensive undergrounding and installing composite poles.[106] St. Croix is supplied by 140 megawatts of electricity. About 40 miles of ocean separates the power supply on St. Croix from the St. Thomas system. Seabed depth makes any potential electrical connection difficult between the St. Thomas and St. Croix systems. For both electrical

[103] WAPA. 2024. Official website. About Us page. Accessed April 2024, https://www.viwapa.vi/about-us.

[104] U.S. Energy Information Administration. 2024. Official website. Territory Profile and Energy Estimates. Accessed April 2024. https://www.eia.gov/state/print.php?sid=VQ.

[105] U.S. Energy Information Administration. 2024. Official website. Territory Profile and Energy Estimates. Accessed April 2024. https://www.eia.gov/state/print.php?sid=VQ.

[106] WAPA. 2020. Strategic Transformation Plan. June.

systems, the average power demand loads are less than half of their generating capacities, which allows them to maintain their own backup generation and reserves. Electricity at St. Thomas has 160 megawatts of generating capacity and supplies electricity to St. Thomas and both nearby islands St. John and Water by underwater cables.[107]

Renewable Energy: In 2020, renewables were less than 10 percent of the USVI electricity-generating capacity, all from solar power. Customer-installed, small, rooftop panel systems account for almost two-thirds of USVI solar-generating capacity, while the other one-third comes from larger solar energy facilities. The USVI plans to add wind energy capacity in the coming years and also considered other biomass (i.e., organic matter used as fuel) energy sources.[108]

Drinking Water: The WAPA produces and distributes drinking water to residential and commercial customers in the Territory. Under long-term agreements with Seven Seas Water Corporation, modern seawater reverse osmosis facilities on St. Thomas and St. Croix produce drinking water.[109]

Wastewater: The Virgin Islands Waste Management Authority (VIWMA) provides wastewater services, including collection, pumping, treatment, and disposal, to approximately 60 percent of the residents of the territory. Through a network of underground pipes and pump stations, wastewater is transported to treatment plants; ultimately, treated effluent is discharged into the ocean. The system currently consists of eight treatment plants and 31 pump stations, territorially. Compliance with local and federal regulations and permits issued by the USVI DPNR is a requirement. According to the USVI Law, if a residence is located within 60 feet of a public sewer line, the subrecipient would be required to connect to the system.[110]

Stormwater: Section 5.4 discusses stormwater resources. It is not discussed further in this section.

Communications: The traditional and largest communications provider in the USVI is Viya, which is a subsidiary of ATN International, formerly known as Atlantic Tele-Network, Inc. Viya serves both businesses and residential markets, and includes wireline and wireless voice service, fixed and mobile broadband, and cable television service offered over a hybrid fiber-coaxial wireline network and a state-of-the-art 4G LTE wireless network serving St. Croix, St. John, and St. Thomas. Claro Puerto Rico and T-Mobile U.S. also serve the islands.

Solid Waste: The VIWMA provides waste collection, treatment, and disposal services to the USVI. The VIWMA manages the USVI landfills and transfer station to meet local and federal rules and regulations for compliance. Public dumpsters are situated around the islands for VIWMA pickup for ultimate waste disposal at St. Croix's Anguilla Landfill and St. Thomas' Bovoni Landfill,

---

[107] WAPA. 2024. Official website. About Us page. Accessed April 2024, https://www.viwapa.vi/about-us.

[108] Ibid.

[109] Ibid.

[110] VIWMA. 2024. Official website. Wastewater. Accessed April 2024, http://www.viwma.org/index.php/post-formats/wastewater.

which also collects waste from St. John via the Susannaberg Transfer Station. The landfills accept nonhazardous waste only (e.g., household, construction/demolition, yard).[111]

5.18.2 Potential Impacts and Proposed Mitigation

In the analysis that follows, actions were determined to have a transportation impact if the action would result in public utilities failing to meet the demand of USVI residents.

Alternative 1: No Action

Under the **No Action** alternative, FEMA would not undertake or fund any stormwater mitigation projects; therefore, this alternative would have no short-term impacts on public services and utilities.

Because utility infrastructure is often placed within transportation ROWs, deteriorating roadway infrastructure can have a direct adverse minor impact on public utilities and the continuity of utility service. Decisions to defer repairs and improvements to the roadway system are likely to exacerbate disruptions in utility service caused by failing roadway infrastructure vulnerable to future storm events. Strong floodwater eroding roadway areas and landslides would continue to put utilities and their support structures, including those that are overhead or currently buried, at higher risk of damage or failure. This could result in power outages, the loss of water and sewer, heating and cooling, and telecommunication services. Road closures from erosion would also impact emergency response times. If utility infrastructure is damaged because of eroded areas, outages could be extensive and long-term while the utility works to repair or replace the lost facilities. Repairs to roadways often require the excavation of roadbeds and the temporary disconnection of utilities. It is anticipated that by delaying and deferring repairs to the roadway system, the **No Action** alternative would cause minor-to-moderate, long-term adverse impacts on utility providers and customers as periodic disruptions in service persist as major failures in roadway infrastructure occur because of future storm events and erosion.

Alternative 2: Repair, Replace, and Construct New Roadway and Related Infrastructure

Under **Alternative 2**, roadway repair and replacement projects are more likely to intersect existing utility networks. During the construction phase, negligible-to-minor, short-term adverse impacts on utility service providers, associated infrastructure, and the communities they support could occur. It is anticipated that the existing utilities would remain in operation. The subrecipient would be responsible for coordinating with local communities and utility service providers regarding any possible delays or interruptions in service to minimize impacts. Occupational Safety and Health Administration (OSHA) regulations 29 CFR 1926 Subpart P (Excavations), Part 1926.651 (specific excavation requirements), govern methods for uncovering underground utility installations. OSHA mandates that if a utility provider cannot respond to a request to locate

[111] Viya. 2024. Official website. About us page. Accessed April 2024, https://viya.vi/our-company/about-us.

underground utility installations or cannot establish the exact location of these installations, the contractor may proceed provided they use detection equipment or other acceptable means to locate utility installations. Additionally, the FHWA provide guidance and procedures for the management of utilities by transportation workers.[112] These services and training procedures would assist in the minimization of adverse impacts to public utilities from roadside drainage projects.

It is anticipated that **Alternative 2** would have long-term negligible beneficial impacts on public services and utilities. By repairing/replacing roadways and strengthening pavement, the overhead and buried utilities and associated support structures located along roadways would become less vulnerable during future storm events; thus, **Alternative 2** would decrease failures and disruptions in utility network service. A more resilient roadway system is likely to coincide with a reduction in service disruptions. It is not expected that long-term utility demands on the existing USVI utility networks would increase. As such, utility service providers would be able to provide the same level of service to their communities.

Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

The impacts from **Alternative 3** would be like those described for **Alternative 2**. Under **Alternative 3**, the construction or improvement of culverts may require the temporary management of utilities as ground-disturbing activities occur. This could include such things as temporary or permanent relocation of an electrical distribution or transmission line or the temporarily capping and rerouting of an adjacent force main or fiber-optic cable. During the construction phase of **Alternative 3** actions, it is anticipated that projects may have negligible-to-minor, short-term adverse impacts on USVI's public services and utilities. The subrecipient would be responsible for coordinating with local communities and utility service providers regarding any possible delays or interruptions in utility service and synchronizing timing utilities projects with roadside drainage structures projects to avoid multiple successive disruptions to the same area. OSHA regulations 29 CFR 1926 Subpart P (Excavations), Part 1926.651 (Specific excavation requirements), govern methods for uncovering underground utility installations. OSHA mandates that if a utility provider cannot respond to a request to locate underground utility installations or cannot establish the exact location of these installations, the contractor may proceed provided they use detection equipment or other acceptable means to locate utility installations. Additionally, the FHWA provide guidance and procedures for the management of utilities by transportation workers.[113] These services and training procedures would assist in the minimization of adverse impacts to public utilities from roadside drainage projects.

---

[112] FHWA. 1993. Highway/Utility Guide. Office of Technology Applications. Publication No. FHWA-SA-93-049. June. https://www.fhwa.dot.gov/utilities/010604.pdf.

[113] FHWA. 1993. Highway/Utility Guide. Office of Technology Applications. Publication No. FHWA-SA-93-049. June. https://www.fhwa.dot.gov/utilities/010604.pdf.

It is anticipated that, in certain circumstances, the redesign of culverts may require the permanent relocation of utilities within an existing ROW. The need to relocate utilities would occur in response to hazard mitigation efforts that call for more robust culverts. It is anticipated that **Alternative 3** would have no long-term adverse impacts to public services and utilities or the communities they support. The USVI's utility network may derive a negligible long-term beneficial impact as the culverts and stormwater management systems become more resilient to future storm events.

Alternative 4: Construct Slope Stabilization Systems

The impacts from **Alternative 4** would be like those described for **Alternative 2**. During the construction phase, utilities may be temporarily shut off during construction of landslide prevention and soil erosion control projects, which may require temporary road closures and detours. The subrecipient would be responsible for coordinating with local communities and public utility service providers regarding any possible delays or interruptions in service to the utility infrastructure. OSHA regulations 29 CFR 1926 Subpart P (Excavations), Part 1926.651 (Specific excavation requirements), govern methods for uncovering underground utility installations. OSHA mandates that if a utility provider cannot respond to a request to locate underground utility installations or cannot establish the exact location of these installations, the contractor may proceed provided they use detection equipment or other acceptable means to locate utility installations. Additionally, when excavation operations approach the estimated location of underground installations, the contractor must use safe and acceptable means to determine the exact location of the installations. Thus, it is anticipated that the slope stabilization projects under **Alternative 4** would result in minor, short-term adverse impacts on public services and utilities with implementation of the BMPs.

In the long term, **Alternative 4** would have minor-to-moderate beneficial impacts on public services and utilities by reducing the potential for future road closures because of slope erosion and landslides. A reduction in the severity of current and future landslides would help avoid the loss and failure of utility infrastructure. Fewer landslides should reduce the possibility of adverse impacts to public utilities.

Alternative 5: Combination of the Action Alternatives

Alternative 5 assumes that the subrecipient would execute part or all of the activities described under **Alternative 2** through **Alternative 4**. The potential impacts of **Alternative 5** encapsulate the range of possible impacts that could result from **Alternative 2** through **Alternative 4**, which are evaluated in the preceding subsections. Based on the previous analysis, it is expected that **Alternative 5** would result in negligible-to-minor, short-term adverse impacts from construction-related utilities shutoffs. In the long term, **Alternative 5** is expected to have negligible-to-moderate beneficial impacts resulting from a reduction in flood- and landslide-induced damage to public utilities.

5.19 Public Health and Safety

Safety considerations arise in many stages of the NEPA process. Public health and safety can include everything from the safety and security of food supplies to the safe use of drug and medical devices. Understanding health as a human right creates a legal obligation on states to ensure access to timely, acceptable, and affordable health care of appropriate quality and to providing for the underlying determinants of health, such as safe and potable water, sanitation, food, housing, health-related information and education, and gender equality.[114]

Established in February 2019, the USVI Office of Disaster Recovery oversees recovery, designating federal block grant funds for public actions, training staff, using contractors to boost territory government management capacity, making plans to upgrade existing infrastructure, identifying funding options to restore and improve housing conditions, and working to restore natural and cultural resources.[115]

Within the USVI, the primary protective and health services include fire protection, law enforcement, and medical emergency services. The following describes the primary authorities tasked with ensuring public health and safety:

- USVI Department of Health (DOH) functions as both the state or territory regulatory agency and the territorial public health agency for the USVI. As set forth by the V.I.C. Title 3 and 19, DOH has direct responsibility for conducting programs of preventive medicine, including environmental sanitation, providing Emergency Medical Services (EMS), and assuming primary responsibility for the health of the community in the event of a disaster. USVI DOH services are administered by 34 activity centers, with three healthcare facilities, two district offices and field offices, and the central office located on St. Thomas.[116]
- USVI DOH provides emergency care and transport of the sick and injured through its Office of Emergency Medical Services (VIEMS). USVI DOH created VIEMS in 1976 and is responsible for public safety, highway safety, rescue response, health and environmental monitoring, community outreach, and EMS for children. VIEMS operates on St. Croix, St. John, and St. Thomas. It also provides EMS to the surrounding cays and waterways via ground and sea transport vehicles.[117]

---

[114] World Health Organization. 2023. Official website. Human rights page. https://www.who.int/news-room/fact-sheets/detail/human-rights-and-health.

[115] USVI Office of Disaster Recovery. 2024. Official website. Accessed April 2024, https://www.usviodr.com.

[116] USVI DOH. 2024. Official website. Emergency Medical Services page. Accessed April 2024, https://doh.vi.gov/programs/emergency-medical-services.

[117] Ibid.

- The primary hospital on St. Thomas is Schneider Regional Medical Center. St. Croix has Governor Juan F. Luis Hospital and Medical Center. There are only clinic facilities, no full hospital, on St. John; medical teams transfer serious cases to the hospital on St. Thomas.
- The VI Fire Services has a total of 11 stations (4 stations on St. Croix, 5 stations on St. Thomas, and 2 stations on St. John).[118]
- The Police Division is organized into five bureaus: Patrol, Criminal Investigation, Traffic, Special Operations, and Communications. The Police Division further organizes the bureaus into three districts—St. Thomas and Water Island District, St. Croix District, and St. John District.[119]
- The U.S. Coast Guard Atlantic Area Marine Safety Detachment (MSD) St. Thomas is in the port city of Charlotte Amalie. The MSD's area of responsibility incudes three of the four islands in the USVI—St. Thomas, St. John, and Water Island. Working closely with other government agencies, federal, territorial, and local law enforcement, MSD St. Thomas is responsible for the protection of the marine environment and the promotion of the safe passage of marine traffic, carrying passengers, oil, hazardous products, and consumer goods.[120]

The National Environmental Health Association (NEHA) is working with the U.S. Centers for Disease Control and Prevention and the Agency for Toxic Substances and Disease Registry to improve public health, childcare, and building safety. The 2-year cooperative agreement directs NEHA to conduct its work in jurisdictions impacted by the 2017 hurricanes Harvey, Irma, and Maria, notably in areas of the USVI and Puerto Rico. The agreement outlines a multifaceted objective—develop and maintain a trained skilled environmental health workforce, which is essential for responding to hurricane recovery efforts and ensuring preparedness for future emergencies when contagious disease, vector control, and threats to drinking water and food supplies pose increased public risks after a storm.[121]

5.19.1 Existing Conditions

The major hospital on. St. Croix has Governor Juan F. Luis Hospital and Medical Center. The VI Fire Services has a total of 11 stations (4 of which are on St. Croix).

---

[118] Virgin Islands Fire and Emergency Medical Services. 2023. Official website. Stations page. Accessed April 2024, http://vifems.org/stationS.

[119] USVI Police Department. 2022. Official website. Offices, Bureaus, Units and Commands page. Accessed April 2024, http://www.vipd.vi.gov/about-us/offices-bureaus-units-and-commands.

[120] U.S. Coast Guard Atlantic Area. 2024. Official website. Sector San Juan–MSD St. Thomas page. Accessed April 2024. https://www.atlanticarea.uscg.mil/Our-Organization/District-7/Units/Sector-San-Juan/Sector-San-Juan-Units/MSD-St-Thomas.

[121] NEHA. 2024. Official website. Post-Hurricane Health and Safety Work Partnership page. Accessed April 2024. https://www.neha.org/post-hurricane-health-safety.

There is no full hospital on St. John, only clinic facilities; medical teams transfer serious cases to the hospital on St. Thomas. The VI Fire Services has a total of 11 stations (2 of which are on St. John).

The primary hospital on St. Thomas is Schneider Regional Medical Center. The VI Fire Services has total of 11 stations (five of which are on St. Thomas).

5.19.2 Potential Impacts and Proposed Mitigation

In the analysis that follows, actions were determined to have a public health and safety impact if the action would (1) substantially increase risks associated with the safety of construction personnel or the local community, (2) substantially impede the ability to respond to an emergency, (3) introduce a new health or safety risk for which the community is not prepared or does not have adequate management and response plans in place, or (4) result in noncompliance with the ADA.

Alternative 1: No Action

Under the **No Action** alternative, FEMA would not undertake or fund any stormwater mitigation projects; therefore, no short-term impacts would occur because of the **No Action** alternative. It is anticipated that the existing drainage system is enough to maintain the USVI's public health and safety. However, emergency measures funded by FEMA following Hurricane Maria may not be enough to prevent localized future flood damages to roads and associated infrastructure, which could adversely affect the administration, specifically emergency response times, of emergency medical personnel, police, and fire protective services. Because no stormwater mitigation activities would occur, flood and erosion hazards would remain and roadways in disrepair would contribute to vehicle damage, accidents, and increased traffic congestion. It is anticipated that the **No Action** alternative has the potential to cause negligible-to-minor, long-term adverse impacts related to public health and safety.

Alternative 2: Repair, Replace, and Construct New Roadway and Related Infrastructure

Under **Alternative 2**, during the construction phase, full or partial road closures may interrupt or delay fire, emergency, and law enforcement services. This alternative includes activities that may require the rerouting of traffic. Road detours could adversely impact emergency services depending on how far traffic is to be rerouted. The subrecipient can minimize disruptions through coordinating with service providers and public notifications.

The roadway repairs and replacement projects under **Alternative 2** would be built in accordance with applicable and relevant building codes and standards. Projects would be completed in compliance with federal, state, and local rules and regulations for safety and health, and would thereby mitigate safety risks. The subrecipient would be responsible for posting the appropriate signage and placement of construction barriers to alert the public of potential hazards and prevent unauthorized access to project sites. BMPs would be required to be incorporated into all work practices during construction to minimize risk and improve safety. Individual projects reviewed

under this PEA would be analyzed for any special safety concerns. Therefore, the construction of projects under **Alternative 2** is expected to have negligible-to-minor, short-term adverse impacts on public health and safety.

In the long term, the USVI residents may experience a benefit to their health and safety from more resilient roadway and utility infrastructure. Police and fire protective services would be able to consistently respond to emergencies in a timely manner. Patients would arrive at medical facilities in time for life saving measures. By repairing and replacing roadways and related infrastructure, **Alternative 2** actions would reduce rain and flood damages to USVI roads. Based on the current status of USVI roadway networks, this would result in minor-to-moderate, long-term beneficial impacts on the health and safety of USVI communities.

Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

The impacts from **Alternative 3** would be like those described for **Alternative 2**. It is anticipated that interruptions and delays in fire, emergency, and law enforcement services are possible as the result of short-term road closures and detours during the construction phase. The modifications of service routes may have a short-term negligible-to-minor adverse impact on public health and safety. The subrecipient would minimize disruptions through coordinating with service providers and public notifications. Therefore, projects under **Alternative 3** would have negligible-to-minor, short-term adverse impacts on public health and safety.

In the long-term, the affected populations in USVI are likely to benefit from the improvement and construction of roadside drainage and stormwater management systems. Police and fire protective services would be able to consistently respond to emergencies in a timely manner. Patients would arrive at medical facilities in time for lifesaving measures. It is anticipated that emergency services and local populations would derive a minor-to-moderate, long-term beneficial impact from the construction of a more resilient and efficient roadside drainage and stormwater management system.

Alternative 4: Construct Slope Stabilization Systems

The impacts from **Alternative 4** would be like those described for **Alternative 2**. The projects under **Alternative 4** may require road closures during the construction phase of landslide repair and soil erosion control projects. It is anticipated that these projects would result in negligible-to-minor, short-term adverse impacts on emergency services and the communities they support.

For all applicable projects, the subrecipient would be responsible for coordinating with service providers and public notifications. Following the repair of landslide areas, public health and safety emergency response times should return to pre-Hurricane Maria standards. Furthermore, it is anticipated that the USVI would derive a minor-to-moderate, long-term beneficial impact from installing soil erosion control measures that prevent existing landslides from worsening or future landslides from occurring adjacent to roadways.

Alternative 5: Combination of the Action Alternatives

Alternative 5 assumes that the subrecipient would execute part or all of the activities described under **Alternative 2** through **Alternative 4**. The potential impacts of **Alternative 5** encapsulate the range of possible impacts that could result from **Alternative 2** through **Alternative 4**, which are evaluated in the preceding subsections. Based on the previous analysis, it is expected that **Alternative 5** would result in negligible-to-minor, short-term adverse impacts on emergency services and the communities they support resulting from road closures and delays. In the long term, **Alternative 5** is expected to have minor-to-moderate beneficial impacts resulting from a reduction in flood- and landslide-induced damage to roadways, which would facilitate reliable emergency ingress and egress within the study area.

5.20 Hazardous Materials

As written, 49 CFR § 171.8 defines hazardous materials as hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (49 CFR § 172.101), and materials that meet the defining criteria for hazard classes and divisions in 49 CFR § 173. Resource Conservation and Recovery Act (RCRA) defines hazardous wastes at 42 U.S.C. § 6903(5). The Pollution Prevention Act of 1990, 42 U.S.C. § 13101(b), established a national policy to prevent or reduce pollution at the source, whenever feasible.

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. § 9601 et seq.) RCRA, Subtitle D states the primary federal laws for the management and disposal of hazardous substances. EPA regulates the management of nonhazardous solid waste, according to the RCRA. Under RCRA, EPA is also in charge of regulating the handling and disposal of hazardous wastes. The USVI DPNR regulates locally.

A considerable number of health and safety laws and regulations exist for a wide variety of activities. With regards to worker safety, the U.S. Congress enacted OSHA of 1970, 29 U.S.C. Part 651 et seq. to assure safe and healthful working conditions for working men and women. The USVI Division of Occupational Safety and Health operates an OSHA-approved public sector only State Plan under the 23(g) 50/50 Grant. Safety and occupational health issues include exposure to natural hazards; one-time and long-term exposure to asbestos, lead, mold, radiation, chemicals, and other hazardous materials; and injuries or deaths resulting from a one-time accident.

5.20.1 Existing Conditions

Work sites and plots of land within the USVI may contain soil and/or groundwater contamination from past industrial and other similar land uses. However, because the measures proposed within **Alternative 2** through **Alternative 4** relate primarily to existing roadways and slopes, it is unlikely that Environmental Site Assessments would need to be performed before the initiation of work. Should an Environmental Site Assessment be required, it would be performed according to the

ASTM E1527-21 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.[122]

While working outdoors negates exposure to some construction-related contaminants, roadwork and the construction of stormwater mitigation infrastructure and slope stabilization measures may still expose workers to other contaminants and irritants, including cement dust and other fine particulate matter. Long-term exposure to these contaminants can lead to health issues. OSHA requires that contractors use BMPs and wear appropriate personal protective equipment to minimize fugitive dust particulate and mold exposure while working with materials that have the potential to become hazardous. Construction work routinely includes use of hazardous materials such as aerosols, antifreeze, fertilizers, motor oil, vehicle fuel, paint supplies, solvents, and more. It is expected that their use and storage would be on-site as part of the existing conditions for all alternatives and locations.

5.20.2 Potential Impacts and Proposed Mitigation

In the analysis that follows, actions were determined to have a public health and safety impact if the action would (1) generate a new waste stream that cannot be immediately or safely managed under existing protocols, (2) generate an excessive quantity of waste that cannot be adequately or safely managed under existing protocols, (3) develop on contaminated land, or (4) risk exposure to mold, asbestos, and lead-based paint.

Alternative 1: No Action

Under the **No Action** alternative, FEMA would not undertake or fund any stormwater mitigation projects; therefore, this alternative would have no short-term impact on hazardous materials. In the absence of stormwater mitigation activities, periodic flooding and erosion would result in damaged roadways and stormwater infrastructure. Equipment used to repair damaged infrastructure could result in the inadvertent release of fuels and oils. Furthermore, periodic flooding could inundate or damage hazardous material sites in the study area, which would increase the potential for exposure to toxic substances. Receding floodwaters could carry pollutants into nearby surface waters. Therefore, there would be a negligible-to-minor, long-term adverse impact on hazardous materials from periodic flooding.

Alternative 2: Repair, Replace, and Construct New Roadway and Related Infrastructure

During construction of projects under **Alternative 2**, there would be a minor risk of leaks of oils, fuels, and lubricants from construction equipment. Any fill brought in from outside the project site to repair or construct roadways would need to come from a licensed or permitted source and would be free of contaminants. There is also a potential for construction to expose unknown contaminated materials because of excavation and removal of soil and construction debris from the project area.

[122] ASTM International. 2021. "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process." Accessed May 2024, www.astm.org/e1527-21.html.

FEMA would review the databases of known contaminated sites during project reviews to confirm that there would not be more than a minor potential for people and the environment to be exposed to hazardous materials. In addition, the project would comply with relevant local and federal regulations and standards. With the implementation of the BMPs listed below, the proposed action would have negligible-to-minor, short-term adverse impacts related to hazardous materials.

- Any hazardous and contaminated materials discovered, generated, or used during construction of activities under **Alternative 2** would be disposed and handled by the subrecipient in accordance with applicable federal, state, and local regulations.
- Construction equipment would be kept in proper working order. Any equipment to be used above, in, or within 100 feet of water would be inspected daily for fuel and fluid leaks consistent with 29 CFR 1926.1412(d). Any leaks would be promptly contained and cleaned up, as required by 40 CFR 450.21(d)(3), and the equipment would be repaired.
- Any imported fill used at the project site would meet state and local regulations for clean fill. Fill material discharged below the ordinary high-water mark of a stream or into a wetland would require a Section 404 permit and must be free from hazardous materials, as determined by 40 CFR 230.60(b).
- In the event of an inadvertent spill, the subrecipient must immediately contact the appropriate regulatory agency, or other contact listed on the subrecipient's NPDES permit, if applicable. State or local requirements that may necessitate reporting of spills or other prohibited discharges to local emergency response, public health, or drinking water supply agencies would also be followed.

Projects under **Alternative 2** would not involve the addition of hazardous facilities, operations, or chemicals to the project area. Roadway repair activities may reduce the frequency and severity of future roadway damage. A reduction in the frequency at which construction equipment is needed to repair damage would reduce the likelihood of hazardous materials (such as oil and fuel) to be released by equipment and vehicles into the study area. Therefore, **Alternative 2** would have negligible-to-minor, long-term beneficial impacts.

Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems

The implementation of projects under **Alternative 3** would require the use of heavy construction equipment. Thus, the same construction-related impacts described under **Alternative 2** are expected to occur under **Alternative 3**. The BMPs listed under **Alternative 2** would be adhered to. Therefore, projects under **Alternative 3** would have negligible-to-minor, short-term adverse impacts on hazardous materials.

Projects under **Alternative 3** do not include the use of any known hazardous materials. Flood events have the potential to disturb contaminated sites through the physical disruption of soil and sediment layers, facilitating a release of contamination that otherwise may not occur under more stable conditions. Because this alternative would reduce the risk of flooding in portions of the

study area, the potential for floodwaters to release or transport hazardous materials would be reduced. Therefore, this alternative would have minor-to-moderate, long-term beneficial impacts.

Alternative 4: Construct Slope Stabilization Systems

The potential short-term impacts of **Alternative 4** are like those described under **Alternative 2** and **Alternative 3**. Construction work under **Alternative 4** would be subject to the same BMPs described under **Alternative 2**. Therefore, projects under **Alternative 4** would have negligible-to-minor adverse short-term impacts on hazardous materials.

The proposed work under **Alternative 4** does not include the use of hazardous materials in the construction of slope stabilization systems. FEMA would ensure that any fill used in MSEs or other stabilization systems would originate from uncontaminated sources. Because this alternative would reduce the risk of uncontrolled flooding that could result in the potential release of hazardous materials on contaminated sites, **Alternative 4** is expected to result in minor-to-moderate, long-term beneficial impacts related to hazardous materials.

Alternative 5: Combination of the Action Alternatives

Alternative 5 assumes that the subrecipient would execute part or all of the activities described under **Alternative 2** through **Alternative 4**. The potential impacts of **Alternative 5** encapsulate the range of possible impacts that could result from **Alternative 2** through **Alternative 4**, which are evaluated in the preceding subsections. Based on the previous analysis, it is expected that **Alternative 5** would result in negligible-to-minor, short-term adverse impacts on hazardous materials through the inadvertent release of fuels and oils associated with construction vehicles and equipment. In the long term, **Alternative 5** is expected to have minor-to-moderate beneficial impacts resulting from a reduction in flood- and landslide-induced damage to areas storing hazardous materials, and through a reduction in the spread of contaminants via floodwaters.

5.21 Cumulative Effects

In accordance with NEPA, this PEA considers the overall cumulative impact of the alternatives and other actions that are related in terms of time or proximity. According to the CEQ regulations, cumulative impacts represent the “impact on the environment which results from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what federal agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR 1508.7).

Cumulative impacts are those impacts “which result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions” (40 CFR 1508.7). The statutory basis for considering cumulative impacts of federal actions is the NEPA of 1969, 42 U.S.C. 4321 et seq. In the context of evaluating the scope of a proposed action, FEMA must consider direct, indirect, and cumulative impacts.

In addition to NEPA, other statutes require federal agencies to consider cumulative effects. These include the CAA Section 404(b)(1) guidelines, the regulations implementing the conformity provisions of the CAA, Section 106 of the NHPA, Section 7 of the ESA and Section 6 of the CBRA.

FEMA will consider specific cumulative effects once the subrecipient identifies individual proposed actions and schedules. Overall, FEMA anticipates beneficial cumulative impacts because of restoring infrastructure to improved pre-disaster conditions and improving resiliency, which will improve health of these communities and indirectly reduce poverty, thereby improving the economy and tourism and improving equity on the islands. The potential adverse effects of these actions will prove to be short-term, whereas the beneficial impacts of the stormwater management actions are long-term, therefore resulting in a net beneficial impact to the identified resources.

6.0 PERMITS AND PROJECT CONDITIONS

The subrecipient is responsible for obtaining all applicable federal, state, and local permits and other authorizations for project implementation before construction and adherence to all permit conditions. Any substantive change to the approved SOW would require re-evaluations by FEMA for compliance with NEPA and other laws and EOs. The subrecipient must also adhere to the following conditions during project implementations and consider the below conservation recommendations. Failure to comply with grant conditions may jeopardize federal funds:

1. **Subrecipient:** Must comply with all applicable environmental and historic preservation laws. Federal funding is contingent upon acquiring all necessary federal, state, and local permits. Noncompliance with this requirement may jeopardize the receipt of federal funds.
2. **Air Quality:** Ultralow sulfur diesel fuel would be used to power construction equipment to reduce the amount of sulfur dioxide emitted from construction equipment and vehicles. Precautions must be taken to prevent particulate matter from being airborne. Preventive measures may include use of water or suitable chemicals for the control of dust in construction operations, grading of roads, or clearing of land. Hoods, fans, and fabric filters may be used to enclose and vent the handling of dusty materials. Operators should always cover open-bodied trucks transporting materials likely to give rise to airborne dust when in motion.
3. **Stormwater and Soils:** Under the EPA NPDES, any project disturbing more than 1 acre requires an EPA Construction General Permit, an NPDES permit, and an SWPPP. The permits and plan require BMPs, which serve to protect soils and stormwater. The subrecipient is required to manage any piles of soil or debris, minimize steep slope disturbance, preserve native topsoil unless infeasible, and minimize soil compaction and erosion.
4. **Erosion and Sediment Control:** Each project will implement BMPs and guidelines recommended by USVI state officials. The subrecipient must obtain all necessary permits, such as NPDES, and implement required plans, such as SWPPP.
5. **Endangered Species Act:** All projects will comply with and implement the ESA conditions found in any FEMA programmatic consultation that applies or those conditions from a project-specific consultation to any actions that may adversely affect federally listed species or designated critical habitat. Impacts not resolved through consultation will require individual NEPA compliance.
6. **Work Affecting Water:** USACE will consult on any work that may affect WOTUS. The subrecipient is responsible for obtaining and implementing all appropriate permit requirements, including preconstruction notification, before beginning work.
7. **Floodplain:** For FEMA-funded projects that are within or may affect a floodplain, FEMA will apply the eight-step decision-making process. FEMA will assess short-term and long-term effects to floodplains and apply applicable avoidance, minimization, and mitigation measures to limit impacts to less than major. FEMA will consider projects in the V-Zone,

those with potential major or greater impacts, or those with the potential to increase flood elevations on a case-by-case basis for whether this PEA applies or to prepare a tiered EA or site-specific EA. Projects must also comply with USVI floodplain and flood risk regulations.

8. **Wetlands:** For FEMA-funded projects that are within or may affect a wetland, FEMA will apply the eight-step decision-making process. FEMA will assess short-term and long-term effects to wetlands and apply applicable avoidance, minimization, and mitigation measures to limit impacts to less than major.
9. **Historic Preservation/Archaeological Resources:** For FEMA-funded projects, FEMA will review for any historic or archaeological resources listed in or eligible for listing in the NRHP. If there is potential to affect historic or cultural resources, consultation with the VISHPO must occur and any recommendations would be implemented.
10. **Discovery of Cultural Resources:** If workers discover any cultural materials or human remains during construction, the contractor must stop construction activities near the discovery and notify FEMA. FEMA will immediately notify the VISHPO and other consulting parties with an interest in the discovery. FEMA staff meeting the Secretary of the Interior's Professional Qualification Standards (48 FR 22716, September 1983) will evaluate the discovery in coordination with VISHPO.
11. **Construction Material and Debris:** The subrecipient must remove any materials deposited in eroded embankments before starting work. The subrecipient is responsible for ensuring that final disposal of bituminous and any nonrecyclable debris materials resulting from the renovation, redevelopment, relocation, and demolition activities must take place at a properly permitted landfill. If necessary, waste characterization may be required for certain waste types (e.g., oil, asbestos, lead-based paint) are properly disposed. The subrecipient is responsible for obtaining any permits associated with staging, transportation, and handling of construction debris.
12. **Solid and Hazardous Waste:** The subrecipient will handle, manage, and dispose of all solid and hazardous waste in accordance with requirements of local, state, and federal laws, regulation, and ordinances.
13. **Clean Air Act:** The subrecipient is responsible for complying with applicable EPA and USVI requirements for low sulfur fuels and fugitive dust suppression. CAA permitting in the USVI is the shared responsibility of EPA Region 2 for PSD permits and the Air Pollution Control Program of the Division of Environmental Protection of the USVI DPNR for all permits for emission sources that do not require a PSD permit.
14. **Invasive Species:** The subrecipient is responsible for restoring disturbed soils with planting native noninvasive species. Construction equipment should be power washed before initial transportation to the construction site and before changing locations to prevent spread of noxious weeds.

7.0 AGENCY COORDINATION AND PUBLIC INVOLVEMENT

This PEA is available for agency and public review and comment for a period of 30 days. The public information process will include a public notice with information about the proposed action in The Virgin Islands Daily News.

The PEA is available on the following websites:

- National Environmental Policy Act Repository | FEMA.gov
  (https://www.fema.gov/emergency-managers/practitioners/environmental-historic/nepa-repository?combine=&field_related_locations_target_id=49196&field_nepa_level_of_review_value=All&field_nepa_fema_program_value=All&field_nepa_broad_keywords_value=All&field_nepa_broad_keywords_value_1=All&field_nepa_specific_topics_value=All)
- Public Notice DPW Stormwater PEA - US Virgin Islands Office of Disaster Recovery: US Virgin Islands Office of Disaster Recovery (https://www.usviodr.com/public-notice-dpw-stormwater-pea/)
- Home - Virgin Islands Department of Public Works (https://dpw.vi.gov)
- FEMA U.S. Virgin Islands | Facebook
  (https://www.facebook.com/FEMAUSVirginIslands/)

A hard copy of the PEA is available at the following locations:

- St. Thomas DPW Main Building
  8244 Sub Base Charlotte Amalie, VI 00802
- St. Croix DPW Main Building
  6002 Annas Hope Christiansted, VI 00820
- St. John DPW/VITRAN building
  6 Susannaberg Cruz Bay, VI 00830
- St. Croix VITEMA Office
  2164 King Cross St, Christiansted, St. Croix 00820
- St. Thomas VITEMA Headquarters
  8221 Estate Nisky St. Thomas, VI 00803

Interested parties may request an electronic copy of the PEA by sending an email to FEMA at FEMA-4340-Comment@fema.dhs.gov. This PEA reflects the evaluation and assessment of the federal government, the decision-maker for the federal action; however, FEMA will consider comments submitted during the public review period. The public is invited to submit written comments by sending an email to FEMA-4340-Comment@fema.dhs.gov or via mail to:

USVI Recovery Office
4500 Sunny Isle Shopping Center
Christiansted, VI 00820
Attn: USVI Stormwater PEA Comments

If FEMA receives no substantive comments from the public and/or agency reviewers, FEMA will adopt the PEA as final and will issue a FONSI. If FEMA receives substantive comments, it will evaluate and address comments as part of the FONSI documentation or in a Final PEA.

8.0 LIST OF PREPARERS

The following is a list of preparers who contributed to the development of the Stormwater Improvement Projects PEA for FEMA. The individuals listed below had principal roles in the preparation of this document.

Federal Emergency Management Agency

Reviewers	Experience and Expertise	Role in Preparation
McKee, John	Regional Environmental Officer	Project Review
Dawson, John	Regional UFR Coordinator	Project Review
Azizi, Sharla	EHP Branch Director/Advisor DR-4335/4340-USVI	Project Review
Dore, Shenelle	Environmental Protection Specialist	Project Specialist
Johnson, Rebecca	Historic Preservation Specialist	Project Specialist

CDM Smith

Preparers	Experience and Expertise	Role in Preparation
Quan, Jenna	Biologist and Environmental Planner	NEPA Documentation/EA Lead
Ramirez, Juan	Transportation Planner/GIS	NEPA Documentation
Kohan, Danielle	Environmental Planner	NEPA Documentation
Sadkowski, Benjamin	Environmental Planner	NEPA Documentation
Weddle, Annamarie	Environmental Planner	NEPA Documentation
Giordano, Brock	Senior Cultural Resources Specialist	NEPA Documentation/Project Technical Lead
Nelson, Tracy	Senior Cultural Resources Specialist	NEPA Documentation/Technical Reviewer
Ijams, Robin	Senior NEPA Specialist	Quality Assurance/Quality Control Review
Veronese, Gina	Senior NEPA Specialist/Project Manager	Quality Assurance/Quality Control Review

9.0 SUMMARY OF IMPACTS

Section	Area of Evaluation	Alternative 1 No Action	Alternative 2 Repair, Replace, and Construct New Roadways and Related Infrastructure	Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems	Alternative 4: Construct Slope Stabilization Systems	Alternative 5: Combination of Alternatives
5.1	Geology, Topography, and Soils	No short-term impact. Minor-to-moderate, long-term adverse impact.	Negligible-to-minor, short-term adverse impact. Minor-to-moderate, long-term adverse impact.	Negligible-to-minor, short-term adverse impact. Negligible-to-minor, long-term beneficial impact.	Negligible-to-minor, short-term adverse impact. Minor-to-moderate, long-term beneficial impact.	Negligible-to-moderate, short-term adverse impact. Negligible-to-moderate beneficial long-term impact.
5.2	Air Quality	No short-term impact. Negligible-to-minor, long-term adverse impact.	Minor short-term adverse impact. Negligible-to-minor, long-term beneficial impact.	Minor short-term adverse impact. Negligible-to-minor, long-term beneficial impact.	Minor short-term adverse impact. Negligible-to-minor, long-term beneficial impact.	Minor short-term adverse impact. Negligible-to-minor, long-term beneficial impact.
5.3	Climate Change	No short-term impact. Negligible-to-minor adverse impact.	Negligible short-term adverse impact. Negligible long-term beneficial impact.	Negligible short-term adverse impact. Negligible long-term beneficial impact.	Negligible short-term adverse impact. Negligible long-term beneficial impact.	Negligible short-term adverse impact. Negligible long-term beneficial impact.

Section	Area of Evaluation	Alternative 1 No Action	Alternative 2 Repair, Replace, and Construct New Roadways and Related Infrastructure	Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems	Alternative 4: Construct Slope Stabilization Systems	Alternative 5: Combination of Alternatives
5.4	Water Quality	No short-term impact. Minor-to-moderate, long-term adverse impact.	Negligible-to-minor, short-term adverse impact. Negligible-to-minor, long-term adverse impact.	Minor-to-moderate, short-term adverse impact. Minor-to-moderate, long-term beneficial impact.	Negligible-to-minor, short-term adverse impact. Minor-to-moderate, long-term beneficial impact.	Negligible-to-moderate, short-term adverse impact. Negligible-to-moderate beneficial long-term impact.
5.5	Wetlands	No short-term impact. Minor-to-moderate, long-term adverse impact.	Negligible-to-minor, short-term adverse impact. Negligible-to-minor, short-term adverse impact.	Minor-to-moderate, short-term adverse impact. Minor-to-moderate, long-term beneficial impact.	Negligible-to-minor, short-term impact. Minor-to-moderate beneficial impact.	Negligible-to-moderate, short-term adverse impact. Negligible-to-moderate beneficial long-term impact.
5.6	Floodplain	No short-term impact. Minor long-term adverse impact.	Negligible-to-minor, short-term adverse impact. Minor-to-moderate, long-term adverse impact.	Negligible-to-minor, short-term adverse impact. Moderate long-term beneficial impact.	Negligible-to-minor, short-term adverse impact. Minor-to-moderate, long-term beneficial impact.	Negligible-to-moderate, short-term adverse impact. Minor-to-moderate beneficial long-term impact.
5.7		No short-term impact. Negligible-to-minor, long-term adverse impact.	Negligible-to-minor, short-term adverse impact. Negligible-to-minor, long-term beneficial impact.	Negligible-to-minor, short-term adverse impact. Negligible-to-minor, long-term beneficial impact.	Negligible-to-minor, short-term adverse impact. Negligible-to-minor, long-term beneficial impact.	Negligible-to-minor, short-term adverse impact. Negligible-to-minor, long-term beneficial impact.

Section	Area of Evaluation	Alternative 1 No Action	Alternative 2 Repair, Replace, and Construct New Roadways and Related Infrastructure	Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems	Alternative 4: Construct Slope Stabilization Systems	Alternative 5: Combination of Alternatives
5.8	Vegetation	No short-term impact. Minor-to-moderate, long-term adverse impact.	Negligible-to-minor, short-term adverse impact. Negligible long-term beneficial impact.	Minor-to-moderate, short-term adverse impact. Negligible-to-minor, long-term beneficial impact.	Minor-to-moderate, short-term adverse impact. Negligible-to-minor, long-term beneficial impact.	Negligible-to-moderate, short-term adverse impact. Negligible-to-minor, long-term beneficial impact.
5.9	Wildlife and Fish	No short-term impact. Minor long-term adverse impact.	Negligible-to-moderate, short-term adverse impact. Negligible-to-minor, long-term adverse impact.	Negligible-to-moderate, short-term adverse impact. Minor-to-moderate, long-term beneficial impact.	Negligible-to-moderate, short-term adverse impact. Mild-to-moderate, long-term beneficial impact.	Negligible-to-moderate, short-term adverse impact. Negligible-to-moderate, long-term beneficial impact.
5.10	Threatened and Endangered Species	No short-term impact. Negligible-to-minor, long-term adverse impact.	Negligible-to-moderate, short-term adverse impact. Negligible-to-minor, long-term adverse impacts.	Negligible-to-moderate, short-term adverse impact. Minor-to-moderate, long-term beneficial impact.	Negligible-to-moderate, short-term adverse impact. Negligible-to-moderate, long-term beneficial impact.	Negligible-to-moderate, short-term adverse impact. Negligible-to-moderate, long-term beneficial impact.
5.11	EFH	No short-term impact. Minor long-term adverse impact.	Negligible-to-minor, short-term adverse impact. Negligible-to-minor, long-term adverse impact.	Minor-to-moderate, short-term adverse impact. Minor-to-moderate, long-term beneficial impact.	Negligible-to-moderate short-term adverse impact. Minor-to-moderate, long-term beneficial impact.	Negligible-to-minor, short-term adverse impact. Negligible-to-moderate, long-term beneficial impact.

Section	Area of Evaluation	Alternative 1 No Action	Alternative 2 Repair, Replace, and Construct New Roadways and Related Infrastructure	Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems	Alternative 4: Construct Slope Stabilization Systems	Alternative 5: Combination of Alternatives
5.12	Cultural Resources– Historic Standing Structures	Minor, short-term adverse impacts. Long-term minor adverse impacts.	Negligible short-term adverse impacts. Minor-to-moderate, long-term beneficial impact.	Minor-to-moderate, short-term adverse impacts. Minor-to-moderate, long-term beneficial impact.	Minor-to-moderate, short-term adverse impacts. Minor long-term beneficial impact.	Negligible-to-moderate, short-term adverse impacts. Minor-to-moderate, long-term beneficial impacts.
5.12	Cultural Resources– Archaeological Resources	No impact.	Negligible short- and long-term adverse impact.	Moderate short- and long-term adverse impact.	Moderate short- and long-term adverse impact.	Minor-to-moderate short-term adverse impact. Negligible-to-moderate, long-term adverse impact.
5.13	Aesthetic Resources	No short-term impact. Negligible-to-minor, long-term adverse impact.	Negligible-to-minor, short-term adverse impact. Negligible-to-minor, long-term beneficial impact.	Negligible-to-minor, short-term adverse impact. Negligible-to-minor, long-term beneficial impact.	Negligible-to-minor, short-term adverse impact. Negligible-to-moderate, long-term beneficial impact.	Negligible-to-minor, short-term adverse impact. Negligible-to-moderate, long-term beneficial impact.

Section	Area of Evaluation	Alternative 1 No Action	Alternative 2 Repair, Replace, and Construct New Roadways and Related Infrastructure	Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems	Alternative 4: Construct Slope Stabilization Systems	Alternative 5: Combination of Alternatives
5.14	Environmental Justice	No short-term impact. Minor-to-moderate, long-term adverse impact. Potential disproportionate impact on environmental justice populations.	Negligible-to-minor, short-term adverse impact. No disproportionate impact on environmental justice populations. Minor-to-moderate, long-term beneficial impact.	Negligible-to-minor, short-term adverse impact. No disproportionate impact on environmental justice populations. Minor-to-moderate, long-term beneficial impact.	Negligible-to-minor, short-term adverse impact. No disproportionate impact on environmental justice populations. Minor-to-moderate, long-term beneficial impact.	Negligible-to-minor, short-term adverse impact. No disproportionate impact on environmental justice populations. Minor-to-moderate, long-term beneficial impact.
5.15	Land Use and Planning	No short-term impact. Negligible long-term adverse impact.	No short-term impact. Negligible-to-minor, long-term beneficial impact.	No short-term impact. Negligible-to-minor, long-term beneficial impact.	No short-term impact. Negligible-to-minor, long-term beneficial impact.	No short-term impact. Negligible-to-minor beneficial impact.
5.16	Noise	No short-term impact. Negligible-to-minor, long-term adverse impact.	Negligible-to-minor, short-term adverse impact. Negligible-to-minor beneficial impact.	Negligible-to-minor, short-term adverse impact. Negligible-to-minor beneficial impact.	Negligible-to-minor, short-term adverse impact. Negligible-to-minor beneficial impact.	Negligible-to-minor, short-term adverse impact. Negligible-to-minor beneficial impact.

Section	Area of Evaluation	Alternative 1 No Action	Alternative 2 Repair, Replace, and Construct New Roadways and Related Infrastructure	Alternative 3: Improve, Replace, and Construct New Roadside Drainage Structures and Stormwater Management Systems	Alternative 4: Construct Slope Stabilization Systems	Alternative 5: Combination of Alternatives
5.17	Transportation	No short-term impact. Moderate long-term adverse impact.	Minor short-term adverse impact. Moderate to major long-term beneficial impact.	Minor short-term adverse impact. Moderate to major long-term beneficial impact.	Minor short-term adverse impact. Moderate to major long-term beneficial impact.	Minor short-term adverse impact. Moderate to major long-term beneficial impact.
5.18	Public Services and Utilities	No short-term impact. Minor-to-moderate, long-term adverse impact.	Negligible-to-minor, short-term adverse impact. Negligible long-term beneficial impact.	Negligible-to-minor, short-term adverse impact. Negligible long-term beneficial impact.	Minor short-term adverse impact. Minor-to-moderate, long-term beneficial impact.	Negligible-to-minor, short-term adverse impact. Negligible-to-moderate, long-term beneficial impact.
5.19	Public Health and Safety	No short-term impact. Negligible-to-minor, long-term adverse impact.	Negligible-to-minor, short-term adverse impact. Minor-to-moderate, long-term beneficial impact.	Negligible-to-minor, short-term adverse impact. Minor-to-moderate, long-term beneficial impact.	Negligible-to-minor, short-term adverse impact. Minor-to-moderate, long-term beneficial impact.	Negligible-to-minor, short-term adverse impact. Minor-to-moderate, long-term beneficial impact.
5.20	Hazardous Materials	No short-term adverse impact. Negligible-to-minor, long-term adverse impact.	Negligible-to-minor, short-term adverse impact. Negligible-to-minor, long-term beneficial impact.	Negligible-to-minor, short-term adverse impact. Minor-to-moderate, long-term beneficial impact.	Negligible-to-minor, short-term adverse impact. Minor-to-moderate, long-term beneficial impact.	Negligible-to-minor, short-term adverse impact. Minor-to-moderate, long-term beneficial impact.

10.0 REFERENCES

ASTM International. 2021. "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process." Accessed May 2024, www.astm.org/e1527-21.html.

Beck, N. 2023. History of Hazards in the USVI. *Caribbean Green Technology Center.* Accessed April 4, 2024, https://cgtc-usvi.org/blog/history-of-hazards-in-the-usvi.

Corven, J. n.d. U.S. Virgin Islands. Bristol Community College. Accessed May 13, 2024, https://datazone.birdlife.org/userfiles/file/IBAs/CaribCntryPDFs/virgin_islands_(to_usa).pdf.

Duquette, C.A., S.R. Loss, and T.J. Hovick. 2021. *A meta-analysis of the influence of anthropogenic noise on terrestrial wildlife communication strategies*. J Appl Ecol. 2021; 58: 1112–1121. Accessed November 7, 2024, https://doi.org/10.1111/1365-2664.13880.

Environmental and Energy Law Program. 2022. "Social Cost of Greenhouse Gas Estimates." Accessed on December 21, 2023. Available at: https://eelp.law.harvard.edu/2022/10/social-cost-of-greenhouse-gas-estimates/.

EPA. 2024a. Sole Source Aquifers Mapper. Accessed May 15, 2024, https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=9ebb047ba3ec41ada1877155fe31356b.

———. 2024b. "Green Book: Current Nonattainment Counties for All Criteria Pollutants." Accessed May 2024. www3.epa.gov/airquality/greenbook/ancl.html.

———. 2024c. EJScreen. Accessed April 20, 2024, https://ejscreen.epa.gov/mapper/.

———. 2024d. Climate Change Indicators: Greenhouse Gases. Accessed November 3, 2024, https://www.epa.gov/climate-indicators/greenhouse-gases.

———. 2021. Stormwater Best Management Practice: Vegetated Filter Strip. Accessed March 12, 2024, https://www.epa.gov/system/files/documents/2021-11/bmp-vegetated-filter-strip.pdf.

———. 2020. "The 2020 USVI Integrated Water Quality Monitoring & Assessment Report." Accessed May 7, 2024, https://dpnr.vi.gov/wp-content/uploads/2022/10/2020-USVI-Integrated-Report-FINAL.pdf.

———. 2016. What Climate Change Means for the U.S. Virgin Islands. Accessed April 4, 2024, https://19january2017snapshot.epa.gov/sites/production/files/2016-11/documents/climate-change-usvi.pdf.

Ewel, J.J., and J.L. Whitmore. 1973. *The Ecological Life Zones of Puerto Rico and the U.S. Virgin Islands.* Forest Service Research Paper ITF-18. Institute of Tropical Forestry, Rio Piedras, Puerto Rico.

FEMA. 2022. Programmatic Environmental Assessment U.S. Virgin Islands Housing Actions St. Croix, St. John, and St. Thomas, USVI. 4340-VI. December.

FHWA. 2023. *Manual on Uniform Traffic Control Devices for Streets and Highways* (11th ed.). U.S. Department of Transportation. Accessed June 11, 2024, https://mutcd.fhwa.dot.gov.

———. 1993. Highway/Utility Guide. Office of Technology Applications. Publication No. FHWA-SA-93-049. June. https://www.fhwa.dot.gov/utilities/010604.pdf.

Furniss, M.J. 1989. Stabilization of Landslides for the Improvement of Aquatic Habitat. USDA Forest Service Gen. Tech. Rep. PSW-110.

Gautam, S., and R. Bhattarai. 2018. "Low-Water Crossings: An Overview of Designs Implemented along Rural, Low-Volume Roads." *Environments*, 2018, 5, 22. doi:10.3390/environments5020022.

Geosynthetic Materials Association. 2016. Geotextiles Enhance Road Performance. Accessed March 12, 2024, https://geosynthetics.textiles.org/wp-content/uploads/sites/10/2016/06/geotextiles_road_performance.pdf.

Government of the Virgin Islands. n.d. *Our History*. Accessed June 5, 2024, https://bvi.gov.vg/content/our-history.

International Finance Corporation. 2019. *The Dirty Footprint of the Broken Grid*. Accessed November 7, 2024, https://www.ifc.org/en/insights-reports/2010/dirty-footprint-of-broken-grid.

iNaturalist. 2024. "Observations." Accessed May 10, 2024, https://www.inaturalist.org/observations?place_id=97315&view=species&iconic_taxa=Plantae.

Keller Group. 2024. Soil Nailing. Accessed March 12, 2024, https://www.keller-na.com/expertise/techniques/soil-nailing.

National Centers for Environmental Information. 2024. Official website. Past Weather. Accessed June 2024. https://www.ncei.noaa.gov/access/past-weather/USVI.

NEHA. 2024. Official website. Post-Hurricane Health and Safety Work Partnership page. Accessed April 2024. https://www.neha.org/post-hurricane-health-safety.

NMFS. 2024a. Threatened and Endangered Species List U.S. Virgin Islands. Accessed May 2, 2024, https://www.fisheries.noaa.gov/southeast/consultations/threatened-and-endangered-species-list-us-virgin-islands.

———. 2024b. Essential Fish Habitat Mapper. Accessed May 14, 2024, https://www.habitat.noaa.gov/apps/efhmapper/efhreport/.

NPS. 2024. Virgin Islands. Accessed April 20, 2024, https://www.nps.gov/state/vi/index.htm.

———. 2021a. St. John History Timeline. Accessed June 6, 2024, https://www.nps.gov/viis/learn/timeline.htm.

———. 2021b. Virgin Islands Birds. Accessed May 13, 2024, https://www.nps.gov/viis/learn/nature/bird.htm.

———. 2020. Geology: Transform Plate Boundaries. Robert J. Lillie, Emeritus Professor of Geosciences, Oregon State University. February 11. Accessed on June 11, 2024, https://www.nps.gov/subjects/geology/plate-tectonics-transform-plate-boundaries.htm.

———. 2017. Virgin Islands Animals. Accessed May 13, 2024, https://www.nps.gov/viis/learn/nature/animals.htm.

NRCS. 2024. Web Soil Survey. Accessed May 10, 2024, http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm.

Reinforced Earth. 2024. Mechanically Stabilized Earth (MSE) Retaining Walls. Accessed March 11, 2024, https://reinforcedearth.com/products/retaining-walls/mechanically-stabilized-earth-mse-retaining-walls/.

Resilient Virgin Islands. 2024. Hazard Mitigation and Resilience Plan: Riverine Flooding in the U.S. Virgin Islands. Accessed April 4, 2024, https://resilientvi.org/.

Runkle, J., K.E. Kunkel, L.E. Stevens, S.M. Champion, D.R. Easterling, A. Terando, L. Sun, B.C. Stewart, G. Landers, and S. Rayne. 2022. *Puerto Rico and the U.S. Virgin Islands State Climate Summary 2022*. NOAA Technical Report NEDIS 150-PR. NOAA/NESDIS, Silver Spring, MD, 5pp.

St. George Village Botanical Garden. 2024. Welcome to the St. George Village Botanical Garden. Accessed April 20, 2024, https://www.thegardenstcroix.org/.

Trip Advisor. 2024. Scenic Drives in U.S. Virgin Islands. Accessed April 20, 2024, https://www.tripadvisor.com/Attractions-g147400-Activities-c47-t74-U_S_Virgin_Islands.html.

U.S. Census Bureau. 2020. Decennial Census of Island Areas. Accessed April 20, 2024, https://www.census.gov/data/tables/2020/dec/2020-us-virgin-islands.html.

U.S. Coast Guard Atlantic Area. 2024. Official website. Sector San Juan–MSD St. Thomas page. Accessed April 2024. https://www.atlanticarea.uscg.mil/Our-Organization/District-7/Units/Sector-San-Juan/Sector-San-Juan-Units/MSD-St-Thomas.

U.S. Energy Information Administration. 2024. Official website. Territory Profile and Energy Estimates. Accessed April 2024. https://www.eia.gov/state/print.php?sid=VQ.

U.S. Fish and Wildlife Service. 2024a. National Wetlands Inventory. Accessed July 3, 2024, https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/.

———. 2024b. Information for Planning and Consultation. Accessed May 2, 2024, https://ipac.ecosphere.fws.gov/.

———. 2022. Endangered Species Act. Accessed November 21, 2024, https://www.fws.gov/laws/endangered-species-act/section-3#:~:text=(19)%20The%20term%20%22take,geographical%20context%2C%20includes%20all%20States.

———. 2019. Saving rare plants in the U.S. Virgin Islands. Accessed May 13, 2024, https://www.fws.gov/story/2021-07/saving-rare-plants-us-virgin-islands.

U.S. Forest Service. 2006. Low-Water Crossings: Geomorphic, Biological, and Engineering Design Considerations. “Chapter 5: Low-Water Crossing Types: Pros, Cons, Idiosyncrasies, and Anecdotes.” Accessed March 19, 2024, https://www.fs.usda.gov/eng/pubs/pdf/LowWaterCrossings/.

USGS. 2018. Caribbean Tsunami and Earthquake Hazards Studies. Woods Hole Coastal and Marine Science Center. August 21. Accessed on June 11, 2024, https://www.usgs.gov/centers/whcmsc/science/caribbean-tsunami-and-earthquake-hazards-studies#overview.

———. 1996. "U.S. Virgin Islands Wetland Resources, National Water Summary-Wetland Resources (p. 369-374)". D. Briane Adams, and John M. Hefner. Accessed May 1, 2024, https://pubs.usgs.gov/wsp/2425/report.pdf.

U.S. National Park Service. 2021. "Virgin Islands Native Plants". Accessed November 21, 2024, https://www.nps.gov/viis/learn/nature/vi-native-plants.htm.

U.S. National Weather Service. 2020. "PR and USVI Normals". Accessed November 21, 2024, https://www.weather.gov/sju/climo_pr_usvi_normals.

USVI. 2024. The United States Virgin Islands. Accessed April 20, 2024, https://www.visitusvi.com/.

USVI Department of Tourism. 2024. Accessed April 3, 2024, https://dot.vi.gov/our-islands/general-information/.

USVI DOH. 2024. Official website. Emergency Medical Services page. Accessed April 2024, https://doh.vi.gov/programs/emergency-medical-services.

USVI DPNR. 2024. Permits and Forms. Accessed on July 1, 2024, https://dpnr.vi.gov/.

———. 2020. "Fact Sheet on the U.S. Virgin Islands 2020 Impaired Waters List." Accessed May 1, 2024, https://www.epa.gov/sites/default/files/2021-01/documents/usvi_2020_ir_fact_sheet_final.pdf.

———. 2016. U.S. Virgin Islands Invasive Species Action Plan. Accessed May 10, 2024, https://invasives.vi.gov/wp-content/uploads/2021/11/USVI_Invasive_Species_Action_Plan.pdf.

———. 2010. "Wetlands of the U.S. Virgin Islands." Accessed June 2022, https://www.ncei.noaa.gov/data/oceans/coris/library/NOAA/CRCP/other/other_crcp_publications/Watershed_USVI/steer_exisiting_studies/USVIWetlandsdraft2.pdf.

USVI DPNR DFW. 2018a. United States Virgin Islands Wildlife Action Plan Volume 1: Management Framework. Accessed May 13, 2024, https://dpnr.vi.gov/wp-content/uploads/2022/10/VI-WAP-Vol-1-Management-Framework.pdf.

———. 2018b. United States Virgin Islands Wildlife Action Plan Volume 2: Habitats and Species. Accessed on May 13, 2024, https://dpnr.vi.gov/wp-content/uploads/2022/10/VI-WAP-Vol-2-Habitats-Species.pdf.

USVI DPW. 2023. Department of Public Works, USVI Home Page. Accessed April 4, 2024, https://dpw.vi.gov/.

USVI Hurricane Recovery and Resilience Task Force. 2018. USVI Hurricane Recovery and Resilience Task Force: Report.

USVI Office of Disaster Recovery. 2024. Official website. Accessed April 2024, https://www.usviodr.com.

USVI Office of the Governor. 2013. MOA between the Government of the Virgin Islands Department of Public Works, and the Department of Transportation – Federal Highway Administration Puerto Rico and Eastern Federal Lands Highway Division. Agreement No. DTFH71-13-X-50049. August 12, 2013.

USVI Police Department. 2022. Official website. Offices, Bureaus, Units and Commands page. Accessed April 2024, http://www.vipd.vi.gov/about-us/offices-bureaus-units-and-commands.

V.I.C. 2019. Title 29–Public Planning and Development. Chapter 3 – Virgin Islands Zoning and Subdivision Law Subchapter III – Conservation and Preservation of Historic and Cultural Assets Part 285. "Building permits in Historic and Architectural Control Districts and Registry: and Part 286. Coordination of other departments and agencies with the Virgin Islands Historic Preservation Commission." Accessed June 2024, https://law.justia.com/codes/virgin-islands/2019/title-29/chapter-3/subchapter-iii/.

WAPA. 2020. Strategic Transformation Plan. June.

———. 2024. Official website. About Us page. Accessed April 2024, https://www.viwapa.vi/about-us.

Wikipedia. n.d. Saint Croix. Accessed June 5, 2024, https://en.wikipedia.org/wiki/Saint_Croix.

———. n.d. St Thomas. Accessed June 5, 2024, https://en.wikipedia.org/wiki/Saint_Thomas,_U.S._Virgin_Islands.

Virgin Islands Fire and Emergency Medical Services. 2023. Official website. Stations page. Accessed April 2024, http://vifems.org/stationS.

Virgin Islands Now. 2024. Virgin Islands: Fishing Guide. Accessed May 14, 2024, https://www.vinow.com/general_usvi/fishing-guide/#:~:text=The%20primary%20target%20of%20shallow%20water%20fishing%20and,catch%20and%20release%20only.%20Snook%20are%20caught%20occasionally.

VIPA. 2024. Official website. Accessed April 2024, https://www.viport.com.

VIWMA. 2024. Official website. Wastewater. Accessed April 2024, http://www.viwma.org/index.php/post-formats/wastewater.

Viya. 2024. Official website. About us page. Accessed April 2024, https://viya.vi/our-company/about-us.

World Health Organization. 2023. Official website. Human rights page. https://www.who.int/news-room/fact-sheets/detail/human-rights-and-health.

APPENDIX A

Figures

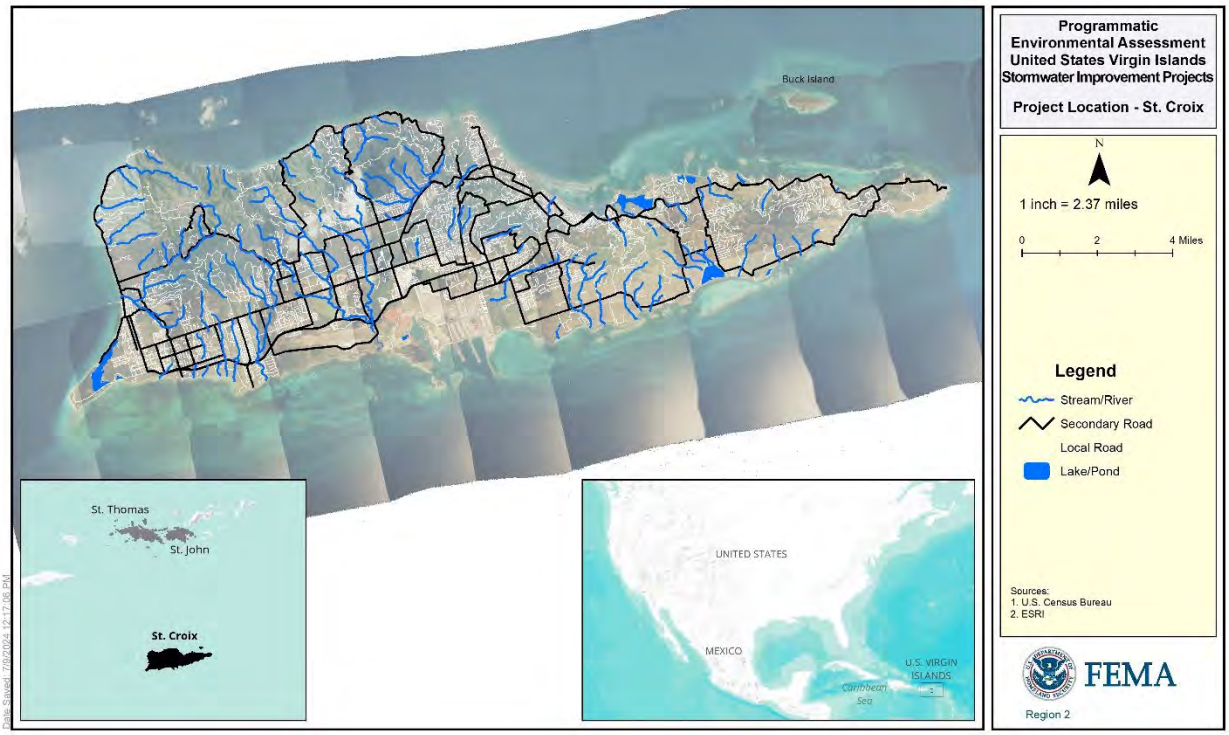

Figure 1. Project Location Aerial – St. Croix

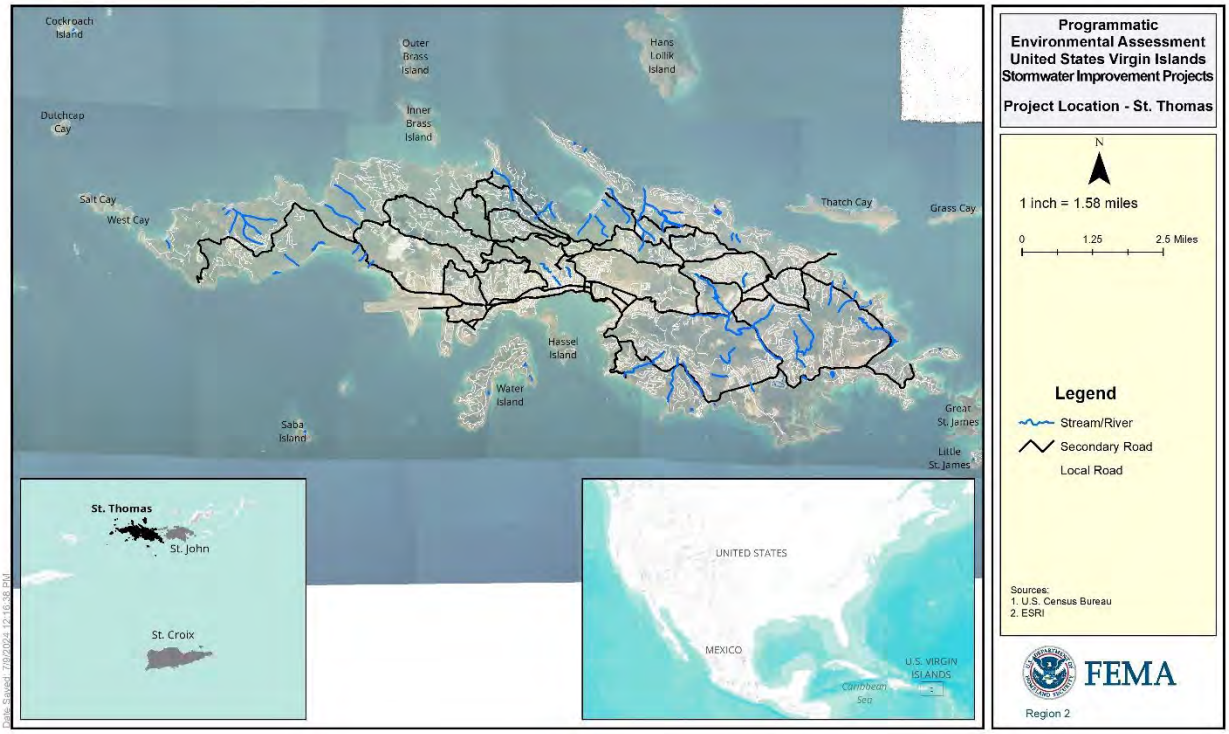

Figure 2. Project Location Aerial – St. Thomas

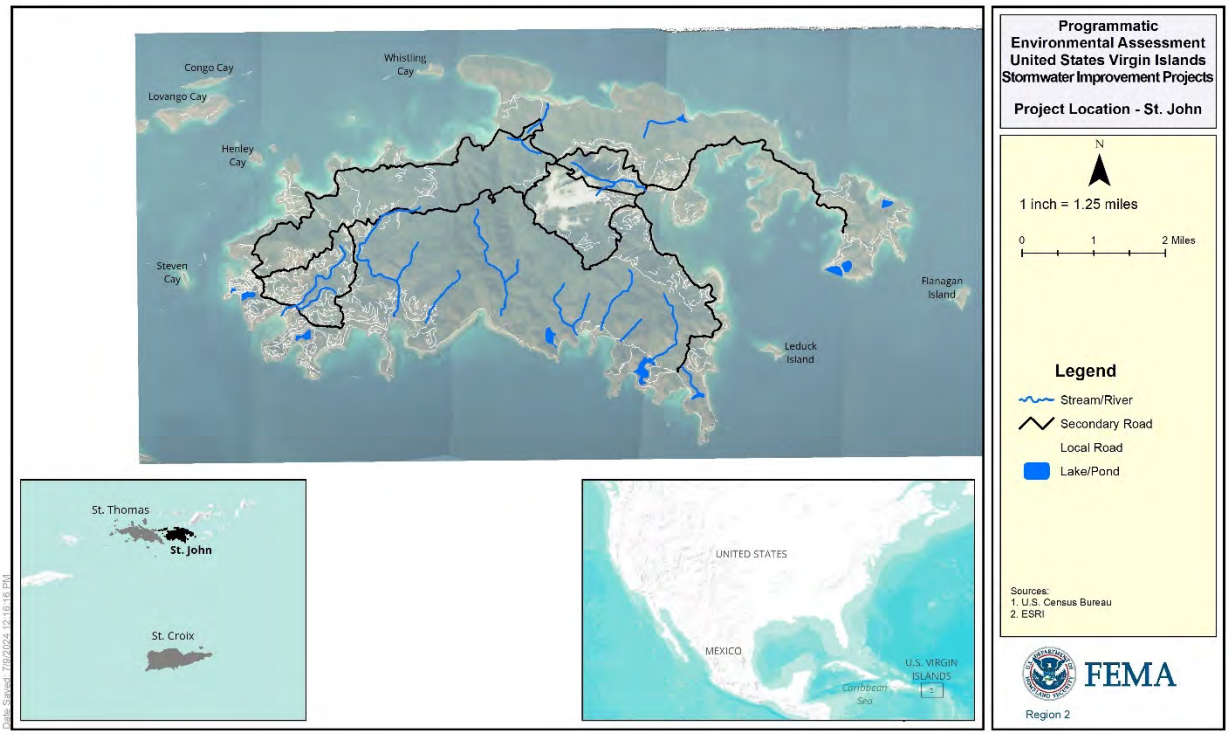

Figure 3. Project Location Aerial – St. John

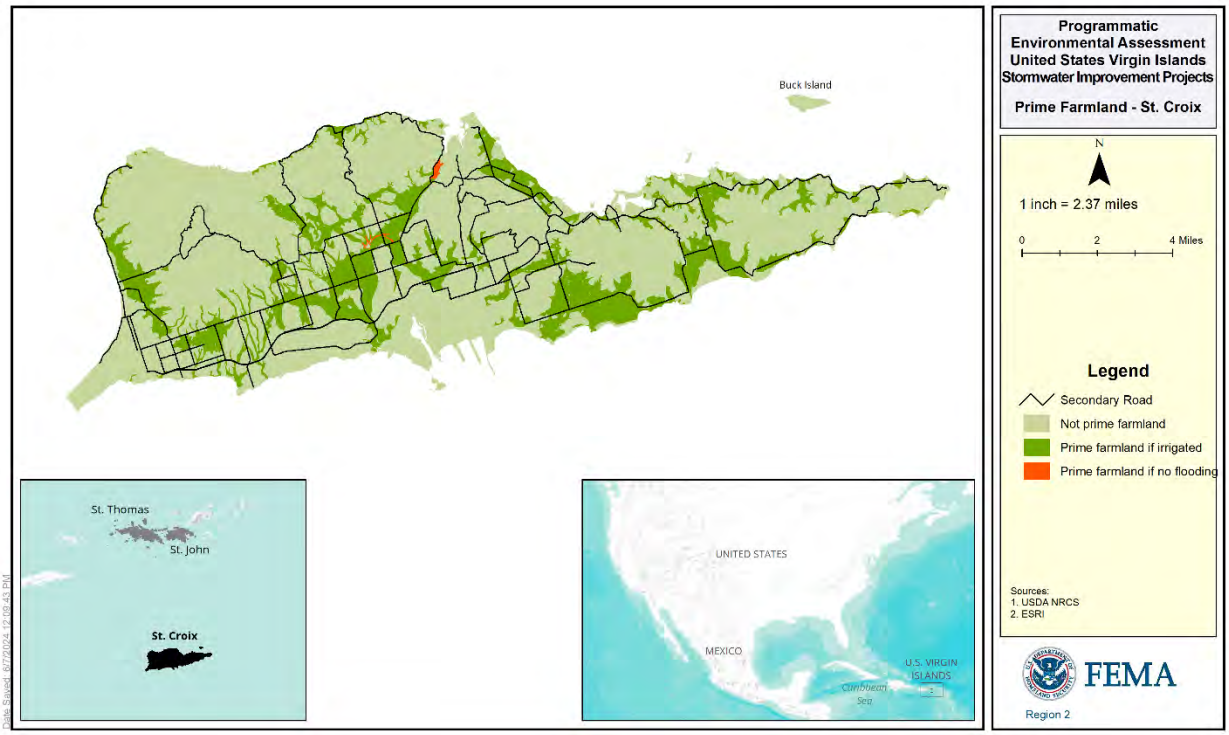

Figure 4. Farmland – St. Croix

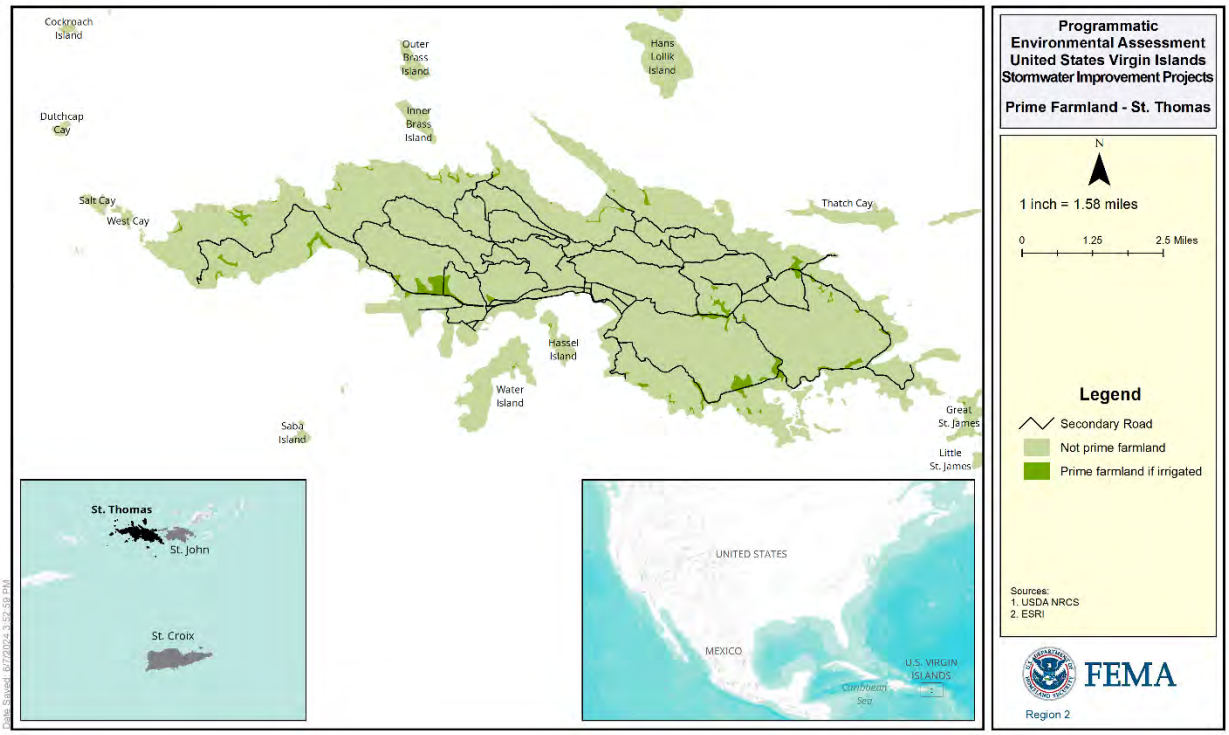

Figure 5. Farmland – St. Thomas

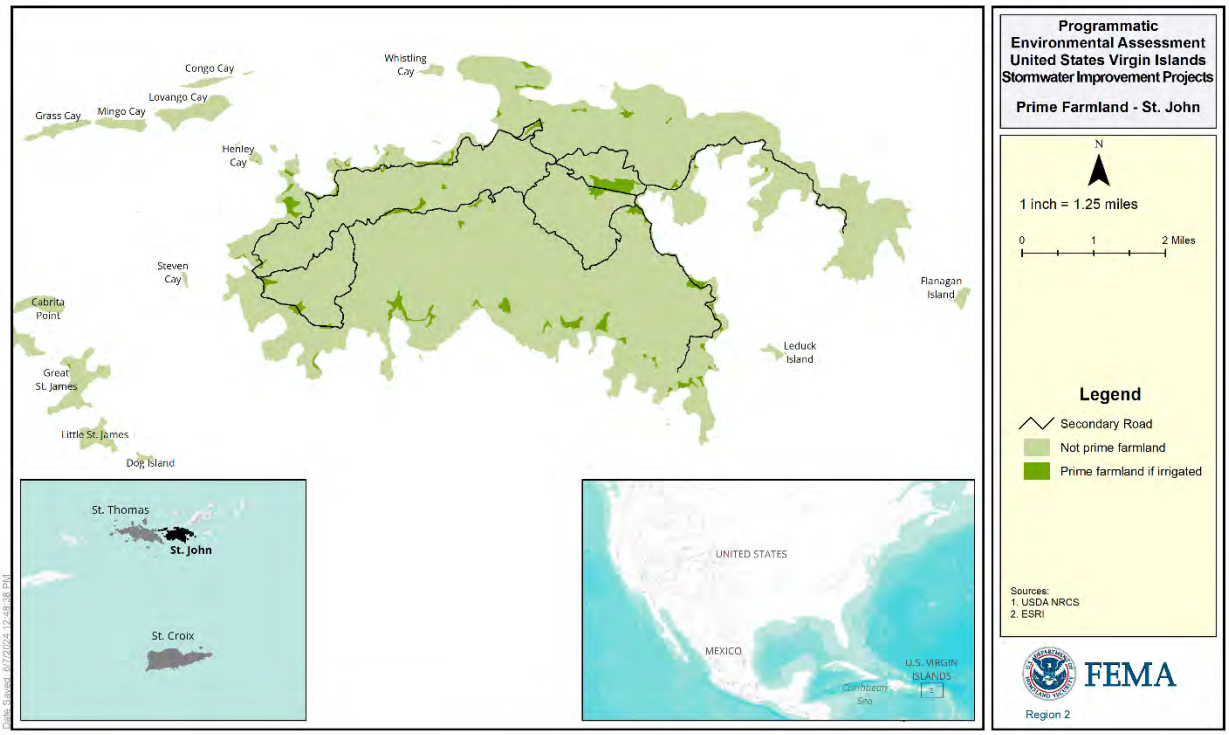

Figure 6. Farmland – St. John

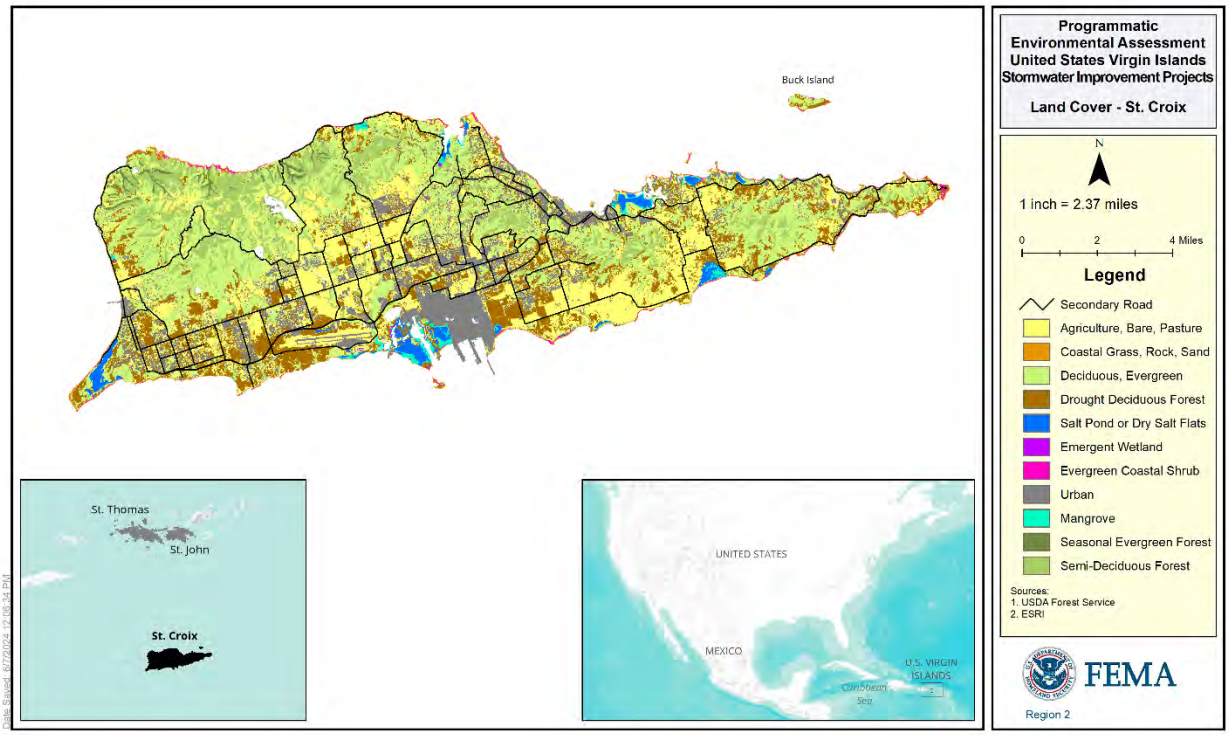

Figure 7. Land Cover – St. Croix

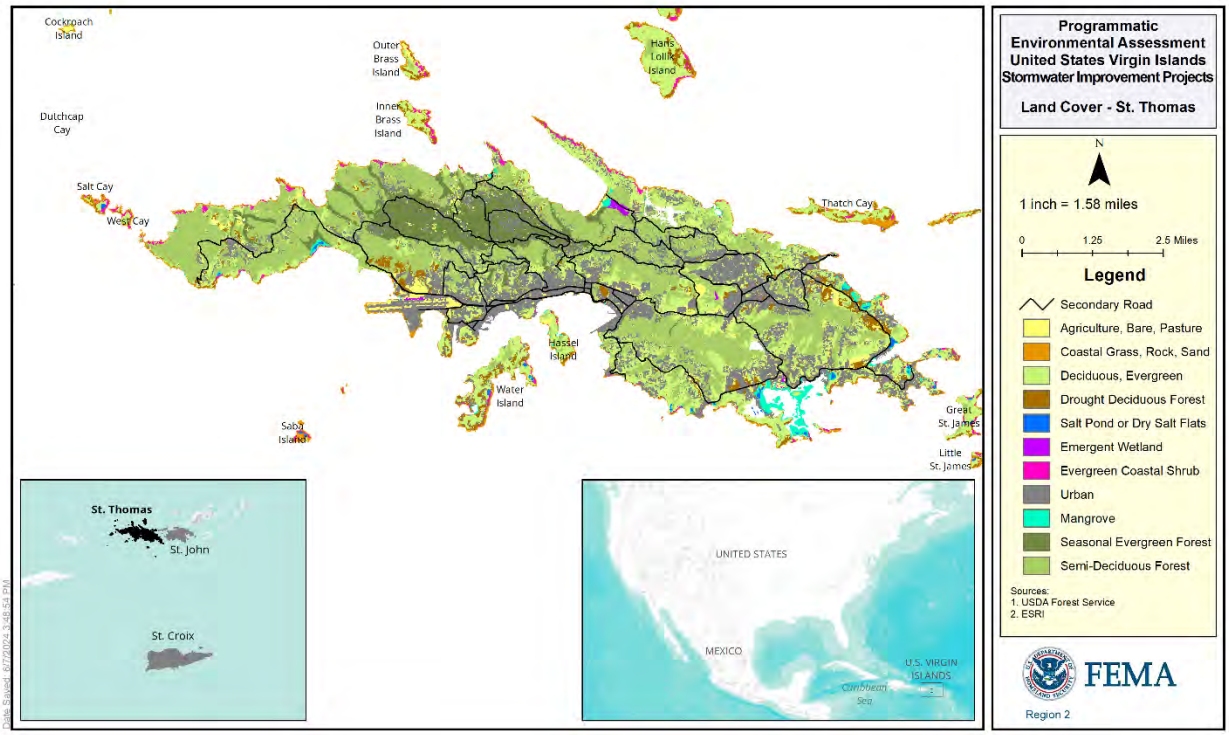

Figure 8. Land Cover – St. Thomas

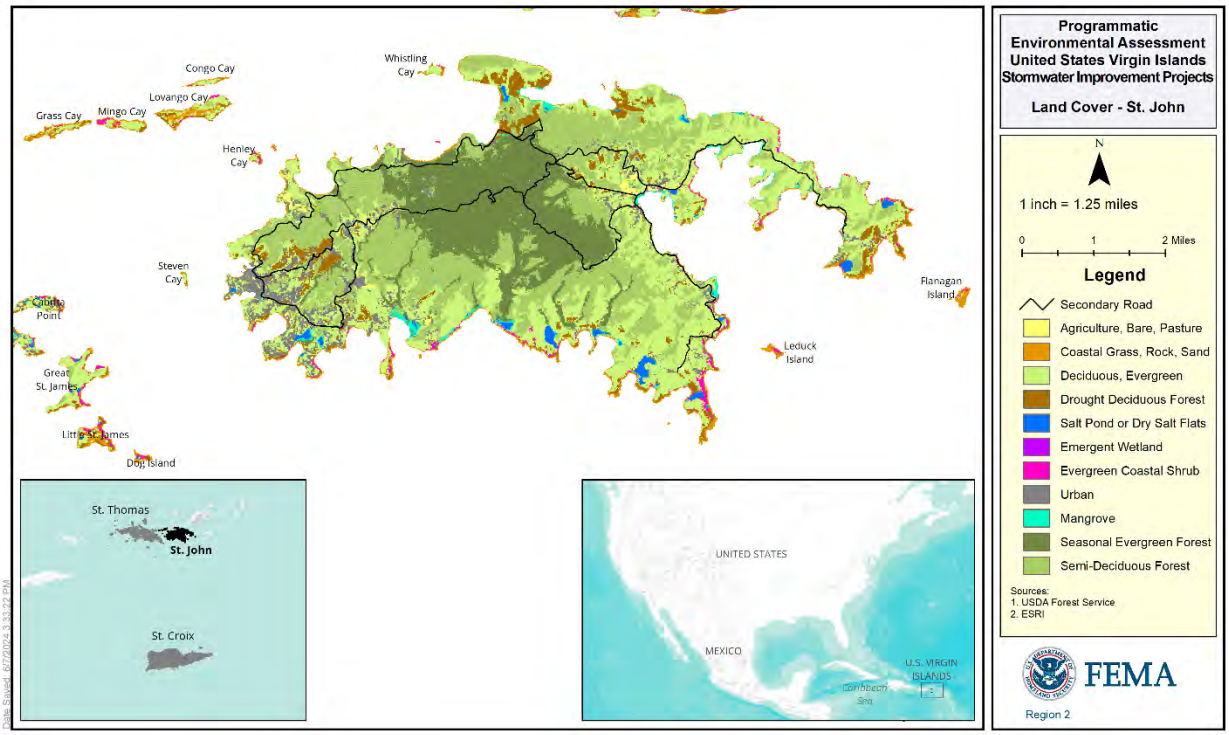

Figure 9. Land Cover – St. John

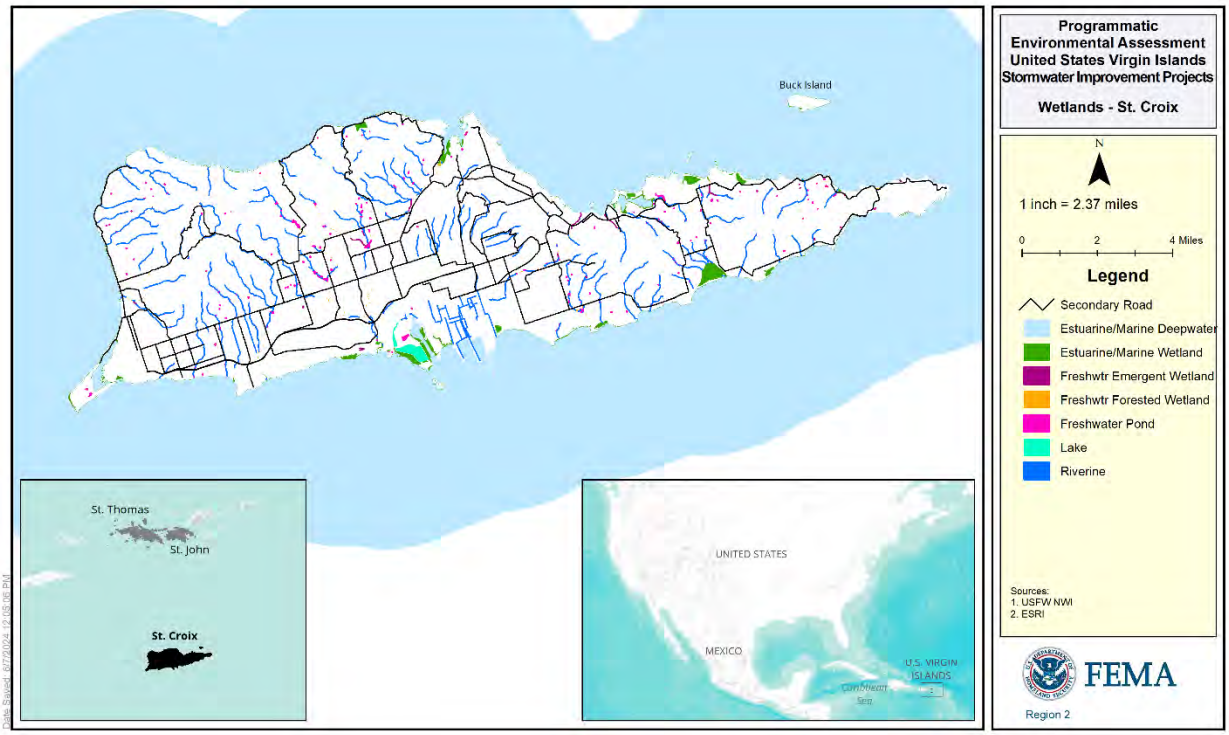

Figure 10. Wetlands – St. Croix

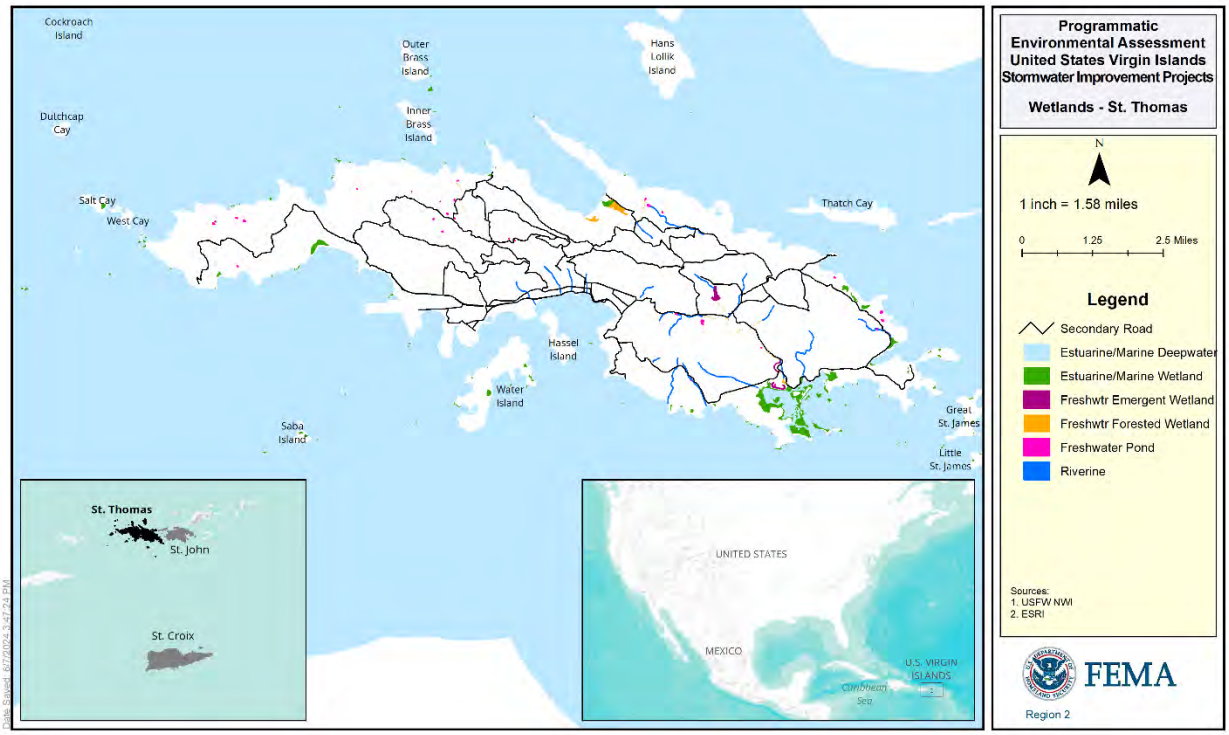

Figure 11. Wetlands – St. Thomas

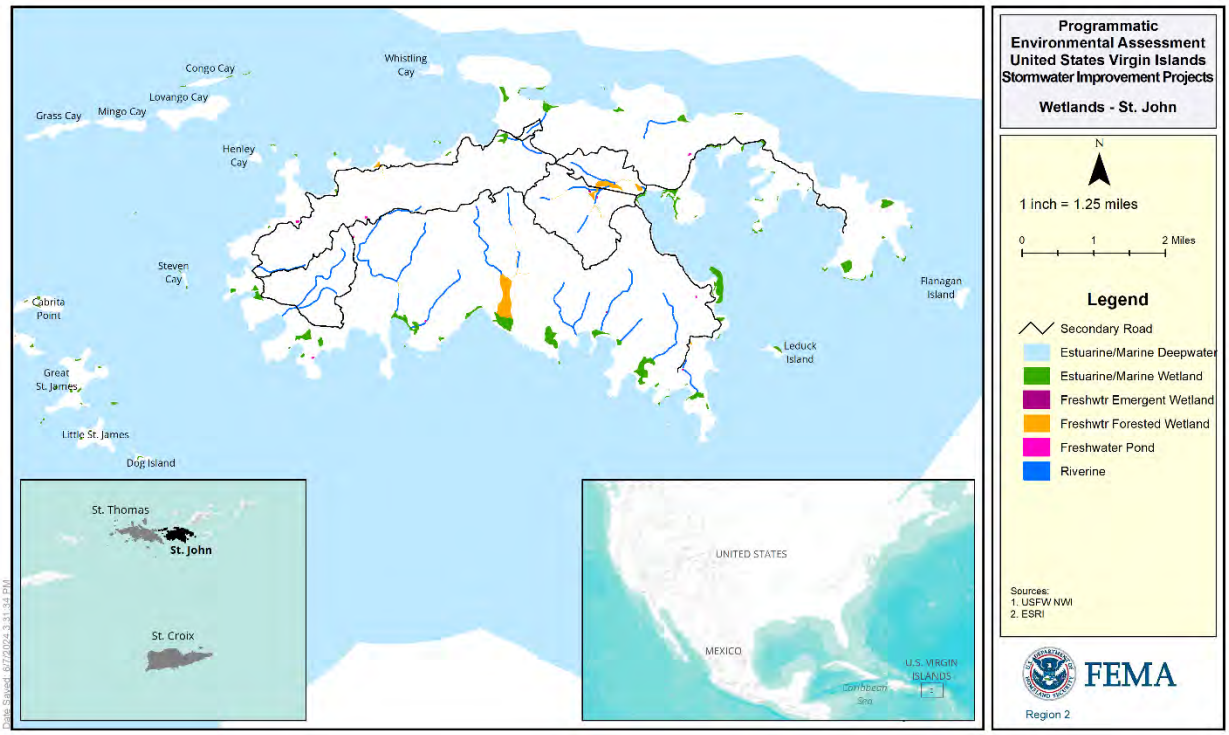

Figure 12. Wetlands – St. John

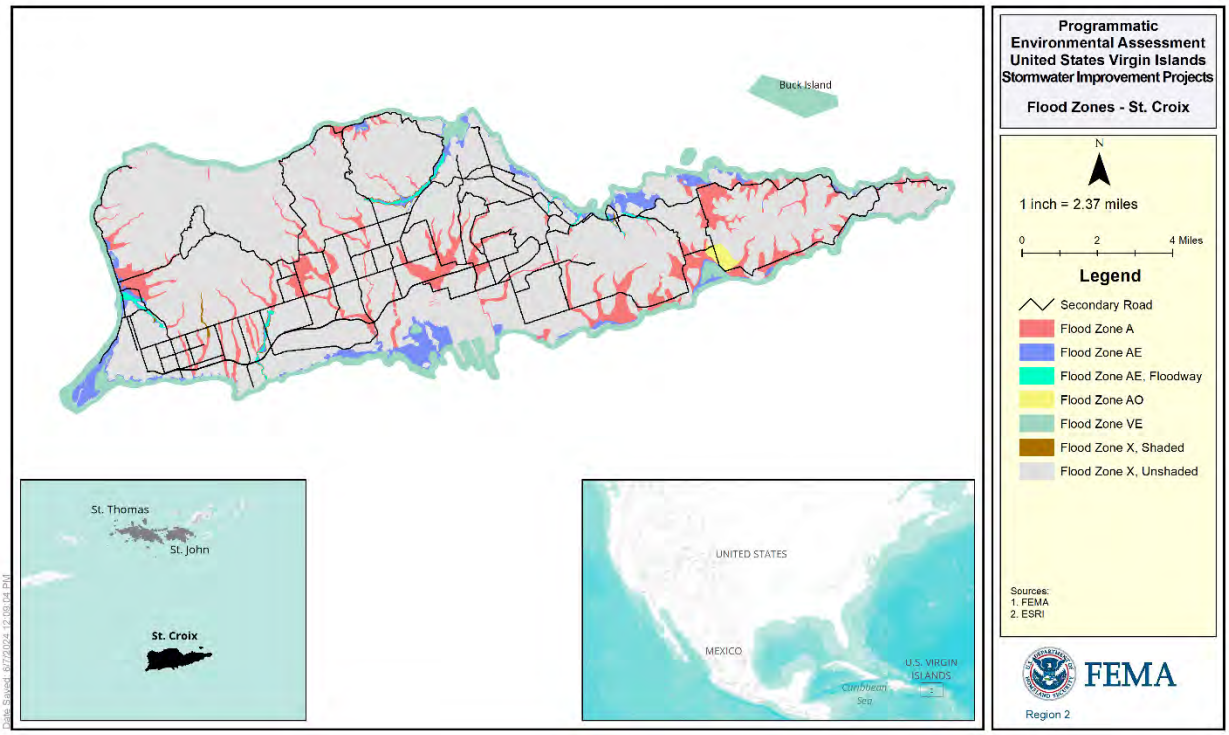

Figure 13. Flood Zones – St. Croix

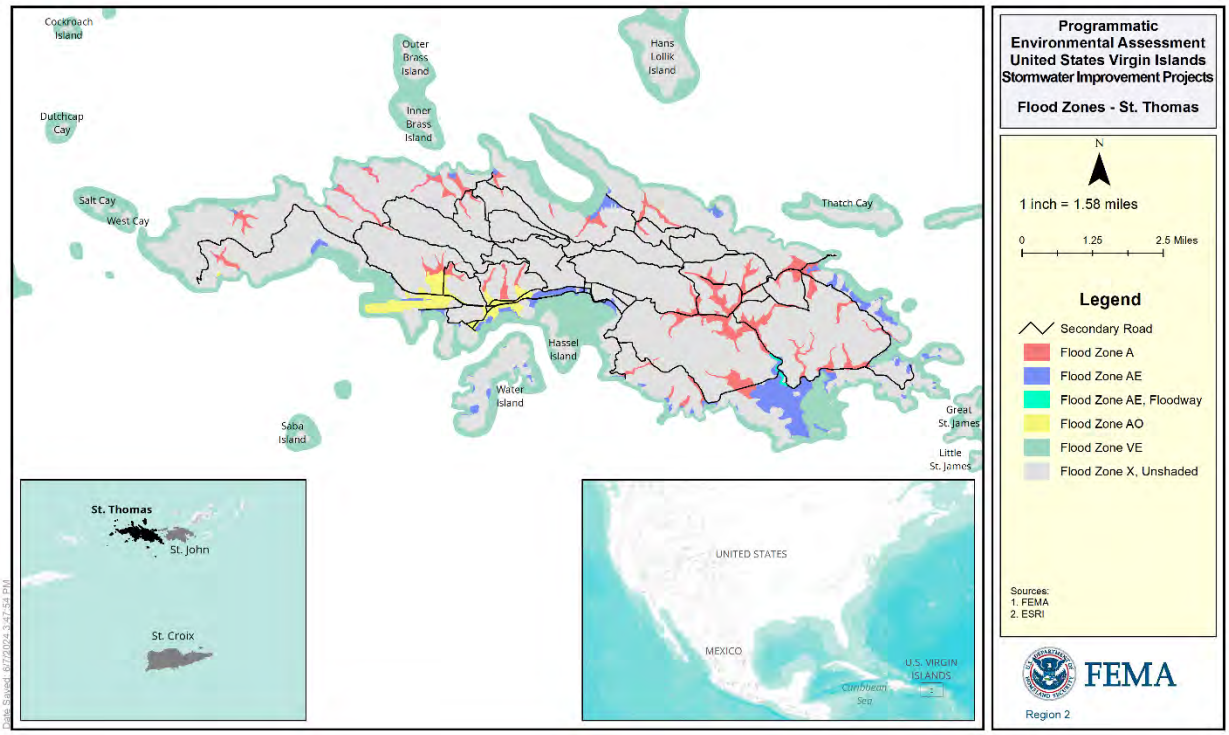

Figure 14. Flood Zones – St. Thomas

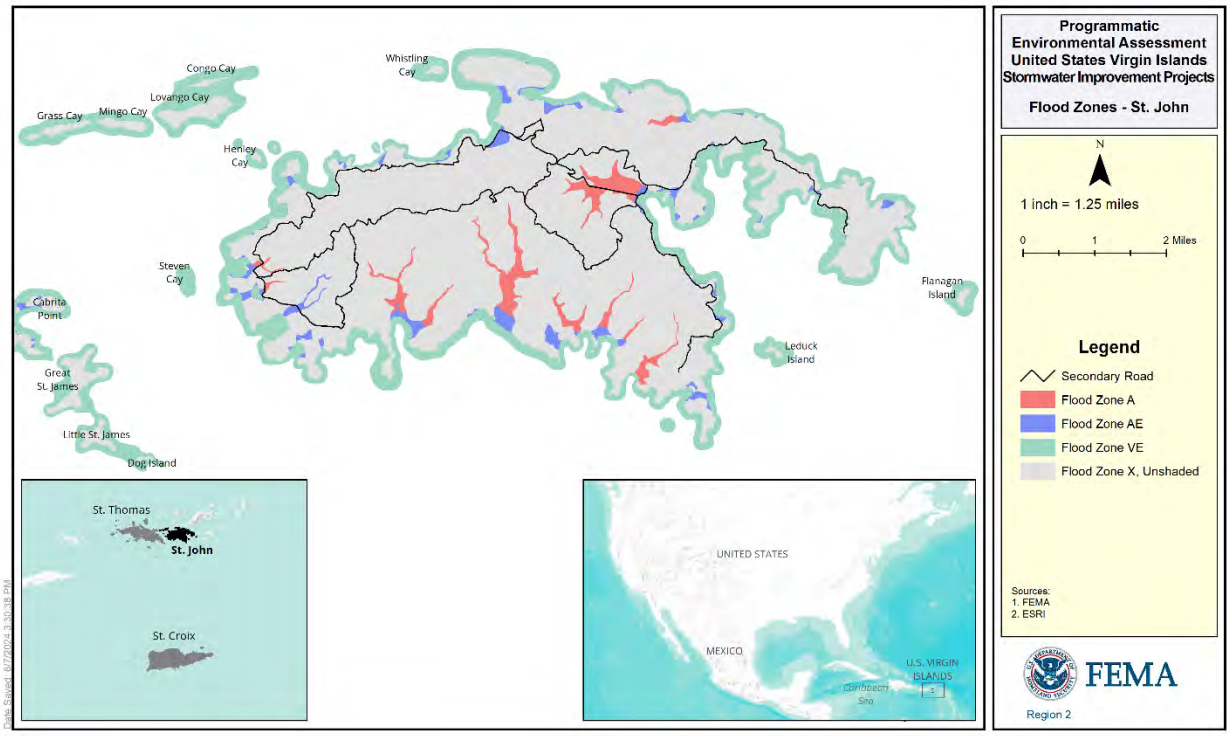

Figure 15. Flood Zones – St. John

APPENDIX B

Basic Construction Types

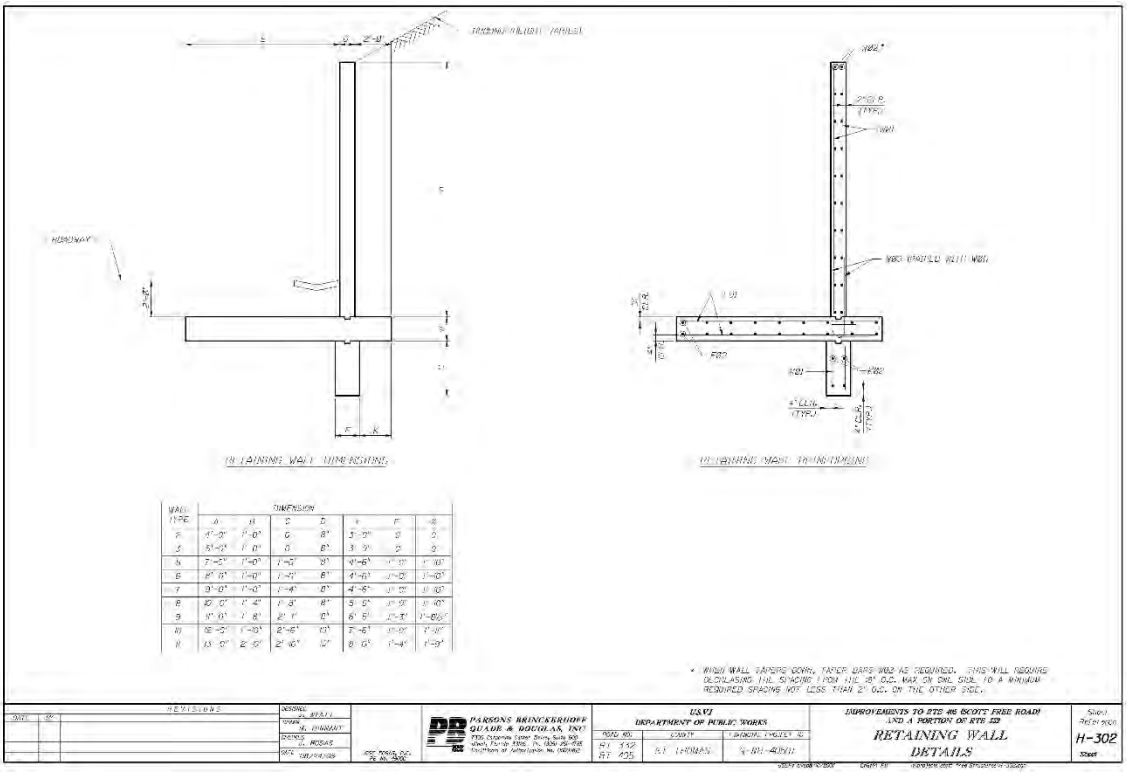

Illustration 1 – Retaining Wall Details, Cross Section

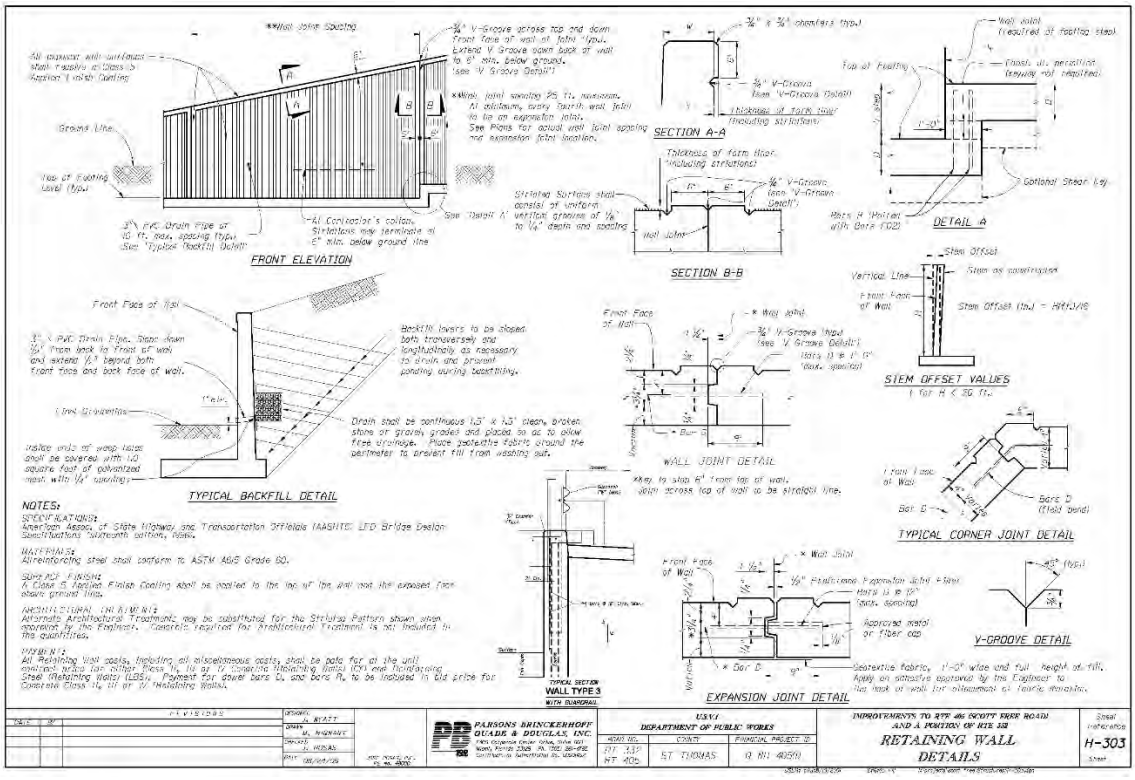

Illustration 2 – Retaining Wall Details Descriptions

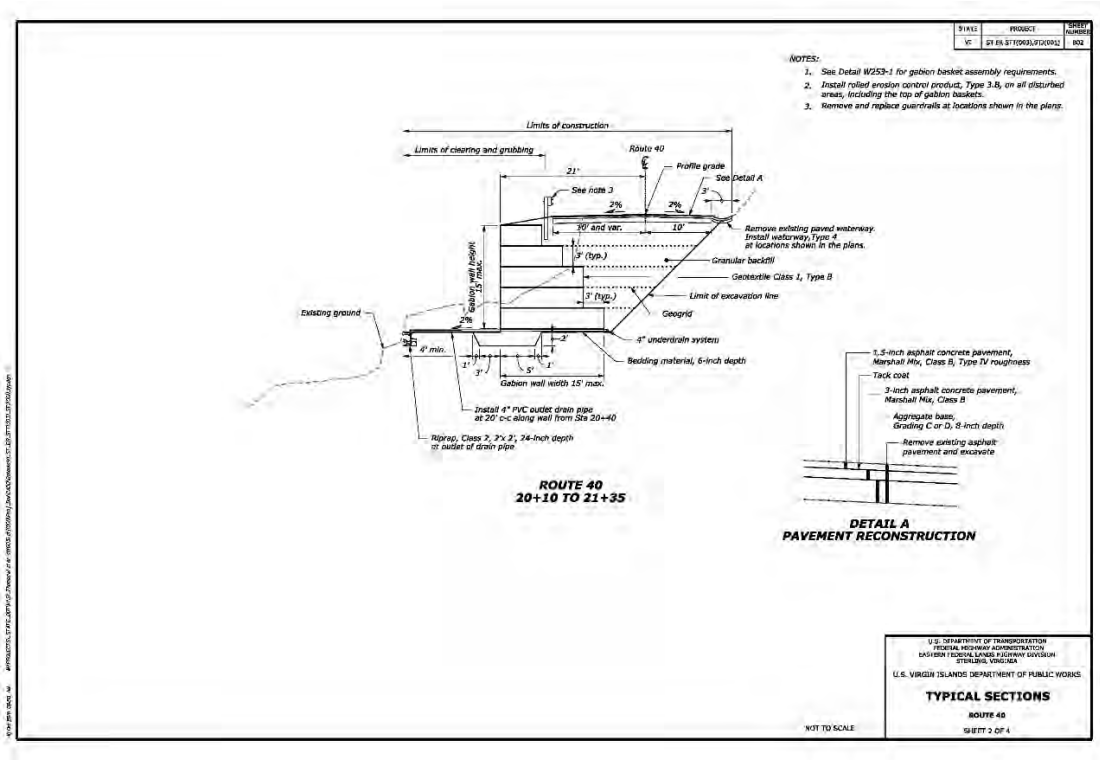

Illustration 3 – Basic Mechanically Stabilized Earth Wall Cross-Section

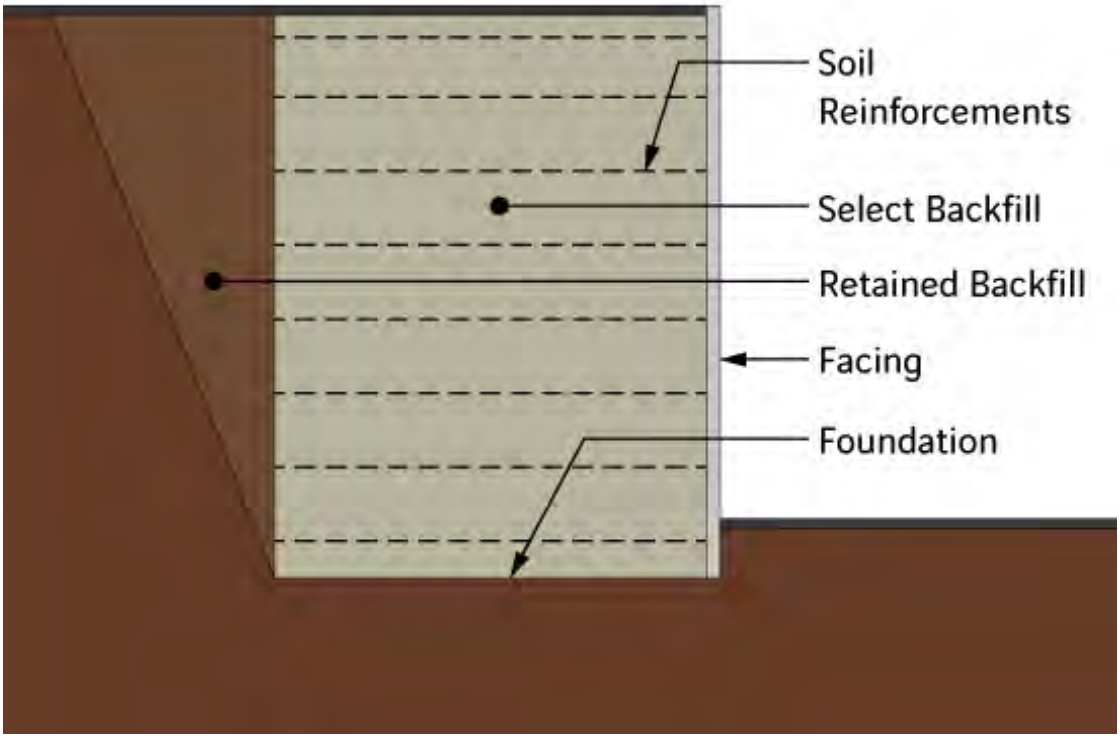

Illustration 4 – Basic Mechanically Stabilized Earth Wall Cross-Section

APPENDIX C

Species Tables

Table 1. Federally Listed Species with Potential to Occur in the Study Area

Species Name	Federal Status/Agency Jurisdiction	Critical Habitat Designated?	Potential to Occur and Designated Critical Habitat			Preferred Habitat
			St. Croix	St. Thomas	St. John	
Mammals						
Sperm whale *Physeter macrocephalus*	Endangered NMFS	None	X	X	X	Occurs throughout all of the world's oceans. Migrations are not well understood/predictable. Mostly occur in deep waters (2,000 to 10,000 feet), although they return to the surface to breath every 45 to 60 minutes.
West Indian manatee *Trichechus manatus*	Threatened USFWS	Final	X	X	X	Occurs in marine, brackish, and freshwater habitats in coastal and riverine areas. Habitat areas generally feature underwater vegetation like seagrass and eelgrass.
Birds						
Black-capped petrel *Pterodroma hasitata*	Endangered USFWS	None	X	X	X	Nests only on the island of Hispaniola in the Caribbean, but can travel long distances to foraging areas in the western Atlantic and southern Caribbean basins and the Gulf of Mexico.
Roseate tern *Sterna dougallii dougallii*	Threatened USFWS	None	X	X	X	Breeds on islands in the Caribbean Sea from the Florida Keys to the Lesser Antilles. Overwinters on the north and east coasts of South America. Foraging and roosting habitats are characterized as sparsely vegetated coastal marine and estuarine habitats with large areas of exposed intertidal substrates (USFWS 2021).

Species Name	Federal Status/Agency Jurisdiction	Critical Habitat Designated?	Potential to Occur and Designated Critical Habitat			Preferred Habitat
			St. Croix	St. Thomas	St. John	
Reptiles						
Green sea turtle *Chelonia mydas*	Threatened USFWS and NMFS[1]	Proposed	X PC	X	X	Occurs in coastal areas in subtropical and temperate regions of the Atlantic, Pacific, and Indian Oceans, and in the Mediterranean Sea.
Hawksbill sea turtle *Eretmochelys imbricata*	Endangered USFWS and NMFS[1]	Final	X	X	X	Occurs in the tropical and sub-tropical regions of all of the world's major oceans. Typically occur in nearshore coral reef habitats and can also be found in mangrove estuaries.
Leatherback sea turtle *Dermochelys coriacea*	Endangered USFWS and NMFS[1]	Final	X C	X	X	Occurs in the Atlantic, Pacific, and Indian Oceans. Nesting occurs in Florida, Puerto Rico, and USVI.
Loggerhead sea turtle *Caretta caretta*	Threatened USFWS and NMFS[1]	Final	X	X	X	Occurs in subtropical and temperate regions of the Atlantic, Pacific, and Indian Oceans, and in the Mediterranean Sea.
St. Croix ground lizard *Ameiva polops*	Endangered USFWS	Final	X C			Occurs in coastal dry forest vegetation in four offshore islands of St. Croix (USFWS 2019a).
Virgin Island tree boa *Chilabothrus granti*	Endangered USFWS	None		X		Occurs in subtropical dry and moist forests. The presence of arboreal and ground-level refugia is important. Suitable habitat typically comprises forests with high tree density and connectivity.

Species Name	Federal Status/Agency Jurisdiction	Critical Habitat Designated?	Potential to Occur and Designated Critical Habitat			Preferred Habitat
			St. Croix	St. Thomas	St. John	
Flowering Plants						
Eggers' century plant *Agave eggersiana*	Endangered USFWS	Final	X C			Occurs on coastal cliffs with sparse vegetation and dry coastal shrubland vegetation communities within the subtropical dry forest on St. Croix. Only occurs in the subtropical dry forest life zone.
Thomas' lidflower *Calyptranthes thomasiana*	Endangered USFWS	None			X	Occurs primarily within the subtropical moist forest life zone. May establish within areas in which agricultural activities have been abandoned and reforestation has occurred. Has been recorded on mountains at 300 to 1,240 feet above mean sea level (USFWS 2013).
Catesbaea melanocarpa[2]	Endangered USFWS	Final	X C			Occurs in the subtropical dry forest life zone. Suitable habitat typically comprises succulent or coriaceous vegetation of a nearly continuous single-layered canopy with little ground cover (USFWS 2005).
Marron bacora *Solanum conocarpum*	Endangered USFWS	Final			X C	Occurs in the dry and deciduous forest of the island of St. John. Typically is found in communities with diverse assemblages of woody species (USFWS 2020).
St. Thomas prickly-ash *Zanthoxylum thomasianum*	Endangered USFWS	None		X	X	Occurs within the subtropical dry forest and subtropical moist forest zones above the sea spray zone from approximately 100 to 1,000 feet above mean sea level.

Species Name	Federal Status/Agency Jurisdiction	Critical Habitat Designated?	Potential to Occur and Designated Critical Habitat			Preferred Habitat
			St. Croix	St. Thomas	St. John	
						Typically found on slopes facing south to east (USFWS 2015).
Vahl's boxwood *Buxus vahlii*	Endangered USFWS	None	X			Occurs within the subtropical dry forest life zone and to a lesser extent the subtropical moist forest life zone in areas that receive 24 to 88 inches of rain per year (USFWS 2019b).
Wheeler's peperomia *Peperomia wheeleri*	Endangered USFWS	None			X	Occurs in humus accumulated on granodiorite boulders within a semi-evergreen seasonal open forest, as well as in humus accumulated on limestone boulders in subtropical wet forest (USFWS 2014).
Fish, Sharks, and Rays						
Nassau grouper *Epinephelus striatus*	Threatened NMFS	Final	X C	X C	X C	Occurs in tropical and subtropical waters in the Caribbean and western North Atlantic. Generally occur in nearshore shallow waters in macroalgal and seagrass habitats, although they occur in deeper waters as they grow.
Oceanic whitetip shark *Shyrna lewini*	Endangered NMFS	None	X	X	X	Occurs throughout the world in tropical and subtropical waters. Generally occurs in the open ocean or in deep waters around oceanic islands. Surface-dwelling.
Giant manta ray *Mobula birostris*	Threatened NMFS	None	X	X	X	Occurs throughout the world in tropical, subtropical, and temperate waters. Found offshore and within bays and oceanic inlets. Can be found in cool waters, though

Species Name	Federal Status/Agency Jurisdiction	Critical Habitat Designated?	Potential to Occur and Designated Critical Habitat			Preferred Habitat
			St. Croix	St. Thomas	St. John	
						temperature preference varies throughout its range.
Marine Invertebrates						
Queen conch *Aliger gigas*	Threatened NMFS	None	X	X	X	Can occur in a variety of habitat types including seagrass beds, sand flats, algal beds, and rubble areas up to 100 feet deep.
Elkhorn coral *Acropora palmata*	Threatened NMFS	Final	X C	X C	X C	Occurs in clear, shallow water (approximately 1 to 15 feet deep) in coral reefs in the Bahamas, Florida, and the Caribbean. Typically found in high-energy zones with high levels of wave action.
Staghorn coral *Acropora cervicornis*	Threatened NMFS	Final	X C	X C	X C	Occurs in clear, shallow water (approximately 15 to 60 feet deep) in coral reefs. Suitable coral reef habitats include spur and groove, bank reef, patch reef, and transitional reef, as well as on limestone ridges, terraces, and hardbottom habitats.
Boulder star coral *Orbicella franksi*	Threatened NMFS	Final	X C	X C	X C	Native to shallow waters in the Caribbean Sea, Gulf of Mexico, Bahamas, Bermuda, and Florida.
Mountainous star coral *Orbicella faveolate*	Threatened NMFS	Final	X C	X C	X C	Native to the Caribbean Sea and the Gulf of Mexico.

Species Name	Federal Status/Agency Jurisdiction	Critical Habitat Designated?	Potential to Occur and Designated Critical Habitat			Preferred Habitat
			St. Croix	St. Thomas	St. John	
Lobed star coral *Orbicella annularis*	Threatened NMFS	Final	X C	X C	X C	Occurs in the Caribbean Sea, Gulf of Mexico, and southern Atlantic.
Rough cactus coral *Mycetophyllia ferox*	Threatened NMFS	Final	X C	X C	X C	Occurs in the Caribbean Sea, Southern Gulf of Mexico, and southern Atlantic.
Pillar coral *Dendrogyra cylindrus*	Threatened; Proposed Endangered NMFS	Final	X C	X C	X C	Occurs in the Caribbean Sea, Gulf of Mexico, and southern Atlantic.

Notes: Unless otherwise indicated, preferred habitat information was sourced from the USFWS Species website (https://www.fws.gov/species/search) and the NMFS Species Directory (https://www.fisheries.noaa.gov/species-directory).
[1]Jurisdiction of sea turtles is shared between NMFS and USFWS. NMFS has jurisdiction in the marine environment and USFWS has jurisdiction in the terrestrial environment (USFWS and NMFS 2015).[2]No common name has been identified for this species.

References

U.S. Fish and Wildlife Service (USFWS). 2021. Rufa red knot (*Calidris canutus rufa*) 5-Year Review: Summary and Evaluation. New Jersey Field Office, Galloway, New Jersey.

———. 2020. Species Status Assessment for Marron Bacora (*Solanum conocarpum*).

———. 2019a. St. Croix Ground Lizard (*Ameiva polops*) 5-Year Review: Summary and Evaluation. Caribbean Ecological Services Field Office, Boquerón, Puerto Rico.

———. 2019b. Diablito de Tres Cuernos or Vahl's Boxwood (*Buxus vahlii*) 5-Year Review: Summary and Evaluation. Caribbean Ecological Services Field Office, Boquerón, Puerto Rico.

———. 2015. St. Thomas Prickly-Ash (*Zanthoxylum thomasianum*) 5-Year Review: Summary and Evaluation. Caribbean Ecological Services Field Office, Boquerón, Puerto Rico.

———. 2014. *Peperomia wheeleri* Britton (Wheeler's peperomia) 5-Year Review: Summary and Evaluation. Caribbean Ecological Services Field Office, Boquerón, Puerto Rico.

———. 2013. Thomas' Lidflower (*Calyptranthes thomasiana*) 5-Year Review: Summary and Evaluation. Caribbean Ecological Services Field Office, Boquerón, Puerto Rico.

———. 2005. Recovery Plan for *Catesbaea melanocarpa*. U.S. Fish and Wildlife Service, Southeast Region, Atlanta, Georgia.

U.S. Fish and Wildlife Service and National Marine Fisheries Service (USFWS and NMFS). 2015. Memorandum of Understanding Defining the Roles of the U.S. Fish and Wildlife Service and the National Marine Fisheries Service in Joint Administration of the Endangered Species Act of 1973 as to Sea Turtles. Accessed May 2, 2024, https://www.fisheries.noaa.gov/s3//dam-migration/fws-nmfs_mou_2015.pdf.

Table 2: Essential Fish Habitat Mapper

EFH Mapper Report

EFH Data Notice

Essential Fish Habitat (EFH) is defined by textual descriptions contained in the fishery management plans developed by the regional fishery management councils. In most cases mapping data can not fully represent the complexity of the habitats that make up EFH. This report should be used for general interest queries only and should not be interpreted as a definitive evaluation of EFH at this location. A location-specific evaluation of EFH for any official purposes must be performed by a regional expert. Please refer to the following links for the appropriate regional resources.

Southeast Regional Office
Atlantic Highly Migratory Species Management Division

Query Results

Degrees, Minutes, Seconds: Latitude = 18° 11' 13" N, Longitude = 65° 10' 7" W
Decimal Degrees: Latitude = 18.187, Longitude = -64.831

The query location intersects with spatial data representing EFH and/or HAPCs for the following species/management units.

EFH

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
		Blacktip Shark (Gulf of Mexico Stock)	Neonate	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
		Blue Marlin	Adult, Juvenile	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
		Caribbean Reef Shark	ALL	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
		Corals	Larvae	Caribbean	Corals
		Lemon Shark	Adult, Juvenile, Neonate	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
		Nurse Shark	Juvenile/Adult	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
		Oceanic Whitetip Shark	ALL	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
		Queen Conch	Larvae	Caribbean	Queen Conch
		Reef Fish (43 Species) **Balistidae - Triggerfishes** Gray triggerfish (*Balistes*	Larvae	Caribbean	Reef Fish

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
		capriscus) **Carangidae - Jacks** Greater amberjack (*Seriola dumerili*) Lesser amberjack (*Seriola fasciata*) Almaco jack (*Seriola rivoliana*) Banded rudderfish (*Seriola zonata*) **Labridae - Wrasses** Hogfish (*Lachnolaimus maximus*) **Lutjanidae - Snappers** Queen snapper (*Etelis oculatus*) Mutton snapper (*Lutjanus analis*) Schoolmaster (*Lutjanus apodus*) Blackfin snapper (*Lutjanus buccanella*) Red snapper (*Lutjanus campechanus*) Cubera snapper (*Lutjanus cyanopterus*) Gray (mangrove) snapper (*Lutjanus griseus*) Dog snapper (*Lutjanus jocu*) Mahogany snapper (*Lutjanus mahogoni*) Lane snapper (*Lutjanus synagris*) Silk snapper (*Lutjanus vivanus*) Yellowtail snapper (*Ocyurus chrysurus*) Wenchman (*Pristipomoides aquilonaris*) Vermilion snapper (*Rhomboplites aurorubens*) **Malacanthidae - Tilefishes** Goldface tilefish (*Caulolatilus chrysops*) Blackline tilefish (*Caulolatilus cyanops*) Anchor tilefish (*Caulolatilus intermedius*) Blueline tilefish (*Caulolatilus microps*) (Golden) Tilefish			

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
		(*Lopholatilus chamaeleonticeps*) **Serranidae - Groupers** Dwarf sand perch (*Diplectrum bivittatum*) Sand perch (*Diplectrum formosum*) Rock hind (*Epinephelus adscensionis*) Speckled hind (*Epinephelus drummondhayi*) Yellowedge grouper (*Epinephelus flavolimbatus*) Red hind (*Epinephelus guttatus*) Goliath grouper (*Epinephelus itajara*) Red grouper (*Epinephelus morio*) Misty grouper (*Epinephelus mystacinus*) Warsaw grouper (*Epinephelus nigritus*) Snowy grouper (*Epinephelus niveatus*) Nassau grouper (*Epinephelus striatus*) Marbled grouper (*Epinephelus inermis*) Black grouper (*Mycteroperca bonaci*) Yellowmouth grouper (*Mycteroperca interstitialis*) Gag (*Mycteroperca microlepis*) Scamp (*Mycteroperca phenax*) Yellowfin grouper (*Mycteroperca venenosa*)			
		Sailfish	Adult, Juvenile	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
		Spiny Lobster (2 Species) Spiny lobster (*Panulirus argus*) Slipper lobster (*Scyllarides nodifer*)	Larvae	Caribbean	Spiny Lobster
		Swordfish	SpawningEggsLarvae	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
		Tiger Shark	Juvenile/Adult	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
		White Marlin	Adult, Juvenile	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH

Pacific Salmon EFH

No Pacific Salmon Essential Fish Habitat (EFH) were identified at the report location.

Atlantic Salmon

No Atlantic Salmon were identified at the report location.

HAPCs

No Habitat Areas of Particular Concern (HAPC) were identified at the report location.

EFH Areas Protected from Fishing

Link	Data Caveat	Name	Management Council
		Caribbean EEZ gear restrictions	Caribbean

Spatial data does not currently exist for all the managed species in this area. The following is a list of species or management units for which there is no spatial data.
****For links to all EFH text descriptions see the complete data inventory: open data inventory -->**

Caribbean HAPCs,
Los Corchos Reef - Culebra,
Luis Pena Channel - Culebra,
Secretarial EFH,
Bigeye Sand Tiger Shark,
Bigeye Sixgill Shark,
Caribbean Sharpnose Shark,
Galapagos Shark,
Narrowtooth Shark,
Sevengill Shark,
Sixgill Shark,
Smooth Hammerhead Shark,
Smalltail Shark