



United States Virgin Islands CDBG-Mitigation Action Plan

Virgin Islands Housing Finance Authority



Version 2.0

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ACTION PLAN REVISION HISTORY

For Substantial and Non-substantial Changes

Version	Date	Description
Version 1.0	November 4, 2020	Initial CDBG MIT Action Plan
Version 2.0	January 4, 2021	CDBG MIT Action Plan HUD Submission
Version 3.0	February 25, 2021	CDBG MIT Action Plan with HUD requested Revisions
Version 4.0	June 14, 2021	CDBG MIT Action Plan with HUD requested Revisions
Version 5.0	July 06, 2023	CDBG MIT Action Plan Substantial Amendment for addition of Covered Project and Reallocation of funds

Substantial Amendments will be available on the U.S. Virgin Islands CDBG-MIT Action Plan website (<https://cdbgdr.vihfa.gov/programs/cdbg-mitigation/>) for public review and comment for at least 30 days. More details about substantial and non-substantial changes are provided in Appendix B.



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TABLE OF CONTENTS

Action Plan Revision History.....	2
Action Plan Executive Summary.....	12
1.0 Mitigation Needs Assessment (MNA).....	20
1.1 Background.....	20
1.2 General Methodology.....	21
1.3 U.S. Virgin Islands Hazard Mitigation Plan.....	23
1.4 USVI Mitigation and Needs Assessment (MNA).....	23
1.5 USVI History and Geography.....	24
1.5.1 Recent Hurricane Impacts.....	27
1.6 USVI Social Vulnerability and Distress Indicators.....	30
1.7 Hazard Context.....	36
1.7.1 Hazards of Concern.....	36
1.7.2 Methodology for Hazard Analysis.....	37
1.8 Critical Facilities and Lifelines.....	38
1.8.1 Safety and Security.....	39
1.8.2 Lifeline Locations.....	40
1.9 Risk Assessment Summary.....	44
1.9.1 Drought.....	44
1.9.2 Earthquakes.....	50
1.9.3 Flooding.....	56
1.9.4 Hurricane Winds.....	67
1.9.5 Rain-Induced Landslides.....	71
1.9.6 Tsunami.....	74
1.9.7 Wildfire.....	78
1.9.8 Disease Outbreak/Pandemic.....	81
1.10 Unmet Mitigation Needs.....	83
1.11 Risk Assessment Summary.....	83
1.12 CDBG-DR Considerations.....	86
1.12.1 Analysis of the Mitigation Housing and Public Facilities Needs.....	86
2.0 Long-Term Planning and Risk Mitigation Assessments.....	91
2.1 Building Code Standards.....	91
2.1.1 Vertical Flood Elevation Protection.....	92



2.2 Land Use and Zoning Policies.....	92
2.2.1 Coastal Zone Management.....	93
2.2.2 Land Development Regulations.....	93
2.3 Flood Mitigation Efforts.....	94
2.3.1 Elevation.....	94
2.3.2 Stormwater Management.....	95
2.3.3 Unified Watershed Assessment and Restoration Priorities.....	95
2.3.4 High Wind.....	96
2.3.5 Sea Level Rise.....	96
2.4 Local and Regional Planning Coordination.....	96
2.5 Flood Insurance Coverage.....	97
2.5.1 National Flood Insurance Program, Floodplain Management, and Building Codes.....	98
3.0 Connection of Mitigation Programs to Identified Risks.....	101
3.1 Infrastructure & Public Facilities.....	102
3.2 Housing.....	103
3.2.1 New Construction for Homeownership Opportunity and First Time Home Buyer Assistance.....	103
3.2.2 Public and Affordable Housing Development.....	104
3.2.3 Homeless and Supportive Housing.....	105
4.0 Low- and Moderate-Income Priority.....	107
4.1 Vulnerable Populations.....	107
4.2 Specific Impact on Vulnerable Populations and Protected Classes.....	108
4.2.1 Seniors.....	108
4.2.2 Special Needs.....	108
4.2.3 Homelessness.....	108
4.2.4 Natural Infrastructure.....	113
4.2 How Programs or Projects Increase Resiliency for Housing Serving Vulnerable Populations.....	114
4.3 Minimizing Displacement.....	115
5.0 Coordination of Mitigation Projects Leverage.....	117
6.0 Minimizing Displacement and Ensuring Accessibility.....	119
7.0 Allocation and Maximum Award Amounts, Necessary and Reasonable Assistance.....	121
7.0.1 Projected LMI Benefit.....	122

7.1 Program Allocations.....	122
7.2 Overall Method of Distribution and Delivery	124
7.3 Infrastructure and Public Facilities	124
7.3.1 Community Resilience Centers & Public Facilities Construction	125
7.3.2 Critical & Natural Infrastructure Resilience.....	127
Covered Projects.....	129
7.4 Economic Resilience & Revitalization	132
7.4.1 Commercial Hardening & Financing Program	133
7.4.2 Small Business Mitigation Improvements	136
7.5 Resilient Housing Programs	137
7.5.1 Single Family Resilient New Home Construction Program.....	138
7.5.2 Resilient Multifamily Housing Program.....	139
7.5.3 Homeless Housing Initiative--Permanent Supportive Housing Development	141
7.5.4 Innovative Resilient Housing	143
7.6 Public Services	144
7.6.1 Improved Access to Healthcare.....	145
7.6.2 Allocation and Maximum Award	145
7.6.3 Eligible Applicants.....	145
7.6.4 Eligible Activities.....	145
7.6.5 Priorities	145
7.6.6 Projected Start and End Dates.....	145
7.7 Territory Planning Program	145
7.7.1 Allocation and Maximum Award	146
7.7.2 Eligible Applicants.....	146
7.7.3 Eligible Activities.....	146
7.7.4 Priorities	147
7.7.5 Projected Start and End Date	147
7.8 VIHFA Administration	147
7.9 Timely Information on Application Status and Confidentiality	147
7.9.1 Confidentiality/Personally Identifiable Information (PII)	148
7.10 Exceptions to Maximum Award Amounts	149



7.11 Long-term Operation and Maintenance	149
7.12 Subrecipient Expenses, Program Income, and Timely Payment	150
8.0 Natural Infrastructure	153
9.0 Construction Standards	155
9.1 Sustainability.....	155
9.2 Accessibility.....	155
9.3 Green Building Standards	155
9.4 Broadband Infrastructure	156
10.0 Operation and Maintenance Plans	158
11.0 Cost Verification.....	160
12.0 Building Code and Hazard Mitigation Planning.....	162
Appendix A: Schedule of Expenditures and Outcomes.....	163
Appendix B: Amendments to the Action Plan.....	164
Appendix C: Certifications	165
Appendix D: Community Participation and Public Comment	166
D-1 Community Engagement	167
D-2 Links to Websites and PowerPoint Presentations	168
D-3 Links to Websites for Screenshots of Chats and other Transcript Data.....	168
D-4 Survey and Summary Data.....	168
D-5 Citizen Advisory Committee	168
D-6 Response to Citizen Complaints, and Appeals & Website Information	168
D-7 Summary of Comments	168
D-8 Copies/ Screenshots of Citizen Participation/Public Notice	168
Appendix E: References	169
Appendix F: Summary of VIHFA Outreach with Stakeholders to Align and Coordinate Efforts	174
Appendix G: Proposed Projects list for potential consideration under CDBG-MIT funding.....	175
Appendix H: Acronyms and Agencies	185
Appendix I: <i>Construction Information for a Stronger Home</i>	188
Appendix J: Covered Project (PR1).....	189
I. Project Description and Eligibility.....	192

1.0	Project Scope	192
1.1.0	<i>Virgin Islands Water and Power Authority Overview</i>	192
1.1.1	<i>WAPA Service Area – Territory-wide</i>	192
1.1.2	<i>Service Territory at High Risk for Natural Disasters</i>	192
1.1.3	<i>Overview of Power Generation Assets</i>	193
1.1.4	<i>New Generation Changing the Optimal Operating State and Fuel Mix on St. Thomas</i> 194	
1.1.5	<i>Overview of Reverse Osmosis Water Production Assets</i>	197
1.1.6	<i>Propane Supply Infrastructure Overview</i>	198
1.2	Activity Benefits	199
1.2.0	<i>Owning the Propane Supply Infrastructure Mitigates Significant Risk</i>	199
1.2.1	<i>Owning the Propane Supply Infrastructure Supports FEMA Community Lifelines</i>	199
1.3	Propane Supply Infrastructure Detail	209
1.3.0	<i>LPG Pipeline from the Fuel Dock to the Storage Tanks</i>	209
1.3.1	<i>LPG Storage</i>	210
1.3.3	<i>LPG Pipeline from the Storage Tanks to the Vaporizer</i>	210
1.3.4	<i>Vaporizer</i>	211
1.3.6	<i>Offshore Mooring Buoy</i>	212
1.4	Availability of Comparable Facilities	212
1.4.0	<i>Local Resources</i>	212
1.4.1	<i>Alternative Fuel Import Options</i>	213
1.5	Licenses and Permits	213
1.6	Project Milestones	214
1.6.0	<i>Major Milestone I</i>	214
1.6.1	<i>Interim Milestones:</i>	214
1.6.2	<i>Major Milestone II</i>	214
1.6	Project Location	215
1.6.0	<i>St. Croix</i>	215
1.6.1	<i>St. Thomas</i>	215
II.	HUD Eligible Activity	216
3.1	Project Cost	216



3.3	Impacts to the Population	218
3.4	Resilient or Mitigative Elements	219
3.4.1	<i>Owning the Propane Supply Infrastructure Mitigates Significant Risk</i>	219
III.	Consistency with Mitigation Needs Assessment	220
IV.	Analysis of Energy Lifeline Mitigation	220
V.	Compliance with National Objective for Covered Projects	221
4.1.0	Long-term Efficacy and Sustainability of the Project	222
4.1.1.1	<i>Financial Resources to Pay Ongoing Operations and Maintenance Expenses</i>	222
	Demonstration of Benefit to Most Impacted and Distressed Area⁵	229
	Benefit Cost Analysis	229
	<i>BCA Methodology</i>	229
VI.	Consistency with Other Mitigation Activities	232

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Action Plan Introduction and Executive Summary

ACTION PLAN EXECUTIVE SUMMARY

The United States Virgin Islands (USVI or the Territory) are gems of the Caribbean with a rich culture influenced by hundreds of years of African, Danish, and French heritage. The Territory suffered the impacts of back-to-back category five Hurricanes Irma and Maria. The resulting aftermath can be briefly summarized as catastrophic destruction that resulted in the Territory experiencing the longest blackout in U.S. history according to the United States Government Accountability Office (United States Government Accountability Office, 2019); and in HUD qualifying the entire United States Virgin Islands, as a “Most Impacted and Distressed” (MID) area. Under Public Law 115-123 (The Appropriations Act), approved on February 9, 2018, Congress appropriated \$28 billion in Community Development Block Grant disaster recovery (CDBG-DR) funds, and directed the United States Department of Housing and Urban Development (HUD) to allocate not less than \$12 billion for mitigation activities proportional to the amounts that CDBG-DR grantees received for qualifying disasters in 2015, 2016, and 2017. The Unmet Recovery Needs Assessments and corresponding Action Plans for the Hurricanes Irma and Maria recoveries present the details of ongoing projects, programs, and restoration efforts specific to the CDBG-DR allocations for those disasters. Individuals seeking information on the recovery efforts from those disasters should refer to the Action Plans **and subsequent amendments** posted on the Virgin Island Housing Finance Authority’s (the VIHFA) website (www.vihfa.gov) to review details of the full breadth of the ongoing recovery of the Territory.

HUD published [84 FR 45838](#) on August 30, 2019 (CDBG-MIT Main Notice) which allocated \$6.875 billion in Community Development Block Grant – Mitigation (CDBG-MIT) funds, consistent with the Appropriations Act. No funding for USVI was included in that allocation. Subsequently, HUD published [84 FR 47528](#) (USVI Supplemental Notice) which allocated **\$774,188,000** in CDBG-MIT funds to the USVI. The USVI Supplemental Notice provides specific guidance to the USVI that supplements the requirements outlined in the CDBG-MIT Main Notice.

The CDBG-MIT Main Notice describes an expanded CDBG disaster mitigation initiative referred to as CDBG-MIT. CDBG-MIT presents a new funding approach from Congress and HUD intended to protect lives and property through development of greater resilience to natural disasters. Thus, the CDBG-MIT Main Notice provides details on what is required by federal law to carry out such mitigation activities, including the requirements and expectations that HUD places on grantees that will administer CDBG-MIT funds. The CDBG-MIT Main Notice also provides an overview of the grant processes and requirements that are vital components to a CDBG-MIT Action Plan (Action Plan or “MIT-AP”). **Submitted MIT-AP, this document, and implementation plan was approved; subsequently, VIHFA received and executed the grant agreement on April 25, 2023.**

CDBG-MIT Action Plan (MIT-AP) **was** prepared by the Government of the U.S. Virgin Islands in consultation with local territorial government agencies, semi-autonomous agencies, authorities, and community stakeholders, plus US governmental representatives. The U.S. Virgin Islands has a Territorial Government that has organized various autonomous and semi-autonomous entities, including the Virgin Islands Housing Finance Authority (VIHFA), as these agencies and authorities perform vital roles within the Territory.

CDBG-MIT funds represent a unique and significant opportunity for the Territory to carry out strategic and high-impact activities to minimize, mitigate or eliminate risks and reduce losses from future disasters. In addition to mitigating disaster risks, the funds provide an opportunity to increase resilience through improved local planning protocols and procedures, within the parameters and guidelines

required by HUD. In following federal guidance, MIT-AP reviewed existing data to identify risks posed by natural hazards to identify the mitigation needs that can and should be addressed within the Territory, building on work done previously. The MIT-AP aligns with the Territory Hazard Mitigation Plan (THMP), which meets Federal Emergency Management Agency (FEMA) requirements. The MIT-AP considers decisions made and analysis done in the THMP, HUD requirements for this plan are distinct.

This Action Plan details the Territory's strategy and proposed uses of the \$774,188,000 in CDBG-MIT funding allocated in accordance with the USVI Supplemental Notice. The grantee agency, the Virgin Islands Housing Finance Authority (VIHFA), will be administering the grant on behalf of the USVI. References to the HUD grantee and to the Territory as a decision-making entity are construed to mean the VIHFA in all instances. The Action Plan includes the Mitigation Needs Assessment (MNA), which provides an analysis of the specific conditions that are present in USVI and presents weaknesses in the disaster recovery cycle. These mitigation needs are placed in context with "Community Lifelines critical parts of communities, that when damaged present a major obstacle to full recovery. The MNA explains the risks that are present in the Territory and identifies the Community Lifeline(s) which face the greatest risks. Further, the MNA provides a framework within which the Territory may determine projects that would be most effective in mitigating such risks.

This CDBG-MIT Action Plan's Mitigation Needs Assessment is intended to extract relevant data and information that has been previously analyzed to identify priority projects for HUD mitigation funding. During this process, and based on available information, the data utilized in the THMP may be enhanced to further quantify the risk of the most significant hazards. However, in accordance with federal guidance, while the MNA may identify further opportunities to improve the risk and vulnerability assessment for inclusion in updated THMP, [U.S. Virgin Islands Hazard Mitigation Plan 2019 - Update \(vi.gov\)](#), HUD expects the basis of MIT-AP analysis in the MNA to build primarily on the data and work done previously in the most recent THMP, in this way the MIT-AP focuses on how to apply these prior efforts and analysis to examine potential mitigation activities for the Territory based on risk, as well as input from the community.

The MNA is followed by a review of the long-term planning and risk mitigation considerations, to ensure that the forward-looking aspect of the CDBG-MIT allocation is not lost on temporary solutions to permanent problems. This review precedes a discussion on leveraging CDBG-MIT funds with other funds, the role of natural infrastructure in the mitigation plan, construction monitoring, and controlling costs in context with the MNA. The Mitigation Needs Assessment is based on the hazard analysis included in the THMP, [U.S. Virgin Islands Hazard Mitigation Plan 2019 - Update](#), enhanced with newly available data to address key high-ranking hazards for the Territory. The THMP will provide an even better provide a tool for looking at continuing mitigation needs for the USVI.



Pictured: Discussion with the public on mitigation planning at UVI on St. Croix.

In addition to completing the MNA, this Action Plan (MIT-AP) was developed through a strategic collaboration process with multiple federal agencies committed and actively involved in the territory's resiliency efforts, as well as with significant input from local agencies, local community members and key stakeholders to determine the territories most critical disaster mitigation needs. The VIHFA hosted three (3) separate "virtual" public engagements prior to publishing the MIT-AP and three (3) virtual public hearings following publication of the draft MIT-AP, using the most innovative technology available and the territory's most used social media platforms, the details of which are captured later in this Action Plan. After the draft MIT-AP was published, the public had more than forty-five (45) days of review time in which to submit public comments to the VIHFA. The VIHFA reviewed data and feedback from several sources and stakeholders on the proposed uses of the funds. Separately, impacted agencies and individuals participated in a stakeholder survey and provided feedback that has informed this Action Plan as well, with additional coordination meetings held to ensure alignment with the Territory's most recent Federal Emergency Management Agency Hazard Mitigation Grant Program (HMGP).

Due to its unique location, the Territory is at risk of experiencing a variety of hazards including tropical winds, storm surge, flash flooding, sea level rise, coastal erosion, extreme heat, drought, earthquakes, wildfires, tsunamis, and pandemics. As the direct HUD recipient of CDBG-MIT funds, the VIHFA is committed to maximizing the impact of available funds for the Territory by encouraging and leveraging public-private partnerships and coordinating with other Federal and local programs. This is based on the understanding that CDBG-MIT recipients are expected to take steps to set in place policies and fund projects that will enhance the impact of HUD investments in the territory.

The VIHFA is focused on implementing data-informed investments through high-impact projects that will reduce risks, suffering and hardship attributable to natural disasters, with particular attention to repetitive loss of property, critical infrastructure, and economic hardening in the Territory. The USVI also supports funding of projects and the adoption of policies that reflect local priorities that will have long-lasting effects on community risk reduction.

The USVI MIT-SP document clearly specify the proposed hazard mitigation projects and budget estimates. To truly realize the potential of this "once in a generation" funding opportunity it is important to understand the meaning of hazard mitigation, and examples of mitigation measures and their benefits. Hazard mitigation is defined as any action taken to reduce or eliminate the long-term risk to human life and property from man-made or natural hazards. A hazard is any event or condition with the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural loss, environmental damage, business interruption or other structural or financial losses.

Hazard mitigation seeks to make human development and the natural environment safer and more resilient. The mitigation process generally enhances resiliency to significantly reduce risks and vulnerability to hazards. Mitigation can also include removing the built environment from disaster prone areas and maintaining natural mitigating features, such as wetlands or floodplains. Hazard mitigation makes it easier and less expensive to respond to, and recover from, disasters by breaking the damage and repair cycle.



Examples of hazard mitigation measures include, but are not limited to, the following:

- Development of mitigation standards, regulations, policies, and programs;
- Land use/zoning policies;
- Strong building code and floodplain management regulations;
- Dam safety programs, seawalls, and levee systems;
- Acquisition of flood prone and environmentally sensitive lands;
- Retrofitting/hardening/elevating structures, roadways, and critical facilities;
- Public awareness/education campaigns;
- Improvement of warning and evacuation systems; and
- Other measures that may prove to be effective means of mitigation.

Benefits of hazard mitigation include, but are not limited to, the following:




- Saving lives and protecting public health and the environment in the Territory;
- Preventing or minimizing property damage;
- Minimizing social dislocation and stress;
- Reducing economic losses;
- Protecting and preserving infrastructure;
- Reducing legal liability of government and public officials; and
- Protection of the environment and green infrastructure.

In final consideration of available data from the MNA, ongoing disaster recovery needs, community and stakeholder input, and regulatory requirements, the VIHFA has determined that several key investments in long-term hazard mitigation will be required.

Based on conversations with local communities, selected CDBG-MIT projects will be paired, to the greatest extent possible and feasible, with resilient affordable housing solutions to ensure that individuals have a safer place within which to live and thrive. Funding will be allowed for planning activities and other pre-award costs, which will include necessary plans and studies that will provide data to inform the building of a more resilient community. The VIHFA will also continue to partner and coordinate with the territorial entities in its planning activities; and will continue to execute public engagement to drive a planning process that is both strategic and responsive to the needs of impacted communities.

Due to limitations placed upon the CDBG-MIT funds, it will be crucial to understand the relevant data and analyses which reflect narratives that clearly support and justify any long-term mitigation approaches that will be sourced with this funding within the Territory. The VIHFA will ensure that all programs will be chosen and implemented based on proven data and analysis to ensure that the optimum actions are undertaken to increase resilience in the Territory. Should additional CDBG-MIT funds become available, the Territory will consider other infrastructure mitigation projects outlined on its project list that have been ranked according to priority but would be eclipsed by lack of funding considerations hereunder. A summary of the allocations is found on the following page:

Table 1: CDBG-MIT Allocations

Activity Category	Project/Program	Project Costs	VIHFA Project Delivery Costs	Total Allocations	% of Total	% LMI Projection
Infrastructure & Public Facilities 	Community Resilience & Public Facilities	\$100,000,000	\$2,500,000	\$102,500,000		
	Resilient Critical & Natural Infrastructure	\$308,000,000	\$7,700,000	\$315,700,000		
	Total Allocation	\$408,000,000	\$10,200,000	\$418,200,000	54%	54%
Economic Resilience & Revitalization 	Commercial Hardening & Financing	\$40,000,000	\$962,500	\$40,962,500		
	Small Business Mitigation	\$35,000,000	\$787,500	\$35,787,500		
	Total Allocation	\$75,000,000	\$1,750,000	\$76,750,000	10%	70%
Housing 	Multifamily Housing	\$100,000,000	\$2,500,000	\$102,500,000		
	VIHFA New Home Construction (Home Ownership)	\$60,000,000	\$1,500,000	\$61,500,000		
	Homeless Housing Initiative	\$23,000,000	\$575,000	\$23,575,000		
	Innovative Resilient Housing	\$5,000,000	\$125,000	\$5,125,000		
	Total Allocation	\$188,000,000	\$4,700,000	\$192,700,000	25%	80%
Public Services		\$15,000,000	\$400,000	\$15,400,000	2%	100%
Planning		\$29,750,000	\$2,678,600	\$32,428,600	4%	70%
Administration		\$38,709,400	\$0	\$38,709,400	5%	
Totals		\$754,459,400	\$19,728,600	\$774,188,000	100%	≥70%



Finally, the affordable housing component of the Action Plan will empower VIHFA to assist in hardening, rehabilitating, and developing new resilient affordable housing stock, creating homeownership opportunities and first-time home buyer assistance. For new construction, building in the floodplain is never a first consideration; however, if there is insufficient land available in the Territory that is outside of floodplain areas, then in an effort to mitigate the cost of satisfying the eight-step approach that allows floodway building, the Territory would conduct a land survey/plan (or use one that may already be in existence) to determine availability, including instances where eminent domain may be an option. If the results of the survey/plan were to support the perceived limitation, VIHFA would then consider other available options and plan for specific floodplain mitigation, among its proposed activities. VIHFA will also continue to review and consider options to mitigate risks to existing developments or to perform one-for-one replacement for units outside of the floodplain, as necessary, and as may be available.

The U.S. Virgin Islands will use established criteria to prioritize funds to initiatives that benefit LMI individuals and households. All CDBG-MIT activities will be routinely monitored for its benefit to LMI individuals and communities. At all times, it is VIHFA’s primary objective to serve the greatest identified mitigation need of residents and protect low-and-moderate income individuals, while building a more resilient Territory.

In addition to the above statements of facts, the substantial amendment to the Action Plan brings forth a covered project. Per 84 FR 45851, this amendment is the addition of a covered project under the Infrastructure and Public Facilities activity category, Appendix J entitled “Covered Project - PR1 Vitol Acquisition”.

I. Covered Project Addition

The Virgin Islands Water and Power Authority (VIWAPA) acquisition of the Propane Supply Infrastructure (VITOL) projects address the Energy, Fuel, and Electric Grid Community Lifeline. The acquisition benefits the community with lower costs of fuel and transportation, fuel redundancy and security, drinking water security, including improved reliability and environmental profile.

II. Reallocation of Funds

Funding allocations remain the same as outlined above in Table 1 and summarized below.

Activity Category	Allocation	Total (%)	LMI Projection (%)
Infrastructure and Public Facilities	\$418,200,000	54	*54%
Housing	\$192,700,00	25	80%
Economic Resilience and Revitalization	\$76,750,000	10	70%
Public Services	\$16,400,000	2	100%
Planning	\$32,428,600	4	70%
Administration	\$38,709,400	5	
Total	\$744,188,000	100	≥ 70%

*LMI projection change - Appendix J -Covered Project - PR1 Vitol Acquisition, national objective urgent need mitigation (UNM).

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1.0 Mitigation Needs Assessment (MNA)

1.0 Mitigation Needs Assessment (MNA)

1.1 Background

According to HUD guidance in the CDBG-MIT Main Notice, the CDBG-MIT funds represent a unique and significant opportunity for grantees to use this assistance in areas impacted by recent disasters to carry out strategic and high-impact activities to mitigate disaster risks and reduce future losses. HUD guidance further specifies that CDBG-MIT funds should be closely aligned with the current Federal Emergency Management Agency (FEMA) approved local or state Hazard Mitigation Plan, which for the USVI is called the [U.S. Virgin Islands Hazard Mitigation Plan 2019-Update](#) (THMP). To align closely with FEMA guidance and best practices, as well as the CDBG-MIT specific requirements, the Territory has reviewed the following resources required by HUD in the CDBG-MIT Main Notice:

- [The Federal Emergency Management Agency Local Mitigation Planning Handbook](#)
- [The Department of Homeland Security Office of Infrastructure Protection Fact Sheet](#)
- [The U.S. Department of Housing and Urban Development CPD Mapping Tool](#)

The approximate \$6.875 billion dollars in CDBG-MIT funds allocated in the CDBG-MIT Main Notice after appropriations made in Public Law 115-123 are specifically associated with Hurricanes Irma and Maria. However, Section V.A.5.b of the USVI Supplemental Notice permits the United States Virgin Islands (USVI) to use CDBG-MIT funds for the same activities, consistent with the requirements of the CDBG-MIT grant, in the most impacted and distressed areas related to Hurricanes Irma and Maria in the USVI. The entire Territory of the USVI has been declared a most impacted and distressed area or most impacted and distressed (MID) area under 84 FR 47528.

At the time of the 2010 Census 106,405 people,¹ all of which fall within the HUD-designated MID area for the Territory, as detailed further in Table 2 below.

Table 2. Population of USVI MID Areas for Hurricanes Irma, and Maria per 2010 Census

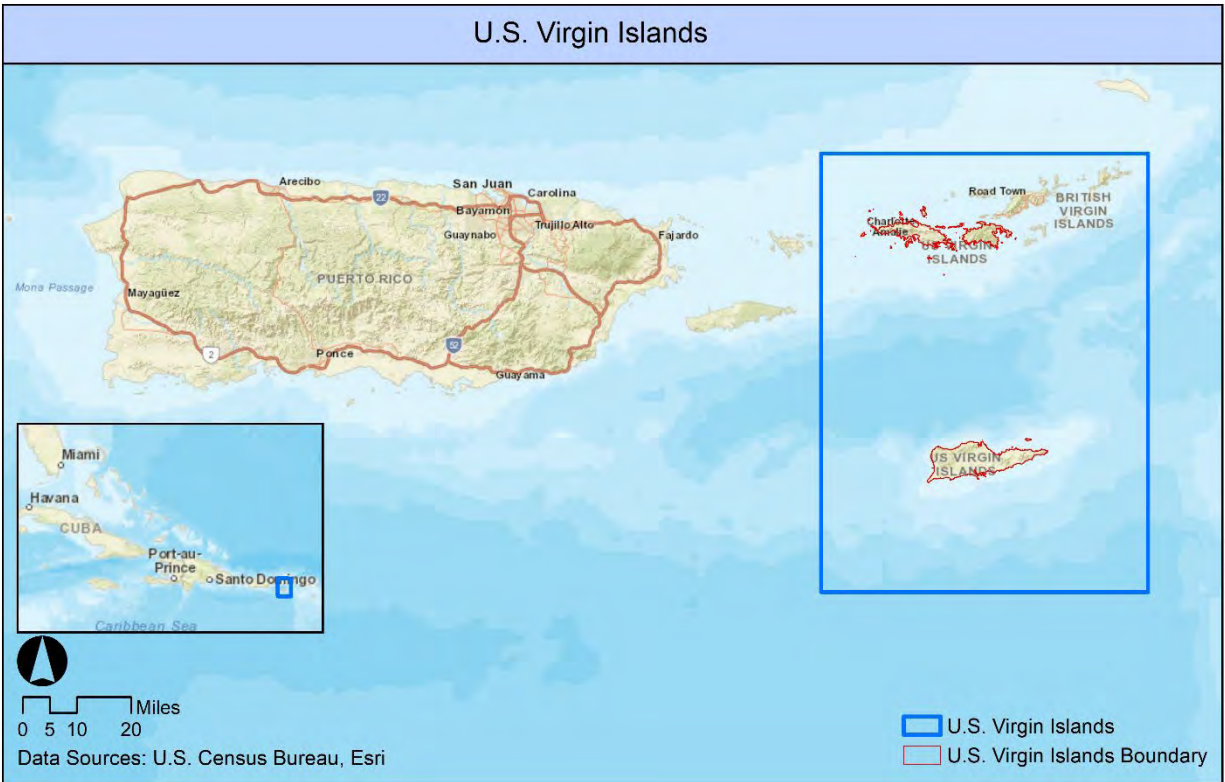
MID Areas - Hurricanes Irma,	Population
St. John	4,170
St. Thomas	51,634
Water Island	182
St. Croix	50,601
Total	106,405

Figure 1 shows the location of the US Virgin Islands, which was directly impacted by both Hurricane Irma and Hurricane Maria, leading to the HUD MID designation for the entire Territory. The Territory's entire population of over 100,000 residents was impacted by the devastation brought on by these storms.

¹ 2010 Census: <https://www2.census.gov/programs-surveys/decennial/tables/cph/cph-t/cph-t-8/table4a.pdf>



Figure 1. US Virgin Islands Location



Although the funding allocation from HUD is specific to hurricane recovery, the CDBG-MIT Main Notice requires CDBG-MIT funding be used to address many types of risks, based on a risk-based mitigation needs assessment, which begins in the next section. The assessment that follows addresses current and future risks, including hazards, vulnerability, and impacts of disasters to identify appropriate mitigation actions to reduce the highest risks faced in the Territory.

1.2 General Methodology

The risk assessment methodology utilized in this Mitigation Needs Assessment (MNA) builds on the approach that was utilized in the 2019 Territorial Hazard Mitigation Plan (THMP), enhanced by incorporating some additional risk data in key areas. For example, additional data for certain prioritized hazards (i.e. flooding and sea level rise) that have been indicated in the THMP and in documented impacts of recent disaster events to provide the most significant risk are included within the MNA analysis. This approach is consistent with the process and steps presented in FEMA Publication 386-2 (Federal Emergency Management Agency, 2001), and utilizes a risk assessment methodology that is similar to FEMA’s Hazards U.S. Multi-Hazard (HAZUSMH) to ensure that the MNA aligns with the current THMP for the Territory while also taking into account HUD requirements for a CDBG-MIT Action Plan.

The below MNA aligns with the prior hazard identification and work done previously for the 2019 THMP, which was compiled by investigating the various natural hazard occurrences and building further on analysis done in the 2014 THMP. As hazards that occurred previously in the Territory may be experienced in the future, the hazard identification process in the prior THMP documents involved extensive discussions with Virgin Islands Territorial Emergency Management Agency (VITEMA), its

Hazard Mitigation Steering Committee, experts with the University of the Virgin Islands (UVI), the Long-Term Recovery Group (LTRG) and the general public. Approved in 2019, the most recent HMP identifies hazards that could potentially affect the Territory. The THMP also identifies actions to potentially reduce the loss of life and property from a disaster across the Territory. Past hazards information came from historical hazard assessment documents, plus hazard specific plans and reports developed by experts over the past two decades. The most recent THMP also considered the frequency of occurrence and/or estimated the magnitude of historical events to accurately determine vulnerability and losses (i.e. future impacts).

Guidance issued in the CDBG-MIT Main Notice specifies how to approach the MNA for this Action Plan, with the goal of taking existing data and information and looking at it with a goal of identifying how to better prepare the Territory for future disaster events. Mitigation needs identified in the prior THMP have been supplemented by an analysis of the impacts of current and future hazards, as well as available data developed in the analysis of impacts of Hurricane Irma and Hurricane Maria. This MNA's approach focuses on providing a current understanding of the actual risks to the Territory and its people that are created by hazard events. In this MNA some revised hazard models or maps have been developed to align the present analysis with prior work done in preparing the most recent THMP and what is needed under HUD regulations for CDBG-MIT. However, per 84 FR 45840 and 86 FR 561 the MNA shall use the most current risk assessment completed or currently being updated through FEMA's own Hazard Mitigation Planning (HMP) process. Specifically, "grantees are ...required to reference the applicable FEMA HMP in their action plan and describe how the HMP has informed the CDBG-MIT action plan." Therefore, in alignment with the intent of this MNA to use the current approved THMP and to ensure the best available data is used for ongoing mitigation analysis, the plan includes enhanced analysis for flood and sea level rise using available information and includes inherent recommendations regarding the use of improved available data for the current THMP update to quantify the magnitude of potential risk and impacts of hazards affecting the Territory more accurately.

As outlined below, this MNA seeks to combine the institutional knowledge contained in the THMP, lessons learned from previous disaster recovery (specifically Hurricane Irma and Maria recovery efforts), and the local knowledge from citizens and stakeholders in disaster-impacted areas. These three sources are the primary source of hazard, risk, and mitigation information for the MNA. For each of the three primary sources contributing to the MNA, the risks are quantitatively assessed according to their potential impacts on seven critical service areas, also known as the Community Lifelines, identified in V.A.2.a.(1) of the CDBG-MIT Main Notice, as outlined below:

1. Safety and Security
2. Communications
3. Food, Water, Sheltering
4. Transportation
5. Health and Medical
6. Hazardous Material (Management)
7. Energy (Power and Fuel)

Analyzing relative risk and how it likely will impact the seven critical service areas by hazard type informs a mitigation approach to most effectively use CDBG-MIT funds. An important product of this exercise is a risk assessment that assigns values to risks informing decisions on prioritizing potential activities and projects. By assessing the risks to the Community Lifelines and looking at the likely impact of each potential risk based on current data, will then inform decision making in the CDBG-MIT context so that funds can be used on activities that mitigate the risks that are identified as most troublesome.



The foundation of the MNA is the THMP drafted by The U.S. Virgin Islands Territory Emergency Management Agency (VITEMA). The THMP includes the following components as mandated in the Disaster Mitigation Act of 2000: Planning Process, Risk Assessment, Mitigation Strategies, Coordination of Local Plans, Plan Maintenance, and Plan Adoption and Assurances. Requirements for each component are further defined in 44 CFR §201.4, the FEMA Territory Plan Review Guide and the FEMA Territory Plan Review Tool and can be leveraged to provide a roadmap for mitigating hazards of concern to increase the resiliency of the Territory.

The MNA is a snapshot in time of the current mitigation needs, and subject to change as shifting priorities and risks are discovered by the Territory. As new risks are identified, or as previously identified risks are sufficiently mitigated, the Territory will update the MNA as necessary, using the mandated format and tools. The Mitigation Needs Assessment section of this Action Plan is incorporated hereunder in its entirety.

1.3 U.S. Virgin Islands Hazard Mitigation Plan

This CDBG-MIT Action Plan (“Action Plan” or “MIT-AP”) is a functionally separate document informed by the Territory’s Disaster Mitigation Act of 2000-compliant Hazard Mitigation Plan. The US Virgin Islands has adopted the [U.S. Virgin Islands Hazard Mitigation Plan 2021-Update \(THMP\)](#), which identifies strategies and actions that can be taken before a disaster strikes and that can greatly reduce the human suffering, damage to property, and the long-term economic impact of natural hazards.

An assessment of the most recent hurricane events in context adds perspective to the THMP. In September 2017, an unprecedented event occurred where two catastrophic Category 5 hurricanes tore through the Territory within 14 days of each other. The storms crippled the Territory, impacting communications systems, both USVI power grids, numerous roads, drinking water, and wastewater facilities. They disrupted the food supply, compromising medical services, contributed to surpassing landfill capacity, and caused significant detriment to the environment and public health in various routes such as the release of waste and hazardous material into oceans and watersheds. Analysis shows that safety and security; food, water, shelter; health and medical; energy; communications systems; and the transportation lifelines were all impacted. The destruction of USVI lifelines following the storms hampered response after the storm and the Islands’ recovery. Many homes and businesses were demolished beyond repair. As the Territory rebuilds, hazard and risk assessments have been analyzed to determine the adequate mitigative efforts to prevent similar destruction from happening again with future storms. Capacity building and collaborative community efforts have also been incorporated into the THMP update to facilitate initiatives where the Territory can ultimately become self-sustainable (USVI Office of Disaster Recovery, 2019).

This MNA considers the THMP as it relates to the entire Territory, as it has been declared in its entirety a MID area under the implementing authority. While the MNA acknowledges the many hazards faced by the residents and property in the Territory, the focus will remain on risks which can be mitigated using CDBG-MIT funding to align the Action Plan with existing activities planned through the THMP.

1.4 USVI Mitigation and Needs Assessment (MNA)

This MNA has been prepared pursuant to 84 FR 47528 to support the development of a Community Development Block Grant Mitigation (CDBG-MIT) Action Plan for the USVI. The Federal Register notice dated 9/10/2019 allocated \$774,188,000 to the USVI for mitigation activities. Use of the appropriate funds is to be informed by this MNA. This document informs the identification of mitigation actions to be funded by the CDBG-MIT funds by:

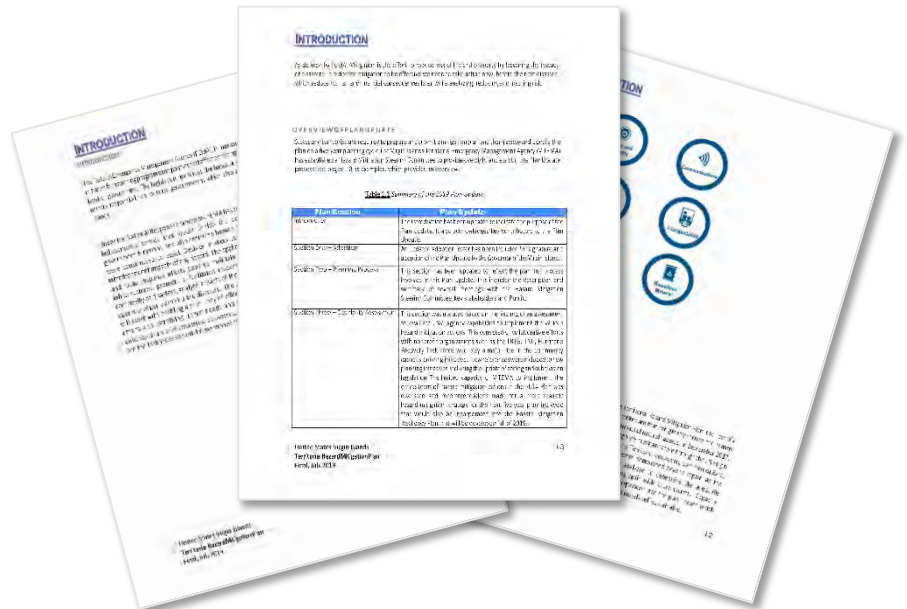
- Identifying and analyzing all significant current and future disaster risks
- Providing a substantive basis for activities proposed in the Action Plan
- Consulting with jurisdictions and stakeholders for FEMA mitigation funding alignment
- Using the most recent adopted THMP to inform hazard mitigation actions

This wide-reaching and inclusive planning process has yielded both the MNA, and this Action Plan reflects the range of hazards impacting the Territory, and the needs of residents most vulnerable to these hazards. This plan seeks to advance actions that reduce or eliminate human casualties and mitigate damage to the Territory's infrastructure, property, and economy.

The MNA builds upon the foundation of the USVI's 2019 THMP Plan. The THMP was updated in 2019 for the following purposes:

- Promote interagency coordination of programs, policies, and practices regarding hazard mitigation opportunities;
- Enhance public awareness and understanding of hazards that affect communities and actions the public can take to make themselves safe;
- Identify, evaluate, and prioritize a range of mitigation actions that are specific to St. Thomas, St. Croix, and St. John;
- Comply with federal program requirements regarding eligibility for disaster recovery and mitigation grant funding;
- Incorporate assessment findings to incorporated post disaster data to identify capability deficiencies and risks that were not identified prior to Hurricane Irma and Maria; and
- Expand on Mitigation efforts which would be crucial in the implementation of mitigation efforts for the Territory

Figure 2. 2019 Hazard Mitigation Plan



Upon a review of the full range of natural hazards suggested under the FEMA planning guidance, it was necessary to generate some supplementary risk assessment analysis to incorporate best available data for drought and flood hazards. Other resources reviewed in developing this assessment included the USVI CDBG-DR Action Plan, “Conducting a Mitigation Needs Assessment for CDBG-MIT” webinar materials, FEMA Local Mitigation Plan Handbook, and supplementary HUD materials, with invaluable input from many experts who are intimately familiar with the THMP.

1.5 USVI History and Geography

The U.S. Virgin Islands, previously inhabited by Taino and Island-Carib indigenous groups prior to European settlement, were under control by various European powers until 1672. By 1733, the Danes also controlled St. Croix and St. John, having established control of St. Thomas in 1672. The United

States first agreed to buy the islands from Denmark in 1867, though the United States did not assume control over the islands until 1917. Since that time, the economy in the Territory has shifted, with tourism as an industry assuming a larger role (Austin, 2018). The Territory's location continues to attract many visitors tourists who contribute to the local economy.

The USVI is an archipelago located in the Greater Antilles east of Puerto Rico as shown in **Figure 1**. With many islands and cays, the three largest islands – St. Croix, St. John, and St. Thomas – are home to approximately 105,000 people. St. Thomas is comprised of approximately 27 square miles in area, St. John is 19 square miles in area, and St. Croix is approximately 82 square miles in area. St. John and St. Thomas are separated by three miles of Pillsbury Sound, whereas St. Croix is approximately 35 miles south of both St. John and St. Thomas.

The Territory consists of three districts and 20 sub-districts for Census purposes. The three districts (county equivalents) are comprised of the three largest islands: St. Croix, St. Thomas, and St. John. Subdistricts on each island are treated like county subdivisions for the Census, even though the Territory is also divided into estates. These estates are typically smaller than Census subdistricts and are derived from boundaries of agricultural plantations in existence when the United States received the islands from Denmark in 1917 (United States Census Bureau 2019). Groups of adjacent estates comprise Census Tracts. However, meaning that the estates do not nest within subdistricts.

As of the 2010 Census, the Territory is home for well over 100,000 people, comprising 134.3 square miles of land area, with over 55,900 housing units (United States Census Bureau 2013). Approximately three percent of the Islands' for-sale housing stock and 15 percent of its rental housing stock is vacant (U.S. Department of Housing and Urban Development, 2017), of which much of the vacant housing stock is intended for higher-priced single-family vacation rentals for tourists or temporary visitors, as outlined in the 2015 Housing Demand Study. Indeed, given HUD definitions that extend up to 80 percent of Area Median Income, the totals shown for current single family homes for sale that would fall within the affordability range on each of the major islands were inadequate to service the low-income to moderate-income segment that may seek a homeownership alternative, with St. Croix at 18%, St. John at 0%, and St. Thomas at 30% (Community Research Services, LLC, 2015). Figure 3 **Error! Reference source not found.** through Figure 5 shows the US Virgin Islands planning area.

Figure 3. St. Thomas Planning Area

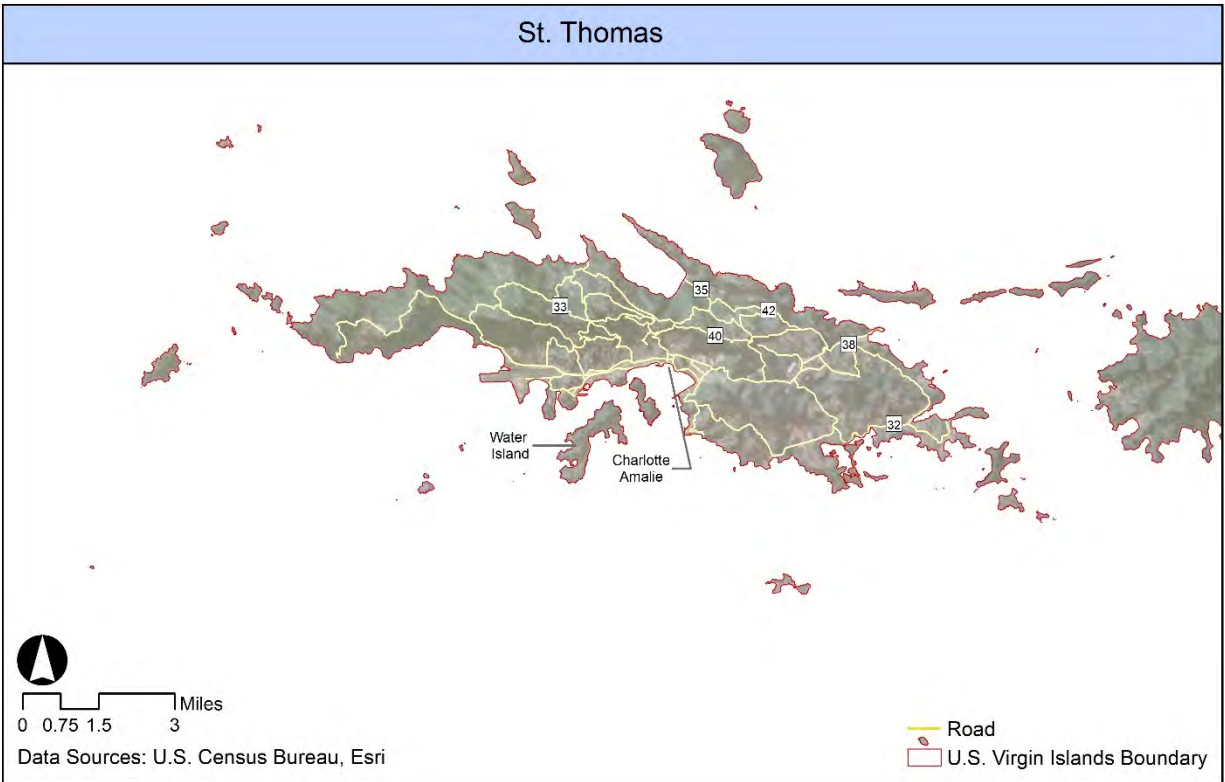


Figure 4. St. Croix Planning Area

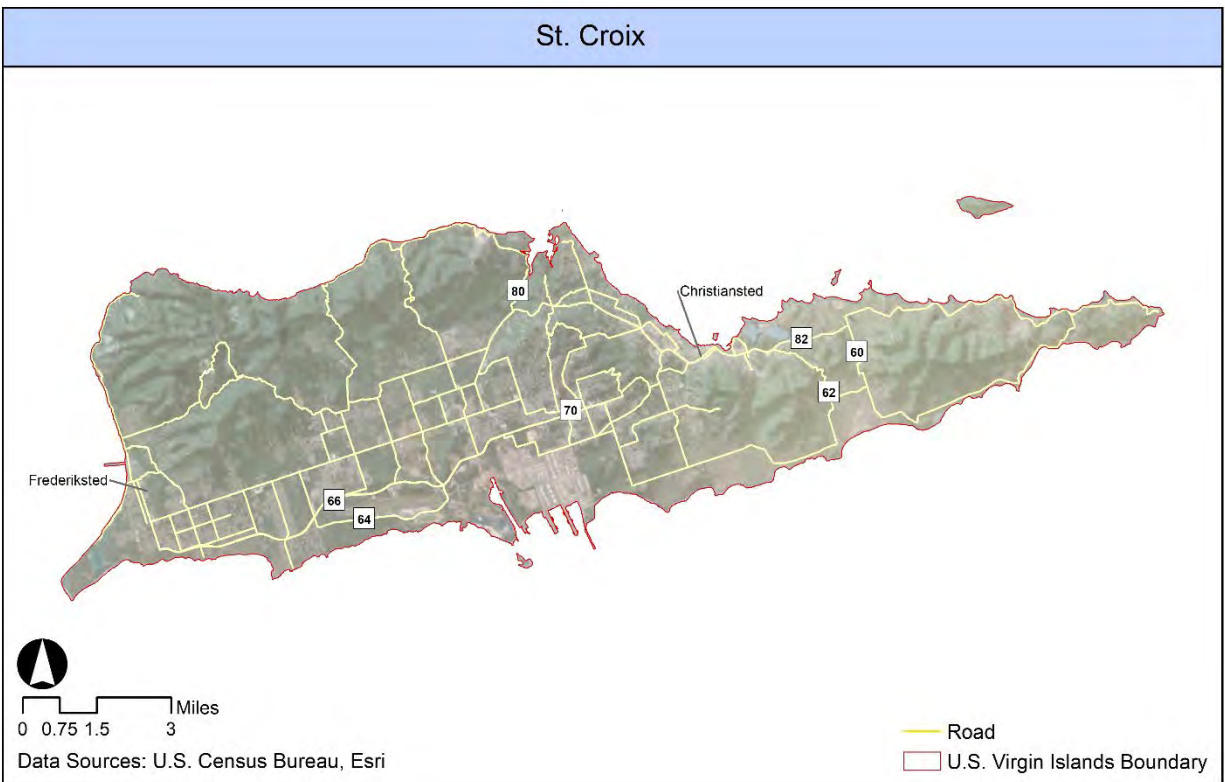
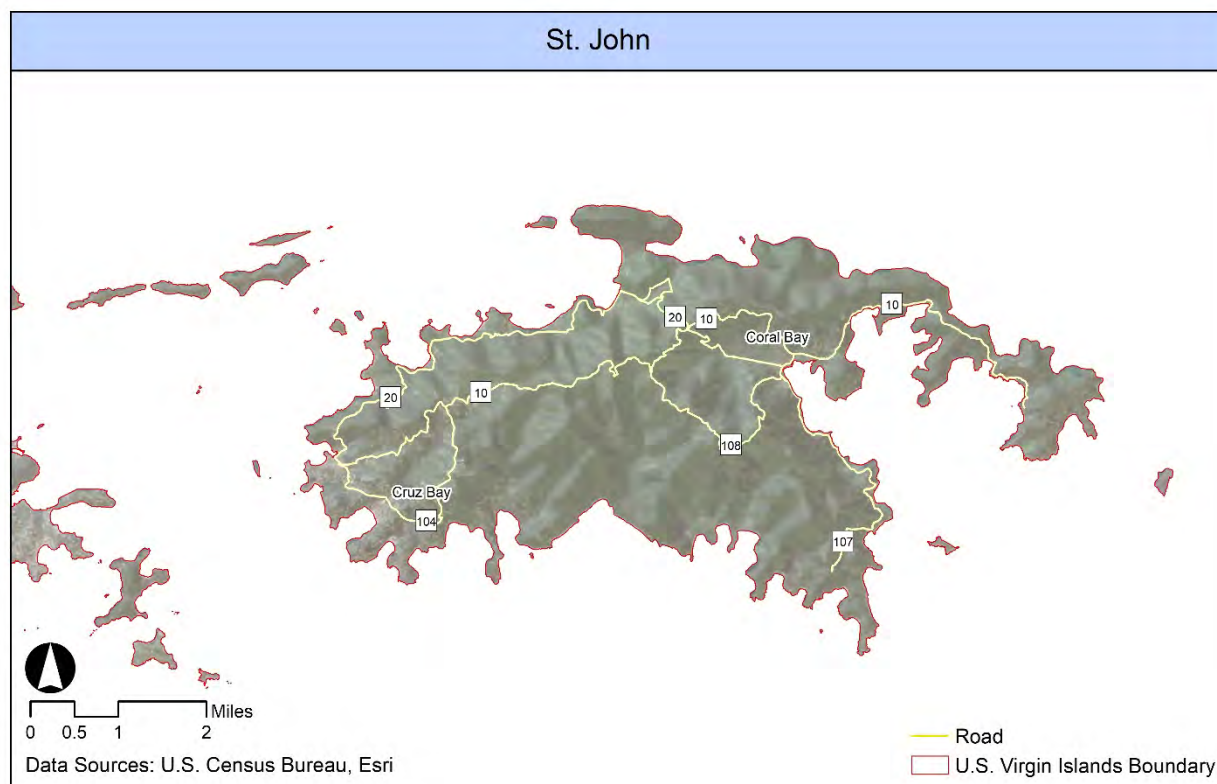


Figure 5. St. John Planning Area



1.5.1 Recent Hurricane Impacts

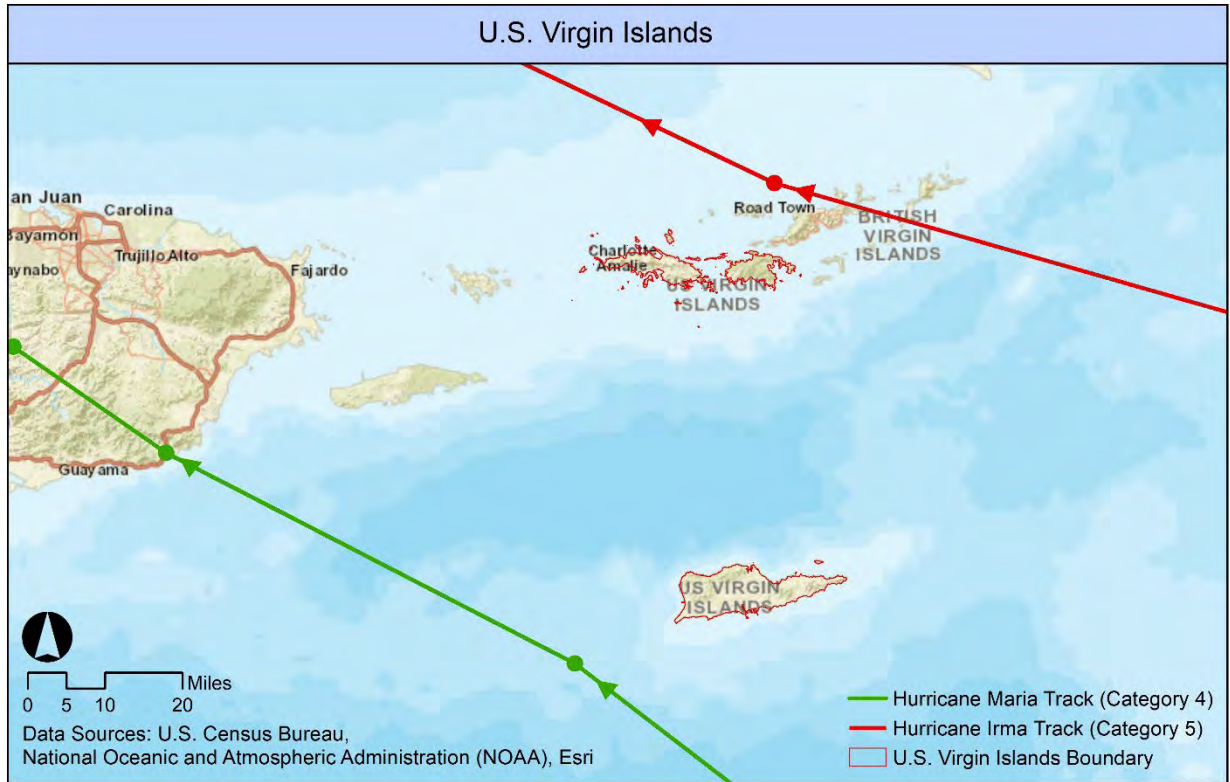
Although the Territory has long been exceptionally vulnerable to natural hazards such as hurricanes and tropical storms, the Islands' readiness and resilience were tested during the 2017 hurricane season. This Mitigation Needs Assessment arises from the unprecedented damage and lasting impacts of Hurricanes Irma and Maria. The impacts from these storms, which made landfall in late September 2017, continue to be felt to this day both in the Virgin Islands and other islands in those hurricanes' path.

On September 6, 2017, Hurricane Irma passed just north of St. Thomas and St. John as a Category 5 storm, yielding 4-10 inches of rainfall and wind gusts up to 160 mph in St. Thomas and St. John. Hurricane winds extended more than 50 miles from the eye, with tropical storm force winds extending up to 185 miles from Irma's eye. On September 20th, just two weeks later, Hurricane Maria passed south of St. Croix as a Category 5 storm and struck Puerto Rico. Hurricane Maria brought 8-12 inches of rain to the islands and directly impacted Hurricane Irma. Hurricane Irma resulted in wind gusts up to 140 mph, and hurricane-force winds extended 60 miles from the eye. Tropical storm-force winds were experienced up to 150 miles from Hurricane Maria's eye, meaning that the Territory encountered extremely high winds as both storms passed. Storm surges were relatively minor (up to three feet) owing in part to the presence of the Territory's geography, though higher localized flooding may still have occurred in many locations (National Centers for Environmental Information, 2019). **Figure 6** indicates the hurricane tracks of these events. **Table 3** compares the impacts of the two hurricanes.

Hurricanes Irma and Maria together are currently regarded as the second-most costly storms in American history, totaling \$147 billion in damage. Individually, the storms ranked third and fifth most

damaging in terms of cost. Hurricane Maria was the deadliest of the storms, causing 2,981 deaths in its path (National Centers for Environmental Information, 2019).

Figure 6. Hurricane Irma and Hurricane Maria Tracks



Pictured: Storm destruction on St. John near the school in Cruz Bay.



Table 3. Comparative Hurricane Impacts.

	Hurricane Irma	Hurricane Maria
Category	5	5
Landfall date	September 6	September 20
Landfall location	St. Thomas / St. John	St. Croix
Worst affected areas	St. Thomas / St. John District	St. Croix District
Maximum measured sustained wind speeds	106 mph*	107 mph*
Maximum measured wind gusts in the USVI	137 mph*	137 mph*
Rainfall	Data not available*	5 in.+*
Storm surge	0.60 – 2.28 ft.+*	1.48 – 2.85 ft.+*
Storm tide	0.50 – 1.7 ft.+*	1.61 – 3.17 ft.+*
Direct deaths	3	2

*Precipitation and tide measuring instruments were knocked off-line or destroyed

Source: USVI Hurricane Recovery and Resilience Task Force

Enormous devastation resulted from the impact of these two hurricane events. In 2018 the total damage to the Territory from both storms was estimated to be \$10.8 billion, including \$6.9 billion in damage to infrastructure, \$2.3 billion in damage to housing, and \$1.5 billion in economic damage. Five direct deaths were attributed to the Hurricanes, though a December 2019 article published in the *American Journal of Public Health* reports that there may be several hundred excess deaths not reflected in official counts (Chowdhury, 2019).

Hurricane damage to the Territory was crippling and wide-reaching for many sectors on the island. The USVI Hurricane Recovery and Resilience Task Force reported the following damages:

- More than 90% of above-ground power lines were damaged and more than half of all poles were knocked down. Power outages persisted for months after the storm. By January 2018, more than three months after the storm, power was restored to most customers.
- The hurricanes disabled cell service on St. John and took 80% of cell sites out of service in St. Croix and St. Thomas. Government telecommunications, radio, and television stations were knocked out of service.
- The airports on St. Croix and St. Thomas were closed for over two weeks after the storms.
- Ports were closed for more than three weeks and more than 400 vessels were sunken or grounded with over 300 containing hazardous substances.
- The storms disabled reverse osmosis water facilities for two days in St. Croix and 10 days in St. Thomas, reducing potable water reserves to a three-day volume. Storage tanks and pumping stations were severely damaged. Raw sewage was discharged into streets and coastal waterways, and the Islands' landfill exceeded full capacity
- More than half (52%) of housing stock was damaged. 12% of homes were damaged severely.

- The territory's hospitals were rendered non-operational for most services, with inpatient capacity reduced by 50% and resulting in evacuations of patients from the Islands.
- More than half of the territory's schools were damaged by more than 50%.
- The territory lost 8% of jobs in the aftermath of the two Hurricanes (USVI Hurricane Recovery and Resilience Task Force, 2018).

The US Virgin Islands' recovery from these devastating storm events continues to the present day. The intention of the Mitigation Needs Assessment and Mitigation Action Plan is to reduce vulnerability and mitigate damages and losses to future hazard events by looking at the impact of prior events, including hurricanes.

1.6 USVI Social Vulnerability and Distress Indicators

The anticipated benefits from the projects and activities described in this CDBG-MIT Action Plan will accrue to LMI residents in the Territory, as mandated by HUD regulations. Data from the 2010 U.S. Census provides the dataset used for analyzing the demographic profile for the Territory, as the census tract level given that the American Community Survey is not conducted in the Territory. However, to ensure a more accurate and comprehensive view of the socioeconomic characteristics of the U.S. Virgin Islands' population, 2010 data were supplemented with insights from the most recent U.S. Virgin Islands Community Survey conducted by the University of the Virgin Islands (available at the island level) and various U.S. Virgin Islands government agencies, including the Bureau of Economic Research and the Department of Labor, including the most recently available FEMA Data Maps, which are included below. Taken together, the three main islands show a relatively similar demographic profile, with high percentages of Low to Moderate Income (LMI) Individuals. In 2020 HUD approved the USVI use of FEMA IA data to determine LMI residents on an area basis under a survey methodology as set forth in the CDBG regulations under 24 CFR 570.483(b)(1)(i).

The anticipated benefits from the projects and activities described in this CDBG-MIT Action Plan will accrue to LMI residents in the Territory, as mandated by HUD regulations. The median household income in the Territory is 25% lower than the national median (\$37,254 compared to \$51,914), and 22% of the population is below the poverty level (compared to 14.4% nationally). Of the three principal islands, St. Croix faces the more severe economic vulnerability with 26% of residents living below the poverty line, with an island-wide median household income of \$36,042. The poverty rate is 7% higher than in St. Thomas and 11% higher than in St. John (United States Virgin Islands Housing Finance Authority, 2018). According to the US Virgin Islands Community Survey, approximately 25% of all persons in the Islands live in poverty, and income per capita is \$20,156. The following table shows the percent of low and moderate income (LMI) households for each Census Tract based on 2010 Census data. Just over half (52%) of households in the Virgin Islands are LMI households, though this figure varies slightly between the Islands and more significantly between Census Tracts. In the process of analyzing prior census data, the VIHFA previously encountered findings that did not align with pre-storm and current conditions within the Territory. Specifically, the data utilized for income designation of households was not indicative of the current economic and income profile of residents of the U.S. Virgin Islands. Given discrepancies between the high costs of living in the U.S. Virgin Islands (including the fair market rents that do not align with the wages, the higher construction costs, and the exceptionally high average costs of electricity paid by Territory residents, and the income limits set by HUD), the VIHFA developed an alternative method of documenting income using information from the FEMA Individual Assistance income data that more accurately represents incomes in the Territory. The VIHFA received a waiver from HUD in 2020 that permitted use of that more recent data to more accurately capture Virgin Island residents' income status, which is reflected in Figure 7 and Figure 8 on the following pages.



Figure 7. St. Thomas & St. John LMI

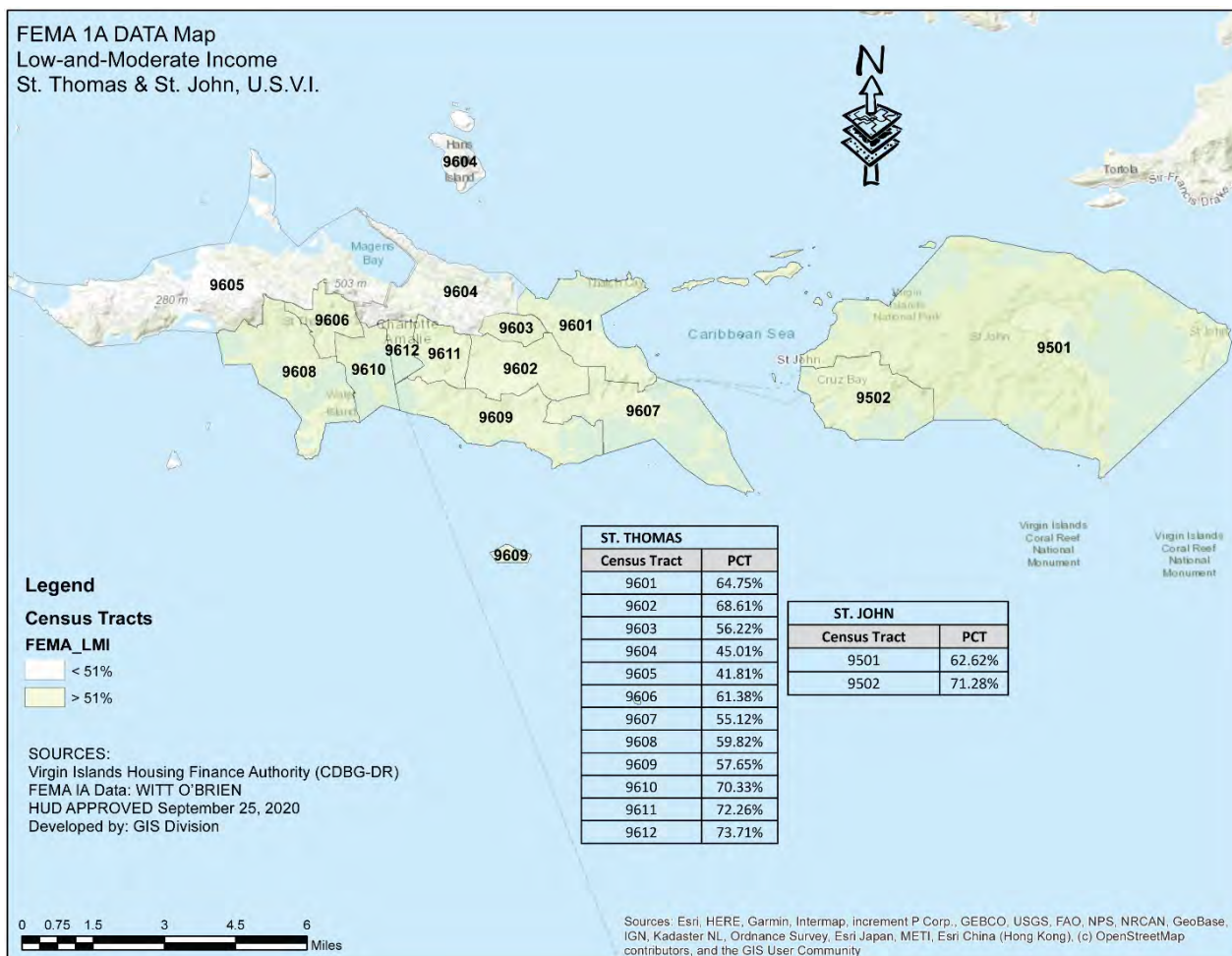
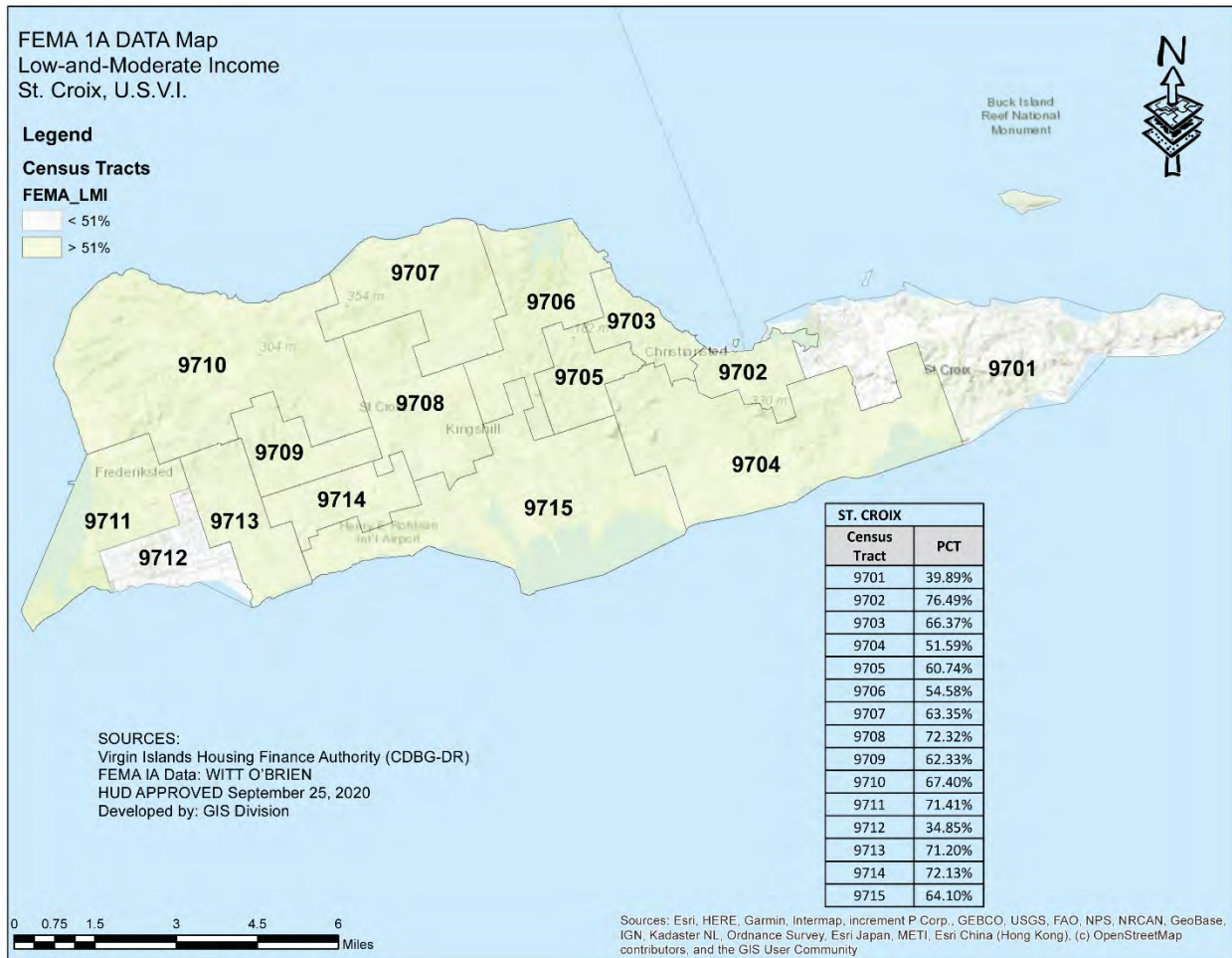


Figure 8 St. Croix LMI



While the use of 2010 Census Bureau data for evaluating the projected income status of the beneficiaries within the existing established geographical boundaries unfairly represents the pre-storm and current community characteristics of the U.S. Virgin Islands, utilizing the FEMA IA data collected immediately after the storm provides a more comprehensive and representative income data set. To address the extent of U.S. the storms' impact, it is necessary to examine their effects first on LMI populations and the most vulnerable households, given the planned scope of the MIT-AP, with a high LMI population existing in the Territory even before the two storms made landfall, as shown in the 2010 Census data and reflected below:

Table 4. Percent of Low- and Moderate-Income Households in the USVI

Census Tract (Subdistrict)	% of LMI Households	Census Tract	% LMI Households
USVI	52%		
St. Croix	46%		
9701 (East End)	29%	9709 (Northwest)	69%
9702 (Christiansted)	59%	9710 (Northwest)	42%
9703 (Sion Farm)	58%	9711 (Frederiksted)	56%
9704 (Anna's Hope Village)	32%	9712 (Southwest)	44%
9705 (Sion Farm)	37%	9713 (Southwest)	50%
9706 (Sion Farm)	31%	9714 (Southcentral)	48%
9707 (Northcentral)	42%	9715 (Southcentral)	40%
9708 (Southcentral/Northcentral)	59%		
St. John	55%		
9501 (Central/Coral Bay)	54%	9502 (Cruz Bay)	55%
St. Thomas	58%		
9601 (East End)	59%	9607 (East End/Red Hook)	55%
9602 (East End)	59%	9608 (Charlotte Amalie West)	60%
9603 (Tutu)	56%	9609 (Southside)	58%
9604 (Northside)	42%	9610 (Charlotte Amalie)	70%
9605 (Northside/West End)	38%	9611 (Charlotte Amalie East)	72%
9606 (Northside/Charlotte Amalie)	61%	9612 (Charlotte Amalie)	74%

Source: US Census – 2010. Cited in 2018 CDBG-DR Action Plan.

Figure 9 illustrates the distribution of low-income households (those earning less than \$30,000 per year) across the islands. Both Frederiksted and Christiansted on St. Croix see higher proportions of low-income households. Charlotte Amalie on St. Thomas is similarly comprised of low-income households, with approximately one-third earning less than \$30,000.

Figure 9. St. Croix Low-Income Household Percentages

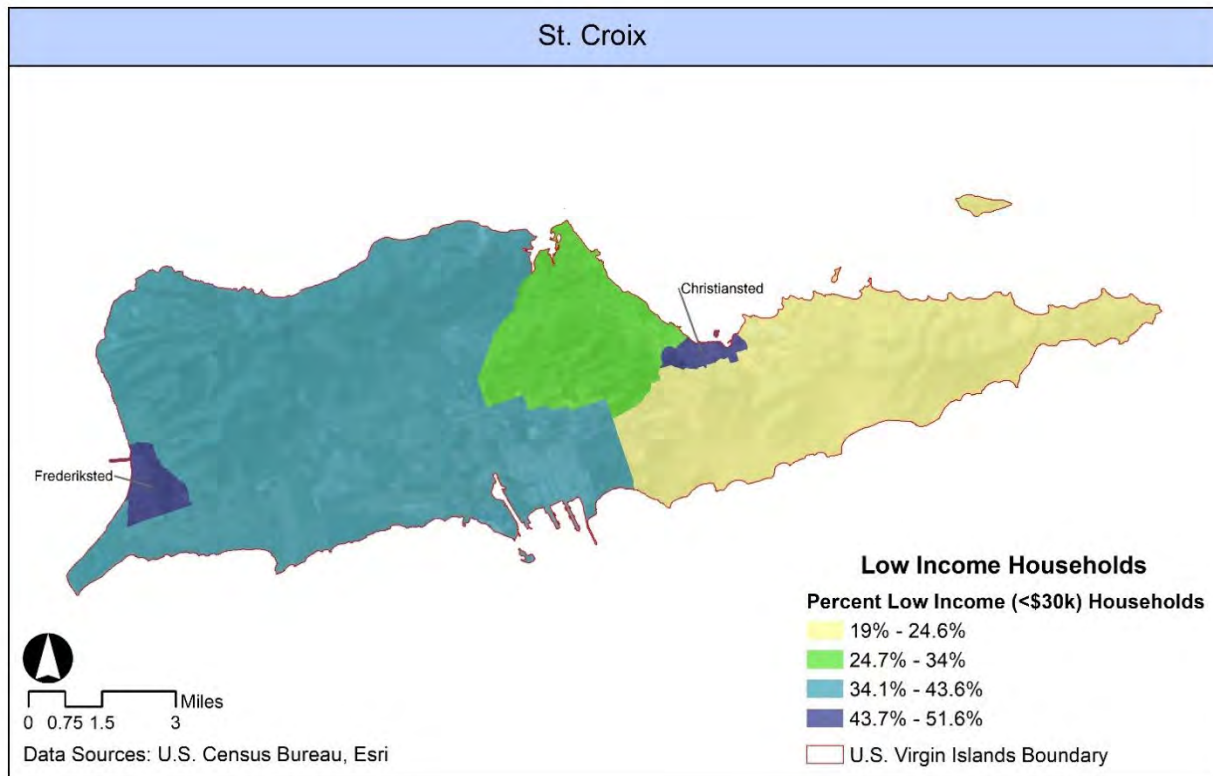


Figure 10. St. Thomas Low-Income Household Percentages

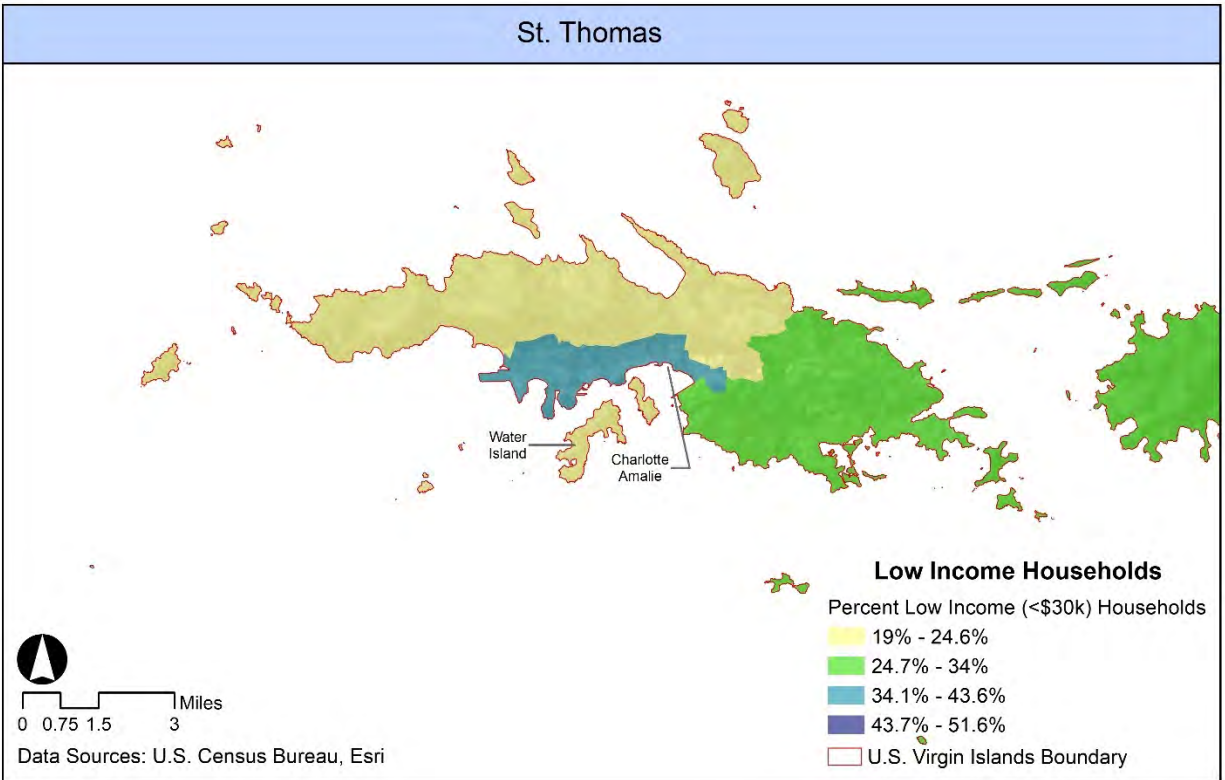
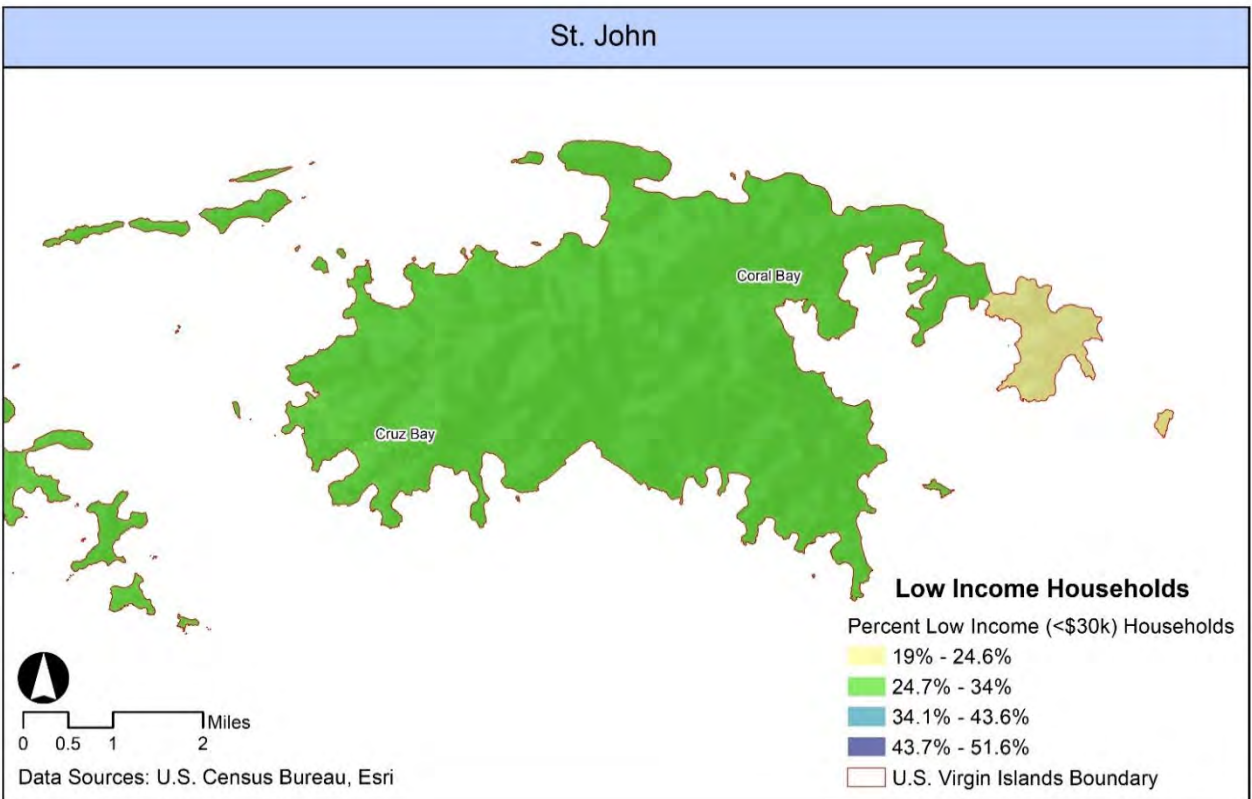


Figure 11. St. John Low-Income Household Percentages



Pursuant to Federal Register Notice 83 FR 40314, all subdivisions of the territory are considered “most impacted and distressed” (MID) for Community Development Block Grant-Disaster Recovery allocations (United States Government Publishing Office, 2018). Pursuant to Appendix A of the CDBG-MIT Main Notice, “most impacted and distressed” are those that meet three standards:

(1) Individual Assistance/IHP designation. HUD has limited allocations to those disasters where FEMA had determined the damage was enough to declare the disaster as eligible to receive Individual and Households Program (IHP) funding.

(2) Concentrated damage. HUD has limited its estimate of serious unmet housing need to counties and Zip Codes with high levels of damage, collectively referred to as “most impacted areas”. For this allocation, HUD defines the most impacted areas as either most impacted counties—counties exceeding \$10 million in serious unmet housing needs—and most impacted Zip Codes—Zip Codes with \$2 million or more of serious unmet housing needs. The calculation of serious unmet housing needs is described below.

(3) Disasters meeting the most impacted threshold. Only 2017 disasters that meet this requirement for most impacted damage are funded:

a. One or more most impacted county

b. An aggregate of most impacted Zip Codes of \$10 million or greater

The 2019 THMP, as noted in the prior section, analyzed hazards for potential dollar loss for the given facility as well as the social impact in terms of the population of those under the age of 18 and over the age of 65 in the hazard area.

Vulnerability Classifications for MNA derive from the THMP. The THMP ranked vulnerability for structures and critical facilities on the following scale:

- Very Low, (no, or negligible damage)
- Low, (easily repairable damage mainly to part of components and/or contents)
- Moderate, (considerable, yet repairable damage to mainly non-structural components)
- High (considerable damage to both structural and non-structural components), and
- Very High (the extent of damage is too much to be repaired; the facility must be demolished and replaced)

1.7 Hazard Context

1.7.1 Hazards of Concern

The 2019 THMP Plan identified eight hazards of concern for the Territory for which vulnerability assessments were conducted. Following the vulnerability assessment, these hazards were ranked by potential dollar loss in the table below, with 1 being the highest. Although vulnerability estimates were not previously conducted for rain-induced landslides or wildfires within the most recent THMP, current analysis showed that hurricane and riverine flooding were top-ranked hazards for the Territory. In preparing the MNA, the Project Team examined recent disaster data and undertook new risk assessments for flooding as described in the subsequent section while also bringing pandemic into the mix because of recent world events related to the spread of the coronavirus commonly called



COVID-19. The results from these analyses resulted in the ordinal re-ranking of hazards. Table 5 shows the new results of the hazard ranking for each of the major three islands within the Territory.

Table 5. Adjusted 2020 Hazard Ranking by Dollar Loss

Hazard	St. Thomas	St. Croix	St. John
Hurricane	1	1	1
Riverine Flooding	2	2	2
Earthquake	3	3	4
Tsunami	4	4	7
Drought	5	5	5
Coastal Flooding	6	6	3
Rain-Induced Landslide	7	7	6
Wildfire	8	8	8
Pandemic/Disease Outbreak	<i>Unranked</i>	<i>Unranked</i>	<i>Unranked</i>

Source: 2019 Territorial THMP – Includes adjusted 2020 vulnerability assessment results

1.7.2 Methodology for Hazard Analysis

This MNA was developed with data and findings from the 2019 Territorial Hazard Mitigation Plan (THMP), which while in the process of being updated is the most recently adopted plan. As noted within the prior section, the 2019 Plan examined each hazard of concern and analyzed hazards for potential dollar loss for community lifelines, plus residential and commercial structures. The Plan also examined the social impact in terms of affected population of residents under the age of 18 and over the age of 65. Explanations of the methodologies used to conduct the risk assessment and vulnerability can be found in the 2019 Territorial Hazard Mitigation Plan (THMP). For the Mitigation Needs Assessment, which is to build on the most recent THMP, hazard exposure and consequence have been reclassified by also factoring in the risk to lifelines and structures in the Territory. For these hazards, the most recent Hazard Mitigation Plan classified relative risk to specific hazards.

Consequence classification components are adapted from the 2019 Territorial Hazard Mitigation Plan, which had classified risk exposure into five categories rather than three. Lifelines and structures consequence classifications were classified based on high, moderate, or low impacts, building on data analysis and work done in developing prior THMP analysis, with Table 6 below showing impact classification.

Table 6. Exposure Classification and Consequence

Consequence Classification	Classification Definition	Hazard
High Impact	Hazard impacts result in substantial damage to structural and non-structural components and/or building destruction.	Earthquake; Hurricane Wind
Moderate Impact	Hazard impacts result in apparent structural damage to both structural and non-structural components.	Drought; Tsunami; Coastal Flooding; Riverine Flooding
Low Impact	Hazard impacts result in no or negligible damage to non-structural components and no damage to structural components. Damage, if any, is easily repairable with minimum resources.	Rain-Induced Landslide; Wildfire

During the development of the Mitigation Needs Assessment (MNA), the need to update the assessments of the flood and drought hazards was identified by the Project Team. The Project Team re-assessed impacts for lifelines and general building stock for the Flood, Sea Level Rise, and Storm Surge hazards using best available data² and HAZUS analysis. This will account for discrepancies in the buildings and lifelines for which the risk was assessed. The 2019 Territorial Hazard Mitigation Plan utilized a list of critical facilities developed by VITEMA with updates identified through site visits and assessments. Lifeline consequences for all hazards except flooding were determined by damage ratios calculated for the 2014 and 2019 Territorial THMP. Consequence classifications for lifelines impacted by flooding-related hazards (including sea level rise and storm surge) were determined by a lifeline's location in the hazard zone.

General building stock and community lifeline exposure and vulnerability analyses for the 1%-annual-chance (100-year) flood hazard were also conducted using GIS and HAZUS software. The flood hazard was represented by Advisory Flood Zone data provided by the Federal Emergency Management Agency (FEMA), which represents the best available data for this hazard. Exposure analyses for the storm surge and sea level rise hazards were conducted using GIS software. The storm surge hazard was represented by the inundation area modeled by the National Oceanic and Atmospheric Administration (NOAA) utilizing the hydrodynamic Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model. The sea level rise hazard was represented by mapping the inundation area (including low-lying, hydrologically "unconnected" areas that may flood) from a 2 foot and 4 foot of sea level rise as modeled by NOAA, representing the projected 2050 high and 2100 high scenarios, respectively. The general building stock data is the individual structure inventory used by FEMA to update the HAZUS default data in 2019. The community lifeline data is the HAZUS (version 4.2) critical facilities default data, which was also recently updated by FEMA.

The drought risk and vulnerability assessment from the 2019 Hazard Mitigation Plan was not retained for the MNA due to the Project Team's concerns that the Islands' vulnerability to the drought hazard was not adequately captured by the assessments undertaken in the 2019 Plan Update. Additionally, recent drought events were not described in the 2019 plan. This Mitigation Needs Assessment does not include spatial analyses and damage assessments owing to the nature of the drought hazard. The findings from the drought re-assessment elevated the hazard's ranking.

1.8 Critical Facilities and Lifelines

FEMA has defined Community Lifelines for incident response, to provide the federal government a better understanding of the impacts of hazards and disasters in local jurisdictions. The 2019 THMP identified three types of critical facilities and infrastructure: Critical Facilities, Transportation Infrastructure, and Utilities. For the purposes of this Mitigation Needs Assessment, these facilities have been cross-referenced with FEMA lifelines to assess vulnerability based on lifeline categories. A matrix describing this crosswalk is found in **Table 7**. Lifeline exposure to each hazard is described in subsequent sections.

² 8/2018 Advisory Base Flood Elevation dataset provided by FEMA/STARR II (2018 Advisory Base Flood Elevation data).



Table 7. FEMA Lifelines and Identified Critical Facility Crosswalks

USVI-THMP Critical Facility	FEMA Lifeline Category	USVI THMP- Transportation Infrastructure	FEMA Lifeline Category	USVI THMP – Utilities	FEMA Lifeline Category
Police Stations	Safety & Security	Marine Ports	Transportation	Electrical Power Generating Plants	Energy
Fire Stations	Safety & Security	Airport	Transportation	Water System	Food, Water, Shelter
Hospital/Medical Clinic	Health and Medical			Desalinization Plant	Food, Water, Shelter
Government Buildings	Safety and Security			Desalination Plant	Food, Water, Shelter
Shelters/Special Needs	Food, Water, Shelter			Water Distribution System	Food, Water, Shelter

For this MNA, the Territory’s impacted lifelines were assessed on a hazard-by-hazard basis. Each lifeline category was classified with a Consequence Classification as shown in Table 4. The classification is informed by damage assessments and modeled damage estimates calculated for the 2019 Territorial Hazard Mitigation Plan and the Mitigation Needs Assessment.

1.8.1 Safety and Security

Safety and Security lifelines include various law enforcement, emergency services, and government services facilities. Disruption to these services can significantly hamper the territorial government’s ability to provide public safety services and critical government functions. In the wake of Hurricanes Maria and Irma, these lifelines saw major impacts, and facilities saw significant damage. In the Islands, schools, police stations, US Coast Guard facilities, the Readiness Center, fire stations, libraries, and daycares are all considered Safety and Security Lifelines.

Food, Water, Shelter

Food, water, and shelter lifelines provide basic needs such as housing, the commercial food supply chain and programs, and water systems. These lifelines are critical for sustaining life prior to, during, and following storm events. In the US Virgin Islands, these facilities include wastewater facilities, potable water facilities, desalinization facilities, shelters, and some residential buildings. Shelter facilities



Pictured: Innovative model shelter on St. Thomas owned by the VIHFA.

were stressed and damaged during and following the hurricanes as residents stayed at the shelters due to damage to homes. WAPA water facilities were damaged and impacts to the food supply chain resulted in delays to residents receiving food.

Health/Medical

Health and medical lifelines include facilities that comprise the medical supply chain, perform public health services, fatality management, patient movement, and medical care. This includes home care, pharmacies, and raw materials needed to produce medicine. Impacts to medical facilities were profound during the hurricanes of 2017, necessitating the evacuation of 800 patients from the Territory to facilities in Puerto Rico and the American mainland. Medical facilities in the Territory also suffer from workforce shortages, inadequate funding, and infrastructure limitations (USVI Hurricane Recovery and Resilience Task Force, 2018).

Energy

Energy lifelines power the US Virgin Islands and include facilities that produce and distribute electric power, with two separate electricity grids managed by the Water and Power Authority (WAPA). The residential sector consumes over one-third of WAPA's electricity, and just under one-third is consumed by large power users that each use more than 25 kilowatts (U.S. Energy Information Administration, 2020). Primary WAPA generating facilities include the Harley Generating Station near Charlotte Amalie on St. Thomas and the generating facility at Estate Richmond near Christiansted on St. Croix.

Communications

Communications lifelines include communications infrastructure such as data centers and cell towers, in addition to LMR networks, payment-processing systems, 911/emergency dispatch facilities, and emergency alert systems. The 2017 hurricanes substantially damaged cellular, landline, and radio-based telecommunications systems. Following the storms, cell phone availability decreased by between 80 to 90 percent for several weeks. The loss of cell phone coverage disrupted communications among residents as well as to responding agencies. St. John was noted to have been hard-hit, with landline and public safety radio communications destroyed between Coral Bay and Cruz Bay. Following the storm, amateur radio resources were used to relay information.

Transportation

Transportation lifelines facilitate the movement of people and goods throughout the Islands. Following the 2017 hurricanes, seaports in the Territory did not open for three weeks and both major airports remained closed for approximately two weeks as well (USVI Hurricane Recovery and Resilience Task Force, 2018). As relatively remote landmasses, the Islands rely on imports for many goods. The Islands' port facilities are particularly important for this reason, as well as due to their connection to the regional economy. Throughout the islands, ferry terminals, airports, and heliports connect the Islands to each other and to the global economy.

1.8.2 Lifeline Locations

The maps on the following page show the location and distribution of lifeline locations across the three islands. Note that the lifelines shown on these maps are those identified in the most recent Hazus dataset. This dataset was used for the risk assessment of flood-related hazards. Vulnerability assessments for other hazards used a separate critical facilities dataset developed for the Territorial THMP. The following maps show the distribution of community lifelines in St. Croix. Safety and Security lifelines are most prevalent, and are found near the population centers of Frederiksted, Christiansted, and Golden Grove. Energy and transportation lifelines are heavily concentrated in the



vicinity of the former HOVENSA refinery (now **West Indies Petroleum Limited and Port Hamilton Refining and Transportation, LLLP**), where petroleum storage, refining, and transportation facilities are located. WAPA water facilities were damaged and impacts to the food supply chain resulted in delays to residents receiving food.

On St. Thomas, safety, and security lifelines (mostly school facilities) are predominately clustered near Charlotte Amalie and at the University of the Virgin Islands, located west of Charlotte Amalie. Transportation facilities can be found clustered along the shore, including at the cruise ship ports, ferry terminals, and at the Cyrus King Airport. Energy lifelines are found south of the airport near the WAPA desalinization plant.

St. John is the smallest in both population and population density of the three main islands of the USVI. Most of the safety and security and transportation lifelines are clustered near Cruz Bay with a few scattered across the Island.

Figure 12. St. Croix Community Lifelines (Map 1 of 2)

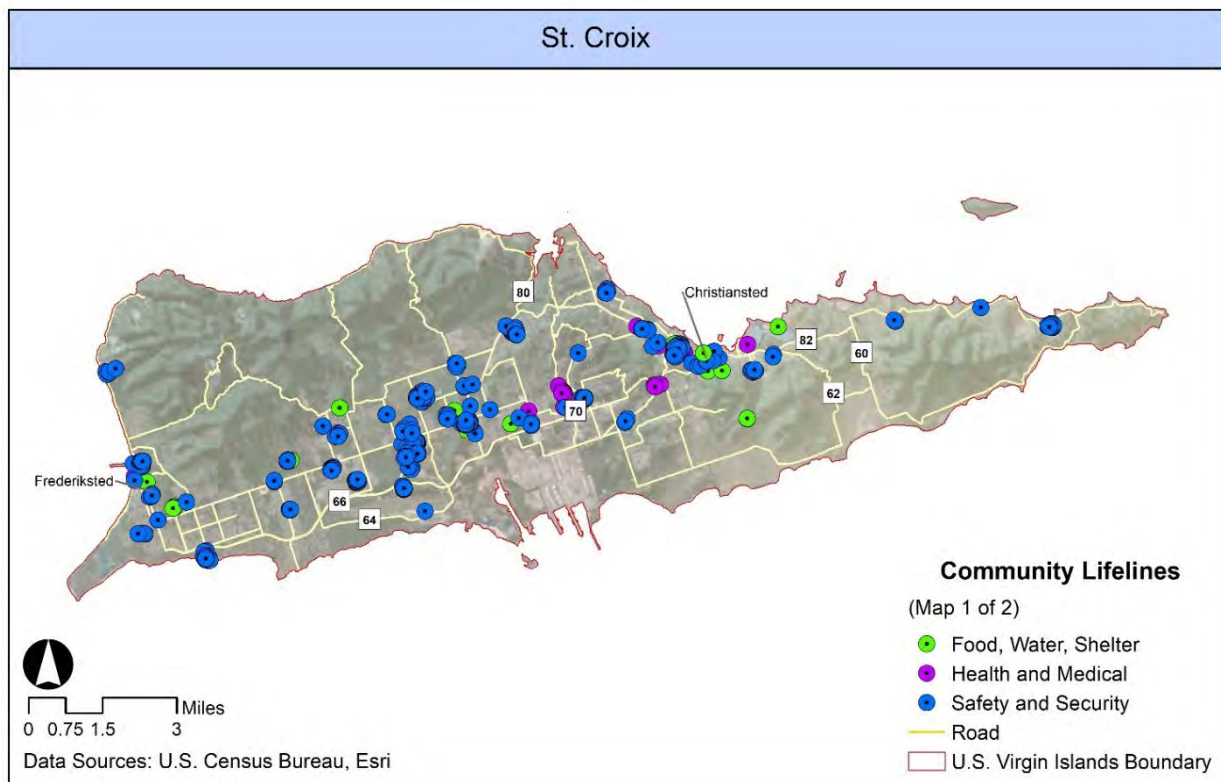


Figure 13. St. Croix Community Lifelines (Map 2 of 2)

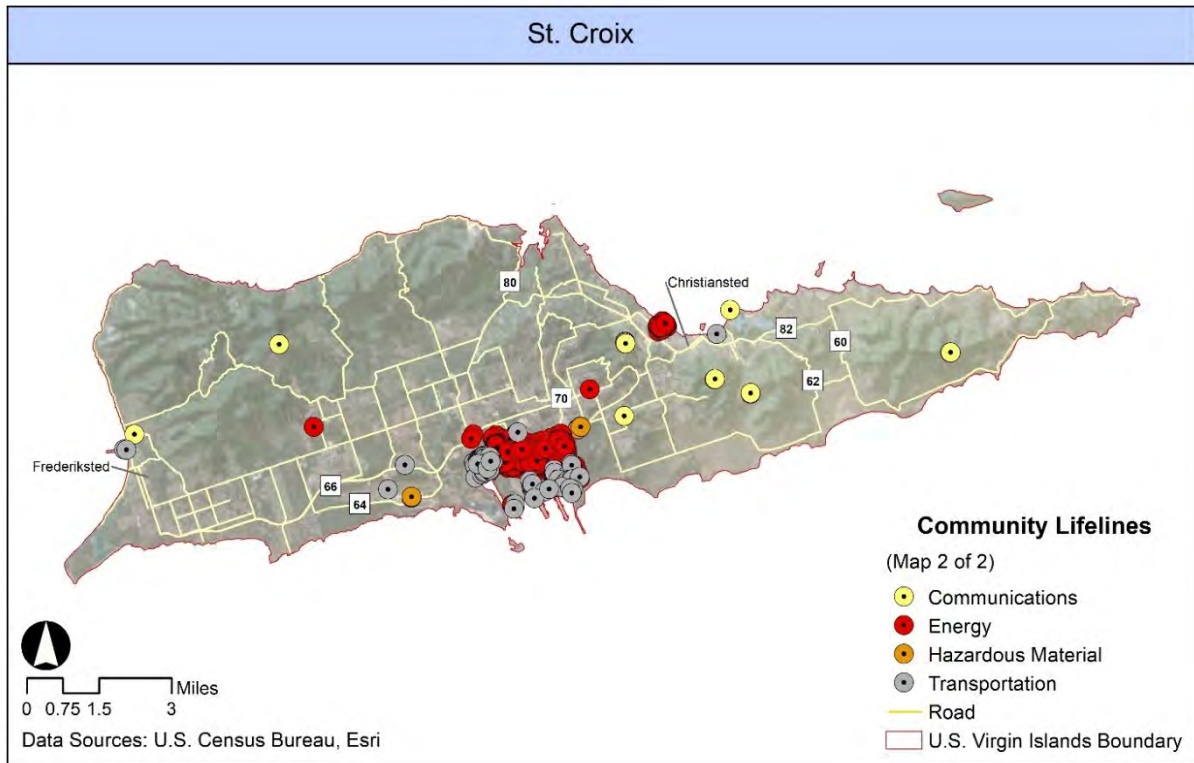


Figure 14. St. Thomas Community Lifelines (Map 1 of 2)

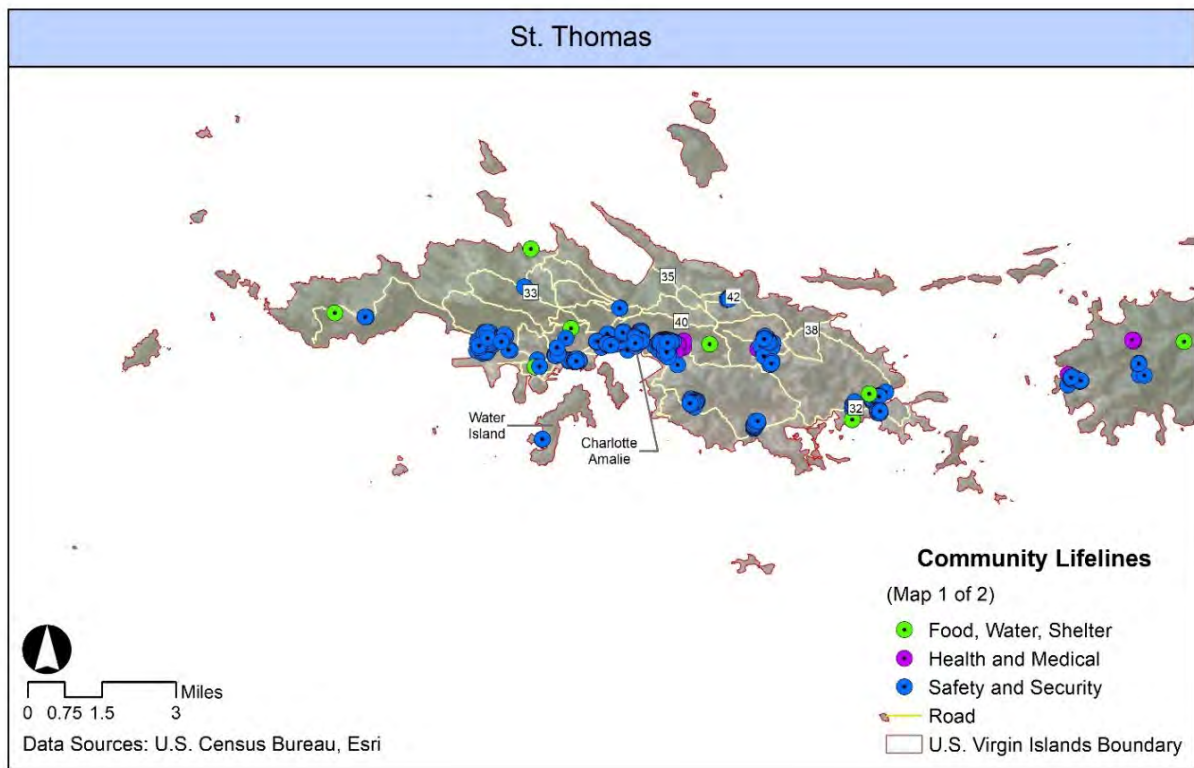


Figure 15. St. Thomas Community Lifelines (Map 2 of 2)

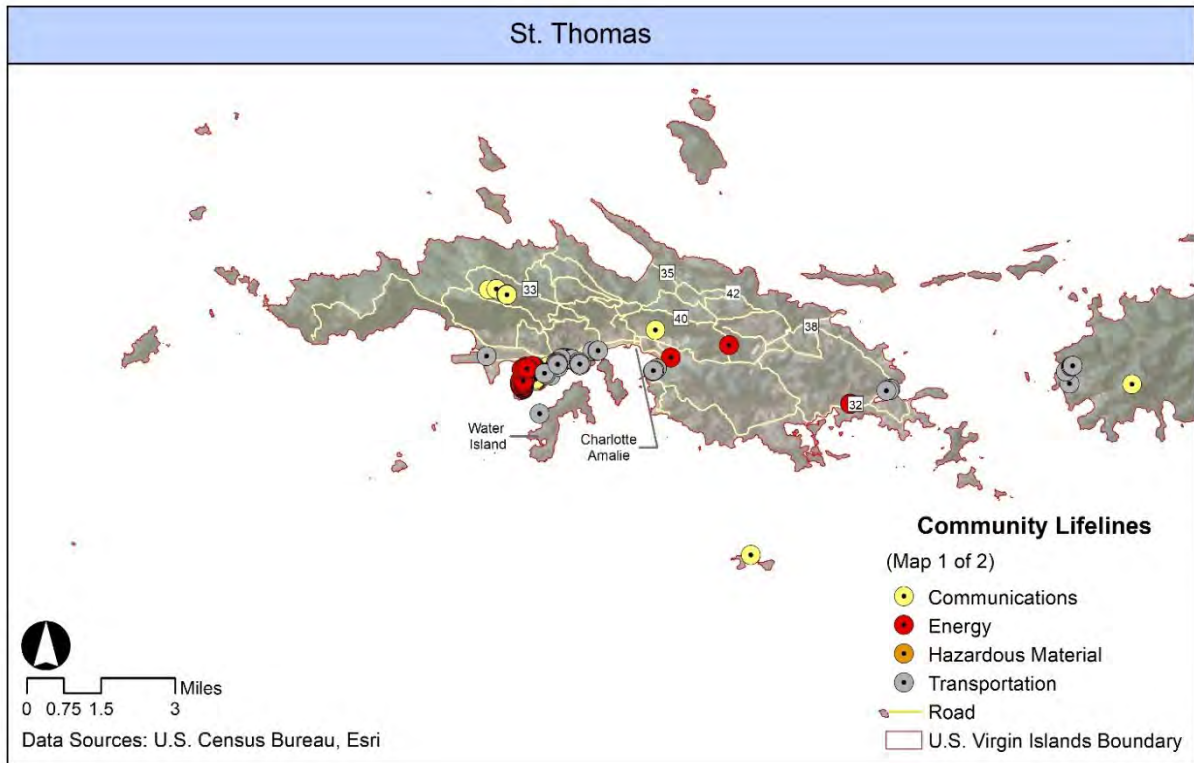


Figure 16. St. John Community Lifelines (Map 1 of 2)

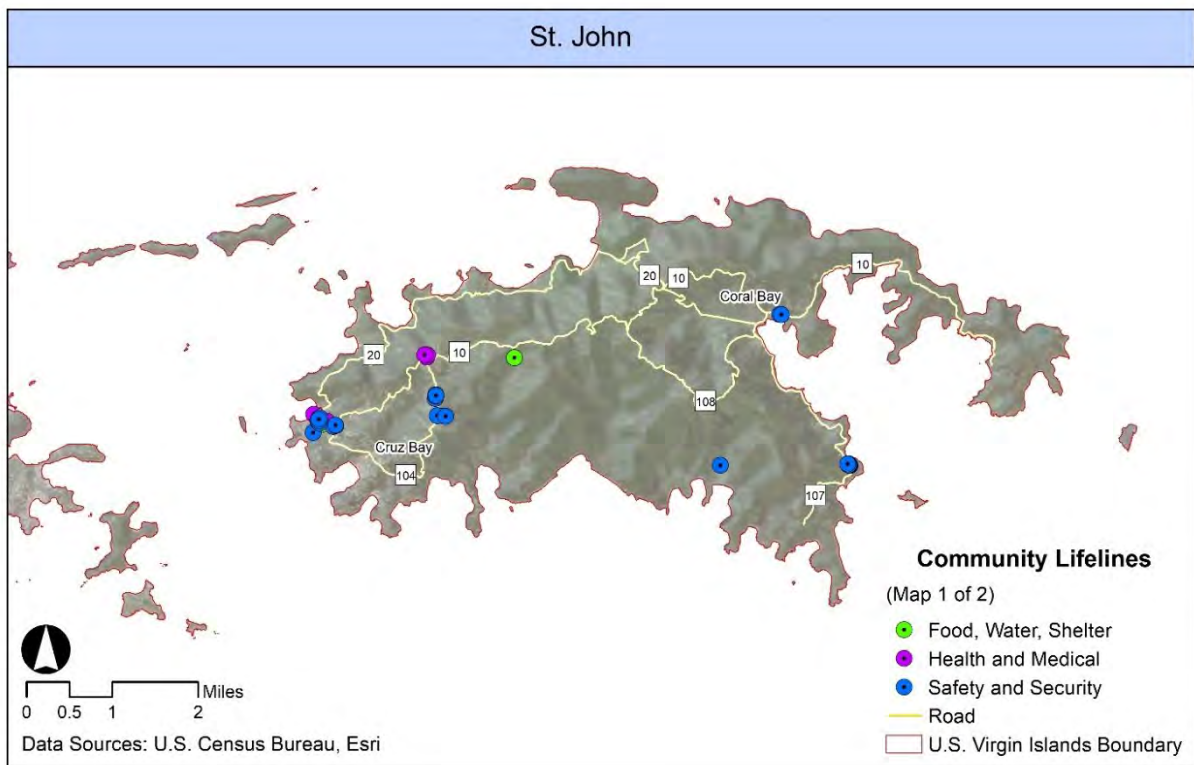
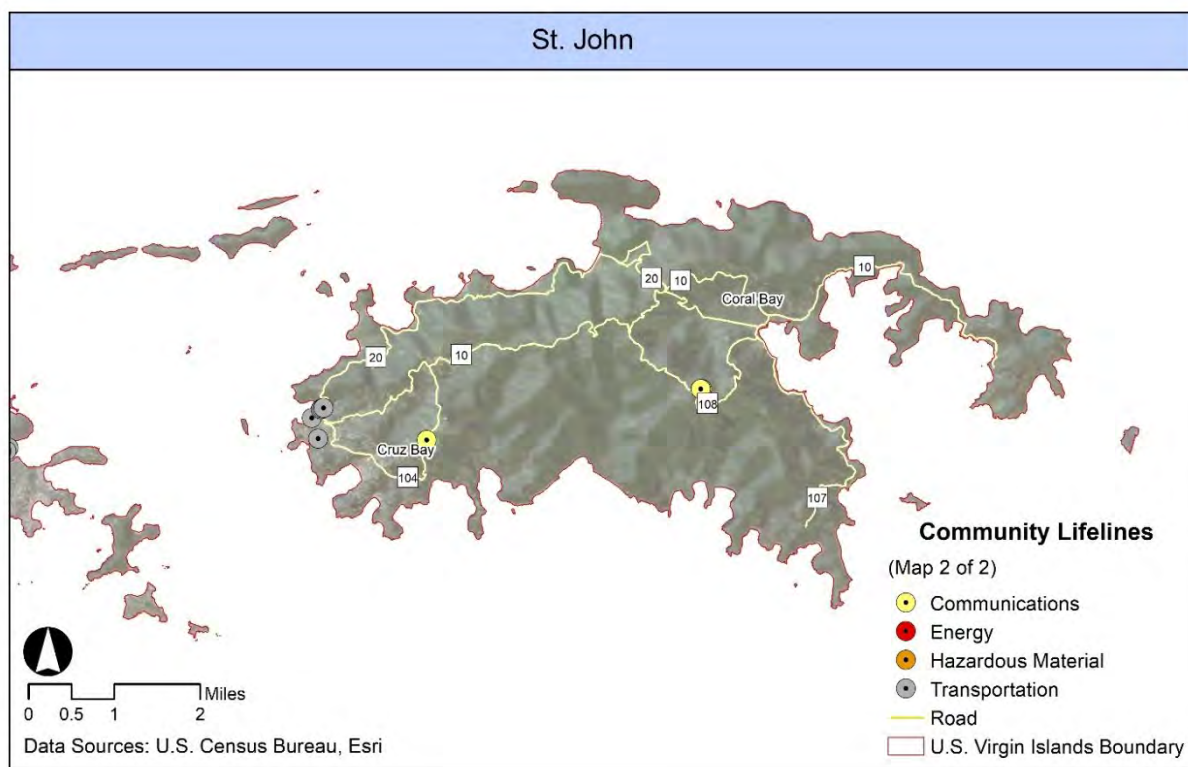


Figure 17. St. John Community Lifelines (Map 2 of 2)



1.9 Risk Assessment Summary

1.9.1 Drought

A drought is a period of abnormally dry weather. Drought diminishes natural stream flow and depletes soil moisture, causing social, environmental, and economic impacts. The term “drought” typically refers to periods of moisture deficiency that are relatively extensive in both space and time. Droughts originate from decreased precipitation amounts relative to normal weather patterns. They can be both short-term (lasting over the course of weeks or a month) or long-term (lasting the course of a season or years). Droughts can impact an array of economic, environmental, and social activities. The demand that society places on water systems and supplies – such as expanding populations, irrigation, and environmental needs – also contributes to drought impacts.

Droughts can be categorized as follows:

- Meteorological drought (degree of departure from expected precipitation),
- Hydrologic drought (Effects of precipitation shortfalls on waterbodies and groundwater),
- Agricultural drought (Soil moisture relative to agricultural/plant needs), and
- Socioeconomic drought (Demand of water exceeding supply due to a weather-related shortfall).

How vulnerable an activity may be to the effects of drought is usually linked on its water demand, how the demand is met, and what water supplies are available to meet the demand. The impacts of drought vary between sectors of the community in both timing and severity:

- Water supply—The water supply sector encompasses urban and rural drinking water systems that are affected when a drought depletes ground water supplies due to reduced recharge from rainfall.
- Agriculture and commerce—The impact of drought on the agriculture and commerce sector includes the reduction of crop yield and livestock sizes due to insufficient water supply for crop irrigation and maintenance of ground cover for grazing, absent purchase of water to supplement water derived from rainfall.
- Environment, public health, and safety—The environmental, public health, and safety sector focuses on wildfires that are both detrimental to the forest ecosystem and hazardous to the public. It also includes the impact of desiccating streams, such as the reduction of in-stream habitats for native species.

The four types of droughts would likely have disparate impacts throughout the Territory. Although cisterns are common for USVI residents, the territory experiences a dry season that typically lasts from January to April. There is often a shorter dry season in June and July. Only one quarter to under a half of residents in the Territory are connected to the Territory’s public water system that the Water and Power Authority (WAPA) operates, which means that many residents rely heavily on collected rainfall for water.³ For those connected to the central water system, WAPA’s water derives from reverse osmosis desalinization processes. Most residents in the Territory rely on cisterns for water supplies, with some households also attached to WAPA water. Households attached to WAPA water are less impacted by periods when less rain falls as they have access to water from WAPA to readily meet water needs. For those who are not connected to WAPA water droughts can lead to empty cisterns, requiring residents to purchase water for essential daily use. While potential drought impact in the Territory lends itself to further study, the LMI population in the Territory would be more adversely affected by the need to purchase water to fill empty cisterns.

Droughts have been experienced throughout the Territory’s history but have only been documented by United States Drought Monitor system (<https://droughtmonitor.unl.edu/>) since June, 2019. Although records are limited, historic droughts have been noted in 1733, the 1920s, 1964, early 1970s, and 2002. According to the 2019 THMP, the National Climate Data Center reports no new drought events since 2002. However, a review of records indicated the presence of a historic drought in 2015, causing a water deficit in 86% of Puerto Rico and the US Virgin Islands (NRCS). In 2016, the US Department of Agriculture reported that Puerto Rico and the US Virgin Islands had experienced uncommonly dry weather over the course of the previous three to five years (NRCS). The 2015 drought caused major agricultural impacts for the region, resulting in the declaration of agricultural disaster S3874 for St. Croix. The Islands also received 53 payments totaling nearly \$30,000 between 2014-2015 from the USDA Livestock Forage Program owing to drought-related losses to livestock (United States Department of Agriculture).

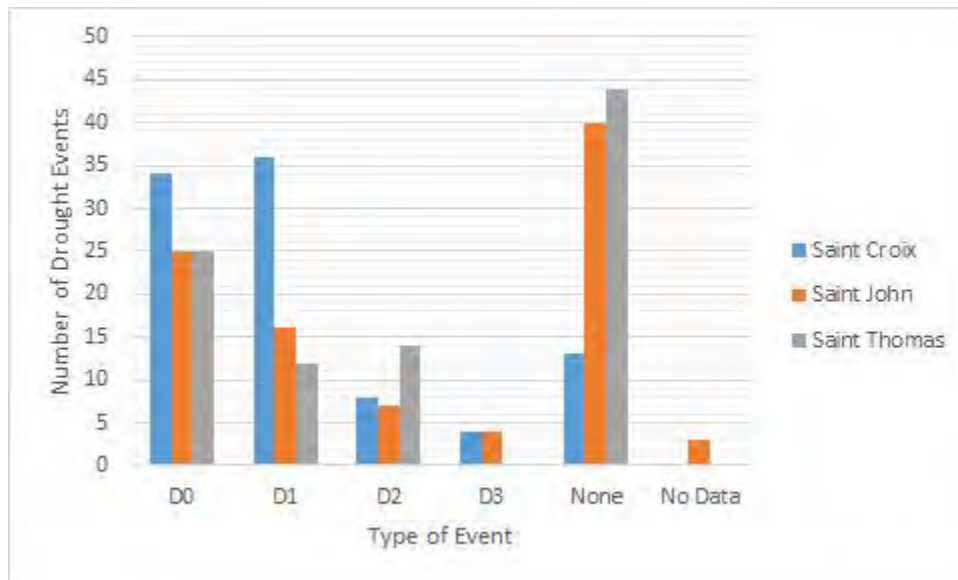
In July 2020, St. Thomas recorded a severe drought and St. John and St. Croix recorded extreme droughts. On St. Croix, this drought was characterized by year-to-date rainfall that is 3.2 inches below normal and year-to-date rainfall approximately one inch below normal on St. Thomas and St. John (Southeast Climate Adaptation Science Center, 2020). In August 2020, the Territory received a

³ A 2019 RA Briefing indicates that WAPA provides drinking water service to nearly half of the population of the Territory.

“severe drought” designation that was lifted in early September. At the time of this report’s drafting, the Territory remains under abnormally dry conditions (Virgin Islands Source, 2020).

In June 2019, the National Oceanic and Atmospheric Administration added the US Virgin Islands to the United States Drought Monitor. The Virgin Islands’ participation in the program is expected to enhance data collection and build a better understanding of drought and precipitation changes in the Virgin Islands. Limited drought data available for analysis at the time of this Mitigation Needs Assessment included weekly island wide drought classification as summarized in Figure 18. Climate change is expected to decrease the amount of annual precipitation in the region by between five and fifteen percent, with much of the change occurring between June and August. This is expected to increase the frequency of drought conditions in the future.

Figure 18. Weekly Drought Category Data for USVI (June 4, 2018 through 3/23/2021)



Source: US Drought Monitor



1 Drought Categories as well as correlation with related indices is provided in Figure 19.

Figure 19. Description of Drought and Related Indices

Category	Description	Possible Impacts	Ranges				Objective Drought Indicator Blends (Percentiles)
			Palmer Drought Severity Index (PDSI)	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	
D0	Abnormally Dry	<ul style="list-style-type: none"> Going into drought: <ul style="list-style-type: none"> short-term dryness slowing planting, growth of crops or pastures Coming out of drought: <ul style="list-style-type: none"> some lingering water deficits pastures or crops not fully recovered 	-1.0 to -1.9	21 to 30	21 to 30	-0.5 to -0.7	21 to 30
D1	Moderate Drought	<ul style="list-style-type: none"> Some damage to crops, pastures Streams, reservoirs, or wells low, some water shortages developing or imminent Voluntary water-use restrictions requested 	-2.0 to -2.9	11 to 20	11 to 20	-0.8 to -1.2	11 to 20
D2	Severe Drought	<ul style="list-style-type: none"> Crop or pasture losses likely Water shortages common Water restrictions imposed 	-3.0 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3	Extreme Drought	<ul style="list-style-type: none"> Major crop/pasture losses Widespread water shortages or restrictions 	-4.0 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4	Exceptional Drought	<ul style="list-style-type: none"> Exceptional and widespread crop/pasture losses Shortages of water in reservoirs, streams, and wells creating water emergencies 	-5.0 or less	0 to 2	0 to 2	-2.0 or less	0 to 2

Source: US Drought Monitor

Due to a lack of spatial data for drought on the Islands, drought impacts to lifelines and general building stock were not calculated and maps from the 2019 THMP were not used to inform this assessment. Structures typically are not directly affected by drought conditions, although certain structures can become vulnerable to wildfires, which become more likely following prolonged droughts. Droughts can also have significant impacts on landscapes, which could cause a financial burden to property owners and certain businesses. However, these impacts alone are not considered critical in planning for impacts from the drought hazard. Economic impact will be largely associated with industries that use water or depend on water for their business. Most residents in the territory reside in places with a cistern that is filled via rainwater, and some are connected to WAPA water as well. Private companies in the Territory sell water to fill cisterns and support farmers’ water needs in periods with little to no rain. The following map shows areas in the US Virgin Islands with prime agricultural soil, with most prime farmland located on St. Croix.

Figure 20. Farmland Classification Map for St. Croix

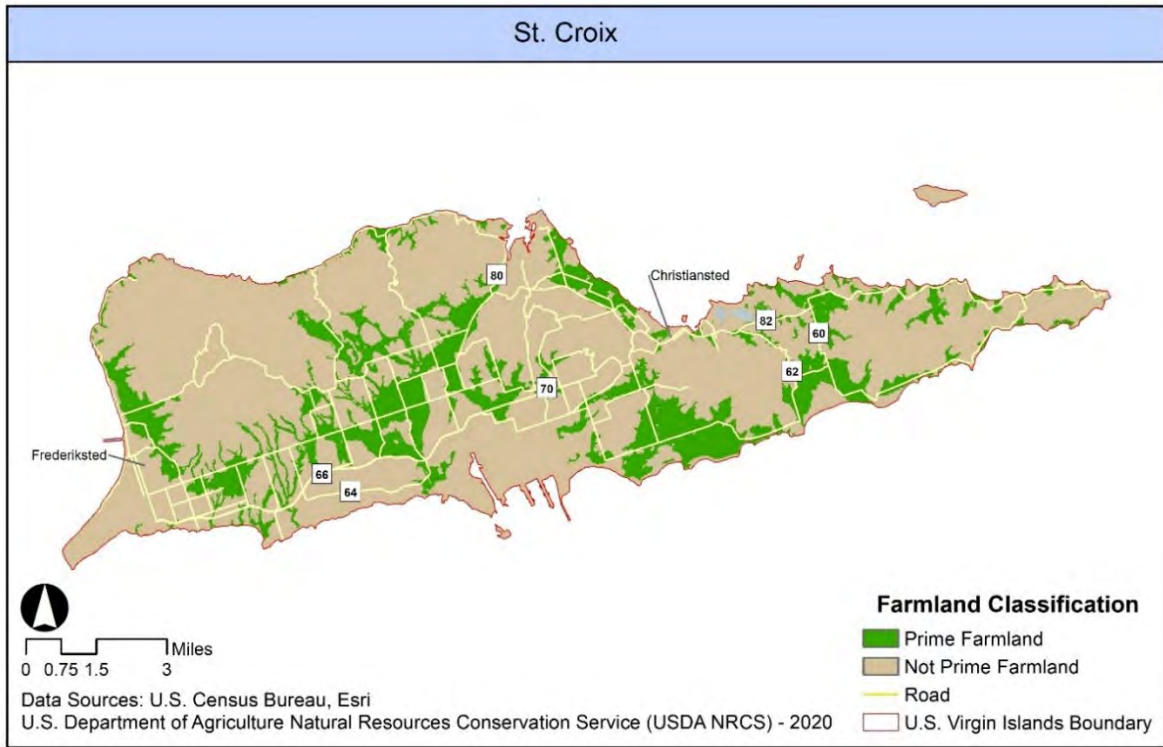


Figure 21. Farmland Classification Map for St. Thomas

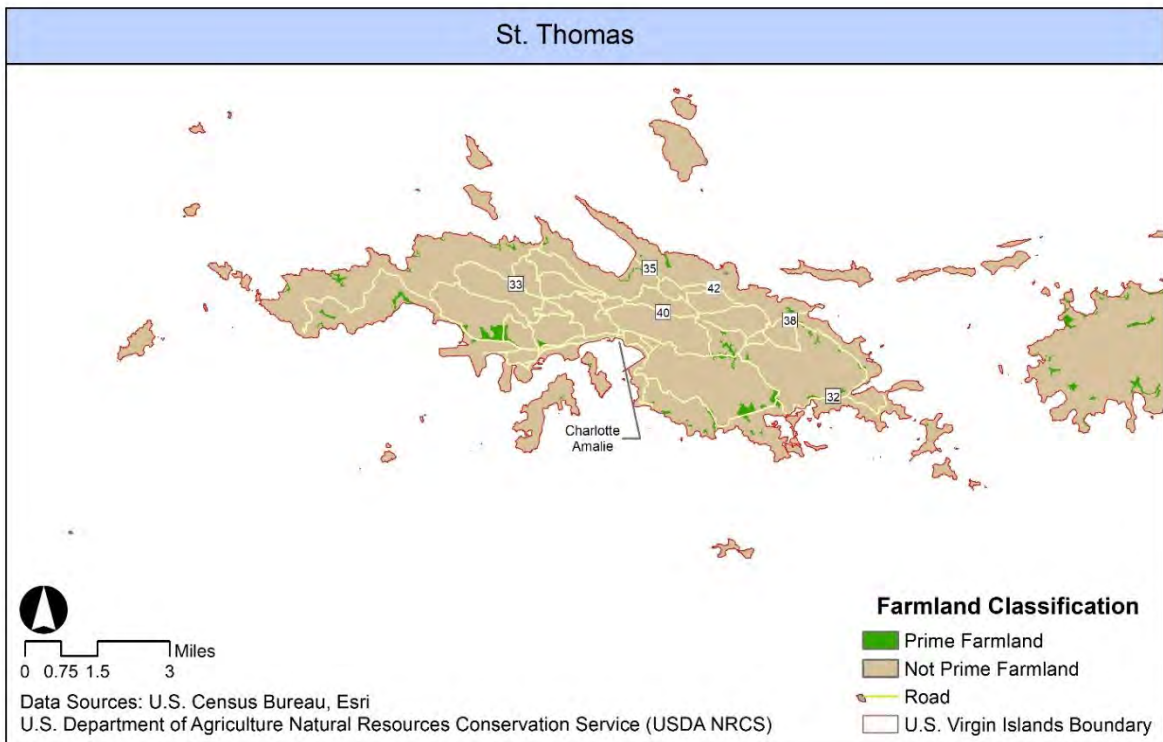
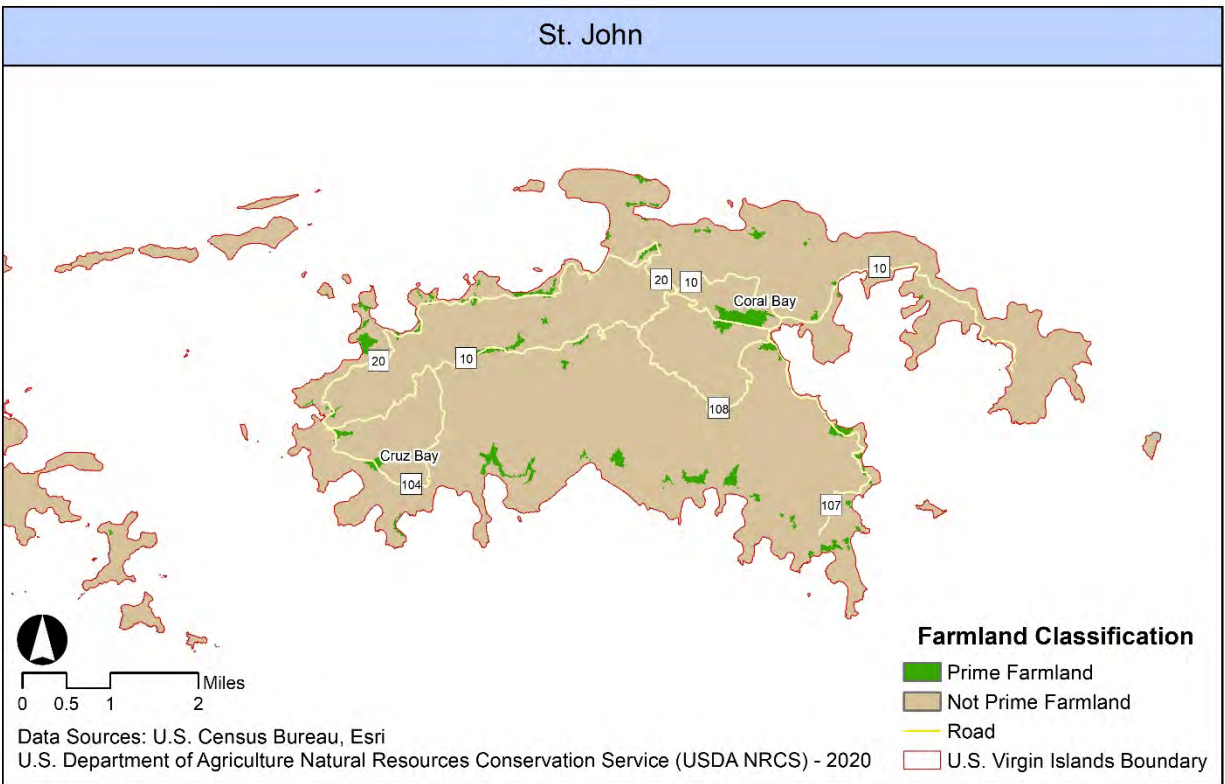


Figure 22. Farmland Classification Map for St. John



Lifelines as defined for this plan will continue to be operational during a drought, but for LMI individuals the cost of purchasing water to fill cisterns and support agriculture has an impact that would benefit from additional study. For the many residents who are not also connected to WAPA water, purchasing water in periods of drought is part of providing food, water, and shelter. Given the economic stress that the COVID-19 pandemic has already caused within the Territory, having a reliable and inexpensive water source is a key priority that impacts day-to-day life and potentially even health as well, given the necessity of good water to healthy individuals.

Table 8. Consequence Classification for Lifelines Impacted by Droughts

Lifeline	Consequence Classification St. Croix	Consequence Classification St. John	Consequence Classification St. Thomas
Communications	Low Impact	Low Impact	Low Impact
Energy	Low Impact	Low Impact	Low Impact
Food, Water, Shelter	Moderate Impact	Moderate Impact	Moderate Impact
Hazardous Material	Low Impact	Low Impact	Low Impact
Health and Medical	Low Impact	Low Impact	Low Impact
Safety and Security	Low Impact	Low Impact	Low Impact
Transportation	Low Impact	Low Impact	Low Impact

Based on the data examined in this Mitigation Needs Assessment and in consideration of the low to moderate consequence risk ranks of lifelines, the drought hazard is considered a moderate risk. This is predominantly due to the reliance on rainwater collection in cisterns by the majority of residents and impacts to water services following the 2017 hurricanes, but careful analysis of future data will be important too as many LMI individuals work to ensure continued access to food, water, and shelter in

the territory, especially if global environmental trends indeed lead to less rain and more drought in the Territory.

1.9.2 Earthquakes

Earthquakes are caused by the sudden release of stored energy from shifting blocks of earth. Several Caribbean Islands have a significant vulnerability to earthquake hazards. These Islands are located on the northeastern edge of the Caribbean Plate, which is considered a seismically active region with an active plate boundary. The North American tectonic plate and the Caribbean tectonic plate are converging, resulting in the potential for significant and frequent ground movements and associated impacts. The seismic region in the vicinity of Puerto Rico and the US Virgin Islands is complex and poorly understood (US Geological Survey, 2020).

Despite these vulnerabilities, the US Virgin Islands has not experienced major earthquakes in recent history, and none have produced a federal disaster declaration. However, the US Virgin Islands have been significantly impacted by earthquakes in the longer-term. This includes more than 200 events experienced since 1530, and 170 individual events between the first recorded incident on the islands in 1777 and 1977. The most significant earthquake on record occurred on St. Thomas and St. Croix in 1867, which had an intensity of VIII on the Modified Mercalli Intensity (MMI) scale, with VIII constituting severe.

As described in the 2019 Hazard Mitigation Plan, earthquake risk is varied throughout the Territory's islands and data from this plan provides the basis for the exposure and vulnerability analysis. Future THMP updates will benefit from including Hazus-MH v5.0, which recently has included modelling and datasets for the USVI and can provide an updated impact assessment. Additionally, to illustrate the earthquake risk, for this plan a series of Shake Maps for the Territory are provided below. Figure 23 to Figure 25 indicate the intensities of an M.7 scenario earthquake event in the USVI based on the MMI scale of VII and VIII based on a range of I to X were categorized VII and VIII are defined as follows:

- VII - Very Strong is defined to be an event whereby damage is negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; and considerable in poorly built structures, and
- VIII - Severe is defined as slight damage in specially designed structures; considerable in ordinary substantial buildings with partial collapse; and great in poorly built structures. (US Geological Survey, 2020)

The Modified Mercalli Intensity value assigned to a specific site after an earthquake has a more meaningful measure of severity to the nonscientist than the magnitude because intensity refers to the effects experienced at that place.

The lower numbers of the intensity scale generally deal with the way the earthquake is felt by people. The higher numbers of the scale are based on observed structural damage (US Geological Survey, 2020).



Figure 23. Earthquake Intensity Shake Map for St. Croix

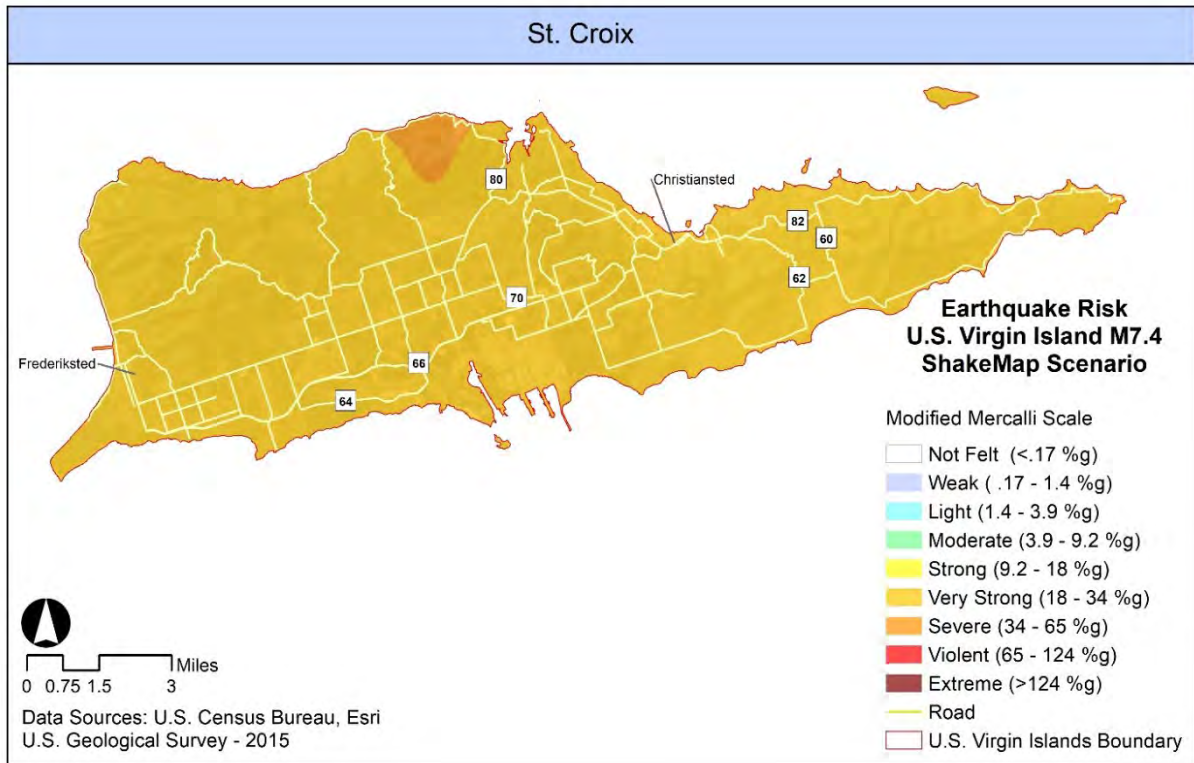


Figure 24. Earthquake Intensity Shake Map for St. Thomas

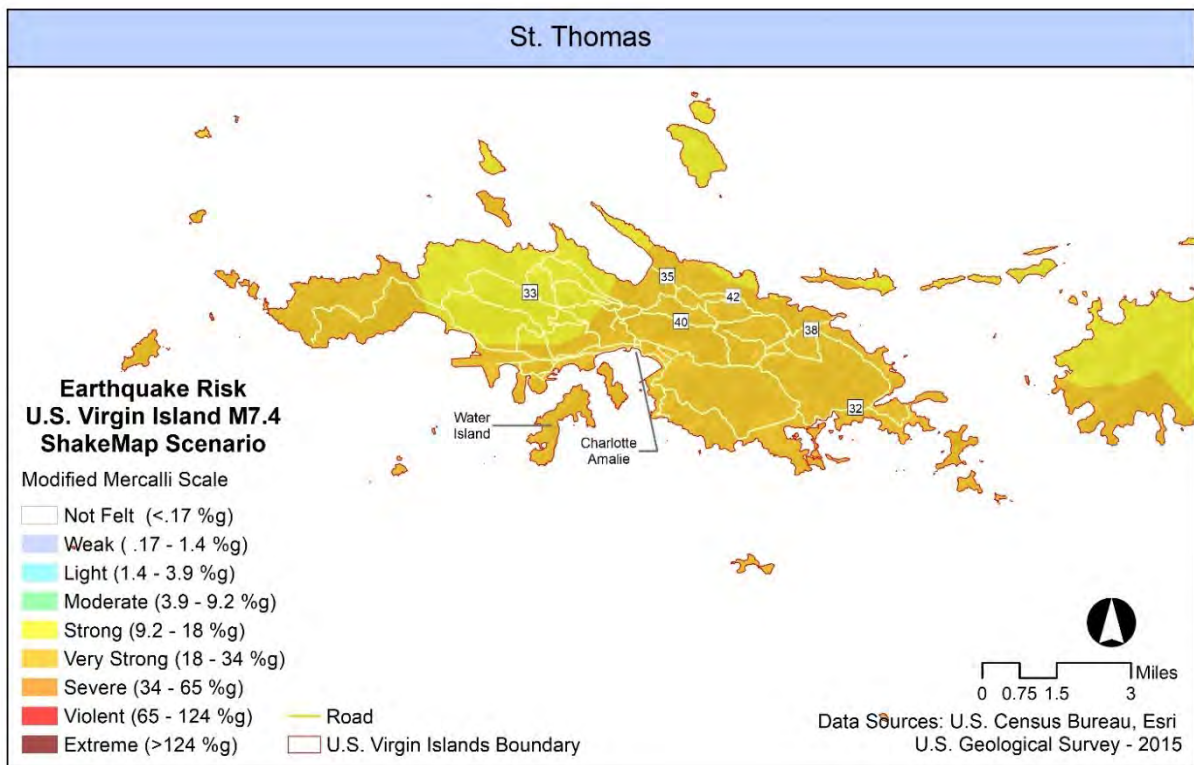
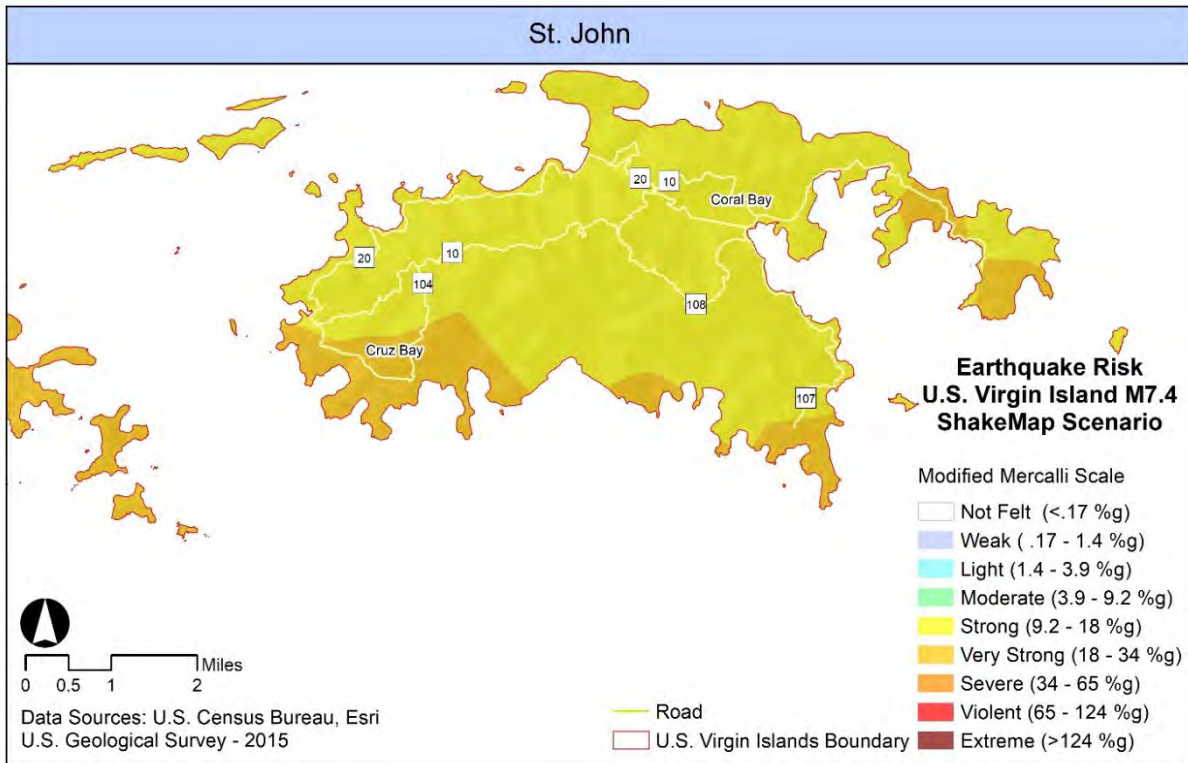


Figure 25. Earthquake Intensity Shake Map for St. John



To indicate assets exposed to this hazard, results from the 2019 THMP are provided, which indicate the results of an analysis of a designed earthquake based on the 1,000-year probabilistic ground shaking map. This indicates that the Territory has a 0.1% annual probability of experiencing losses shown in the 2019 Hazard Mitigation Plan.

An exposure analysis indicates that many structures on St. Croix have a moderate consequence classification for earthquakes, and most structures on St. Thomas have a high exposure to earthquakes. On St. John, most commercial buildings have a high exposure whereas most residential buildings have exposure characterized as Moderate. According to the 2019 Territorial Hazard Mitigation Plan, St. Thomas has a wider distribution of soil types at higher risk for earthquake compared to St. Croix and St. John.

Table 9. Building Exposure to Earthquake

Island	Type	Type	Percent of Total Buildings in Category Exposed	High Exposed Buildings Impact Percentage	Moderate Exposed Buildings Impact Percentage	Low Exposed Buildings Impact Percentage
St. Croix	Commercial	84%	27%	73%	0	0
	Residential	70%	25%	75%	0	0
St. John	Commercial	85%	68%	32%	0	0
	Residential	71%	30%	71%	0	0
St. Thomas	Commercial	96%	100%	0	0	0
	Residential	91%	100%	0	0	0

Source: 2019 Territorial Hazard Mitigation Plan

The results of an analysis of the location of identified lifeline facilities with the earthquake hazard location mapping is provided in Table 10 which shows lifeline exposure to the earthquake hazard. Most lifeline facilities across the islands (including all energy lifelines) have high exposure to earthquakes. St. Thomas, where there is a wider breadth of exposure, has the highest percentage of lifelines with a higher exposure, followed closely by St. John.

Table 10. Lifeline Exposure to Earthquake Hazards

	High	Moderate	Low
St. Croix	28	26	15
Energy	1	0	0
Food, Water, Shelter	14	13	8
Health and Medical	1	3	0
Safety and Security	12	9	2
Transportation	0	1	5
St. John	15	4	4
Energy	1	0	0
Food, Water, Shelter	7	2	0
Health and Medical	3	1	1
Safety and Security	4	1	2
Transportation	0	0	1
St. Thomas	30	7	5
Energy	1	0	0
Food, Water, Shelter	7	1	1
Health and Medical	5	1	0
Safety and Security	15	4	2
Transportation	2	1	2

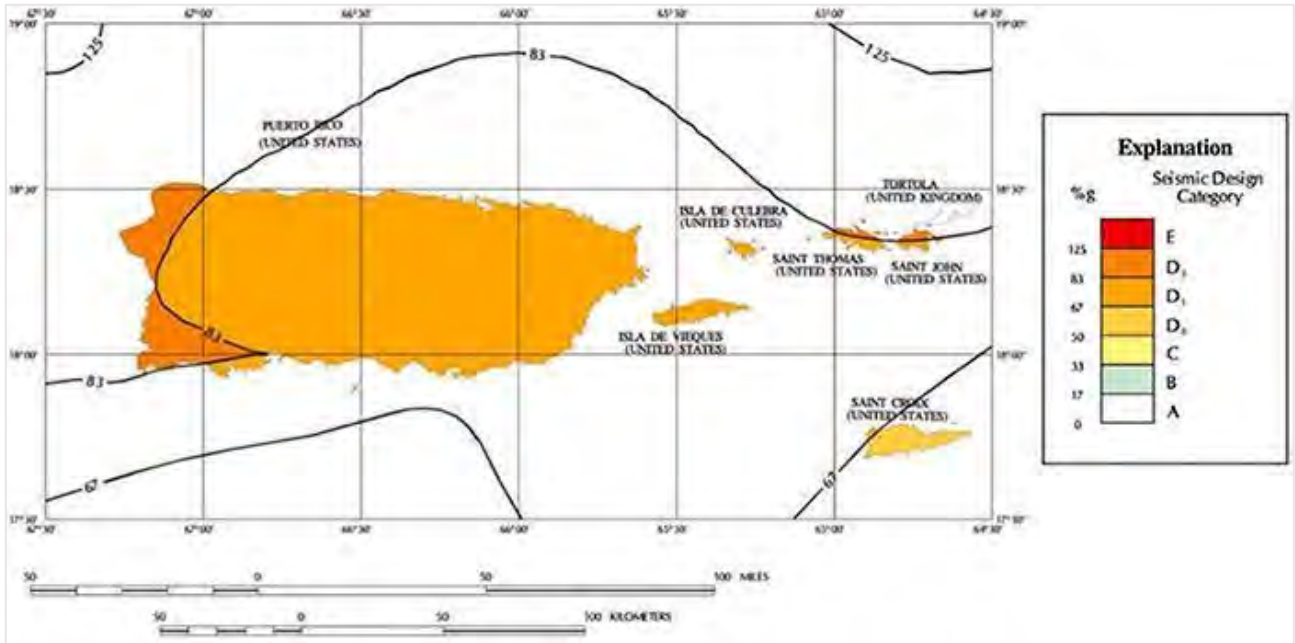
Source: 2019 Territorial Hazard Mitigation Plan

Table 11. Consequence Classification for Lifelines Impacted by Earthquakes

Lifeline	Consequence Classification St. Croix	Consequence Classification St. John	Consequence Classification St. Thomas
Communications	Low Impact	Low Impact	Low Impact
Energy	High Impact	High Impact	High Impact
Food, Water, Shelter	High Impact	High Impact	High Impact
Hazardous Material	High Impact	High Impact	High Impact
Health and Medical	High Impact	High Impact	High Impact
Safety and Security	High Impact	High Impact	High Impact
Transportation	Low Impact	Low Impact	Low Impact

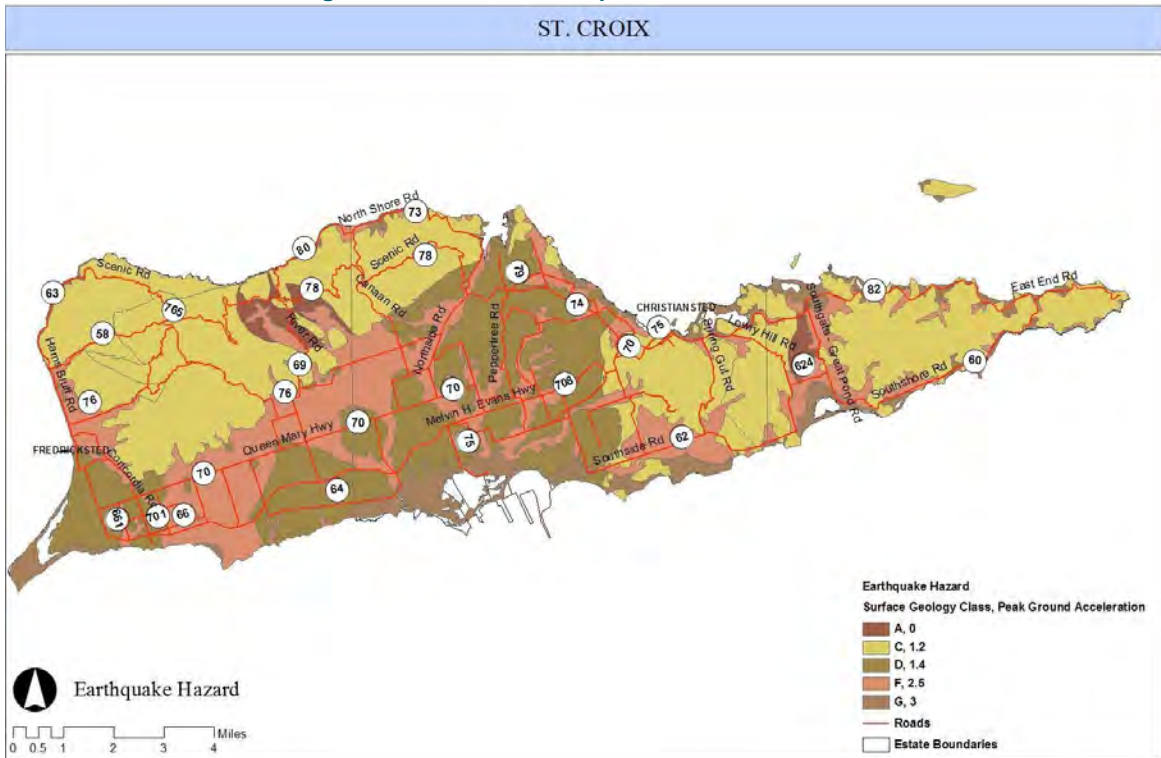
Figure 26 displays earthquake exposure indicating the relative seismic design categories for the Islands. St. John and St. Thomas, of volcanic origin, have variable earthquake risk that is more pronounced along steep slopes. St. Croix, formed by sedimentary processes, is at particular risk for liquefaction due to alluvial soils in Frederiksted and Christiansted.

Figure 26. Earthquake Exposure



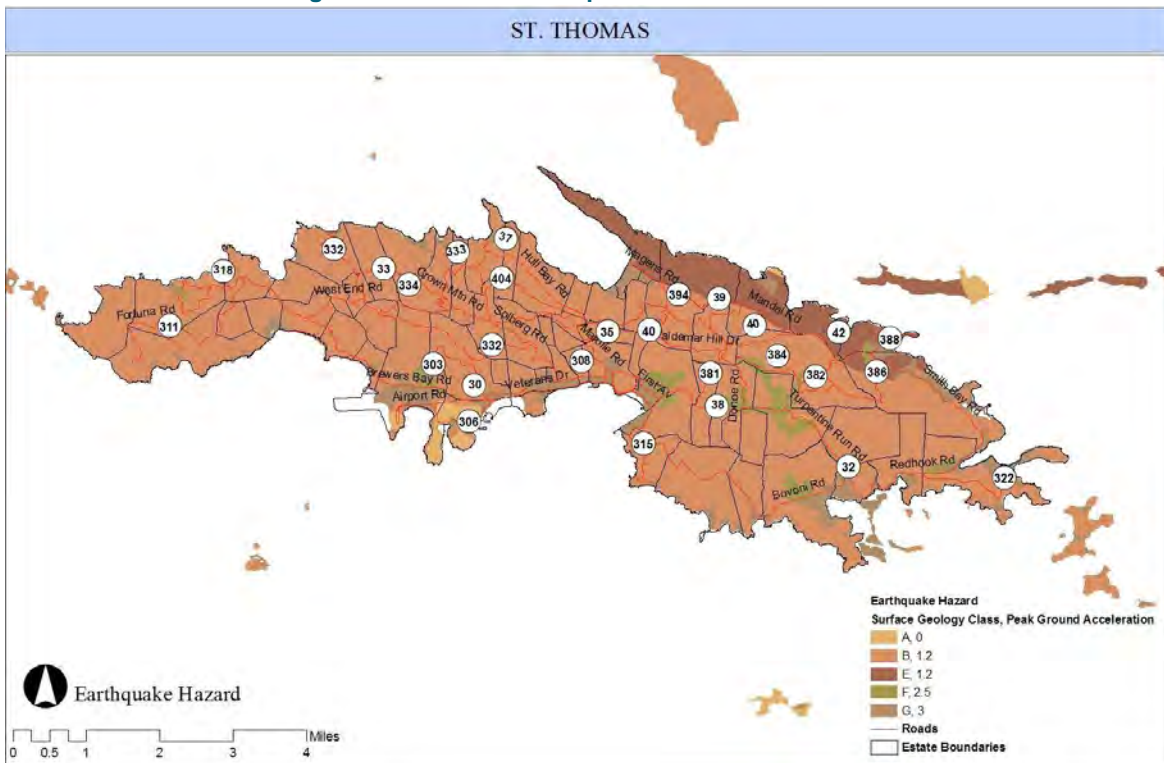
Source: 2019 Territorial Hazard Mitigation Plan

Figure 27. Extent of Earthquake Hazard in St. Croix



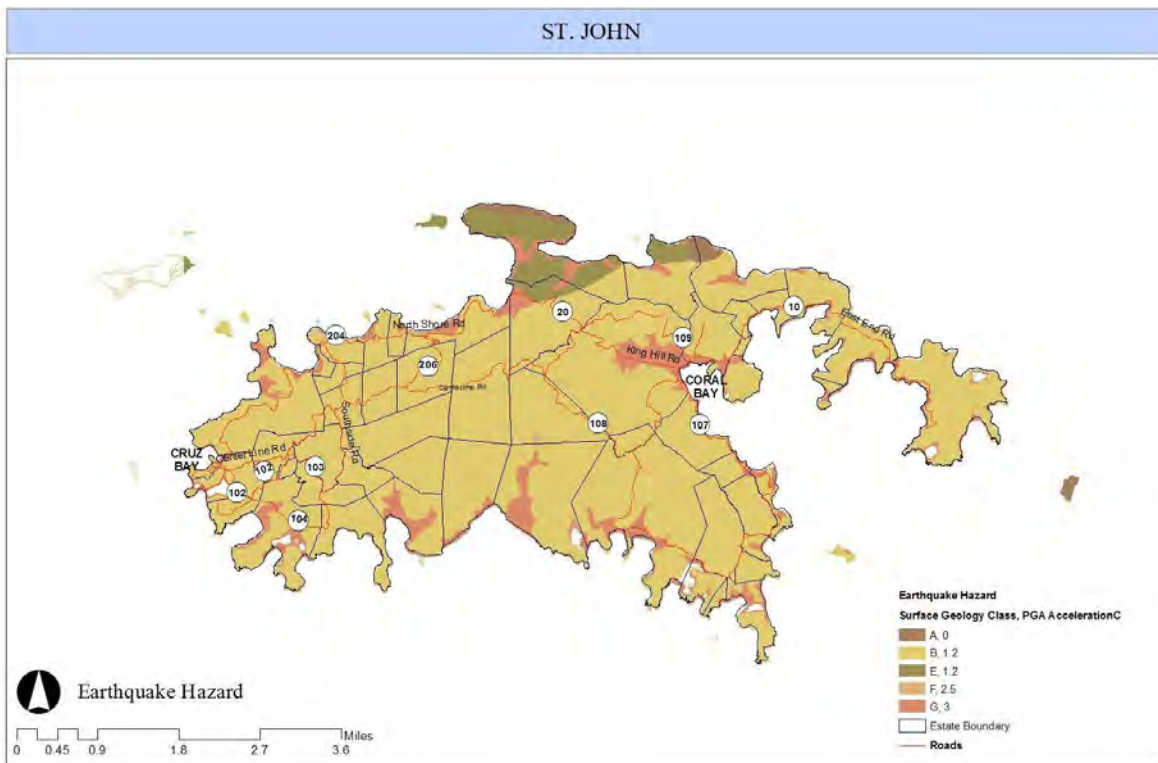
Source: 2019 Territorial Hazard Mitigation Plan

Figure 28. Extent of Earthquake Hazard in St. Thomas



Source: 2019 Territorial Hazard Mitigation Plan

Figure 29. Extent of Earthquake Hazard in St. John



Source: 2019 Territorial Hazard Mitigation Plan

1.9.3 Flooding

The 2019 Territorial Hazard Mitigation Plan (THMP) examined riverine flooding and coastal flooding and erosion as separate hazards. For the purposes of this Mitigation Needs Assessment, riverine flooding and coastal flooding and erosion risks will be examined together. The term Riverine Flooding refers to flooding that occurs from excess precipitation or other factors that cause water to be displaced onto floodplains, as explained further herein.

According to data cited in the 2019 Territorial THMP, no significant change in frequency of hurricanes and associated storm surge due to climate change is anticipated in the future. Coastal flooding is a year-round concern in the Territory, with impacts expected during hurricane season as well as between October and April when swell waves from mid-latitude storms in the North Atlantic can cause storm surge. The 2019 Territorial THMP also explored the coastal erosion hazard, whereby erosive wave forces cause decreases in land area. Erosive forces can be impacted by coastal storm events, beach replenishment and construction, and geological changes. Coastal erosion can be measured by assessing rates of shoreline loss and can be highly variable from year-to-year or from season-to-season. The 2019 Territorial THMP did not independently assess the impact of sea level rise upon the Islands.

As a likely worst-case scenario and to inform this report, potential exposure, and damages to structures due the following conditions were considered.

- Category 5 storm surge event
- 2100 high scenario sea level rise (4 feet), to consider long-term implications,
 - 2050 high scenario sea level rise mapping provided for information
- Advisory Base Flood Elevation (ABFE) base flood elevation (STARRII, 2018)

Again, Riverine Flooding occurs from excess precipitation or other factors that cause water to be displaced onto floodplains. Such flooding can be caused by a combination of human and natural factors, including intense precipitation events or modifications to the passage of water due to encroachments, the installation of impervious surface, or debris blockage, for example. The 2019 THMP reports that tropical weather patterns (including hurricane seasons) create heavy rainfall conditions that cause flooding in the Territory, particularly outside of urban areas. The steep topography in the Virgin Islands and non-porous substrata can exacerbate runoff conditions that cause flooding. Although the Territory lacks rivers, the technical term used riverine flooding that is frequently used in evaluating risk is a fit for the most common form of flooding seen in the USVI, especially during severe rain.

Although the USVI Flood Insurance Study maps flood zones for both inland and coastal areas, the 2019 THMP notes that the principal flooding cause is stormwater run-off. The runoff flooding can exceed delineated flood zones on flood insurance rate maps or may not be mapped at all. According to the FEMA Mitigation Assessment Team Report issued in the wake of Hurricanes Irma and Maria, flood damage from the Hurricanes was predominantly caused by localized ponding and runoff. Over the years, encroachments into historic flood zone have displaced flood water to unanticipated locations. Increased development, undersized culverts, impervious surface installation following development, combined sewer systems for stormwater and wastewater, insufficient preventative maintenance of sewer infrastructure, improper engineering design for drainage of constructed surfaces, inadequate use of green infrastructure, and functionally obsolete stormwater management infrastructure contribute to the pervasiveness of runoff and riverine flooding in the Territory.



Exposure to riverine flooding varies throughout the Virgin Islands. St. John generally experiences less pervasive flooding owing in part to the comparative lack of development, when compared to the other major islands. Flooding does occur in Cruz Bay and Coral Bay near the bottom of steeper hills, for example. St. Thomas is more heavily developed with documented, more serious flooding in certain areas, sometimes due to ineffective draining that causes localized flood damage to nearby structures. This phenomenon has been documented in Charlotte Amalie on St Thomas, for example, resulting in shallow flooding to its business district. St. Croix is somewhat less susceptible to sudden riverine flooding although certain developments experience shallow flooding due to the inadequacy of existing drainage infrastructure, but flood risk impacts the residents on all three major islands in the Territory.

Coastal Flooding, Storm Surge, and Erosion

Coastal flooding is a significant aspect of hurricanes and tropical storms. Coastal flooding during a storm event is characterized by storm surge, whereby displaced water from winds and barometric pressure “piles up” and increases in height as it approaches land. This causes local water levels to rise, resulting in overland inundation that can be exacerbated by wind conditions that cause waves, sea level rise, or by astronomical tidal patterns (National Oceanic and Atmospheric Administration, 2013). The storm surge data shows potential storm surge vulnerability for all areas and incorporates varying landfall locations, local bathymetry and topography, varying storm sizes, forward speeds, tracks, approach angles, and tide levels. This is accomplished by performing thousands of different SLOSH simulations for a given area and then compositing the results into a worst-case snapshot, by Saffir-Simpson Category, indicating storm surge vulnerability.⁴ In the 2019 Territorial THMP, the SLOSH (Sea, Lake, and Overland Surges from Hurricane) model was used to determine the extent of coastal flooding in the US Virgin Islands from a variety of storm scenarios. These scenarios are classified by the SLOSH categories, which is reproduced in the table below.

Table 12. SLOSH Categories for Storm Surge

Category	Storm Surge (feet above sea level)
1	4-5 feet
2	6-8 feet
3	9-12 feet
4	13-18 feet
5	> 18 feet

Source: Blake, et al.

Hurricanes Irma and Maria caused small or moderate recorded storm surges (up to three feet) despite the intensity of the storms. This may be attributed to the bathymetry of the waters surrounding the Virgin Islands as not conducive to the generation of significant storm surges. Puerto Rico and the Virgin Islands are surrounded by a narrow and steep shelf that diminishes storm surge effects (USVI Office of Disaster Recovery, 2019). Though coastal flooding from these storms caused minor structural damage, wave action and surge destroyed beaches due to erosion by powerful waves and surges. The Territorial THMP associates erosion with hurricane systems but did not include an independent assessment of the erosion risk.

⁴ To help reduce public confusion about the impacts associated with the SLOSH and various hurricane categories as well as to provide a more scientifically defensible scale, the storm surge ranges have been removed from the Saffir-Simpson *Wind* Scale and only peak winds are employed in that scale (National Oceanic and Atmospheric Administration, 2013).

Sea Level Rise

Sea level rise is the increase in relative sea level and was discussed as an ancillary to the coastal flooding and erosion hazard in the 2019 Territorial THMP. Long-term sea level rise has been observed in the US Virgin Islands at an annualized average rate of 0.08 inches per year. According to the 2018 National Climate Assessment, these rates have been slowly accelerating since the early 2000s, with the rate tripling in 2010-2011. Future sea level rise will be dependent on the discharge of greenhouse gas emissions that contribute to sea ice melting and thermal expansion. Intermediate-low, intermediate, and extreme emissions scenarios are anticipated to cause 0.8 feet, 1.2 feet, and 2.8 feet (respectively) of relative sea level rise in the US Virgin Islands compared to 2000 levels by 2050. By 2100, the rise is anticipated to be 1.6 feet, 3.6 feet, and 10.2 feet respectively (U.S. Global Change Research Program). For the purposes of this Mitigation Needs Assessment, four feet of sea level rise is modeled which aligns with the 2100 scenario presented in the 2018 USVI Hurricane Recovery and Resilience Task Force Report (USVI Hurricane Recovery and Resilience Task Force, 2018).

According to the 2018 Task Force Report, the continued rise of sea levels around the Territory will cause inundation and coastal erosion on all three primary islands. This might have consequences for tourism at popular places like Magens Bay and Smith Bay on St. Thomas, Sandy Point on St. Croix, or Maho Bay on St. John. The built environment will also suffer consequences, as Charlotte Amalie, Red Hook, Bovoni, Coral Bay, Christiansted, Salt River area, and Limetree Bay area will experience significant flooding.

Sea level rise will increase the impact on flooding. In addition to aggravating nuisance flooding and causing inundation of low-lying areas, the relative sea level rise will increase the impact of storm surges and coastal flooding events, resulting in inundation of areas that historically have not been inundated with flood waters.

Exposure Impacts

The following tables describe impacts to buildings resulting from flood hazards. Approximately 20 percent of the Islands' residents of St. Croix and St. Thomas are in the Special Flood Hazard Area, compared to approximately seven percent of residents of St. John. Only a fraction of Island residents exposed to flooding are also exposed to Storm Surge and Sea Level Rise, indicating that the preponderance of flood hazard and exposure is due to inland/riverine flooding. However, building exposure values in St. Thomas for storm surge and sea level rise are significantly higher than those on St. Croix and St. John, and similarly higher than exposure values for the Special Flood Hazard Area. For more detailed data, please see the attached Appendix and the maps at the end of this section.

The tables below show flood-related exposures for US Virgin Islands lifelines. This Mitigation Needs Assessment used an updated critical facilities and lifelines dataset from the dataset used for the 2019 Territorial THMP.

There is significant flood exposure for the US Virgin Islands' lifelines. The Islands' energy lifelines are particularly exposed owing to vulnerabilities to refinery operations on St. Croix. Transportation lifelines are exposed to flooding owing to their waterfront locations. On St. Croix, Health and Medical lifelines such as the VA Clinic and Nesbitt Clinic are also exposed, alongside various Safety and Security lifelines such as police substations and educational facilities. The Ann E. Abramson Marine Facility is also exposed, in addition to the Anguilla Wastewater Treatment Facility. On St. John, various marine facilities, the deCastro Clinic, and VIERS Eco Education facility are in the Special Flood Hazard Area. On St. Thomas, marina facilities, the Airport, WAPA Power Plant, and various schools and police



stations are also within the Special Flood Hazard Area. Excepting the seaports, in most cases the impacted lifelines are in riverine or inland flood zones.

Table 13. Lifeline Exposure due to the Flood Hazard

	Communi- cations	Energy	Food, Water, Shelter	Hazardou- s Material	Health and Medical	Safety and Security	Transpor- tation	Total
St. Croix	1	193	5	0	2	31	20	252
St. John	0	0	0	0	1	1	5	7
St. Thomas	0	5	0	2	1	83	37	128

Source: HAZUS

Table 14. Consequence Classification for Lifelines Impacted by Flooding (Designated Special Flood Hazard Area)

Lifeline	Consequence Classification St. Croix	Consequence Classification St. John	Consequence Classification St. Thomas
Communications	High Impact	Low Impact	Low Impact
Energy	High Impact	Low Impact	High Impact
Food, Water, Shelter	High Impact	Low Impact	Low Impact
Hazardous Material	Low Impact	Low Impact	High Impact
Health and Medical	High Impact	High Impact	High Impact
Safety and Security	High Impact	High Impact	High Impact
Transportation	High Impact	High Impact	High Impact

Looking ahead projected sea level rise inundation, sea level rise flooding will eventually impact a subset of lifelines in the Special Flood Hazard Area or regulatory floodplain in the territory. Impact to beaches is not documented as they are not included as lifeline facilities, although economically these locations are significant assets that attract tourists who contribute significantly to local economy. Many lifelines subject to coastal flooding will be exposed to sea level rise (such as waterfront Transportation lifelines) in the future. On St. Croix, impacted lifelines include the Army National Guard compound in Bethlehem, the Good Hope School, and the US Customs facility. On St. John, the deCastro Clinic and marine facilities will be inundated. On St. Thomas, Addelita Cancryn Junior High, the Moravian School, and the US Coast Guard facility will be inundated (in addition to various waterfront Transportation lifelines).

Table 15. Four-Foot Sea Level Rise Exposure by Lifeline

Census County Subdivision	Communi- cations	Energy	Food, Water, Shelter	Hazardou- s Material	Health and Medical	Safety and Security	Transpo- rtation	Total
St. Croix	0	0	2	0	0	2	3	7
St. John	0	0	0	0	1	0	5	6
St. Thomas	1	0	0	0	0	6	18	25

Table 16. Consequence Classification for Lifelines Impacted by Four Feet of Sea Level Rise

Lifeline	Consequence Classification St. Croix	Consequence Classification St. John	Consequence Classification St. Thomas
Communications	Low Impact	Low Impact	High Impact
Energy	Low Impact	Low Impact	Low Impact
Food, Water, Shelter	High Impact	Low Impact	Low Impact
Hazardous Material	Low Impact	Low Impact	Low Impact
Health and Medical	Low Impact	High Impact	Low Impact
Safety and Security	High Impact	Low Impact	High Impact
Transportation	High Impact	High Impact	High Impact

An exposure analysis shows that storm surge impacts from a SLOSH scenario would likely impact waterfront Transportation lifelines, especially as sea levels rise, given prior flood data and its current elevation. In addition to impacting critical facilities impacted by future sea level rise, on St. Croix five terminals at the Limetree Bay Refinery on St. Croix, the WAPA power facility, and the St. Patrick Catholic School would be impacted. On St. Thomas, two additional schools, the Police Headquarters, and liquefied petroleum gas facilities are expected to be inundated under this scenario.

Table 17. SLOSH Category 5 Flood Exposure by Lifeline

Census County Subdivision	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total
St. Croix	0	6	0	0	0	12	6	24
St. John	0	0	0	0	1	0	4	5
St. Thomas	0	0	0	2	0	15	26	43

Source: HAZUS

Table 18. Consequence Classification for Lifelines Impacted by Storm Surge from a Category 5 Storm

Lifeline	Consequence Classification St. Croix	Consequence Classification St. John	Consequence Classification St. Thomas
Communications	Low Impact	Low Impact	Low Impact
Energy	High Impact	Low Impact	Low Impact
Food, Water, Shelter	Low Impact	Low Impact	Low Impact
Hazardous Material	Low Impact	Low Impact	High Impact
Health and Medical	Low Impact	High Impact	Low Impact
Safety and Security	High Impact	Low Impact	High Impact
Transportation	High Impact	High Impact	High Impact

Flooding Extent

Figure 30. **St. Croix Flood Hazard Zones** through Figure 32 demonstrate the extent of the Special Flood Hazard Area in the US Virgin Islands. Due to the Islands' topography, coastal flood zones are relatively limited in geographic extent. However, large sections of the inland area are designated Zone A, which means that these locations have only a one percent annual chance of flooding over a 100-year period (USVI Office of Disaster Recovery, 2019). However, due to limited data, flood depths and base flood elevations are not presently available.

Special Flood Hazard Areas

St. Croix exhibits large Special Flood Hazard Areas or regulatory floodplains that stretch deep inland along expected drainageways. Impacts are anticipated near Frederiksted and throughout portions of



the Island's interior. On St. Thomas, coastal flood areas have been delineated along the Island's ocean shoreline and surrounding the Cas Cay Mangrove Lagoon Marine Reserve. Inland flood zones are less pronounced than on St. Croix but include large sections of inland area along Nadir Gut. On St. John, limited inland flood zones have been delineated northwest of Coral Harbor near King Hill Road and extend north from the ocean along the Island's southern shore.

Figure 30. St. Croix Flood Hazard Zones

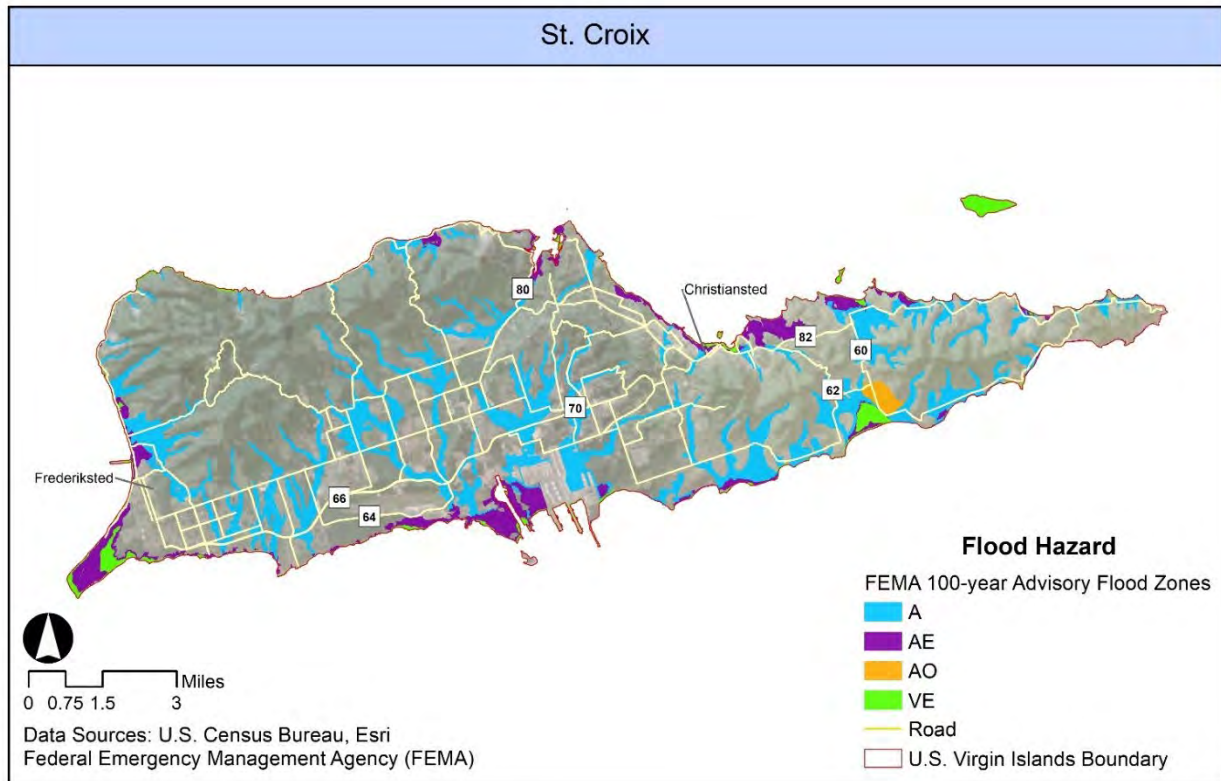


Figure 31. St. Thomas Flood Hazard Zones

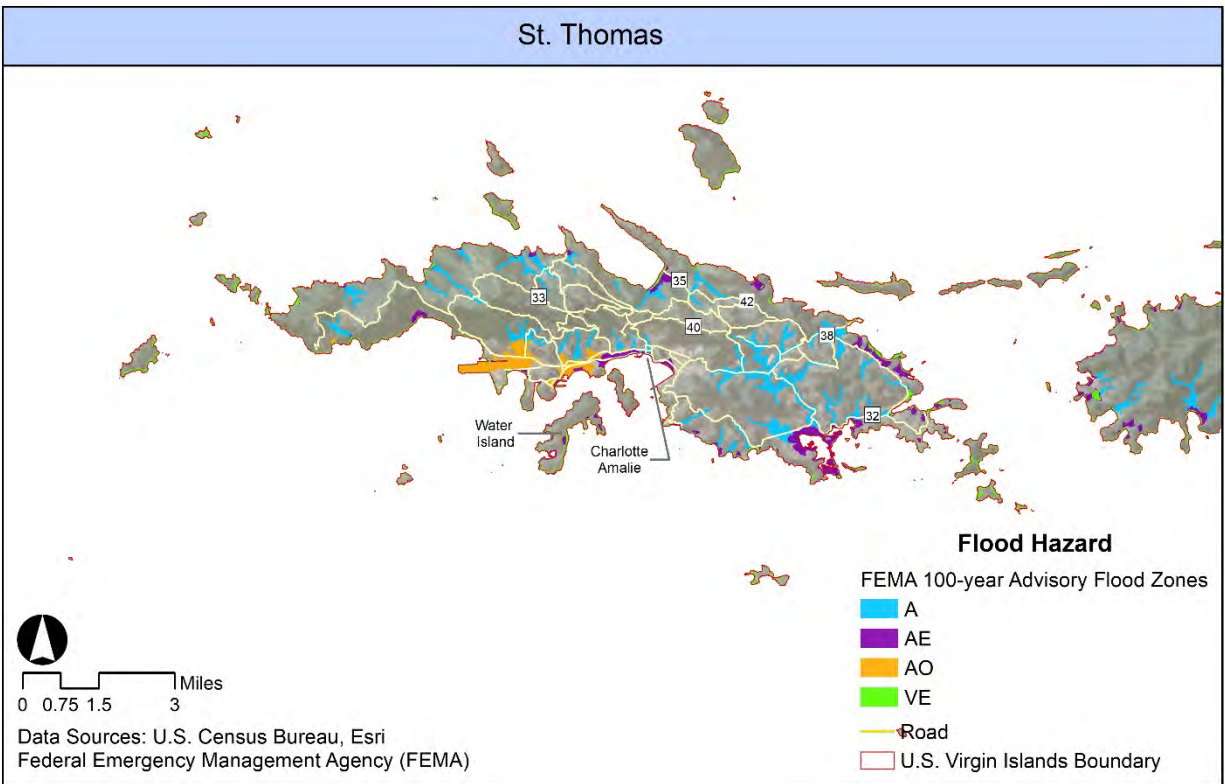
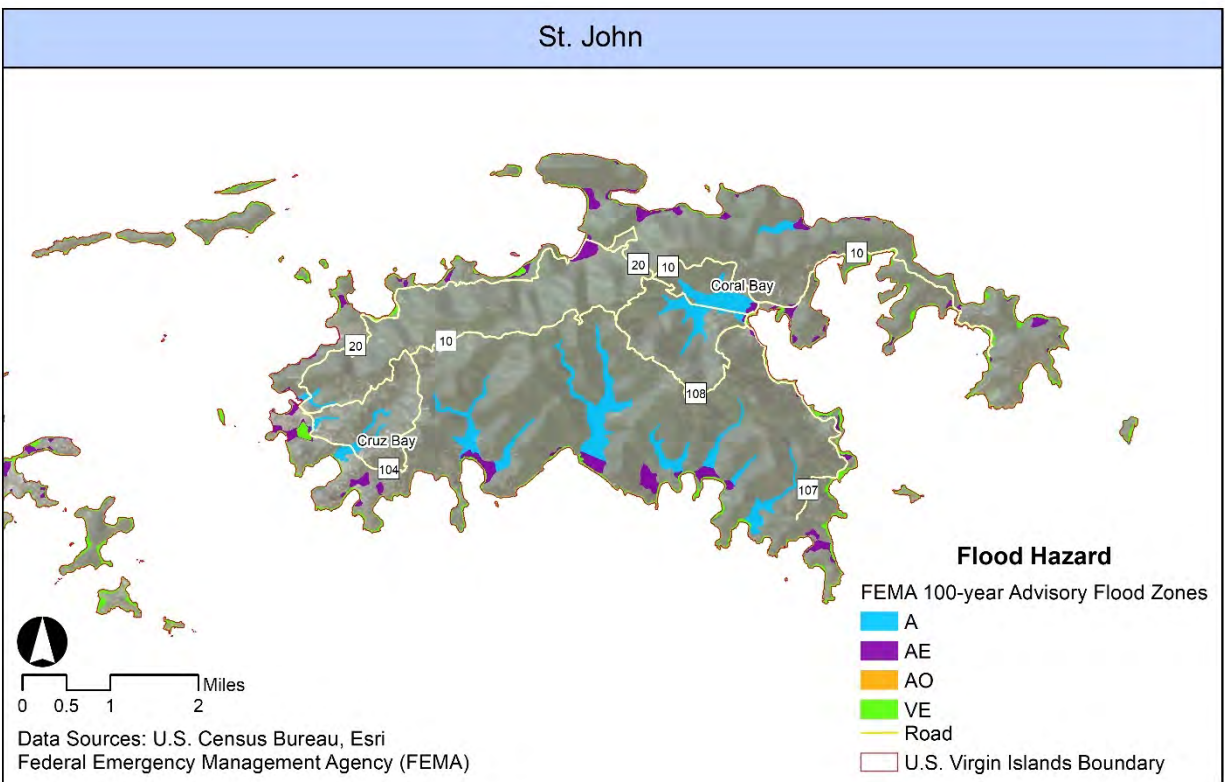


Figure 32. St. John Flood Hazard Zones



Storm Surge

The following maps show storm surge hazards impacting the three islands. On St. Croix, Sandy Point, portions of Christiansted, and portions of the St. Croix Renaissance Park are particularly vulnerable to storm surge. On St. Thomas, the inner harbor area of Charlotte Amalie is perhaps the most vulnerable owing to the density of development and potential depth of storm surge. The Veterans Drive Improvement Project is seeking to ameliorate storm surge hazards by enhancing the seawall along Veterans Drive to provide a higher level of protection. Storm surge flooding is also anticipated in Smith Bay, particularly near waterfront resorts along Water Bay. St. John has relatively limited storm surge exposure due to its topography, though localized impacts can be anticipated near Cruz Bay and along the Island's northern shore.

Storm surge impacts in St. John are more limited owing to topography and settlement patterns. Exposure is more pronounced near Cruz Bay where there is a greater concentration of waterfront development.

Figure 33. St. Croix Storm Surge Hazard

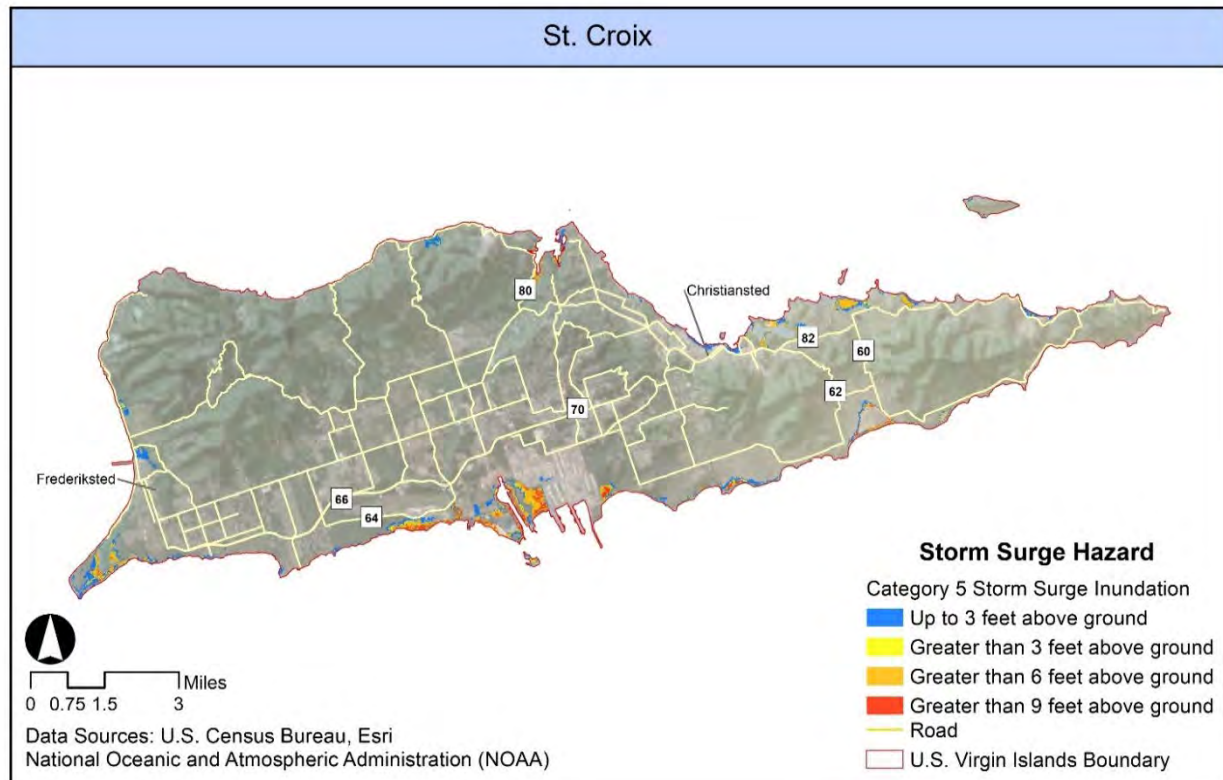
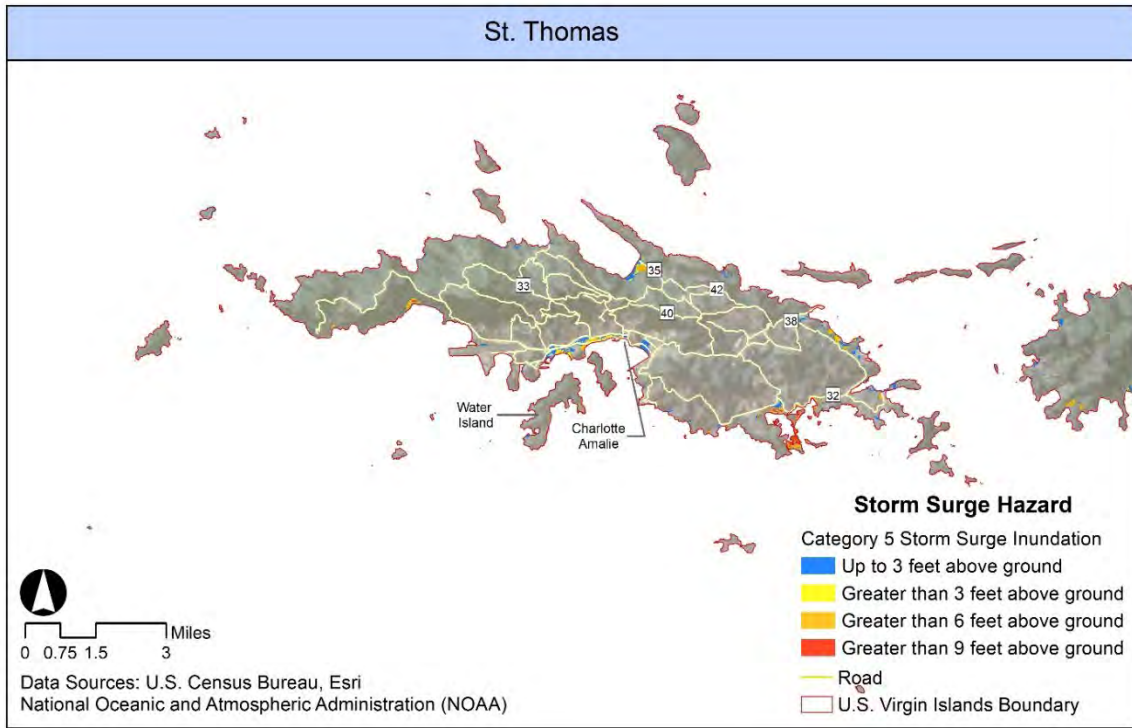
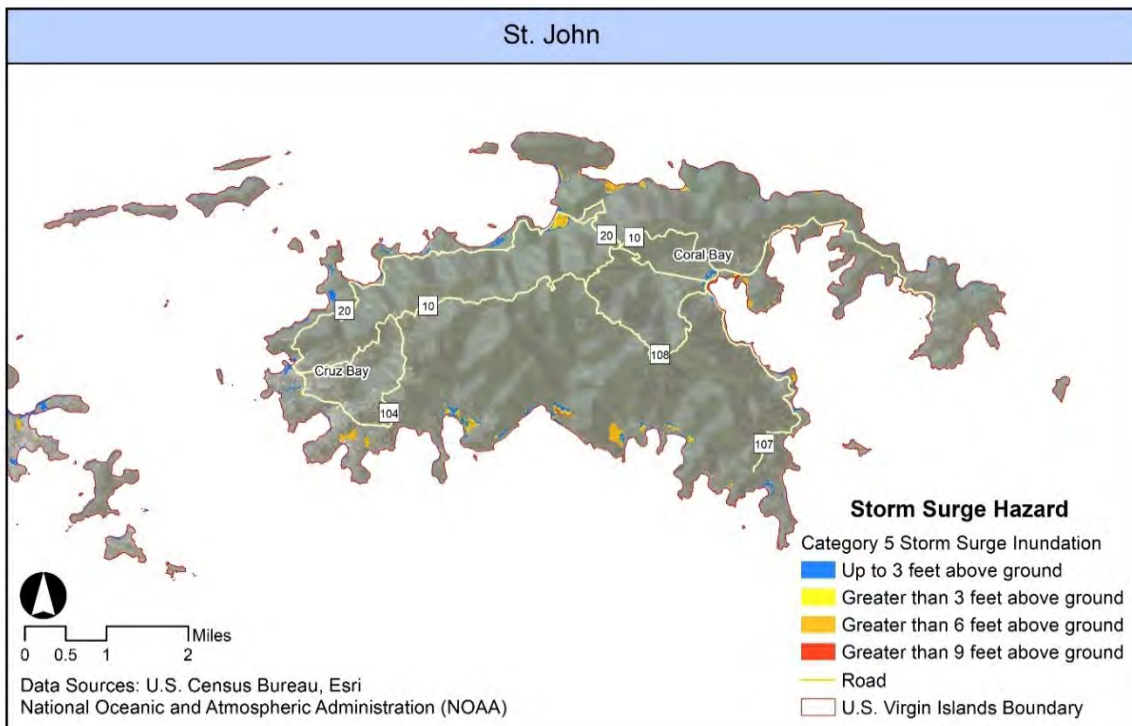


Figure 34. St Thomas Storm Surge Hazard



Storm surge impacts in St. John are more limited owing to topography and settlement patterns. Exposure is more pronounced near Cruz Bay where there is a greater concentration of waterfront development.

Figure 35. St John Storm Surge Hazard



Sea Level Rise

A four-foot sea level rise (anticipated by 2100, resulting from an intermediate emissions scenario) would have relatively limited impacts upon St. Croix, St. John, and St. Thomas due to the islands' topography. However, in combination with storm surge and coastal flooding conditions, sea level rise inundation will have a much broader and stronger exposure to areas that previously experienced coastal flooding and storm surge impacts. Under this scenario, on St. Croix, Sandy Point will likely be separated from the rest of the island and persistent shallow flooding may occur in the vicinity of the refinery and St. Croix Renaissance Park under current projections. The mangrove cays off St. Thomas will also be inundated, as will areas inland from Magen's Bay Beach, and waterfront areas of Charlotte Amalie. St. John will experience inundation along Coral Bay and along low-lying waterfront areas.

Figure 36. St Croix Sea Level Rise Hazard

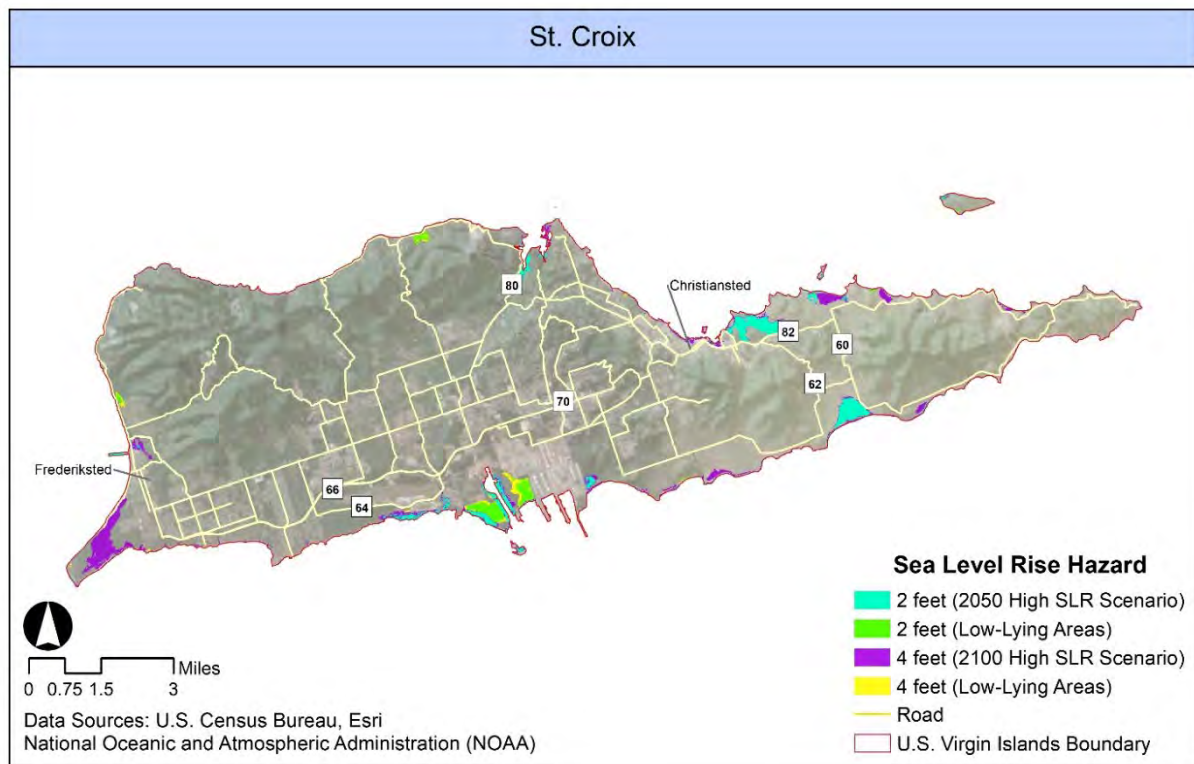


Figure 37. St Thomas Sea Level Rise Hazard

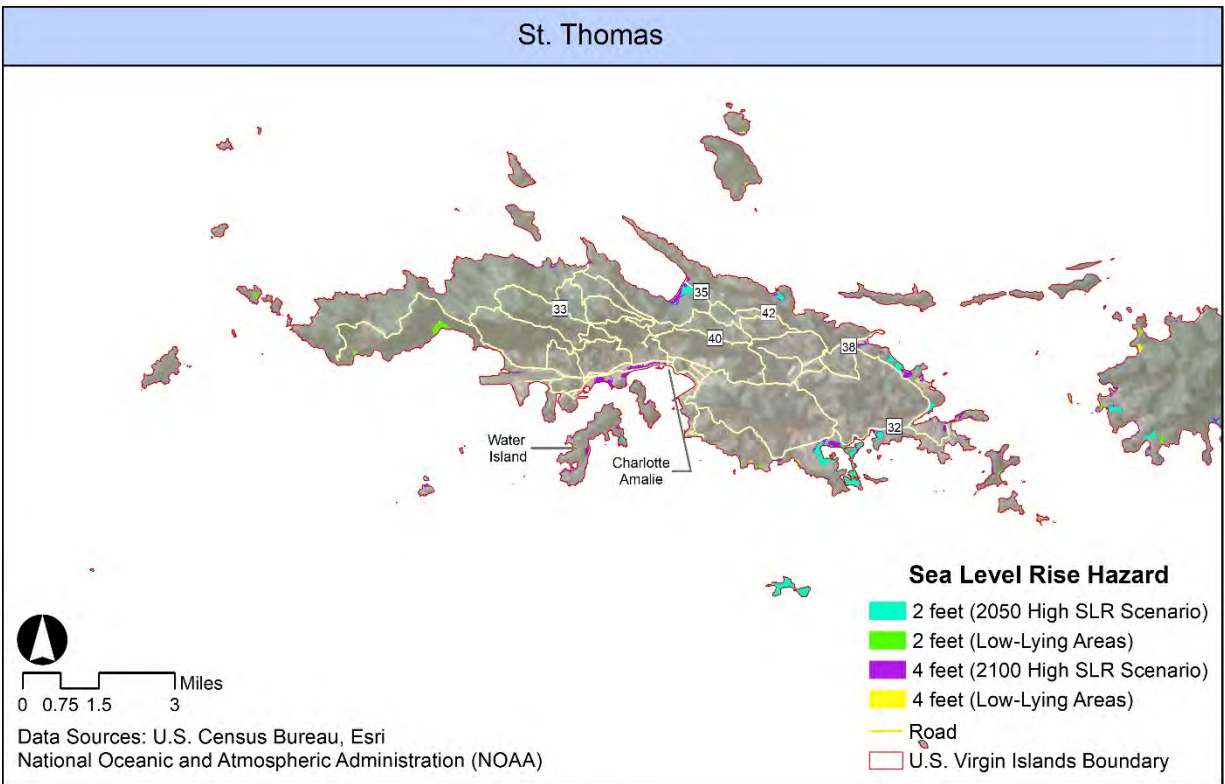
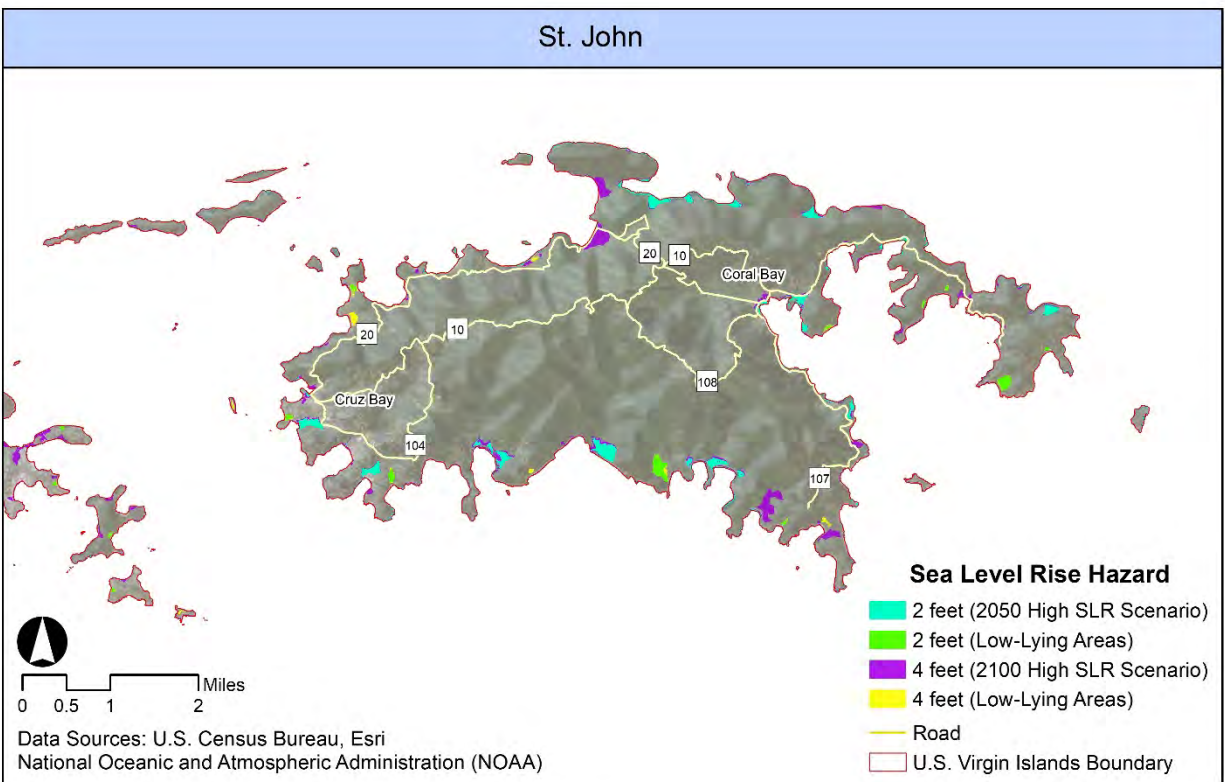


Figure 38. St John Sea Level Rise Hazard



1.9.4 Hurricane Winds

Hurricanes are categorized according to the strength and intensity of their winds using the Saffir-Simpson Hurricane Scale, as shown in Table 19. A Category 1 storm has the lowest wind speeds, while a Category 5 hurricane has the highest. Hurricane winds are a damaging aspect of the tropical systems that frequently impact the US Virgin Islands. These winds are measured on the Saffir-Simpson Hurricane Scale and are broken down into the following categories:

Table 19. Saffir-Simpson Hurricane Wind Categories

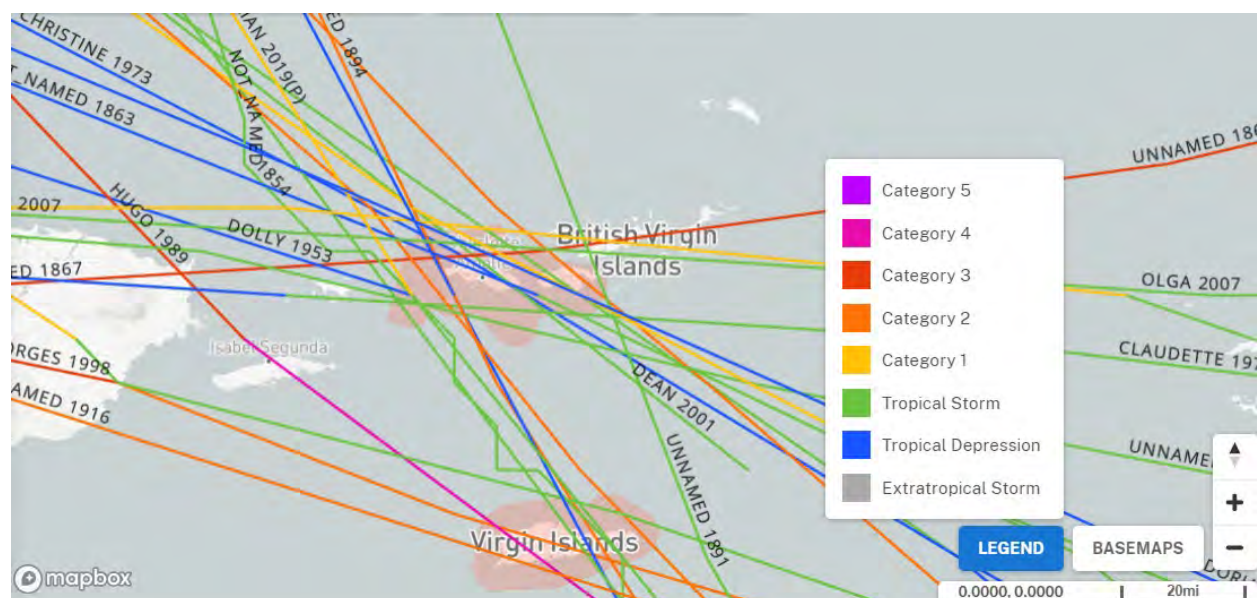
Category	Wind Speed
1	74-95 mph
2	96-110 mph
3	111-129 mph
4	130-156 mph
5	>157 mph

Source: National Hurricane Center

Hurricane winds have historically been a major source of damage in the US Virgin Islands, spawning two disaster declarations in 2017 and accounting for nine of the 22 deadliest, most expensive, and most intense hurricanes to strike outlying US territories and Hawaii in the past century (2019 Hazard Mitigation Plan). Since October 1984, Hurricanes Klaus, Hugo, Marilyn, Lenny, Omar, Earl, Irma, and Maria have had significant impacts to the islands. Given its location and hurricane history, the US Virgin Islands are categorized in Wind Zone 4, where requirements for strength design wind speed are the highest at 145 mph (FEMA 2009, FEMA 2015, USVI 2019).

Since the 1850s, the US Virgin Islands have been impacted by 24 hurricanes or tropical storms that passed through the territory, the most recent of which was Hurricane Dorian in 2019. The following image shows the path and strength of storms impacting the US Virgin Islands.

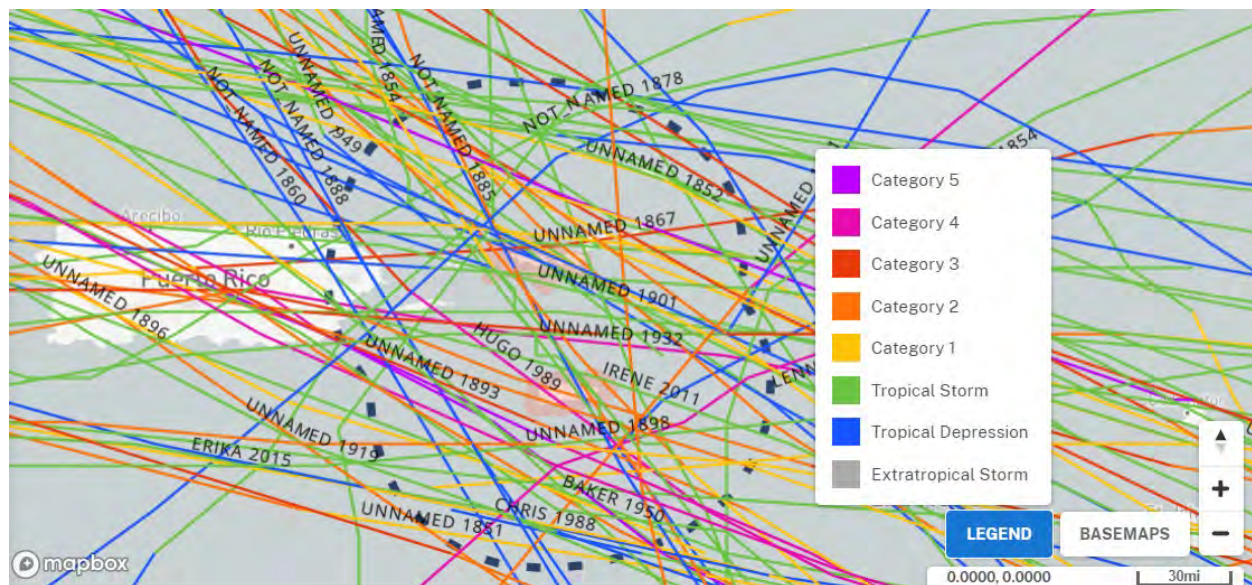
Figure 39. Hurricane Paths Impacting the US Virgin Islands (1850-2019)



Source: National Hurricane Center

In the same time period, 87 storms passed within 50 miles of the US Virgin Islands. The most significant and damaging of these were Hurricanes Maria and Irma, which occurred in 2017. The paths and strengths of these storms are shown in the following image. A 50-mile radius from the US Virgin Islands is outlined in a dashed black line.

Figure 40. Hurricane Paths Passing within 50 Miles of the US Virgin Islands (1850-2019)



Source: National Hurricane Center

For the purposes of this MNA, the 2019 THMP is utilized to provide an analysis of vulnerability related to hurricane wind events. This provides an indication of the magnitude of potential damage developed from the risk analysis in the THMP as aligned with the available data and provided in the tables below. The next THMP will benefit from the even more current available information regarding wind speeds to represent potential risk associated with this hazard in even greater detail.

The 2019 Hazard Mitigation Plan (THMP) cites data from the Atlantic Oceanographic and Meteorological Laboratory that calculates a 42% annual chance of a hurricane or tropical storm striking the US Virgin Islands. The impacts of climate change are expected to marginally increase the frequency and intensity of North Atlantic region (USVI Office of Disaster Recovery, 2019).

The vulnerability assessment of the 2019 THMP indicates that many residential and commercial properties in the Territory are vulnerable to hurricane winds, in part because of how close most buildings are to the coast and the nature of the winds the storms generate (USVI Hurricane Recovery and Resilience Task Force, 2018). On St. John, only one-third of both residential and commercial structures are considered vulnerable, almost all of which are classified as moderate or low consequence. On St. Thomas, the percentage of exposed buildings represents a majority, though also at moderate or low consequence. On St. Croix, just over half of commercial buildings and less than half of residential buildings are exposed, all of which are considered at moderate or low exposure.

Table 20. Building Exposure to Hurricane Winds

Island	Type	Percent of Total Buildings in Category Exposed	Exposed Buildings Impact		
			High	Moderate	Low
St. Croix	Commercial	58%	0%	31%	69%
	Residential	42%	5%	12%	83%
St. John	Commercial	35%	0%	27%	73%
	Residential	35%	5%	9%	86%
St. Thomas	Commercial	70%	0%	99%	1%
	Residential	54%	5%	94%	1%

Source: 2019 Territorial Hazard Mitigation Plan

Lifeline vulnerabilities to hurricane winds are variable across the islands, with lifelines on St. John at considerably less risk than that of St. Croix and St. Thomas. On those islands, lifeline facilities with pre-code structural components represent the most significant vulnerability. These facilities comprise Safety and Security lifelines.

Table 21. Lifeline Exposure to Hurricane Winds

Island/Lifeline	High	Moderate	Low
St. Croix	28	20	33
Energy	0	0	1
Food, Water, Shelter	17	9	21
Health and Medical	1	2	1
Safety and Security	10	8	5
Transportation	0	1	5
St. John	7	2	12
Energy	0	0	1
Food, Water, Shelter	3	2	4
Health and Medical	1	0	2
Safety and Security	3	0	4
Transportation	0	0	1
St. Thomas	18	10	13
Energy	0	0	1
Food, Water, Shelter	4	1	4
Health and Medical	2	2	2
Safety and Security	11	6	3
Transportation	1	1	3

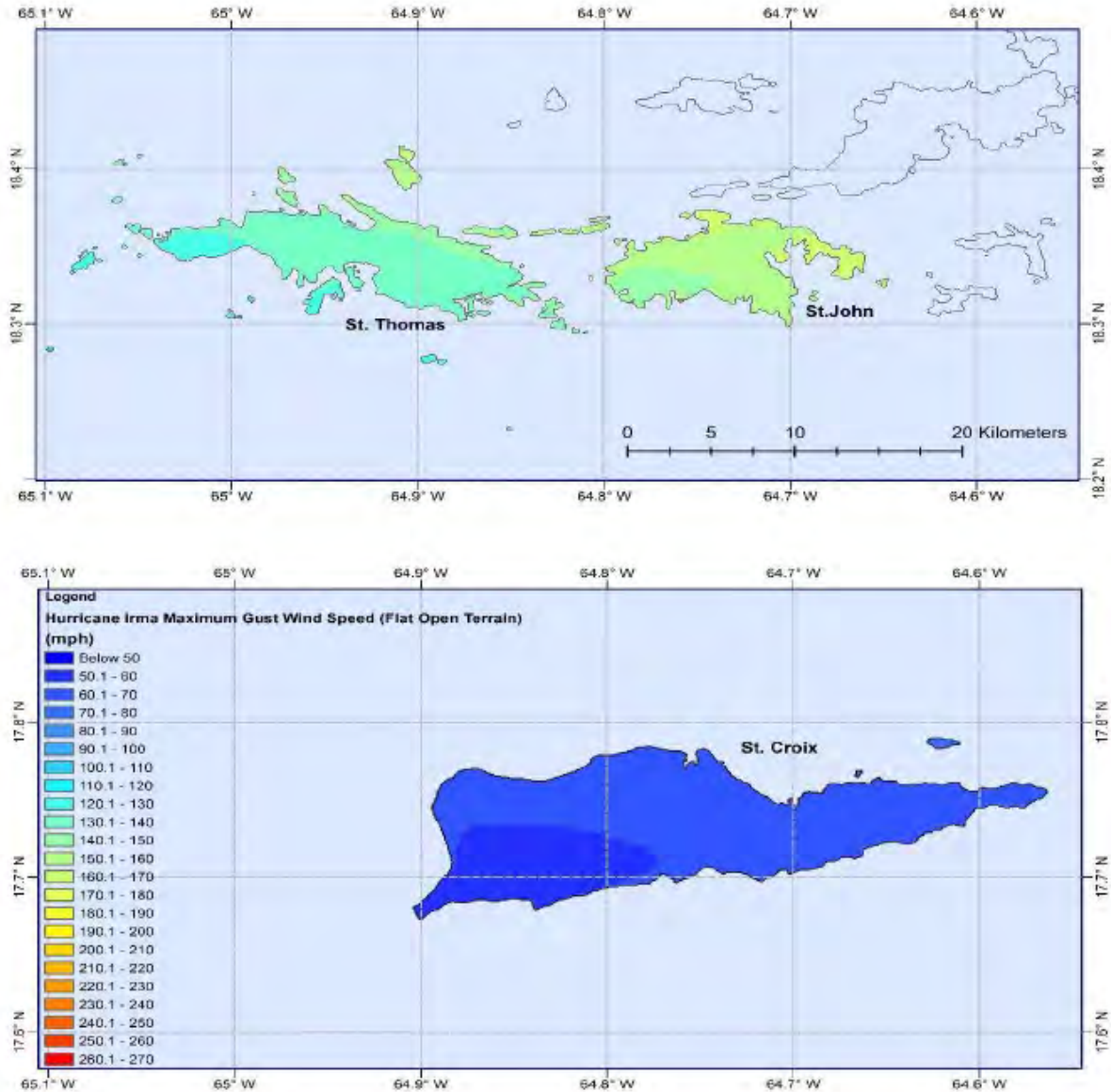
Source: 2019 Territorial Hazard Mitigation Plan

Table 22. Consequence Classification for Lifelines Impacted by Hurricane Winds

Lifeline	Consequence Classification St. Croix	Consequence Classification St. John	Consequence Classification St. Thomas
Communications	Low Impact	Low Impact	Low Impact
Energy	Low Impact	Low Impact	Low Impact
Food, Water, Shelter	High Impact	High Impact	High Impact
Hazardous Material	Low Impact	Low Impact	Low Impact
Health and Medical	High Impact	High Impact	High Impact
Safety and Security	High Impact	High Impact	High Impact
Transportation	Low Impact	Low Impact	High Impact

Figure 41 displays observed wind gusts from Hurricane Irma. The Hazard Mitigation Plan did not utilize HAZUS wind speed modeling, but instead utilized observed wind speeds from the 2017 hurricanes upon terrain models. The results are shown in the following map and tables.

Figure 41. Extent of Hurricane Irma Observed Wind Gusts



Source: 2019 Territorial Hazard Mitigation Plan



1.9.5 Rain-Induced Landslides

Rain-induced landslides are a hazard of concern in the US Virgin Islands. The combination of heavy rainfall, development, and natural factors combine to create a significant vulnerability for threats to life, property, and critical facilities. The 2019 Hazard Mitigation Plan identifies the following conditions for landslides to occur:

- Location on or in proximity to steep hills
- Steep road-cuts or excavations
- Existing or historically occurring landslides
- Steep areas where surface runoff is channeled
- Unmaintained or adversely altered slopes

The Islands' susceptibility to landslides is acknowledged but not well understood. St. Croix has a more dispersed risk due to precipitation variation. St. John recently experienced landslide events in November 2010 in the vicinity of Centerline Road between Cruz Bay and Coral Bay. On St. Thomas, the northern facing slopes of the island's mountains are particularly prone to landslides. The largest landslide documented on St. Thomas occurred in 1979. St. John and St. Thomas experienced several landslides in 2010, and landslides were reported in 1983 in the vicinity of Dorothea Bay on St. Thomas.

The 2019 THMP noted difficulties (including a lack of available information) to determine the frequency and magnitude of landslides in the US Virgin Islands. The 2019 THMP produced landslide susceptibility maps that are reproduced below. The significant topographical relief evident in St. Thomas and St. John indicates a high hazard level, whereas the relatively lower topographic relief in St. Croix sees less overall risk. According to the 2019 Plan, IPCC projections for an increase in precipitation event will likely increase the likelihood of landslides occurring. These conditions may be exacerbated by continued hillside development.

According to the 2019 THMP, exposure to landslides varies throughout the islands. On St. Thomas, 50% of residential building stock and 38% of commercial building stock is considered vulnerable. This figure is 18% and 17% respectively for St. Croix and 39% and 37% respectively for St. John. The majority of residential buildings on St. Thomas that are vulnerable have a moderate or high consequence classification, whereas most vulnerable commercial buildings on both St. John and St. Thomas have a low consequence classification. St. Croix, with generally flatter topography, is significantly less vulnerable to rain-induced landslides.

Table 23. Building Exposure for Landslide Hazards

Island	Type	Percent of Total Buildings in Category Exposed	Exposed Buildings Impact		
			High	Moderate	Low
St. Croix	Commercial	18%	0%	0%	100%
	Residential	18%	18%	17%	66%
St. John	Commercial	37%	0%	0%	100%
	Residential	39%	39%	24%	37%
St. Thomas	Commercial	38%	0%	0%	100%
	Residential	50%	40%	22%	38%

Source: 2019 Territorial Hazard Mitigation Plan

All identified critical facilities expected to be impacted by rain-induced landslides in St. Croix and St. John have low consequence to exposure. St. Thomas has two critical facilities – both shelters – that have high or moderate consequence to exposure.

Table 24. Lifeline Exposure to Rain-Induced Landslides

Island/Lifeline	High	Moderate	Low
St. Croix	0	0	68
Energy	0	0	1
Food, Water, Shelter	0	0	35
Health and Medical	0	0	3
Safety and Security	0	0	23
Transportation	0	0	6
St. John	0	0	21
Energy	0	0	1
Food, Water, Shelter	0	0	9
Health and Medical	0	0	3
Safety and Security	0	0	7
Transportation	0	0	1
St. Thomas	1	1	40
Energy	0	0	1
Food, Water, Shelter	1	1	7
Health and Medical	0	0	6
Safety and Security	0	0	21
Transportation	0	0	5

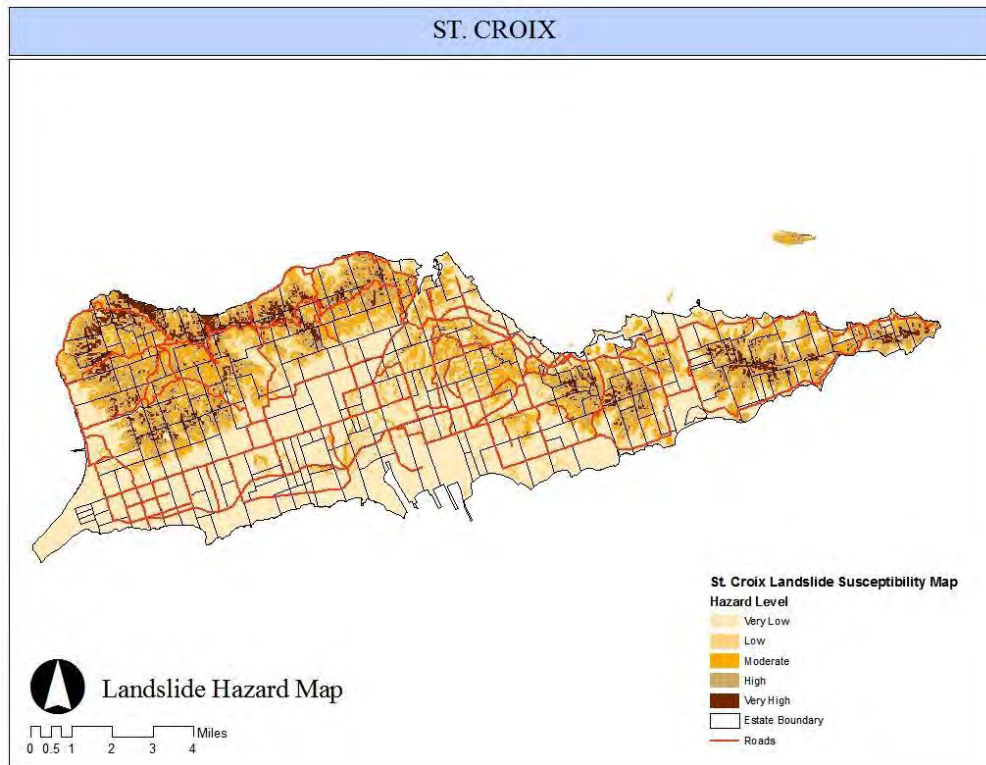
Source: 2019 Territorial Hazard Mitigation Plan

Table 25. Consequence Classification for Lifelines Impacted by Rain-Induced Landslides

Lifeline	Consequence Classification St. Croix	Consequence Classification St. John	Consequence Classification St. Thomas
Communications	Low Impact	Low Impact	Low Impact
Energy	Low Impact	Low Impact	Low Impact
Food, Water, Shelter	Low Impact	Low Impact	High Impact
Hazardous Material	Low Impact	Low Impact	Low Impact
Health and Medical	Low Impact	Low Impact	Low Impact
Safety and Security	Low Impact	Low Impact	Low Impact
Transportation	Low Impact	Low Impact	Low Impact

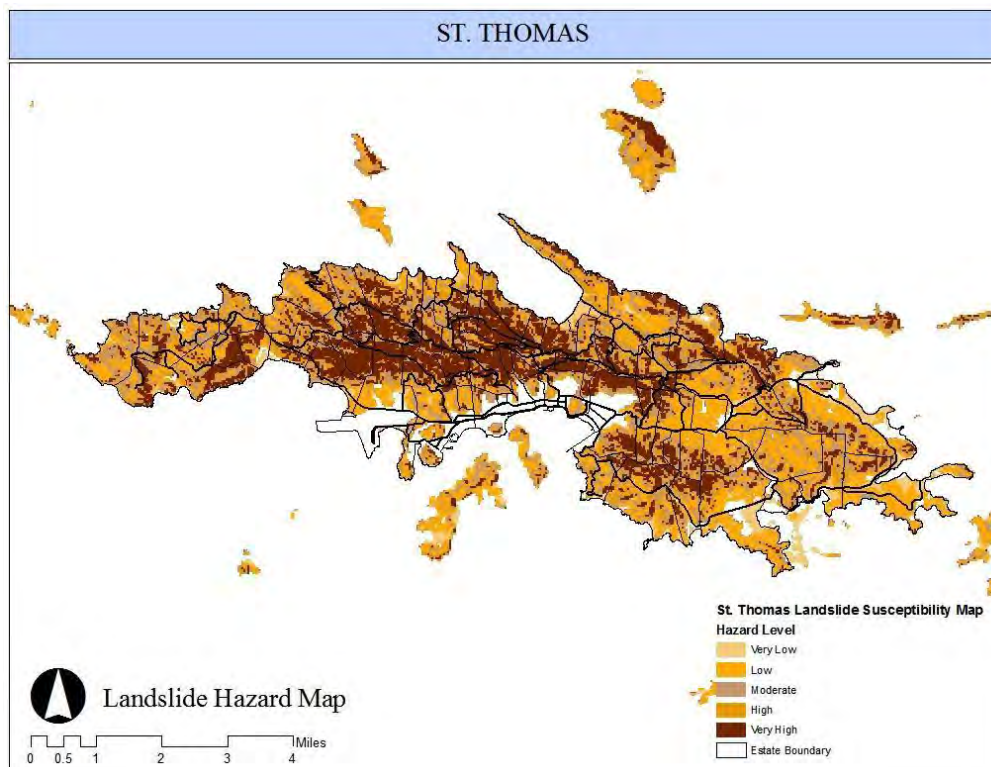


Figure 42. Extent of Rain-Induced Landslide in St. Croix



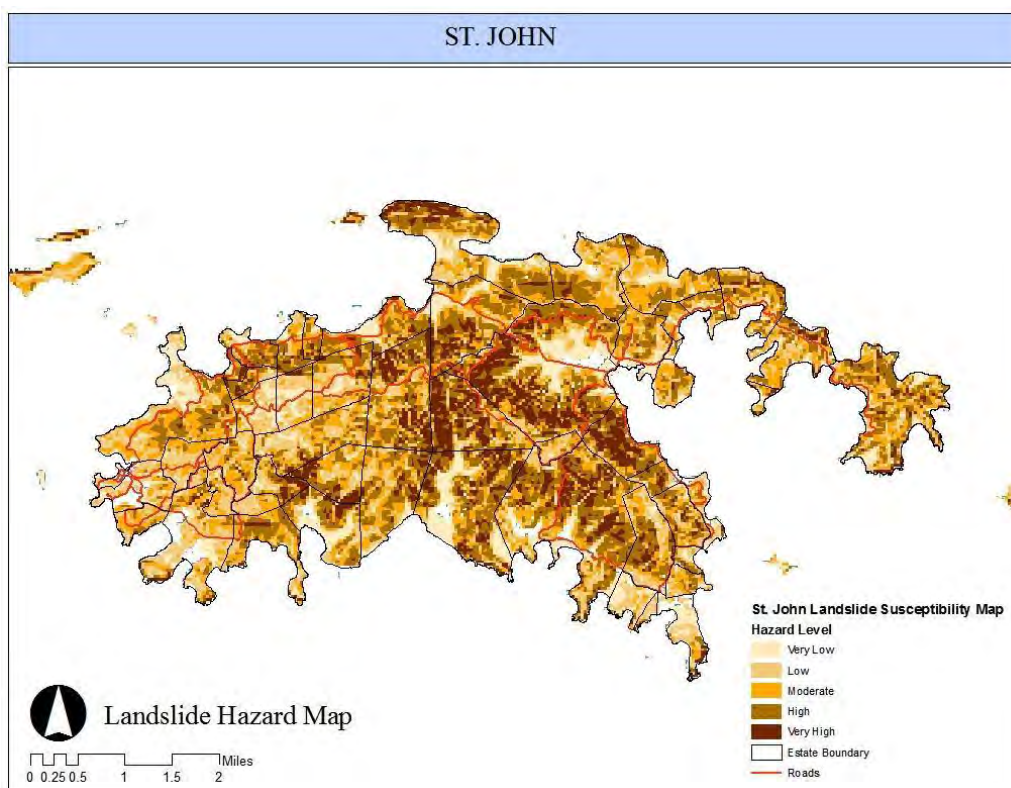
Source: 2019 Territorial Hazard Mitigation Plan

Figure 43. Extent of Rain-Induced Landslide in St. Thomas



Source: 2019 Territorial Hazard Mitigation Plan

Figure 44. Extent of Rain-Induced Landslide in St. John



Source: 2019 Territorial Hazard Mitigation Plan

1.9.6 Tsunami

The US Virgin Islands are susceptible to tsunamis owing to its history of earthquakes and its location in a seismically active region. Tsunamis can originate throughout the region and can quickly travel to adjacent coastlines at speeds between 450 to 600 miles per hour.

Vulnerability to tsunamis has increased throughout the region as populations and development have increased. A tsunami warning system for Puerto Rico and the Virgin Islands has been in place since 2000 and has an estimated response time of 20 minutes. However, the Islands' proximity to the Puerto Rican Trench and the Anegada Fault could result in a tsunami experienced on land before warnings can be issued.

The most recent and damaging tsunami impacting the Islands occurred following a magnitude 7.5 earthquake in 1867. The earthquake's epicenter was located in the Anegada Fault between St. Thomas and St. Croix. The resulting tsunami caused wave heights of up to 12.2 m near Water Island off St. Thomas, 7.8 meters at Frederiksted, and 6.1 meters at Charlotte Amalie. Since 1530, 116 tsunamis with run-ups exceeding 0.5 meters (1.6 feet) have been separately observed. Of these, 14 tsunamis were reported from Puerto Rico or the Virgin Islands.

Low-lying coastal areas are most vulnerable to tsunamis. Tsunamis pose a unique vulnerability to cruise ships and appurtenant waterfront/harbor developments, where exceptionally strong waves can cripple crucial transportation vectors. The following table shows the percentage of residential and commercial buildings impacted by the tsunami hazard. Due to the location of many buildings on higher land away from the water, total percent of buildings impacted by a tsunami is relatively low. However,

buildings that are within an anticipated tsunami zone have a very high vulnerability to the hazard. On St. Thomas, an estimated 18% of residential buildings and 33% of commercial buildings are exposed to tsunamis. On St. Croix, this figure is 11% and 5% respectively and on St. John this figure is 13% for both residential and commercial buildings.

For the purposes of this MNA, the 2019 THMP is utilized to provide an analysis of vulnerability related to tsunami events. This provides an indication of the magnitude of potential damage developed from the risk analysis in the THMP as aligned with the previously available data and provided in the tables below. Current information from NOAA 2018 will be beneficial to the latest update of the THMP to represent potential risk associated with this hazard in even greater detail.

Table 26. Building Exposure to Tsunamis

Island	Type	Percent of Total Buildings in Category Exposed	Exposed Buildings Impact		
			High	Moderate	Low
St. Croix	Commercial	5%	100%	0%	0%
	Residential	11%	100%	0%	0%
St. John	Commercial	13%	100%	0%	0%
	Residential	13%	100%	0%	0%
St. Thomas	Commercial	33%	100%	0%	0%
	Residential	18%	100%	0%	0%

Source: 2019 Territorial Hazard Mitigation Plan

Tsunamis pose significant threats to lifeline facilities, with many identified lifeline facilities in the islands experiencing very high vulnerability to tsunami hazards. Across the Islands, ports are the most vulnerable transportation lifeline, nearly all of which have a high consequence classification for exposure. On St. Thomas, nearly half of Safety and Security lifelines have high consequence classifications for tsunamis.

Table 27. Lifeline Exposure to Tsunamis

Island/Lifeline	High	Moderate	Low
St. Croix	8	0	60
Energy	0	0	1
Food, Water, Shelter	1	0	33
Health and Medical	1	0	3
Safety and Security	1	0	22
Transportation	5	0	1
St. John	7	0	11
Energy	1	0	0
Food, Water, Shelter	3	0	3
Health and Medical	0	0	3
Safety and Security	2	0	5
Transportation	1	0	0
St. Thomas	15	0	27
Energy	1	0	0
Food, Water, Shelter	0	0	9
Health and Medical	1	0	5
Safety and Security	10	0	11
Transportation	3	0	2

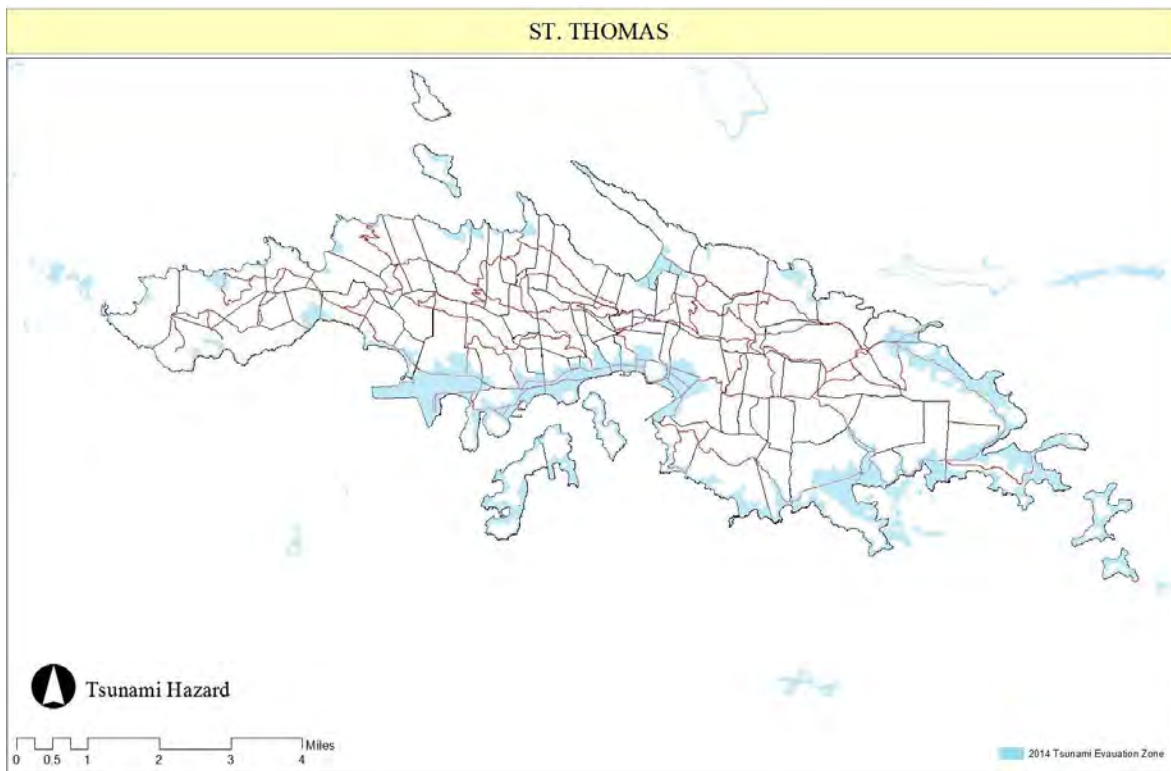
Source: 2019 Territorial Hazard Mitigation Plan

Table 28. Consequence Classification for Lifelines Impacted by Tsunami

Lifeline	Consequence Classification St. Croix	Consequence Classification St. John	Consequence Classification St. Thomas
Communications	Low Impact	Low Impact	Low Impact
Energy	Low Impact	Low Impact	Low Impact
Food, Water, Shelter	Moderate Impact	High Impact	High Impact
Hazardous Material	Low Impact	Low Impact	Low Impact
Health and Medical	High Impact	High Impact	High Impact
Safety and Security	High Impact	High Impact	High Impact
Transportation	High Impact	High Impact	High Impact

The following maps show tsunami-vulnerable areas on the three islands. The tsunami-impacted zone extends farther inland than the Coastal Flooding does, impacting a higher percentage of both buildings and lifeline facilities.

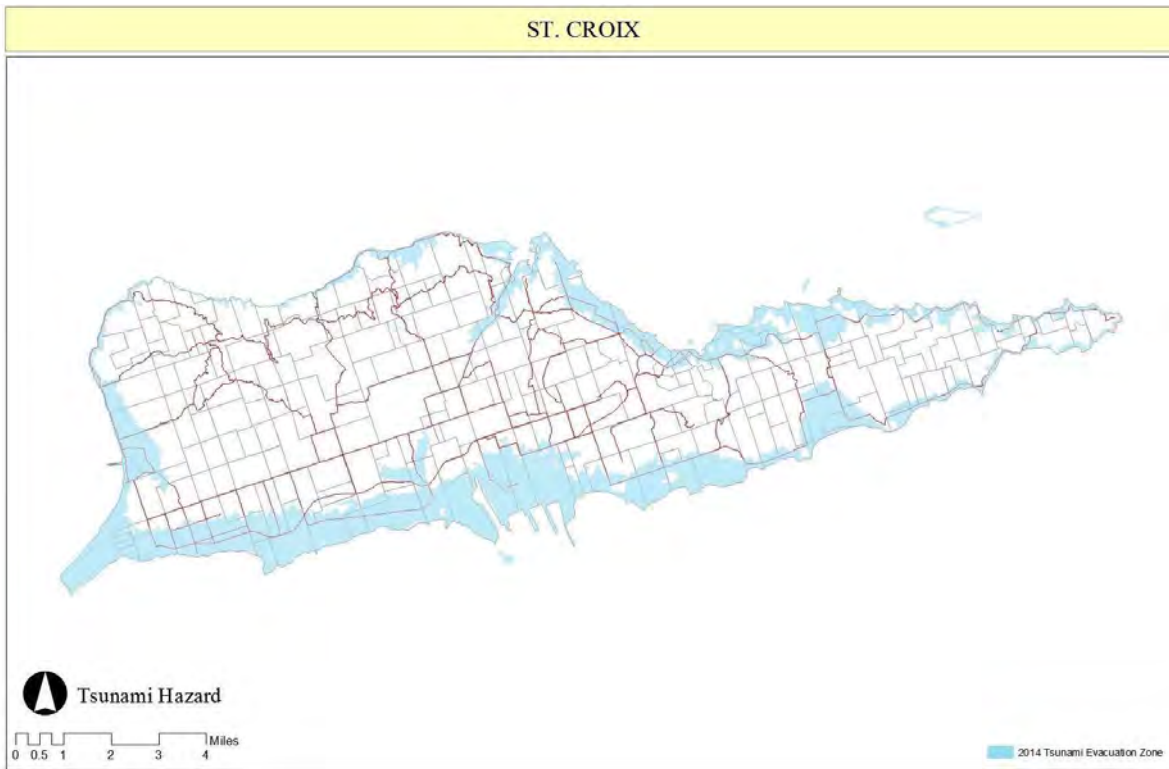
Figure 45. Extent of Tsunami Hazard for St. Thomas



Source: 2019 Territorial Hazard Mitigation Plan

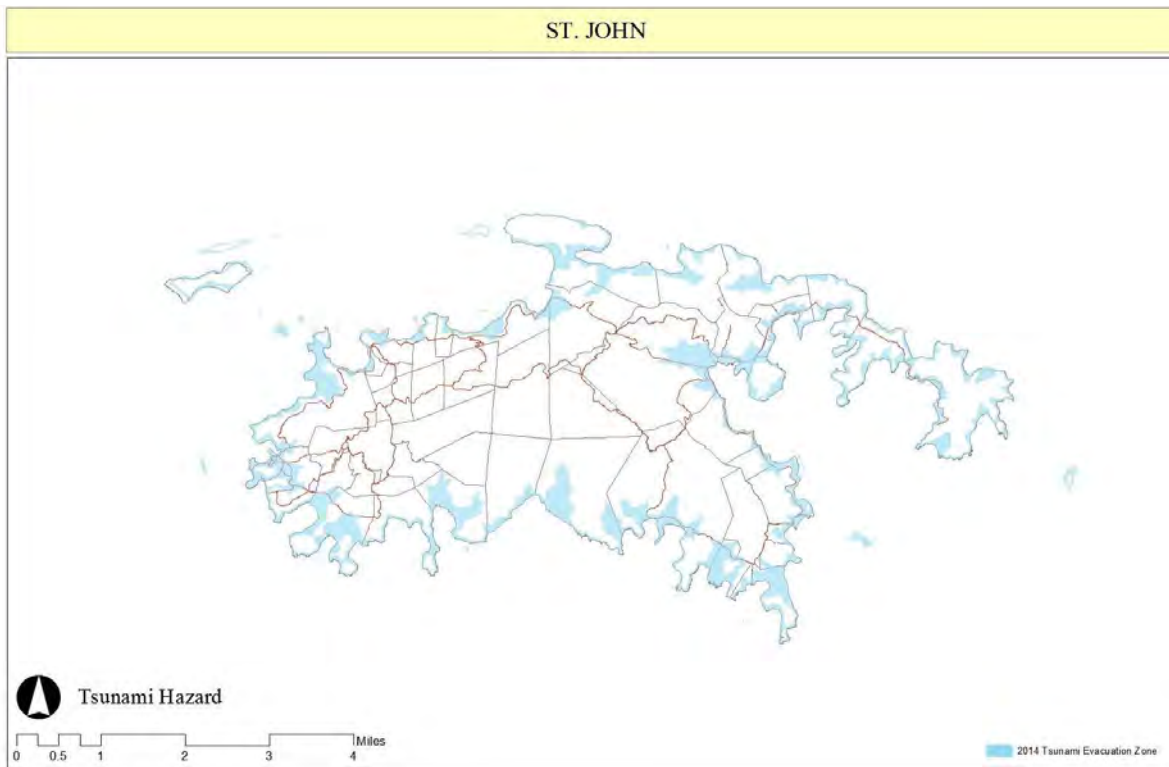


Figure 46. Extent of Tsunami Hazard for St. Croix



Source: 2019 Territorial Hazard Mitigation Plan

Figure 47. Extent of Tsunami Hazard for St. John



Source: 2019 Territorial Hazard Mitigation Plan

1.9.7 Wildfire

The dense vegetation and sprawling nature of development in the US Virgin Islands contributes to a significant wildfire risk in the communities. According to the 2019 THMP, the Islands have a mixed wildland/urban interface. Fire risk is compounded by this interface along with steep and narrow roadways on St. John and St. Thomas that make access difficult. On St. Croix, development alongside grasslands and scrublands along with trash and land-clearance fires create considerable risk. Between 2000 and 2010, all recorded wildfires on the Islands have occurred on St. Croix. The 2019 THMP estimates that the Islands can expect at least one wildfire per year. Data cited by the THMP points to warmer average temperatures (particularly in the dry months of the year) due to climate change. These changes are expected to exacerbate wildfire risk.

Wildfire risk impacts a significant percentage of residential and commercial properties across the Islands. On St. Thomas, vulnerabilities are present for 42% of residential properties and 35% of commercial properties. St. Croix's vulnerabilities are 47% and 27%, respectively. Vulnerabilities on St. John include 38% of residential properties and 44% of commercial properties.

Table 29. Building Exposure to Wildfire

Island	Type	Percent of Total Buildings in Category Exposed	Exposed Buildings Impact		
			High	Moderate	Low
St. Croix	Commercial	27%	0%	0%	100%
	Residential	47%	46%	26%	27%
St. John	Commercial	44%	0%	0%	100%
	Residential	38%	38%	18%	44%
St. Thomas	Commercial	35%	0%	0%	100%
	Residential	42%	43%	22%	35%

Source: 2019 Territorial Hazard Mitigation Plan

Table 30. Consequence Classification for Lifelines Impacted by Wildfire

Lifeline	Consequence Classification St. Croix	Consequence Classification St. John	Consequence Classification St. Thomas
Communications	Low Impact	Low Impact	Low Impact
Energy	Low Impact	Low Impact	Moderate Impact
Food, Water, Shelter	Moderate Impact	Moderate Impact	Moderate Impact
Hazardous Material	Low Impact	Low Impact	Low Impact
Health and Medical	Moderate Impact	Low Impact	Low Impact
Safety and Security	Moderate Impact	Moderate Impact	Moderate Impact
Transportation	Low Impact	Low Impact	Low Impact

The following table describes wildfire exposure to lifelines in the US Virgin Islands. On St. Croix, Transportation and Energy lifelines have low exposure, whereas more than half of Food, Water, Shelter and Safety and Security lifelines have moderate or high exposure. On St. John, most Safety and Security and Food, Water, Shelter lifelines have high exposure. On St. Thomas, most lifelines have low or moderate exposure whereas the vast majority of Safety and Security lifelines are exposed.



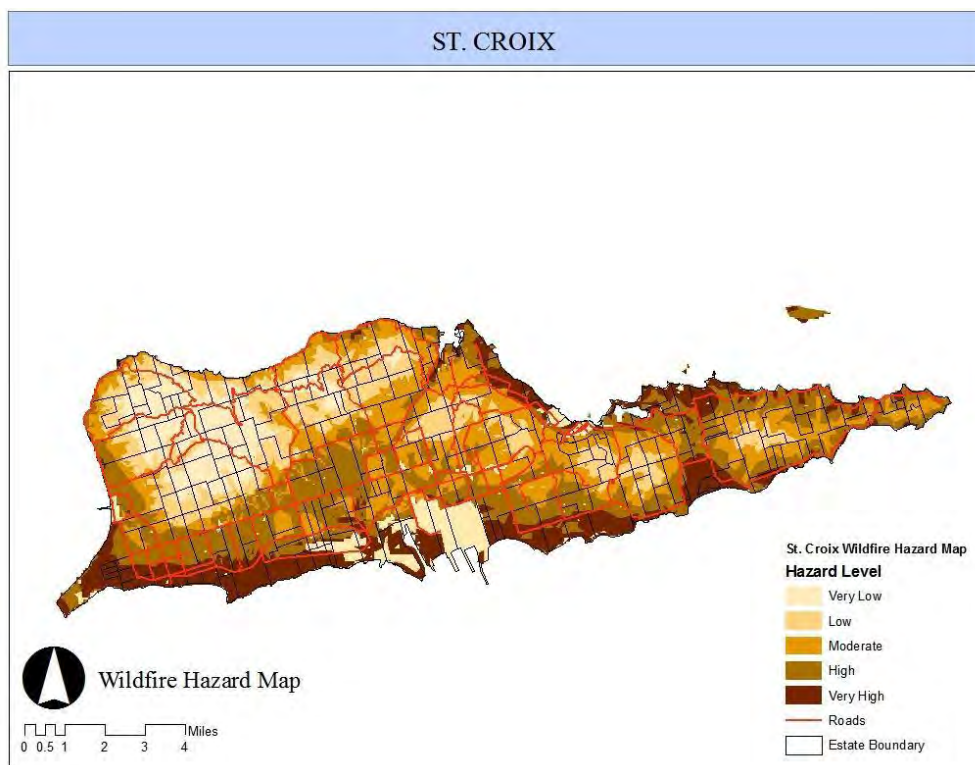
Table 31. Lifeline Exposure to Wildfire

Island/Lifeline	High	Moderate	Low
St. Croix	30	12	45
Energy	0	0	1
Food, Water, Shelter	19	9	25
Health and Medical	1	1	2
Safety and Security	10	2	11
Transportation	0	0	6
St. John	13	0	7
Energy	1	0	0
Food, Water, Shelter	6	0	3
Health and Medical	0	0	2
Safety and Security	6	0	1
Transportation	0	0	1
St. Thomas	25	6	18
Energy	0	0	1
Food, Water, Shelter	1	3	8
Health and Medical	1	0	6
Safety and Security	18	3	3
Transportation	5	0	0

Source: 2019 Territorial Hazard Mitigation Plan

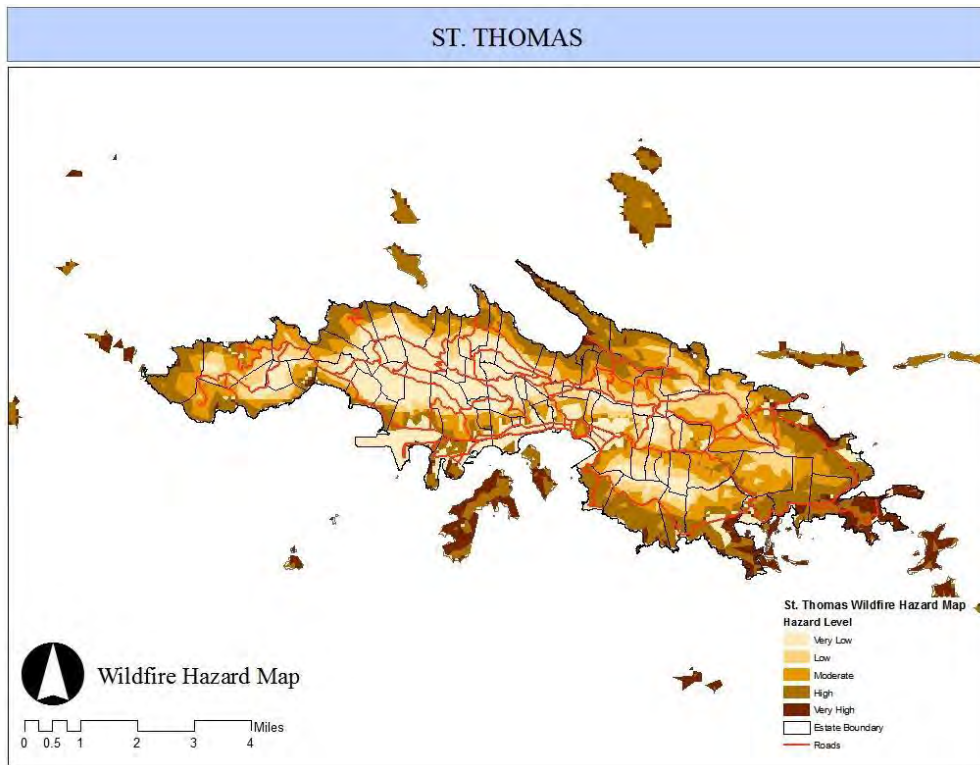
The following map shows wildfire-vulnerable areas on the three islands. Wildfire risk is relatively low in most of St. John and St. Thomas. Areas with higher vulnerability are found closer to the coastline. Acute areas of higher vulnerability are found in the southern section of St. Croix and the East End of St. John.

Figure 48. Extent of Wildfire Hazards in St. Croix



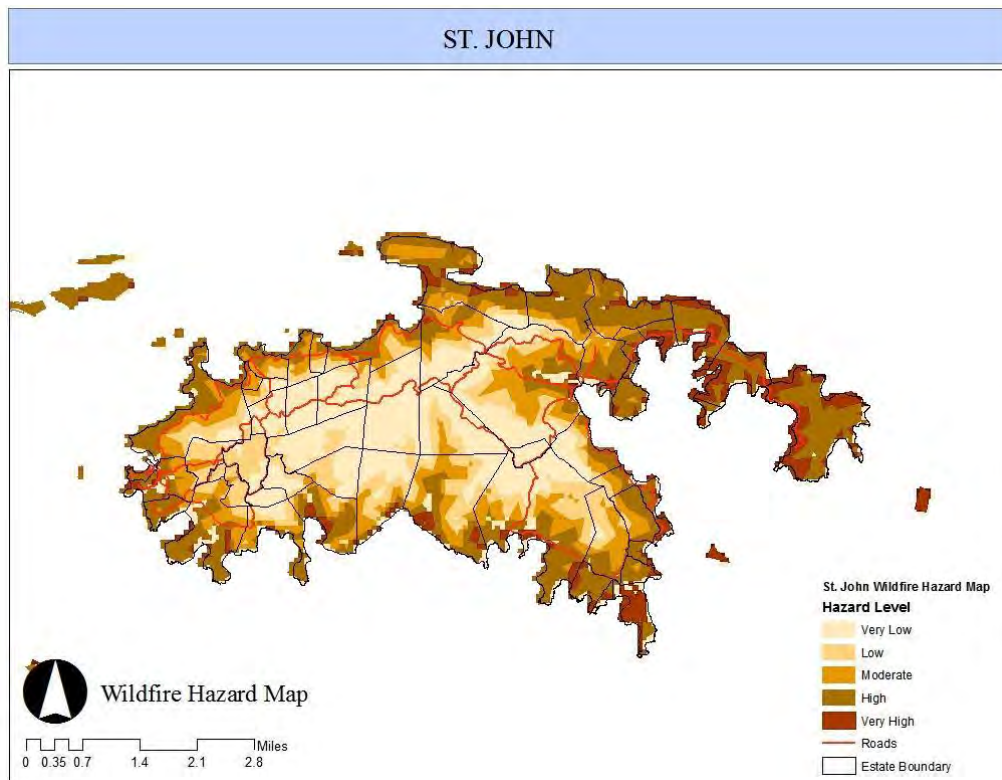
Source: 2019 Territorial Hazard Mitigation Plan

Figure 49. Extent of Wildfire Hazards in St. Thomas



Source: 2019 Territorial Hazard Mitigation Plan

Figure 50. Extent of Wildfire Hazards in St. John



Source: 2019 Territorial Hazard Mitigation Plan



1.9.8 Disease Outbreak/Pandemic

An outbreak or an epidemic occurs when new cases of a certain disease substantially exceed what is expected. An epidemic may be restricted to one locale. When occurring globally, it is referred to as a pandemic. Pandemic is defined as a disease occurring over a wide geographic area and affecting a high proportion of the population. A pandemic can cause sudden, pervasive illness in all age groups on a local or global scale. A pandemic is a novel virus to which humans have no natural immunity that spreads from person-to-person. A pandemic will cause both widespread and sustained effects and is likely to stress the resources of the territorial and federal government (New Jersey Office of Emergency Management, 2019).

As an island territory with substantial tourist visitation and limited medical resources, disease outbreaks present a significant hazard for the US Virgin Islands. The hazard was not included in the 2019 Territorial HMP (THMP). However, the Islands' vulnerability was exposed during the 2020 COVID-19 pandemic.

Prior to COVID-19, isolated incidents of disease outbreak have occurred recently in the Territory. In June 2005, an outbreak of dengue virus was detected which resulted in 331 suspected cases, of which 54% resulted in hospitalizations (Mohammed, Ramos, Armstrong, & Muñoz-Jordán, 2010). In April 2012, an outbreak of acute gastroenteritis occurred sickened 51 guests and 38 employees of a hotel in St. Thomas (Leshem, et al., 2016). More recent disease outbreak control efforts in the Territory have focused on prevention of dengue and mosquito-borne illnesses (The St. John Source, 2020). Prior to 2020, the Virgin Islands had not experienced a dengue outbreak since 2012. Currently, the Centers for disease Control recognizes three non-vaccine-preventable diseases in the Territory that can be encountered, including African tick-bite fever, dengue, and zika (Centers for Disease Control and Prevention, 2021).

The table below shows the number of cases reported in the Islands in the USVI Department of Health – Epidemiology Division's 2014-2018 Report. In 2014, the USVI began to implement a National Electronics Disease Surveillance System. Of the diseases for which data were collected, Staphylococcal aureus (commonly known as a Staph infection), represented many of the reported cases, followed by influenza.

Table 32: Infectious Diseases in the US Virgin Islands, 2014-2018

Foodborne Diseases	68	General Communicable Diseases	485
Cryptosporidiosis	1	Staphylococcal aureus	477
Giardiasis	15	Enterococcus	6
Salmonellosis	45	Legionellosis	2
Shigellosis	4		
Staphylococcal enterotoxin	3	Influenza	182
		Influenza outbreak	6
Hepatitis	80	Influenza	175
Hep A- Acute	3	Novel Type A	1
Hep B- Prenatal	2		
Hep B- Acute	4	Vectorborne and Environmental Diseases	22
Hep C- Acute	2	Dengue	8
Hep B- Chronic	26	Leptospirosis	3
Hep C- Chronic	43	Lyme Disease	1
		Malaria	5
		Melioidosis	3
		West Nile	1
		Zika	1

The US Virgin Islands has been profoundly affected by novel coronavirus (COVID-19). COVID-19 is an infectious disease first identified in 2019. The virus rapidly spread into a global pandemic by spring of 2020. Older people, and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness (World Health Organization, 2021). With the virus being relatively new, information regarding transmission and symptoms of the virus is still new. The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes. Reported symptoms include trouble breathing, persistent pain or pressure in the chest, new confusion or inability to arouse, and bluish lips or face. Symptoms may appear 2-14 days after exposure to the virus (based on the incubation period of MERS-CoV viruses) (Centers for Disease Control and Prevention, 2021).

In an effort to slow the spread of the virus, the federal government and states have urged the public to avoid touching the face, properly wash hands often, and use various social distancing measures. On March 23rd, the Governor of the USVI issued a “stay-at-home” order for all non-essential businesses (Government of the United States Virgin Islands, 2021). In mid-March 2020, the Territory’s first COVID-19 case was reported, with the number of cases growing gradually through June 2020. By July 1st, 2020, 90 cases of COVID-19 were reported in the Territory following the reopening of Territory’s tourism industry (Giles & Rodriguez, 2020). However, by the end of July more than 400 cases would be reported. As of September 2020, the number of cases has continued to increase, though at a slower rate than what was seen in July and August 2020 (Johns Hopkins University & Medicine, 2021). At the time of this plan update, there are no specific vaccines or treatments for COVID-19. However, there are many ongoing clinical trials evaluating potential treatments (World Health Organization, 2021).

As of September 21, 2020, the US Virgin Islands are on travel notice Level 3 – the CDC’s highest – which recommends travelers avoid all nonessential travel to the US Virgin Islands (Centers for Disease Control and Prevention, 2021). The impact of COVID-19 upon the Territory is exacerbated by pre-existing health disparities experienced on the Island, as well as pressing health needs that were worsened by the 2017 hurricanes (Artiga, Hall, Rudowitz, & Lyons, 2018).

Table 33: COVID-19 Confirmed Cases and Deaths as of 9/9/21

Status	Count
Positive/Confirmed Infections (Cumulative)	3652
Active Cases	120
Recovered	3504

Source: USVI Department of Health - [Health Data \(vi.gov\)](https://www.vi.gov/health-data)

Lifelines will face considerable impacts due to disease outbreaks and pandemics, though the extent will vary based on the severity of the disease outbreak and the types of measures taken to prevent disease spread and respond to the disease. Communications, energy, and hazardous materials lifelines are anticipated to have low consequence impacts from the hazard owing to the types of operations present at those lifelines. Food, water, shelter lifelines are expected to be impacted due to disruptions to food supply chains as well as impacts to congregate/sheltering facilities and higher-density housing. Health and medical lifelines (present on each of the three largest islands) are expected to have high impacts owing to the need to treat patients and the potential for the lifelines to be overwhelmed during a large-scale event. Safety and Security and Transportation lifelines are expected to experience moderate impacts due to disruption of government services, and additional constraints or stressors placed on Transportation lifelines from transporting or evacuating disease casualties, importing supplies, and serving as a vector of disease.



Table 34: Consequence Classification for Lifelines Impacted by Pandemic

Lifeline	Consequence Classification St. Croix	Consequence Classification St. John	Consequence Classification St. Thomas
Communications	Low Impact	Low Impact	Low Impact
Energy	Low Impact	Low Impact	Low Impact
Food, Water, Shelter	Moderate Impact	Moderate Impact	Moderate Impact
Hazardous Material	Low Impact	Low Impact	Low Impact
Health and Medical	High Impact	High Impact	High Impact
Safety and Security	Moderate Impact	Moderate Impact	Moderate Impact
Transportation	Moderate Impact	Moderate Impact	Moderate Impact

Based on the data examined in this Mitigation Needs Assessment, the disease outbreak hazard has been identified as a hazard of concern for the US Virgin Islands. This assessment is due to the exceptional impacts that COVID-19 has had upon the Territory, the residents, and the economy. While the ongoing impact of COVID-19 continues to develop, its impact on the Territory cannot be overstated and must be a factor for consideration within the MNA.

1.10 Unmet Mitigation Needs

To address the unmet mitigation needs specified in this MIT-AP, CDBG-MIT funds will be allocated as described in Table 1: CDBG-MIT Allocations. Use of the one-time CDBG-MIT grant money will be used to fundamentally change resilience preparedness in the Territory, focusing on mitigation activities that will result in reduced need for recovery and mitigation resources in the future. The Territory recognizes that the perpetual cycle of disaster and recovery is not model that is socially, economically, environmentally, or fiscally sustainable, so activities and projects will be selected based on fact-based analysis and careful review toward increasing resilience in the Territory.

In April 2021, the U.S. Virgin Islands Hazard Mitigation Plan 2019-Update was updated to incorporate the introduction to FEMA-Lifelines and USVI Hazard mitigation planning elements that addresses a wide range of natural and human-caused hazards. The VIHFA is considering covered projects related to the community lifelines:

The proposed Energy Lifeline Project is to address the long-term operation and maintenance of the utility’s fuel supply. The regulated electrical utility is the primary resource and responsible entity for providing reliable and resilient power to the territory. While VIWAPA has control over the diesel inventory, it does not currently have direct control over the LPG inventory. This places the utility in a vulnerable position as without access to LPG, power generation for the territory. The more inventory that the Authority has under its control, the more resources it has to respond to and reduce the likelihood of a service interruption.

1.11 Risk Assessment Summary

The 2019 THMP assessed potential losses to residential and commercial buildings as well as lifelines. The THMP additionally identified social impacts to vulnerable populations. In the 2019 THMP, vulnerable populations included residents under the age of 18 and over the age of 65 at the time of the 2010 Census. The following tables display the vulnerabilities for each hazard. The Islands younger residents are proportionately more exposed to droughts, earthquakes, wildfires, and hurricane winds. On St. John there is a significant exposure to rain-induced landslides for younger residents.

Table 35. Social Impact for St. Thomas Hazards

Hazard	Residents <18 years	%	Residents >65	%
Coastal Flooding	1,128	2%	23	0.04%
Drought	8,271	15%	2,037	4%
Earthquake	8,461	15%	1,692	3%
Riverine Flooding	4,512	8%	1,128	2%
Hurricane Winds	14,101	25%	2,820	5%
Rain-Induced Landslide	3,462	6%	853	2%
Tsunami	2,440	5%	919	2%
Wildfire	7,111	13%	1,752	3.11%

Table 36. Social Impact for St. John Hazards

Hazard	Residents <18 years	%	Residents >65	%
Coastal Flooding	89	2%	2	0.04%
Drought	925	21%	228	5%
Earthquake	623	14%	178	4%
Riverine Flooding	267	6%	44	1%
Hurricane Winds	1,067	24%	267	6%
Rain-Induced Landslide	1,516	34%	146	3%
Tsunami	141	3%	71	2%
Wildfire	421	9%	104	2.33%

Table 37. Social Impact for St. Croix Hazards

Hazard	Residents <18 years	%	Residents >65	%
Coastal Flooding	1,128	2%	23	0.04%
Drought	8,271	15%	2,037	4%
Earthquake	8,461	15%	1,692	3%
Riverine Flooding	4,512	8%	1,128	2%
Hurricane Winds	14,101	25%	2,820	5%
Rain-Induced Landslide	3,462	6%	853	2%
Tsunami	2,758	5%	919	2%
Wildfire	7,111	13%	1,752	3.11%

The table below displays overall losses for critical facilities/lifelines, residential properties, and commercial properties for the hazard of concern and return period. St. Thomas and St. John experience a higher volume of losses owing to the density of development. In terms of total losses, earthquakes and hurricane winds have the potential to generate the highest losses in the Territory. However, the return period for an earthquake is considerably longer than that of other hazards. Tsunami events have a similar capability to generate significant losses for all facility types, though like earthquakes the return period is longer than it is for other hazards. Owing to the Islands' development patterns, there is considerably higher absolute exposure to residential properties than there is to commercial properties.

Table 38. Island Loss Calculations

Hazard	Return Period (Years)	Critical Facility Losses	Residential Losses	Commercial Losses	Total Loss	Loss/Year
St. Thomas						
Drought	100	N/A	N/A	N/A	\$1,058,990	\$10,590
Earthquake	1000	\$442,013,206	\$4,641,269,145	\$1,384,710,463	\$6,467,992,814	\$6,467,993
Riverine Flooding	100	\$223,420,272	\$752,430,862	\$292,639,745	\$1,268,490,879	\$12,684,909



Coastal Flooding	120	\$56,868,971	\$115,105,946	\$56,606,106	\$228,581,024	\$1,904,842
Hurricane	50	\$314,644,509	\$3,097,521,815	\$571,109,732	\$3,983,276,056	\$79,665,521
Rain-Induced Landslide	50	\$23,153,076	\$76,647,667	\$ -	\$99,800,743	\$1,996,015
Tsunami	500	\$295,629,176	\$808,769,974	\$402,633,004	\$1,507,032,154	\$3,014,064
Wildfire	10	N/A	N/A	N/A	\$571,815	\$57,181
St. Croix						
Drought	100	N/A	N/A	N/A	\$1,058,990	\$10,590
Earthquake	1000	\$528,799,950	\$3,645,930,917	\$746,489,600	\$4,921,220,467	\$4,921,220
Riverine Flooding	100	\$61,399,508	\$618,081,641	\$150,076,139	\$829,557,287	\$8,295,573
Coastal Flooding	120	\$17,245,151	\$52,319,194	\$26,256,719	\$95,821,063	\$798,509
Hurricane	50	\$409,677,613	\$1,508,195,711	\$307,082,553	\$2,224,955,877	\$44,499,118
Rain-Induced Landslide	50	\$ -	\$ 20,892,953	\$ -	\$20,892,953	\$417,859
Tsunami	500	\$198,006,714	\$524,598,730	\$261,998,197	\$984,603,641	\$1,969,207
Wildfire	10	N/A	N/A	N/A	\$571,815	\$57,181
St. John						
Drought	100	N/A	N/A	N/A	\$1,058,990	\$10,590
Earthquake	1000	\$120,120,930	\$444,103,045	\$88,306,986	\$652,530,961	\$652,531
Riverine Flooding	100	\$58,192,860	\$18,067,019	\$1,804,774	\$78,064,652	\$780,647
Coastal Flooding	120	\$54,333,776	\$25,861,531	\$4,738,932	\$84,934,239	\$707,785
Hurricane	50	\$78,957,369	\$188,034,154	\$30,409,148	\$297,400,671	\$5,948,013
Rain-Induced Landslide	50	\$ -	\$21,247,859	\$ -	\$21,247,859	\$424,957
Tsunami	500	\$54,368,571	\$96,449,264	\$18,284,842	\$169,102,677	\$338,205
Wildfire	10	N/A	N/A	N/A	\$571,815	\$57,181

The following table shows combined hazard exposure for the three islands. The combined total losses are largest for earthquakes, riverine flooding, hurricanes, and tsunamis overall, but the likelihood of occurrences of earthquakes and tsunamis based on historical data are comparatively low. The data shows that hurricanes and flooding are much more likely to occur with more regularity in the Territory. Consideration of this aspect of the combined loss calculations is reflected in the return periods listed next to each hazard, which are shown in the loss per year. This potential loss per year must be factored into prioritizing the risks to be mitigated within the MIT-AP.

Table 39. Combined Loss Calculations

	Return Period	Critical Facility Losses	Residential Losses	Commercial Losses	Total Loss	Loss/Year
Drought	100	\$ -	\$ -	\$ -	\$3,176,969	\$31,770
Earthquake	1000	\$1,090,934,086	\$8,731,303,107	\$2,219,507,049	\$ 12,041,744,242	\$12,041,744
Riverine Flooding	100	\$343,012,640	\$1,388,579,522	\$ 444,520,658	\$ 2,176,112,818	\$21,761,129
Coastal Flooding	120	\$128,447,898	\$193,286,671	\$87,601,757	\$ 409,336,326	\$3,411,136
Hurricane	50	\$803,279,491	\$4,793,751,680	\$ 908,601,433	\$ 6,505,632,604	\$130,112,652
Rain-Induced Landslide	50	\$23,153,076	\$118,788,479	\$ -	\$141,941,555	\$2,838,831
Tsunami	500	\$548,004,461	\$1,429,817,968	\$682,916,043	\$2,660,738,472	\$5,321,476
Wildfire	10	N/A	N/A	N/A	\$1,715,445	\$171,543
Total		\$2,936,831,652	\$16,655,527,427	\$4,343,146,940	\$23,940,398,431	\$175,690,281

1.12 CDBG-DR Considerations

The primary focus of CDBG-MIT funding is to enable localities that are vulnerable to natural disasters to take a forward-looking, risk-based approach to implementing projects that are designed to reduce future losses from such disasters. Conversely, CDBG-DR is a responsive funding source intended to repair, restore, and rehabilitate communities after major disasters. For this reason, the required CDBG-MIT risks analysis will utilize similar data but focus more on long-term priorities to mitigate risks instead of immediate recovery projects, even while making sure that identified CDBG-MIT project plans align with identified FEMA THMP and CDBG-DR plans for the Territory in an effort to ensure that undertaken CDBG-MIT activities effectively compliment projects already contemplated in the Territory.

During program design for CDBG-MIT, it became apparent that lessons learned, and data gathered implementing CDBG-DR programs would be a major consideration for CDBG-MIT programming. In this instance, the unmet housing and public facilities and infrastructure needs for Hurricanes Irma and Maria are major priorities for CDBG-MIT funding.

1.12.1 Analysis of the Mitigation Housing and Public Facilities Needs

Within the MNA outlined above, potential threats and risks have been analyzed with regard to mitigation measures that may reduce potential risk to residents of the Territory. Investment priorities, project selections and proposed programs in this Action Plan align the MNA with selected activities outlined herein. While the CDBG-MIT framework is not ideal to serve every action item, there is significant overlap between territorial priorities, the assessment of the data for community needs, and the CDBG eligible activities.

The programs outlined in this Action Plan were developed to meet CDBG-MIT, federal and Territorial requirements, and to fund activities that will protect against loss of life and property and reduce suffering and hardship attributable to natural disasters. Identified risks in the MNA have been considered along with planning, housing, economic, infrastructure and public facilities needs across the Territory to yield potential projects that will help to make the Territory more resilient in the event of future disasters or other threats to community lifelines.

Housing is a key component to be considered for residents of the Territory, as this is the primary means of shelter for residents when hurricanes and floods occur, with housing a key component for HUD in establishing the Community Development Block Grant program. In the Territory, limited housing options continue to be a source of concern for many residents, especially those considered LMI. The 2015 Housing Demand Study commissioned by VIHFA determined that there was already a 5,000-unit shortage of affordable housing in the Territory before the dual hurricane disasters in 2017, both for purchase and rent. As shown within that study, the Territory’s housing market severely limits options for LMI individuals, as approximately 6% of the homes sold could be designated as affordable for them.

Table 40. Home Sales Data by Type – USVI – April 2015

	St. Croix	St. John	St. Thomas	USVI
<u>Average Sale Price</u>				
Overall	\$572,168	\$1,984,599	\$797,993	\$966,826
Single Family	\$763,485	\$2,190,574	\$1,218,199	\$1,306,163
Condominiums	\$186,236	\$560,687	\$272,736	\$259,766
<u>Median Sale price</u>				



Overall	\$259,500	\$1,362,500	\$798,436	\$398,700
Single Family	\$394,500	\$928,000	\$545,000	\$647,700
Condominiums	\$149,700	\$510,000	\$236,250	\$210,000
<u>Average Days on Market</u>				
Overall	222	219	203	246
Single Family	254	318	207	265
Condominium	159	375	197	202
<u># of Homes for Sale</u>				
Overall	350	182	279	811
Single Family	234	159	155	548
Condominium	116	23	124	263

Source: Community Research Services, LLC, 2015

Limited homeownership options can be linked to home prices increasing dramatically starting in 2000, a trend that has continued to the present, which means for many residents it is becoming considerably more difficult to obtain housing. As housing assumes an important role in mitigating hurricane and flood risks, looking at housing availability for residents is an important consideration, especially for LMI households that have less income and have fewer housing options. The high cost of development across the Territory has been a primary issue in regard to providing affordable housing. Per unit costs are often as much as three times as compared to continental development. The numbers show that from a supply standpoint, an extremely limited number of homeowner choices are available for low- and moderate-income households on all three islands. While St Croix offers more options, far fewer exist on St. Thomas, and even fewer still on St. John, where affordable homeownership options are essentially nonexistent (Community Research Services, LLC, 2015).

Rental housing options for low- and moderate-income households also have been affected, with limited options available. As noted in the 2015 study, rental rates seem to be continuing to appreciate at a rate well above wage/income growth, resulting in an increase in the level of rent-overburden for low-income renter households, a trend that the 2017 hurricanes only exacerbated as landlords worked to rebuild damaged properties. That same 2015 Housing Demand Study conducted by the Community Research Services, LLC in 2015 showed strong findings of the significant need in the Territory for a myriad of housing, to include the following:

- Affordable rental housing – for households with one income and families across the Territory.
- Affordable homeownership opportunities – to provide direct and indirect assistance for those families seeking homeownership.
- Supportive Housing – targeted for those that are homeless and/or exhibit various special needs characteristics.
- Senior rental housing – primarily targeted for persons aged 65 and older on St. Thomas and St. Croix, with potential options for multi-generational housing, mixed-use development, and mixed- income housing.

The Housing Needs Study made the following recommendations in 2015 that still represents present reflect the present-day market needs, with development options ranked by priority:

St. Croix:

- #1) Homeless/Special Needs
- #2) Affordable Senior Rental
- #3) Workforce/Affordable Rental
- #4) Homeownership

St. Thomas:

- #1) Homeless/Special Needs
- #2) Workforce/Affordable Rental
- #3) Affordable Senior Rental
- #4) Homeownership

St. John:

- #1) Workforce/Affordable Rental

The condition of the existing housing stock is also a major factor in terms of overall housing need creating an increasing preference for newer and more modern housing options and a greater need for demolition of substandard units. There is a significant percentage of the Territory rental units that are considered substandard, much greater than the national average. The total substandard percentages range from 16 percent to 18 percent. The impact of major storms has only exacerbated the housing need and tighten the rental market. According the 2019 USVI Comprehensive Housing Market Analysis of the overall rental vacancy rate in the Territory was estimated to have fallen by more than one-half since the hurricanes, with rents estimated to have more than doubled for some unit types.

The USVI has historically had one of the highest cost-burden rental population with residents spending more than 30% of their income on rent far exceeded the rest of the nation, an issue that has been



compounded by rapidly rising rents since the hurricanes. The lack of affordable multi-family developments has resulted in many low-income residents being forced to seek market rate units. As of August 2019, Studio units, which rented for \$600 a month prior to the hurricanes, are currently estimated to rent for up to \$1,000 a month, while rents for one-bedroom units, which previously rented for \$1,100 a month, are currently as high as \$2,500 a month. Two- and three-bedroom units, which rented for approximately \$1,800 and \$2,500, currently rent for as much as \$3,000 and \$6,000 a month, respectively. 1.13 Assessing Priorities

In Section 5 of the THMP, the Territory outlines goals aimed at reducing risk. Each major island is assessed by description of the goal to be achieved, the priority of the goal according to risk presented, collaborative partners, and identification of funding sources, among other things. The selection of projects and proposed programs in this Action Plan aligns the MNA with selected projects. While the CDBG-MIT framework is not ideal to serve every action item, there is significant overlap between territory priorities, the assessment of the data for community needs, and the CDBG eligible activities.

Identified mitigation actions to be considered based upon the MNA include:

- Planning activities including studies and other products that can help local communities better understand their risks.
- Engagement with all territorial entities to identify available funding that could be used for mitigation and discuss opportunities to collaborate.
- Housing development to increase the resilience of housing for their residents after disasters
- Infrastructure and public facilities improvements that use mitigation measures
- Economic resilience activities

The VIHFA recognizes that Territorial priorities exist in the THMP which are focused on risks that are unique to the Territory. These specific priorities are most strongly associated with CDBG-MIT funded interventions and in many instances are complimentary. USVI will continue to look at planned CDBG-MIT projects, to identify connections to those arising from the THMP to ensure alignment of these assessments and initiatives.



2.0 Long-term Planning and Risk Mitigation Assessments

2.0 LONG-TERM PLANNING AND RISK MITIGATION ASSESSMENTS

The Territory commends the various planning organizations for their accomplishments and disaster management efforts prior to the creation of this CDBG-MIT Action Plan (MIT-AP). Organizations and efforts, such as those undertaken by the Virgin Islands Office of Disaster Recovery, the Virgin Islands Territorial Emergency Management Agency, and Department of Planning and Natural Resources represent a few examples of existing efforts that have inspired the content of the present Mitigation Action Plan. The considerable funds made available in the CDBG-MIT allocation provided to the US Virgin Islands provides ample opportunities that require careful consideration as to their best and highest use for long-term planning and risk mitigation considerations.

Given the many fundamental needs within the Territory, the goal for this MIT-AP has been to select clear, actionable mitigation activities that are supported by a data-driven analysis of the corresponding mitigation need. An allocation of funds is available to fund planning events, as well as to fund the CDBG-MIT Action Plan development itself and good community outreach to inform future projects and programs. However, the Territory will revisit planning needs as projects and programs develop to ensure that activities undertaken with CDBG-MIT funds engage local and Federal partners to produce a data-driven, comprehensive analysis of the mitigation approaches funded in this Action Plan. This following Action Plan section reviews the state of broad planning initiatives across the Territory, examining actionable elements that include building codes, land use, and flood risk protection.

Due to the relatively small size and limited resources of the Territory, funding for planning activities has not been widely available in the past. Historically, local and regional planning efforts have been limited. However, approximately \$29 mm is being set aside in the MIT-AP for planning efforts to be undertaken by the parties and stakeholders best positioned to do so in the USVI. This represents an unprecedented opportunity for local and regional planning to be undertaken on a scale not previously possible. UVI, VITEMA ODR and other departments of government, academic institutions and non-profits will be enabled to undertake much needed planning efforts to increase resiliency in the Territory.

2.1 Building Code Standards

The US Virgin Islands has adopted and enacted the International Code Council construction standards as its own within the Territory. These include:

- International Building Code (IBC) - Pertains to the construction of commercial and multi dwelling buildings.
- International Residential Code (IRC) – Regulates the construction of single and two-family dwellings.
- International Mechanical Code (IMC) – Establishes standards for electrical, plumbing and air quality systems.
- International Energy Conservation Code (IECC) – Pertains to the standards for energy efficient structure construction

Buildings in the Territory are required to comply with the USVI Building Code, which automatically updates every three years when the International Code Council (ICC) releases its updates, to then be enforced six months later. These codes established by the International Code Council contain specific references to hazard mitigation. Consistently enforcing these construction codes would result in a

significant reduction of property loss, especially from identified mitigation hazards like windstorm and earthquake, as well as fire and flooding.

The USVI Building code is also informed by the “Construction Information for a Stronger Home” guide available through the Department of Planning and Natural Resources (DPNR), which undergoes periodic updates, as needed. Newly constructed buildings and homes or those requiring renovations of over 50 percent of the structure must comply with code updates, and no requirements currently exist for retrofitting structures to meet updated building codes. The requirements are outlined in “Construction Information for a Stronger Home,” a document promulgated by the Department of Planning and Natural Resources (DPNR). A complete copy of the most recent version of this guide will be attached to the final action plan as Appendix E.

The Division of Building Permits (DBP) within DPNR oversees both permit issuance and building code development for new and modified buildings. DBP does not perform regular or systematic compliance checks, relying instead on outside engineers to submit their recommendations for design approval and code issues prior to construction. Under the present system, current building codes do not explicitly address floodplain construction requirements, per se. A combination of local floodplain management regulations and building codes determine the requirements that govern construction, which are applied at the building permit stage, as outlined further herein.

2.1.1 Vertical Flood Elevation Protection

The VIHFA requires that new or substantially improved residential structures are elevated two feet or more above the BFE or high-water mark (if outside the floodplain), unless the home is already connected to an existing cistern, as is common with many older homes. For new construction using CDBG-MIT funds, VIHFA will remain consistent with this requirement and depending on the facts of the construction may require additional freeboard or other mitigation techniques to ensure that new construction is sufficiently protected.

2.2 Land Use and Zoning Policies

Land use and zoning practices, including adopting zoning regulation and amending zoning text or maps is a legislative policy choice entrusted to local elected officials. Plans provide a context to consider the long-term impact of individual land use decisions. Planning provides for public participation, coordination of programs and decisions, and the opportunity to set forth the basic policy choices that underlie a rational program of land use regulation.

While contemplated previously, no Territory-wide comprehensive land use and zoning plan is currently in place. A long-range Comprehensive Land and Water Use Plan (CLWUP) had previously been developed to provide guidance on how, when, and where the Virgin Islands were to be developed until the year 2005. That plan projected how the Virgin Islands would look by 2005 and addressed known issues, including infrastructure deficiencies, lack of affordable housing, and environmental degradation. The Legislature did not adopt the draft plan, and in February 2020 plans emerged for revisiting the CLWUP approach to develop a land-use plan tailored to fit each island district as part of the larger whole, to account for variations in geography and land use in St. Thomas, St. John, and St. Croix, which would factor in existing plans for Coastal Zone Management and Land Development Regulations.



2.2.1 Coastal Zone Management

The Federal Coastal Zone Management Act of 1972 included requirements for the States and Territories of the United States to develop a coastal zone management program. The US Virgin Islands Coastal Zone Management Act of 1978 became effective in 1979. The resulting US Virgin Islands Coastal Zone Management Program was prepared by the US Virgin Islands Planning Office (which has since been reorganized as DPNR) and submitted by the Governor to the US Department of Commerce. The Virgin Islands Coastal Zone Management Program, as articulated in Title 12 VIRR, Chapter 21, §901-14, is based on a fundamental desire to preserve a significant environmental resource that benefits the economy and quality of life for the Territory's residents.

DPNR is the central territorial agency administering the Coastal Zone Management program in the US Virgin Islands. Other principal entities include the Office of the Governor, Legislature, the Department of Public Works, and the Board of Land Use Appeals. The Coastal Zone Management Act created a Coastal Zone Management Commission within DPNR. A Division of Coastal Zone Management was also created within DPNR to assist the Commission and the Commissioner in administration and enforcement.

2.2.2 Land Development Regulations

Land development regulations play an essential role in an integrated coordinated mitigation program. By controlling where and how development occurs, major problems can be lessened or avoided. Also, as properties are redeveloped or rebuilt, strong regulations can ensure that the replacement or repaired structures are better able to resist damage from future events.

In the US Virgin Islands, the key elements to land development regulation include the following:

- Zoning;
- Subdivision Regulations;
- Building Codes; and
- Building Permits

US Virgin Islands zoning law is based on VIC Title 29, Chapter 3, Subchapter 1. The code divides all the islands into various land and water-based districts. Applying these key elements functionally prohibits or regulates the development and redevelopment in hazard prone areas. In this way zoning can be an effective means to eliminate or reduce the risk of loss of life and property damage, especially for hazards that have defined geographic extents such as flooding, as identified within the MIT-AP Hazard Mitigation section. Comparing hazard profiling and risk assessment with the existing Zoning District Map helps to identify areas where potential development may be in harm's way. A careful study into updating or revising the current map to provide a better match between the suitability of the land for development and the type and intensity of use proposed would be an excellent use of mitigation planning funds.

Considering a revised Zoning District Map for the Territory that includes substantial reductions in development capacities in hazard prone areas would have immediate results in limiting future losses. Zoning can also be used to reduce density in existing developed areas. By down-zoning (i.e., reducing allowable development densities and intensities), non-conforming uses will be established. Under the current system, these uses will persist until such time as the property owners request permits for substantial changes to the property or until the property is substantially improved or damaged (i.e., at a level greater than 50 percent of its value). In these cases, provisions can then take effect to reduce hazard vulnerability and / or the property would not be redeveloped.

The US Virgin Island Code sets out Zoning and Subdivision Law, describing permitted uses and restrictions assigned to classified Agricultural, Residential, Business, Commercial, Industry, Waterfront, Public, and Special properties within the Virgin Islands Development Code. These zoning laws define acceptable lot uses, sizes, maximum density, height, parking requirements, and setbacks, for example. DPNR is charged with revising the US Virgin Islands zoning regulations and enforcing their use.

DPNR and the Division of Environmental Protection have implemented a regulation requiring all applicants submitting documents and plans for construction or earth change permits, for developments one acre or greater, to submit a storm water prevention plan. Any storm water prevention plan must consider pre-existing hydrology as well as postulate on post construction run-off. The storm water prevention plan must also clearly indicate how mitigation measures will be introduced in the site design. This action has potential to be an effective strategy to ensure that surface run-off does not exceed pre-existing conditions and may assure that future development does not exacerbate flooding in downstream areas.

2.3 Flood Mitigation Efforts

As the CDBG-MIT allocation is directly tied to the impacts of flooding from the 2017 hurricanes, flood mitigation must be a key part of the MIT-AP. The Territory remains committed to ensuring responsible floodplain and wetland management based on the history of flood mitigation efforts and the frequency and intensity of precipitation events.

Coordinating infrastructure and other projects can facilitate design decisions to mitigate potential drainage and water management issues. All programs will incorporate, where applicable, appropriate mitigation measures and floodplain management.

The Territory previously adopted NFIP-compliant floodplain management provisions under Rules and Regulations on Flood Damage Prevention, Title 3. Executive Chapter 22, Department of Planning and Natural Resources, Subchapter 401(b)(15), VIRR in 1993. The Rules and Regulations apply only to the areas defined in the most recent FIRMs as the Special Flood Hazard Areas (SFHA). In these areas, a permit is required for any type of development procedure or change to the floodplain including excavation, dredging, filling, drilling, modification to existing structures and construction of new structures. The Rules and Regulations reference the appropriate provisions of Section 44 of the Code of Federal Regulations (44 CFR) as General Standards, but also add several general and specific standards. The Commissioner of DPNR is appointed to administer and implement the provisions of these regulations and may request the assistance of other departments and agencies to provide technical assistance.

FEMA's HMGP funding anticipates obligating important mapping and hydrologic studies, which will provide up-to-date data and land use recommendations that are critical for roads and power-related projects and can be used as part of efforts to develop a comprehensive land use and zoning plan that is current and based on present observations within the Territory.

2.3.1 Elevation

While the Territory will implement resilient home construction standards, the Territory does not anticipate elevating homes given the cost and structural limitations of cisterns, which are structurally connected to the slab. However, new housing construction within the floodplain will be built in accordance with the existing local building codes. The existing code is consistent with HUD guidance



to ensure all structures, as defined at 44 CFR 59.1, designed principally for residential use and located in the 1 percent annual (or 100-year) floodplain that receive federal assistance for new construction, repair of substantial damage, or substantial improvement, as defined at 24 CFR 55.2(b)(10), must be elevated with the lowest floor, including the basement, at least two to three feet above the 1 percent annual base floodplain elevation as determined by best available data.

Residential structures with no dwelling units and no residents below two feet above the 1 percent annual floodplain, must be elevated or flood-proofed, in accordance with FEMA flood proofing standards at 44 CFR 60.3(c)(3)(ii) or up to at least two feet above the 1 percent annual floodplain. Thus, the Territory has put mechanisms in place to ensure all structures requiring elevation go through an in-depth structural analysis to determine how and whether the rehabilitation or reconstruction is the most cost-effective approach to helping the homeowner. Home elevation is not common in the Territory, as it is not often required due to the mountainous and hilly terrain. Further, a home's cistern is often connected to its foundation and provides some elevation to the home. However, elevation will be done where required by the Territory's building code, which in accordance with 44 CFR 59.1, requires the first floor of structures located in the 1 percent annual (or 100-year) floodplain that receive federal assistance to be at least two to three feet above the 1 percent annual base floodplain elevation as determined by best available data.

Property owners assisted through the recovery program will be required to acquire and maintain flood insurance if their properties are in a FEMA-designated floodplain. This requirement is mandated to protect the safety of residents and their property and the investment of federal dollars. The elevation height of a house can significantly reduce the cost of flood insurance. The Territory will implement procedures and mechanisms to ensure that assisted property owners comply with all flood insurance requirements, including the purchase and notification requirements as a condition of receiving assistance.

2.3.2 Stormwater Management

The Virgin Islands Department of Public Works (DPW) has been actively surveying and assessing the Territory's stormwater management post-hurricanes. For example, they conducted a survey of 160 culverts on St. Croix, as well as some on St. Thomas and St. John. The storm water management system includes ghuts, culverts, concrete swales, low water crossings and curbs. Some ghuts are naturally formed green infrastructure (dry stream beds) and others are concrete lined channels added to facilitate water runoff, often along the side of streets.

In conjunction with these efforts, the Territory continues to work on addressing water/flooding damages to local roadways in FEMA Public Assistance Project Worksheets (PWs) via hazard mitigation. Mitigation measures may include paving a gravel street, building new concrete swales, re-building sections of road as rigid pavement (concrete) instead of the original asphalt design that is easily damaged by water. Conversations moving forward need to include resizing culverts and replacing older ones and adding best use and maintenance of green infrastructure. Some older culverts simply need to be replaced as they have degraded over time to not work well, and large sections of the system need to have previously installed 8" pipes upgraded to larger ones to improve how the system currently functions.

2.3.3 Unified Watershed Assessment and Restoration Priorities

The Department of Planning & Natural Resources (DPNR) for the Territory has developed the Unified Watershed Assessment Report pursuant to the Territory's Clean Water Action Plan, in cooperation with the US Department of Agriculture and its Natural Resources Conservation Service. Undertaking

a cooperative process for restoring and protecting water quality on a watershed basis is a key priority for the Territory. DPNR has identified problem watersheds that have not met or are in danger of not meeting clean water or other natural resource goals. The DPNR assessments utilize existing information and represent a collaborative effort between local government, federal land management agencies, conservation districts and land conservation departments, non-governmental and private organizations, and other stakeholders as well.

The watershed approach and the collaborative model for public and private partnerships would be conducive to much of the work that needs to be done to implement a comprehensive hazard mitigation strategy. However, the implementation of these programs has been stymied by lack of adequate staffing and resources. Enforcement of erosion and sediment control should become priorities for DPNR, particularly as it relates to reducing surface run-off and flood hazard reduction along with water quality protection.

2.3.4 High Wind

In addition to this vertical height requirement, the VIHFA will take into consideration high wind considerations for new or rehabilitated buildings. There are many informational resources available to safeguard against high wind conditions, including *FEMA 543: Risk Management Series Design Guide for Improving Critical Facility Safety from Flooding and High Winds*. FEMA 543 recommends incorporating hazard mitigation measures into all stages and at all levels of critical facility planning and design, for both new construction and the reconstruction and rehabilitation of existing facilities (Federal Emergency Management Agency, 2007). While the guidelines in FEMA 543 are applicable to critical facilities, they may also be applied to new construction of other buildings and infrastructure. In all instances, the VIHFA will defer to engineering and design experts to ensure that high wind hazards are addressed.

2.3.5 Sea Level Rise

In addressing flood mitigation, it is essential to the long-term planning process to also consider the effects of sea level rise on the coastal communities of the State. According to National Oceanic and Atmospheric Administration (NOAA) data, the sea level off the coast of USVI has risen 11 inches higher than its 1950 level (National Oceanic and Atmospheric Administration).

While the Territory's topography somewhat lessens the future impact, rising sea levels potentially place both private and public waterfront properties at risk of coastal erosion in the future, as well as greater risk of flooding, compounding complications with storm surges when hurricanes threaten the Territory. As a result, FEMA's 100-year floodplain will expand further, putting more homes at risk of flooding during storms and requiring more homeowners to purchase flood insurance (National Oceanic and Atmospheric Administration).

2.4 Local and Regional Planning Coordination

The CDBG-MIT Action Plan (MIT-AP) has been prepared by the Government of the U.S. Virgin Islands in consultation with local territorial government agencies and authorities (and/or their consultants), including the Virgin Islands Housing Authority (VIHA), and community stakeholders. As it is a territory, the U.S. Virgin Islands lacks the state government layer seen elsewhere in the United States. This means that government is conducted without restrictions that arise from state laws and regulations, as well as those that are connected with municipal and county regulations and laws too. As a result,



the USVI Territorial Government uses various autonomous and semi-autonomous agencies/authorities in conducting governmental operations in the Territory.

The U.S. Virgin Islands plans to spend no more than 15% of its total allocation on eligible Planning activities. This includes all Action Plan development activities, which are considered Planning activities. The U.S. Virgin Islands also intends to fund planning-only grants for studies, technical reports, or the like. This may include costs incurred for data gathering, studies, analysis, and preparation of plans. For the purposes of this grant award, the cost of engineering or architectural plans in support of construction activities will be treated as direct project delivery costs. Only VIHFA and its subrecipients can incur planning costs.

Following the multiple methods CDBG-MIT funding for the Territory will be disbursed, the VIHFA will continue to coordinate with existing planning efforts, including the Governor's Hurricane Recovery and Resilience Taskforce and the planned update of the Hazard Mitigation Plan. FEMA's Hazard Mitigation Grant Program (HMGP) is funding a comprehensive update to the Territorial Hazard Mitigation Plan with 100 percent HMGP funding for an amount around \$3 million, with the University of the Virgin Islands (UVI) taking the lead for the technical work on this key endeavor. The current plan was completed in 2014 and expires in 2019. The VIHFA is working closely with VITEMA to stay up to date on related efforts being funded through HMGP, which are also coordinated through the Territory of the Virgin Islands Administrative Plan for the Hazard Mitigation Grant Program.

As part of its coordination efforts, the VIHFA has partnered with VIHA, in consultation with the Government of the Virgin Islands and others, to convene an Urban Land Institute Advisory Panel to provide input on potential redevelopment areas. The panel focuses on ways to support the transformation of St. Croix through the long-term recovery process including economic growth through equitable and entrepreneurially means. The VIEDA Vision 2040 Plan, partially funded with CDBG-DR, functions as a long-term strategic economic recovery and development plan with economic growth, job creation and wealth generation as measurable deliverables, with a focus on improved quality of life for the Territory's residents.

Furthermore, the VIHFA will further develop a protocol for coordination amongst implementing entities and other stakeholders key to fulfilling programmatic goals defined with the Action Plan for the Territory. Working with the Government of the U.S. Virgin Islands and implementing entities to determine what additional planning needs exist and how to best coordinate them for the Territory will result in continuing updates to the unmet needs analysis and program identification interventions to support both short and long-term recovery efforts.

2.5 Flood Insurance Coverage

With respect to flood insurance, CDBG-MIT funded homeowners of a property located in a Special Flood Hazard Area (SFHA) must obtain and maintain flood insurance in the amount and for the duration prescribed in FEMA's National Flood Insurance Program. Section 102(a) of the Flood Disaster Protection Act of 1973 (42 U.S.C. 4012a) mandates the purchase of flood insurance protection for CDBG-MIT (a HUD-assisted property) within a SFHA, when CDBG-MIT is used to finance acquisition or construction, including rehabilitation. The VIHFA will encourage the purchase of flood insurance outside of SFHA's but carrying flood insurance outside of SFHA's is not a requirement.

Section 582 of the National Flood Insurance Reform Act of 1994, as amended, (42 U.S.C. 5154a) prohibits flood disaster assistance in certain circumstances. In general, it provides that no Federal disaster relief assistance made available in a flood disaster area may be used to make a payment

(including any loan assistance payment) to a person for “repair, replacement, or restoration” for damage to any personal, residential, or commercial property if that person at any time has received Federal flood disaster assistance that was conditioned on the person first having obtained flood insurance under applicable Federal law and the person has subsequently failed to obtain and maintain flood insurance as required under applicable Federal law on such property. This means that CDBG-MIT assistance may not be provided for the repair, replacement, or restoration of a property to a person who has failed to meet this requirement.

Section 582 also imposes a responsibility on the VIHFA and its subrecipients to inform property owners receiving assistance that triggers the flood insurance purchase requirement that they have a statutory responsibility to notify any transferee of the requirement to obtain and maintain flood insurance in writing and to maintain such written notification in the documents evidencing the transfer of the property, and that the transferring owner may be liable if he or she fails to do so.

Private rentals, tax credit rentals, and communities are insured with casualty and property policies to protect buildings in the event of a disaster. Insurance for privately owned real estate is only required if properties are mortgaged or their owners have construction loans. In the former case, forced-placed insurance is applied when homeowners do not insure a mortgaged property, and all financed properties must also be assessed for flood insurance requirements (see below). In the latter case, homeowners must purchase builders’ risk insurance during construction. Unfortunately, owners who are not required to purchase insurance often do not do so: homeowners insurance premiums in the Territory are high, forcing many USVI homeowners with no mortgage USVI Hurricane Recovery and Resilience Task Force 139 “Housing and Buildings” to underinsure or forgo homeowners insurance entirely.

To ensure homeowners are educated on the risks of remaining uninsured or underinsured, the USVI government issued an emergency order in February 2018 to insurance companies, mandating explanation of the consequences of underinsurance to their policyholders.

2.5.1 National Flood Insurance Program, Floodplain Management, and Building Codes

In the future, as hurricanes become more intense— though not necessarily more frequent—homes and housing properties may face greater damage. For public housing, the aging 40+ year-old buildings in the territorial public housing communities will continue to deteriorate and sustain more damage if the buildings are not improved and mitigated. For private owners, worse storm damage, combined with an increase in storms and flooding, will also lead to stricter requirements and higher property and homeowner’s insurance rates, potentially increasing the number of homeowners unable either to get or pay for insurance coverage.

Improved floodplain management, including land use planning, zoning, and enforcement in the Territory can reduce flood related damage for both existing buildings and new development. Taking full advantage of the National Flood Insurance Program (NFIP) is critical to the reduction of future, repetitive flood damage costs to taxpayers.

All developments, regardless of the location, require a permit to include buildings, fill, and any other type of development. The Territory has the authority to implement and enforce adopted ordinances related to floodplain management, building code and zoning compliance. The NFIP requires that when the cost of reconstruction, rehabilitation, addition, or other improvements to a building equal or exceeds 50% of the fair market value, then the building must meet the same construction requirements



as a new building. Substantially damaged buildings must be brought up to new construction standards. A residence or building damaged so that the cost of repairs equals or exceeds 50% of the structure's fair market value must also be elevated above the Base Flood Elevation (BFE) in flood zones where BFEs are established. This provision applies to the entire jurisdiction of the Territory.

FEMA's National Flood Insurance Program (NFIP) offers flood insurance to businesses, homeowners, and renters, but the coverage is optional. Homeowners can purchase up to \$250,000 in coverage, while businesses can purchase up to \$500,000; renters can purchase separate contents protection for coverage. Typically, policies can be purchased through homeowner's insurance agents, as rates do not differ from one company or agent to the next. The amount a policy holder pays is based on various factors, including the year the building was constructed, building occupancy, number of floors, location of its contents, flood risk (flood zone), location of the lowest floor relative to the Base Flood Elevation on the flood map, the deductible amount, and amount of building and contents coverage. Buildings with federally backed mortgages (e.g., through Fannie Mae) are required to get insurance through NFIP if they are in FEMA-determined flood zones.



3.0 Connection of Mitigation Programs to Identified Risks

3.0 CONNECTION OF MITIGATION PROGRAMS TO IDENTIFIED RISKS

The Territory remains committed to advancing mitigation programs and projects that advance long term resilience to current and future hazards. HUD published [84 FR 45838](#) on August 30, 2019 (CDBG-MIT Main Notice) that outlined the primary rules for grantees administering CDBG-MIT funded projects and programs. The CDBG-MIT Main Notice established the following definition for mitigation:

For the purposes of this notice, mitigation activities are defined as those activities that increase resilience to disasters and reduce or eliminate the long-term risk of loss of life, injury, damage to and loss of property, and suffering and hardship, by lessening the impact of future disasters.

Each mitigation program or project funded through this Action Plan must meet this definition of mitigation to be eligible for funding through the CDBG-MIT program.

Additionally, each proposed mitigation program or project must comply with the following three-pronged test established in the CDBG-MIT Main Notice:

1. It must advance long-term resilience.
2. Align with other planned capital improvements; and
3. Promote community-level and regional planning for current and future disaster recovery efforts and additional mitigation investment.

The VIHFA will incorporate this three-pronged test as a requirement to be met for any projects proposed in procurements issued for CDBG-MIT funding or projects proposed by subrecipients. Additionally, this Action Plan provides approximately \$29,000,000 for community and regional level planning which the VIHFA is making available to promote the kind of community and regional planning required above. In the past, the Territorial government has not had the financial resources necessary to engage in many of such planning activities. This relatively massive investment in planning will make such planning efforts possible.

The Mitigation Needs Assessment (MNA) cited the Hazard Ranking from the 2019 Territorial Hazard Mitigation Plan (THMP) (see Table 4 above). Hurricanes and Riverine Flooding were identified as the two top ranked hazards. While earthquakes and tsunamis were ranked third and fourth respectively, the return periods for such hazards are much longer than those for hurricanes and riverine flooding (see Table 27 above).

The projected return periods for Hurricanes are 50 years and riverine flooding is 100 years. In contrast, the return periods for earthquakes are 1,000 years and tsunamis are 500 years. The Combined Loss Calculations in Table 27 take into consideration the relationship between relative frequency and potential losses of likely hazards. This analysis yields a loss/year calculation of \$130,112,652.00 for hurricanes, \$21,761,129.00 for riverine flooding, \$12,041,744.00 for earthquakes and \$5,321,476.00 for tsunamis.

To demonstrate the connection between mitigation and identified risks, all proposed projects or programs must fall squarely within the above mitigation definition and meet the three-pronged test outlined above. Furthermore, each program or project selected must be coordinated with and guided by the identification and prioritization of hazards described in the MNA. Examining the combined loss

calculation analysis shows that Hurricane, Riverine Flooding, Earthquake, and Tsunami pose the most significant risks financially overall when factoring in losses to critical facilities, commercial interests, and residential losses.

3.1 Infrastructure & Public Facilities

The U.S. Virgin Islands' reliance on the proper functioning of its infrastructure systems—including energy, transportation, and telecommunications infrastructure—was evident when these systems failed in the aftermath of Hurricanes Irma and Maria. High winds, torrential rainfall, and flooding from both disasters had compounding effects on the infrastructure sectors on each of the U.S. Virgin Islands, leading to widespread and prolonged failures which has delayed economic recovery. High winds toppled above-ground utility lines; storm water runoff flooded roads and induced mudslides; and flooding, wind, and heavy rain severely damaged water and wastewater treatment plants, hospitals, and other buildings that provide critical services. Electrical substations were crippled, causing power failures to 95% of electrical customers. Water pump failures and sewage overflows from storm water surges led to potable water safety precautions such as “boil water” advisories and EPA drinking water assessments. Lacking both a steady power supply and functioning transportation and water infrastructure, many businesses were forced to shut down, some for extended periods. Closure of the ports and airports for more than two weeks, had significant effects on the Territory's connectivity, limiting the pace of voluntary evacuation efforts, delaying the delivery of essential supplies for emergency relief, and causing further disruption to the economy.

The U.S. Virgin Islands has identified multiple infrastructure priorities that must be addressed, and which directly support housing needs. Residents not only suffered from direct damage to their homes from the hurricanes, but also endured the loss of critical services such as power and water due to damaged public infrastructure. Without water or power, residents were forced to evacuate their homes and seek shelter and emergency assistance. If the Territory's infrastructure is made more resilient, critical services could be stabilized and maintained for residents in the event of a future disaster, creating a safer and more secure environment. Like housing programs, all infrastructure programs will meet a HUD national objective. The most applicable national objective for infrastructure will likely be LMI benefit. A subcategory of LMI benefit is the low- and moderate-income area benefit (LMA). LMA allows activities that benefit all persons in a particular service area to count towards the LMI objective when at least 51% of residents in the service area are classified as LMI. For each activity, the Territory will determine the appropriate service area based on factors including: the nature of the activity; the location of the activity; accessibility issues; the availability of comparable activities; and boundaries for facilities and public services. The Territory will ensure that projects will be appropriately prioritized to provide services to LMI persons and support unmet housing needs.

Program activities will be reviewed to determine URA/104(d) compliance and required actions. The policies and procedures will be further developed in modifications to the existing Residential Anti-displacement and Relocation Assistance Plan (RARAP) and a soon to be developed Optional Relocation Policy. Primary needs for the proper preparedness for, and recovery from, future natural disasters include: (i) comprehensive planning to identify resilience opportunities; (ii) adoption and enforcement of codes to bring critical infrastructure up to industry standards; (iii) holistic mitigation designs to meet future challenges and hazards; and (iv) implementation of innovative technology and other best practices to create a more reliable, sustainable, and cost-effective electric grid.

Infrastructure improvements to the public water system will increase resilience by providing a more plentiful, safe, and stable water system. The current system relies heavily on individual residents capturing rainwater in cisterns. Approximately 25% of the residents are connected to the public water



system and therefore rely on cistern capture for the water needed to sustain life. Frequent “dry spells” and droughts often result in residents having to refill their cisterns with costly water obtained from private tanker trucks which serve as backup when rainwater is not available. Therefore, extending the public water system to more homes will help more USVI families to decrease the risks to health and safety posed by rainfall water shortages.

Infrastructure improvements to the pedestrian and vehicular mobility systems will enable residents to evacuate more effectively as necessary to remove themselves from harm’s way when natural disasters strike. Currently, the street systems for vehicular traffic are generally very narrow with little or no shoulder for emergency stops to enhance driver safety in the event of an accident or mechanical problem. Additionally, the street system experiences significant congestion and traffic delays in the more concentrated areas. The pedestrian mobility system is almost non-existent, except for a few commercial areas predominantly frequented by tourists. The lack of sidewalks, crosswalks, medians and hike and bike trails makes it extremely difficult and dangerous for pedestrians to move safely between residential and commercial centers even when no natural disasters are present. During disasters this danger is exacerbated when floods, storm debris (e.g., vegetative, building, etc.), and other hazards impede vehicular mobility and render pedestrian mobility even less practical and even more dangerous. For low-income residents who do not own cars and for the chronically homeless, the lack of safe alternatives to vehicular mobility is a significant barrier to resilience. Furthermore, the inadequate street system heightens danger to residents in times of crisis.

Improvements to the USVI storm drainage system will significantly decrease danger to residents during hurricanes, and other high rain events that result in riverine and other flooding.

USVI recovery efforts have been supported through the provision of multiple funding sources. Primarily of interest to long-term mitigation are funds received for FEMA Public Assistance (PA), FEMA Individual Assistance (IA), FEMA Hazard Mitigation Grant Program (HMGP), Small Business Administration (SBA) Disaster Loans, Department of Transportation (DOT) funds, and U.S. Army Corps of Engineers (USACE) funds. Currently, a list of ongoing USACE projects does not indicate that there is significant priority overlap with CDBG-MIT activities (United States Army Corps of Engineers). If new USACE projects are introduced, the VIHFA will establish whether they would be a vehicle to leverage CDBG-MIT funds. Given the limited CDBG-MIT funds available, it is difficult to meaningfully interface with the major infrastructure projects that the USACE typically undertakes.

3.2 Housing

Within the Housing programs, the VIHFA will utilize a slate of solutions to address the need for resilient and viable permanent housing solutions. Solutions include mitigation rehabilitation or reconstruction of owner-occupied and rental units; options for first time homebuyers; voluntary acquisition or buyouts of high-risk properties; increased affordability of rental stock; and restoring and making more resilient the inventory of units for particularly vulnerable populations, especially those living in public and supportive housing. Priority will be given to the most vulnerable Virgin Islanders.

3.2.1 New Construction for Homeownership Opportunity and First Time Home Buyer Assistance

To build resiliency, reduce the pressure on the housing stock, and improve the quality of life for residents of the U.S. Virgin Islands funds will be used to provide LMI households the opportunity to purchase a home through direct financial incentives, effectively creating first time home buyers. The program will provide an affordable alternative to renting by creating new homeowner stock; thus, it will

alleviate some of the pressure on the rental market post-storms. Hurricanes Irma and Maria caused significant damage to both owner-occupied and rental stock, depleting the already-limited housing stock, and drove up prices beyond affordable levels. Almost half of all renters in the Territory were cost-burdened paying more than 30% of their income on rent prior to the storms. Due to the limited affordable rental stock, renters are most often paying more than the costs of a mortgage for homes of a similar size.

3.2.2 Public and Affordable Housing Development

The VIHFA will use funding to redevelop and create new affordable rental housing stock including subsidized and mixed income rental units. Eligible development activities include development of low-income and mixed-income units, infill construction of new units, and substantial rehabilitation of vacant commercial or uninhabitable dwellings to bring more mixed-use rental stock online. Funding will be used to incentivize the development of new low-income and mixed-income small and multi-family stock, including project-based subsidized housing. While low-income stock remains an urgent priority, mixed-income stock is also needed on the islands given the unmet need for rental units across the full spectrum of citizens, from low-income individuals typically supported by Low-Income Housing Tax Credit housing, low-income households with incomes that make them ineligible for LIHTC tax credit units (e.g. households with incomes between 60% of AMI and market rate) and tenants that can afford market rate units. This program intends to enable the development of rental housing which prevents concentrations of poverty. The VIHFA uses the HUD-defined fair market rents as a basis to determine affordable rent caps.

For mitigation projects, the VIHFA will foster the creation of Public Private Partnerships (PPP) to leverage available CDBG-MIT funds and focus additional resources on the identified risks. For example, in developing more resilient affordable housing, the VIHFA and the Virgin Islands Housing Authority (VIHA) plan to work cooperatively to form PPPs with Low Income Housing Tax Credit equity investors, commercial lending institutions and private sector nonprofit and for-profit developers. These PPPs will allow the VIHA to comprehensively rehabilitate or reconstruct its portfolio of approximately 3,000 aging and functionally obsolete public housing units.

Many of these units are more than 50 years old and sustained significant damage from Hurricane's Irma and Maria. VIHA's goal is to transform these homes by hardening or replacing them with state-of-the-art hurricane, flood and drought resiliency design features and components. Repairing and hardening existing structures would conserve natural resources and reduce construction and demolition waste by maintaining the available housing stock.

In addition to the pressing need to render VIHA's housing stock safer and more resilient, as explained within the 2015 Housing Demand study prepared for the VIHFA, the Virgin Islands Housing Authority (VIHA) has confirmed that a 5,000-unit shortage of affordable housing in the Territory existed even before the 2017 hurricanes devastated VIHA's existing housing (see VIHA 10-year Action Plan, page 1).

The acute shortage of affordable housing in the Territory has put enormous economic pressure on LMI residents resulting in many Virgin Islanders being housed in substandard or overcrowded conditions or becoming homeless. Therefore, improving and increasing resilient affordable housing will directly address the needs of those most vulnerable to Hurricanes and flooding by providing affordable housing that can safely sustain such disasters and by providing safe shelter to those who are chronically homeless.



3.2.3 Homeless and Supportive Housing

The Territory will continue to prioritize the creation of a Supportive Housing for Vulnerable Populations program which covers eligible costs to rehabilitate or replace damaged residential units for the Territory's most vulnerable populations. CDBG-MIT funds will be allocated for the creation of new temporary and supportive housing, and for the expansion or development of supportive U.S. Virgin Islands' This housing will be available to assist those USVI residents who were homeless before the storms, those who became homeless as a result of the storms and those applicants who are in danger of becoming homeless as a result of job loss in connection with the storm, the requirement to make higher than normal rental housing payments. It will also be developed to assist victims of domestic violence, drug abuse or developmental disabilities and mental illness. The VIHFA will continue to use its emergency housing plan as a guide to prioritize potential projects for populations, including domestic violence, natural disaster victims, catastrophic incident victims, and financial hardship victims.



Pictured: Groundbreaking ceremony for the VIHFA's Wild Pineapple housing development.



4.0 Low- and Moderate- Income Priority

4.0 LOW- AND MODERATE-INCOME PRIORITY

The VIHFA is committed to serving the LMI population of the impacted areas of the Territory. By waiver in the Notice, the requirement to expend 70 percent of CDBG funds on activities that benefit low- and moderate-income persons is replaced by a requirement to expend 50 percent of funds on LMI activities. This waiver does not change the need to prioritize the protection of LMI individuals. The VIHFA has a goal of reaching the traditional 70 percent level of LMI benefit.

Therefore, the affordable housing components of the CDBG-MIT allocation will be at least 70 percent allocated to the benefit of LMI individuals and households. To the extent that it is feasible, buyout and acquisition activities will also prioritize LMI individuals and households – although following HUD guidance on executing buyouts strategically, exceptions may be made as a means of acquiring contiguous parcels. To the maximum extent practicable, the VIHFA will attempt to avoid circumstances in which parcels that could not be acquired through a buyout remain alongside parcels that have been acquired through the grantee's buyout program. This may require executing buyouts that do not serve an LMI individual or household.

4.1 Vulnerable Populations

Of significant concern is housing which typically serves vulnerable populations, including transitional housing, permanent supportive housing, permanent housing serving individuals and families (including subpopulations) that are homeless and at-risk of homelessness, and public housing developments. The VIHFA intends to repair or rehabilitate existing housing and will also create new housing opportunities outside of the floodplain. An analysis of the housing need in these areas will be conducted prior to project approval to ensure that these vulnerable populations are not ignored.

The VIHFA is considering individuals with access and functional needs that will require assistance with accessing and/or receiving CDBG-MIT disaster resources. These individuals may be children, senior citizens, persons with disabilities, from diverse cultures, transportation disadvantaged, homeless, having chronic medical disorders, and/or with limited English speaking, reading, having comprehension capacity, or altogether be non-English speaking.

The VIHFA is considering the provision of specialized resources that may include, but are not limited to, public or private social services, transportation accommodations, information, interpreters, translators, I-speak cards, and other services for those persons who may be visually or speech impaired during the Action Plan process free of charge. The VIHFA is taking care to ensure that individuals can access disaster recovery resources.

As previously stated in its Hurricanes Irma and Maria CDBG-DR Action Plan, the approach to recovering both homes and neighborhoods after Hurricanes Irma and Maria was to strategically examine where the damage occurred, and then focus its recovery efforts in those areas, paying special attention to the housing types, household types, and special needs of these unique communities. The strategy for mitigation and resiliency is similar in that the VIHFA will approach disaster resilience and climate change adaptation through a cross-sector lens that anticipates how a changing climate, extreme events, ecological degradation, and their cascading effects will impact the needs of the Territory's vulnerable populations.

4.2 Specific Impact on Vulnerable Populations and Protected Classes

4.2.1 Seniors

According to the 2010 Census, 10% of households in the Virgin Islands are single households comprised of an individual 65 or older. FEMA IA data bolsters this estimate of the elderly population in Territory: as of March 30, 2018, 12% of registered households were individuals 65 or older living alone, and 30% of registered households had at least one individual 65 or older in their household. Based on past experiences from other disasters, the U.S. Virgin Islands recognizes that certain senior households may face special challenges after natural disasters. For example, senior owner-occupied households in the Territory are likely to have larger unmet needs following a disaster as a large proportion has fully paid off their mortgages and thus are not frequent purchasers of home insurance. Hurricanes Irma and Maria have highlighted the need to increase the resilience of seniors' homes and utilities so that vulnerable senior residents can remain housed safely during future severe weather events. Furthermore, there is a need to ensure a safe potable water supply and prevent the loss of power to maintain medicines at correct temperatures. The senior population is expected to grow significantly, intensifying the need for special considerations and accommodations for the aging population.

4.2.2 Special Needs

According to the 2010 U.S. Census, approximately 15% of the population of the U.S. Virgin Islands have disabilities. Hurricanes Irma and Maria had a particularly negative affect on these individuals, who are more likely to have a difficult time navigating assistance program and finding accommodating housing. Moreover, the storms also inflicted damages on support facilities and impacted service delivery for the special needs' population. For example, VIHFA's Emergency Housing Program provides close to 40 units of temporary housing for victims of domestic violence, natural disaster, catastrophic incidents, and financial hardships across four complexes – three in St. Croix and one in St. Thomas. All four complexes sustained damages because of the hurricanes. According to the service providers managing the complexes, residents had to be relocated to other housing. Other residents chose to leave the Territory for the mainland. Estimates of the total amount of damage incurred to the Program's facilities are still being developed. Another example is Lutheran Social Services (LSS), which is the largest provider of housing for adults and children with developmental disabilities and vulnerable seniors with 166 individuals housed in 8 properties. LSS experienced at least some amount of storm-damage to all 8 properties, requiring them to temporarily move some of their vulnerable residents to less damaged units in partially repaired facilities or to place them with local families.

4.2.3 Homelessness

According to a January 2019 study conducted by the Virgin Islands Continuum of Care consortium (CoC), the organization of service providers, advocacy groups and other stakeholder agencies charged with preventing and ending homelessness, there are 314 individuals across the Territory who were homeless. Of that total, 0 were family households, 13 were Veterans, 6 were unaccompanied young adults (aged 18-24), and 105 were individuals experiencing chronic homelessness. The hurricanes had a devastating impact on this population, many of whom were unable to find shelter during the storms. The storms caused severe damage to homeless facilities and providers serving vulnerable populations. According to the Homeless Management Information System (HMIS) maintained by the CoC, there were 14 homeless facilities operating in the Territory as of January 2017, providing a total of 136 beds. As of March 2018, only 11 of these facilities were in operation and offered



only 99 beds. The lack of insurance or sufficient insurance has left several providers without the resources to repair facilities. Furthermore, several shelters are in floodplains, thereby inhibiting their ability to consistently provide assistance.

Facilities need immediate and longer-term assistance to return to the level of repair they were before the storm. Few have been able to repair the structures with their own funds and all need improvements to make them more resilient for future disasters.

Based on emerging contractor estimates of repair costs for existing facilities, the unmet need for the Territory's homeless population is approximately \$2 million, including efforts aimed at bringing existing facilities back to pre-storm condition and increasing the resilience of those facilities.

The CDBG-MIT housing programs will coordinate with the CDBG-DR housing programs to prioritize the most vulnerable Virgin Islanders, especially those who remain placed or living in severely damaged homes more than a year after the 2017 hurricanes. The Territory will further prioritize reconstruction for owner-occupied low- and moderate- income households whose homes were either destroyed or with major or severe damage with no other resources to complete rehabilitation or reconstruction. The roof repair solution under STEP has drastically reduced the number of unmet needs. Households not eligible for STEP are being evaluated for CDBG-DR funded home rehabilitation or reconstruction.

The proposed housing program will also support the repair and development of affordable rental and public housing as well as sheltering initiatives. The program will support landlords who continue to make repairs or build new rental housing to repair and expand the availability of affordable rental more quickly. Additionally, the Territory will build new affordable housing for eligible owners and renters. The program will manage disaster-impacted, low- to moderate-income households that may be ready to move up to home ownership or are interested in subsidized and affordable rental housing.

New public housing and affordable rental units, the need for which predates but was exacerbated by the storms, will be built to provide long-term housing for LMI families throughout the U.S. Virgin Islands. Residential units for particularly vulnerable populations—the homeless, disabled, mentally ill, and elderly—will also be prioritized. New housing units funded through this Action Plan will meet the U.S. Virgin Islands' enhanced building codes and HUD's resilience standards, which will reduce the future need for emergency sheltering.

Based on available data, as well as input from relevant Territorial departments, organizations and agencies, the needs of vulnerable populations include:

- Assisting providers of housing for the vulnerable to repair or replace their damaged units;
- Supporting the expansion or new development of units for the vulnerable, especially for the aged and the mentally ill; and
- Enabling providers to support the most vulnerable through provision of services including those for mental health and crisis counseling, legal counseling, and case management, enabling individuals to access the programs they need.

In October 2017, the Governor created an expert advisory committee to help guide short- and long-term recovery efforts for the Territory. This Task Force included representatives from territorial departments and agencies that serve low-income residents, the elderly, children, and persons with physical and developmental disabilities. While these individuals face the most barriers, they may be the least able to advocate on their own behalf. The involvement of groups and agencies that represent them ensures that these vulnerable individuals and households are not forgotten in the recovery.

The vulnerable population is estimated by the Governor’s Recovery and Resilience Task Force to be approximately 63,000 people; 56,500 supported through financial programs, 6,300 elderly, 1,100 children and 400 persons with disabilities (USVI Hurricane Recovery and Resilience Task Force, 2018). This number represents roughly 60% of the Virgin Island’s total population (U.S. Census Bureau, n.d.). Through the consultation process and Task Force involvement, the organizations helped to make sure the needs of these populations were recognized and addressed in both the CDBG-DR Action Plan and the CDBG-DR MIT Action Plan.

Funds under the CDBG MIT Plan are allocated among 4 broad categories—infrastructure; economic resilience; housing; and public services. The Virgin Island Housing Finance Authority Analysis of Impediments dated 2006; updated in 2015, and as may be further amended, contains discussion on vulnerable populations, areas of poverty concentration; and steps that VIHFA are already undertaking to insure priority and inclusivity of the protected classes under the Fair Housing Act. We hereby incorporate the AI by reference herein and will continue to roll in other recommendations as the projects are more specifically defined. Thus, the impact that the above-mentioned activities will have on both vulnerable and protected classes, etc. includes, but are not limited to the following:

- (1) Creating more resilient units of affordable housing through:
 - a. An increase in the number of units of affordable single-family housing
 - b. An increase in the number of units of affordable multi-family housing
- (2) There will be better access to information for protected and vulnerable populations
- (3) Will provide the appropriate number of disabled units in multifamily projects; and more than the minimum, if necessary
- (4) Single-family housing for disabled persons will be equipped and made appropriately accessible for their comfortable living and maneuvering
- (5) For vulnerable populations, there will be an increased number of resilient transitional housing units and shelters
- (6) VIFHA will increase the capacity of system providers and coordination between providers
- (7) Work with Public Transportation and the public to ensure that to the greatest extent feasible; public transportation is accessible to persons with disabilities
- (8) All public facilities will be accommodated to ensure use by the disabled community
- (9) Will seek other ways to work with public and private transportation companies in how to assist this vulnerable community.

The VIHFA is dedicated to ensuring that it reaches its vulnerable populations; providing accessibility and making changes and adjustments to enhance quality of life.

Historically, over 52% of fair housing complaints are filed by persons with special needs or persons with a disability. VIHFA will ensure that this population has easy access to voicing all complaints to



HUD. VIHFA will also use its own Virgin Island Fair Housing Commission to ensure complaints are being heard; and resolutions are following.

The Fair Housing Act prohibits discrimination because of race, color, national origin, religion, sex, familial status, and disability. We recognize that additional protection under fair housing includes, but is not limited to Title VI of the Civil Rights Act of 1964, Section 109 of the HCD Act of 1974, Section 504 of the Rehabilitation Act of 1973, Section 508 of the Rehabilitation Act of 1973, American With Disabilities Act of 1990, The Architectural Barriers Act, HUD's Equal Access Rule that specifically includes sexual orientation, etc. The VIHFA is committed to driving an equitable recovery and serving all residents, particularly the most vulnerable in the Territory where the entire territory has been designated as a Most Impacted and Distressed or "MID" area, which means that the great majority of the funding will be spent in LMI. We understand that while income is not a factor in the fair housing statute; the low-income requirement overlays protected classes (see maps below delineating dispersal of LMI populations across the USVI).

The following are minimum actions that the VIHFA will take to ensure that the public is aware of their rights; and that they have convenient and immediate access to filing complaints of discrimination in all areas impacted by the Act.

- (1) VIHFA will launch an aggressive Fair Housing Campaign, that educates the public with respect to their rights under the Fair Housing Act, in coordination with the Virgin Islands Housing Authority (VIHA).
- (2) VIHFA will make educational materials and information available in prominent public places; to include some of the following: apartment associations, public platforms, radio spots, PSA's, etc.
- (3) VIHFA will work with utility companies to place an education pamphlet in the electric bills.
- (4) VIHFA will place a Fair Housing PowerPoint presentation on the VIHFA Website.
- (5) VIHFA will require training for all employees and recipients of federal funds.
- (6) In conjunction with VIHA, establish a Fair Housing Hotline to capture data regarding prevalent issues and the number of protected classes that may be impacted.
- (7) Analyze data at the end of each year to determine what steps VIHFA will take to ameliorate such barriers.
- (8) VIHFA will offer continuing training that will help to overcome lack of affordable housing barriers (credit repair, financial literacy, computer services, etc.) VIHFA already provides such training to the community, adding additional training on Fair Housing.
- (9) VIHFA will hold a regular Housing Expo event that brings together governmental agencies, non-profits, for-profits, etc. that covers all things Fair Housing.

Finally, due to the unique demographics and small land areas of the islands, coupled with the fact that approximately 80% of the population in the Territory is African or Hispanic, racially and ethnically concentrated areas as well as concentrated areas of poverty are not segregated as is often the case in the continental United States.

Additionally, there is a lack of data describing and delineating protected classes as opposed to such data which is normally readily available in the continental US. Nevertheless, VIHFA reported in the earlier version of its Analysis of Impediments that Public Housing presents an issue of concentration. The issue is whether it is minority concentration, since the island is majority minority. VI will look at case scenarios around the country that have been previously approved by FHEO, along with the rules, and will work directly with FHEO to resolve any concentration issues.

Figure 51. LMI Household Damage Analysis (St. Croix)

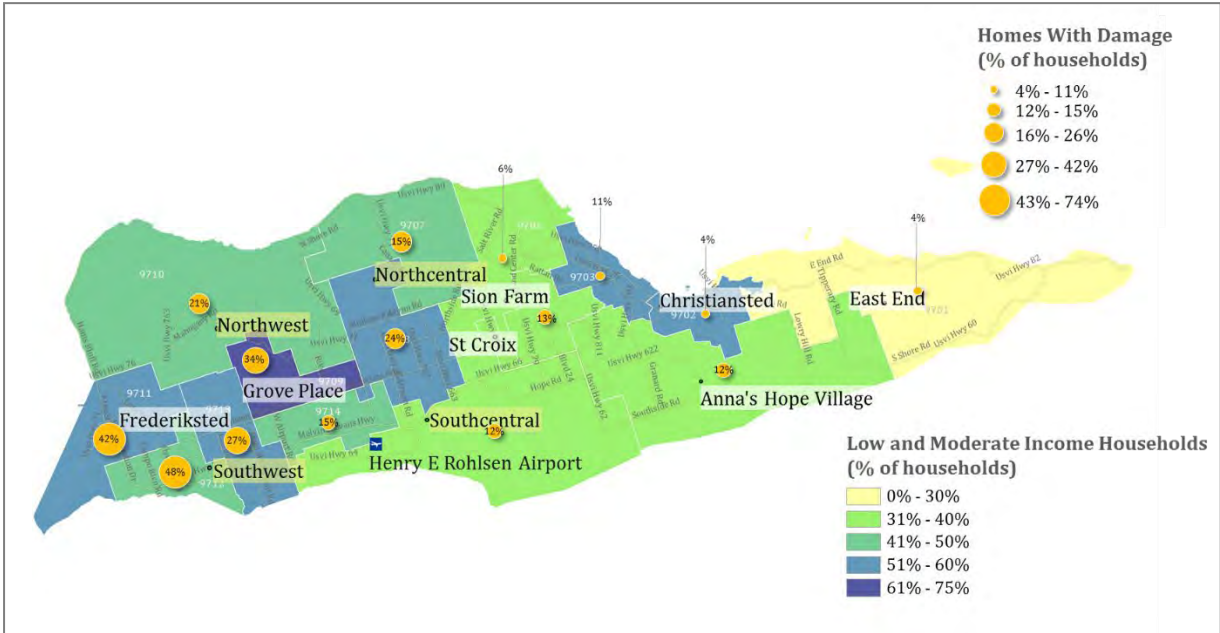
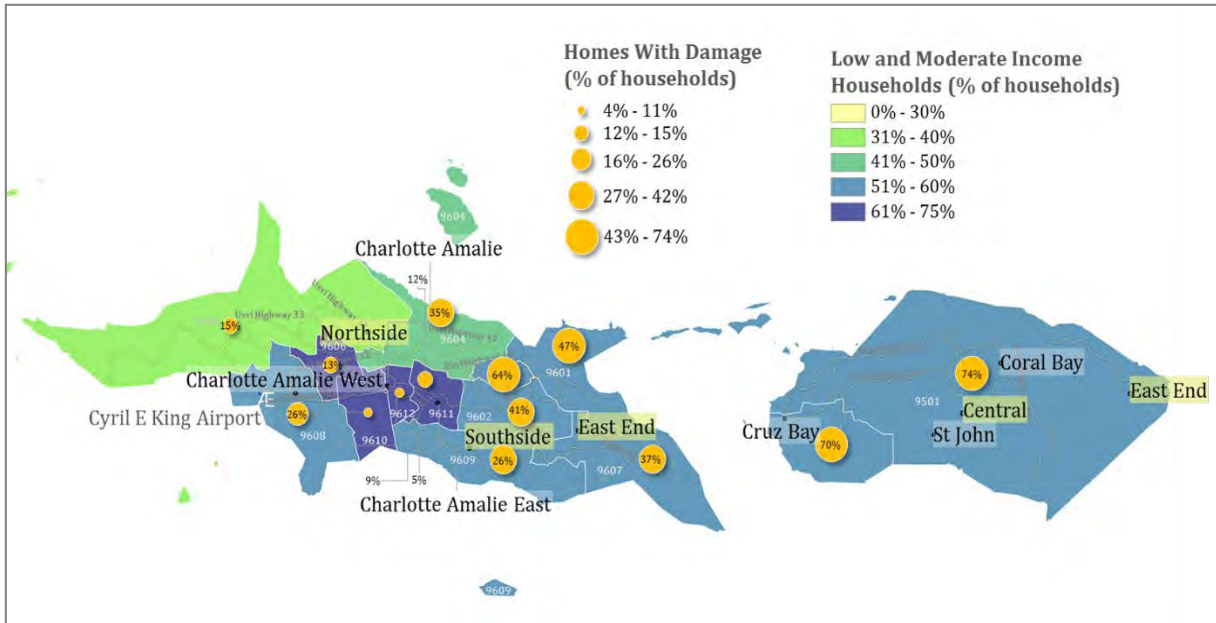


Figure 52. LMI Household Damage Analysis (St. Thomas and St. John)



Advocates of vulnerable populations who may need additional resources to engage with the CDBG-DR-MIT planning process are encouraged to contact the CDBG-DR Program Communication Manager at (340) 772-4432. A list of the vulnerable populations that will continue to be outreached to directly and information about equitable accessibility is available in the VIHFA Citizen Participation Plan which is available in Spanish on the VIHFA Mitigation website (<https://cdbgdr.vihfa.gov/programs/cdbg-mitigation/>). Citizens are advised on the website to please call (340) 772-4432 or write to cdbgdr@vihfa.gov, for any questions on any accessibility needs.

Physical copies of the proposed Action Plan with a Spanish translation are available at VIHFA and partner government offices and public libraries. A large print version is available online and in print

upon request. The website continues to be compatible with Google Translate and screen reader software.

All meeting locations will be ADA-accessible and language (Spanish (required based upon population) and French Creole (by request only) and accessibility services for hearing or sight-impaired available upon request (with 48-hours' notice).

4.2.4 Natural Infrastructure

Beyond the specific methods needed to assess and compare grey (human engineered) infrastructure against natural infrastructure options relative to their utility to mitigate risk, a framework is required that would provide guidance to USVI on how to consider natural infrastructure solutions in its envisioned CDBG-MIT projects. The VIHFA is focused on how municipalities are advancing adaptation to climate change through the management of natural infrastructure assets that provide municipal and ecosystem services. Such focus provides effective solutions for minimizing coastal flooding, erosion, and runoff, as do man-made systems that mimic natural processes – known as natural infrastructure. Across the Territory, aging water infrastructure is creating challenges for water management. Combined sewer systems are pumping toxins into estuaries, bays, lakes, and other water bodies and overflowing during extreme precipitation events into urban and residential areas. At the same time, coastal communities are being heavily damaged from extreme storm events and sea level rise.

Experts agree that natural infrastructure such as healthy wetlands can provide many of the same benefits of traditional man-made infrastructure at a much lower investment and maintenance cost. Natural infrastructure approaches include forest, floodplain and wetland protection, watershed restoration, wetland restoration, permeable pavement, and driveways; green roofs; and natural areas incorporated into city designs, and conservation easements. A natural infrastructure approach represents a successful and cost-efficient way to protect riverine and coastal communities. While there is much to be done in the way of design and restoration in coastal communities, this plan, due the preponderance of MID counties and communities and their locations, will focus on upstream rather than coastal natural infrastructure.

Ordinances and codes are the regulatory mechanisms available to local governments for land use and natural resource management. Though local governments in USVI have no preexisting grants of power, the General Assembly has made both general grants of power to cities and counties and specific grants of power to regulate other activities under certain special circumstances. Cities and counties are generally allowed to “by ordinance define, regulate, prohibit, or abate acts, omissions, or conditions detrimental to the health, safety, or welfare of its citizens and the peace and dignity of the county; and may define and abate nuisances.” Other grants of authority are made to address specific issues, including the environmental impacts of development, and are found in other statutes.

Many of the resources discussed here are written as separate ordinances but could also be modified to work in a unified ordinance framework. Some of the ordinances are written as overlay ordinances, which are used to establish additional development requirements in specific areas of a community, such as environmentally sensitive areas. The additional requirements are superimposed over, or “overlay”, the base regulations already in place.

4.2 How Programs or Projects Increase Resiliency for Housing Serving Vulnerable Populations

The territory has allocated 25% of its CDBG-MIT which is approximately \$192,700,000 towards housing activities that will include but not be limited to new single family and multi-family construction or reconstruction that will serve its vulnerable population. The new and reconstructed housing units will meet additional resiliency and mitigation standards. The USVI will serve as a regional example for more resilient residential construction practices and provide the opportunity to disseminate these practices through the residential construction industry on a scale larger than previously attempted.

Given the increased construction costs of the U.S. Virgin Islands the VIHFA will invest additional CDBG-MIT program funds into the rehabilitation to increase the resiliency of its existing housing inventory, including but not limited to affordable rental housing, transitional housing, public housing, permanent supportive housing, and permanent housing serving individuals and families that are homeless or at risk of becoming homeless and new housing developments. All housing construction or rehabilitation will comply with the accessibility requirements under Section 504, the ADA, and the Fair Housing Act, and local building codes.

The USVI programs and projects will serve a two-fold function: (1) provide high quality, durable, sustainable, and mold resistant housing; and (2) demonstrate cost effectiveness of enhanced resiliency features in residential construction on a large scale to protect against the inevitable next storm or flooding event. By building homes to a higher standard than conventional construction practices on the scale proposed through this Action Plan, new housing activities will bring those more resilient building practices into the mainstream where they can scale-up and become cost-competitive with conventional building practices.

To ensure that CDBG MIT activities focus on providing services to the territory's low/moderate vulnerable population, all proposed projects will undergo AFFH review by the VIFHA before approval. Such review will include assessments of (1) a proposed project's area demography, (2) socioeconomic characteristics, (3) housing configuration and needs, (4) educational, transportation, and healthcare opportunities, (5) environmental hazards or concerns, and (6) all other factors material to the AFFH determination. The VIHFA will ensure that projects lessen area racial, ethnic, and low-income concentrations, and/or promote affordable housing in low-poverty, nonminority areas in response to natural hazard-related impacts. This effort will also assist the territory to allocate funding to increase resiliency for housing that serves vulnerable populations, including transitional housing, permanent supportive housing, permanent housing serving individuals and families that are homeless and at-risk of homelessness and public housing developments.

The VIHFA will also expand its range of populations under the definition to include socially vulnerable populations to reflect protected classes that are vulnerable to the effects of disasters. The VIHFA will collect data to identify the following in areas vulnerable to damage from disasters: (1) racial and ethnic make-up of population; (2) Limited English proficiency (LEP) populations; (3) number or percentage of persons belonging to other protected classes (race, color, national origin, religion, sex, disability, and familial status); and (4) racially and ethnically concentrated areas and concentrated areas of poverty.

The VIHFA will utilize its planning and administration allocation for the comprehensive review of land use policies, codes, and procedures, including affordable housing siting maps and decisions to protect against segregation and to comply with HUD's site and neighborhood standards.



The VIHFA will also encourage the use of its CDBG-MIT Planning allocation for modifications to USVI planning, zoning and other land use policies, codes, and procedures. The VIFHA will also review projects to ensure against the segregation of persons with disabilities.

The VIHFA will ensure that a key target population for all CDBG-MIT projects and activities are Section 3 residents (public housing residents and low- and very low-income residents who live in areas where Section 3 covered assistance is expended) and businesses. The VIHFA will require all CDBG-MIT funding recipients to have a Section 3 plan to ensure that construction activities (commercial and residential) provide employment, training, contracting, and other economic opportunities to Section 3 residents to the greatest extent feasible.

4.3 Minimizing Displacement

Prior to pursuing each activity, the VIHFA will consider the potential that the activity will trigger relocation or displacement and will explore options to minimize relocation or displacement of persons and entities. In instances in which relocation or displacement is necessary, the VIHFA will take the following steps to mitigate disruption due to relocation and to minimize displacement.

1. Facilitate, to the greatest extent possible, new construction on government-owned, vacant land.
2. Stage rehabilitation of apartment units in a manner such as to allow tenants to remain in the building or complex during and after the rehabilitation – i.e., by working with vacant units first and transferring existing tenants as units are completed.
3. Arrange for facilities to house persons who must be relocated temporarily during rehabilitation.
4. Adopt policies which provide reasonable protections for tenants faced with conversion of their housing to a condominium, cooperative, or single-family ownership, such as working closely with the local PHA to identify alternate housing including provision of Housing Choice Vouchers for those tenants who choose to vacate rather than participate in the conversion initiative.

Permanent relocation is not anticipated under the programs covered in this Action Plan; however, if invoked, temporary relocation and permanent replacement housing payments will be provided in accordance with the Uniform Relocation Act. As temporary relocation will likely be necessary, the VIFHA will develop an Optional Relocation Policy. The policy will include certain provisions for relocation advisory services to persons with disabilities such as facilitating supportive services and provide for grievance procedures.



5.0 Coordination of Mitigation Projects Leverage

5.0 COORDINATION OF MITIGATION PROJECTS LEVERAGE

The Territory has benefitted from the extensive and fruitful participation in mitigation planning by stakeholders, including VITEMA, Public Works, ODR, DPNR, Waste Management, WAPA as well as with representatives of the major non-profit entities in this community. This communication has enabled the VIHFA to identify key risks and structure activities and programs that will yield projects that will provide optimum resilience against those risks. Additionally, such cooperation has facilitated identification of opportunities to leverage CDBG-MIT funds with other funding from USVI, federal, private nonprofit and for-profit enterprises together with philanthropic sources.

Favorable leverage opportunities will receive greater prioritization for CDBG-MIT funding.

For mitigation projects, the VIHFA will foster the creation of Public Private Partnerships (PPP) to leverage available CDBG-MIT funds and focus additional resources on the identified risks. For example, in developing more resilient affordable housing, VIHFA and the Virgin Islands Housing Authority (VIHA) plan to work cooperatively to form PPPs with Low Income Housing Tax Credit equity investors, commercial lending institutions and private sector nonprofit and for-profit developers. These PPPs will allow the VIHA to comprehensively rehabilitate or reconstruct its portfolio of approximately 3,000 aging and functionally obsolete public housing units.

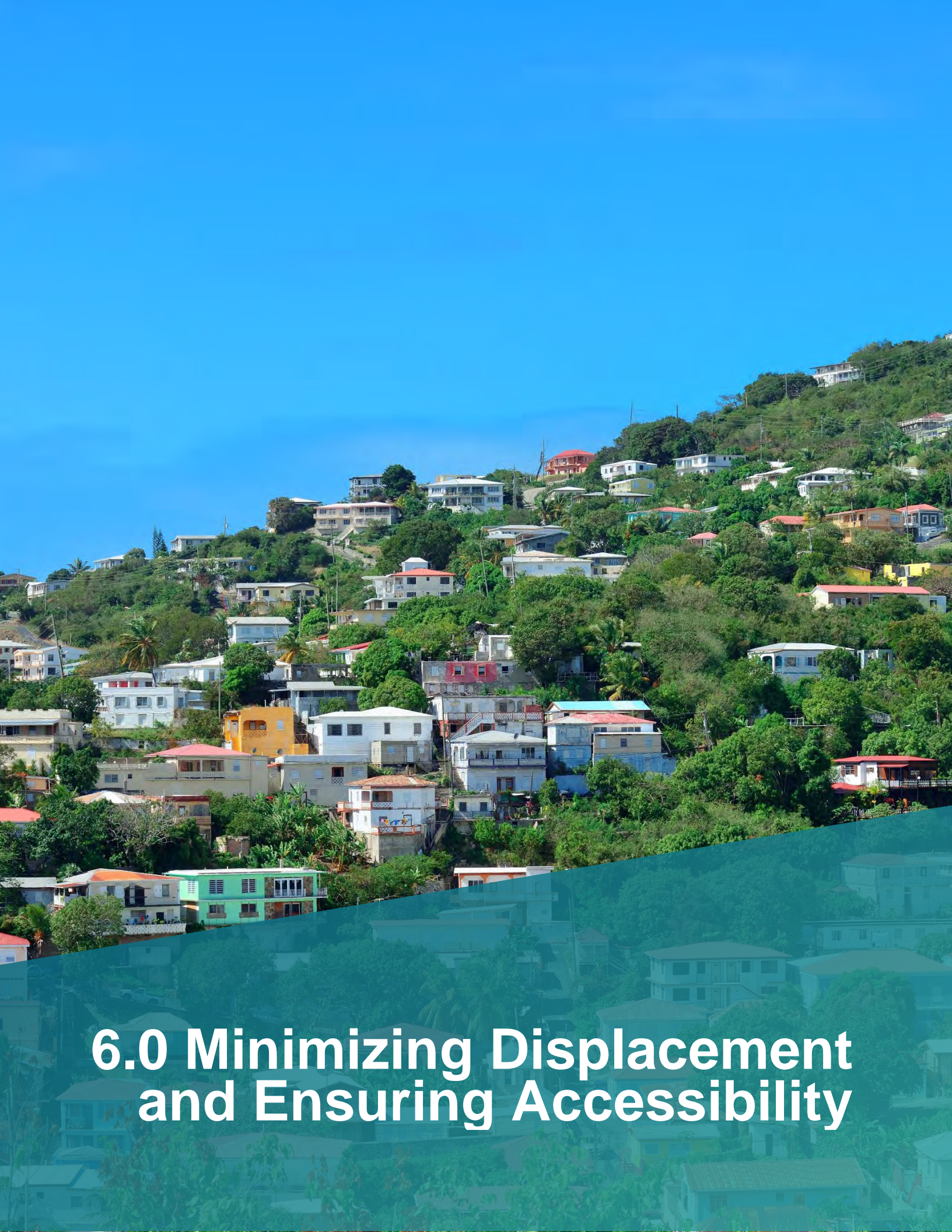
The development of new construction for Homeownership Opportunity and First Time Home Buyer Assistance will also be priority of the CDBG-MIT Funding. CDBG MIT funding will be used to provide to expand existing VIHFA program for LMI households the opportunity to purchase a home through direct financial incentives, effectively creating first time home buyers.

Due to the ongoing need, CDBG-MIT funding will also be leveraged to expand the EnVIsion Tomorrow's Homeowner Rehabilitation and Reconstruction Program. The program will continue eligible costs for the rehabilitation or replacement of damage to real property, replacement of disaster-impacted residential appliances, and environmental health hazard mitigation costs related to the repair of disaster-impacted property. For residences considered substantially damaged, support will be granted for reconstruction or provision of a modular (or manufactured) home in place of their original unit. The Program recognizes the advantages of modular construction, from a cost standpoint, speed of construction and the potential for workforce development as well.

Homeless Initiatives to provide Permanent Supportive Housing for those experiencing chronic homelessness will provide leveraging opportunities through the potential utilization of Low-income Housing Tax Credits, FEMA funding, private debt or equity and other sources.



Pictured: VITEMA Emergency Operation Center on St. John.



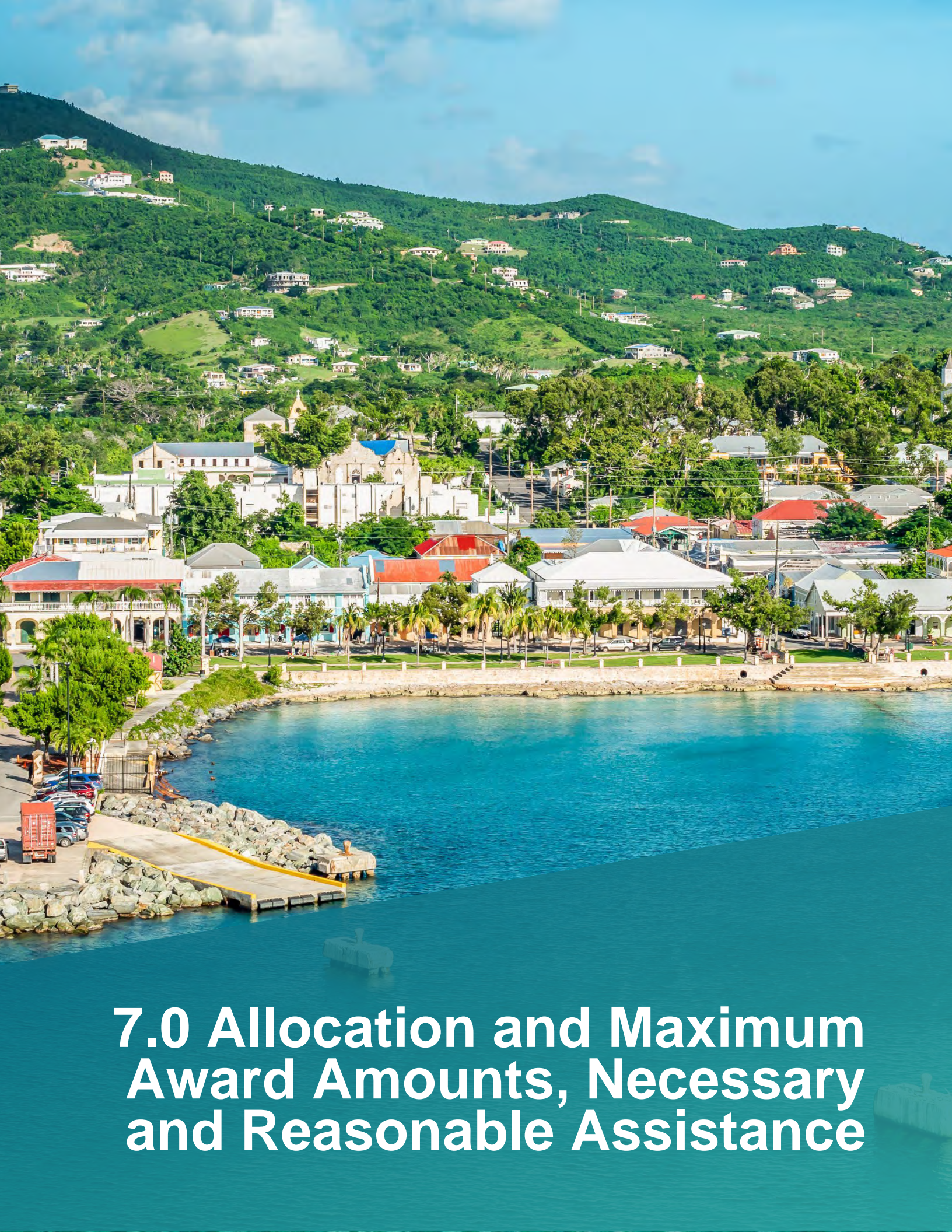
6.0 Minimizing Displacement and Ensuring Accessibility

6.0 MINIMIZING DISPLACEMENT AND ENSURING ACCESSIBILITY

The Territory will minimize displacement of persons or entities as a result of the implementation of CDBG-MIT projects by ensuring that all programs are administered in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act (URA) of 1970, as amended (49 CFR Part 24) and Section 104(d) of the Housing and Community Development Act of 1974 and the implementing regulations at 24 CFR Part 570.496(a), subject to any waivers or alternative requirements provided by HUD. While nonstructural mitigation (e.g., elevations, buyout and/or acquisition) programs may prove to be necessary to achieve flood risk mitigation goals and may cause displacement in certain rare instances, many of the programs detailed in this MIT-AP will be implemented with the goal of minimizing displacement of families from their homes, whether rental or owned. Moreover, in the event displacement does occur, VIHFA will take into consideration the functional needs of the displaced persons in accordance with guidance outlined in Chapter 3 of HUD's Relocation Handbook.

In practice, when a tenant is displaced by a CDBG-MIT activity, relocation case managers are assigned to both owners and tenants work with applicants to coordinate activities and communicate updates in real time concerning when to expect to move out of their residences, assist the displaced individuals with securing temporary housing arrangements, and all other aspects of moving belongings. One of the case manager's primary goals is to minimize the time that the tenant/owner will be impacted by coordinating the construction calendar in real time and during construction, keeping the displaced individual updated on the construction progress and communicating an expected timeline for construction completion and eventual move in.

To ensure accessibility for applicants, VIHFA has adopted a Section 504/Americans with Disabilities Act (ADA) policy which ensures the full right to reasonable accommodations by all program participants. Under this policy, case managers shall assess the specific needs of each program beneficiary and determine if a 504/ADA modification is required based on the family composition members. All public facilities that are federally assisted shall also exceed the minimum threshold for 504/ADA compliance. Multifamily and other housing development programs will also be required to have a certain set-aside of fully compliant 504/ADA units of varying sizes to accommodate eligible applicants. Along with single family programs, the multifamily rental programs will be required to have an architect's/engineer's signature on a form stating that the designed unit meets 504/ADA compliance. Failure to deliver the appropriately constructed ADA/504 compliant unit(s) will result in the construction firm not being paid and in breach of contract until the deficiencies are corrected.



7.0 Allocation and Maximum Award Amounts, Necessary and Reasonable Assistance

7.0 ALLOCATION AND MAXIMUM AWARD AMOUNTS, NECESSARY AND REASONABLE ASSISTANCE

The Virgin Islands Housing Finance Authority (the VIHFA) has established program allocations that consider the risks identified and prioritized in the MNA, data from ongoing CDBG-DR recovery, and the public participation process. In addition, the mitigation activities to be undertaken have been considered in conjunction with potential threats to Community Lifelines. These combined factors were evaluated in determining reasonable and necessary amounts of assistance in different programs to improve the Territory's resilience to future disaster events in the most effective manner possible.

The VIHFA has identified the maximum assistance available for each program (minimum amounts will be identified in program guidelines) and has established priorities for the programs with consideration of the guidelines set forth in the CDBG-MIT Main Notice. Some CDBG-MIT activities align with unmet recovery needs and have functional overlap with CDBG-DR activities. Activities where a CDBG-MIT activity is used in combination with CDBG-DR funds previously allocated will be indicated in project applications submitted to the VIHFA.

All of the Territory's mitigation activities under this grant will meet at least one CDBG-MIT national objective for either (1) benefiting low- to moderate-income persons (LMI), or (2) urgent need mitigation (UNM). At least 50 percent of CDBG-MIT funds will be used to support activities that benefit LMI persons.

- LMI (Low- and moderate-income). Activities which benefit low- and moderate-income individuals, such as providing an area benefit to an LMI area, establishing benefits to limited clientele, housing LMI individuals and households, or job creation or retention. While the VIHFA will strive to attain approximately 70% LMI benefit overall, at least 50% of CDBG-MIT funds must be spent on projects that primarily benefit LMI individuals to comply with HUD rules.
- UNM (Urgent Need Mitigation). Set by HUD in the Notice to allow for certain mitigation activities. To meet the UNM National Objective, the VIHFA must document that the activity addresses the current and future risks as identified in the MNA of most impacted and distressed areas and will result in a measurable and verifiable reduction in the risk of loss of life and property.

Most activities undertaken by the Territory are anticipated to meet the LMI national objective, and if certain projects do not meet this objective, the UNM national objective will be used.

Projects utilizing the CDBG-MIT UNM National Objective must indicate that they meet the following two criteria:

1. Addresses the current and future risks as identified in the grantee's Mitigation Needs Assessment of most impacted and distressed areas; and
2. Will result in a measurable and verifiable reduction in the risk of loss of life and property.

Projects qualifying under the UNM national objective will be required to submit as part of the application documentation evidence of a measurable and verifiable reduction in loss of life or property which addresses risk(s) identified in the Mitigation Needs Assessment. Additional guidance regarding UNM project justification requirements will be released in the program guidelines, and the VIHFA will assess these criteria prior to undertaking projects using the UNM national objective.

7.0.1 Projected LMI Benefit

The Territory has unique geographic and demographic characteristics. Given the impact of both Hurricanes and its unique geography, all 3 islands are Most Impacted and Distressed or “MID” areas as defined by HUD and should each be seen as having sufficient LMA for the territory to qualify as having more than 51% of its residents as LMI. The relatively small geography of the islands coupled with high density in developed areas results in a situation where mitigation projects with general or community-wide impact will benefit LMI residents, as reflected within the LMI projections herein.

At least 51% of its residents must be LMI persons for an area to meet the low- and moderate-income area (LMA) benefit requirements under HUD guidelines. Many areas that qualify as low- and moderate-income within the U.S. Virgin Islands are shown via the 2010 U.S. Census data, which is still the most recently available data at the census tract level. 2010 Census data shows that a majority of St. Thomas and St. John census tracts exceed the threshold 51% LMI resident threshold. Just over half (52%) of households in the Virgin Islands are LMI households overall, though this figure varies slightly between the Islands. Given population density, both St. John (54.8% LMI) and St. Thomas (57.9% LMI) qualify for the LMA benefit at an island level, with Hassel Island and Water Island included as part of the St. Thomas data. While only a third of St. Croix census tracts qualify for LMA benefit, the island does not meet the LMA based only on the 2010 census data, as only 46.3% of residents are LMI, just a few percentage points below the 51% threshold. The updated LMA and Service Benefit derived from the FEMA IA data allowed by HUD specifies that 64.21% of the island is LMI. With St. Thomas at 61.90%, St. Croix at 66.39% and St. John at 65.35% which appropriately represents the most accurate post-storm LMI data for the USVI. As a result, all eligible projects and activities that are determined to provide an “island-wide” benefit should utilize the FEMA IA LMI data.

While census data is important to the HUD CDBG-MIT Action plan, the 2010 Census data does not reflect the current picture in the Territory, which HUD acknowledged in its 9/28/2020 “Waivers and Alternative Requirements for Community Development Block Grant Disaster Recovery Grantees” Federal Register notice. Recognizing the high cost and other unique characteristics of the Territory, HUD granted the USVI a waiver of 42 U.S.C. 5302(a)(20)(A) in order to standardize the area median incomes (AMI) across the entire territory, permitting the USVI to use the St. John area median income for all islands in the territory (because those LMI income limits are the highest of the three islands). As LMI eligibility is defined by the AMI standard and St. John qualifies with its higher income level than on St. Croix, the entire Territory can properly be classified as having over 51% of LMI residents within the present plan.




7.1 Program Allocations

The total CDBG-MIT allocation set forth in PL 115-123 is \$774,188,000.00. The VIHFA will set aside five percent of these funds for administrative costs associated with the mitigation activities described below. As a result of the MNA, lessons learned from CDBG-DR, and from community and stakeholder input, the following table outlines the allocations for each CDBG-MIT eligible activity. All funds have been allocated to the eligible mitigation activities outlined in Sections 7.3 through 7.8 below.



Pictured: VIHFA office on St. Croix.

Table 41: CDBG-MIT Program Allocations

Activity Category	Project/Program	Project Costs	VIHFA Project Delivery Costs	Total Allocations	% of Total	% LMI Projection	Identified Community Lifeline Risks	Identified Territory Risks
Infrastructure & Public Facilities 	Community Resilience & Public Facilities	\$100,000,000	\$2,500,000	\$102,500,000			<ul style="list-style-type: none"> • Food Water Shelter • Transportation • Energy • Health & Medical 	<ul style="list-style-type: none"> • Hurricane • Riverine Flooding
	Resilient Critical & Natural Infrastructure	\$308,000,000	\$7,700,000	\$315,700,000			<ul style="list-style-type: none"> • Transportation • Hazardous Material • Safety & Security 	<ul style="list-style-type: none"> • Hurricane • Riverine Flooding • Drought
	Total Allocation	\$408,000,000	\$10,200,000	\$418,200,000	54%	54%		
Economic Resilience & Revitalization 	Commercial Hardening & Financing	\$40,000,000	\$962,500	\$40,962,500			<ul style="list-style-type: none"> • Transportation • Food Water Shelter • Health & Medical 	<ul style="list-style-type: none"> • Hurricane • Riverine Flooding • Pandemic
	Small Business Mitigation	\$35,000,000	\$787,500	\$35,787,500			<ul style="list-style-type: none"> • Health & Medical • Communication • Energy 	<ul style="list-style-type: none"> • Hurricane • Riverine Flooding
	Total Allocation	\$75,000,000	\$1,750,000	\$76,750,000	10%	70%		
Housing 	Multifamily Housing	\$100,000,000	\$2,500,000	\$102,500,000			<ul style="list-style-type: none"> • Food Water Shelter • Health & Medical 	<ul style="list-style-type: none"> • Hurricane • Riverine Flooding
	VIHFA New Home Construction (Home Ownership)	\$60,000,000	\$1,500,000	\$61,500,000			<ul style="list-style-type: none"> • Food Water Shelter • Health & Medical 	<ul style="list-style-type: none"> • Hurricane • Riverine Flooding
	Homeless Housing Initiative	\$23,000,000	\$575,000	\$23,575,000			<ul style="list-style-type: none"> • Food Water Shelter • Health & Medical 	<ul style="list-style-type: none"> • Hurricane • Riverine Flooding
	Innovative Resilient Housing	\$5,000,000	\$125,000	\$5,125,000			<ul style="list-style-type: none"> • Food Water Shelter • Health & Medical 	<ul style="list-style-type: none"> • Hurricane • Riverine Flooding
	Total Allocation	\$188,000,000	\$4,700,000	\$192,700,000	25%	80%		
Public Services		\$15,000,000	\$400,000	\$15,400,000	2%	100%		
Planning		\$29,750,000	\$2,678,600	\$32,428,600	4%	70%		
Administration		\$38,709,400	\$0	\$38,709,400	5%			
Totals		\$754,459,400	\$19,728,600	\$774,188,000	100%	≥70%		

7.2 Overall Method of Distribution and Delivery

All programs will be implemented by the VIHFA, its subrecipients, or non-profit or for-profit entities selected in accordance with applicable procurement requirements. Details regarding program allocations, maximum awards, eligible applicants, project prioritization and timeline are outlined within the programs described below. Further details including the application process and criteria used to select applicants for funding under each program, including the relative importance of each criterion, will be developed in program policies and procedures.

The VIHFA will oversee the entire portfolio of programs but certain projects will be implemented by other appropriate agencies of the territorial government. The VIHFA determined funding will be delivered through three primary methods based on the needs for services and the expertise of certain entities to complete specific projects.

- The first method will deliver funds directly to beneficiaries including primarily residents and landlords depending on the eligibility criteria detailed within respective programs.
- The second method will be a direct grant to implementing entities, or subrecipients, to oversee a specific program and/or projects as outlined within the Action Plan.
- A third method will utilize subrecipients selected through a competitive process to deliver a service or project to beneficiaries under a specific program.

Many projects are being further defined in direct coordination between the VIHFA, partner agencies of the territorial government, and other entities established by the territorial government. If any project development results in a Covered Project, this Action Plan will be amended to include project details and a benefit-cost analysis as detailed in the CDBG-MIT Main Notice. A Covered Project is defined for USVI as “any infrastructure project having a total project cost of \$50 million or more, with at least \$25 million of CDBG funds, regardless of the source (e.g., CDBG–DR, CDBG–MIT, or CDBG).”

FR-6109-N-02 encourages grantees to maximize the impact of available funds by encouraging leverage, private-public partnerships, and coordination with Federal programs. This includes mitigation grants administered by FEMA or the US Army Corps of Engineers (USACE). Use of CDBG-MIT funding as non-federal cost share for the FEMA Public Assistance Program (“Local Match”) is authorized by relevant legal requirements pertaining to FEMA and HUD. Additionally, both FEMA and HUD have encouraged the use of the “Flexible Match Concept” in the *“Implementation Guidance for Use of Community Development Block Grant Disaster Recovery Funds as Non-Federal Cost Share for the Public Assistance Program”* published jointly by FEMA and HUD in October of 2020. Therefore, applicants may request (subject to approval of the VIHFA) that any of the CDBG-MIT funds referenced in this Action Plan may be used as Local Match if doing so would be consistent with all applicable legal requirements pertaining to the FEMA PA and HUD CDBG-MIT programs.

7.3 Infrastructure and Public Facilities

The U.S. Virgin Islands’ reliance on the proper functioning of its infrastructure systems—including energy, transportation, and telecommunications infrastructure—was evident when these systems failed in the aftermath of Hurricanes Irma and Maria. High winds, torrential rainfall, and flooding from both disasters had compounding effects on the infrastructure sectors on each of the U.S. Virgin Islands, leading to widespread and prolonged failures which has delayed economic recovery. High winds toppled above-ground utility lines; storm water runoff flooded roads and induced mudslides; and

flooding, wind, and heavy rain severely damaged water and wastewater treatment plants, hospitals, and other buildings that provide critical services. Electrical substations were crippled, causing power failures to 95% of electrical customers. Water pump failures and sewage overflows from storm water surges led to potable water safety precautions such as “boil water” advisories and EPA drinking water assessments. Lacking both a steady power supply and functioning transportation and water infrastructure, many businesses were forced to shut down, some for extended periods. Closure of the ports and airports for more than two weeks, had significant effects on the Territory’s connectivity, limiting the pace of voluntary evacuation efforts, delaying the delivery of essential supplies for emergency relief, and causing further disruption to the economy.

The U.S. Virgin Islands has identified multiple infrastructure priorities that must be addressed. If the Territory’s infrastructure is made more resilient, critical services could be stabilized and maintained for residents in the event of a future disaster, creating a safer and more secure environment.

In addition to hardening infrastructure and following other construction best practices to mitigate the risks described in the MNA, the Territory will seek to incorporate the “no adverse impacts” approach (NAI) set forth by the Association of State Floodplain Managers, as applicable. This strategy relies on a calculated mix of mitigation approaches to ensure infrastructure development does not increase flooding risks. A key consideration in NAI is green infrastructure and the use of green spaces and natural systems to promote safer, more predictable conveyance of water through communities. All projects in the Infrastructure and Public Facilities programs will be required to provide a narrative summary of the green and natural infrastructure components applicable to the project during scope and budget development and are encouraged to use the [ASFPM’s NAI How-to-Guide for Infrastructure](#) to assist in effective project design.

Table 42. Infrastructure Program

Program	Project Allocation	Community Lifeline Impact	National Objective
Community Resilience & Public Facilities Construction	\$100,000,000.00	<ul style="list-style-type: none"> • Food, Water, Sheltering • Communications • Safety and Security 	LMI UNM
Resilient Critical and Natural Infrastructure	\$308,000,000.00	<ul style="list-style-type: none"> • Food, Water, Sheltering • Transportation • Health and Medical • Hazardous Materials 	LMI UNM

7.3.1 Community Resilience Centers & Public Facilities Construction

There are several risks to the Territory identified in the MNA that require adequate sheltering during and after disasters. When Hurricanes Irma and Maria hit the U.S. Virgin Islands in September of 2017 there were limited locations for individuals, families and the most vulnerable to seek shelter from the storms. Throughout the public participation process, community shelters and communications were mentioned as mitigation measures residents believe are needed to be better prepared for future disasters. The VIHFA has identified the need to have centralized and well-equipped shelters for receiving resources, critical communications, charging phones and battery-operated equipment, among other functions.

This program addresses the urgent need for adequate, permanent emergency shelters in the U.S. Virgin Islands. To this end, the program will support the development of multi-purpose facilities which will be dedicated to disaster preparedness, sheltering needs in disasters and other emergency



situations. Additionally, the program may support increasing sheltering capacity by hardening and upgrading existing community, public or private infrastructure to bring them up to sheltering standards. To address this need, this program will cover the eligible costs to rehabilitate, reconstruct or newly construct a facility to meet the needs of this population. In addition, the projects will address mitigation measures by utilizing construction methods that meet FEMA standards.

Allocation Amount and Maximum Award

Project Allocation Amount: \$100,000,000.00

Maximum Award Amount: \$25,000,000.00

Minimum Award Amount: \$1,000,000.00

Eligible Applicants

- Non-governmental organizations (501(c)(3)) or Not for Profit Entities
- Units of Government of the USVI, and its autonomous and semi-autonomous entities
- Public or Private Institutions of Higher Learning (Universities)
- Private developers
- Private Utility Companies

Eligible Activities

- HCDA Section 105(a)(1) Acquisition of Real Property
- HCDA Section 105(a)(2) Public Facilities and Improvements
- HCDA Section 105(a)(4) Clearance, Rehabilitation, Reconstruction, and Construction of Buildings
- HCDA Section 105(a)(5) Architectural Barrier Removal
- HCDA Section 105(a)(8) Public Services
- HCDA Section 105(a)(14) Activities Carried Out through Nonprofit Development Organizations
- HCDA Section 105(a)(15) Eligible nonprofit organizations
- HCDA Section 105(a)(21) Higher Education
- HCDA Section 105(a)(12) Planning

Priorities

- All facilities constructed or rehabilitated as part of this program must be available to the public in future disaster events.
- Organizations and agencies must agree to provide year-round maintenance and operations expenses as CDBG-MIT funds will not fund long-term maintenance and operations.
- During non-crisis events shelters may serve as traditional community centers for public benefit. For example, the shelter may be leased or rented year-round for community organizations or for events, and income generated will be utilized to maintain the operation of the center and shall not be considered program income.
- Projects may be selected based on their projected performance against a set of factors, including but not limited to: cost effectiveness, speed with which projects and shelters can be developed, number of individuals served, location and accessibility, and proposed use(s) outside of hurricane season or other disaster events.
- All projects must:
 - Meet the definition of mitigation activities;

- Address identified current and future risks; mitigation related to hurricanes, tropical storms and depressions, severe flooding, earthquake, tsunami, drought, landslide, wildfire, and pandemic;
- Meet a CDBG national objective;
- Include a plan for the long-term funding and management of the operations and maintenance of the project.
- For any proposed projects not listed below, the VIHFA will develop a competitive application process to select eligible projects that meet the criteria described above. The competitive application process will be open to all eligible applicants and one application may be submitted per entity. Applicants are encouraged to incorporate nature-based solutions, including natural or green infrastructure, into their proposed projects.
- The VIHFA will prioritize development of the following known shelter projects, assuming they meet the criteria and application requirements developed for public facilities projects:
 - A multi-purpose complex on the St Croix campus of the University of the Virgin Islands (UVI) in an amount of approximately \$25,000,000.00.
 - A community shelter and natural infrastructure recreational area at Mars Hill Park
 - Restoration and hardening of the Territory's two homes for the elderly, which also serve as special needs shelters – Herbert Grigg and Queen Louise, managed by the Department of Human Services at an amount of no more than \$25,000,000 per development.
- The Territory will also prioritize a potential dredging project at Gallows Bay in an amount of approximately \$6,000,000.00, which is intended to expand port capacity through dredging and additional berthing space. This will enable the Territory to enter formal berthing access agreements for larger cruise ships, thus increasing the number of cruise passenger arrivals and overall tourism expenditures in the Territory. This project may also be eligible as an Economic Resilience and Revitalization project.

Projected Start and End Date

The proposed timeline for shelter and public facilities projects is from 2021 to 2029.

7.3.2 Critical & Natural Infrastructure Resilience

Hardening public infrastructure is critical to the Territory's ability to mitigate risks to public health and safety even before an extreme weather event occurs. A high priority for the U.S. Virgin Islands will be funding activities that mitigate risks to utility, transportation, and hazardous waste disposal systems particularly for the facilities that serve the health and safety of the community. The Territory has identified several resilience and mitigation measures, which include hardening public infrastructure, elevating key roadways, burying or otherwise hardening utility lines, reducing the risk of storm water runoff erosion and flood exposure, and creating sustainable waste management for the Territory.

Activities related to these projects will be focused on hardening infrastructure against severe weather events. This will include measures to harden infrastructure facilities against high winds, heavy rainfall, flood exposure, storm water run-off, and their effects (e.g., erosion). For example, the Department of Public Works (DPW), with assistance from FEMA and FHWA, has identified potential mechanisms to reduce overall vulnerability of the transportation infrastructure. Structural projects for DPW may include repair, reconstruction, and improvement of resilience to transportation infrastructure including roads, bridges, ghuts, culverts, additional drainage systems, embankments, traffic signals, and bringing signage up to industry standards, as applicable to the Territory. Non-structural approaches



may include hydrologic and hydraulic studies, flood-risk modeling, monitoring systems such as GIS, public outreach and education, and future planning measures.

The US Virgin Islands Waste Management infrastructure was severely damaged by Hurricanes Irma and Maria. The hurricanes generated 825,000 cubic yards of debris, which is almost three times as much waste as the Territory typically generates in an entire year. The Territory's two existing landfills are mandated to close by two Consent Decrees, entered in 2012 and 2013. One of the overburdened landfills is near an environmentally sensitive zone on St. Thomas (Bovoni) and the other landfill is near the St. Croix airport (Anguilla).



Pictured: Storm impact at the VI Waste Management facility on St. John near Cruz Bay.

The debris from the two hurricanes during that period, further exacerbated the serious waste disposal issues that previously existed in the Territory. VIWMA is subject to two federal Consent Decrees, under which a district court judge in St. Thomas directly oversees compliance with the Decrees, which require installation and operation of the gas collection and control systems, plus the closure of the landfills. Not only must VIWMA close the existing landfill, but also there may be more waste excavation and re-shaping needed due to all the excess waste placed over the last several years.

Ultimately the goal is to close the landfill, open a new landfill site and manage stormwater and landfill gas so that there is no negative impact to resident health and safety due to hazardous materials being dumped outside of acceptable locations, and/or damaging groundwater, surface water, or the adjacent mangroves, which have already been significantly impacted by both hurricanes.

The limitations on landfill use makes debris removal and cleanup a major health and safety concern for residents when future disasters generate significant amounts of additional debris. Few mangroves remain on the island and it is important for the long-term sustainability of the coast to preserve the mangroves as they assist with flood control. Mangroves may reduce the impact of the storm surge and resulting debris generation.

The VIHFA will develop policies and procedures for the Critical and Natural Infrastructure Resilience program that will outline all requirements for a project to be eligible for funding. Potential projects to be carried out by governmental departments of the Territory have been determined to be key mitigation priorities for the Territory as described below. All proposed projects must submit an application that describes the project's connection to mitigation needs and the priorities and eligibility requirements outlined in this Action Plan. If remaining funds allow for additional projects that are not identified below in Priorities, they may be ranked and scored in conformance with a set of scoring criteria identified in the policies and procedures.

Covered Projects

If a proposed infrastructure project results in a Covered Project, which is an infrastructure project having a total project cost of \$100 million or more, with at least \$50 million of CDBG funds (regardless of source (e.g., CDBG–DR, CDBG–MIT, or CDBG), this Action Plan will be amended to include the project at a future date.

HUD defines an infrastructure project at 84 FR 45838, 45851, as an activity or group of related activities that develop the physical assets that are designed to provide or support services to the general public in the following sectors: surface transportation, including roadways, bridges, railroads, and transit; aviation; and ports, including navigational channels; water resources projects; energy production and generation, including from fossil, renewable, nuclear, and hydro sources; electricity transmission; broadband; pipelines; stormwater and sewer infrastructure; drinking water infrastructure; and other sectors as may be determined by the Federal Permitting Improvement Steering Council.

Critical Lifelines Infrastructure & Public Facilities



Sector Lifeline	Agency/Entity	Estimated Project Costs	Other Funding Source	National Objective	HCDA Eligibility
Energy	Water and Power Authority	\$145,000,000 VITOL Acquisition		LMI	Section 105(a)(1)(D) Section 105(a)(2)2 Section 105(a)16

See Infrastructure Projects Cost and Benefits section below for details about this process.

Allocation and Maximum Award

Allocation Amount: \$308,000,000.00

Maximum Award Amount: To be determined based upon necessary and reasonable costs submitted with applications for infrastructure projects. If a Covered Project is proposed, this Action Plan will be amended at a future date.

Eligible Applicants

- Units of Governments of the USVI, including its autonomous and semi-autonomous instrumentalities, such as the Water and Power Authority, the Department of Public Works, the Waste Management Authority, the Bureau of Information Technology and other

infrastructure related governmental and quasi-governmental entities, plus private sector entities procured to execute Public-Private Partnerships.

Eligible Activities

- HCDA Section 105(a)(1) Acquisition of Real Property
- HCDA Section 105(a)(2) Public Facilities and Improvements
- HCDA Section 105(a)(4) Clearance, Rehabilitation, Reconstruction, and Construction of Buildings
- HCDA Section 105(a)(5) Architectural Barrier Removal
- HCDA Section 105(a)(8) Public Services
- HCDA Section 105(a)(11) Relocation
- HCDA Section 105(a)(12) Planning
- HCDA Section 105(a)(14) Activities Carried Out through Nonprofit Development Organizations
- HCDA Section 105(a)(15) Eligible nonprofit organizations
- HCDA Section 105(a)(21) Higher Education
- HCDA Section 105(a)(12) Planning

Priorities

- Project beneficiaries are evidenced to be at least 50% low- and moderate-income persons or communities.
- Projects that meet the definition of mitigation activities.
- Projects that meet a CDBG-MIT national objective.
- Projects that demonstrate an accelerated timeline.
- Projects that use natural infrastructure methods to achieve resilience.
- Projects that include measures to prevent vulnerability in the future or provide innovative solutions to existing vulnerabilities.
- Projects that both improve existing infrastructure and address identified current and future risks; mitigation related to hurricanes, tropical storms and depressions, severe flooding, earthquake, tsunami, drought, landslide, wildfire, and pandemic;
- Projects that employ modern sustainability standards or best practices.
- An operations and maintenance plan must be provided to maintain the infrastructure in the long-term.
- The project is evidenced to resolve an impediment to or create new opportunities for economic activities.
- For any proposed projects not listed below, the VIHFA will develop a competitive application process to select eligible projects that meet the criteria described above. The competitive application process will be open to all eligible applicants and up to three applications may be submitted per entity. Depending on demand, no applicant will be awarded for their subsequent application until all successful eligible applicants have been awarded funding at least once. If a project is a phase of a larger project, the phase of the project submitted must be viable as a stand-alone project. Applicants are encouraged to incorporate nature-based solutions, including natural or green infrastructure, into their proposed projects.
- Department of Public Works projects in an aggregate amount of approximately \$147,479,876.00.
- Essential Water projects by WAPA Water in an amount of approximately \$36,500,000.000.
- Essential Electric projects by WAPA Electric in an amount of approximately \$30,000,000.00.

- Waste Management department solutions that meet the requirements of this Action Plan and offer long term advantages for sustainability will be considered in an amount up to \$100,000,000.00.

Projected Start and End Dates

Due to the complexity of this program, the timeline is 12 years from the date of the grant agreement.

Infrastructure Project Cost and Benefits Analysis

Infrastructure projects typically carry a high cost of labor and materials relative to the continental U.S. due to the isolated geography and limited workforce in the Territory. Each project will be informed by a consideration of cost and benefits considering these unique circumstances, but whenever possible will utilize local/regional talent and materials to reduce costs. The Territory's approach to assessing costs and benefits may be based on two existing frameworks. The first, HMGP's Guidance on cost effectiveness relies on a Benefit Cost Analysis, where projects for which benefits exceed costs are generally considered cost effective.

- The project cost estimate requested with each project application includes a line-item breakdown of all anticipated costs, including, as applicable: Costs for anticipated environmental resource impact treatment or historic property treatment measures;
- Costs for engineering designs/specifications, including hydrologic and hydraulic studies/analyses required as an integral part of designing the project;
- Construction/demolition/relocation costs, such as survey, permitting, site preparation, and material/debris disposal costs;
- All other costs required to implement the mitigation project, including any applicable project-type specific costs. Benefits in this methodology are often calculated using standard loss of function estimates provided by relevant federal agencies, which may also be utilized by the Territory.

One disadvantage of this method is that benefits may only be measured as avoided damage, loss of function, and displacement and not fully consider the important socio-economic factors involved. Given the Territory's approach to mitigation and resilience as giving full consideration to systemic, inter-related processes that promote resilience, the method produced through the National Disaster Resilience Competition (NDRC) will help to supplement some of these factors. Under this method, to the greatest extent possible, a narrative description may be produced to identify evidence-based practices as the basis for the project proposal.

This method includes the following steps:

1. A full proposed cost, including Federal, Territorial, and private funding, as well as expected operations and maintenance costs and functionally related to geographically related work;
2. A description of the current situation and the problem to be solved (including anticipated changes over the analysis period);
3. A description of the proposed project or program including functionally or geographically related elements and estimated useful life;
4. A description of the risks to the community if the proposal and any land use, zoning or building code changes are not implemented, including costs that might be avoided if a disaster similar to the qualifying disaster struck again, including costs avoided if as a result of the project remaining effective in a future disaster;



5. A list of the benefits and costs of the proposal and the rationale for including each effect using the table provided according to the following categories:
 - a. Lifecycle costs;
 - b. Resiliency value;
 - c. Environmental Value;
 - d. Social Value; and
 - e. Economic Revitalization.
6. A description of risks to ongoing benefits from the proposed project or program; and
7. An assessment of challenges faced with implementing the proposal.

The exact method of benefit and cost assessments may vary and will be detailed further in the Infrastructure Policies and Procedures. Infrastructure programs will generate a wide array of employment opportunities and other positive impacts. The Territory is committed to ensuring local firms and jobseekers are fully engaged in this work. Coordination is underway with the Virgin Islands Department of Labor (DOL) to ensure employers' and jobseekers' needs are being considered for both large and small-scale infrastructure projects. DOL is a critical partner in ensuring the Territory's workforce is trained, prepared, and qualified for the work initiated by infrastructure construction. A key target population for this program will be low-income residents and businesses that qualify under Section 3. The Section 3 program requires that recipients of certain HUD financial assistance, to the greatest extent possible, provide training, employment, contracting and other economic opportunities to low- and very low-income persons, especially recipients of government assistance for housing, and to businesses that provide economic opportunities to low- and very low-income persons. Each agency receiving funds under the Infrastructure Programs will receive technical assistance from VIHFA and direct hiring and training assistance from DOL to ensure their projects are compliant with Section 3 to the greatest extent feasible.

7.4 Economic Resilience & Revitalization

As part of a comprehensive mitigation program, economic development is a crucial component for the long-term resilience and viability of communities and households. Each economic resilience activity must demonstrate how it will contribute to meeting the CDBG-MIT criteria for eligible economic development assistance.

In addition to the economic hardship caused by Hurricanes Irma and Maria, the U.S. Virgin Islands economy has contracted since the Great Recession in 2008 and the closure of the HOVENSA oil refinery in 2012. A 2019 report notes that "Economic stressors on the predominantly single -sector economy have contributed to high unemployment and conspicuous poverty in the Territory" (Caribbean Exploratory Research Center, 2019). According to the assessment, the major areas of employment in the U.S. Virgin Islands are government, services, leisure and hospitality, and wholesale retail trade while the areas of manufacturing and information represent the industries with the lowest employment levels in the Territory.

As detailed in the CDBG-DR Action Plan, Hurricanes Irma and Maria had profound and lasting effects on the already fragile economy of the U.S. Virgin Islands. Revitalizing economic sectors like tourism and retail are critical to job creation/retention and expanding economic opportunities for small businesses throughout the Territory. Along with creating economic opportunities for residents, hardening commercial areas, and assisting small businesses with mitigation efforts will ensure that future disasters cause less economic disruption.

In addition to reinvigorating existing economies such as tourism, it is important to support the sustainable diversification of the economy. A more diversified economy will be more resilient in the face of future natural disasters and will incentivize the creation of higher-earning jobs in the long-run.

Economic diversification can pose major challenges, as there are considerable obstacles to attracting private investment and expanding existing businesses within the Territory. In addition to dramatically higher-than-average shipping and electricity costs and regulatory hurdles, the lack of a skilled labor force can preempt the relocation, growth, and creation of new, high-value businesses. Furthermore, access to financing is seriously limited, especially for small business ventures. It is critical that entrepreneurs in the Territory have a supportive business environment with easier access to capital and adequate technical support in the design and implementation of viable business plans.

Therefore, the U.S. Virgin Islands proposes an economic resilience program to complement its economic revitalization efforts through CDBG-DR.

The VIHFA will develop policies and procedures that will outline all requirements for any Economic Resilience & Revitalization project to be eligible for funding. All proposed projects must submit an application that describes the project’s connection to mitigation needs and the priorities and eligibility requirements outlined in this Action Plan. Identified projects will be ranked and scored in conformance with a set of scoring criteria identified in the policies and procedures.

Table 43. Economic Resilience and Revitalization

Program	Allocation	Community Lifeline Impact	National Objective
Commercial Hardening & Financing	\$40,000,000.00	<ul style="list-style-type: none"> • Food, Water, Sheltering • Safety and Security • Hazardous Materials • Communications 	LMI UNM
Small Business Mitigation	\$35,000,000.00	<ul style="list-style-type: none"> • Food, Water, Sheltering • Safety and Security • Communications 	LMI UNM

7.4.1 Commercial Hardening & Financing Program

The goal of the Commercial Hardening & Financing Program is to minimize operational down time and accelerate recovery of commercial areas after a disaster to benefit LMI residents and others. Privately owned commercial or industrial buildings or ports may be rehabilitated or hardened to become more resilient. Such projects may include but are not limited to those that result in abatement of asbestos hazards, remediation of mold, lead abatement, lead-based paint hazards evaluation and reduction, and the correction of code violations and provision of permanent emergency power (e.g., generators and solar arrays). 24 CFR 570.202(a)(3).

The intention of the program is to upgrade private buildings and return them to productive business uses and ensure the ability for such facilities to be fully operating during emergencies. Accordingly, at the time the application is submitted the private entity or person that is going to undertake the rehabilitation of the structure must own the property or have an option to purchase the property.

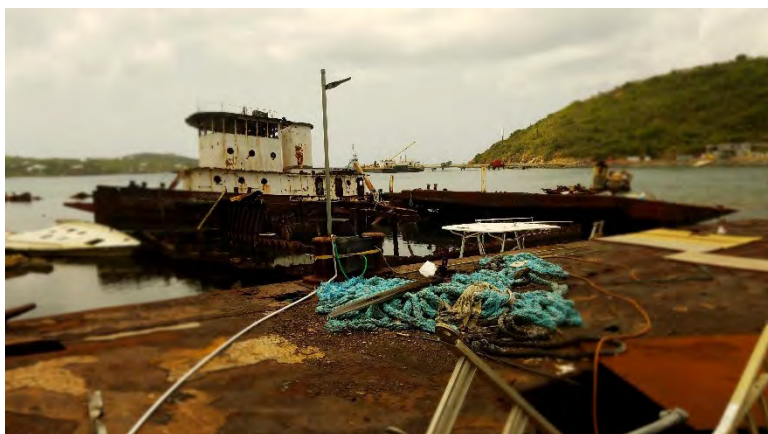


Commercial financing is often needed to supplement or replace CDBG-MIT funds for economic resilience and revitalization projects. Programs initiated or systems improved to enhance or replace privately available capital sources may be eligible for funding.

Historic Preservation: CDBG-MIT funds may be used for the rehabilitation/hardening, preservation or restoration of historic properties that are privately owned. Historic properties are those sites or structures that are either listed in or eligible to be listed in the National Register of Historic Places, listed in an inventory of historic places, or designated as a landmark or historic district by appropriate law or ordinance. Historic preservation, however, is not authorized for buildings for the general conduct of government.

Hardening marine industrial and commercial facilities has particular importance to the US Virgin Islands. Current facilities are limited, with only three marine industrial sites operating in the Territory at present. Therefore, damage to or degradation of such facilities can and has had profound impact on island commercial enterprises that depend on having clear and functioning port facilities.

For example, when a hurricane approaches, many ships--be they residential or commercial--must be moved out of ports and on to safe land-based facilities to avoid destruction from hurricane winds and waves. Previous disasters have resulted in the sinking of numerous ships in areas such as Krum Bay where deteriorating sunken ships have resulted in environmental degradation of the Bay and pose an environmental risk to the island's salinization-based water supply system, which has its intake nearby.



Pictured: Deteriorating ships and barges in Krum Bay.

The USVI has received a small grant from the United States Environmental Protection Agency (EPA) to assist in removing the sunken vessels from Krum Bay. However, the EPA grant would only cover a small part of the cost of eliminating the environmental hazards and clearing the defunct wreckage out of the bay.

There is an essential need for alternate port sites to dramatically improve the efficiency and speed of critical life-saving operations and the inflow of supplies needed to assist residents of the island, especially during emergencies.

Mitigation measures undertaken as part of commercial hardening may include but are not limited to:

- Drainage and stormwater/surge management for commercial areas
- Boat ramps and improved shoreline and roads for evacuation/receiving supplies
- Port and harbor improvements
- Generators for commercial facilities' infrastructure
- Generators for continuous power at critical private retailers
- Removal of hazardous materials
- Hardening of Building exteriors and improved facility for community outreach/education efforts

Allocation and Maximum Award

Allocation Amount: \$40,000,000.00

Maximum Award Amount: \$20,000,000.00

Eligible Applicants

- For profit businesses
- Non-profit organizations
- Units of Government of the USVI, including its autonomous and semi-autonomous instrumentalities

Eligible Activities

- HCDA Section 105(a)(1) Acquisition of Real Property
- HCDA Section 105(a)(2) Public Facilities and Improvements
- HCDA Section 105(a)(4) Clearance, Rehabilitation, Reconstruction, and Construction of Buildings
- HCDA Section 105(a)(5) Architectural Barrier Removal
- HCDA Section 105(a)(8) Public Services
- HCDA Section 105(a)(11) Relocation
- HCDA Section 105(a)(12) Planning
- HCDA Section 105(a)(14) Activities Carried Out through Nonprofit Development Organizations
- HCDA Section 105(a)(15) Eligible nonprofit organizations
- HCDA Section 105(a)(12) Planning
- HCDA Section 105(a)(17) Assistance to For-Profit Entities
- HCDA Section 105(a)(19) Provision of technical assistance to public or nonprofit entities to increase the capacity of such entities to carry out eligible neighborhood revitalization or economic development
- HCDA Section 105(a)(22) Assistance to public and private organizations, agencies, and other entities to facilitate economic development

Priorities

Priorities will be projects that meet the CDBG-MIT criteria for eligible economic development assistance and do the following:

- Create jobs for predominantly LMI individuals
- Reduce risks to life, property, and critical environments



- Stabilize and grow the tourism industry through key infrastructure improvements to ports and commercial areas that will increase the Territory's capacity to receive tourists
- Remove hazardous materials from key commercial areas
- Harden infrastructure to mitigate against future disasters in key commercial areas
- In conjunction with improvements, utilize job placement programs for trainees
- Increase the capacity of ports, harbors, and other marine infrastructure

The VIHFA will develop a competitive application process to select eligible projects that meet the criteria described above. The competitive application process will be open to all eligible applicants and up to two applications may be submitted per entity. Depending on demand, no applicant will be awarded for their subsequent application until all successful eligible applicants have been awarded funding at least once. Applicants are encouraged to incorporate nature-based solutions, including natural or green infrastructure, into their proposed projects.

Projected Start and End Dates

Commercial hardening and financing activities may involve complex projects with an expected timeline of 2021 for up to 12 years from the program start date.

7.4.2 Small Business Mitigation Improvements

The Mitigation Improvements for Small Business Program is intended to minimize operational down time and accelerate recovery of small businesses after a disaster.

Mitigation measures may include but are not limited to:

- Dry Floodproofing of Non-residential Structures
- Generator installation
- Solar power installation
- Weatherization
- Drainage Improvements
- Communication Systems

Allocation and Maximum Award

Allocation Amount: \$35,000,000.00

Maximum Award Amount: \$2,000,000.00 per small business

Eligible Applicants

- Small businesses as defined the SBA at 13 CFR part 121 or businesses engaged in "farming operations" that meet the U.S Department of Agriculture Farm Service Agency criteria described at 7 CFR 1400.500

Eligible Activities

- HCDA Section 105(a)(1) Acquisition of Real Property
- HCDA Section 105(a)(2) Public Facilities and Improvements
- HCDA Section 105(a)(4) Clearance, Rehabilitation, Reconstruction, and Construction of Buildings
- HCDA Section 105(a)(5) Architectural Barrier Removal

- HCDA Section 105(a)(8) Public Services
- HCDA Section 105(a)(11) Relocation
- HCDA Section 105(a)(12) Planning
- HCDA Section 105(a)(14) Activities Carried Out through Nonprofit Development Organizations
- HCDA Section 105(a)(15) Eligible nonprofit organizations
- HCDA Section 105(a)(12) Planning
- HCDA Section 105(a)(17) Assistance to For-Profit Entities
- HCDA Section 105(a)(19) Provision of technical assistance to public or nonprofit entities to increase the capacity of such entities to carry out eligible neighborhood revitalization or economic development
- HCDA Section 105(a)(22) Assistance to public and private organizations, agencies, and other entities to facilitate economic development

Priorities

Priorities will be projects that meet the CDBG-MIT criteria for eligible economic development assistance and do the following:

- Create jobs predominantly for LMI individuals
- Reduce risks to life, property, and critical environments
- In conjunction with improvements, utilize job placement programs for trainees

The VIHFA will develop a competitive application process to select eligible projects that meet the criteria described above. The competitive application process will be open to all eligible applicants and up to two applications may be submitted per entity. Depending on demand, no applicant will be awarded for their subsequent application until all successful eligible applicants have been awarded funding at least once. Applicants are encouraged to incorporate nature-based solutions, including natural or green infrastructure, into their proposed projects

Projected Start and End Dates

Small business mitigation activities may be carried out from 2021 when project applications are released through 2027.

7.5 Resilient Housing Programs

The VIHFA is exploring expansion of existing CDBG-DR development projects to conform to the additional objectives and responsibilities set forth in this Action Plan. Any changes to the existing housing programs will be reflected through an Action Plan amendment. In assessing the community demand (driven by public outreach and stakeholder events), the VIHFA has identified significant increased need for housing in addition to the programs already undertaken through the CDBG-DR program.

All housing construction and repairs are projected to use sustainable building code standards as well as prioritizing opportunities to include advanced housing mitigation solutions.

Table 44. Resilient Housing

Program	Allocation	Community Lifeline Impact	National Objective
Single Family Resilient New Home Construction	\$60,000,000.00	Food, Water, Sheltering	LMI UNM



Resilient Multifamily Housing	\$100,000,000.00	Food, Water, Sheltering	LMI UNM
Homeless Housing Initiative	\$23,000,000.00	Food, Water, Sheltering	LMI
Innovative Resilient Housing	\$5,000,000.00	Food, Water, Sheltering	UNM

7.5.1 Single Family Resilient New Home Construction Program

The Territory has historically relied much more on single-family housing than multi-family housing to meet housing needs and home ownership has traditionally been an attainable goal for USVI residents. However, the cost of single-family housing has risen dramatically, therefore, many residents are unable to become homeowners. This program will be established to increase home ownership opportunities for residents of low-moderate income at or below 80% of AMI and to provide workforce housing for those with income levels between 80% and 120% of AMI. Providing a broader income spectrum will have the benefit of decreasing the concentration of poverty and helping to provide workforce housing for those who would otherwise not be able to reach the aspiration of home ownership.

The VIHFA will develop policies and procedures for the Single Family Resilient New Home Construction program that will outline all requirements for funding eligibility.

Allocation and Maximum Award

Allocation Amount: \$60,000,000.00

Maximum Award Amount: Awards will be based on the scope of work based on a consistent economy grade of building materials for the Territory, using a national building standard estimating software. Units will be required to meet housing quality standards (HQS) standards. Details of building standards will be further defined in the program guidelines. Per unit costs may not exceed \$700,000 (inclusive of mitigation measures such as elevation as needed).

Funds for rehabilitation and construction will be delivered in the form of forgivable construction loans. These loans will be forgivable over a five-year period. Rents must be restricted based on AMI as applicable.

Eligible Applicants

- Units of Government of the USVI
- Public housing authorities
- For-profit Developers/Borrowers
- Not-for-profit Developers/Borrowers

Eligible Activities

- HCDA Section 105(a)(1) Acquisition of Real Property
- HCDA Section 105(a)(4) Clearance, Rehabilitation, Reconstruction, and Construction of Buildings
- HCDA Section 105(a)(5) Architectural Barrier Removal
- HCDA Section 105(a)(8) Public Services
- HCDA Section 105(a)(11) Relocation
- HCDA Section 105(a)(18) Rehabilitation or development of housing

Priorities

- Projects with single family home resiliency solutions including but not limited to elevation, breakaway ground floor walls, reinforced roofs, storm shutters, use of ENERGY STAR appliances and fixtures, cisterns and septs built to code and household need, band mold and mildew resistant products.
- Projects with longer affordability periods may receive priority

Projected Start and End Dates

The proposed timeline is from HUD approval through 2027.

7.5.2 Resilient Multifamily Housing Program

The Resilient Multifamily Housing Program will allow for rehabilitation, reconstruction, and the new construction of multi-family developments. The purpose of the rental program is to repair, restore and increase the affordable housing stock predominantly for LMI households.

A minimum of 51 percent of the units must be restricted for a minimum affordability period of fifteen (15) years for the rehabilitation or reconstruction of multifamily rental projects with eight or more units, and a minimum affordability period of twenty (20) years for the new construction of multifamily rental units with five or more units for LMI individuals earning 80 percent or less of the AMFI at HUD established affordable rents. If a rental project that requires rehabilitation or reconstruction is subject to existing affordability requirements associated with other funding sources, the 15-year and 20-year affordability periods may run concurrently (or overlap) with the affordability requirements associated with such other funding.

The VIHFA will develop policies and procedures for the Resilient Multi-family Housing program that will outline all requirements for a project to be eligible for funding.

Allocation and Maximum Award

Allocation Amount: \$100,000,000.00

Maximum Award Amount: \$30,000,000.00 million per development

Eligible Applicants

- Public housing authorities
- Units of Government of the USVI, including its autonomous and semi-autonomous instrumentalities
- The VIHFA
- For-profit Developers/Borrowers
- Not-for-profit Developers/Borrowers

Eligible Activities

- HCDA Section 105(a)(1) Acquisition of Real Property
- HCDA Section 105(a)(2) Public Facilities and Improvements
- HCDA Section 105(a)(4) Clearance, Rehabilitation, Reconstruction, and Construction of Buildings (including Housing)
- HCDA Section 105(a)(5) Architectural Barrier Removal



- HCDA Section 105(a)(8) Public Services
- HCDA Section 105(a)(11) Relocation
- HCDA Section 105(a)(12) Planning
- HCDA Section 105(a)(14) Activities Carried Out through Private or Public nonprofits

Priorities

The priority in implementation of these initiatives is the benefit to LMI individuals and households. In addition, the following priorities will be considered:

- Projects that leverage public and private financing, such as Low-Income Housing Tax Credits (LIHTC) and other funds
- Projects located in Opportunity Zones
- Projects that use mitigation solutions and other construction technology designed to mitigate disaster risks including but not limited to elevation; retention basins; fire-safe landscaping; firewalls; and landscaped floodwalls

Projected Start and End Dates

The proposed timeline is from HUD approval up to 12 years from the start of the program. New resilient construction may take additional time to complete when considering siting, design, development, and construction timeframes.

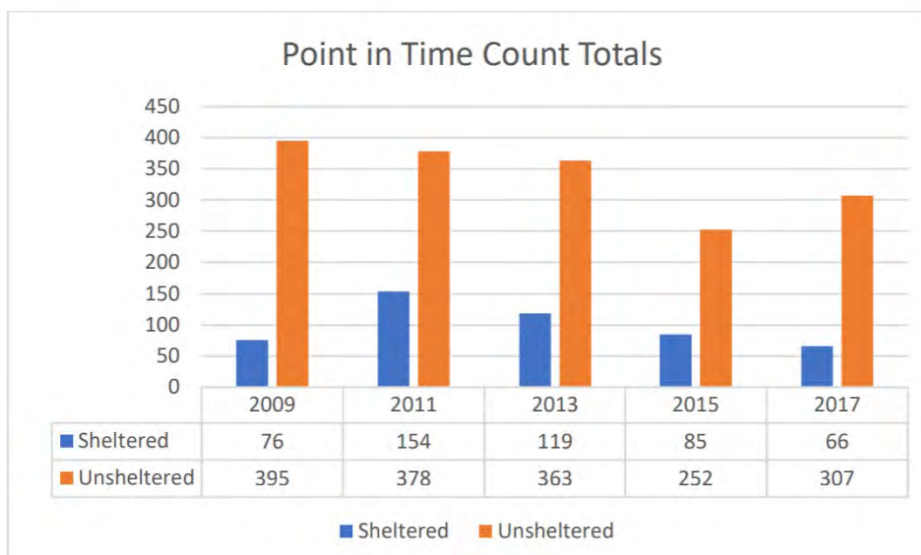
7.5.3 Homeless Housing Initiative--Permanent Supportive Housing Development

According to recent Point in Time Count data (see chart below) the Territory has an unusually high percentage of chronically homeless persons relative to the homeless population as a whole. For example, in 2017, 66 homeless persons were sheltered, versus 307 homeless persons who were unsheltered.

Additionally, previous Point in Time Counts have emphasized the need for more Permanent Supportive Housing. Because Permanent Supportive Housing has proven to be the most effective method of housing those who are chronically homeless, this program will focus on the production of Permanent Supportive Housing units to account for more recent data on the USVI homeless population.

The VIHFA will develop policies and procedures for the Homeless Housing Initiative program that will outline all requirements for a project to be eligible for funding.

Figure 53. USVI Homeless Count Totals



Allocation and Maximum Award

Allocation Amount: \$23,000,000.00

Maximum Award Amount: Project awards will be deemed reasonable on a case-by-case basis within the parameters of the program policies and procedures established.

Eligible Applicants

- Units of Government of the USVI, including its autonomous and semi-autonomous instrumentalities (including Public housing authorities)
- For-profit Developers/Borrowers
- Not-for-profit Developers/Borrowers

Eligible Activities

- HCDA Section 105(a)(1) Acquisition of Real Property
- HCDA Section 105(a)(2) Public Facilities and Improvements
- HCDA Section 105(a)(4) Clearance, Rehabilitation, Reconstruction, and Construction of Buildings (including Housing)
- HCDA Section 105(a)(5)
- HCDA Section 105(a)(8) Public Services
- HCDA Section 105(a)(11) Relocation
- HCDA Section 105(a)(12) Planning
- HCDA Section 105(a)(14) Activities Carried Out through Private or Public nonprofits

Projected Start and End Dates

The proposed timeline is from HUD approval until 2027.

7.5.4 Innovative Resilient Housing

The USVI has an acute shortage of housing units that may be used for temporary housing in the event of emergencies or disasters. The VIHFA desires to establish an innovative resilient housing program to mitigate the risk to loss of life of those who are homeless or residing in substandard housing when disasters strike.

This program will encourage innovative architectural and construction techniques to provide strong, resilient housing with economical development costs.

The VIHFA will develop policies and procedures for the Innovative Resilient Housing Initiative program that will outline all requirements for a project to be eligible for funding.

Allocation and Maximum Award

Allocation Amount: \$5,000,000.00

Maximum Award Amount: \$5,000,000.00

Eligible Applicants

- Units of Government of the USVI, including its autonomous and semi-autonomous instrumentalities
- Public housing authorities
- For-profit Developers/Borrowers
- Not-for-profit Developers/Borrowers

Eligible Activities

- HCDA Section 105(a)(1) Acquisition of Real Property
- HCDA Section 105(a)(2) Public Facilities and Improvements
- HCDA Section 105(a)(4) Clearance, Rehabilitation, Reconstruction, and Construction of Buildings (including Housing)
- HCDA Section 105(a)(5) Architectural Barrier Removal
- HCDA Section 105(a)(8) Public Services
- HCDA Section 105(a)(12) Planning
- HCDA Section 105(a)(14) Activities Carried Out through Private or Public nonprofits

Projected Start and End Dates

The proposed timeline for the Innovative Resilient Housing project is from 2022 to 2026.

7.6 Public Services

In addition to public services associated with many of the programs listed above, the MNA and public input process have revealed the need for direct services to the community to increase resilience during and after disasters.

The 2017 disasters exacerbated situations for already vulnerable populations. Within this group the share of unemployment is high resulting in a wide range of social services and subsidies required for these individuals and households. The occurrence of two back-to-back Category 5 storms and the displacement and chaos that followed, has also increased the need for supportive services for vulnerable populations.

To address this need, the program will provide grants through a competitive application process to social services organizations that may enhance the support service network for vulnerable populations through the following types of programs:

- Education and outreach campaigns designed to alert communities and beneficiaries to opportunities to further mitigate identified risks through insurance, best practices, and other strategies
- Health and welfare programs to increase personal resilience to disasters and protect the health and safety of residents during and after disasters
- Apprenticeship/Mentorship programs in key sectors
- Homelessness prevention
- Hurricane and other disaster preparedness
- Technology-based Resiliency Programs
- Housing Counseling

7.6.1 Improved Access to Healthcare

Public service funds will be used to propose new services or provide a measurable increase in an existing operational service.

Table 45. Public Services Allocation

Program	Allocation	Community Lifeline Impact	National Objective
Public Services	\$15,000,000.00	<ul style="list-style-type: none"> • Food, Water, Sheltering • Safety and Security • Health and Medical 	LMI

7.6.2 Allocation and Maximum Award

Allocation Amount: \$15,000,000.00

Maximum Award: Awards will be determined on the amount of funding available and based on applications received and projects determined eligible for award. Reasonable costs for services will be considered on a per unit basis based on comparison of standard industry-specific costs. For example, if an organization is selected to provide meal delivery services, the award would be based on current reasonable, documented costs of these services as determined through a cost reasonableness evaluation considering the unique costs experienced in the Territory.

7.6.3 Eligible Applicants

- Units of Government of the USVI, including its autonomous and semi-autonomous instrumentalities
- Public, nonprofit, and for-profit providers of support services for vulnerable populations. This includes but is not limited to the Department of Human Services and the Department of Health.

7.6.4 Eligible Activities

- HCDA Section 105(a)(8) Public Services
- HCDA Section 105(a)(12) Planning
- HCDA Section 105(a)(14) Activities Carried Out through Private or Public nonprofits

7.6.5 Priorities

Funding will be allocated to the individual program components as needed to ensure that the most vulnerable are served expediently and effectively. The Territory reserves the right to include additional vulnerable populations.

7.6.6 Projected Start and End Dates

Public service activities may be carried out from the date of HUD approval up to 12 years. The VIHFA anticipates that most public services projects will be administered during the initial 6 years of the CDBG-MIT program.

7.7 Territory Planning Program

In addition to using Planning funds for activities such as Action Plan development, public outreach, and coordination, the VIHFA understands through the MNA process that planning studies may be



beneficial to identify solutions to disaster risks and promote sound mitigation practices across the Territory.

The requirements at 24 CFR 570.483(b)(5) or (c)(3), which limit the circumstances under which the planning activity can meet a low- and moderate-income national objective, will not apply to CDBG-MIT planning activities; instead, the Territory will comply with 24 CFR 570.208(d)(4) when funding mitigation, planning-only grants, or directly administering planning activities that guide mitigation in accordance with the Appropriations Act. In addition, the types of planning activities that may be funded or undertaken in the MIT-AP will be consistent with those of entitlement communities identified at 24 CFR 570.205, which may include support for local and regional functional land use plans, master plans, historic preservation plans, comprehensive plans, community recovery plans, resilience plans, development of building codes, zoning ordinances, and neighborhood plans.

Studies may include, but are not limited to, climate change, flood control, earthquake mitigation, waste management, drainage improvements, resilient housing solutions, homelessness, surge protection, economic development and sustainability, infrastructure improvement, engineering studies or other efforts to mitigate risks and future damages and establish plans for comprehensive recovery and emergency planning efforts. Further amendments to this Action Plan may convert a portion of these planning funds to execute specific projects contemplated or developed through the planning process.

Table 46. Planning Allocation

Program	Allocation	Community Lifeline Impact	National Objective
Planning	\$29,750,000.00	<ul style="list-style-type: none"> • Food, Water, Sheltering • Safety and Security • Hazardous Materials • Communications • Transportation • Health & Medical • Energy 	LMI UNM

7.7.1 Allocation and Maximum Award

Allocation Amount: \$29,750,000.00

Maximum Award Amount: The minimum planning award is \$10,000 and the maximum award is \$5,000,000. No more than 60 awards will be made.

7.7.2 Eligible Applicants

- Non-governmental organizations (501(c)(3)) or Not for Profit Entities
- Units of Government of the USVI, including its autonomous and semi-autonomous instrumentalities
- Public or Private Institutions of Higher Learning (Universities)
- Organizations and/or vendors to conduct studies with CDBG-MIT funds

7.7.3 Eligible Activities

- HCDA section 105(a)(12) Eligible planning, urban environmental design, and policy-planning-management-capacity building activities as listed in 24 CFR 570.205.

7.7.4 Priorities

The criteria to select plans for completion will be set forth in the Planning policies and procedures developed by VIHFA.

Planning priorities include the following:

- Promote sound, sustainable mitigation planning informed by an evaluation of hazard risk, especially land-use decisions that reflect responsible floodplain management and consider future possible extreme weather events and other natural hazards and long-term risks
- Integrate mitigation measures into rebuilding activities and achieve objectives outlined in regionally or locally established plans and policies that are designed to reduce future risk to the jurisdiction
- Consider the costs and benefits of the project
- Ensure that activities will avoid disproportionate impact on vulnerable populations such as, but not limited to, families and individuals that are homeless or at risk of homelessness, the elderly, persons with disabilities, persons with alcohol or other drug addiction, persons with HIV/AIDS and their families, and public housing residents
- Ensure that activities create opportunities to address economic inequities facing local communities
- Align investments with other improvements and infrastructure development efforts
- Employ adaptable and reliable technologies to guard against premature obsolescence of infrastructure and to increase the resilience of the economy

7.7.5 Projected Start and End Date

The proposed timeline is from HUD approval through 2028. Plans that relate to projects which may be carried out with CDBG-MIT funds as part of another project will have required plan completion dates that allow time for construction completion within the program timeline.

7.8 VIHFA Administration

VIHFA administrative costs including subrecipient administration costs will not exceed five (5) percent, \$38,709,400. Planning and administrative costs combined will not exceed twenty (20) percent. The VIHFA will retain the full 5 percent allocated for administrative costs associated with the CDBG-MIT allocation for purposes of oversight, management, and reporting.

The VIHFA may also set forth caps on administration and project delivery costs for partner entities and subrecipients in subsequent program guidelines and policies and procedures.

7.9 Timely Information on Application Status and Confidentiality

The VIHFA understands the importance of providing all program applicants with current, accurate, and clear information throughout their application process. The processes required to deliver benefits, particularly in housing-related activities, are multi-step complex processes that require extensive documentation. Not only do applicants need to keep up to date on any missing supporting documentation or impediments to their grant award, but the program can also assist applicants in staying aware of other resources that may be available to them. Real time access to information about grant status is a priority, together with effective case management, including the ability to contact their



case manager by appointment, mail, email, or phone during operation hours. Parameters will be set so that applicants will understand their expected return response times. Printed status updates to applicants who do not have access to electronic media and phone service will be provided.

In addition to program-wide information available on the CDBG-MIT area of the VIHFA's website, the Program will use printed and electronic materials, various forms of media including television and radio, publications, direct contact, and placement of flyers/posters in public facilities, neighborhood facilities, churches, and community centers to provide timely information. Program information and documents will also be available in multiple languages to accommodate the non-English speaking participants. The website will also contain a contact number to obtain information by phone and to contact a Constituent Services Representative to request information related to applications along with a Web Form Application Status Request. There will be a link on the website to access VIHFA's secure method of requesting specific information related to the status of applications.

Prior to scheduling an in-person appointment for the intake process of their application, program applicants will receive a detailed listing of all required documentation needs. Applicants with physical disabilities and/or a need for translation services will be accommodated as needed. Scheduled updates will be made to keep the applicant updated on missing documentation and application status. Application status will be accessible to the program applicant during the processing of the application, until the eligibility determination is made, and the grant award is determined via the applicant's preferred contact method, as selected in their application. This determination of grant award will be provided to the applicant in writing.

Applicants will have an opportunity to appeal the determination of eligibility and grant award as well as provide additional documentation to support their appeal through an appeals process that will be provided to all applicants at the initial intake and posted on the Program's website. All applications, guidelines, and websites will include details on the right to file an appeal, and the process for beginning an appeal. Refer to Appendix O of the Implementation Plan– Timely Information on Application Status Policy as well.

7.9.1 Confidentiality/Personally Identifiable Information (PII)

VIHFA is committed to ensuring the privacy and confidentiality of Personally Identifiable Information (PII). The current measures of the VIHFA include distribution of an Employee Handbook during the orientation process for all new employees.

If there is a question of whether certain information is considered confidential, the employee should first check with their supervisor. All employees may be required to sign a non-disclosure agreement as a condition of employment. Employees who improperly use or disclose trade secrets or confidential business information will be subject to disciplinary action, up to and including termination of employment and legal action, even if they do not actually benefit from the disclosed information.

The protection of confidential business information and trade secrets is vital to the interests and the success of VIHFA. Such confidential information includes, but is not limited to, the following examples:

- Compensation data
- Customer lists
- Customer preferences
- Financial information
- Labor related strategies
- Proprietary production processes
- Research and development strategies
- Scientific data
- Scientific formulae
- Specific prototypes

- New materials research
- Pending projects and proposals
- Technological data
- Technological prototypes

A policy regarding confidentiality and personally identifiable information will be distributed to all contractors, consultants, vendors, contractors, auditors, and any personnel engaged on any part of the CBDG-DR program, information received via electronic media and all agreements. This fully updated policy will be included in the Action Plan. Refer to Appendix Q – Employee Handbook: Section 112 – Non-Disclosure/Confidentiality; Appendix R – Personally Identifiable Information (PII) draft policy as well.

Finally, and including all of the aforementioned information, for any application status on any program that requires an application submission, a status update can be obtained by contacting Ms. Antoinette Fleming at (340) 777-4432 or via email at anfleming@vihfa.gov. An additional phone number will be established under CDBG-MIT to provide information to the public, by making a request by email, similar to what is already being done under CDBG-DR’s EnVIsion program.

7.10 Exceptions to Maximum Award Amounts

The VIHFA will make exceptions to the maximum award amounts based on its Exception Policy. Each request for an exception to the maximum award amount or other program policies will be reviewed on a case-by-case basis by VIHFA. Requests must be submitted in writing and include a justification for exceeding the maximum award amount or other policy requirements. The policy exception is not to be implemented until the VIHFA authorizes the exception in writing. Requests will be review by VIHFA and a response will be provided in writing within 45 business days.

7.11 Long-term Operation and Maintenance

The specific funding for long-term Operation and Maintenance (O&M) for infrastructure and public facility projects will depend upon what specific projects are chosen through the procurement process. The chart below is duplicative from Section 7.3 of the MIT-AP.

Program	Project Allocation	Community Lifeline Impact	National Objective
Community Resilience & Public Facilities Construction	\$100,000,000.00	<ul style="list-style-type: none"> • Food, Water, Sheltering • Communications • Safety and Security 	LMI UNM
Resilient Critical and Natural Infrastructure	\$308,000,000.00	<ul style="list-style-type: none"> • Food, Water, Sheltering • Transportation • Health and Medical • Hazardous Materials 	LMI UNM

Community Resilience and Public Facilities Construction projects selected will include items such as community shelters and multipurpose facilities dedicated to disaster preparedness. Such projects will be underwritten by VIHFA staff to ensure that the financial models upon which they are based will include funding for long-term O&M. Such projects may be proposed by departments of the Territorial government acting as subrecipients or to private non-profit or for-profit groups that successfully respond to VIHFA procurement activities. In the case of government owned facilities, the VIHFA will not find them to be eligible unless they provide assurance that sufficient funding has been dedicated from existing local taxation, or other fees or revenue that can reasonably be projected as viable sources for the Territory, with information to be collected by the VIHFA as part of the application process.



Resilient Critical and Natural Infrastructure projects will consist of food, water, sheltering, transportation, health, and medical projects and those relating to the safe and appropriate disposition of hazardous materials. This broad spectrum of potential projects will also be underwritten by VIHFA staff to ensure that the financial models upon which they are based will include funding for long-term O&M. In the case of such projects that address water, transportation and other infrastructure provided by the Territorial Government or quasi-governmental entities such as WAPA, sufficient resources for O&M will have to be dedicated from available and reasonably predictable revenue sources such as taxation and user fees. Food, sheltering, health and medical projects will be required to demonstrate that sufficient reserves have been established to cover long-term O&M.

Because such projects have not yet been identified, the VIHFA will include language in its policies and procedures that clearly requires dedicated revenue streams to be adequate for long term O&M for any proposed projects to be eligible for CDBG-MIT funding.

7.12 Subrecipient Expenses, Program Income, and Timely Payment

The VIHFA is currently updating its Financial Policy and Procedures to provide more detail regarding monitoring subrecipient expenditures, accounting for and managing program income and reprogramming funds in a timely manner.

Program Income is defined as “gross income generated from the use of CDBG-MIT funds.” Examples of program income include, but are not limited to, the following: a) proceeds from the disposition by sale or lease of real property purchased or improved with CDBG-MIT funds, b) proceeds from the disposition of equipment purchased with CDBG-MIT funds, c) net income from the use of rental property owned by the grantee. The VIHFA does not anticipate generating any program income with the utilization of CDBG-MIT funds, and the VIHFA intends to continue to follow its practice of ensuring that any program income will be used or distributed before seeking further withdrawals from the U.S. Treasury. However, should program income be generated, the VIHFA will track the receipts within the VIHFA’s financial records and report the receipts to HUD via the Disaster Recovery Grant Reporting System (DRGR) database as required in the regulations. Any program income received prior to grant closeout shall be utilized for additional eligible CDBG-MIT activities.

The updated Financial Policy and Procedures will further detail how the VIHFA will ensure that all contracts and bills that require payment are timely paid, as well as ensuring that its actual and projected expenditure of funds will be accurately reported in DRGR QPR. In conjunction with this Financial Policy and Procedure update, the VIHFA plans to enhance its SOP documents, and complete a Subrecipient Handbook that will be provided to HUD, all CDBG-MIT grantees, and subrecipients.

Upon ongoing development of the CDBG-MIT Program, this comprehensive CDBG-MIT Subrecipient Handbook builds on lessons learned from CDBG-DR operations. It will encompass administration, programmatic implementation, and compliance and monitoring, including required monitoring of subrecipient expenditures. This Handbook will serve as the guide for CDBG-MIT Program staff, grantees, and subrecipients. The purpose of the handbook will be to assure that all CDBG-MIT funds are properly managed and accounted for, to establish a process for submitting and receiving timely payments; for processing program income, if any; the rules for determining when VIHFA may recapture funds for reprogramming; instructions to ensure that actual and project expenditures are reported in

DRGR QPR; and finally it will provide assurances that require grantees and subrecipients to administer their projects and programs in accordance with all CDBG-MIT rules and regulations.

Additionally, VIHFA will provide required training to grantees and subrecipients on how to use the Handbook, in addition to continuing to follow its practices for signed required agreements and approved checklists for vetting potential subrecipients for eligibility before proceeding with any steps to provide CDBG-MIT funds.

Current VIHFA processes will be further enhanced and updated with the integration of subrecipient and grantee communication via the CDBG-MIT area of the VIHFA's website, advertisements of program milestones, meetings throughout the affected areas of the territory, direct mailings regarding individual application status, and emails. Finally, the VIHFA is considering an application portal for subrecipients and grantees to check the status of submissions in real-time. VIHFA personnel will be responsible for the communication and processing of applications.





8.0 Natural Infrastructure

8.0 NATURAL INFRASTRUCTURE

Located in the Leeward Islands of the Lesser Antilles, the U.S. Virgin Islands (USVI) is approximately 40 miles east of Puerto Rico and over 1,100 miles from Miami, Florida. The USVI is a territory comprised of three main islands—Saint Croix, Saint John, and Saint Thomas—and several surrounding islands. The Territory is focused on advancing resilience strategies through carefully managing its natural infrastructure, while also carefully improving infrastructure systems on each of the major islands to maintain the natural resources it currently enjoys. This focus can continue to provide effective solutions for minimizing flooding, erosion, and runoff, by developing man-made systems that work with and mimic natural processes— known as natural infrastructure.

Natural infrastructure approaches include forest, coastal, floodplain and wetland protection, watershed restoration, wetland restoration, permeable pavement, and driveways; green roofs; and natural areas incorporated into designs and conservation easements. A natural infrastructure approach represents a successful and cost-efficient way to protect communities within the Territory. While there is much to be done to further improve the design and restoration efforts in coastal communities, this Action plan will focus on key programs that strengthen and support the natural infrastructure through data-driven solutions that improve resiliency within the Territory.

As outlined within this MIT-AP, regulations and codes are key mechanisms used within the Territory for land use and natural resource management. Many of the resources discussed within the plan are parts of the US Virgin Islands Code and additional requirements may need to be superimposed over, or “overlay”, the base regulations already in place.

Beyond the specific methods needed to assess and compare grey infrastructure against natural infrastructure options relative to their utility to mitigate risk, a framework is required that would provide additional guidance on how to further consider natural infrastructure solutions in its envisioned CDBG-MIT projects within the Territory.

The Territory has and will continue to collaborate with experts in the field of resource management to verify that projects funded through this grant maintain and sustain natural processes, while minimizing impacts to critical habitats, species composition and biodiversity. Further, the Territory will consider natural infrastructure during the CDBG-MIT project selection and program development process.



9.0 Construction Standards

9.0 CONSTRUCTION STANDARDS

In the interest of reducing the risks associated with natural hazards, the Territory will continue to seek to incorporate an industry-recognized standard for building resilient or disaster resistant structures, such as those outlined within the International Code Council construction standards that have been already adopted.

To ensure that housing activities result in resilient, energy efficient affordable housing units, the VIHFA has developed CDBG-DR Construction Standards (Standards) which are required for housing activities and projects that include CDBG-DR funding. These Standards promote energy efficiency and green building practices for new construction or rehabilitation (retrofit) residential projects. The VIHFA subrecipients and developers must utilize the VIHFA Green Building Retrofit Checklist in its entirety based on the type of structure (new construction or rehabilitation of single- or multi-family housing). The VIHFA will also incorporate the “Stronger Home” construction standards developed by FEMA and the Department of Planning and Natural Resources (DPNR).

9.1 Sustainability

All construction will implement methods that emphasize high quality, energy efficiency, sustainability, and mold resistance. All rehabilitation, reconstruction, and new construction will be designed to incorporate principles of sustainability, including water and energy efficiency, resilience, and mitigation against the impact of future disasters.

9.2 Accessibility

The use of recovery funds must meet accessibility standards, provide reasonable accommodations to persons with disabilities, and take into consideration the functional needs of persons with disabilities in the relocation process.

A checklist of accessibility requirements under the Uniform Federal Accessibility Standards (UFAS) is available at: <http://www.hudexchange.info/resources/796/ufas-accessibility-checklist/>. The HUD Deeming Notice 79 FR 29671 (May 23, 2014) explains when HUD recipients can use 2010 ADA Standards with exceptions, as an alternative to UFAS to comply with *Section 504*.

9.3 Green Building Standards

Within the Territory, all new construction of residential buildings or replacement and/or reconstruction of substantially damaged buildings are expected to incorporate the VIHFA’s Green Building Standards recently approved by HUD, and rehabilitation of non-substantially damaged residential buildings must follow guidelines in the HUD Community Planning and Development Green Building Retrofit Checklist. Any construction subject to the Green Building Standards must meet an industry-recognized standard and achieve certification under at least one of the following programs: Energy Star; Enterprise Green Communities; LEED; ICC-700 National Building Standard; EPA Indoor AirPLUS; or any other equivalent comprehensive green building program deemed acceptable to HUD and approved by the VIHFA.

9.4 Broadband Infrastructure

Per 83 FR 8362, any substantial rehabilitation, as defined by 24 CFR 5.100, or new construction of a building with more than four rental units must include installation of broadband infrastructure, except where the U.S. Virgin Islands documents that: a) The location of the new construction or substantial rehabilitation makes installation of broadband infrastructure infeasible; b) the cost of installing broadband infrastructure would result in a fundamental alteration in the nature of its program or activity, and/or pose an undue financial burden; or c) the structure of the housing to be substantially rehabilitated makes installation of broadband infrastructure infeasible.



10.0 Operation and Maintenance Plans

10.0 OPERATION AND MAINTENANCE PLANS

FRN-6109-N-02 allows for flexibility in the use of program income to address on-going operations and maintenance of mitigation projects. Such eligible uses include repair, operation, and maintenance of publicly owned projects financed with CDBG-MIT funds. The Territory will request an appropriate waiver to avail itself of this flexibility for itself and subgrantees as appropriate. Through its implementation of CDBG-MIT programs, the VIHFA will plan for the long-term operation and maintenance of infrastructure and public facilities funded with CDBG-MIT funds.

Each proposed project application must identify the plan for long-term operation and maintenance of infrastructure and public facility projects funded with CDBG-MIT. The proposed project application must describe how it will fund long-term operation and maintenance for CDBG-MIT projects. The VIHFA will also address the following requirements within its policies and procedures on a program-by-program basis, including specific benchmarks instituted to ensure operations and maintenance requirements are met:

1. Resources must be identified for the operation and maintenance costs of projects assisted with CDBG-MIT funds;
2. If operations and maintenance plans are reliant on any proposed changes to existing taxation policies or tax collection practices, those changes and relevant milestones must be expressly addressed; and
3. Any public infrastructure or facilities funded with CDBG-MIT resources must illustrate the ability to account for long-term operation and maintenance needs beyond an initial investment of CDBG-MIT funds.



11.0 Cost Verification

11.0 COST VERIFICATION

At all times, construction costs must remain reasonable and consistent with market costs at the time and place of construction.

If Covered infrastructure projects are implemented in a future change to the Action Plan, the VIHFA will establish specific cost controls for infrastructure, in accordance with accepted HUD standards.

The VIHFA will review projects and test for compliance with financial standards and procedures including procurement practices and adherence to cost reasonableness for all operating costs and grant-funded activities. All program expenditures will be evaluated to ensure they are:

- Necessary and reasonable
- Allocable according to the CDBG contract
- Authorized or not prohibited under territory/local laws and regulations
- Conform to limitations or exclusions (laws, terms, conditions of award, etc.)
- Consistent with policies, regulations, and procedures
- Adequately documented.
- Compliant with all Cross Cutting Federal Requirement including Uniform Administrative Requirements at 2 CFR 200.



12.0 Building Code and Hazard Mitigation Planning

12.0 BUILDING CODE AND HAZARD MITIGATION PLANNING

The Territory is committed to strengthening the resiliency of the islands by implementing strategies and plans; and by adopting ordinances to ensure building codes and mitigation plans are reflective of same. While no funds appropriated under Public Law 114-123 have been allocated for building code and hazard mitigation planning, these areas were already under discussion by territorial and regional agencies and collaborators, stakeholders, partners, and the local communities, prior to Hurricanes Irma and Maria. As a result of such discussions and meetings, plans have been implemented, and changes to the building codes were and still are being addressed to ensure construction and mitigation efforts result in a more resilient USVI. These areas are discussed in more detail hereinabove in Section 2.0 Long-Term Planning and Risk Mitigation Considerations and a copy of current Building Standards are in Appendix ED.

APPENDIX A: SCHEDULE OF EXPENDITURES AND OUTCOMES

The VIHFA maintains a schedule of expenditures and outcomes, periodically updated in accordance with its mandatory reporting to HUD. The schedule of expenditures and outcomes will be located at <https://cdbgdr.vihfa.gov/programs/cdbg-mitigation/>.

In accordance with the requirements of the Federal Register notice, these projections will be monitored and updated to achieve compliance with the following:

- 50 percent of funds will benefit low-and-moderate income persons;
- 50 percent of funds will be expended within six (6) years; and
- 100 percent of funds will be expended within twelve (12) years of HUD’s execution of the grant agreement.

CDBG-MIT Expenditure Timeline

		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Infrastructure & Public Facilities	Community Resilience & Public Facilities													
	Critical & Natural Infrastructure													
Economic Resilience & Revitalization	Commercial Hardening & Financing													
	Small Business Mitigation													
Housing	Single Family Resilient New Home Construction													
	Resilient Multifamily Housing													
	Homeless Housing Initiative													
	Innovative Resilient Housing													
Public Services														
Planning														
Administration														
	YEAR	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035



APPENDIX B: AMENDMENTS TO THE ACTION PLAN

Amendments to the action plan will be made to update its needs assessment, modify, or create new activities, or reprogram funds, as necessary. HUD requires amendments to be included in a contiguous document to make easier tracking of program and budget changes.

Substantial Amendments are characterized by the following criteria:

- The addition of a CDBG-MIT Covered Project
- A change in program benefit or eligibility criteria
- The addition or deletion of an activity
- The allocation or reallocation of any change greater than \$25 million dollars or a change constituting more than 25% of an activity's budget. Substantial amendments will be available on the U.S. Virgin Islands CDBG-MIT Action Plan website (<https://cdbgdr.vihfa.gov/programs/cdbg-mitigation/>) for public review and comment for at least 30 days.

Non substantial Amendments are minor changes that do not materially alter the program activities or eligible beneficiaries as described above. The grantee must notify HUD five business days before the effective date of any non-substantial amendments. Non substantial amendments will be numbered in sequence, posted to the VIFHA website, and incorporated into this Action Plan.

This substantial amendment to the Action plan includes the addition of a covered project under the Infrastructure and Public Facilities Program. The narrative is provided in Appendix J. A summary of the changes is provided below.

- **The Infrastructure and Public Facilities Mitigation Program** was updated to incorporate the 'cover project' as an eligible activity granted by HUD under Federal Register Vol. 84, Vol (169 30, August 2019) 84 FR 45370, 45850. Additionally, clarifying language on the LMI and LMA beneficiaries.
- **Covered Project Section** was added with details of the requirements, project cost threshold criteria, and other alternative requirements established by HUD for these type of infrastructure projects. Revisions are included across the document to streamline the narrative for Covered Projects provisions.

APPENDIX C: CERTIFICATIONS

To be completed.



APPENDIX D: COMMUNITY PARTICIPATION AND PUBLIC COMMENT

The VIHFA values the input of its many affected citizens, decision makers, and stakeholders representing the vulnerable communities that suffered the impacts of Hurricanes Irma and Maria. As set forth in the Notice at Page 45852, Section V.A. 3.a.; based upon the allocation designated for the Territory, the VIHFA was required to convene at least three (3) public hearings in the HUD identified MID areas (the entire USVI is a HUD MID area) to obtain citizen views; and to respond to proposals and questions. The Notice further requires that one of the public hearings must be held prior to the publication of public comment of its Plan on the website; and that all hearings are convened in different locations in order to ensure geographic balance and maximum accessibility.

HUD has determined the entire Territory to be a MID area, thus eliminating meeting location concerns. As such, COVID-19 and its impact have moved public meetings across the globe from place or location-based to virtual based environments; the USVI notwithstanding. Thus, the Territory has utilized the most popular and accessible technology to reach the full breadth of the USVI MID. The technology is inclusive of all media and social media venues, including the internet via Facebook, Zoom, Go-To Meeting, or similar applications, radio, and television, considering the realities of the current COVID-19 pandemic and the corresponding need to factor social distancing into public outreach. The amount of public participation in these virtual meetings has far surpassed the number of participants who have participated in any of the previous “in person” public hearings held by the VIHFA. Additionally, the use of technology such as Facebook preserved recordings of the entire proceedings which were then available to the public to review in an asynchronous time frame if they were unable to attend the live event. For example, 3,400 people viewed the November 12th public hearing; 741 people viewed the November 19th public hearing; and 5,600 people viewed the December 2nd public hearing. The VIHFA appreciates HUD’s flexibility in allowing virtual public participation in light of the COVID 19 pandemic—doing so dramatically enhanced the public’s participation in this process.

It has been the primary goal of the public hearing process to create an environment to receive feedback and guidance from citizens and stakeholders throughout the Territory in order to shape project and program design, allocation amounts, and community needs. Further, the driver of community engagement and impacted jurisdictions is to course-correct the Plan and to include elements that may have been overlooked. It is difficult to gauge reactions on sometimes divisive issues, such as new construction or development, which has both significant supporters and understandable hesitance. VIHFA will work to incorporate feedback into program development to ensure that the programs that are funded are effectively meeting the needs of the affected individuals.

This appendix is designed to include all prescriptive authority. Thus, the following sections are included hereunder to meet such compliance with the public engagement regulations under the Notice.

- a. (D-1) Provide information on Community Engagement; particularly, the 3 required public hearings
- b. (D-2) Copies of Public Notices
- c. (D-3) Website Links for easy access to materials presented at public hearings
- d. (D-4) Website Links to screen shots of Attendees, Facebook Views, and Chat Discussions
- e. (D-5) Survey and Summary of Data
- f. (D-6) Intent to develop Citizen Advisory Committee

- g. (D-7) Complaints, Appeals, and Website Information
- h. (D-8) Comments and Responses

D-1 Community Engagement

The VIHFA convened three (3) public hearings prior to posting the Draft Action Plan (Draft), as well as three (3) public meetings following its publication; all were done virtually, rather than in-person due to the COVID-19 pandemic. The details and documentation from these hearings are presented herein and/or on the website links that are provided to allow quick access to all information related to the hearings.

Prior to the completion of the Draft, the VIHFA **will convene** a series of public engagements that were designed to inform people (residents, public agencies, decision makers, stakeholders, etc.) of the coming events, the unique opportunity presented by the CDBG-MIT funding, and to encourage the public to present information regarding potential mitigation needs in the territory.

D-2 Links to Websites and PowerPoint Presentations

D-3 Links to Websites for Screenshots of Chats and other Transcript Data

D-4 Survey and Summary Data

D-5 Citizen Advisory Committee

D-6 Response to Citizen Complaints, and Appeals & Website Information

D-7 Summary of Comments

D-8 Copies/ Screenshots of Citizen Participation/Public Notice

APPENDIX E: REFERENCES

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APPENDIX F: SUMMARY OF VIHFA OUTREACH WITH STAKEHOLDERS TO ALIGN AND COORDINATE EFFORTS

NOTE: Lists do not reflect all meetings and details of meetings, it serves as a snapshot of ongoing efforts to coordinate with and listen to stakeholders and agencies in developing a CDBG-MIT Action Plan for the territory that is a fit with input from Virgin Islanders and matches HUD requirements

APPENDIX G: PROPOSED PROJECTS LIST FOR POTENTIAL CONSIDERATION UNDER CDBG-MIT FUNDING

Grantee has vigorously engaged in carefully evaluating potential MIT-AP projects and will continue to do so in accord with 84 FR 45840 which states:

“The Administration cannot emphasize strongly enough the need for grantees to fully and carefully evaluate the projects that will be assisted with CDBG–MIT funds. One of the goals of CDBG–MIT is to set a nationwide standard that will help guide not just future Federal investments in mitigation and resilience activities—to include the mitigation of community lifelines, but state and local investments as well. The level of CDBG– MIT funding available to most grantees cannot address the entire spectrum of known mitigation and resilience needs. Accordingly, HUD expects that grantees will rigorously evaluate proposed projects and activities and view them through several lenses before arriving at funding decisions, including ensuring that already committed public or private resources are not supplanted by CDBG– MIT funds.”

Various departments of the USVI Territorial Government have expressed interest in using CDBG-MIT funds for projects that reduce risks to indispensable services. Grantee has been engaged with such departments in examining potential projects, with continuing discussions ongoing in order to gather additional details on how such proposals fit within the defined MIT-AP Activity Categories, which are Infrastructure and Public Facilities, Economic Resilience and Revitalization, Housing, Public Services, Planning and Administration.

However, most of such proposed “department driven” projects are in the early stages of development, meaning that a need has been identified and a desire for the project expressed, but because funding has not yet been committed to such projects, the detailed design work necessary to generate clear and accurate pricing has not yet occurred. Therefore, the projected costs of such projects are only rough estimates and careful vetting by the grantee will be necessary as ideas are developed further, before final decisions are made. The varied nature of potential activities under the general project categories are such that applications will be reviewed in detail by the Grantee, given the competitive nature and variety of possible mitigation activity options.

Grantee believes the USVI will be best served by establishing general project categories targeted on reducing risks to indispensable services and then utilizing a fully open and fair procurement program to provide competition to all applicants—whether they are government departments or competitively procured private/public partnerships. Such an approach is consistent with federal procurement standards and will provide the best leveraging of federal resources. Such general project categories are defined in the MIT-AP.

Grantee is included in this list of some of the many projects that have been recommended by departments of the Territorial government and other community leaders and stakeholders.

Section 3 of the MIT-AP, entitled “Connection of Mitigation Programs to Identified Risks” provides very relevant insights into the connection between programs and identified risks—projects that are eventually chosen through the procurement process will be required to have such direct connections to risks identified in the MIT-AP.

With some potential projects that have been identified, some details have been provided, which are reflected in the following chart. Potential projects that have been identified and require additional information prior to being considered further include:

No.	Potential Projects	Risk and Mitigation Needs
1	Kidney Dialysis Center(s) for the Territory	<p><i>This project could mitigate risk to Health and Medical Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs and could be set up as a public-private partnership with adequate resources that would allow operations after a hurricane or similar disaster, rather than having to transport all patients off island following a disaster.</p>
2	Training Hotel(s) to educate local workforce on hospitality industry, which the proposed project would promote economic growth and employment in the Territory and with facilities designed to provide additional options for shelter during emergencies	<p><i>This project could mitigate risk to Food, Water, Shelter Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs, and addresses lack of educational options in this field in the territory, with facility potentially to be designed to also serve as a community center and/or shelter during hurricanes or similar disaster.</p>
3	Further support to the ongoing GIS/Naming project	<p>This project aligns with other reported stakeholder needs, and would add to work currently being coordinated through the Lt. Governor's Office to allow U.S. government entities, visitors, and territorial government to have better and more complete information</p>
4	Dual purpose parking garages for Charlotte Amalie and Christiansted that could be designed as hardened facilities to house communications cell trailers and essential emergency vehicles	<p><i>This project could mitigate risk to Transportation and Communications Lifelines.</i></p> <p>This project aligns with other reported stakeholder need and could provide a key resource for sheltering stored equipment that will be needed following disasters.</p>
5	Sargassum seaweed removal program to address the large volume of foreign seaweed that has been more regularly appearing on beaches	<p><i>This project could mitigate risk to Safety and Security.</i></p> <p>This project aligns with other reported stakeholder needs and could be seen as beneficial to economic growth by improving beaches and potentially generating new jobs, as well as the benefit of removing the vast amounts of the seaweed in order to prevent impediments to search and rescue activities.</p>
6	Investing in paths and walking trails to improve options for safe walking and biking within the Territory	<p><i>This project could mitigate risk to both the Health and Medical and Transportation Lifelines.</i></p> <p>This project aligns with other reported stakeholder needs, and potentially improves access to portions of the Territory, especially for LMI individuals who may</p>

		rely less on motor vehicles for transportation and may benefit from being able to have safer walking and biking corridors.
7	Hardened Solar Powered Agricultural Storage Facilities to provide options for storing essential foodstuffs for use in emergencies	<p><i>This project could mitigate risk to Food Water Shelter Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs and addresses potential food security issues within the territory that have been identified following previous disasters.</p>
8	Mobile kitchens for community use that can be stored in secure locations and then deployed following disasters	<p><i>This project could mitigate risk to Food Water Shelter Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs and empowers communities to work together to be more self-sufficient and self-sustaining following a disaster, as identified by the public following previous disasters.</p>
9	Restoring water catchment systems in the territory	<p><i>This project could mitigate risk to Food Water Shelter Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs and facilitates mitigation by storing additional water resources in advance of disasters to further supplement what is already being done by WAPA.</p>
10	Mobile communications centers to establish cell connections and facilitate planning following disasters, potentially on trailers or otherwise similarly portable to make deploying them easier	<p><i>This project could mitigate risk to Communications and Health and Medical Lifelines.</i></p> <p>This project aligns with other reported stakeholder needs, and addresses identified issues with communication that have been made clear following prior disasters when cell coverage has been severely impacted, preventing timely medical assistance and rescue efforts.</p>
11	St Thomas Skate Park and Recreational Facility , likely to be engineered to use features in the park as means for better drainage and flood control	<p><i>This project could mitigate risk to Health and Medical Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs and could be a means for better controlling potential flood zones through careful planning as well as providing healthy recreational opportunities to youth looking for activities, especially when options are more limited following a disaster.</p>
12	WAPA Vitol Acquisition of propane facilities, structured in such a way as to better position WAPA to control costs and potentially pass along rate savings to customers	<p><i>This project could mitigate risk to the Energy Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs and could lower energy costs, although more extensive mitigation activities in this area are anticipated for the Territory electrical grid once HUD releases the pertinent guidance that is anticipated.</p>



13	Acquiring satellite phones and radios for communication within the VIHFA organization following disasters and in preparing for them	<p><i>This project could mitigate risk to Communication Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs, and addresses concerns that arose from lost communication options following prior hurricanes being an impediment to necessary services, including rescue coordination and recovery services.</p>
14	Mobile task force that can aid in the safety of the vulnerable population before, during and after disasters	<p><i>This project could mitigate risk to Health and Medical Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs and addresses a vulnerable population that can be forgotten and face the perils of disasters because of their limitations.</p>
15	A recycling plant or similar program could have significant benefits beyond job creation - Although costly to ship waste and other recycling products of the island, building a program for handled the products within the Territory and reused in the community should be explored	<p><i>This project could mitigate risk to Hazardous Materials lifeline.</i></p> <p>This project aligns with other reported stakeholder needs and could be a study undertaken to further consider feasibility.</p>
16	Improve/restore drainage “guts” to mitigate flooding while also controlling runoff and erosion	<p><i>This project could mitigate risk to Food Water Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs, and improves natural infrastructure to mitigate future risks, given identified deficiencies in the current system within the Territory.</p>
17	Coral Bay STJ Fire Station Relocation to provide adequate space and facilities for those protecting STJ residents	<p><i>This project could mitigate risk to Safety Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs and would provide support to a key population center on St. John.</p>
18	Repair/construct downtown housing to provide for a larger population in walking distance will produce 24-hour activity, supporting businesses and improving safety on St. Thomas and potentially St. Croix as well.	<p><i>This project could mitigate risk to Food Water Shelter Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs and could encourage economic growth while providing additional housing option for LMI individuals.</p>
19	Construct new or improved public open spaces (parks, plazas) that can provide for community gathering and also be designed to hold water and act as drainage/stormwater solutions through proper landscaping and design. This could involve converting parking lots to public green spaces in the waterfront area on St. Thomas is part of this idea	<p><i>This project could mitigate risk to Health and Medical Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs and could encourage economic growth while providing space for exercise and community activities.</p>

20	Community education and enforcement of erosion safeguards and proper use of retaining walls and drainage systems	<p><i>This project could mitigate risk to Safety and Food Water Shelter Lifelines.</i></p> <p>This project aligns with other reported stakeholder needs, while encouraging safe building and compliance.</p>
21	Behavioral Health Care Facility given lack of current options and limitations within current medical facilities in the Territory	<p><i>This project could mitigate risk to Health and Medical Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs and supports vulnerable populations in the Territory.</p>
22	Power grid hardening as the system would be more effective and efficient if the power grid were placed underground territory wide	<p><i>This project could mitigate risk to Energy Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs but may need to be addressed when new power grid regulations are released by HUD.</p>
23	Initiative to improving home inspections and enforcement of requirements , including more stringent inspection requirements	<p><i>This project could mitigate risk to Health and Medical Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs, while encouraging safe building and compliance.</p>
24	Ready-made and locally built shipping container shelters , with stock available on each major island within the territory while homeowners are making repairs following an event	<p><i>This project could mitigate risk to Food Water Shelter Lifeline.</i></p> <p>This potential public-private partnership project aligns with other reported stakeholder needs, encouraging advance planning to mitigate housing risks and engages the community in building them.</p>
25	Dredging harbors on St. Croix and St. Thomas for Quantum class ships	<p><i>This project could benefit economic growth by encouraging additional visits each year.</i></p> <p>This project aligns with other reported stakeholder needs and identified priorities within the USVI government.</p>
26	Vertical Gardening centers as a means of improving agricultural efficiency and better securing local food supply	<p><i>This project could mitigate risk to Food Water Shelter Lifeline and contribute to economic revitalization by creating new jobs.</i></p> <p>This project aligns with other reported stakeholder needs, and potentially improves food security in the territory.</p>
27	St Croix Ambulatory Center to serve as potentially expanded surgery center and medical facilities as potential public-private partnership	<p><i>This project could mitigate risk to Health and Medical Lifeline.</i></p> <p>This potential public-private partnership project aligns with other reported stakeholder needs, providing residents with additional medical support during</p>



		times of crisis when community facilities may be overwhelmed.
28	Krum Bay clean up and infrastructure improvements , to include DPNR enforcement facility and educational center, plus likely public-private partnership for marine industrial facilities	<p><i>This project could mitigate risk to Food Water Shelter Lifeline and contribute to economic revitalization by creating new jobs.</i></p> <p>This project aligns with other reported stakeholder needs, and potentially improves commerce while encouraging economic growth, providing another site for offloading emergency supplies, and storing boats and other assets during storm events, while also better protecting the WAPA water intake location on St. Thomas.</p>
29	Supportive Housing for homeless that can serve as a shelter for this key population during storm events and provide CoC services	<p><i>This project could mitigate risk to Food Water Shelter Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs and relatively few resources exist for the homeless population in the Territory, who are particularly vulnerable during hurricanes. With support services to be provided on site to provide a continuum of care to the population is important, especially with no mental hospitals or similar facilities currently in place.</p>
30	Landfill Funding for St. Thomas and St. Croix facilities	<p><i>This project could mitigate risk to Food Water Shelter Lifeline and Hazardous Materials Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs and can assist in closing the landfills located on St. Croix and St. Thomas and begin transition to new sites has been identified as a priority for the Territory. With limited budgetary resources and court orders mandating action, the ability to handle debris and waste following hurricanes is essential, especially given the logistical complications and costs that arise from shipping it off-island.</p>
31	Critical Road Improvements , to include Queen Mary Highway on St. Croix, Hospital Gade/Mafolie Road on St. Thomas, Bolongo Road on St. Thomas and Centerline Road on St. Croix.	<p><i>This project could mitigate risk to Transportation Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs and In identifying roads that are heavily used for improvements, sidewalks and buried utilities and/or resurfacing current roads with a view of coordinating efforts to account for future development will be considered, with goal of preventing additional repairs or cutting in the future.</p>
32	Water Pipe improvements/replacement across the Territory to modernize the system to improve efficiency and consistent pipe diameters to facilitate maintenance	<p><i>This project could mitigate risk to Food Water Shelter Lifeline.</i></p>

		<p>This project aligns with other reported stakeholder needs and could include both rehab and extensions to identified areas, to both increase pipe size and make the overall system more functional, with consistent pipe diameters that facilitate flow and lessen likelihood of failure, further supporting some improvements already contemplated using non CDBG-MIT funding sources.</p>
33	<p>Multipurpose Sports Facility on St. Croix that also is designed to serve as a shelter and supplies distribution hub during times of emergency</p>	<p><i>This project could mitigate risk to Food Water Shelter and Health Lifelines.</i></p> <p>This project aligns with reported stakeholder needs and could provide an important alternative shelter option to be used instead of schools in disaster events while also providing a site that could safely be used for recreational health activities.</p>
34	<p>Homeless Study to better analyze the existing population and identify potential action items to better support this key population</p>	<p><i>This project could mitigate risk to Food Water Shelter Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs and will enable better support of the unique homeless population in the Territory, who are particularly vulnerable during hurricanes.</p>
35	<p>Veterans Drive Road Extension on St. Thomas</p>	<p><i>This project could mitigate risk to Transportation Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs. Extending Veterans Drive on St. Thomas from the Coast Guard Station to Frenchtown will raise the seawall area in a portion of Charlotte Amalie that floods with some regularity and faces the main harbor; the design also provides an extension of the public space that is used regularly by visitors and locals alike for exercise and recreation and improves underground infrastructure below the road; part of the goal in extending waterfront improvements beyond downtown is to prepare for sea level rise and better control persistent flooding in this key commercial area, which will lessen the impact of future disasters by reducing the risk of damage to and loss of property in this key commercial area on St. Thomas. This project aligns with current improvements already in place, extending the work done through a key corridor that links downtown Charlotte Amalie to the airport and port facilities</p>
36	<p>Providing gap financing to high-impact economic development projects</p>	<p><i>This project could mitigate risk to Communications and Energy Lifelines.</i></p> <p>This project aligns with other reported stakeholder needs and meets an unmet need within the Territory</p>



		to support small business growth and public private partnerships that could improve Energy and Communications resources in particular.
37	Mobile task force that can aid in the safety of the vulnerable population before, during and after disasters	<i>This project could mitigate risk to Food Water Shelter Lifeline.</i> This project aligns with other reported stakeholder needs as often these populations are forgotten and face the perils of disasters because of their limitations.
38	St. Croix Sunday Market Square LMI housing Units for affordable co-working and commercial space	<i>This project could mitigate risk to Food Water Shelter Lifeline.</i> This project aligns with other reported stakeholder needs and provides additional housing options to LMI individuals.
39	Youth Activities Center on St. Croix with various outdoor recreational activity options to engage youth and provide positive opportunities to be active outside that could serve as a shelter during emergency events.	<i>This project could mitigate risk to Food Water Shelter and Health and Medical Lifelines.</i> This project aligns with other reported stakeholder needs and meets a key need identified within the community while also providing an alternative venue to shelter LMI individuals and others that is not an existing school.
40	St. Thomas Fisherman’s Association facility improvement and expansion to provide storage for traps and better options for selling locally caught fish, potentially with additional sites for centralized sales/processing of fish and ideally better facilitating locally caught fish at USVI markets	<i>This project could mitigate risk to Food Water Shelter Lifeline.</i> This project aligns with other reported stakeholder needs and enables fishermen to be better prepared to provide food shortly after a disaster, as well as getting their catch more widely distributed.
41	VI Multifamily Housing Developments – additional projects beyond those previously identified and slated for CDBG-DR	<i>This project could mitigate risk to Food Water Shelter Lifeline.</i> This project aligns with other reported stakeholder needs and provides housing options to LMI individuals given identified needs within the Territory.
42	Infill Scattered Site Single Family Housing – additional sites on STT, STX, and STJ that require site work and further development planning	<i>This project could mitigate risk to Food Water Shelter Lifeline.</i> This project aligns with other reported stakeholder needs and provides additional housing options to LMI individuals given identified needs within the Territory, beyond those already contemplated.
43	Homes for the Aged Improvements on both St. Thomas and St. Croix	<i>This project could mitigate risk to Food Water Shelter Lifeline.</i> This project aligns with other reported stakeholder needs and provides housing to a vulnerable population in the Territory.

44	<p>Cultural Arts and Music Center on St. Thomas - Virgin Islands Center for Arts and Technology would be a nonprofit initiative technology center focused on Vocational Education in film, music and hospitality</p>	<p>This project aligns with other reported stakeholder needs and addresses an identified need within the community, providing education and support to a key population.</p>
45	<p>Small Business Loans and programs to strengthen entrepreneurship</p>	<p><i>This project could mitigate risk to Food Water Shelter Lifeline.</i></p> <p>This project aligns with other reported stakeholder needs and supports economic development that in turn can benefit LMI populations and help the Territory attract new business.</p>
46	<p>Hardened Bunker Facility (and possibly new VITEMA center) for strategic operations during disasters, which could also house VIPD and other essential personnel as a communications hub</p>	<p><i>This project could mitigate risk to Food Water Shelter and Safety & Security Lifelines.</i></p> <p>This project aligns with other reported stakeholder needs and provides additional resources to key organizations to better support LMI populations and others in the Territory from a location that is secure during emergency events.</p>
47	<p>VIHFA Rental Properties Improvements for Retaining Walls on St. Thomas</p>	<p><i>This project could mitigate risk to Food Water Shelter and Safety & Security Lifelines.</i></p> <p>This project aligns with other reported stakeholder needs and supports safe housing options to LMI individuals on St. Croix by hardening existing infrastructure against erosion and runoff risks on properties identified on St. Thomas.</p>
48	<p>Territory Planning Initiatives for improving codes and planning standards or implement Territory-wide land use plans</p>	<p><i>This project could mitigate risk to Food Water Shelter Safety & Security Lifelines.</i></p> <p>This project aligns with other reported stakeholder needs and could support land use planning that has stalled previously. In addition, efforts to support education and training about Form-Based Codes (FBC), to assist with adoption and implementation of the draft code within the territory, looking at how new or repaired housing could be built to higher/green standards to be resilient and better withstand future storms, plus looking at the urban design guidance of the draft Form-Based Code to be consistent with the community vision and historic setting, plus conducting community outreach and education on understand and use these codes, and conducting community-based visioning to plan future development could be contemplated.</p>
49	<p>Improvements/Repairs to St. John Community Health Clinic, given its proximity and importance to the local population due to the distance from hospital facilities on St. Thomas</p>	<p><i>This project could mitigate risk to the Health and Medical Lifeline.</i></p>



		<p>This project aligns with other reported stakeholder needs and addresses a key need for those in the Territory who reside on St. John and must travel to St. Thomas or elsewhere for medical care.</p>
<p>50</p>	<p>Leveraging CDBG-MIT funding for Local Match, to take full advantage of funding opportunities for the Territory</p>	<p><i>This project could mitigate risk to all Lifelines.</i></p> <p>This project aligns with reported stakeholder needs and enables the Grantee to take full advantage of existing funding to address the many identified mitigation needs within the Territory.</p>



APPENDIX H: ACRONYMS AND AGENCIES

ADA – Americans with Disabilities Act

AMI – Area Median Income

DR-4335 – Major Disaster Declaration for Hurricane Irma

DR-4340 - Major Disaster Declaration for Hurricane Maria

DRGR – Disaster Recovery Grant Reporting System

DR-4340 - Major Disaster Declaration for Maria

DRGR – Disaster Recovery Grant Reporting System

CDBG-DR - Community Development Block Grant Disaster Recovery

CDBG-MIT – Community Development Block Grant Mitigation

CoC – Virgin Islands Continuum of Care

DHS – Virgin Islands Department of Human Services

DOA – Virgin Islands Department of Agriculture

DOB – Duplication of Benefits

DOC – U.S. Department of Commerce

DoD – U.S. Department of Defense

DOE – Virgin Islands Department of Energy

DOF – Virgin Islands Department of Finance

DOI – U.S. Department of the Interior

DOL – Virgin Islands Department of Labor

DPNR – Virgin Islands Department of Planning and Natural Resources

DPP – Virgin Islands Department of Property and Procurement

DPW – Virgin Islands Department of Public Works

DSPR – Virgin Islands Department of Sports, Parks and Recreation

ED – U.S. Department of Education

EDA – U.S. Economic Development Administration [part of the U.S. Department of Commerce]

EIA – U.S. Energy Information Administration

EPA – U.S. Environmental Protection Agency

FEMA – Federal Emergency Management Agency [part of the U.S. Department of Homeland Security]

FEMA IA – FEMA’s Individual Assistance Program

FEMA PA – FEMA’s Public Assistance Program

FHWA-ER – U.S. Federal Highways Administration Emergency Relief Program

FVL – Full Verified Loss

GDP – Gross Domestic Product

GIS – Geographic Information Systems

HAZUSMH – FEMA’s Hazards U.S. Multi-Hazard

HCDA – Housing and Community Development Act of 1974

HCV – Housing Choice Voucher

HMGP – [FEMA] Hazard Mitigation Grant Program

HMIS – Homeless Management Information System

HQS – Housing Quality Standards

HUD – U.S. Department of Housing and Urban Development

IHP – Individual and Household Programs

ISP – Internet Service Provider

LEP – Persons of limited-English proficiency

LIHTC – Low Income Housing Tax Credit

LMA – Low- to Moderate- income Area

LMI – Low- to Moderate- income Individual

LMR – Land Mobile Radio

LTRG – Long Term Recovery Group

MIT-AP – CDBG-MIT Action Plan

MNA – Mitigation Needs Assessment

NFIP – National Flood Insurance Program

PAAP – FEMA Public Assistance Alternatives Procedures

PDM – FEMA Pre-Disaster Mitigation Grant Program

PFA – Virgin Islands Public Finance Authority

PP FVL – Personal Property Full Verified Loss

PW – [FEMA] Project Worksheet

QPR – Quarterly Performance Report

SBA – U.S. Small Business Administration

STEP – FEMA’s Sheltering and Temporary Essential Power Program

STJ – Shorthand for St. John

STT – Cyril E. King International Airport, also shorthand for St. Thomas

STX – Henry E. Rohlsen Airport, also shorthand for St. Croix

THMP – Territorial Hazard Mitigation Plan

TIGER - U.S. Department of Transportation’s Transportation Investment Generating Economic Recovery Grants

URA – Uniform Relocation Assistance and Real Property Acquisition Policies Act

USACE – U.S. Army Corps of Engineers

USDA – U.S. Department of Agriculture

UVI – University of the Virgin Islands

VICS – Virgin Islands Community Survey

VIDE – Virgin Islands Department of Education

VIHA – Virgin Islands Housing Authority

VIHFA – Virgin Islands Housing Finance Authority

VITEMA – Virgin Islands Territorial Emergency Management Agency

VIPA – Virgin Islands Port Authority

WAPA – Virgin Islands Water and Power Authority

WMA – Virgin Islands Waste Management Authority



APPENDIX I: CONSTRUCTION INFORMATION FOR A STRONGER HOME

To be updated

APPENDIX J: COVERED PROJECT (PR1)



APPENDIX – COVERED PROJECT ANALYSIS & DESCRIPTION	Error! Bookmark not defined.
I. Project Description and Eligibility	192
1.0 Project Scope	192
1.1.0 Virgin Islands Water and Power Authority Overview	192
1.1.1 WAPA Service Area – Territory-wide	192
1.1.2 Service Territory at High Risk for Natural Disasters	192
1.1.3 Overview of Power Generation Assets	193
1.1.4 New Generation Changing the Optimal Operating State and Fuel Mix on St. Thomas	194
1.1.5 Overview of Reverse Osmosis Water Production Assets	197
1.1.6 Propane Supply Infrastructure Overview	198
1.2 Activity Benefits	199
1.2.0 Owning the Propane Supply Infrastructure Mitigates Significant Risk	199
1.2.1 Owning the Propane Supply Infrastructure Supports FEMA Community Lifelines	199
1.3 Propane Supply Infrastructure Detail	209
1.3.0 LPG Pipeline from the Fuel Dock to the Storage Tanks	209
1.3.1 LPG Storage	210
1.3.3 LPG Pipeline from the Storage Tanks to the Vaporizer	210
1.3.4 Vaporizer	211
1.3.6 Offshore Mooring Buoy	212
1.4 Availability of Comparable Facilities	212
1.4.0 Local Resources	212
1.4.1 Alternative Fuel Import Options	213
1.5 Licenses and Permits	213
1.6 Project Milestones	214
1.6.0 Major Milestone I	214
1.6.1 Interim Milestones:	214

1.6.2	Major Milestone II	214
1.6	Project Location	215
1.6.0	St. Croix	215
1.6.1	St. Thomas	215
II.	HUD Eligible Activity	216
3.1	Project Cost	216
3.3	Impacts to the Population	218
3.4	Resilient or Mitigative Elements	219
3.4.1	Owning the Propane Supply Infrastructure Mitigates Significant Risk	219
III.	Consistency with Mitigation Needs Assessment	220
IV.	Analysis of Energy Lifeline Mitigation	220
V.	Compliance with National Objective for Covered Projects	221
4.1.0	Long-term Efficacy and Sustainability of the Project	222
4.1.1.1	Financial Resources to Pay Ongoing Operations and Maintenance Expenses	222
	Demonstration of Benefit to Most Impacted and Distressed Area⁵	229
	Benefit Cost Analysis	229
	BCA Methodology	229
VI.	Consistency with Other Mitigation Activities	232



I. Project Description and Eligibility

1.0 Project Scope

1.1.0 Virgin Islands Water and Power Authority Overview

The Virgin Islands Water and Power Authority (“WAPA”, or the “Authority”) is a rate-regulated municipal utility that provides electricity and potable water service to the U.S. Virgin Islands. WAPA is the sole utility-scale provider of electricity and potable water in the U.S. Virgin Islands.

- *Electricity*- WAPA owns and operates two power plants. The Estate Richmond Power Plant on St. Croix and the Randolph Harley Power Plant on St. Thomas. St. Thomas is electrically interconnected with St. John and Water Island (St. Thomas/St. John District) via subsea cables; however, St. Croix (St. Croix District) is not electrically interconnected with the St. Thomas/St. John District. Accordingly, the St. Thomas/St. John District and the St. Croix District operate as two separate electrical grids and offer no redundancy to either district. WAPA also owns and operates the electric transmission and distribution system that delivers electricity to customers.
- *Potable Water* - In addition to the production, transmission, and distribution of electricity, WAPA also produces potable water under a Water-as-a-Service contract with its partner Seven Seas Water via reverse osmosis with facilities on both St. Croix and St. Thomas. Under the Water-as-a-Service structure, WAPA does not own or operate the reverse osmosis plants, but rather makes monthly contractual payments to Seven Seas Water for its services. Water production on St. Thomas supplies St. John and Water Island by underwater pipeline. WAPA’s electricity generation is critical to the production of water because the reverse osmosis plants cannot operate without the electricity that WAPA generates.

1.1.1 WAPA Service Area – Territory-wide

WAPA serves a community of approximately 100,000 people and has approximately 55,000 electric meters. Residential electric meters represent approximately 45,000 of the installed meters, or approximately 85% of total installed meters. The most recent U.S. Census identified that the typical household population in the Territory is comprised of 2.14 residents. While not a perfect one-for-one relationship, one residential meter is typically one household, accordingly, WAPA provides electricity to approximately 96,000 residents. Non-residential electric meters are comprised primarily of governmental and commercial customers. WAPA has approximately 15,000 water meters. Residential water meters represent approximately 12,000 of the installed meters, or approximately 80% of total installed meters. Applying the same U.S. Census information discussed above, WAPA provides potable water to approximately 26,000 residents. Non-residential water meters are comprised primarily of governmental and commercial customers. WAPA is the sole utility-scale provider of electricity and water to the Territory, so if WAPA is unable to generate electricity, the people of the Virgin Islands lose electricity service, and the production of drinking water would stop.

1.1.2 Service Territory at High Risk for Natural Disasters

The Territory has been impacted by 13 hurricanes in the past 35 years, or one storm less than every three years on average. Over 50% of the hurricanes that impacted the Territory over that period were rated higher than a Category 1 hurricane. Most recently back-to-back Category 5 hurricanes, Irma and Maria, impacted the Territory over a two-week span in September 2017. The devastation from Irma and Maria was catastrophic for the Territory, and the probability of a major hurricane impacting the Territory at some time in the future is high.

The Territory also experiences seismic activity, and seismic activity can also trigger tsunamis. The Authority’s power plants are at sea level and could suffer damage from either seismic activity, tsunamis, or both.

Hurricanes in the US Virgin Islands 1989 - Present

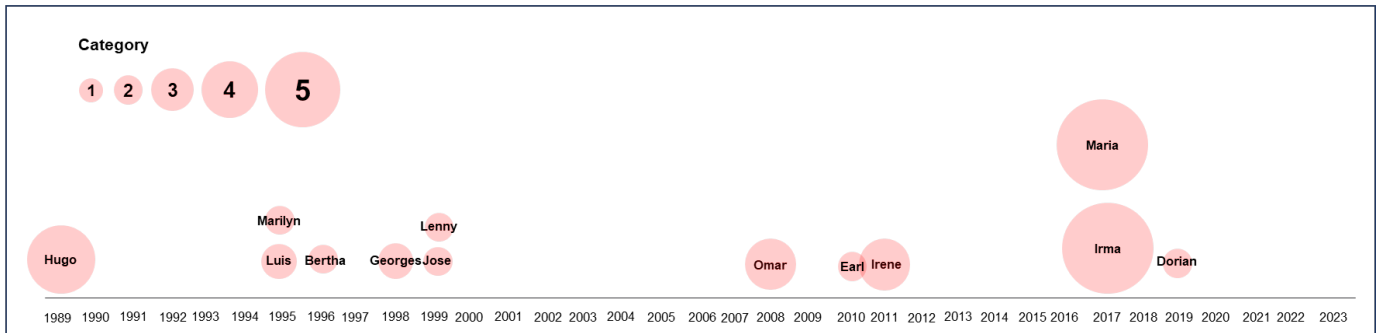


Figure 54- Historical Data - Hurricanes that Impacted Territory

1.1.3 Overview of Power Generation Assets

St. Thomas/St. John District

The Randolph Harley Power Plant is located on Krum Bay on the south side of the island. It has three gas turbine generators, one of which can operate on propane or diesel, and two of which can currently operate only on diesel. The conversion of Unit 27, which currently only operates on diesel, to enable propane operations is underway. The Randolph Harley Power Plant also has three reciprocating internal combustion engines, or RICE engines, (the “Wartsilas”) that can only operate on propane. In its current optimal operating state for the St. Thomas/St. John district WAPA dispatches the three Wartsilas burning propane, Unit 15 burning propane, and Unit 27 burning diesel. WAPA’s current fuel mix in its optimal operating state at the Randolph Harley Power plant is approximately 70% propane and 30% diesel. WAPA’s current optimal operating configuration for St. Thomas is shown below.

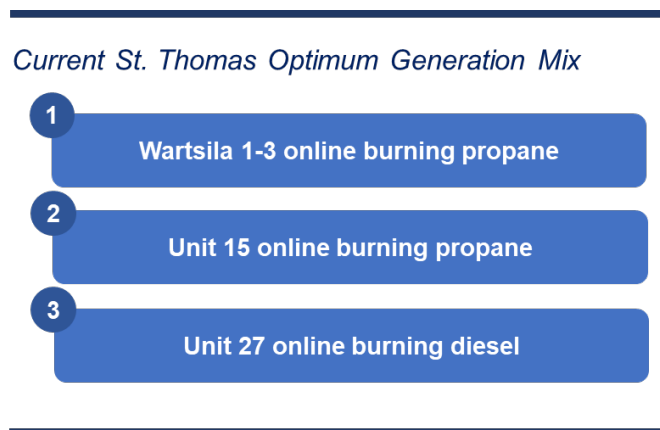


Figure 55 - Impact of New Generation to Operations- St. Thomas



1.1.4 New Generation Changing the Optimal Operating State and Fuel Mix on St. Thomas

A critical project is nearing completion at the Randolph Harley Power Plant. WAPA received a CDBG-DR HUD grant for \$84.2 million to install new efficient, reliable generation at the plant. Four additional RICE engines (the “new Wartsilas”) are being installed along with a Battery Energy Storage System (BESS). The new Wartsilas can operate on either propane or diesel and are slated for first-fire on June 13, 2023. With the new Wartsilas in operation, the optimal operating state at the Randolph Harley Power Plant will change. In its optimal operating state, WAPA will dispatch the existing three Wartsila RICE engines burning propane and the four new Wartsila RICE engines burning propane, so St. Thomas will operate 100% on propane. WAPA’s future optimal operating configuration for St. Thomas is shown below.

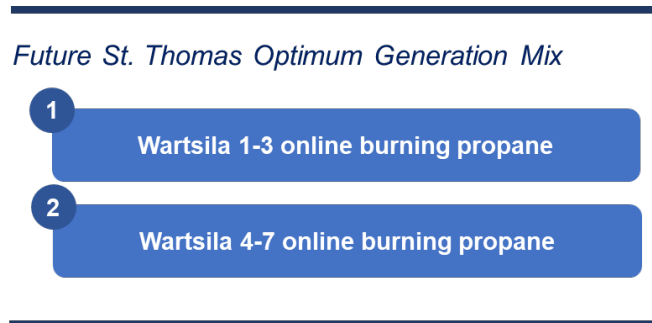


Figure 56 - Impact of Future Generation Mix

The new Wartsila generators that are slated to be in service in the near-term and the \$84.2 million CDBG-DR grant funding will have to be taken out of service and therefore become stranded assets without access to propane. The generators are dual fuel and can operate on either propane or diesel; however, the environmental controls that allow the new generators to operate in compliance with U.S. Environmental Protection Agency limits require propane to operate. Without the Propane Supply Infrastructure and access to the propane it provides, operating the new generators would violate emissions limits. Accordingly, WAPA would not be able to operate the new Wartsilas until WAPA could secure a new source of propane to operate the required environmental controls on the generators.

The roster of current and future generation on St. Thomas is shown below along with the contribution from each generator to 2022 electricity generation. As can be seen in the two-pie chart, WAPA’s current preferred generation mix as well as its future preferred generation mix, with Wartsila 4-7 in service, favors generators that can burn propane. Note that the current optimal fuel mix for St. Thomas was described as 70% propane and 30% diesel; however as can be seen in the pie chart showing 2022 generation mix, the actual fuel mix was closer to 60% propane and 40% diesel. That is due to operational outages, which result in WAPA not always operating with its optimal generation mix; and therefore, burning more diesel than it would burn when operating in its optimal operating state.

St. Thomas Generation Fleet - Current

Generator	Age	Type	Manufacturer	Capacity (Megawatts)	Fuel Type
Unit 15	43 years	Gas Turbine	GE	21 MW	Propane / Diesel
Unit 23	19 years	Gas Turbine	GE	36 MW	Diesel
Unit 27	11 years	Gas Turbine	GE	24 MW	Diesel
Wartsila 1-3	4 years	Reciprocating Engine	Wartsila	21 MW	Propane
Total				102 MW	

Figure 57- Fleet Generation St. Thomas/St. John District- Current

St. Thomas Generation Fleet - Future

Generator	Age	Type	Manufacturer	Capacity (Megawatts)	Fuel Type
Unit 15	43 years	Gas Turbine	GE	21 MW	Propane / Diesel
Unit 23	19 years	Gas Turbine	GE	36 MW	Diesel
Unit 27	11 years	Gas Turbine	GE	24 MW	Diesel
Wartsila 1-3	4 years	Reciprocating Engine	Wartsila	21 MW	Propane
Wartsila 4-7	0 years	Reciprocating Engine	Wartsila	36 MW	Propane / Diesel
Total				138 MW	

Figure 58- Fleet Generation St. Thomas/St. John District- Future



2022 MWh Generation by Unit St. Thomas

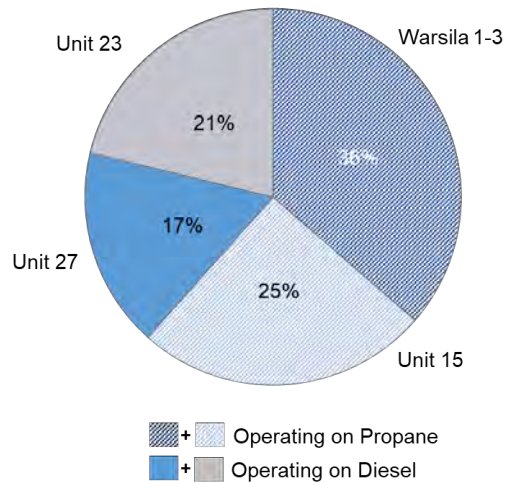


Figure 59 - St. Thomas/St. John 2022 Generation

Future MWh Generation by Unit St. Thomas

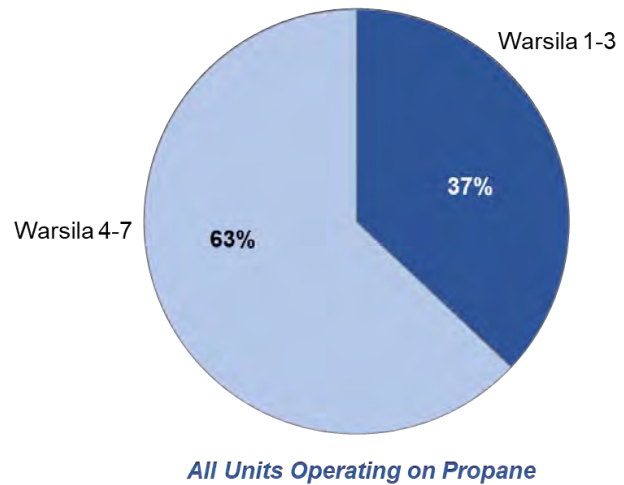


Figure 60 - St. Thomas/St. John Generation - Future

St. Croix District

The Estate Richmond Power Plant is located west of Christiansted Harbor on the north shore of the island. It has three gas turbine generators that can operate on either propane or diesel as well as 18 reciprocating engines, or RICE engines, (the “Aggrekos”) that can only operate on propane. In its optimal operating state for St. Croix WAPA dispatches the Aggreko engines and Unit 20 with both burning propane, so St. Croix operates 100% on propane in its optimal operating state. WAPA’s current optimal operating configuration for St. Croix is shown below.

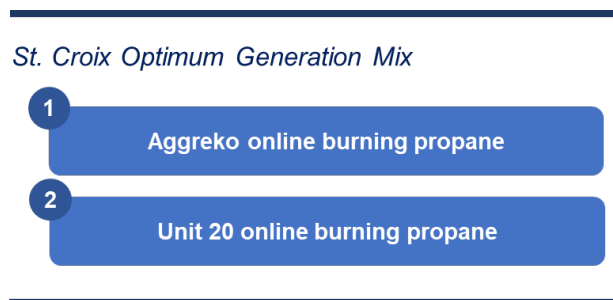


Figure 61 St. Croix District Generation - Optimum

The roster of generation on St. Croix is shown below along with the contribution from each generator to 2022 electricity generation. As can be seen in the pie chart, WAPA’s preferred generation mix favors generators that can burn propane.

St. Croix

Generator	Age	Type	Manufacturer	Capacity (Megawatts)	Fuel Type
Unit 17	35 years	Gas Turbine	GE	20 MW	Propane / Diesel
Unit 19	29 years	Gas Turbine	GE	19 MW	Diesel
Unit 20	29 years	Gas Turbine	GE	22 MW	Propane / Diesel
Aggrekos ¹	5 years	Reciprocating Engine	GE - Jenbacher	20 MW	Propane
Total				81 MW	

Figure 62 - St. Croix District Generation Matrix

2022 MWh Generation by Unit St. Croix

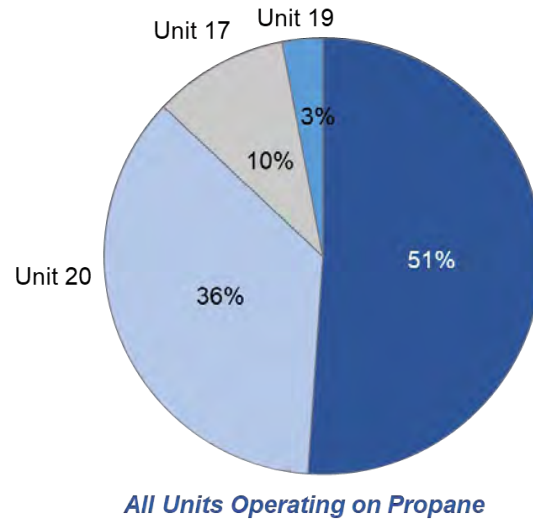


Figure 63 - St. Croix Generation by Unit

1.1.5 Overview of Reverse Osmosis Water Production Assets

WAPA is the sole source of utility-scale drinking water in the Territory, and WAPA generates the electricity required by the reverse osmosis plants operated by Seven Seas Water which produce drinking water. The reverse osmosis plants also include secondary treatment that produces Ultrapure Water. Ultrapure water is used by WAPA's generators to cool the generators while in operation and Ultrapure Water is injected into the generator's combustion to reduce the generator's emissions of Nitrous Oxide (NOx). WAPA can only operate its generators for 5-7 days with Ultrapure Water on hand before it requires resupply. Accordingly, WAPA's power generating assets and the reverse osmosis plants should be considered hand-in-hand as one cannot function without the other and vice versa.

St. Thomas



The St. Thomas reverse osmosis system is comprised of two seawater intake lines that feed a permanently installed reverse osmosis plant, containerized mobile water production skids, and the secondary treatment that produces Ultrapure Water. The facility produces 3.3 million gallons of potable water per day, which is approximately 90% of daily water consumption during the peak-usage dry season, and approximately 60% of daily water consumption during the wet season. The facility has the capacity to produce 500,000 gallons of Ultrapure Water per day.

St. Croix

The St. Croix reverse osmosis system is comprised of two seawater intake lines that feed a permanently installed reverse osmosis plant. The plant also included the secondary treatment that produces Ultrapure Water. The facility produces 3.7 million gallons of potable water per day, which is approximately 70% of daily water consumption during the peak-usage dry season, and approximately 55% of daily water consumption during the wet season. The facility has the capacity to produce 250,000 gallons of Ultrapure Water per day.

1.1.6 Propane Supply Infrastructure Overview

A component-by-component discussion of the Propane Supply Infrastructure is presented later; but in summary, the Propane Supply Infrastructure exists to receive Liquified Petroleum Gas (LPG), from a ship, store it, convert it to gaseous propane, and deliver gaseous propane to WAPA’s generators. The components of the Propane Supply Infrastructure are illustrated in the graphic below. There are two propane facilities, one on St. Thomas and another on St. Croix. The infrastructure is largely identical on each island with the most notable exception being that St. Thomas has ten LPG bullet tanks while St. Croix only has eight. The proposed acquisition will facilitate the transfer of both facilities thus benefiting both the St. Thomas/St. John district and the St. Croix district.

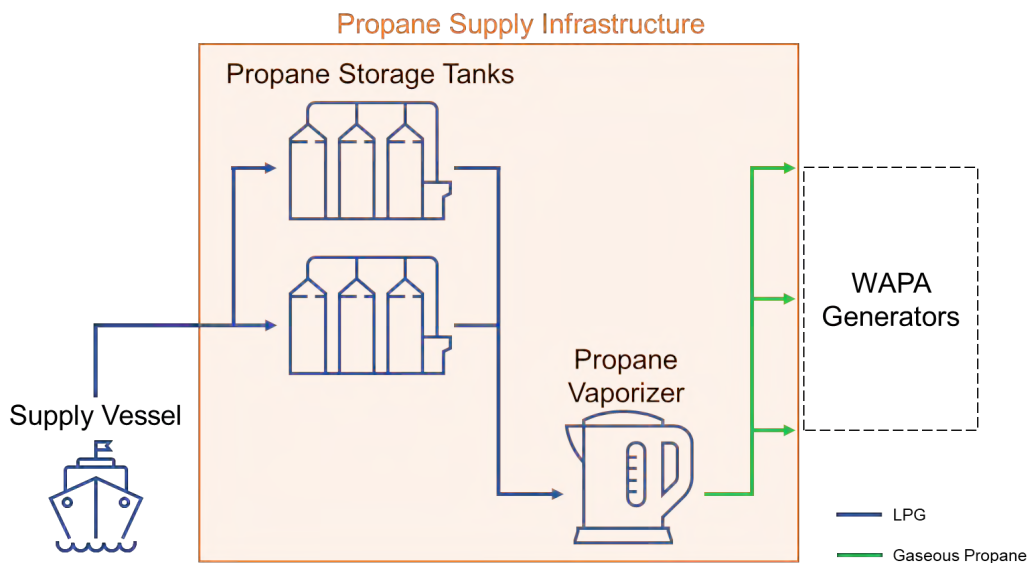


Figure 64 - Supply Diagram

1.2 Activity Benefits

1.2.0 *Owning the Propane Supply Infrastructure Mitigates Significant Risk*

The supply of propane is critical for WAPA to generate electricity and produce potable water. Without propane supply, WAPA cannot operate the Aggrekos on St. Croix or the Wartsilas currently in service on St. Thomas. Without the Aggrekos or the Wartsilas online, WAPA must operate generators that can only burn diesel. Given the high cost of diesel versus propane and the poorer efficiency of WAPA's diesel generation versus its propane generation, WAPA's cost of making electricity increases significantly. It must also rely on older, less reliable generators to make electricity, which causes its reliability to suffer resulting in service interruptions to customers. WAPA's environmental profile also gets worse because propane is a cleaner fuel than diesel and its older, less efficient generation burns more fuel than its new, efficient generation.

1.2.1 *Owning the Propane Supply Infrastructure Supports FEMA Community Lifelines*

The US Department of Homeland Security's Federal Emergency Management Agency (FEMA) utilizes a Community Lifelines framework to identify fundamental services in the community that must be stabilized following a disaster to enable all other aspects of society to function. Energy, Fuel, and Electric Grid is a specific Community Lifeline identified by FEMA. Additionally, other FEMA Community Lifelines depend on the Energy, Fuel, and Electric Grid Community Lifeline being in place. Community Lifelines that depend on the Energy, Fuel, and Electric Grid Community Lifeline include Food, Water, and Shelter (WAPA makes potable water for the Territory and the Authority requires electricity to make potable water), Health and Medical, Communications, and Transportation, all of which need electricity to function.

Ownership of the Propane Supply Infrastructure mitigates several risks that WAPA would face in the event of a natural disaster that could limit or completely impair its ability to make electricity and drinking water and maintain the Energy, Fuel, and Electric Grid Community Lifeline.

In addition to supporting Community Lifelines, ownership of the propane infrastructure is also critical to the community of the Virgin Islands for additional key reasons:

- **Maintain Lower Fuel Costs** -The Authority currently has access to the Propane Supply Infrastructure but does not own it, and the Authority has lost access to the Propane Supply Infrastructure on more than one occasion in the past. The Authority's fuel costs spike sharply if it cannot use the Propane Supply Infrastructure. Without the Propane Supply Infrastructure, the Authority's only option is to operate on diesel and diesel is significantly more expensive than propane – currently 1.7x more expensive on an energy equivalent basis (diesel is more “energy dense” than propane, so the different in energy content between diesel and propane must be taken into account when comparing the cost of operating on the two fuels). Accordingly, ownership of the Propane Supply Infrastructure ensures that the Authority can continue to operate on propane. A comparison of WAPA's projected fuel-only cost of generating electricity while operating 100% on propane versus 100% on diesel is shown below (based on delivered commodity costs as of May 12, 2023). WAPA's total Residential rate (Base Rate plus Fuel) operating 100% on propane versus 100% on diesel is also shown below.



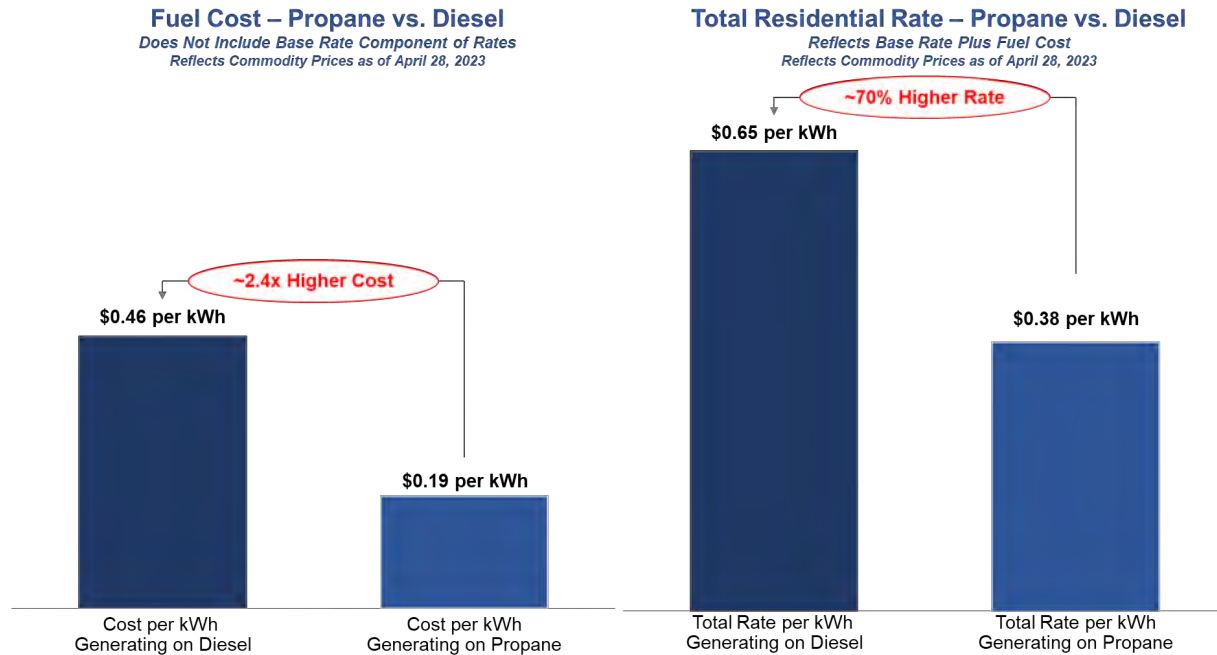


Figure 65 - Rate Structure Variance between Diesel and Propane

The chart shown above illustrates that WAPA’s cost to generate electricity by burning diesel is 2.4x higher than that by burning propane. As noted in the narrative above, the cost of diesel is 1.7x more expensive than propane on an energy equivalent basis. The impact to WAPA’s cost is greater than 1.7x because WAPA’s diesel generators are less efficient and therefore require not only more expensive fuel, but also required a greater quantity of fuel.

The fuel efficiency of a vehicle is expressed in miles per gallon. As efficiency and miles per gallon increase, the fuel required to travel a given number of miles decreases.

Miles per Gallon	Efficiency	Gallons per Mile	Efficiency
45	↑	0.022	↓
35		0.029	
25		0.040	
15		0.067	

Figure 66 - Efficiency Rate - Mileage per Gallon

The efficiency of a generator is expressed in terms of a measure of heat content - British Thermal Units (btu) - consumed to make one kilowatt hour (kWh) of electricity, so the rate is expressed as btu/kWh. This metric is referred to as a generator’s heat rate and represents how much energy is needed to make a kWh of electricity. Larger values reflect poorer efficiency. The higher the btu/kWh value, the more energy is required to make one

kWh of electricity. A generator's heat rate is similar to the gallons per mile calculation for a vehicle shown above (higher values are worse). The heat rates for St. Thomas, St. Croix, and Territory-Wide operating on 100% propane versus operating 100% on diesel are shown below. Note that St. Thomas is shown pro forma for Wartsila 4-7 being in service burning propane.

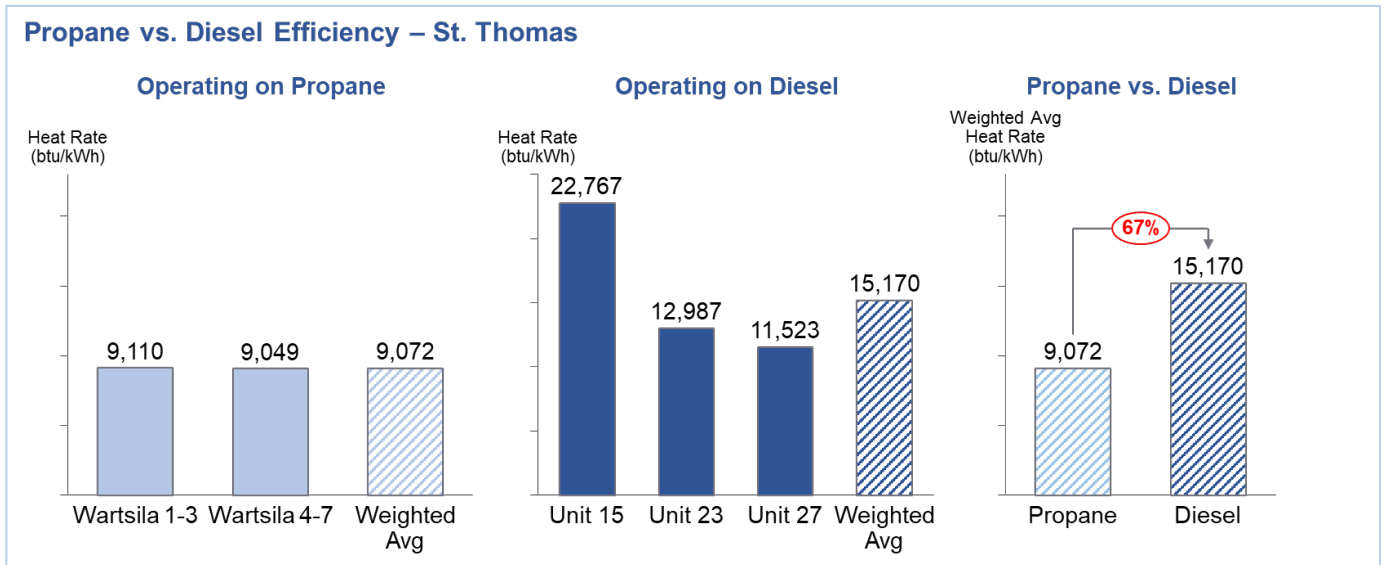


Figure 67 Comparison of Propane to Diesel Efficiency STT/STJ District

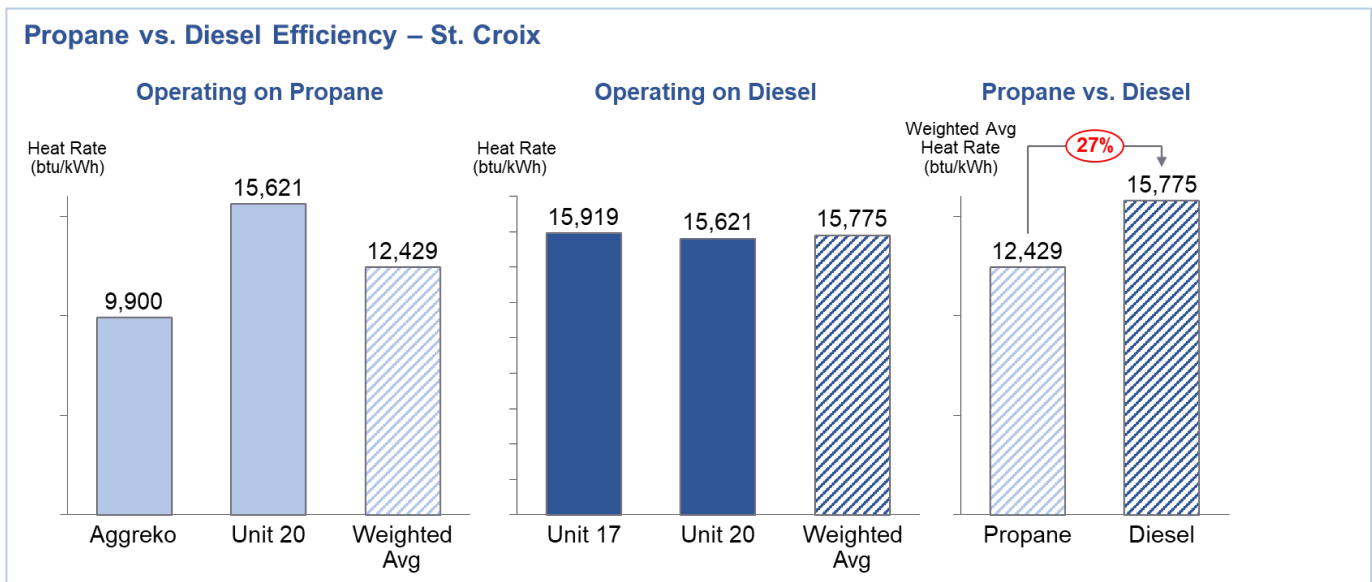


Figure 68 Comparison of Propane to Diesel Efficiency STX District



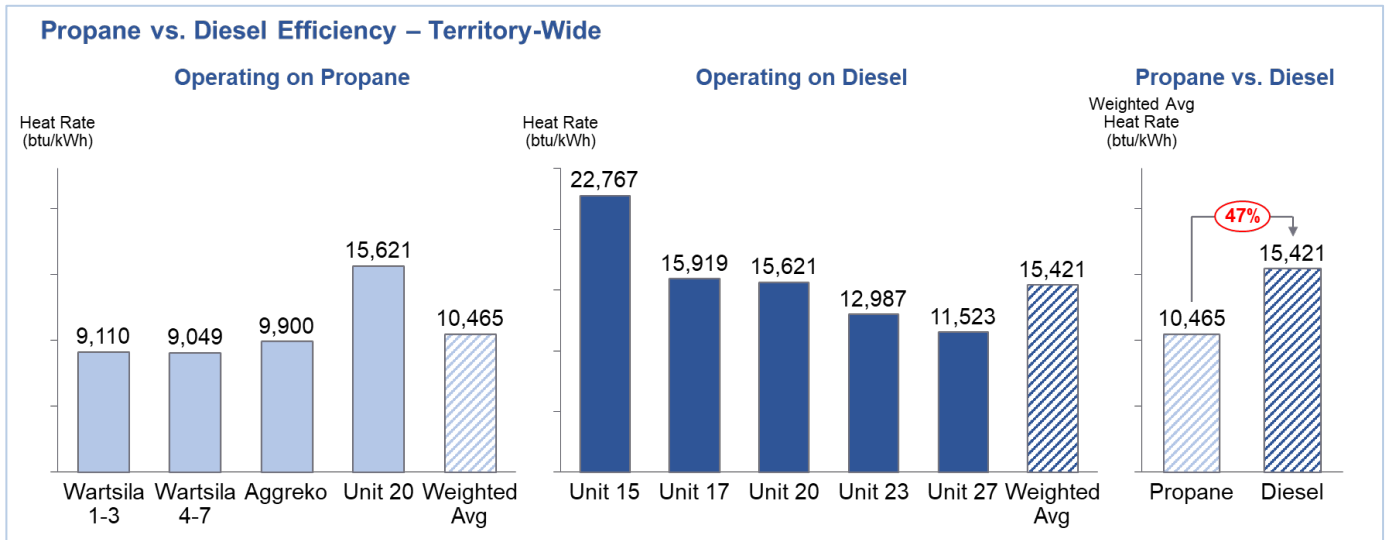


Figure 69 Propane to Diesel Efficiency - Territory Wide

The projected cost of generating electricity on propane versus diesel was shown above; however, to further illustrate the higher cost of operating on diesel in lieu of propane, an additional backward-looking analysis is presented below. WAPA was forced to operate on close to 100% diesel in December 2022 when it lost access to the Propane Supply Infrastructure, and WAPA operated as close as possible to its optimal fuel mix earlier in the year (WAPA's fuel mix can vary from month-to-month depending on the operational performance of its generating fleet, as generator outages can cause WAPA to burn more diesel than it otherwise would choose to). The average delivered price of propane and diesel from December 2022 were held constant to eliminate the impact of commodity price variability and back-cast using WAPA's actual kWh production by fuel type for 2022. WAPA's fuel mix by month is shown below.

Note that this analysis holds December 2022 commodity prices constant across all of 2022 to remove the impact of variability in commodity prices and isolate the impact of the different mix of propane and diesel; however, the actual price of propane and diesel was significantly higher earlier in the year. Accordingly, the cost of generation shown below does not reflect the actual cost of WAPA's generation earlier in the year.

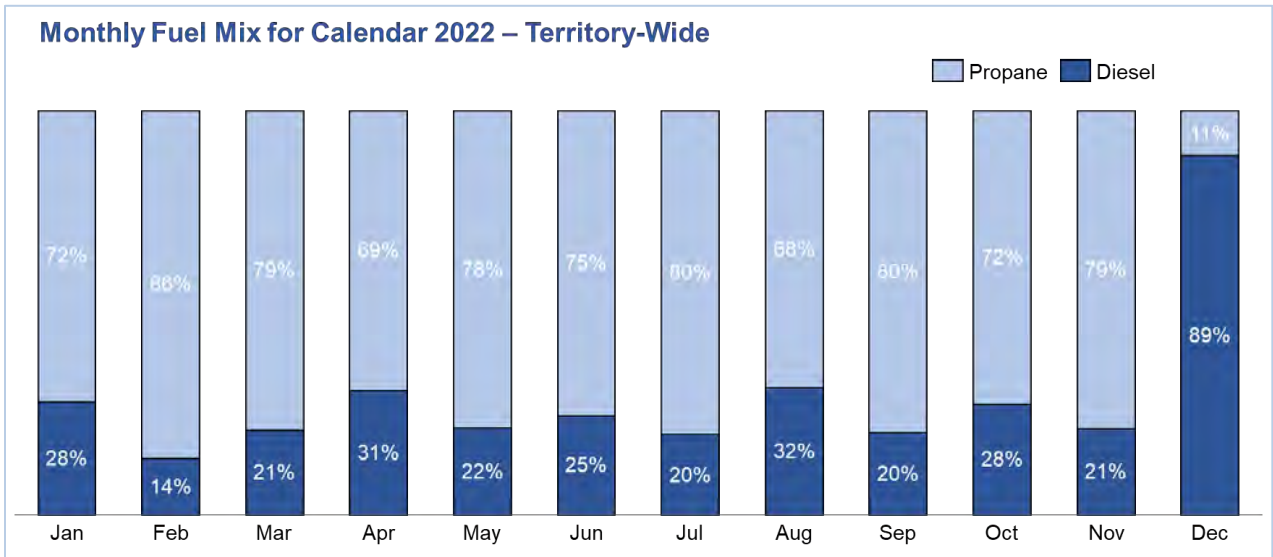


Figure 70 Monthly Fuel Mix 2022 Territory Wide

WAPA's cost of generating electricity by month based on the methodology described above is shown below.

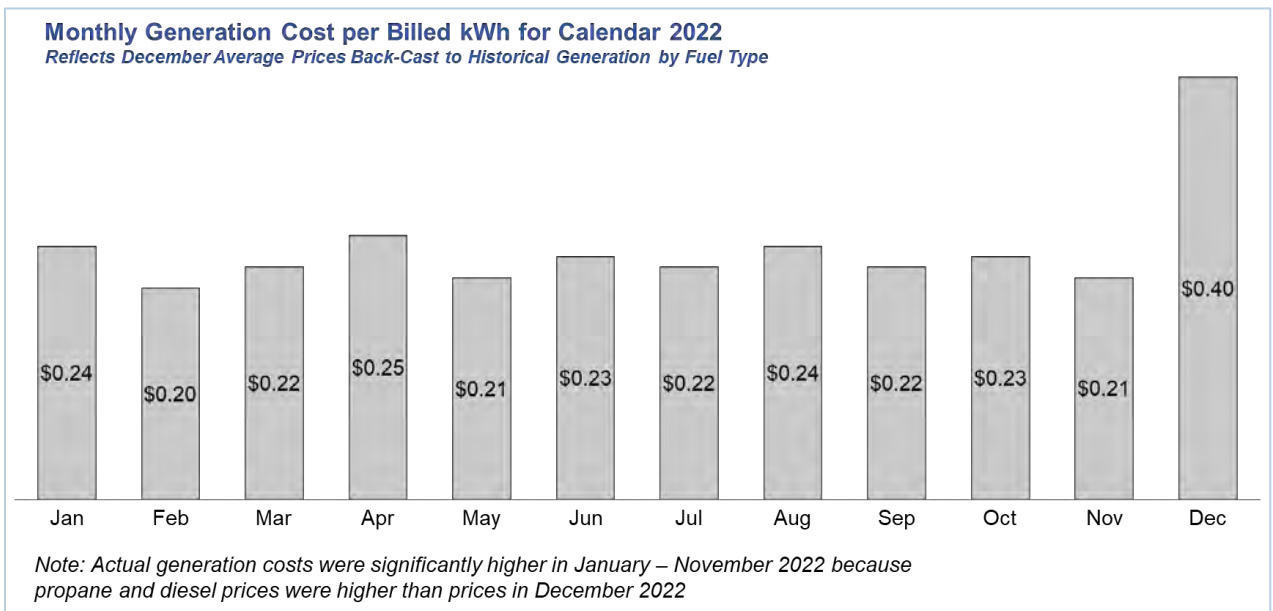


Figure 71 2022 Cost Billed Per kWh

The two calculations are combined in the chart below. The relationship between fuel mix (left y-axis), and the cost of generation (right y-axis), is clear.



Monthly Fuel Mix and Generation Cost for Calendar 2022 – Territory-Wide

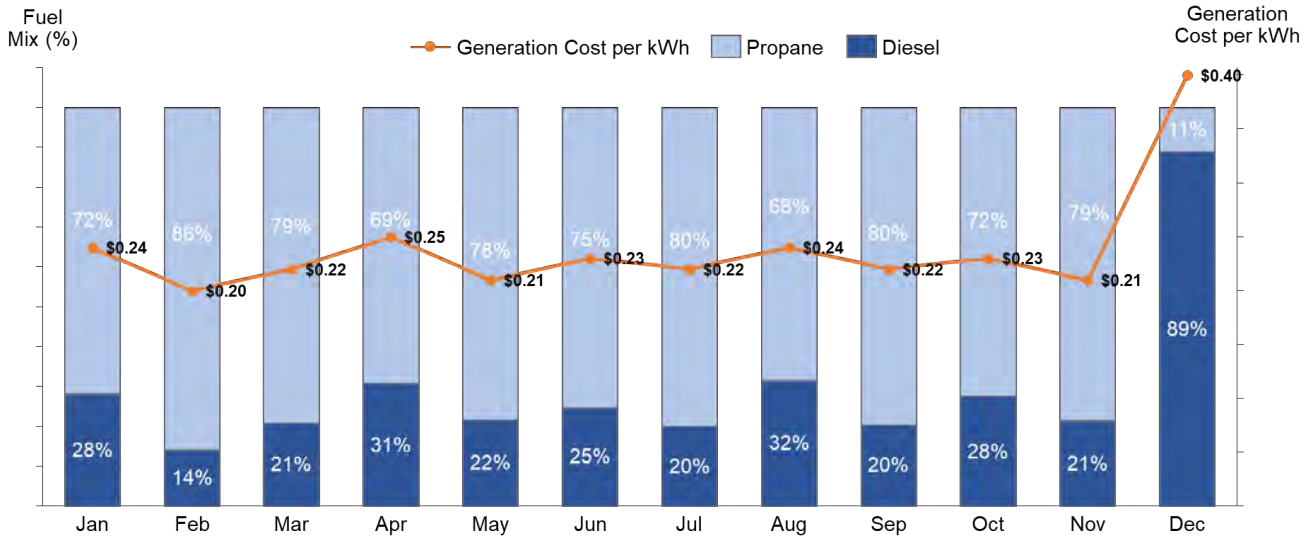


Figure 72 - Cost per Generation Fuel Mix

- Obtain Lower Propane Transportation Costs** – The fuel supply contract associated with the Propane Supply Infrastructure is above-market based on initial competitive market supply indications. Ownership of the Propane Supply Infrastructure will enable WAPA to secure propane transportation service at a competitive market rate. Savings from lower propane transportation cost are not reflected in the comparative rate analysis for diesel versus propane operations shown above. The transportation cost for shipping propane to the Territory is part of the fuel charge that WAPA collects from its customers in rates, and all else being equal customer rates would therefore be lower. Savings from securing competitive market rate propane transportation cannot be achieved without ownership of the Propane Supply Infrastructure.

Propane Transportation \$ per Gallon	Cost Reduction \$ per Gallon	Cost Reduction \$ per year	Cost Reduction \$ per kWh
\$0.38	\$(0.02)		
\$0.36	\$(0.04)	~\$1,800,000	\$0.003
\$0.34	\$(0.06)	~\$3,600,000	\$0.006
\$0.32	\$(0.08)	~\$5,400,000	\$0.009
\$0.30		~\$7,200,000	\$0.012

Figure 73 - Relative Costs for Propane Fuel

- **Fuel Redundancy** – Ownership of the Propane Supply Infrastructure allows WAPA to operate on propane or diesel (with its existing diesel supply infrastructure). Without the Propane Supply Infrastructure, the only fuel WAPA can burn to generate electricity is diesel. If the supply of diesel is interrupted or WAPA’s diesel infrastructure is impaired or rendered unusable by a hurricane, earthquake, tornado, or other natural disaster, WAPA could be left unable to generate electricity, and by extension unable to make potable water. For example, steel diesel storage tanks are exposed to damage from high winds during a storm, whereas the propane storage is housed in mounds that are constructed of alternating layers of sand and soil, and ultimately encased in concrete bunkers. WAPA’s steel diesel storage tanks and its water storage tanks both sustained damage during the 2017 Hurricanes. In fact, Tank #10 which was used to store diesel in the St. Thomas/St. John district was rendered unusable (the damaged diesel storage tank has been subsequently demolished).



Figure 74 - Image of St. Thomas/St. John Propane Storage

Photograph of mounded propane storage bunker with steel tanks installed under multiple layers of sand and soil and encased in concrete bunkers at the Randolph Harley Power Plant on St. Thomas; facility on St. Croix is similar.

- **Fuel Security** – Ownership of the Propane Supply Infrastructure increases the amount of fuel inventory WAPA can hold, and thus be able to have sufficient fuel to operate its generators. Without the Propane Supply Infrastructure, WAPA’s diesel in storage would allow it to operate for 35 days without fuel resupply on St. Thomas and 26 days on St. Croix. With propane infrastructure in addition to diesel storage, St. Thomas can operate without fuel supply for 62 days and St. Croix can operate for 44 days. The additional storage mitigates the risk of WAPA not being able to receive marine shipments of fuel, for example, if the channel to its fuel docks is blocked or its fuel docks are damaged in a natural disaster. Note that the days of storage for St. Thomas is shown pro forma with the new Wartsilas in service.



Fuel Storage Capacity – Days of Fuel Burn on Hand

Assumes Full Inventory on Hand

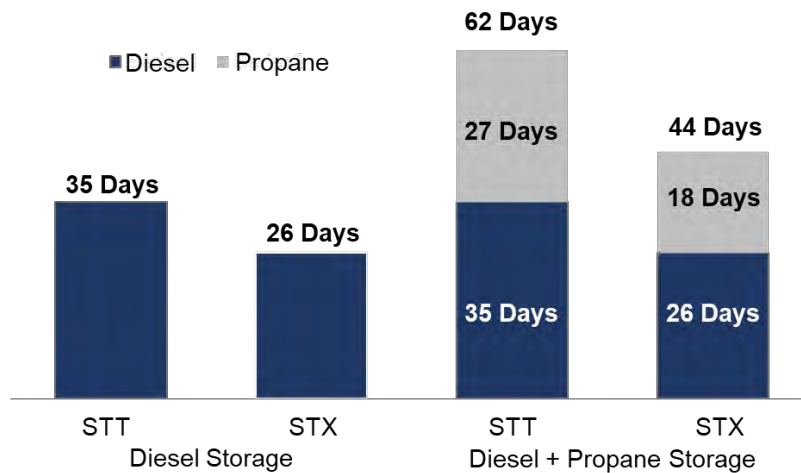


Figure 75 - Fuel Capacity/Storage per District

- **Drinking Water Security** – Ownership of the Propane Supply Infrastructure bolsters the Authority's fuel security as result of several of the benefits of the ownership discussed above. The Authority cannot make potable water without electricity, so improved fuel security also protects the Authority's ability to make drinking water.
- **Improved Reliability** – Ownership of the Propane Supply Infrastructure allows WAPA to take full advantage of its most reliable, modern generators. Without the Propane Supply Infrastructure, WAPA is forced to rely on older, less reliable generation. Relying on less reliable generation results in more frequent power outages for customers. This is especially impactful for the Territory's most vulnerable citizens who rely on home medical care that requires electricity to operate. The first graphic shown below illustrates the age of WAPA's various generators. The next two graphics presented below show the relative age of generation that WAPA must rely upon to generate electricity when it has access to propane versus when it can only operate on diesel.

Generation Fleet

The majority of the Authority's generation capacity is at least 30 years old:

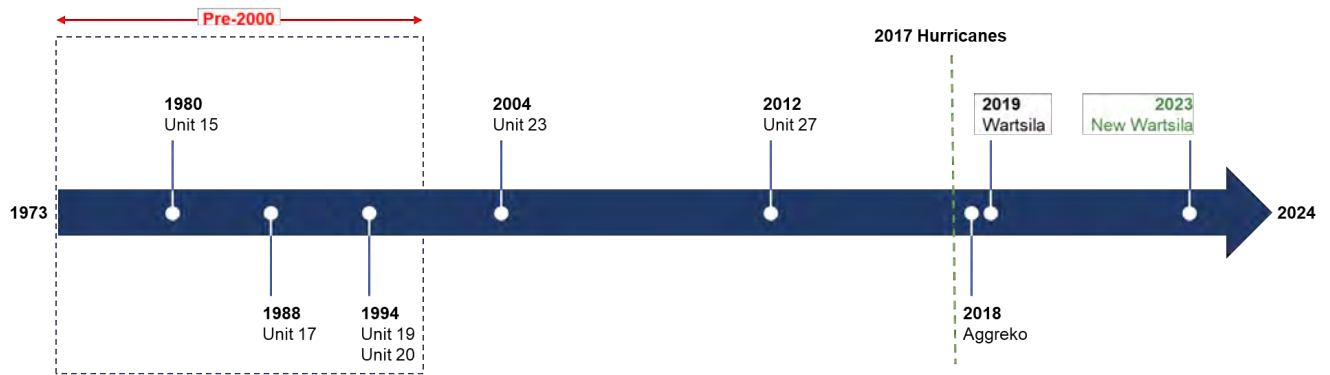


Figure 76 - Age of Generation Infrastructure

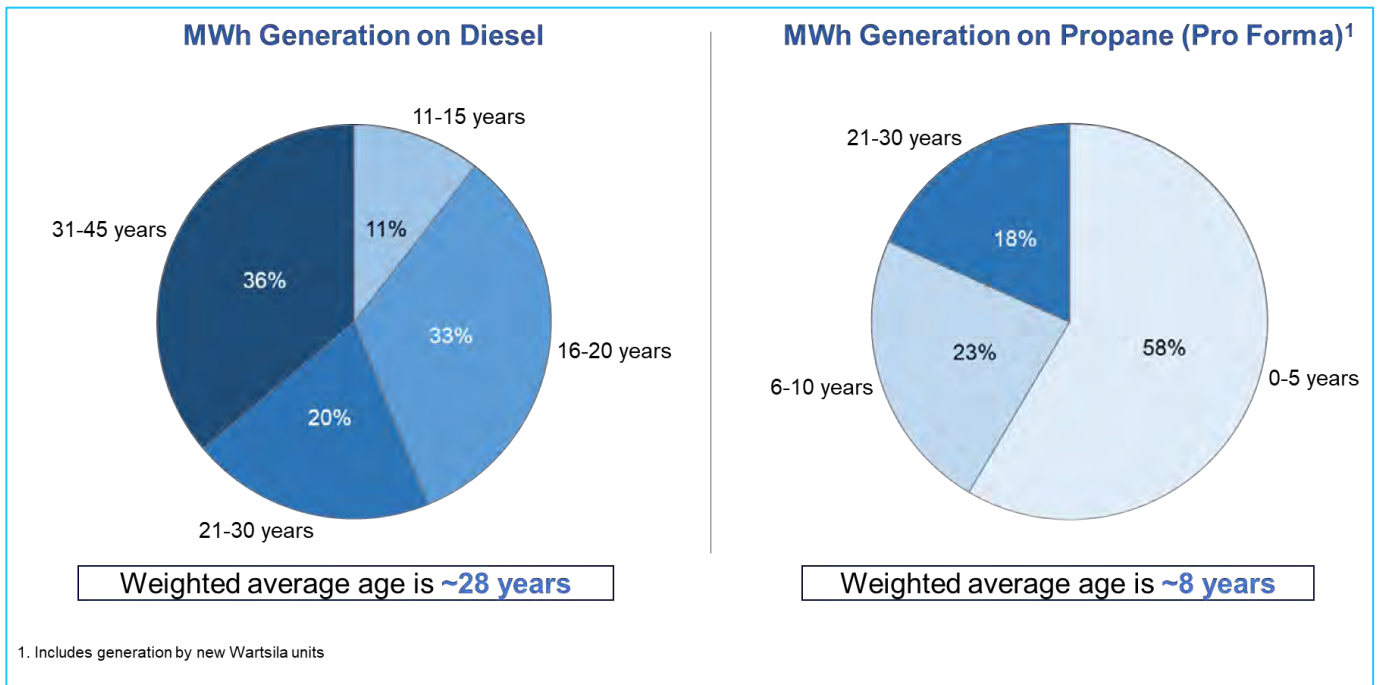


Figure 77 - Comparison of Diesel to Propane on Generation Weighted Average Age

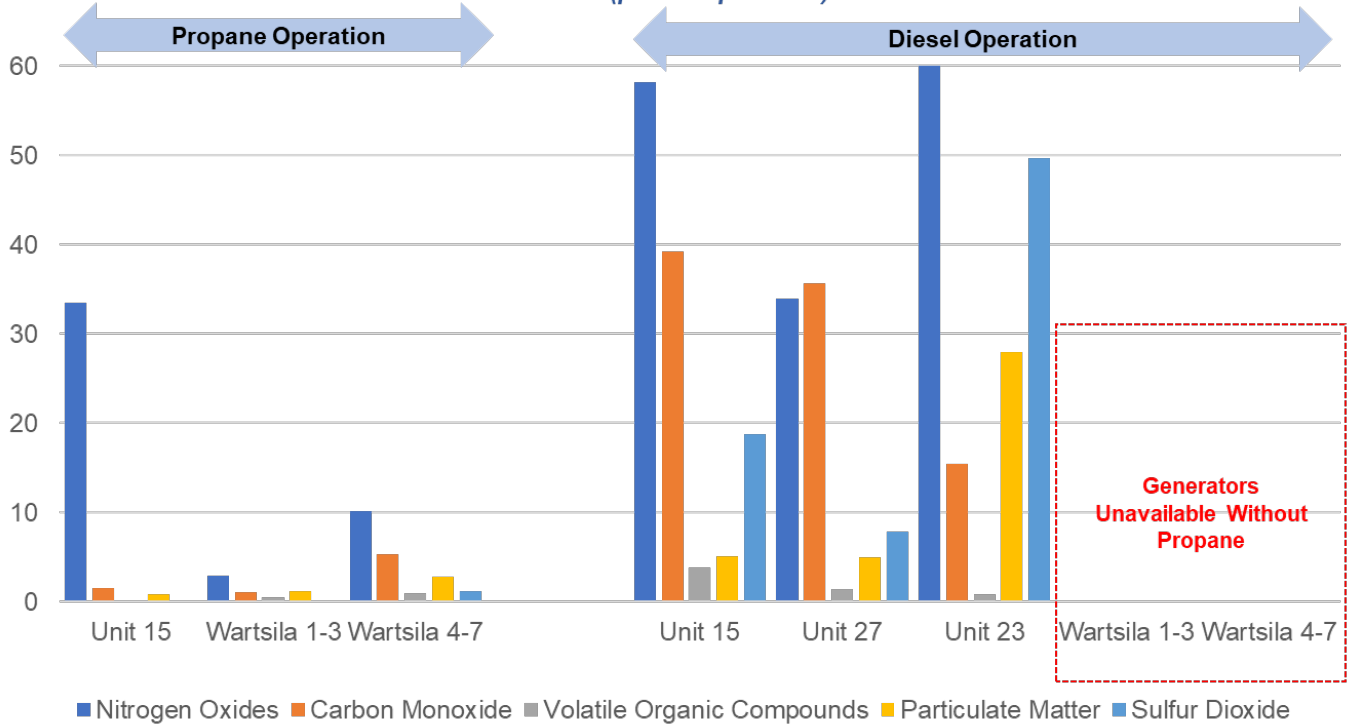
- **Improved Environmental Profile** – Without the Propane Supply Infrastructure, WAPA is forced to burn diesel to generate electricity. Diesel's impact on the environment is worse than burning propane. WAPA's existing US Environmental Protection Agency emissions limits would be exceeded in approximately three months with diesel only operations. The emissions profiles for St. Thomas and St. Croix operating on propane versus diesel are shown below. Environmental emissions are significantly lower when operating on. On St. Thomas, WAPA's most environmentally friendly generators, Wartsila 1-3 and Wartsila 4-7, are unavailable to without access to propane.



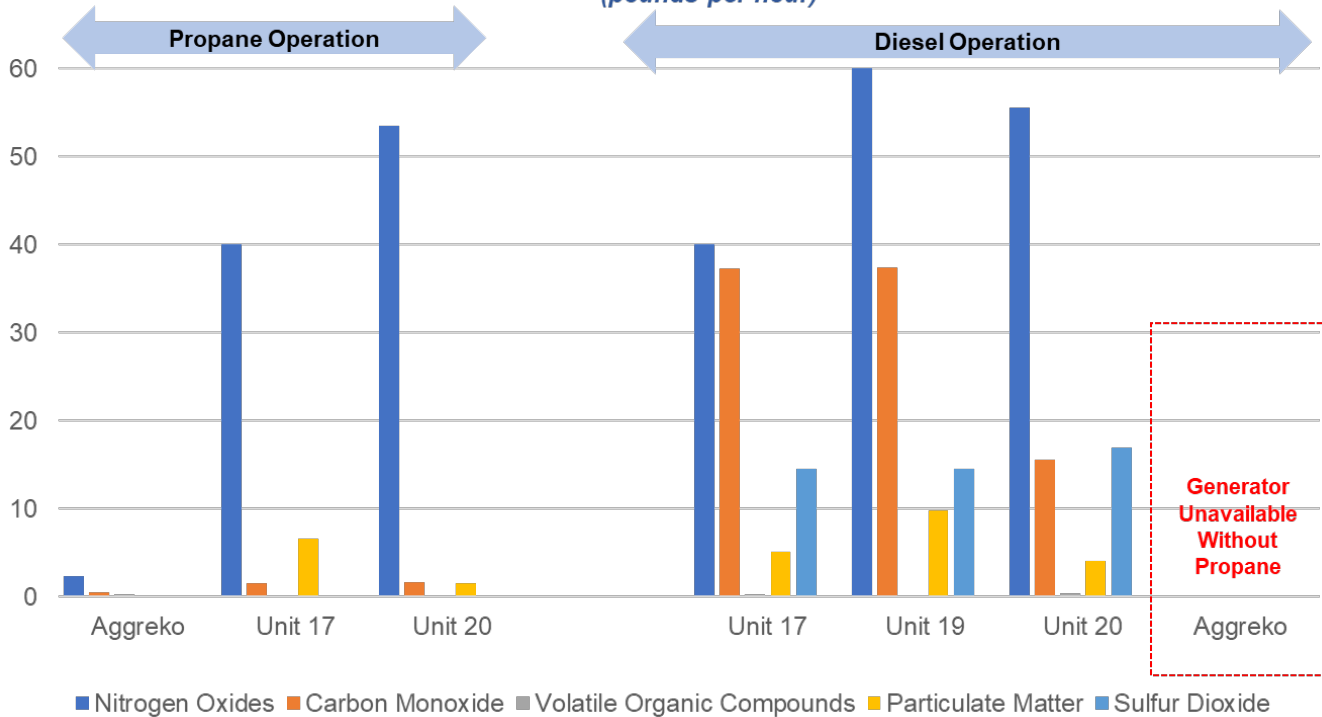
St. Thomas Environmental Emissions

Propane vs. Diesel Operation

(pounds per hour)



St. Croix Environmental Emissions Propane vs. Diesel Operation (pounds per hour)



1.3 Propane Supply Infrastructure Detail

Both the St. Croix and St. Thomas propane infrastructures operate in the same fashion. However, there are differences in the physical layout of the two facilities as well as their storage and operating capacities.

Propane is shipped to the Territory via marine transportation in liquid form as LPG. The Propane Supply Infrastructure starts at the fuel dock, which is owned by WAPA. Once a vessel is on the dock, the fuel loading arm, or the alternate supply line, is connected to the vessel. The fuel dock has a fuel loading arm installed as well as an alternate supply line to provide redundancy. Once the propane passes through the connection flange on the vessel into the loading arm or the alternate supply line, the propane has entered the Propane Supply Infrastructure.

Additional details regarding the Propane Supply Infrastructure components are included in Appendix III.

1.3.0 LPG Pipeline from the Fuel Dock to the Storage Tanks

St. Thomas

The pipeline to the storage tanks from the fuel docks are constructed of carbon steel. Given the hazardous nature of storing and transporting LPG, 28% of the welds in the system were inspected whereas the relevant standard, ASME B31.3 stipulates that only 5% of the welds be inspected to meet the standard. In addition to the pipeline, pumps are needed to maintain the flow of LPG. The pumps in St. Thomas include an additional pump stage given the elevation of the LPG storage tanks. The storage tanks on St. Thomas are on top of Grambokola Hill above Krum Bay and the Randolph Harley Power Plant. The storage facility is approximately



200 feet above sea level while the Randolph Harley Power Plant is at sea level. Accordingly, the LPG must be pumped up to the storage facility. This is facilitated by two propane transfer pumps. One pump is designed for 100% duty flow while the second pump serves as a backup to provide redundancy.

St. Croix

The pipeline to the storage tanks from the fuel docks are also constructed of carbon steel. Given the hazardous nature of storing and transporting LPG, 28% of the welds in the system were inspected whereas the relevant standard, ASME B31.3 stipulates that only 5% of the welds be inspected to meet the standard. The storage facility on St. Croix is at the same elevation as the Estate Richmond Power Plant, and both are at sea level, so the St. Croix facility does not have the extra pump stage that is installed on St. Thomas, but pumps are still needed to move the LPG from the fuel dock to the storage facility. Like on St. Thomas, this is facilitated by two propane transfer pumps. One pump is designed for 100% duty flow while the second pump serves as a backup to provide redundancy.

1.3.1 LPG Storage

St. Thomas

The storage facility consists of 10 tanks that were manufactured by Belgium-based Geldof Integrated Steel Solutions. Each of the tanks is approximately 173 feet in length and 21 feet in diameter. The tanks are installed in two separate concrete bunkers with 5 tanks in each bunker. The installation of the tanks on St. Thomas required extensive excavation, including blasting, due to the rocky terrain on St. Thomas and resulted in the removal of approximately 46,000 cubic meters of primarily rock. The storage tanks are encased in bunkers that consist of multiple layers of earth, sand, rock, gravel, and ultimately concrete. The mounding over the storage tanks is to protect the tanks from external damage and fire, while also eliminating oxygen to prevent uncontrolled ignition and store LPG safely. The storage tanks on St. Thomas can hold 84,000 barrels of LPG based on nameplate capacity; however, fuel storage tanks have a low suction point, called “the heel”, that results in some of the nameplate storage capacity being unusable. On St. Thomas, the working capacity of the storage is 77,000 barrels after accounting for the heel. In St. Thomas’ current optimal operating state, the working storage capacity represents 38 days of propane inventory. Once the new Wartsila’s are in service and St. Thomas is operating 100% on propane, as discussed earlier, St. Thomas’ working storage capacity will still represent almost one month of propane in storage, or 27 days.

St. Croix

The storage facility consists of 8 tanks that were also manufactured by Belgium-based Geldof Integrated Steel Solutions. The storage tanks are smaller than St. Croix, with each of the tanks being approximately 157 feet in length and 21 feet in diameter. The tanks are installed in two separate concrete bunkers with 4 tanks in each bunker. The installation of the tanks on St. Croix also required earthworks, with the removal of approximately 9,000 cubic meters of soil. Like St. Thomas, the storage tanks are encased in bunkers that consist of multiple layers of earth, sand, rock, gravel, and ultimately concrete to be able to store LPG safely. The storage tanks on St. Croix can hold 59,000 barrels of LPG based on nameplate capacity. The working capacity of the storage is 54,000 barrels after accounting for the heel. In St. Croix’s optimal operating state, the working storage capacity represents 18 days of propane inventory. St. Croix has less generation capacity than St. Thomas, which accounts for the smaller system in St. Croix.

1.3.3 LPG Pipeline from the Storage Tanks to the Vaporizer

St. Thomas

The vaporizer, discussed below, is the part of the propane infrastructure that converts LPG into gaseous propane that is then burned in the generators. The pipeline from the storage tanks to the vaporizer is constructed of carbon steel and supplies two export pumps. Like the propane transfer pumps that move LPG from the ship to the storage vessels, there are two installed export pumps with one designed to operate at 100% flow while the second pump provides redundancy.

St. Croix

The vaporizer, discussed below, is the part of the propane infrastructure that converts LPG into gaseous propane that is then burned in the generators. The pipeline from the storage tanks to the vaporizer is constructed of carbon steel and supplies two export pumps. Like the propane transfer pumps that move LPG from the ship to the storage vessels, there are two installed export pumps with one designed to operate at 100% flow while the second pump provides redundancy.

1.3.4 Vaporizer

St. Thomas and St. Croix

The vaporizer, as mentioned above, converts LPG into gaseous propane. This is accomplished by essentially boiling the LPG by heating it with steam. St. Thomas and St. Croix each have two vaporizers to provide redundancy to the Propane Supply Infrastructure on each island. The vaporizers are each supported by two Packaged Steam Boilers that provide the steam that is used by the Vaporizer. The vaporizers not only convert the liquid propane to gaseous propane, but the vaporization process also heats the gaseous propane to the specific temperature required by the generators. Transportation of the gaseous propane is via pipeline to WAPA's generators. The pipelines that transport gaseous propane are constructed of stainless steel.

Once the gaseous propane leaves the vaporizer and passes through the manifold to one of WAPA's generators, the propane has left the Propane Supply Infrastructure, enters infrastructure owned by WAPA, and is burned by WAPA to generate electricity.

In industrial processes, a flare serves to vent fuel. A traditional flare has a visible flame at the top of the flare stack, which can be disconcerting to the public. The propane infrastructure vaporizer is accompanied by a flameless flare. The term "flameless" flare is a misnomer; however, because the flare has a flame, but the flame is housed in the body of the flare, and thus, not visible. As discussed above, prior to gaseous propane being sent to a generator, the temperature and pressure of the propane must meet specific levels to avoid damage to the generators. To reach the temperature required, the vaporizer heats the LPG to gaseous form. To aid this process, there must be a flow of propane passing through the vaporizer; however, that flow of propane is not yet at the temperature and pressure where it can be fed to WAPA's generators. The propane flow is vented to the atmosphere via the flare until the propane flow reaches the appropriate temperature and pressure. Once the proper temperature and pressure is reached, the fuel is no longer vented via the flare and is sent to the generator.

Also, if a generator trips offline while operating on propane the generator can no longer take propane. In that case, the propane supply valves to the generator automatically closes, and any remaining propane in the upstream piping is diverted to the flameless flare to safely remove and burn.



1.3.5 Fire Control and Suppression

St. Thomas and St. Croix

Given the hazardous nature of storing, transporting, and vaporizing propane, the Propane Supply Infrastructure has significant leak detection equipment and systems as well as significant fire control and suppression systems. The fire control and suppression systems are fed with seawater and have redundancy built throughout the system. For example, the firewater pumps have a primary pump and a backup pump for redundancy. The systems are operated by electricity, with the primary source of electricity being WAPA's generators; however, the fire control and suppression systems are also supported by standby diesel generators that can power the fire control and suppression systems if WAPA's generators are not supplying electricity.

The fire suppression systems are deluge systems. The jetties include a fire water curtain system that insulates the facility from the vessel and vice versa in the event of a fire. The jetties are also outfitted with manual water cannons for fire suppression. The propane storage tank mounds are also protected by a deluge fire system and manual water cannons. The vaporizers and balance of plant supporting the vaporizers include deluge fire protection systems.

These systems are cyclically tested weekly to ensure that the systems are operational. The maintenance of the systems is also included in the annual operations and maintenance plan.

1.3.6 Offshore Mooring Buoy

St. Thomas and St. Croix

The Propane Supply Infrastructure also includes a permanently anchored mooring buoy so a vessel can be held in place using a permanent mooring instead of being at anchor. This is safer in inclement weather. The mooring buoy facilitates mooring vessels up to the size of a Very Large Gas Carrier, or VLGC. VLGC's carry significant quantities of propane, up to approximately 550,000 barrels, which represents approximately three months of propane supply for the Territory. One advantage of transporting large quantities of propane is the transportation cost per barrel is lower than on smaller ships.

1.4 Availability of Comparable Facilities

1.4.0 Local Resources

There is currently only one utility-scale Propane Supply Infrastructure facility in the Territory on St. Thomas, and only one utility-scale Propane Supply Infrastructure facility in the Territory on St. Croix. Other commercial companies in the Territory (Antilles Gas Company, Polaris, Paradise Gas, etc.) sell propane in the Territory to residential and small commercial users. They do not have the infrastructure in place to provide the quantity of propane that WAPA consumes, nor do they have the infrastructure in place to supply propane at the temperatures or pressures that WAPA requires for its generators.

There are no hydrocarbon resources in the Territory that can be burned for fuel by WAPA's existing generators. One organic material in the Territory that could be burned to produce electricity is biomass (plant debris, etc.). This is currently not a viable alternative because a biomass facility does not currently exist in the Territory and the Territory does not produce sufficient biomass to meet its electricity needs. Constructing a biomass facility would take several years and the Territory would have to import additional biomass to supplement its own biomass.

Another organic material that is produced in that territory that could be burned to produce electricity is municipal household waste, or waste-to-energy. Like biomass, a waste-to-energy facility would have to be built which would take years, and the Territory does not produce sufficient municipal solid waste to meet its electricity needs. The Territory would need to import trash from outside the Territory.

Solar power and wind energy are two naturally occurring resources that are abundant in the US Virgin Islands, and WAPA recently signed Power Purchase Agreements (“PPAs”) for both solar power and wind energy. However, both projects are expected to take two or more years to place in service. The contracts in place represent approximately 25% of the Territory’s annual energy needs, so significantly more solar power and/or wind energy would need to be developed to fully power the Territory, and that would take years. Finally, solar power and wind energy are intermittent resources. Solar power does not work when the sun is not shining, and wind power does not work when the wind does not blow. With currently available technology, it is impossible to build enough battery energy storage to make up for this intermittency for any significant length of time. Fossil-fuel generation of electricity is needed to keep the lights on in the Territory. The Propane Supply Infrastructure is a critical element of the fuel supply to WAPA’s fossil-fuel generation.

1.4.1 Alternative Fuel Import Options

WAPA currently imports propane through the Propane Infrastructure Supply but could explore other supply options.

One option would be to construct a new Propane Supply Infrastructure. A facility would be required to be built on both St. Thomas and St. Croix. That would take years and cost millions of dollars. Furthermore, why would WAPA build a new Propane Supply Infrastructure when there is existing Propane Supply Infrastructure in the Territory?

A second option would be to develop Liquefied Natural Gas (“LNG”) facilities. This would require building two separate facilities. One on St. Thomas and one on St. Croix. This would take years and cost millions of dollars. Additionally, because LNG is cryogenic and natural gas is stored at a very cold temperature, LNG storage is energy intensive; and therefore, costly from an operating perspective. Currently, WAPA’s generators cannot burn natural gas, so the generators would also have to be converted to be able to burn natural gas to be able to use LNG.

A third option would be to convert to Containerized Natural Gas (“CNG”). This would likely not require material construction; however, it would involve the logistics around moving numerous bullet tanks regularly to the islands full and then removal of the empty containers to be refilled, only to be returned to the Territory to repeat the cycle. Establishing this capability, while likely not requiring material construction, would still have a six-to-twelve-month lead time to establish. Furthermore, the channel into the Estate Richmond Power Plant is narrow and shallow. As a result, CNG would likely need to be delivered to Ocean Point Marine Terminals on the south shore of St. Croix and transported via truck to the Estate Richmond Power Plant to be able to supply sufficient quantities of fuel to the plant. As discussed above, WAPA’s generators cannot burn natural gas, so the generators would have to be converted to be able to burn natural gas to be able to use CNG.

1.5 Licenses and Permits



The Propane Supply Infrastructure project received environmental approval, and all associate environmental permits, construction permits, United States Coast Guard permits, etc. prior to construction commencing. Compliance with permitting and related requirements has been maintained throughout the life of the facility, and the Propane Supply Infrastructure currently has all required licenses and permits in place. Permits in place cover air permits, water permits, wastewater permits, US Coast Guard permits, etc. The list of permits is included in Appendix [I].

1.6 Project Milestones

The purchase of the Propane Supply Infrastructure has two major milestones and several interim milestones:

1.6.0 Major Milestone I

Major Milestone 1 is the payment of \$45 million was made to Vitol on May 1, 2023 with funds advanced by the Government of the Virgin Islands in anticipation of grant funding for the acquisition. WAPA and the Government of the Virgin Islands executed a Promissory Note coincident with the advance of funding that creates a debt obligation for WAPA to repay the \$45 million to the Government of the Virgin Islands.

1.6.1 Interim Milestones:

- **Benefit Cost Analysis** - Targeted completion of the Benefit Cost Analysis. Benefit Cost Analysis received May 23, 2023.
- **Third Party Valuation** – KPMG has been engaged to perform an independent valuation of the asset with completion targeted the week ending June 9, 2023.
- **Independent Engineering Assessment** – Kiewit Inc. has been engaged by WAPA to perform an independent assessment of the condition of the Propane Supply Infrastructure on behalf of WAPA. The independent engineering assessment is targeted for completion by the end of June 2023.
- **Alternative Propane Supply** - Negotiations for alternative propane supply are underway; target timing is seeking approval from the Virgin Islands Water and Power Authority Governing Board at its June meeting, currently planned for June 22, 2023. WAPA expects to seek subsequent approval from the Virgin Islands Public Services Commission (“PSC”) at its July meeting. The July PSC hearing has yet to be scheduled; however, the PSC typically meets the second Tuesday of each month, so the expected date for the July hearing is July 11, 2023.

1.6.2 Major Milestone II

The Major Milestone II is the payment of an additional \$100 million contractually due on August 14, 2023. Milestone II also includes the following:

- Sale of the Propane Supply Infrastructure to WAPA from Vitol.
- Transfer of title, conveyance of all equipment, property, balance of plant, inventory, spares, documentation, etc. to WAPA from Vitol.
- WAPA will assume the existing operations and maintenance contract currently in place between Vitol

and Saintnals, the current third-party operations and maintenance provider, effective upon the sale of the Propane Supply Infrastructure to WAPA.

- WAPA's new fuel supply arrangement with the supplier WAPA selects becomes active.

The achievement of Major Milestone II results in consummating the purchase and sale transaction and the closing of the sale of the Propane Supply Infrastructure by Vitol to WAPA will be complete. WAPA will own the entirety of the Propane Supply Infrastructure and have no residual relationship or obligation to Vitol.

1.6 Project Location

1.6.0 St. Croix

The St. Croix propane storage and fuel gas vaporisation facility (the Propane Supply Infrastructure) is situated adjacent to the Estate Richmond Power Station. WAPA owns the land on which the

Estate Richmond Power Plant is located. WAPA also owns the land on which the Propane Supply Infrastructure is sited. The facility occupies approximately 1.5 acres; however, the site, which was formally used as a cement works, extends to over 2.5 acres.

St Croix Propane Supply Infrastructure facility supplying Richmond Power Station

17° 45' 00.00" North 064° 42' 35.88" West

Aerial picture showing the St. Croix Jetty and propane storage and propane fuel gas vaporiser areas (white with green feature markings) overlaid on the disused and now divested brownfield structures; the footprint of the Richmond Power Plant is outlined in red

1.6.1 St. Thomas

The St Thomas propane storage and fuel gas vaporisation facility (the "Propane Supply Infrastructure") is situated within the Randolph Harley Power Plant. WAPA owns the land on which the Randolph Harley Power Plant is located. WAPA also owns that land on which the Propane Supply Infrastructure is sited. The Propane Supply Infrastructure facility occupies approximately 1.5 acres.

St. Thomas Propane Supply Infrastructure facility supplying Randolph Harley Power Station

18° 19' 42.24" North 064° 54' 41.96" West

Aerial picture showing the St Thomas Jetty and propane storage and propane fuel gas vaporiser areas (white with green feature markings); the footprint of the Randolph Harley Power Plant is outlined in red.



II. HUD Eligible Activity

The CDBG-eligible activity under the Housing and Community Development Act of 1974 (HCDA) is as follows:

Section 105(a)(2) – The acquisition, construction, reconstruction, or installation (including design features and improvements with respect to such construction, reconstruction, or installation that promote energy efficiency) of public works, facilities (except for buildings for the general conduct of government), and site or other improvements.

WAPA has secured an agreement to acquire the existing Propane Supply Infrastructure on the islands of St. Thomas and St. Croix from Vitol. The Propane Supply Infrastructure was originally developed under a Build, Own, Operate, and Transfer (BOOT) agreement between WAPA and Vitol. Under the BOOT agreement, ownership was intended to transfer from Vitol to WAPA after a period of 10 years. WAPA has struggled to meet its financial obligations under the BOOT agreement for many years, and Vitol has declared WAPA in default. In conjunction with this declaration of default, Vitol has prevented WAPA from utilizing the Propane Supply Infrastructure.

Faced with this situation, WAPA had two options.

- Option 1 – Let Vitol keep the Propane Supply Infrastructure and attempt to operate and serve its customers without the use of the assets.
- Option 2 – Acquire the Propane Supply Infrastructure to ensure continued access to and use of the assets.

WAPA's decision to acquire the Propane Supply Infrastructure and the price it is willing to pay are based on the economic value of the assets to WAPA and the mitigation benefits they provide. The decision and price are not based on the terms of the BOOT agreement. As part of the agreement to transfer ownership of the Propane Supply Infrastructure from Vitol to WAPA, the parties have agreed to release each other from all claims and obligations related to the BOOT agreement.

The economic value of the Propane Supply Infrastructure is driven by the cost of propane compared to WAPA's alternative fuel source, which is diesel. The fuel cost savings provided by ownership of the Propane Supply Infrastructure is the primary factor considered in the Benefit Cost Analysis included in this application. The propane infrastructure assets also provide mitigation benefits that reduce the risk of loss of life and property from future disasters and yield community development benefits. These benefits are described in greater detail in the project summary and national objective sections of this application.

3.1 Project Cost

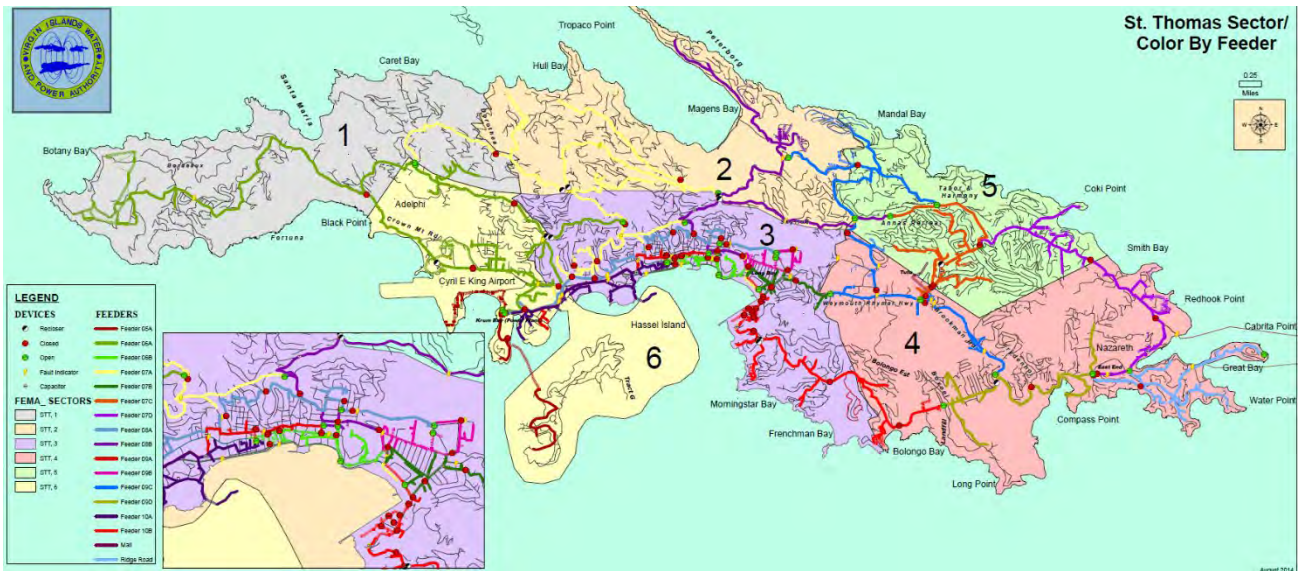
The procurement of the Propane Supply Infrastructure is in accordance and compliance with the procurement and other related policies of WAPA.

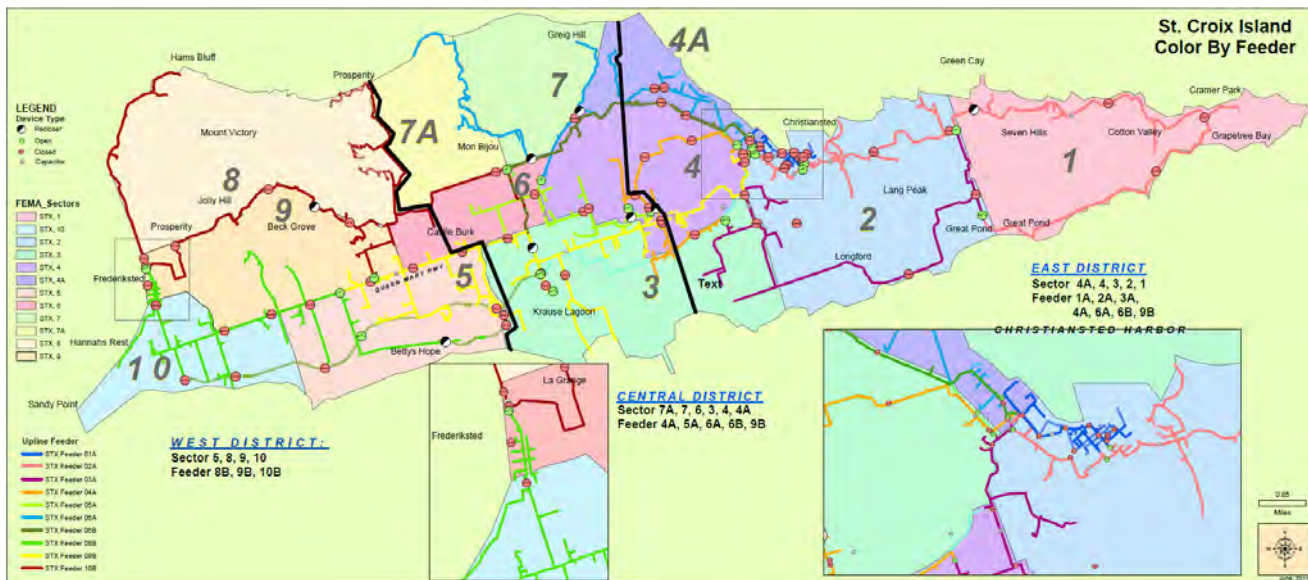
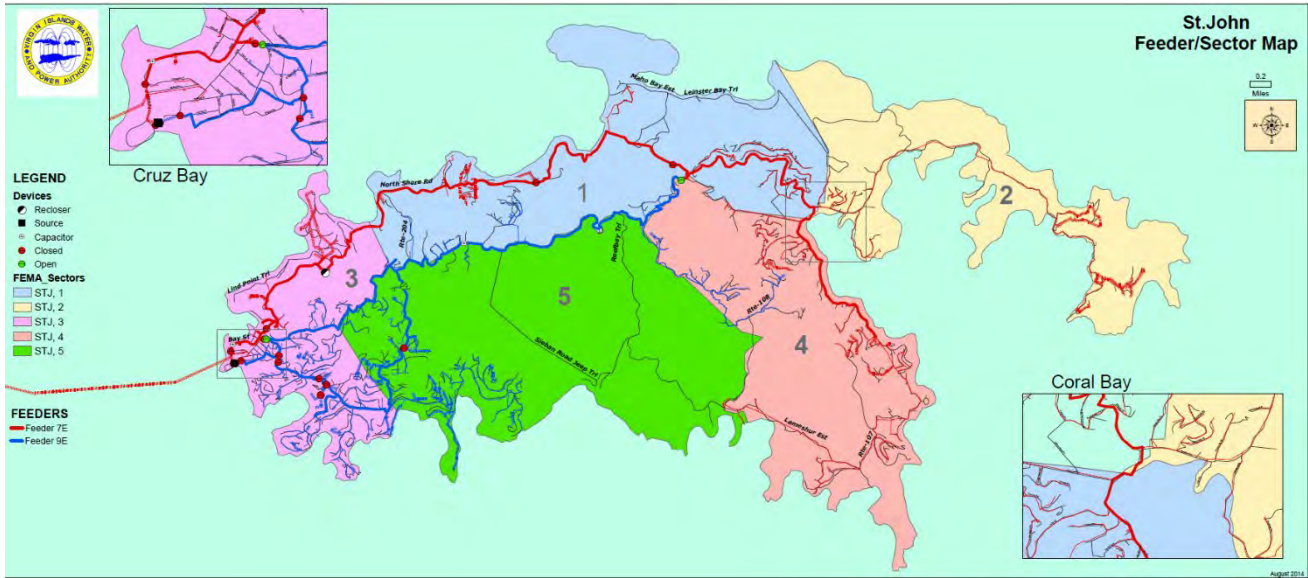
The project cost of \$145,000,000 is the agreed upon purchase price between the seller, Vitol, and the buyer,

WAPA, for acquisition of the Propane Supply Infrastructure. WAPA arrived at the purchase price after extensive negotiations. WAPA’s analysis and calculation of the value of the facility was the primary factor in determining the negotiated purchase price. The Benefit Cost Analysis, discussed later in this document, as well as a valuation analysis performed by an independent valuation firm, KPMG, support the value proposition in the purchase price versus the value of the Propane Supply Infrastructure.

3.2 Area of Impact

The LPG Infrastructure on both St. Thomas and St. Croix complement the distribution of VIWAPA’s generation assets. The St. Thomas Infrastructure is physically located at Krum Bay which is a part of the Charlotte Amalie West Census Tract (9608) and abuts VIWAPA’s Randolph Harley Power Plant. The St. Croix Infrastructure is physically located at Estate Richmond which is a part of the Sion Farm Subdistrict Census Tract (9703) and abuts VIWAPA’s Estate Richmond Power Plant. Although the assets are located in those respective areas, the fuel that they provided is used by VIWAPA’s generators to produce energy that is distributed across each island district via various feeders shown below. Considering the nature of the project’s use, the acquisition of these assets will service all communities and census tracts in the territory.





3.3 Impacts to the Population

Basic household necessities such as food refrigeration cannot be avoided, which requires electricity. Medical conditions can necessitate the use of air conditioning or operation of medical equipment. Insulin requires refrigeration. Accordingly, electricity costs are highly regressive in their impact on household finances and can have a material adverse impact on LMI households as LMI households spend a significant percentage of monthly income on electricity.

The decline in population and electricity sales in the Territory exacerbates the adverse impact of the cost of electricity on LMI households, and vulnerable populations. The Authority has a fixed amount of infrastructure that it must install, maintain, and operate. For example, its transmission and distribution system does not get 20% smaller when the population shrinks by 20%. Accordingly, the Authority's operating costs do not change

materially, despite a smaller population. However, the Authority is a municipal utility, and its only source of revenue is its customers. When the Authority’s customer base shrinks, it must then collect essentially the same amount of revenue from fewer customers, which increases each customer’s costs.

Securing the Territory’s fuel supply by acquiring the propane infrastructure provides dependable, lower cost fuel to make electricity. Without the Propane Supply Infrastructure, the Authority would rely on burning diesel to make electricity. Diesel is currently significantly more expensive than propane on an energy-equivalent basis (converting the cost to \$ per mmbtu, or million British Thermal Units), so operating only on diesel would significantly increase the price that the Authority would need charge its customers for electricity.

3.4 Resilient or Mitigative Elements

The Propane Supply Infrastructure was constructed to meet the applicable industry standard for the relevant component as outlined in the table below.

Component	Design Code/Standard	Component	Design Code/Standard
Overall Design	<ul style="list-style-type: none"> • API 2510 	Piping Integrity	<ul style="list-style-type: none"> • ASME B31.3 design and class 300 • Liquid Piping – A333 • Gas Piping – 304L
Hazardous Area Classification	<ul style="list-style-type: none"> • API RP 505 	Piping Materials and Equipment	<ul style="list-style-type: none"> • ASTM • API • ANSI
Tank Design and Inspection	<ul style="list-style-type: none"> • ASME VIII Div 2 	Electrical Design and Installation	<ul style="list-style-type: none"> • National Electrical Code
Mound Design and Loadings	<ul style="list-style-type: none"> • EEMUA • API/ASME do not cover mounding 	Electrical Materials and Equipment	<ul style="list-style-type: none"> • UL / FM / NEMA
Seismic and Wind Design	<ul style="list-style-type: none"> • ASCE 7-10 	Fire Fighting Design and Installation	<ul style="list-style-type: none"> • NFPA
Piping Design and Installation	<ul style="list-style-type: none"> • ASME B31.3 	Fire Fighting Materials and Equipment	<ul style="list-style-type: none"> • UL / FM

3.4.1 Owning the Propane Supply Infrastructure Mitigates Significant Risk

Owning the propane infrastructure is critical to the community of the Virgin Islands because it significantly improves the Territory’s energy resilience and energy security due to several key reasons. Owning the Propane Supply Infrastructure is also critical to WAPA fulfilling its FEMA Community Lifelines role in the event of a natural disaster.

Note that as discussed previously, the Propane Supply Infrastructure is currently used by WAPA, so the factors discussed below result from WAPA no longer having use of the Propane Supply Infrastructure.



III. Consistency with Mitigation Needs Assessment

The US Department of Homeland Security's Federal Emergency Management Agency ("FEMA") utilizes a Community Lifelines framework to identify fundamental services in the community that must be stabilized following a disaster to enable all other aspects of society to function. Energy, Fuel, and Electric Grid are a specific Community Lifeline identified by FEMA. Additionally, other FEMA Community Lifelines depend on the Energy, Fuel, and Electric Grid Community Lifeline being in place. Community Lifelines that depend on the Energy, Fuel, and Electric Grid Community Lifeline include Food, Water, and Shelter (as discussed, the Authority makes potable water for the Territory and the Authority requires electricity to make potable water), Health and Medical, Communications, and Transportation, all of which need electricity to be fully functional. The Virgin Islands Territorial Emergency Management Agency ("VITEMA") follows the FEMA Community Lifeline framework.

Ownership of the Propane Supply Infrastructure mitigates several risks that WAPA would face in the event of a natural disaster, as discussed, that could limit or completely impair its ability to make electricity and drinking water and maintain the Energy, Fuel, and Electric Grid Community Lifeline.

IV. Analysis of Energy Lifeline Mitigation

The USVI drafted the Territorial Hazard Mitigation Plan (HMP) in 2019 and it was most recently updated in April 2021 to incorporate the introduction to FEMA-Lifelines and USVI Hazard mitigation planning elements that addresses a wide range of natural and human-caused hazards. A fuel supply interruption will adversely affect the energy lifeline. It can occur in three (3) primary ways:

1. **Physical Damage:** A hurricane can inflict tremendous physical damage to fuel storage infrastructure. This is because most fuel is stored in above-ground tanks and supply piping is typically installed on pipe racks that are also above ground. These can be easily damaged by windblown debris as was the case with Tank #10 on St. Thomas. Damage to the exposed storage infrastructure will result in both a fuel supply interruption and have serious adverse environmental impacts by releasing harmful petrochemicals into the environment. Hazardous Material Release is one of the human-caused hazards that is identified in the HMP.
2. **Equipment failure:** Fuel is moved from one place to using various pumps and the flow is controlled via various types of valves. While equipment failure can be mitigated by having secondary supply lines or by bypassing damaged equipment, there are circumstances when a single point of failure can interrupt the entire operation. Having a fuel supply that utilizes an entirely different delivery system can significantly reduce the risk of a single point of failure interrupting fuel delivery.
3. **Supply chain disruption:** The pandemic has revealed that the supply chains are very delicate and susceptible to a wide variety of shocks that can render them inoperable. For example, imagine a fuel vessel en route to the territory when it is discovered that one of the crew members has an infectious disease and that in order to get the crew member the appropriate medical attention the crew is forced to immediately divert the vessel to alternate port. Thus, the vessel doesn't arrive to the territory on time and the on-island fuel inventory is depleted. As has been demonstrated in the pandemic era, such a scenario is entirely plausible.

VIWAPA recognizes that the primary resource that enables it to fulfill its responsibility of providing reliable and resilient power to the USVI is its access to fuel. Simply stated, power cannot be generated without fuel. While VIWAPA has control over the diesel inventory, it does not currently have direct control over the LPG inventory. This places the Authority in a vulnerable position as without access to LPG, power generation for

the territory will be dependent on a single fuel source. Additionally, all VIWAPA's diesel storage tanks on both islands are above ground and each plant has one dock/jetty by which to receive fuel shipments. Should those tanks or docks become compromised, the Authority's ability to generate power will be seriously imperiled. The more inventory that the Authority has under its control, the more time it has to respond, and the likelihood of a service interruption decreases dramatically.

This project furthers VIWAPA's assertion that CDBG-MIT funding should prioritize mitigation of risk.

to key lifeline assets that once secured, contribute significantly to the territory's resilience. Energy is the backbone of almost all other lifelines and investing in securing an alternative fuel source that is almost impervious to damage from hurricanes for the territory's sole power provider has a theoretically infinite return. This project will also reduce the risk of loss of life by ensuring that VIWAPA has the fuel necessary to power the most reliable units thus resulting in fewer power outages on average.

V. Compliance with National Objective for Covered Projects

The national objective met by this activity is the Urgent Need Mitigation (UNM) national objective. To meet the alternative criteria for the UNM national objective, the activity must (i) address the risks identified in the Mitigation Needs Assessment; and (ii) result in a measurable and verifiable reduction in the risk of loss of life and property.

The acquisition of the Propane Supply Infrastructure addresses the risk to the Energy Lifeline as identified in the Mitigation Needs Assessment. The Propane Supply Infrastructure is one of the most critical parts of the Energy Lifeline as the assets are used to currently supply over 80% of the fuel used for power generation in the US Virgin Islands, and The Territory's power generation fleet has been specifically designed to utilize these assets. The Propane Supply Infrastructure will soon be used to supply 100% of the fuel used for power generation in the US Virgin Islands once the new Wartsilas are in service on St. Thomas in 2023. Over almost sixty megawatts of WAPA's newest and most efficient existing generation can only operate on propane. Sixty megawatts of capacity is enough capacity to power the entire St. Thomas District. The thirty-six-megawatt Wartsila generation project, which is funded by HUD CDBG-DR funds, is at risk of becoming a stranded asset if the Propane Supply Infrastructure is lost. These units can run primarily on diesel, but the emissions system requires a steady supply of propane, even when operating on diesel as the primary fuel. Addressing risk to the Energy Lifeline also directly addresses risk to other critical lifelines as they rely on electric services from WAPA. Examples include (i) Safety & Security, (ii) Communications, (iii) Food, Water, and Sheltering, (iv) Health & Medical.

The acquisition of the Propane Supply Infrastructure reduces the risk of loss of life and property from future disasters by providing a more resilient Energy Lifeline. The drivers of this risk reduction include:

1. Enabling the successful completion of the HUD-funded Wartsila generation project on St. Thomas. Having more operational generation units provides redundancy in the event units are damaged in a future disaster. Having more efficient generation units reduces the amount of fuel needed to operate if fuel supply chains are disrupted by a future disaster.

Achievement of this risk reduction can be measured and verified by the successful completion of the project and the successful operation of the units over time.



2. Maintain access to propane as a fuel for power generation. Without the Propane Supply Infrastructure, WAPA will be reliant on diesel as a single fuel for power generation. This increases the risk of fuel supply chain disruptions caused by a future disaster.

Achievement of this risk reduction can be measured and verified with data on the successful procurement of propane and diesel as well as evidence of propane and diesel supply contracts.

3. Maintain access to increased full storage. The Propane Supply Infrastructure includes approximately 27 days of fuel storage on St. Thomas and 18 days of fuel storage on St. Croix. Having additional fuel storage capacity reduces the impact of potential fuel supply chain disruptions caused by a future disaster.

Achievement of this risk reduction can be measured and verified with data on the utilization of this storage capacity over time.

These benefits are described in greater detail in the project summary section of this application.

4.1.0 Long-term Efficacy and Sustainability of the Project

4.1.1.1 Financial Resources to Pay Ongoing Operations and Maintenance Expenses

The Virgin Islands Water and Power Authority is a rate-regulated municipal utility, and the rates it is allowed to charge its customers are determined by the Virgin Islands Public Services Commission (“PSC”). The regulated rate that WAPA charges customers is WAPA’s only source of revenue, and WAPA’s rates are set such that the rates WAPA charges its customers are intended for WAPA to recover its costs. The rate WAPA charges its customers is comprised of two components.

1. The Levelized Energy Adjustment Clause, or LEAC, is to recover WAPA’s cost of fuel and other marginal costs of energy supply such as energy purchased under Power Purchase Agreements.
2. The Base Rate is to recover operating costs such as salaries, maintenance, and other operating costs and debt service.

Separating components in utility rates into rates for fuel recovery and recovery of operating expenses is a common construct in the utility industry.

The PSC conducts a periodic review of WAPA’s operating costs and sets the Base Rate to cover WAPA’s operating costs. The monthly operations and maintenance fee that WAPA currently pays for operation and maintenance services of the Propane Supply Infrastructure is included in WAPA’s base rate, and WAPA has been making monthly payments to Vitol for the third-party operations and maintenance. WAPA is current on these payments and there are no past due amounts outstanding for the monthly operations and maintenance fee. The operations and maintenance expenses related to the Propane Supply Infrastructure is not a new cost to WAPA. WAPA has historically recovered these costs via its customers rates and successfully paid for ongoing operation and maintenance expenses.

The collection in customer rates for the monthly operations and maintenance cost for the Propane Supply Infrastructure represents approximately \$0.03 per kWh, or approximately 15% of WAPA’s \$0.19 per kWh Base Rate and approximately 7% of WAPA’s total rate (Base Rate + LEAC, or \$0.41 per kWh). The remaining \$0.17 per kWh in WAPA’s base rate is intended to cover all of WAPA’s other operating costs, including salaries and

benefits, generator maintenance and repair, automated metering infrastructure, vehicles, materials and supplies, real estate leases, generator leasing expense (Aggreko generation is leased), and debt service. WAPA's regulated rate does not include components of its rate that have line-of-sight to line-item spending. WAPA's operating costs are reflected in rates in aggregate and are not earmarked for specific costs. The order of magnitude of the Propane Supply Infrastructure annual Operations and Maintenance expense in customer rates is shown in the chart below.

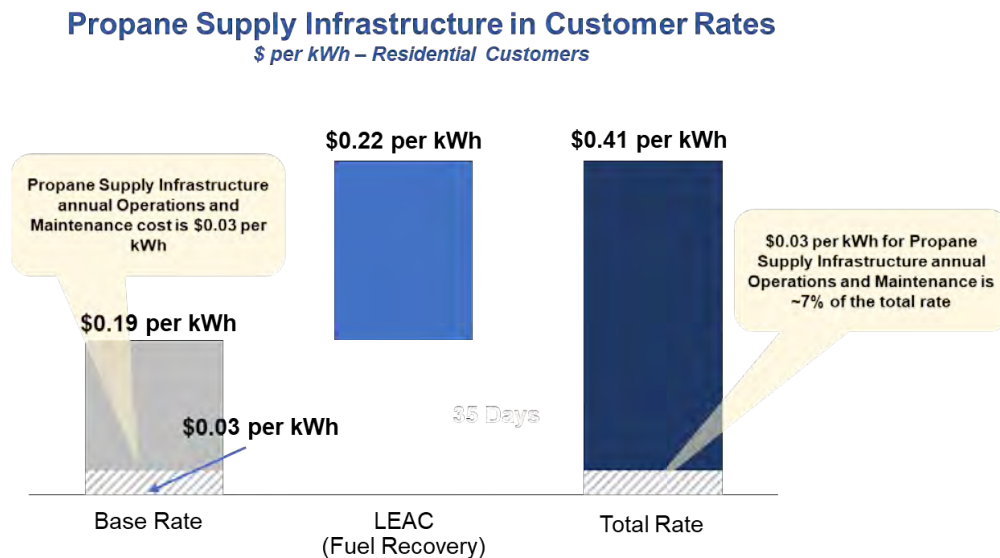


Figure 78 Customer Rates Relative to Project Activities

The Propane Supply Infrastructure is a large industrial asset; however, the system does not include a significant amount of moving equipment, or rotating stock. The bulk of the Propane Supply Infrastructure is piping and storage. The moving equipment component of the system is comprised primarily of pumps. The package boilers do not have a significant number of moving points, but rather essentially boil water. The vaporizer also does not have a significant number of moving parts as it is essentially a heat exchanger, whereby steam is piped through the vaporizer adjacent to a pipe with LPG to apply heat to the LPG and convert the liquid propane to gaseous propane. Accordingly, the Propane Supply Infrastructure does not have a significant Major Maintenance component to its maintenance. Instead, most of the maintenance of the facilities is ongoing routine maintenance and captured in the \$0.03 per kWh in rates described above. For example, over the next 20 years, identified Major Maintenance represents approximately 3% of the total operations and maintenance expense for the Propane Supply Infrastructure.

Finally, WAPA has Bond Resolutions in place associated with its outstanding debt. The Bond Resolutions stipulate that all operating costs are to be paid before any interest or principal payments for WAPA's debt service can be paid. Accordingly, in a situation where WAPA faced a significant shortfall of funds for some reason, paying the operations and maintenance of the Propane Supply Infrastructure is prioritized under the Bond Resolutions before any payments for interest or principal on WAPA's debt.

The operations and maintenance of the Propane Supply Infrastructure has been outsourced to a third-party



since the project was placed in service. WAPA intends to continue to outsource the operations and maintenance to a third party for the foreseeable future. The contract to purchase the Propane Supply Infrastructure includes a provision for WAPA to assume the contract that is currently in place between Vitol and the third-party operations and maintenance provider, (is this Saintnals?). WAPA intends to assume the contract upon transaction close to ensure continuity of operations. The existing operations and maintenance agreement is included in Appendix II.

The excerpt from the purchase contract for the Propane Supply Infrastructure reflecting the ability of WAPA to assume the contact is included below (underlined emphasis added).

12. O&M Agreement. During the Interim Period, Seller shall not terminate the Facilities Services Agreement dated June 14, 2022 between Seller and Saintnals, LLC (as amended, supplemented and/or modified from time to time, the “O&M Agreement”). Furthermore, Seller shall not unreasonably withhold its consent in connection with the assignment of the O&M Agreement by Seller to WAPA under the terms of Section XIII(F) of the O&M Agreement.

Infrastructure Maintenance Program

The maintenance of the Propane Supply Infrastructure includes various recurring inspection/maintenance activities as outlined in the table below. Furthermore, the facilities are managed under a Process Safety Management system (“PSM”). PSM is intended to be utilized when certain hazardous materials are being stored and/or utilized in operations. PSM stipulates inspection and/or maintenance at various intervals much like a commercial jetliner - i.e., certain activities are performed at various time intervals or activity thresholds (after a certain number of takeoffs or landings, for example).

Propane Supply Infrastructure Inspection Cycle

Facility	Inspection Activity	Inspection Frequency	Type of Maintenance
Superstructures	Benchmark	On build completion and then every 5 years	Detailed inspection of every part of the structure and condition record
	General	2 yearly from completion	A visual inspection from ground level of the structure and condition record
	Operational	Daily	At any time the structure is visited by operational or technical staff either for operational reasons or cyclic maintenance
	Special	Ad-hoc	In response to the raising of special concerns such as impact damage
Equipment and Facilities	Benchmark	On commissioning with manufacturer in attendance	Detailed inspection of every part of the equipment and condition record
	Yearly – thorough	Yearly	Thorough cyclic maintenance in accordance with the planned maintenance schedule
	6 monthly – visual	6 monthly	Cyclic maintenance in accordance with the planned maintenance schedule
	Physical testing	Weekly	Cyclic testing of elements of the safety systems to ensure they are operational. To be carried out at the same time each week
	Operational	Daily	At any time the equipment is visited by operational or technical staff either for operational reasons or cyclic maintenance
	Special	Ad-hoc	In response to the raising of special concerns or breakdown of the equipment
Miscellaneous	Tank cleaning	5 years	Inspection and cleaning of tanks
	Painting / refurbishment	10 years	Painting and major refurbishment of the facility outside of normal maintenance

Operations and Maintenance Projected Budget

Operations and maintenance expenses have been estimated on an annual basis based on current conditions, and the estimated operations and maintenance expense is incorporated in the BCA analysis provided in the Demonstration of Benefit section. Development and maintenance of the O&M plan will be monitored in accordance with HUD requirements and industry standards.

Historically, since the Propane Supply Infrastructure was placed in service, WAPA has spent approximately \$63 million on operations and maintenance of the facility. In the past two years, WAPA's annual operations and maintenance expense was approximately \$12 million in fiscal year 2022 (July 1, 2021 through June 30, 2022), and its annual operations and maintenance expense will total approximately \$14.5 million in fiscal year 2023 (July 1, 2022 through June 30, 2023).

The Propane Supply Infrastructure is a large industrial asset; however, the system does not include a significant amount of moving equipment, or rotating stock, and the bulk of the Propane Supply Infrastructure is piping and storage. The moving equipment component of the system is comprised primarily of pumps. The package boilers do not have a significant number of moving points, but rather essentially boil water. The vaporizer also does not have a significant number of moving parts as it is essentially a heat exchanger, whereby steam is piped through the vaporizer adjacent to a pipe with LPG to apply heat to the LPG and convert the liquid propane to gaseous propane. Accordingly, the Propane Supply Infrastructure does not have a significant Major Maintenance component to its maintenance. Instead, most of the maintenance of the facilities is ongoing routine maintenance. For example, over the next 20 years, identified Major Maintenance represents approximately 3% of the total operations and maintenance expense for the Propane Supply Infrastructure.

The projected operations and maintenance budget for the next 20 years of operation and maintenance of the Propane Supply Infrastructure is shown below. Note that the first period shown represents a partial year as the acquisition of the Propane Supply Infrastructure is anticipated to close in August 2023, so the operations and maintenance budget was developed assuming WAPA takes ownership of the assets in August 2023, and the first full forecast month is September 2023.



Propane Supply Infrastructure Operations and Maintenance Budget

Start Date	9/1/2023	1/1/2024	1/1/2025	1/1/2026	1/1/2027	1/1/2028	1/1/2029	1/1/2030	1/1/2031	1/1/2032	1/1/2033
End Date	12/31/2023	12/31/2024	12/31/2025	12/31/2026	12/31/2027	12/31/2028	12/31/2029	12/31/2030	12/31/2031	12/31/2032	12/31/2033
Calendar Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Operating Year	7	8	9	10	11	12	13	14	15	16	17

STT and STX Combined

Personnel Costs	\$1,298,553	\$3,973,572	\$4,053,043	\$4,134,104	\$4,216,786	\$4,301,122	\$4,387,144	\$4,474,887	\$4,564,385	\$4,655,673	\$4,748,786
Saintnals Operations Fee	421,615	1,290,143	1,315,946	1,342,265	1,369,110	1,396,492	1,424,422	1,452,910	1,481,969	1,511,608	1,541,840
Fixed Costs	\$1,720,168	\$5,263,715	\$5,368,989	\$5,476,369	\$5,585,896	\$5,697,614	\$5,811,566	\$5,927,798	\$6,046,354	\$6,167,281	\$6,290,626
Office Supplies	\$26,764	\$81,897	\$83,535	\$85,206	\$86,910	\$88,648	\$90,421	\$92,230	\$94,074	\$95,956	\$97,875
Training & Education	10,728	32,827	33,484	34,153	34,836	35,533	36,244	36,969	37,708	38,462	39,231
Materials & Misc. Spare Parts	482,452	1,476,303	1,505,829	1,535,945	1,566,664	1,597,997	1,629,957	1,662,557	1,695,808	1,729,724	1,764,318
Vehicle Fuel & Maintenance	41,072	125,679	128,193	130,756	133,372	136,039	138,760	141,535	144,366	147,253	150,198
Boiler Fuel and Consumables	53,775	164,551	167,842	171,199	174,623	178,115	181,677	185,311	189,017	192,797	196,653
Communications	57,710	176,594	180,126	183,728	187,403	191,151	194,974	198,873	202,851	206,908	211,046
Personal Protective Equipment	17,497	53,541	54,612	55,704	56,818	57,954	59,113	60,296	61,501	62,731	63,986
Travel	24,595	75,261	76,766	78,301	79,867	81,465	83,094	84,756	86,451	88,180	89,944
Other Prof Services (HR, Legal, Tax)	86,005	263,174	268,438	273,807	279,283	284,868	290,566	296,377	302,305	308,351	314,518
Security Services & Rentals	176,598	540,389	551,196	562,220	573,465	584,934	596,633	608,565	620,737	633,151	645,814
Maintenance & Repairs	1,869,908	5,721,917	5,836,356	5,953,083	6,072,145	6,193,587	6,317,459	6,443,808	6,572,685	6,704,138	6,838,221
Software Expenses	82,637	252,868	257,926	263,084	268,346	273,713	279,187	284,771	290,466	296,276	302,201
Technical Support	0	0	0	0	0	0	0	0	0	0	0
Environmental Compliance	20,000	61,200	62,424	63,672	64,946	66,245	67,570	68,921	70,300	71,706	73,140
Propane Testing & Sampling	100,000	306,000	312,120	318,362	324,730	331,224	337,849	344,606	351,498	358,528	365,698
Insurance: Property & Liability	218,647	669,059	682,440	696,089	710,011	724,211	738,695	753,469	768,538	783,909	799,587
Variable Costs	\$3,332,122	\$10,196,295	\$10,400,221	\$10,608,225	\$10,820,389	\$11,036,797	\$11,257,533	\$11,482,684	\$11,712,338	\$11,946,584	\$12,185,516
Fixed & Variable Costs	\$5,052,291	\$15,460,009	\$15,769,210	\$16,084,594	\$16,406,286	\$16,734,411	\$17,069,100	\$17,410,481	\$17,758,691	\$18,113,865	\$18,476,142
BIR Gross Receipts Tax	252,615	773,000	788,460	804,230	820,314	836,721	853,455	870,524	887,935	905,693	923,807
BIR Income Tax	57,761	176,750	180,285	183,890	187,568	191,319	195,146	199,049	203,030	207,090	211,232
Total O&M	\$5,362,666	\$16,409,759	\$16,737,955	\$17,072,714	\$17,414,168	\$17,762,451	\$18,117,700	\$18,480,054	\$18,849,655	\$19,226,648	\$19,611,181
Major Maintenance											
Propane Transfer Pump	\$160,000	\$0	\$0	\$179,587	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Propane Export Pump	300,000	0	0	336,725	0	0	0	0	0	0	0
Compressor	160,000	0	0	84,897	0	0	0	0	0	0	0
Propane Vaporizer - Shell and Tube HEX	0	816,000	832,320	0	0	0	0	0	0	0	0
Steam Condensate Accumulator	0	306,000	0	0	0	0	0	0	0	0	0
Steam Generator	400,000	400,000	0	0	0	0	0	0	0	0	0
Deaerator Drum	200,000	0	0	0	0	0	0	0	0	0	0
Flare Unit	0	0	0	0	0	0	0	0	937,328	0	0
Tanks for Flare Gas	0	0	0	42,448	0	0	0	0	0	0	0
Firefighting Pumping System	900,000	969,000	0	147,295	0	0	0	0	0	0	0
Emergency Power Generator Set	0	0	0	955,087	0	0	0	0	0	0	0
Major Maintenance	\$2,120,000	\$2,491,000	\$832,320	\$1,746,039	\$0	\$0	\$0	\$0	\$937,328	\$0	\$0
Total O&M and Major Maintenance	\$7,482,666	\$18,900,759	\$17,570,275	\$18,818,752	\$17,414,168	\$17,762,451	\$18,117,700	\$18,480,054	\$19,786,983	\$19,226,648	\$19,611,181

Propane Supply Infrastructure Operations and Maintenance Budget

Start Date	1/1/2034	1/1/2035	1/1/2036	1/1/2037	1/1/2038	1/1/2039	1/1/2040	1/1/2041	1/1/2042
End Date	12/31/2034	12/31/2035	12/31/2036	12/31/2037	12/31/2038	12/31/2039	12/31/2040	12/31/2041	12/31/2042
Calendar Year	2034	2035	2036	2037	2038	2039	2040	2041	2042
Operating Year	18	19	20	21	22	23	24	25	26

STT and STX Combined

Personnel Costs	\$4,843,762	\$4,940,637	\$5,039,450	\$5,140,239	\$5,243,044	\$5,347,904	\$5,454,863	\$5,563,960	\$5,675,239
Saintnals Operations Fee	1,572,677	1,604,131	1,636,213	1,668,937	1,702,316	1,736,363	1,771,090	1,806,512	1,842,642
Fixed Costs	\$6,416,439	\$6,544,768	\$6,675,663	\$6,809,176	\$6,945,360	\$7,084,267	\$7,225,952	\$7,370,471	\$7,517,881

Office Supplies	\$99,832	\$101,829	\$103,866	\$105,943	\$108,062	\$110,223	\$112,427	\$114,676	\$116,970
Training & Education	40,016	40,816	41,633	42,465	43,315	44,181	45,064	45,966	46,885
Materials & Misc. Spare Parts	1,799,605	1,835,597	1,872,309	1,909,755	1,947,950	1,986,909	2,026,647	2,067,180	2,108,524
Vehicle Fuel & Maintenance	153,202	156,266	159,391	162,579	165,831	169,147	172,530	175,981	179,501
Boiler Fuel and Consumables	200,586	204,598	208,690	212,864	217,121	221,464	225,893	230,411	235,019
Communications	215,267	219,572	223,964	228,443	233,012	237,672	242,425	247,274	252,219
Personal Protective Equipment	65,266	66,571	67,903	69,261	70,646	72,059	73,500	74,970	76,469
Travel	91,742	93,577	95,449	97,358	99,305	101,291	103,317	105,383	107,491
Other Prof Services (HR, Legal, Tax)	320,808	327,224	333,769	340,444	347,253	354,198	361,282	368,508	375,878
Security Services & Rentals	658,731	671,905	685,343	699,050	713,031	727,292	741,838	756,674	771,808
Maintenance & Repairs	6,974,985	7,114,485	7,256,775	7,401,910	7,549,949	7,700,948	7,854,966	8,012,066	8,172,307
Software Expenses	308,245	314,410	320,698	327,112	333,654	340,328	347,134	354,077	361,158
Technical Support	0	0	0	0	0	0	0	0	0
Environmental Compliance	74,602	76,095	77,616	79,169	80,752	82,367	84,014	85,695	87,409
Propane Testing & Sampling	373,012	380,473	388,082	395,844	403,761	411,836	420,072	428,474	437,043
Insurance: Property & Liability	815,579	831,891	848,528	865,499	882,809	900,465	918,474	936,844	955,581
Variable Costs	\$12,429,226	\$12,677,811	\$12,931,367	\$13,189,994	\$13,453,794	\$13,722,870	\$13,997,328	\$14,277,274	\$14,562,820

Fixed & Variable Costs	\$18,845,665	\$19,222,578	\$19,607,030	\$19,999,171	\$20,399,154	\$20,807,137	\$21,223,280	\$21,647,745	\$22,080,700
BIR Gross Receipts Tax	942,283	961,129	980,351	999,959	1,019,958	1,040,357	1,061,164	1,082,387	1,104,035
BIR Income Tax	215,457	219,766	224,161	228,644	233,217	237,882	242,639	247,492	252,442
Total O&M	\$20,003,405	\$20,403,473	\$20,811,543	\$21,227,774	\$21,652,329	\$22,085,376	\$22,527,083	\$22,977,625	\$23,437,177

Major Maintenance

Propane Transfer Pump	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Propane Export Pump	0	0	0	0	0	0	0	0	0
Compressor	0	0	0	0	0	0	0	0	0
Propane Vaporizer - Shell and Tube HEX	0	0	1,034,885	0	0	0	0	0	0
Steam Condensate Accumulator	0	0	194,041	0	0	0	0	0	0
Steam Generator	0	0	2,069,771	0	0	0	0	0	0
Deaerator Drum	0	0	258,721	0	0	0	0	0	0
Flare Unit	0	0	0	0	0	0	0	0	0
Tanks for Flare Gas	0	0	0	0	0	0	0	0	0
Firefighting Pumping System	0	0	0	0	0	0	0	0	0
Emergency Power Generator Set	0	0	0	0	0	0	0	0	0
Major Maintenance	\$0	\$0	\$3,557,418	\$0	\$0	\$0	\$0	\$0	\$0

Total O&M and Major Maintenance	\$20,003,405	\$20,403,473	\$24,368,961	\$21,227,774	\$21,652,329	\$22,085,376	\$22,527,083	\$22,977,625	\$23,437,177
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Site Management

Staffing of the Propane Supply Infrastructure is the responsibility of the third-party operations and maintenance services provider. Current staffing at the facility is sufficient for the third-party operator to manage the operations and maintenance of the Propane Supply Infrastructure safely and effectively. A summary of staffing, staff roles, and years of experience is shown below.

Propane Supply Infrastructure Maintenance and Operations Staffing

	Title	Facility	Years of Service	Description of Role
1	Terminal Director	STT	0.7	Responsible for all operations and maintenance of the facilities
2	Operations Manager	STX	1.7	Manager of both facilities - responsible for day to day facility operations
3	Operations Supervisor	STX	7.8	Supervisor of all Operators on STX
4	Operations Supervisor	STT	4.4	Supervisor of all Operators on STT
5	Administrative Assistant	STT	0.2	Office support
1	Lead Operator	STT	8.0	Terminal shift operator with extensive experience and knowledge
2	Lead Operator	STX	8.4	Terminal shift operator
3	Senior Operator	STT	4.8	Terminal shift operator
4	Senior Operator	STX	4.8	Terminal shift operator
5	Operator	STT	5.0	Terminal shift operator
6	Operator	STT	5.0	Terminal shift operator
7	Operator	STT	5.0	Terminal shift operator
8	Operator	STT	4.2	Terminal shift operator
9	Operator	STT	5.0	Terminal shift operator
10	Operator	STT	5.2	Terminal shift operator
11	Operator	STT	4.6	Terminal shift operator
12	Operator	STT	0.3	Terminal shift operator
13	Operator	STX	4.8	Terminal shift operator
14	Operator	STX	8.7	Terminal shift operator
15	Operator	STX	7.9	Terminal shift operator
16	Operator	STX	4.8	Terminal shift operator
17	Operator	STX	7.4	Terminal shift operator
18	Operator	STX	6.1	Terminal shift operator
19	Operator	STX	0.3	Terminal shift operator
20	Operator	STT	0.3	Terminal shift operator
21	Junior Operator	STT	0.3	Terminal shift operator

Operating Hours

WAPA operations are continuous. Its power generation and water production, and thus the Propane Supply Infrastructure that provides the fuel to WAPA's generators, operates 24 hours per day, 7 days per week, 365 days per year.

Security

The Randolph Harley and Estate Richmond Power plants have contiguous fencing around each plant's permitter. Access is controlled by armed guards, and visitor access must be approved by the appropriate plant personnel. WAPA also has numerous security monitoring cameras that provide surveillance for its facilities. The Propane Supply Infrastructure at each plant is within each plant's permitter and the Propane Supply Infrastructure also has contiguous fencing around the facilities with electronically controlled access. Finally, because both plants have marine fuel docks, a number of employees are also required to obtain the

Transportation Worker Identification Credential (“TWIC”) from the US Transportation Security Administration (“TSA”). WAPA performs background checks on all new hires; however, employees must pass an additional TSA background check to obtain TWIC clearance.

Demonstration of Benefit to Most Impacted and Distressed Area⁵

Benefit Cost Analysis

BCA Methodology

The covered project’s benefit cost analysis (BCA) has been completed for the request of HUD CDBG-Mitigation funds.

Under HUD Guidelines, benefit-cost analyses for Covered Projects may employ the FEMA standardized methodology unless one (1) or more of the following conditions is met:

1. A BCA has already been completed or is in progress pursuant to BCA guidelines issued by other Federal agencies such as the Department of Energy;
2. It addresses a non-correctable flaw in the FEMA-approved BCA methodology; or
3. It proposes a new approach that is unavailable using the FEMA BCA Toolkit.

The FEMA-approved methodology and Toolkit have been developed geared toward analyzing major natural hazards such as earthquakes, fires, floods, hurricane winds, and tornados.

The propane supply infrastructure was evaluated with the FEMA Benefit Cost Analysis (BCA) toolkit as a hazard, uncategorized with the damage and frequency relationship based on professional expected damages. The BCA for this project has not been previously submitted, nor has it been denied on any other platform.

The inputs to the BCA are as follows:

Cost Estimation	
Project Useful Life	20 Years
Project Cost	\$145,000,000
Annual Maintenance Cost	\$20,400,000
Number of Maintenance Years	20 Years
Pre-mitigation Impact	
Annual Fuel Cost	\$88,200,000
Recurrence Interval	1 Year
Post Mitigation Impact	
Annual Fuel Cost	\$30,200,000
Recurrence Interval	1 Year

The outputs of the BCA are as follows:



Benefit Cost Summary	
Total Standard Mitigation Benefits	\$529,700,659
Total Mitigation Project Cost	\$361,117,891
Benefit Cost Ratio – Standard	1.47

Project Useful Life

The propane supply infrastructure was placed into service in 2017 and has an initial useful life of approximately 30 years. The Project Useful Life input to the BCA is the remaining useful life which is conservatively estimated as 20 years.

Project Cost

The Project Cost input to the BCA of \$145,000,000 is the acquisition price for the propane supply infrastructure as agreed between WAPA and Vitol.

Annual Maintenance Cost

The Annual Maintenance Cost input to the BCA of \$20,400,000 is based on a maintenance cost schedule for the propane supply infrastructure over its remaining useful life of 20 years. The maintenance cost schedule is based on the most recent operating & maintenance cost budget for the facilities adjusted to include incremental costs for major maintenance requirements. \$20,400,000 is the average annual maintenance cost for the 20-year period from 2024 to 2043. 2023 was not included in the average as it represents a partial year.

The maintenance cost schedule is attached in the file “BCA Model 05.26.2023”.

Pre-mitigation Impact

If WAPA does not acquire the propane supply infrastructure, WAPA will not be able to rely on propane as a generation fuel and will be forced to rely on diesel fuel alone. The measurable impact of not acquiring the propane supply infrastructure is the resulting increase in fuel costs.

Fuel costs have been projected over the remaining useful life of the propane supply infrastructure assuming diesel only operations. The Pre-mitigation Annual Fuel Cost input to the BCA of \$88,200,000 is the average diesel only fuel cost for the 20-year period from 2024 to 2043. 2023 was not included in the average as it represents a partial year. The Annual Fuel Cost over the remaining useful life of the propane supply infrastructure is based on the amount of diesel fuel required to supply electricity to WAPA’s customers and forward diesel fuel market pricing. The projection also considers future penetration of renewable generation which reduces the amount of diesel fuel required over time.

The Recurrence Interval input to the BCA for the Pre-mitigation Impact is 1 year as the Annual Fuel Cost is a yearly occurrence.

The projected pre-mitigation annual fuel cost is attached in the file “BCA Model 05.26.2023”.

Post Mitigation Impact

If WAPA acquires the propane supply infrastructure, WAPA will be able to rely on propane and diesel fuel as generation fuel. The economic benefit and measurable impact of acquiring the propane supply infrastructure is the resulting decrease in fuel costs compared to the pre-mitigation scenario.

Fuel costs have been projected over the remaining useful life of the propane supply infrastructure assuming operations utilizing both propane and diesel. The Post Mitigation Annual Fuel Cost input to the BCA of \$38,200,000 is the average fuel cost for the 20-year period from 2024 to 2043. 2023 was not included in the average as it represents a partial year. The Annual Fuel Cost over the remaining useful life of the propane supply infrastructure is based on the amount of propane and diesel fuel required to supply electricity to WAPA’s customers and forward propane and diesel fuel market pricing. The projection also considers future penetration of renewable generation which reduces the amount of propane and diesel fuel required over time.

The Recurrence Interval input to the BCA for the Post Mitigation Impact is 1 year as the Annual Fuel Cost is a yearly occurrence.

The projected post mitigation annual fuel cost is attached in the file “BCA Model 05.26.2023”.

Non-measured Impact

The acquisition of the propane supply infrastructure provides other benefits not measured in the BCA including, but not limited to the following:

- Prevents a major reduction in available generation capacity – WAPA currently operates generators totaling approximately 40 megawatts (MW) that can only operate on propane. An additional 36 MW of new generators will be placed into operation in 2023. The new generators can operate primarily on propane or diesel fuel but require a steady supply of propane for the emissions system when operating primarily on diesel fuel. This combined generation capacity will become stranded assets if the propane supply infrastructure is not acquired.
- Maintains access to fuel storage capacity – The propane supply infrastructure provides 27 days of fuel storage of St. Thomas and 20 days of fuel storage on St. Croix which will be lost if not acquired.
- Maintains access to multiple fuels for power generation –WAPA’s risk of fuel supply chain disruption is increased if it must rely on a single fuel for power generation.

These benefits increase WAPA’s resiliency and reliability in the event of future disasters and reduce the risk of prolonged territory wide electrical outages. FEMA’s BCA model ascribes the following value to lost electrical service days:

Utility Properties	
Type of Utility	Electric
Number of Customers	100,000
Value of Unit of Service	\$182 / Customer / Day



Total Value of Service per Day	\$18,200,000
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The number of customers is based on the approximate population of the US Virgin Islands as WAPA provides electric service to the vast majority of residents. If the benefits above were measured in the BCA, each day of avoided territorial electric service interruption would increase project benefits by \$18,200,000.

VI. Consistency with Other Mitigation Activities

The acquisition of the Propane Supply Infrastructure is consistent with other proposed mitigation activities in the Territory. As described in detail above, the acquisition of the Propane Supply Infrastructure provides tremendous mitigation benefits to the Energy Lifeline. Resilient power and water supply directly impact the other identified community lifeline risks including Food, Water & Shelter, Health & Medical, and Safety & Security. The identified territory risks directly affected include Hurricane and Drought. A more resilient Energy Lifeline makes anticipated benefits of direct investments in other community lifelines possible. Without investment in the Energy Lifeline, these other anticipated benefits may never be realized.

APPENDIX I

Propane Supply Infrastructure Permits

	Names of Permits/Documents	Statutes & Regulations
1	CZM Major Land Permits (I.PG Terminals Only)	12 VIC§ 910 12 VIR&R Subchapter 910
2	Air Construction Permits (including regasification) Air Operation Permits	12VIC § 206 12 VIR&R Subchapter 206
3	Air Construction Permits (Turbine Conversions) Air Operating Permits (Turbine Conversions)	12VIC § 206 12 VIR&R Subchapter 206
4	Demolition Permits	29VIC § 294
5	Electrical Permits	29VIC § 294
6	Plumbing Permits	29 VIC§ 311
7	Building Permits	29VIC § 294
8	TPDES General Stormwater Discharge Permits (Construction)	12VIC § 185 12 VIR&R Subchapter 184
9	CZM Major Water/USACE 404 Permits - St. Croix (Dock Modifications)	12 VIC§ 910 12 VIR&R Subchapter 910
10	CZM Major Water/USACE 404 Permits - St. Thomas (Dock Modifications - currently has no	12 VIC§ 910 12 VIR&R Subchapter 910

	Names of Permits/Documents	Statutes & Regulations
	CZM Permit for dock)	
11	USCG Lightering Operations Manual	
12	USCG Letter of Recommendation	33 CFR Part 127, Subpart A
13	CZM Major Water Permit (Vessels- may include Long-Term Mooring permit)	12 VIC§ 910 12 VIR&R Subchapter910
14	TPDES Multi-Sector General Stormwater Discharge Permits (LPG Terminal Operations Only)	12VIC § 185 12 VIR&R Subchapter 184
15	TPDES Multi-Sector General Stormwater Discharge Permits (LPG Terminal Operations - modification to WAPA's existing permits)	12VIC § 185 12 VIR&R Subchapter 184
16	Waste (Hazardous) Generator Permits (LPG Terminals Only)	19 VIC§ 1560 12 VIR&R Subchapter 1560
17	Waste (Hazardous) Generator Registrations (LPG Terminals Only)	RCRA Subtitles C & D
18	Terminal Facility Licenses (LPG Terminals Only)	12 VIC§ 706
19	Terminal Facility License Financial Assurances (LPG Terminals Only)	12 VIC§ 714
20	Pollution Prevention Plans (LPG Terminals Only)	40 CFR Part 112
21	Facility Response Plan for Power Plant and Dock - St Croix (WAPA's existing plan for St. Croix to be modified to accommodate LPG, if required; any other aspects of existing plan will remain the responsibility of WAPA)	33 CFR Part 154, Subpart F 40 CFR. Part 112, Subpart D
22	Emergency Response Action Plan for Power Plant and Dock - St. Croix (WAPA's existing plan for St. Croix to be modified to accommodate LPG, if required; any other aspects of existing plan will remain the responsibility of WAPA)	33 CFR Part J54, Subpart F 40 CFR Part 112. Subpart D
23	Facility Security Plans (including Facility Security Assessment Reports) (Docks)	33 CFR Part 105, Subparts C&D



	Names of Permits/Documents	Statutes & Regulations
24	Facility Operations and Emergency Manuals (apply to docks; description of transfer system at dock and emergency response procedures)	33 CPR Part 127. Subpart 33 CPR Part 154
25	Spill Prevention Control, and Countermeasure Plan - St. Thomas (LPG Terminal Only)	40 CPR Part 112, Subpart A
26	Spill Prevention Control, and Countermeasure Plan - St. Croix (LPG Terminal Only)	40 CPR Part 112, Subpart A
27	Spill Prevention Control, and Countermeasure Plan - St. Croix (WAPA's existing plan for St. Croix to be modified to accommodate LPG if required; any other aspects of existing plan will remain the responsibility of WAPA)	40 CFR Part 112, Subpart A
28	Vessel Security Plans (including Vessel Security Assessment Reports)	33 CFR Part 104, Subparts C&D