SAINT THOMAS

RESILIENCE PLAN

UNIVERSITY OF PENNSYLVANIA | FALL 2021

"The sea can do craziness, it can do smooth, it can lie down like silk breathing or toss havoc shoreward; it can give gifts or withhold all; it can rise, ebb, froth like an incoming frenzy of fountains, or it can sweet-talk entirely. As I can too, and so, no doubt, can you, and you."

- Mary Oliver

Contents

The Purpose

The crystal-clear waters that surround Saint Thomas characterize its beauty, history, and the locals' connection to the land; however, a changing climate resulting in sea level rise, increased storm activity, drought and saltwater intrusion are threats to the island's assets and economic activity. St. Thomas' location within "hurricane alley" triggers a precarious cycle of storm damage and recovery. In the past 30 years, 8 major hurricanes (Hugo 1989, Marilyn 1995, Bertha 1996, Georges 1998, Omar 2008, Irma 2017, Maria 2017) have caused significant damage and loss of life across the island. Despite the continuous risks climate change will present to vulnerable communities and systems on the island, resilience is the cornerstone of St. Thomas' history, people, and culture.

The purpose of the studio will focus on the island's vulnerability to climate change and sea level rise in order to address the gaps between the island's most pressing challenges and envisioning what a resilient island would look like. In addition, our work will aim to support current and past resilience work, such as Dr. Greg Gaunnel's contributions towards the USVI's hazard mitigation and resilience plan. Finally, our studio's resiliency plan aims to approach the island's interconnected challenges through recommendations that are grounded in values of solidarity, justice, and respect towards the St. Thomas community.

Image Source: Marinas.com

Our Studio

The 11 students in the studio represent 5 of the concentrations in our department: housing, community, and economic development, public private development, sustainable transportation and infrastructure planning, land use and environmental planning, and urban design.

The interdisciplinary nature of our program allows our unique interests and skill sets to apply a critical lens when assessing the challenges and solutions facing Saint Thomas today.

We are grateful for our studio's instructors, Scott Page and Jamie Granger, for supporting and challenging us throughout the journey.


Scott Page


Jamie Granger


Celine Apollon


Corey Wills


Jamaica Julien


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Qi Si

Planning Concentrations

- Housing, Community, and Economic Development
- Public Private Development
- Sustainable Transportation and Infrastructure Planning
- Land Use and Environmental Planning
- Urban Design

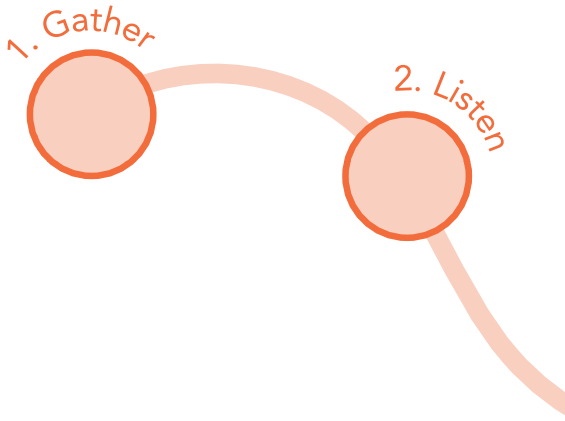
Thank you, St. Thomas!

Dear St. Thomas partners and community stakeholders,

The opportunity to learn from all of you has been an invaluable source of guidance and has deepened our understanding of the US Virgin Islands throughout this studio's journey. It has been a privilege to have spent the past four months working with St. Thomas, a community tethered by a diverse, vibrant social fabric which is reflected by the interdependent, intersectional challenges facing the island today.

Thank you for letting us be a part of the journey. The St. Thomas Resilience Plan is a dedication to each resident, from east to west, of St. Thomas, the island's ancestors who have inherited generations of resistance and culture, and a hopeful future that the stunning island and residents are more than worthy

Special Thanks to:
Greg Guannel, Ph.D
Renata Platenberg, Ph.D
Hilary Lohmann
Pedro Nieve
Kirsten McGregor
Teresa Crean
Elrich Thomas
Hilroy
Dennis
Sonya
Stephen Prosterman
Stanley Latesky
Students of UVI's Marine Biology Program
All USVI residents who we had the pleasure of crossing paths with during our visit whose names are not mentioned

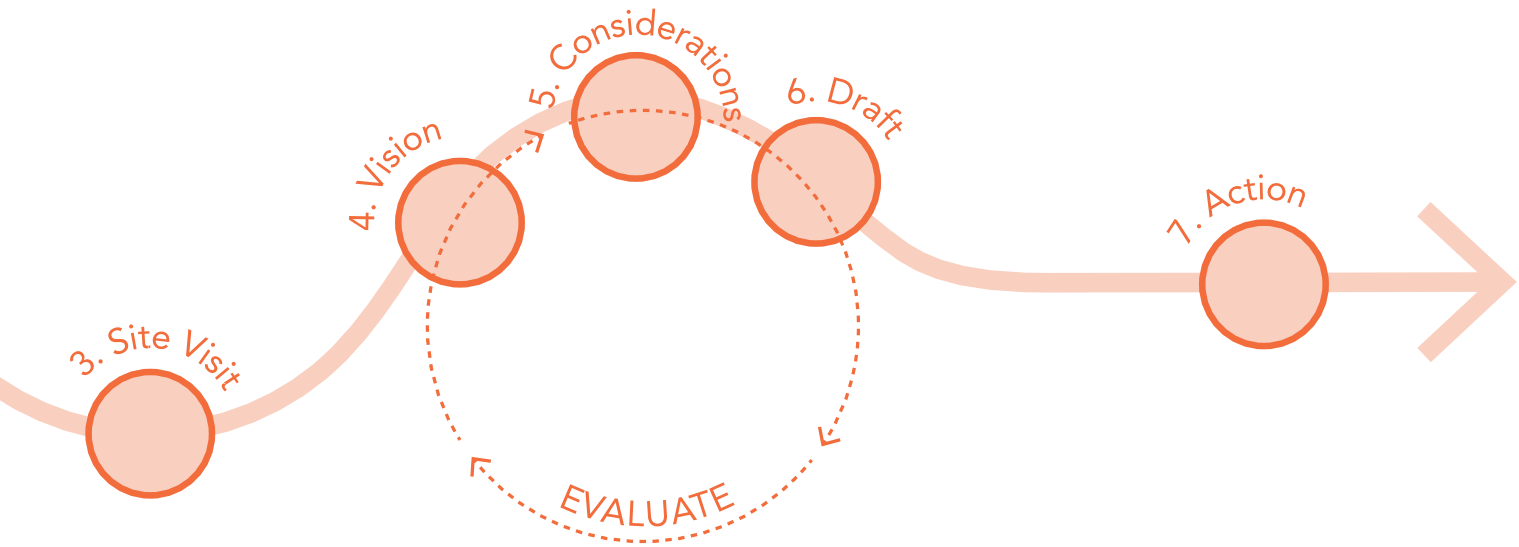


The Process

We've outlined our semester's planning process through a series of 7 steps that guided us towards addressing the studio's purpose.

In the beginning stages of our process, we gathered research from experts in climate change adaptation. We learned from leaders, teachers, and students on St. Thomas who are leading this work on the ground, and we analyzed quantitative and qualitative data from reliable sources and past research.

During our trip in mid-October, we visited sites and spoke with local experts, residents and stakeholders to understand St. Thomas' vulnerability to the impacts of climate change. During the mid – review presentation, we presented our analysis of the research collected and received feedback to shape our recommendations moving forward. The semester-long journey brought us from urban West Philadelphia to the hilly topography of St. Thomas with a breadth of questions, deep curiosity, and intentionality. The St. Thomas Resilience Plan is the final result of this studio's journey. Although the plan marks an end for the studio's work, our hope is that the analysis, data, and ideas can be used as a catalyst for creating lasting, resilient change for all current and future residents of St. Thomas.



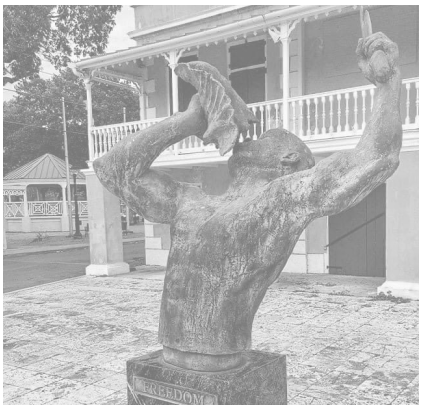
St. Thomas' history can be told through both its social and environmental pasts, as well as the many times which they have intersected.

Slavery + Colonization

SOCIAL, POLITICAL, AND ECONOMIC

The islands were originally inhabited by the Ciboney and Arawak tribes as early as 1000 B.C. and were officially named The Virgin Islands by Christopher Columbus in 1493. Later the islands were settled and colonized by the Danish West India Company in St. Thomas.

During this era, its economy, social, and political structure become dependent upon slavery supporting the sugarcane industry.



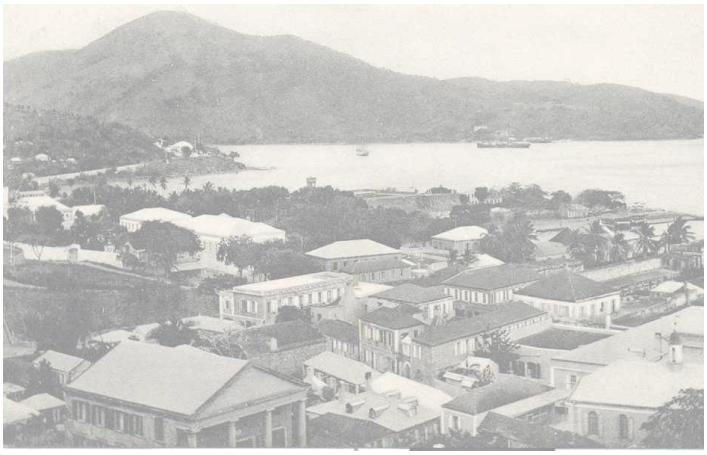
The slave rebellion on St. Croix sought to end slavery in 1848 – leading to the emancipation of all slaves.

ENVIRONMENTAL

1700

1800

The Great Hurricane of 1780 and the San Narciso Hurricane resulted in the loss of 187 lives and devastated the crops on the island causing a huge hit to the economy.



Land Acknowledgment

We acknowledge that the US Virgin Islands remain the unceded territory of the Ciboney and Arawak tribes, and hope to honor their legacy through this resilience plan.

Danish to U.S. Territory

In 1917, The U.S. purchased the islands from Denmark for $25,000,000 dollars in gold coins under the Treaty of the Danish West Indies and USVI is now incorporated and organized by the United States. 15 years later, in 1932, USVI residents were granted citizenship and in the same year were hit with San Ciprian Hurricane resulting in more than $200,000 worth of damages.

Hurricanes + Economic Damage

In 1966 Hess Oil built the Hovensa oil refinery on St. Croix which was responsible for 20% of the territory's GDP and was the largest petrol refinery in the world till 2012. The refinery closed and stopped exporting in 2014 and the islands economy fell into another crisis.

Congresswoman Stacey Plaskett stated that 90% of buildings in the Virgin Islands were damaged or destroyed and 13,000 of those buildings had lost their roofs which is the largest economic hit recorded to date.

1900

In 1932, the same year USVI residents were granted citizenship, San Ciprian Hurricane hit the USVI, resulting in more than $200,000 worth of damages.

More Hurricanes hit USVI in 1996, 1998, 1999, and 2008 that continued to cause damage over time

Hurricane Hugo in 1989 caused more physical and economic damage to St. Croix, followed by Hurricane Marilyn in 1995 which caused more than 2B in damage on the islands.

2020

Most recently, in 2017, the island saw two Category 5 hurricanes -- Irma and Maria -- that caused substantial damage to all three islands. A large-scale rebuilding process began, and it took several months to fully restore power, internet, and other services.

Data Source: Nature

Environmental Threats & Hazards

Climate change is impacting the way we live.

St. Thomas Elevation Model

As carbon emissions climb, so too do temperatures across the globe. Saint Thomas is no exception to this; its tropical climate and seasonal rainfall patterns are swiftly changing due to warming temperatures. Both on a global and local scale, this is causing a cascade of negative environmental effects including sea level rise, intensified impacts of hurricanes, increased duration and intensity of rainfall events and subsequent floods, heightened rates of erosion, ocean acidification, and increasingly long and intense drought periods.

Global Warming

Hurricanes

Erosion

Ocean Acidification

Flooding

Drought

Sea Level Rise

Hurricane impacts are more severe.

Hurricanes have been a seasonal and relatively common occurrence throughout the history of St. Thomas. However, hurricanes are growing in frequency while also moving more slowly, resulting in more severe impacts. This was seen in the destruction caused by Hurricanes Irma and Maria in 2017, which either damaged or destroyed 90% of buildings throughout the Virgin Islands.

Hurricanes and tropical storms passing St. Thomas from 2010 - 2020

Data Source: NOAA

Erosion is affecting both ecosystems and the economy.

Increasingly intense rainfall events, compounded with rising development pressures and stormwater runoff, are causing accelerated rates of erosion on St. Thomas. This heightened rate of erosion is placing coastal communities, seaside resorts, and the island's iconic beaches at risk. This will have catastrophic consequences for the island's economy, which is highly reliant on tourism centered around beachfront activities. The erosion of St. Thomas' beaches not only impacts the economy, but also depletes habitat for coastal species which are already facing challenges due to the over-development of the island's coastline. Additionally, upstream erosion causes over-sedimentation of gut water channels, leading to the degradation of downstream water quality.

Acidifying oceans are bleaching coral reefs.

Image Source: Chairish

As carbon emissions rise, the pH of saltwater plummets, leading to increased acidity in the world's oceans. This causes the bleaching and eventual death of coral reefs. With an economy heavily reliant on the tourism industry, the erosion of beaches and loss of snorkeling activities leave major sources of livelihood for many of the island's residents at risk.

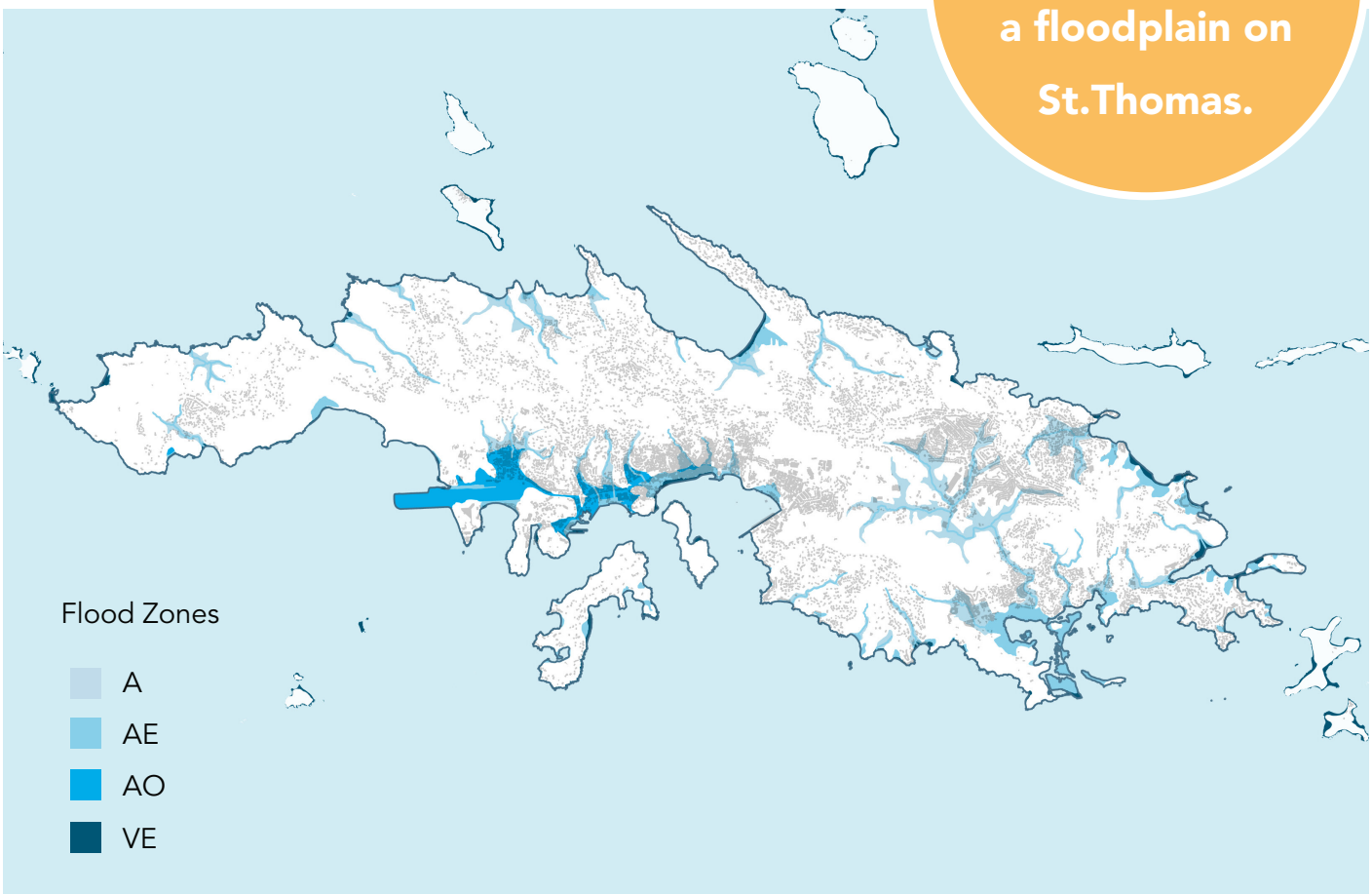
Flooding will increase in intensity and frequency.

Flooding is already a major hazard and will be exacerbated by increasing frequency and duration of wet weather events due to climate change. This will place thousands of properties and large swathes of land at risk of inundation. However, land and property are not all that are at risk from flooding; flooding claims more lives per year than any other natural hazard.

26%
of the iall major roads are within floodplains on the island.

15%
of the island's total landmass is at risk of flooding.

14% of all buildings lie within a floodplain on St.Thomas.



The length and intensity of droughts are increasing.

The length and intensity of droughts are increasing on St. Thomas, which leads to losses in crop production and increased stress on water supplies. This is especially salient on St. Thomas, where food production is difficult, water lines often to not extend to residential neighborhoods or farms, and most people on the island are reliant upon seasonal water collection through cisterns for drinking water and sanitation purposes.

"If we utilize what we have in terms of guttering our roads and more storage capacity, we could collect enough water to take us through the dry period."

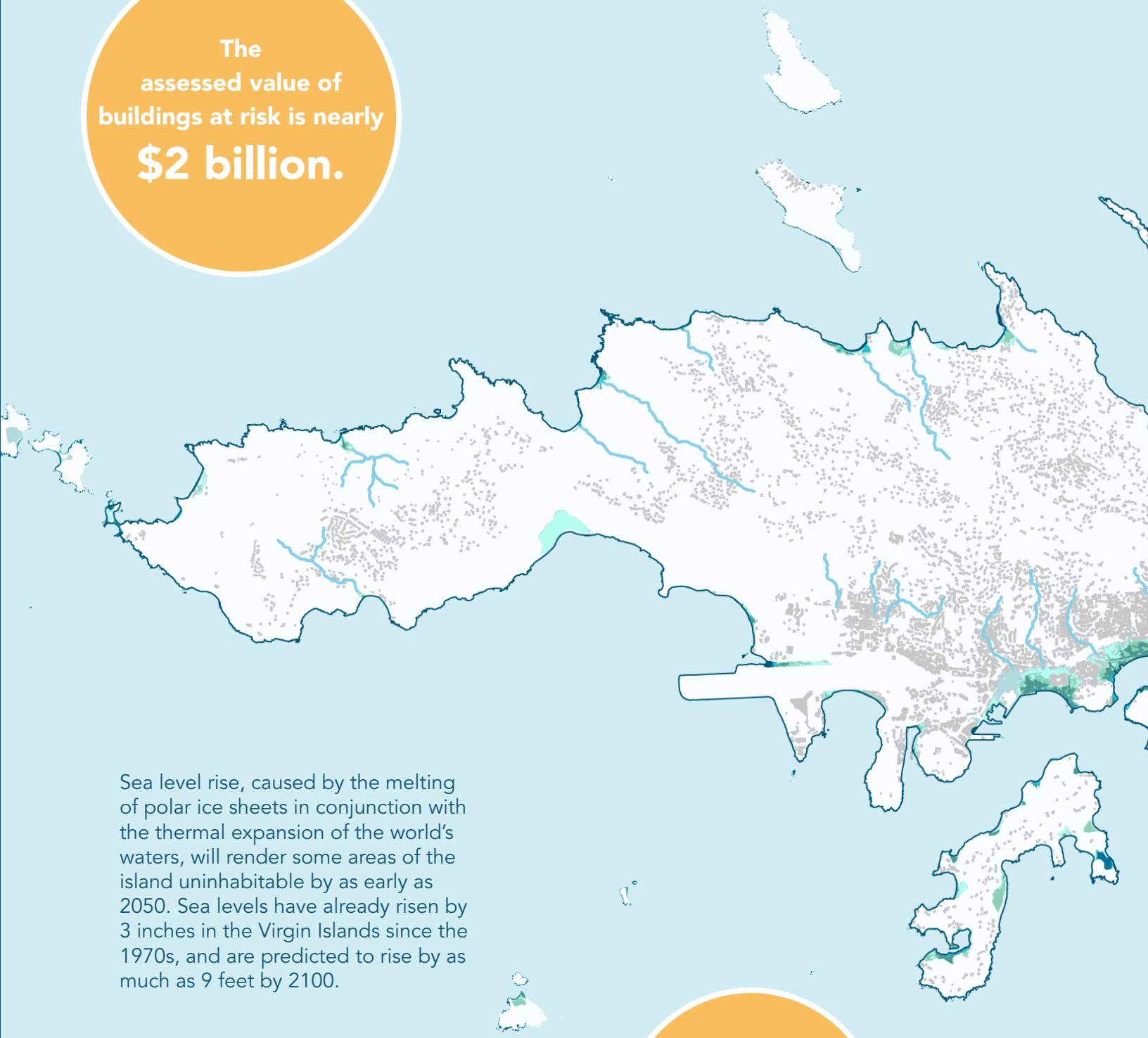
- Elrich Thomas
Bordeaux Estate Farmer

Decreased Water Levels Bordeaux Farmland on August 25th, 2021

Bordeaux Farmland on May 3rd, 2021

Image Source: Caribbean Green Technology Center

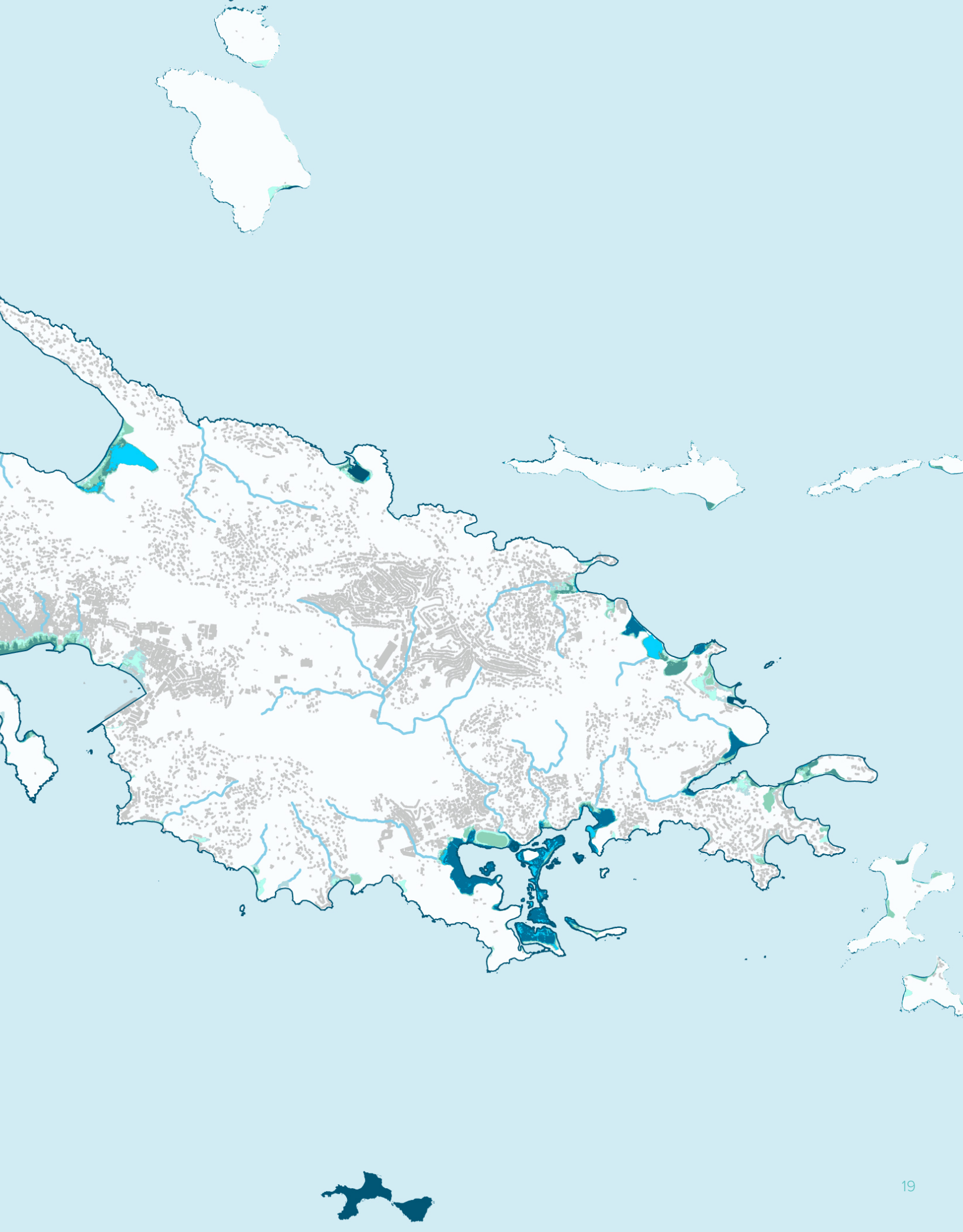
The assessed value of buildings at risk is nearly $2 billion.



Sea level rise, caused by the melting of polar ice sheets in conjunction with the thermal expansion of the world's waters, will render some areas of the island uninhabitable by as early as 2050. Sea levels have already risen by 3 inches in the Virgin Islands since the 1970s, and are predicted to rise by as much as 9 feet by 2100.

5%
of land on the island will be inundated by 6 feet of sea level rise.

Data Source: US Virgin Islands DPNR



Sights, Sounds, & Voices of St. Thomas

It is clear that St. Thomas is vulnerable to a range of natural hazards which will only intensify as climate change accelerates. In order to better understand the impacts of climate change on St. Thomas, we must see and hear the island. Please scan the QR code to view the video.

Charlotte Amalie, Source: UPenn Studio

Existing Conditions

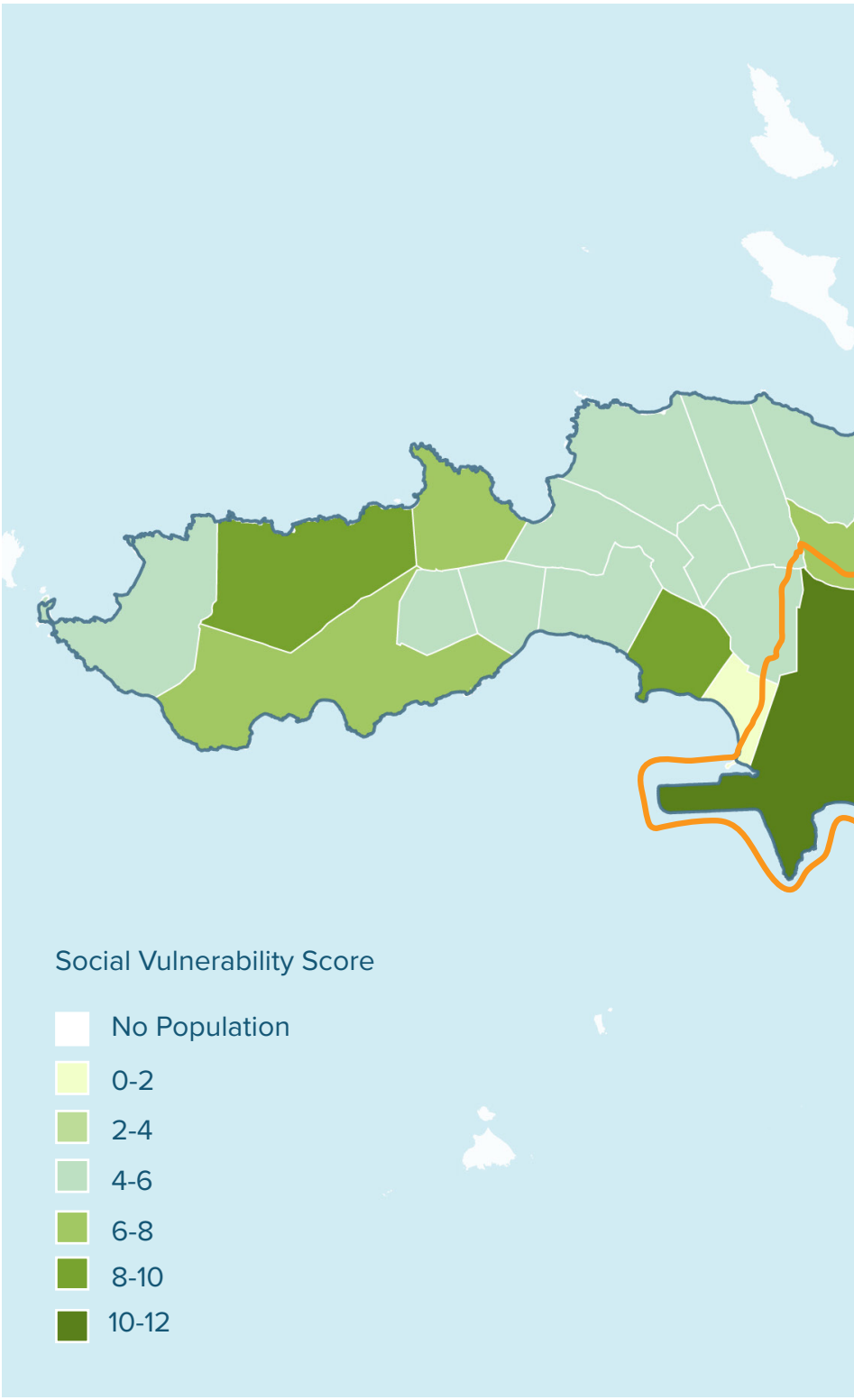
St. Thomas has areas of high social vulnerability.

Prior to our visit, we conducted an estate level analysis of various social indicators to guide us and help to narrow our focus areas using the most readily available data from the 2010 Census, the University of the Virgin Islands' community surveys, and other sources.

The individual components of the index are comprised of: demographics, healthcare access, housing affordability, freshwater access, electricity unreliability, and food production. The purpose of this analysis helps to spatialize vulnerability and most at risk to future climate change impacts.

Our analysis confirms that socially vulnerable communities disproportionately face challenges in their daily lives that are only exacerbated by natural hazards ---as many of these communities are clustered along the island's coastline

This map shows a composite vulnerability score, based on the aforementioned components in an effort to examine each estate's vulnerability to potential climate change impacts.



Source: U.S. Census Bureau, 2010

Demographics

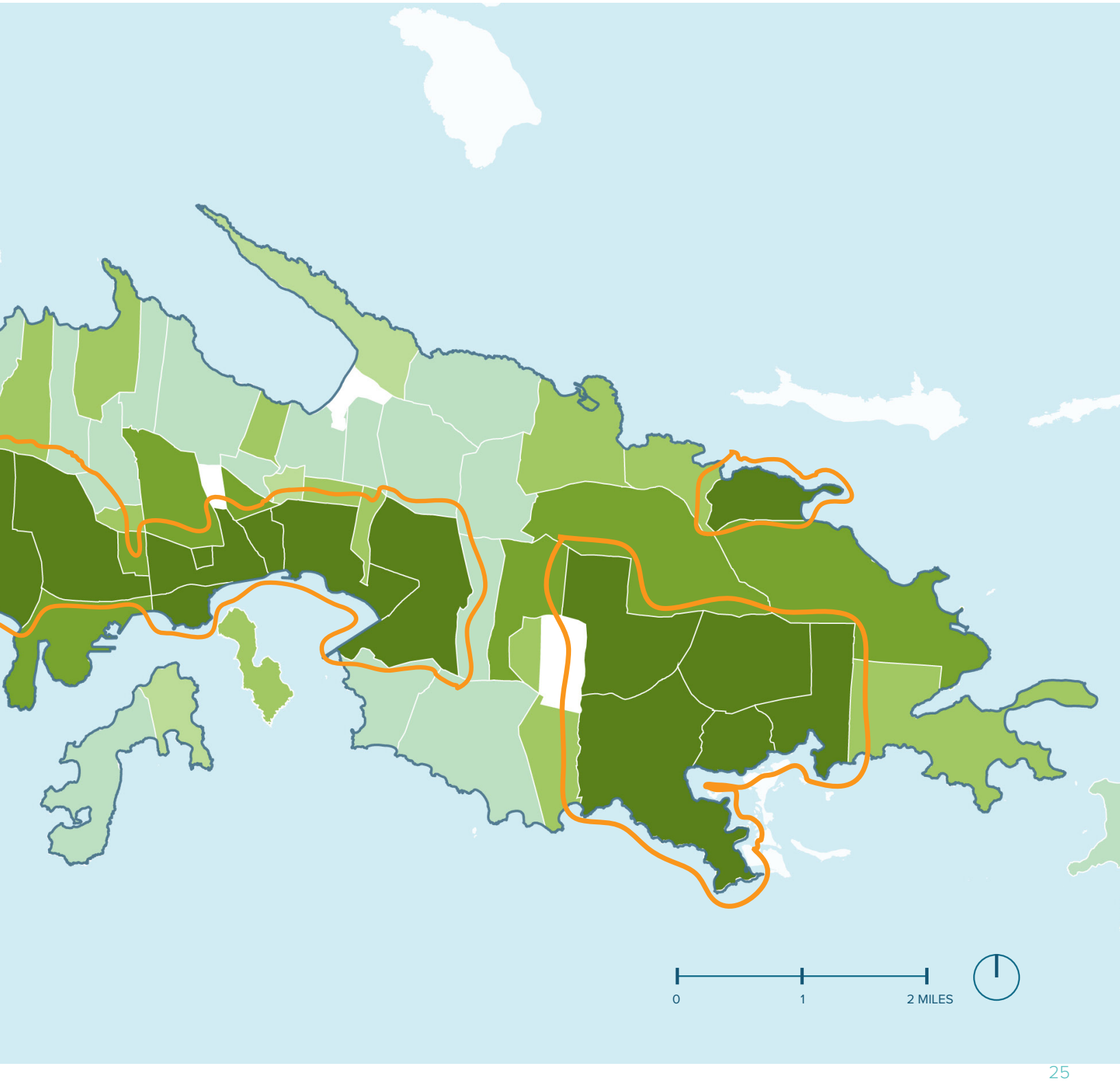
Socioeconomics

Water and Power Reliability

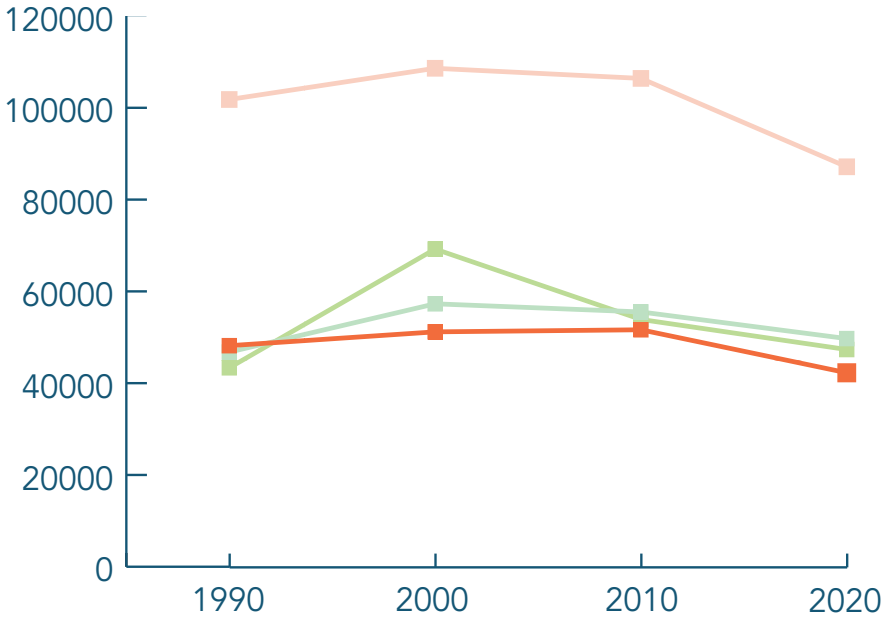
Food Production

Housing Affordability

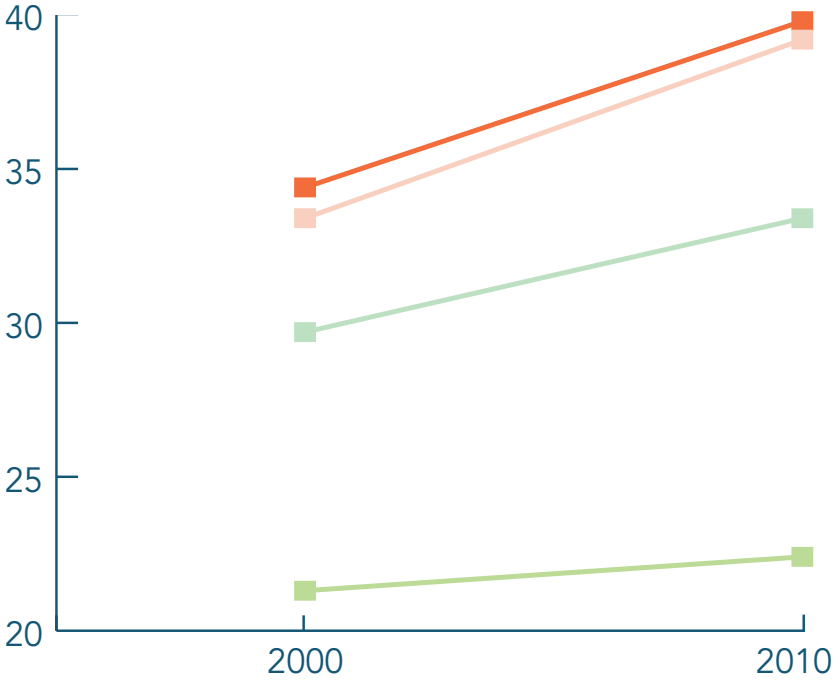
Healthcare Access



Total Population

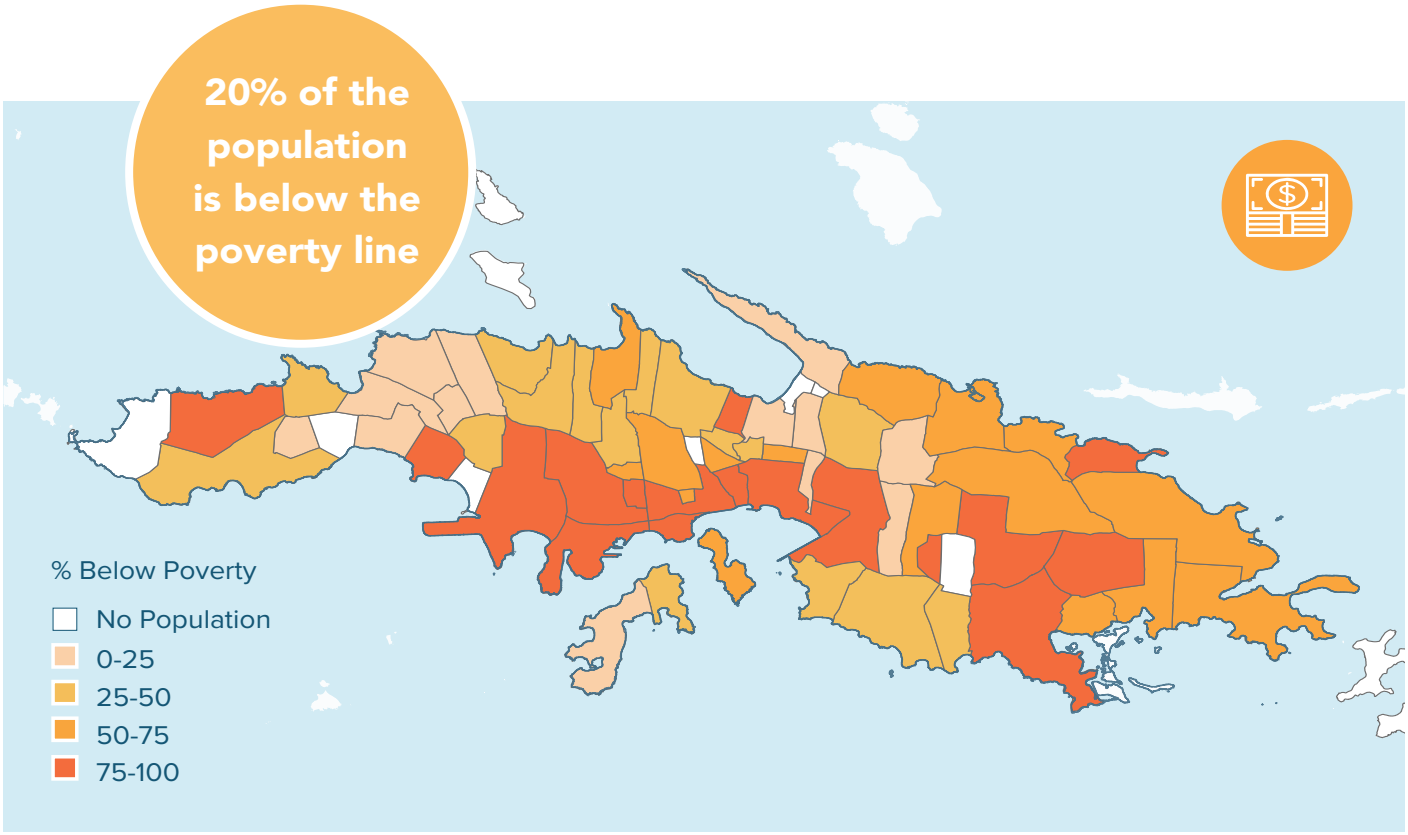


Median Age



As of 2020, St. Thomas's total population is 42,261, an 18% decrease from 2010. The median age on St. Thomas is 40 which is close to the USVI median age of 39. The current population trends of aging and slow growth can put strain on the island's economy and infrastructure.

Roughly half of the USVI's population lives in St. Thomas and has to overcome societal barriers on a daily basis. Racism & historic discrimination have decreased access to essential resources for the island's majority black population.



U.S. Census Bureau, 2010

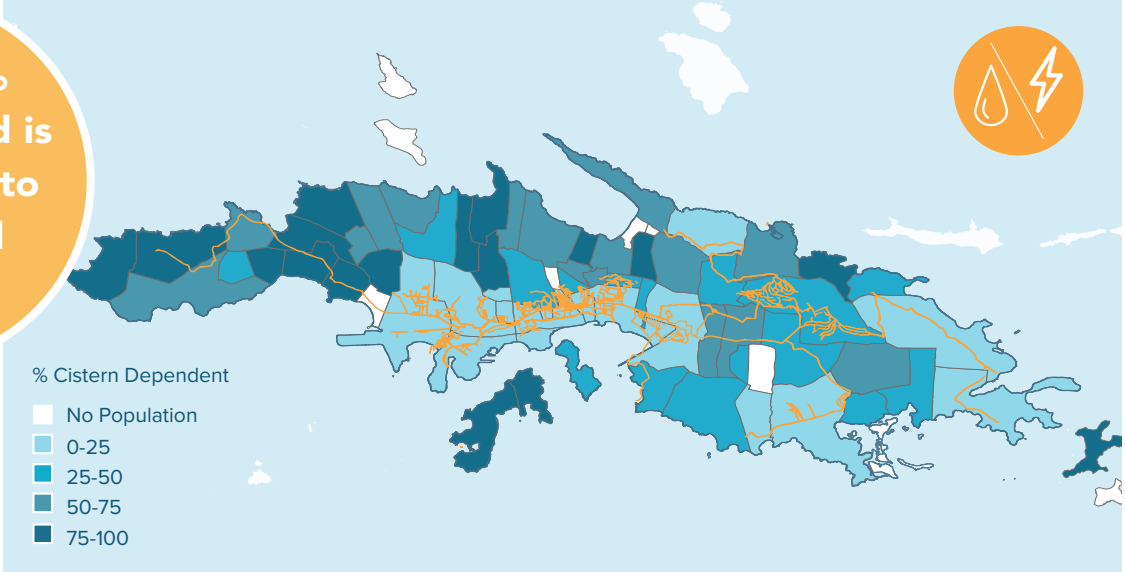
A significant portion of St. Thomas's population is low-income and unemployed making it difficult to afford the island's high cost of living. 26% of residents are without a job and 20% are below the poverty line.

Additionally, 31% of the population above age 25 have a high school diploma and 20% has a bachelor's degree or higher. Though unfortunately, low educational attainment is a barrier to job access.

These demographic and socioeconomic discrepancies not only make daily life on St. Thomas challenging, but are exacerbated in the case of natural disasters.

St.Thomas School, Source: Virgin Islands News

Only 25% of the island is connected to municipal water.



U.S. Census Bureau, 2010; Below: Water and Power Authority; Virgin Islands Today;

Basic public services such as water are unreliable. Approximately 95 percent of the Territory's residents collect rainwater and store it in cisterns attached to their homes or businesses, which are subject to contamination, compared to 25% of residents who are connected to the water supply system run by the Water and Power Authority (WAPA).

The darker shaded blue estates on the map indicate households with a higher percentage of cistern dependence. The lines overlaid on top of the map show the extent of WAPA's water system. This map shows the disconnect between the demand and the water supply.

St. Thomas Desalination Plant, Souce: UPenn Studio

Depending on seasonal conditions, The USVI today only produces anywhere from 1 to 5% of its own food. As a result, the territory is heavily reliant on food imports.

After speaking with Elrich Thomas, the president of We Grow Food, we learned that the main barriers to local food production are the lack of water, agricultural expertise, and fertilizer.

These limited resources and skills cause farming to be far more challenging for a farmer in the USVI compared to the average farmer stateside. Additionally, 25% of the food that comes from off-island is lost during transport. This ends up raising prices for lost food.

"Right now, we are producing less than 2% of our food, and I think we could raise to at least 10% if we invest wisely and implement solid programs"

- Elrich Thomas (We Grow Food, Bordeaux Estate Farmer)

Mr. Thomas believes the USVI has the capacity to produce at least 10% of its food, with increased federal funding, composting programs to produce fertilizer, and continuous supply and transportation of water.

Image Source: Virgin Islands Today, We Grow Food In FacebookFood

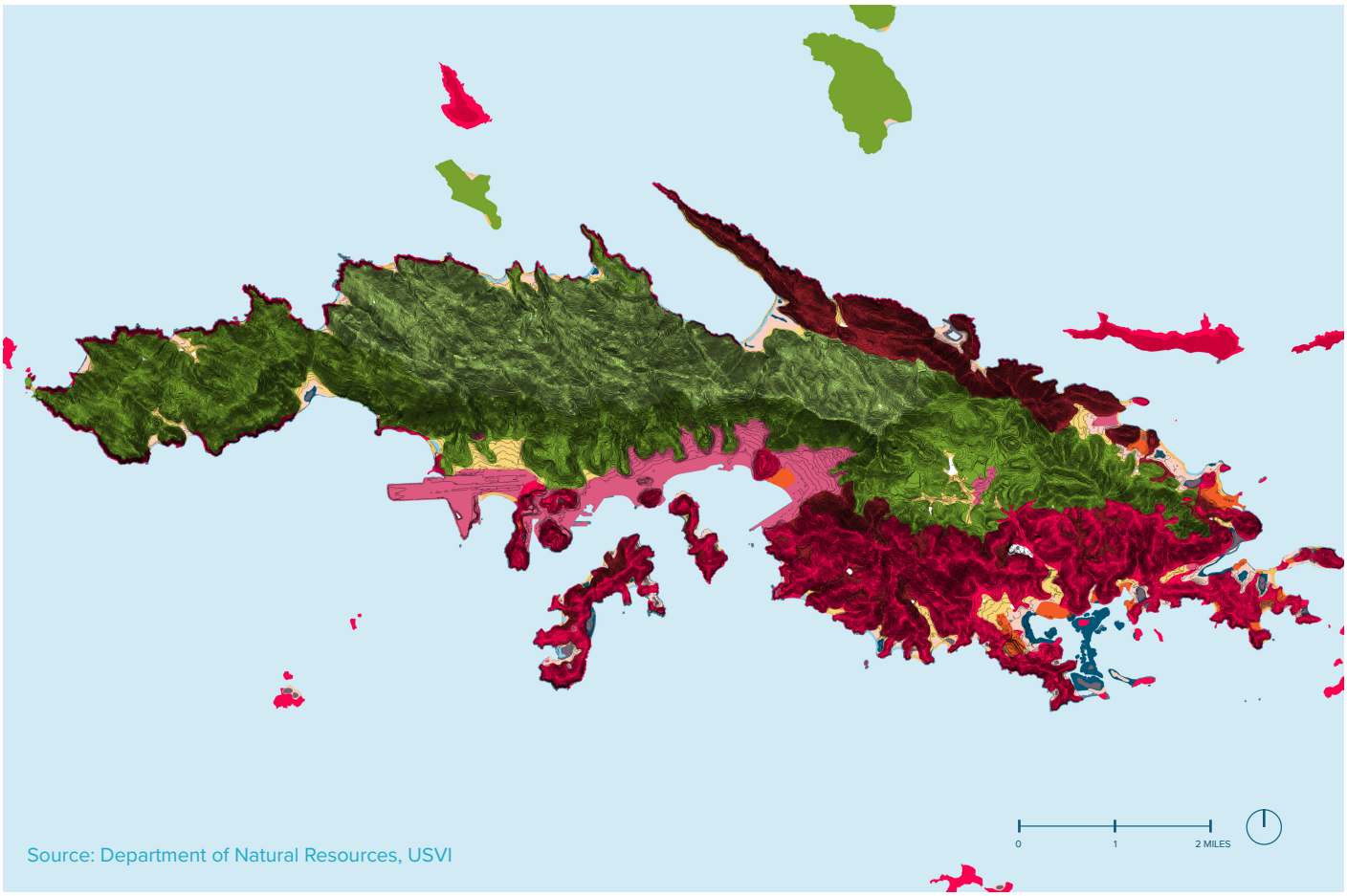
The environment is at risk.

Though undergoing notable challenges due to climate change, St. Thomas' environment is still poised to serve as a valuable resource for resilience if properly protected. Doing so requires a comprehensive look into the factors shaping the environmental makeup of the island.

Turpentine Run, Image Source: Upenn Studio

Preservation of soil health is critical for both wildlife and agriculture.

St. Thomas is home to a wide variety of soil types, but is mostly characterized by extremely stony earth. This makes the conservation of loamy soils and sand critical for the preservation of both habitat and space for agricultural uses.



Source: Department of Natural Resources, USVI

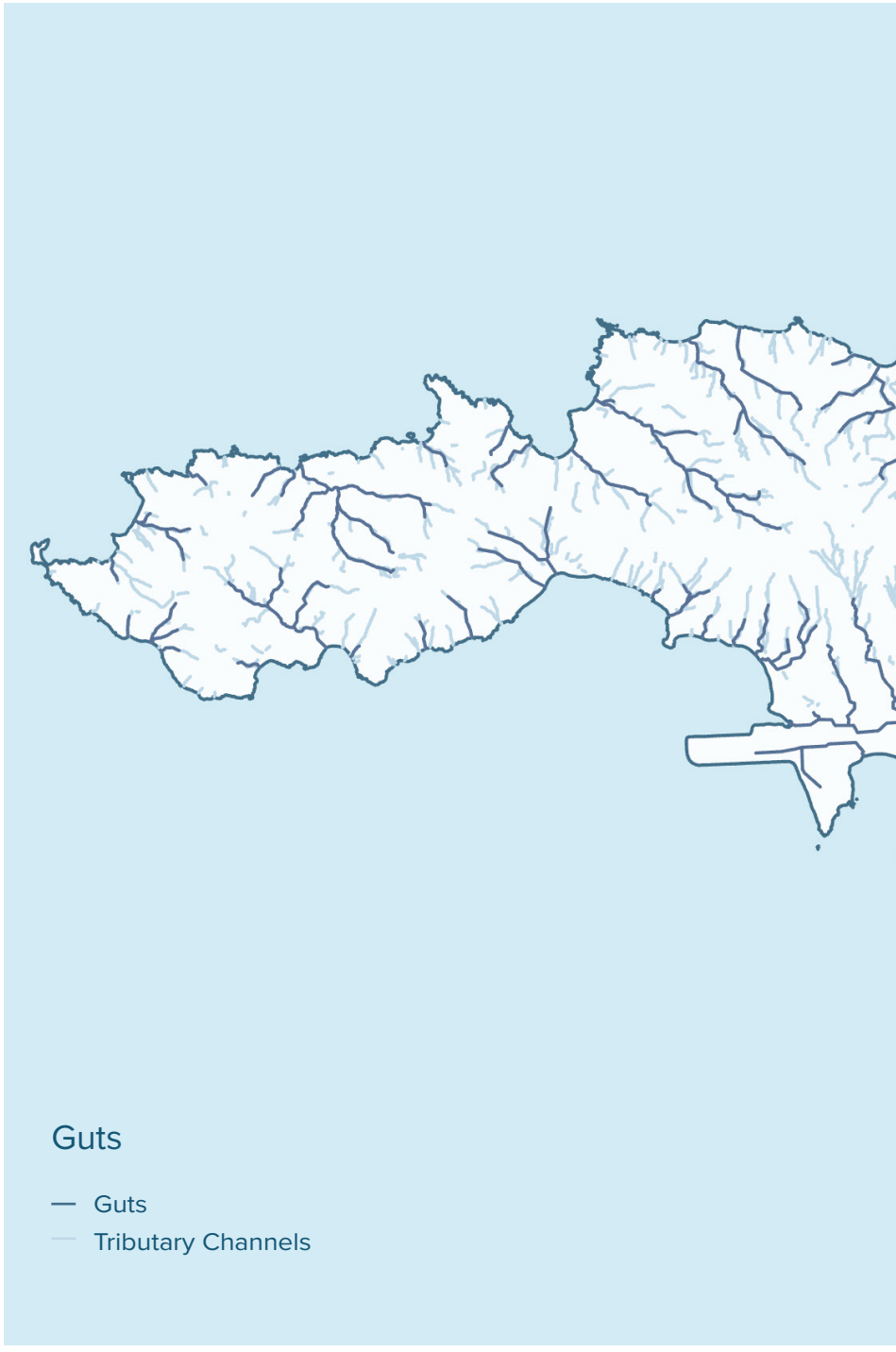
Soil Type

- Maho Bay Extremely Stony
- Rock Outcrop
- Urban Land
- Sandy Loam
- Beaches
- Cinnamon Bay Loam
- Fredriksdal- Susanaberg Extremely Stony
- Sandy Point and Sugar Beach Soils

Guts provide critical ecosystem services for the island, but are threatened.

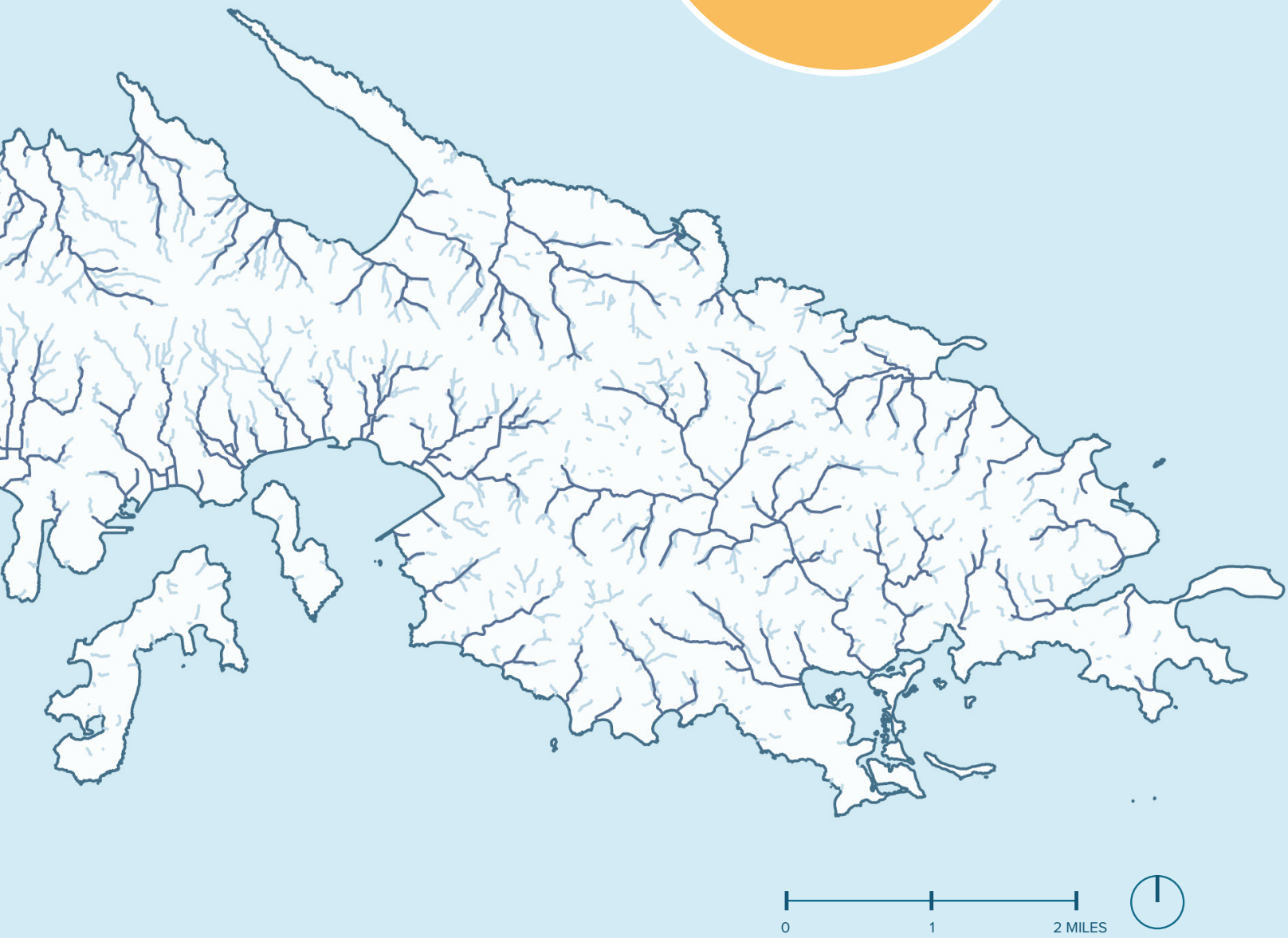
Natural guts are steep watercourses, 3-12 feet wide, with a rocky substrate and understory vegetation. Some guts on St Thomas exhibit intermittent flow during the wet season; however, most guts only flow during and immediately after heavy rain events or during extended periods of saturation. The importance of guts to the ecosystem of St Thomas cannot be overstated. They act as the island's natural water conveyance system by bringing stormwater from the top of the mountainous island down to the sea; serve as natural floodplains to absorb floodwaters and thereby prevent flooding in adjacent communities; filter pollutants from upstream development to preserve downstream water quality; and provide an irreplaceable natural habitat for a variety of plant and animal species.

Indigenous residents used Turpentine Run to travel between the sea and their settlement in Tutu Estate. In fact, there is a historical Tutu Archeological village along Turpentine Run. Some traditional uses of streams and watercourses still continue, and for some groups, such as farmers on St. Thomas, runoff channeled by watercourses still forms a major source of water for agriculture. Little attention is paid to guts, which has caused them to become dumping grounds for household waste, agricultural runoff, untreated sewage, landfill leachate, construction waste, and stormwater runoff. One such gut is Turpentine Run, which was so polluted at one point that it was designated an EPA Superfund site.



Source: Department of Natural Resources, USVI

Historically, guts provided food, pathways through the island, and recreation for the island's indigenous residents.



Water quality is quickly deteriorating.

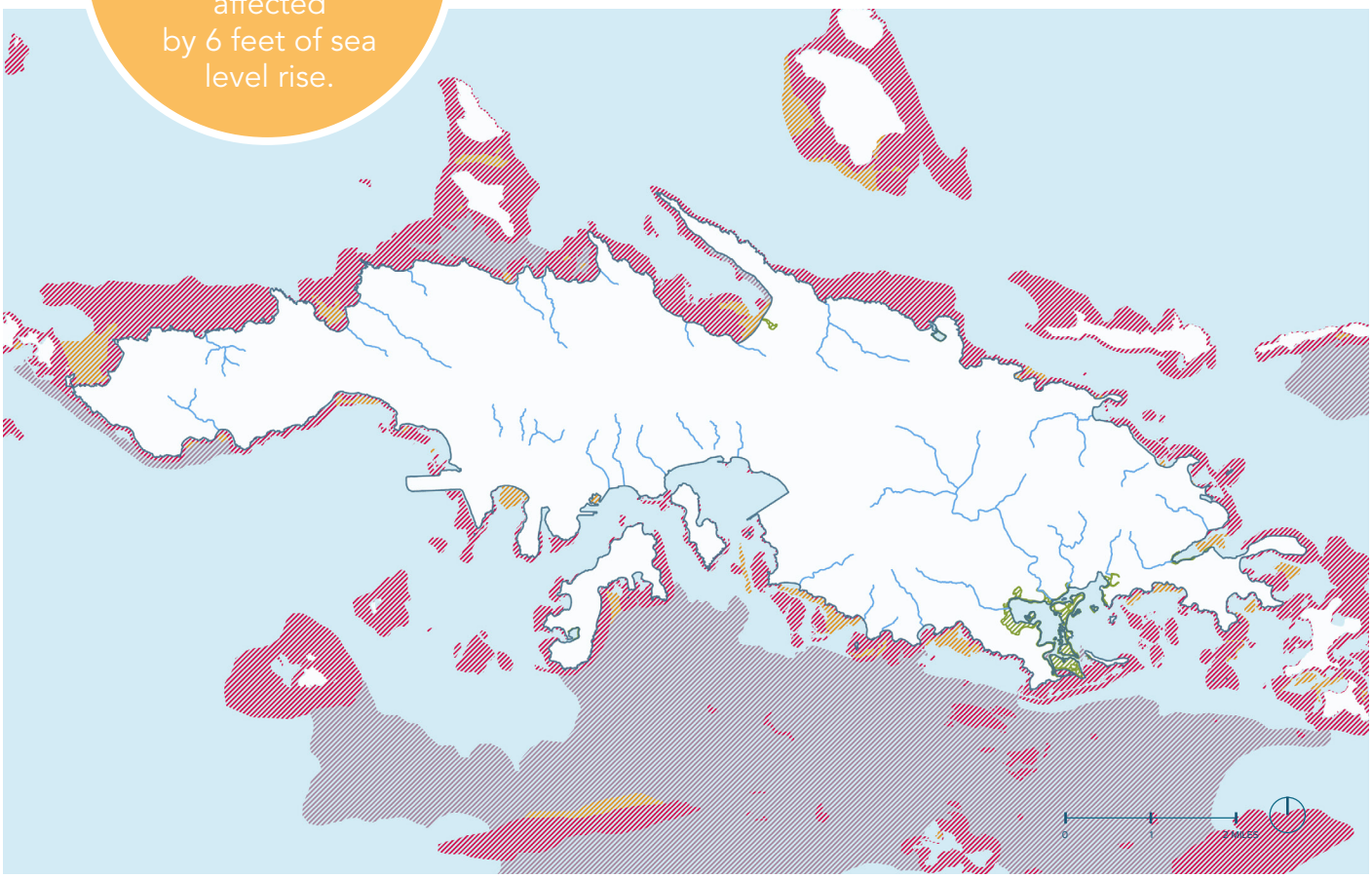
Currently, there is a minimum 30-ft protective buffer zone mandate for guts in the USVI which prohibits the cutting or injury of any vegetation within 30 feet of the center of a gut. However, due to a lack of governmental capacity to enforce this code, the buffer zone is often disregarded, with many houses being built immediately adjacent to guts. Climate change also poses a threat to guts; the increasing intensity, duration, and frequency of storms causes a major increase in the volume and flow rate of water within guts, leading to increased stormwater runoff and downstream flooding. A lack of sustainable waste management is another major threat to guts. There are no measures to prevent trash from being washed into gut watercourses or to stop contaminants from leaching into adjacent soils. St. Thomas' water quality is worsening due to an increase in point and non-point source discharges, including landfill leachate, untreated sewage, stormwater runoff, saltwater intrusion, increases in impervious surface areas, sedimentation, and illegal dumping.

Turpentine Run, Source: UPenn Studio

Habitats are in danger.

Many types of habitats on St. Thomas - terrestrial, marine, and wetland - are severely impacted by climate change and human activities. The island is surrounded by vulnerable coral reefs, beaches, mangroves, and sargassum. Guts form the most extensive network of freshwater habitat in the USVI and are critical for several species of fish and shrimp requiring both fresh and marine water. They are natural riparian corridors that act as conduits between upland terrestrial habitats and the marine environment, offering valuable freshwater access, nesting grounds, foraging opportunities, and habitat to a variety of invertebrates, fish, and wildlife. Even in urbanized areas, guts provide vegetated habitat corridors for birds, bats, and other wildlife. The tree boa, in particular, benefits from the corridors along guts near St. Thomas East End reserve.

68%
of mangroves on St. Thomas will be affected by 6 feet of sea level rise.



Source: Department of Natural Resources, USVI

Benthic Habitats

- Guts
- Macroalgae
- Mangrove
- Reef
- Sand

Beaches are facing challenges due to climate change and human activity.

The many beaches of St. Thomas are a main tourist attraction, but exist within a fragile ecosystem. They provide habitat and foraging grounds for many invertebrates and shorebirds. Nesting birds and sea turtles are particularly threated by beach nourishment, facilities on the beaches, distracting lighting, and massive sargassum intrusion due to climate change.

South facing beaches on St. Thomas have recently seen a debilitating influx of sargassum seaweed. Some resorts have tried to deal with this by removing it; however this can damage the existing ecosystems and requires sand replenishment projects. Beaches are facing erosion from both the flow of high velocity waters from the hills and from rising sea levels, leaving many businesses reliant on their proximity to the beachfront at risk of losing one of their main attractions.

Margaritaville, Source: UPenn Studio

There is no space for mangrove forests to retreat from sea level rise.

Mangroves are threatened by commercial and residential development, leachates from the Bovoni landfill, and climate change.

The largest mangrove forest on St. Thomas is immediately adjacent to the Bovoni landfill and wastewater treatment plant, and lies at the mouth of the largest gut on the island.

Over two thirds of St. Thomas' mangroves are at risk of total inundation due to sea level rise. Normally, mangroves would naturally retreat inland in the face of rising waters. However, there is very limited space for mangroves to retreat due to coastal over-development.

Source: NOAA Marine Debris Program

Source: St. Thomas Source

Excessive sargassum blooms threaten wildlife and the tourism industry.

While sargassum, a type of seaweed, provides food and shelter for native marine species, severe sargassum blooms due to higher sea temperatures and high nutrient levels can cause blockages at bays and inlets and can release toxic hydrogen sulfide fumes as it decomposes. Excessive sargassum blooms can also harm marine life - for example, trapping and preventing sea turtles from accessing nesting beaches.

The increased quantity of sargassum along St. Thomas' shores is also having negative impacts on the tourism industry by reducing visitors' ability to access and enjoy the traditionally pristine beaches.

Source: Woods Hole Oceanographic Institution

Coral reefs in St. Thomas are degrading due to human activities and climate change.

The total value of coral reefs is driven by tourism, recreation, and coastal protection for fisheries. Reefs also provide critical habitat for marine species as well as protection from storm surge. The total value of coral reefs on St. Thomas is $187 million.

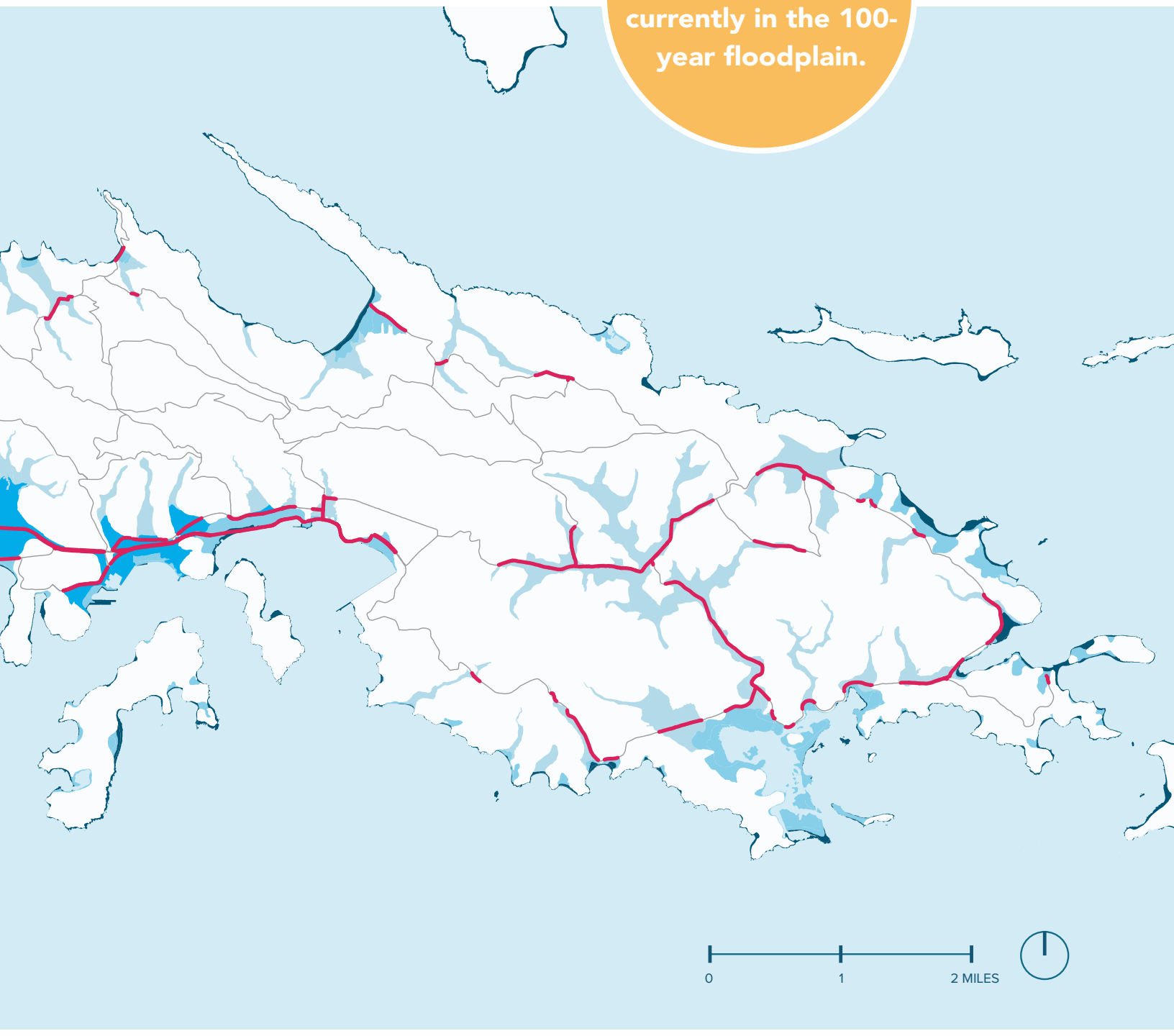
However, despite their immense economic and environmental value, coral reefs in St. Thomas are degrading due to climate change impacts such as temperature increase and destruction caused by hurricanes, as well as human-caused impacts like ocean acidification, overfishing, and increasing sediment loads.

Roadways are vulnerable to hazards.

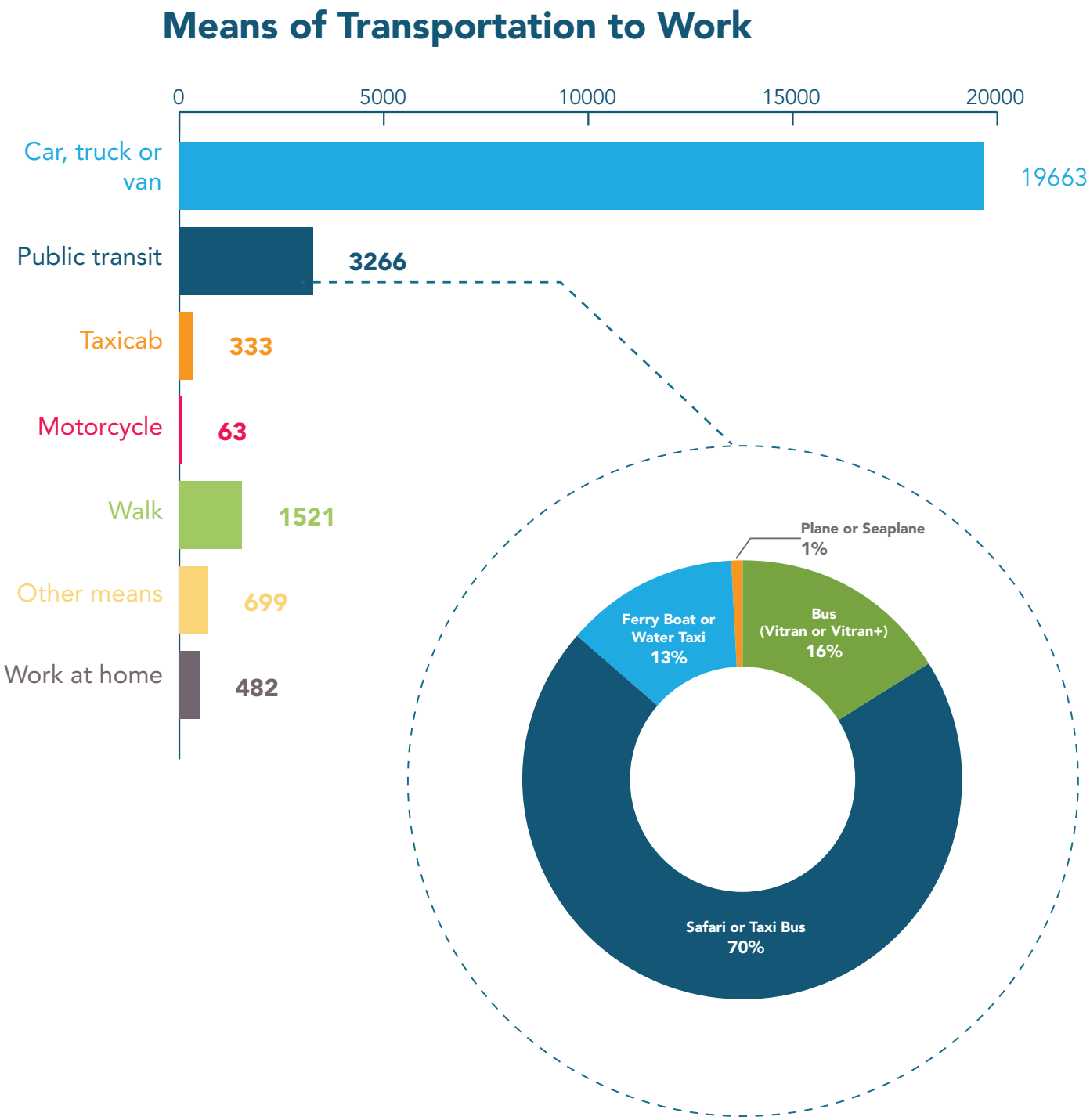
As an island vulnerable to sea level rise and flooding issues, transportation infrastructures and road systems on St. Thomas are very vulnerable to hazards. Transportation infrastructure will predictably degrade under the worst-case scenarios predicted for climate change. If Sea levels rise by 6ft, more than 7% of major roads on the island will be inundated. And 26% of major roads are within the 100-year floodplain. The airport is also high-risk and has a 1% chance of flooding annually.

Data Source: NOAA

26% of major roads are currently in the 100-year floodplain.



St. Thomas is highly reliant on automobiles.



St. Thomas is an automobile-oriented island. A survey done by the Vision 2040 for USVI shows that residents on the islands ranked transportation infrastructures, including roads, sidewalks, air access, bridges, as in poor conditions[1]. Such low-ranked conditions might be the consequence of the island's exclusively reliance on automobiles. According to the 2010 Decennial Census data, more than 75% of residents commute by driving[2].

Though St. Thomas has 6 bus routes, which connect most of respective tourist attractions in the southern and eastern parts of the island, the most often-used mode of public transportation is not a bus, but the dollar rides. The dollar rides do not have specific stops and routes, they generally run the same route as the public bus and pull in or close to bus stops.

Such road layouts make the island dangerous for both walking and biking, and also pose safety concerns for drivers. The narrow road system is worse by street parking. Drivers also compete for parking on the narrow roads. This is even more of an issue in older residential areas, where buildings do not have parking requirements, creating a lack of street parking. On street parking, not only raises safety concerns but also leads to lower traffic flow and ultimately causes more congestion.

1 Camion Associates Economic Development, "PDF" (US Virgin Islands, n.d.).

2 United States Census Bureau. 2010 Census.U.S. Census Bureau. 2010. Web. 18 December 2021

Charlotte Amalie Road, Source: Upenn Studio

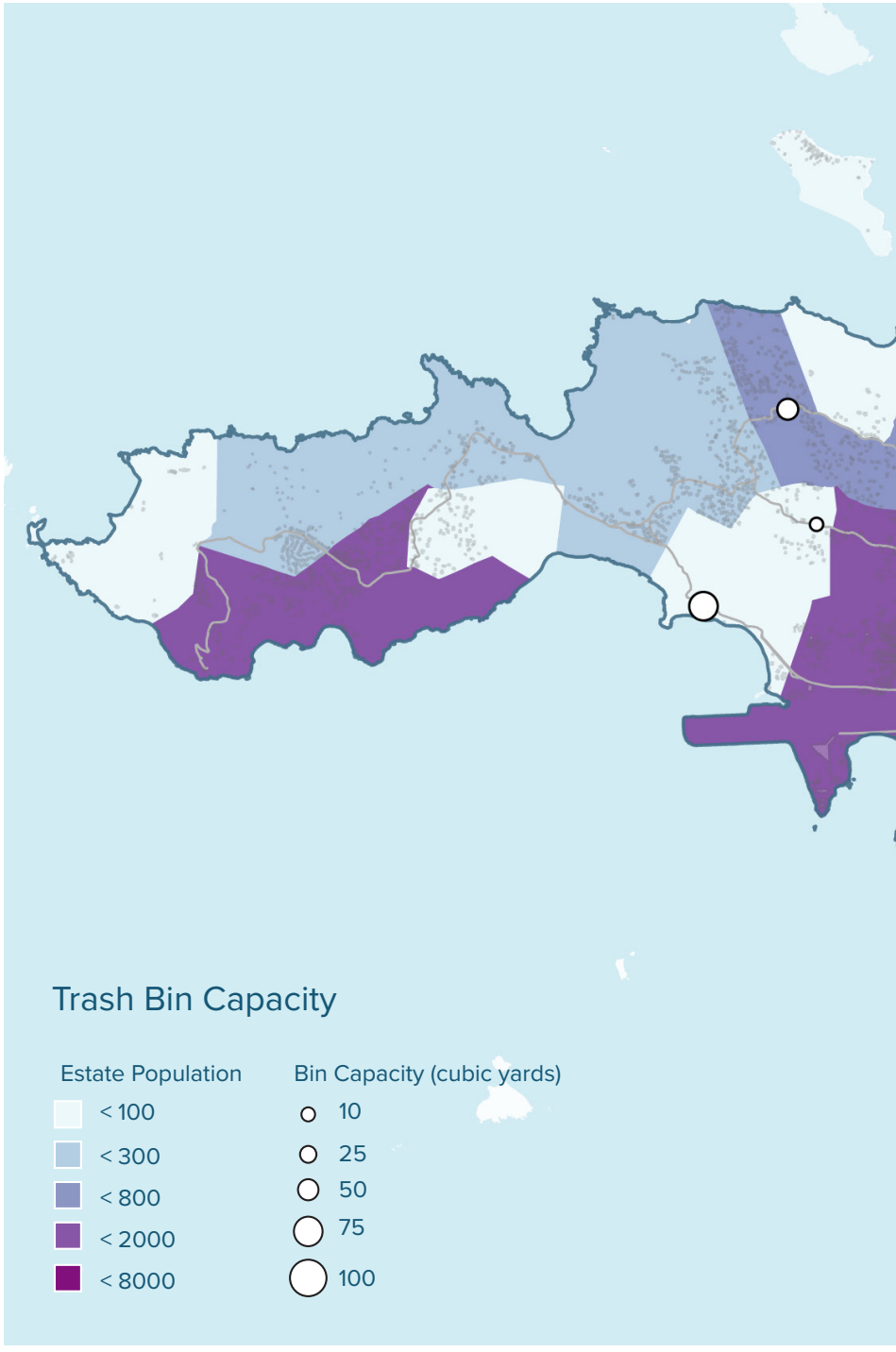
There is limited waste management.

Due to the reliance on imported goods and the absence of a recycling program, the average Virgin Islander generates 40 percent more trash than the average US resident, though this also accounts for tourists and seasonal residents. The leading types of waste are organics and plastics. The waste that is generated on St. Thomas is treated improperly.

As such, the dump site at Bovoni is overflowing. 68% of the Bovoni garbage on St. Thomas could be diverted to either a recycling or composting program at a rate substantially greater than St. Croix and St. John. Poor management and overcapacity of the landfill causes leaching into the groundwater and coastal waterways, threatening both residents and the environment.

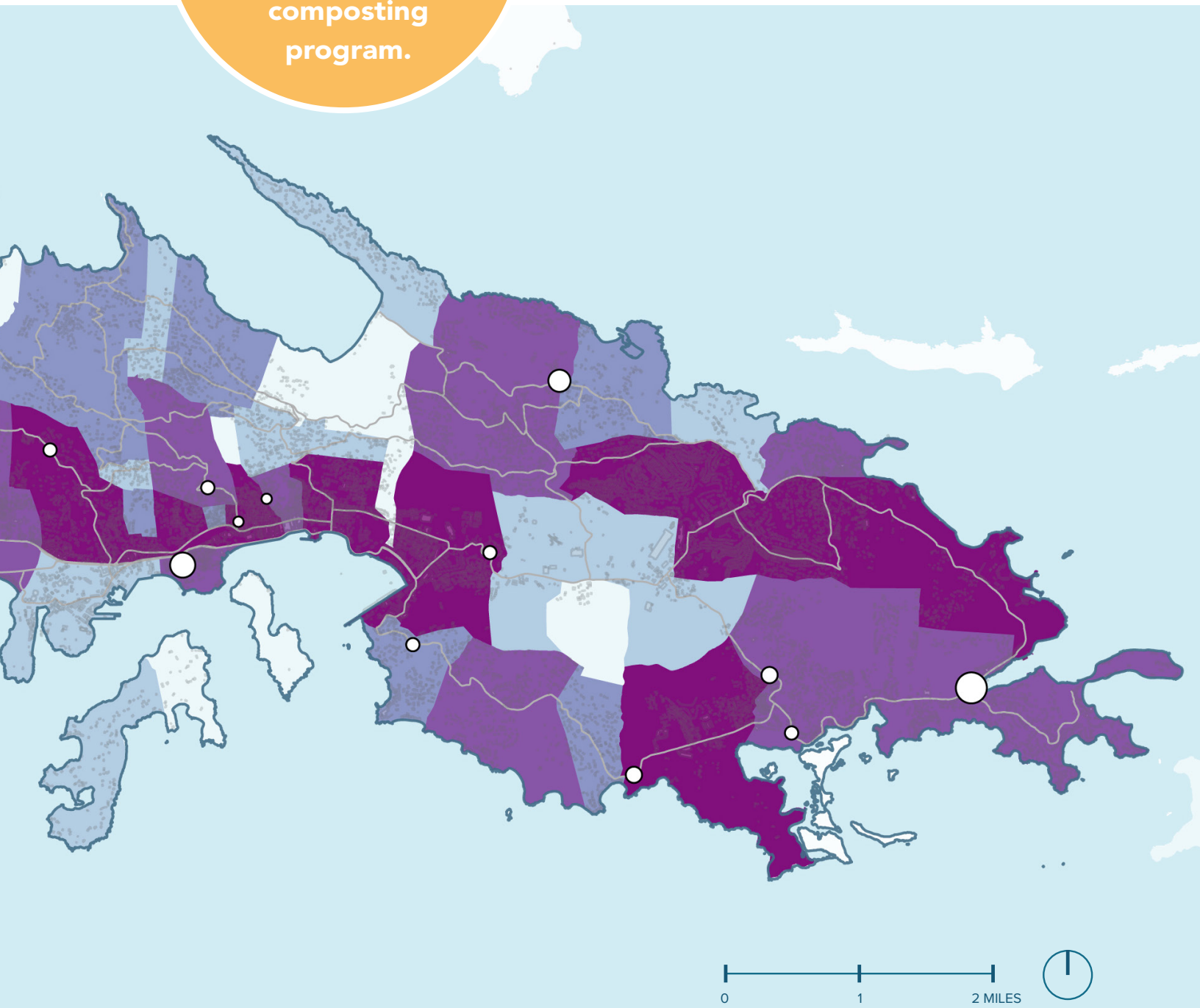
The island has installed waste bins, but the mismanagement of bin sites also compounds Water Contamination Issues.

A lack of trash bin capacity is also an issue facing the island. As the map here shows, St. Thomas's average bin capacity is 1,350 people per dumpster daily, while the ideal is 500 people per dumpster. This lack of capacity results in illegal dumping and informal dump sites. The debris and trash on the ground will runoff along impervious surface and guts during flooding or heavy rain events, harming nearby natural resources and water quality in the island's bays.



Data Source: DPNR, USVI Waste Characterization 2019

68% of garbage at the Bovoni could be diverted to a recycling or composting program.



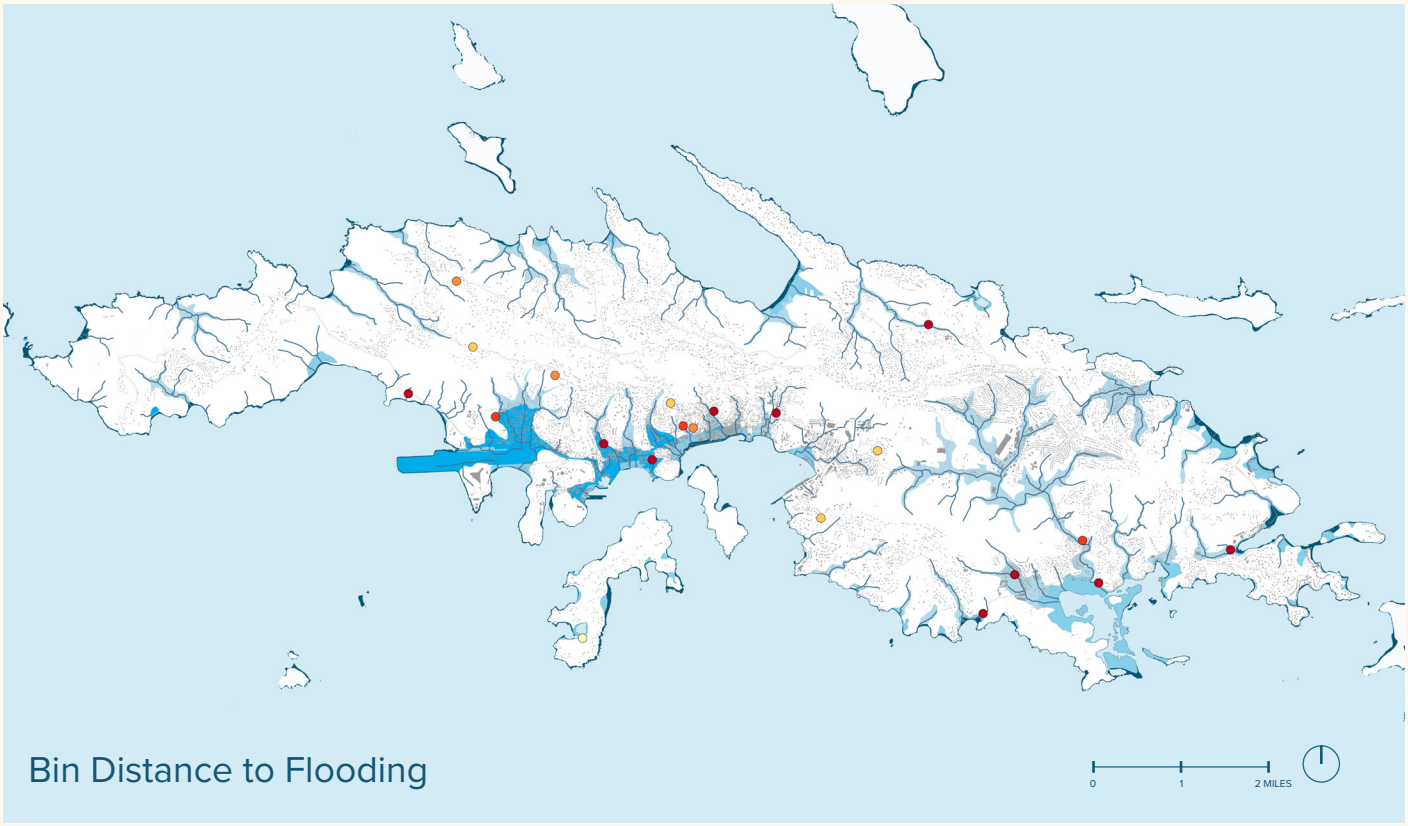
Bin Sites are Inaccessible and poorly maintained.

Source: Upenn Studio

Source: Upenn Studio

Many bins are inaccessible for pedestrians, such as this one on the top left, located at Bolongo. This dumpsite has no sidewalk leading to it. The picture on the bottom left shows trash overflows from bin sites. Which likely leads to a prevalence of illegal dumping, and pollution of nearby natural resources such as mangroves and guts.

These trash bins are harmful for the environment and are vulnerable to flooding risks thus causing water contamination and pollution. This map shows each bin's distance to the nearby guts and flooding zones. 13/20 of them are located extremely close to those vulnerable areas. The choice of location plus the inadequate onsite management make these dumpster sites one of the largest pollution sources to the islands environmental system.



Distance to nearby guts/flooding zones

- <50 ft
- <100 ft
- <200 ft
- <500 ft
- >500 ft

- Flood Zone VE
- Flood Zone AO
- Flood Zone AE
- Flood Zone A
- Guts

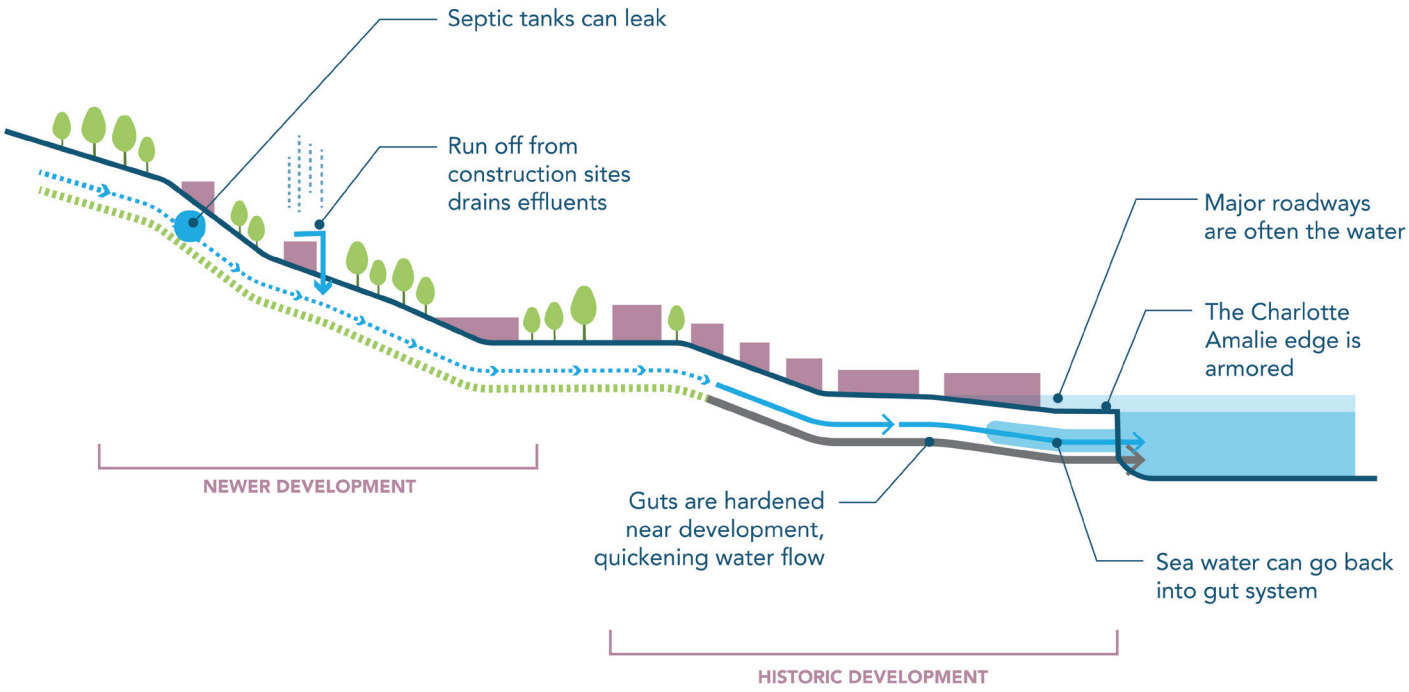
Development is often harmful.

Historically, development has worked against the island's natural form and resources - resulting in incompatible land uses and unstable structures. The development near the waterfront in Charlotte Amalie was initially built to accommodate shipping, resulting in a hardened waterfront edge. In areas suffering from development pressures, natural resources, particularly guts, are put at risk.

As the community perception of guts has shifted from a vital part of the island to a nuisance and source of flooding, guts have been lined with concrete, channelized, and stripped of native vegetation in an attempt to move polluted water and debris away from development and into the sea as quickly as possible. This lack of oversight has resulted in guts becoming dumping grounds for construction debris, household and commercial waste, and overflow from municipal sewers – destroying critical habitats for flora and fauna, causing polluted runoff to seep into the sea. Blocked guts also disrupt the flow of large volumes of water after a storm. The territory's legal code bans development 30-foot from the centerline of the gut watercourse. Due to a lack of capacity on the island, this thirty-foot buffer zone is rarely enforced.

Source: Bloomberg Philanthropies USVI Hurricane Recovery and Resilience Task Force Report

Typical Development Section

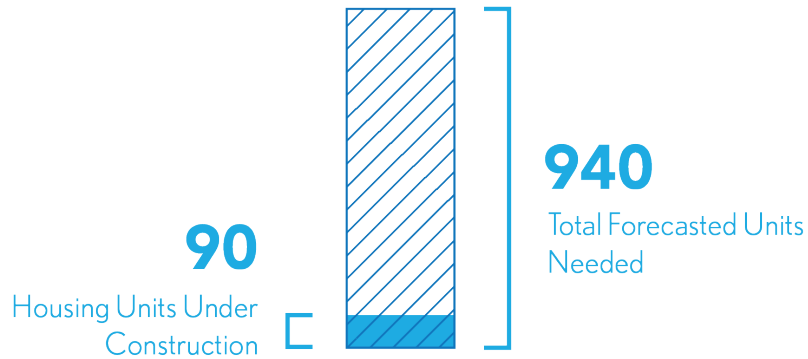


Building construction and building codes have changed after each major hurricane. However, many structures do not meet current codes and construction on the island is often cost prohibitive. The guide "Construction Information for a Stronger Home" went through a major update after hurricane Marilyn. It recently got its 4th edition update after hurricanes Irma and Maria. Some of the major building code changes have included reducing allowable overhangs to 2', using screws instead of nails for roof installation, and increasing the number of tie down straps for roof rafters. However, new codes only effect new construction and there are a lot of older buildings which are vulnerable.

Charlotte Amalie Building, Source: Upenn Studio

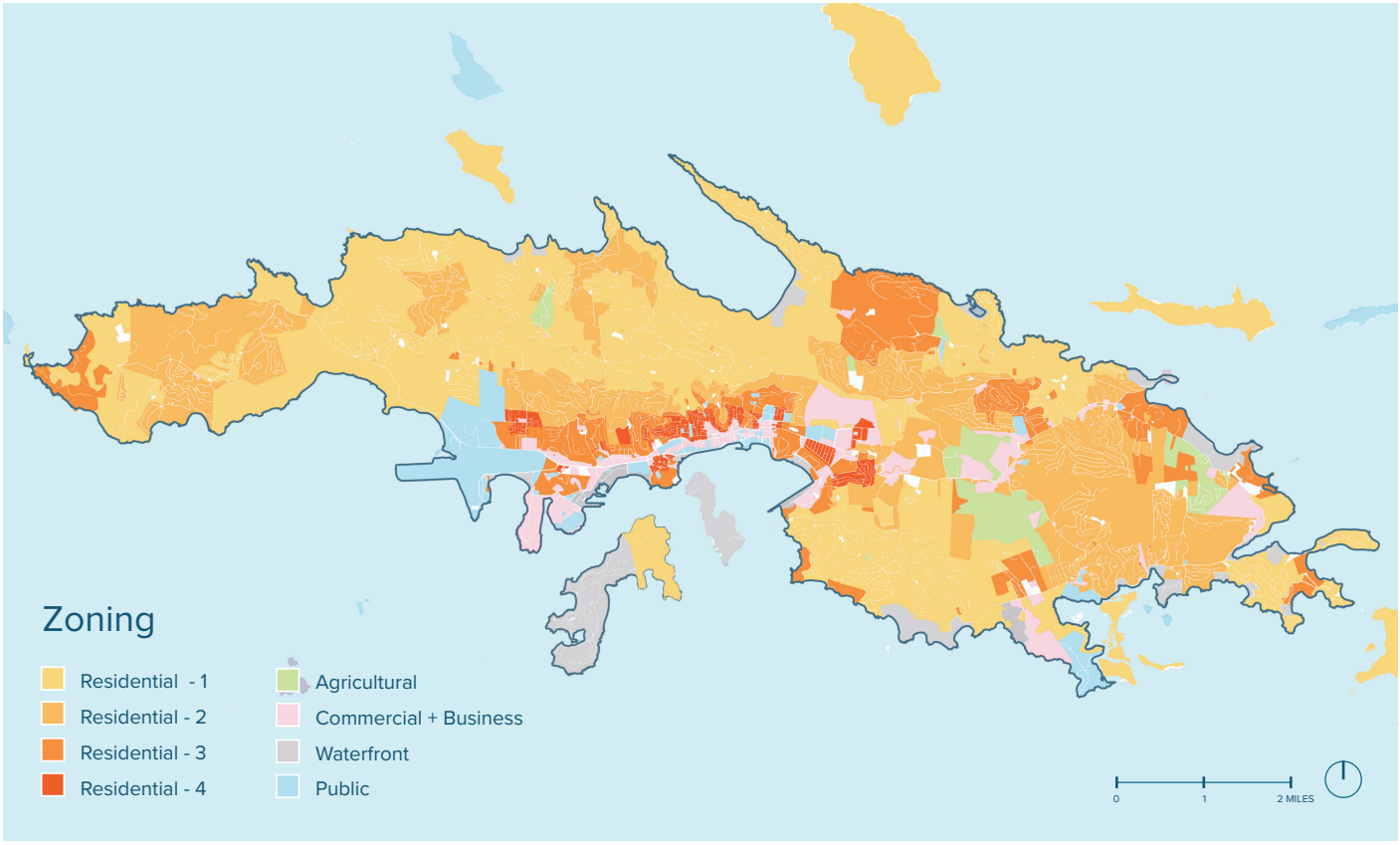
A 4th edition of "Construction Information for a Stronger Home" was released after 2007 storms

Food and shelter are costly.



Data Source: U.S. Department of Housing and Urban Development

Like many places across the U.S., the majority renter island of St. Thomas is grappling with an affordability crisis largely stemming from low wages. There is an outsized, unmet demand for two essential goods on the islands--- and food and shelter. Though Government efforts to address these supply shortages have fallen short of locals' needs, leaving residents cash strapped after spending much of their earnings on basic needs. he median household income in 2010 was reported as $44,805 by the U.S. Census Bureau when adjusted for inflation to 2019 dollars. Despite the low median salary, the mean sale prices of homes sold from 2008 to 2017 was a staggering $777,198. When coupled with an increasingly competitive rental market due to the proliferation of vacation rental websites such as Airbnb, the rising cost of housing impacts year-round residents greatly. Furthermore, homeownership requires a salary high enough to qualify for a mortgage and expensive flood



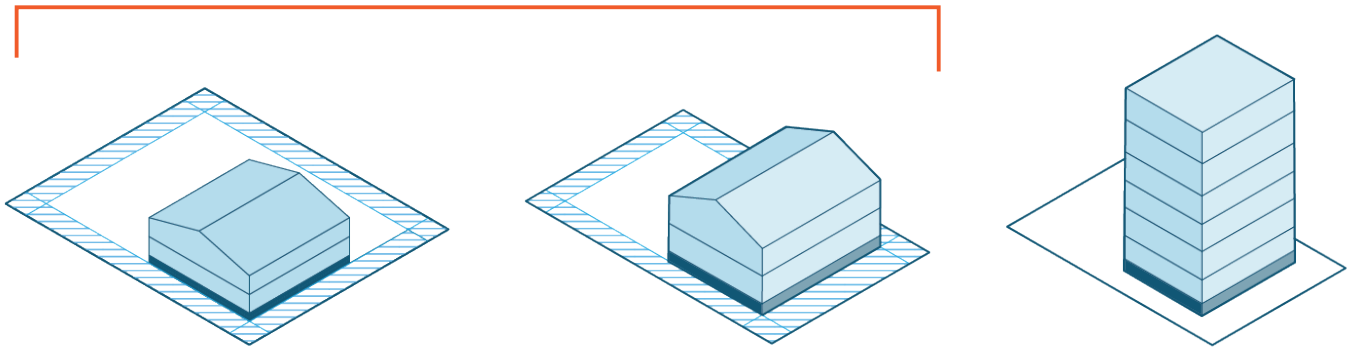
Data Source: Guinnel, G. (n.d.). BuildingsUSVI Shapefile. Caribbean Green Technology Center.

insurance, given that much of the island falls within a flood zone.

Expensive land and construction costs act as a significant barrier to increasing the number of affordable housing units. Research conducted by the U.S. Department of Housing and Urban Development found that based on the island's population size, 940 renter units were needed in 2019, though only 90 units were in construction at the time of the report. Though, despite the lack of rental units, most of the island is zoned for residential use. In this map , residential zones are shown in a progressively darker orange color, which darkens as the level of density allowed increases.

The island's outdated zoning code further contributes to the issue of housing unaffordability, as the zoning is largely based on permitting single-family housing typologies---though many of the 2- and 3-bedroom residences are within subdivided single-family homes. Residential zoning also restricts lot coverage to a maximum of 30%, and in some cases, have setback restrictions as well. Typical housing units in our focus area, the anna's retreat estate, are built to their maximum lot coverage but often fail to meet their maximum height restrictions, leading to a loss of density in development. St. Thomas' building code has been updated after each major storm to encourage more resilient buildings, though it has been difficult for local officials to enforce, leaving Residents in older homes at a greater risk of suffering damage during disasters like tsunamis - as their houses are non-compliant with the recommended storm-safe modifications. The 2017 hurricanes likely contributed to gradually decreasing homeownership rates- though even before the storms - the number of owner-occupied units decreased from 52% in 2010 to 47% in 2015. The cost of home insurance also presents an incredible challenge to homeowners, as roughly 65% in homeowners opted out of home insurance entirely in 2015. In contrast to much of the United States, about 15% of the territory's housing stock is Section 9 public housing, meaning that about 3,000 housing units are priced at 30% of residents incomes in perpetuity. However, much of the public housing stock was built in 1960 – and 68% of the territory's total housing stock was built prior to 1980, leading to poor structural quality and non-compliance with updated building codes.

Most of the Island is zoned in these two types



Residential 1

Residential 2

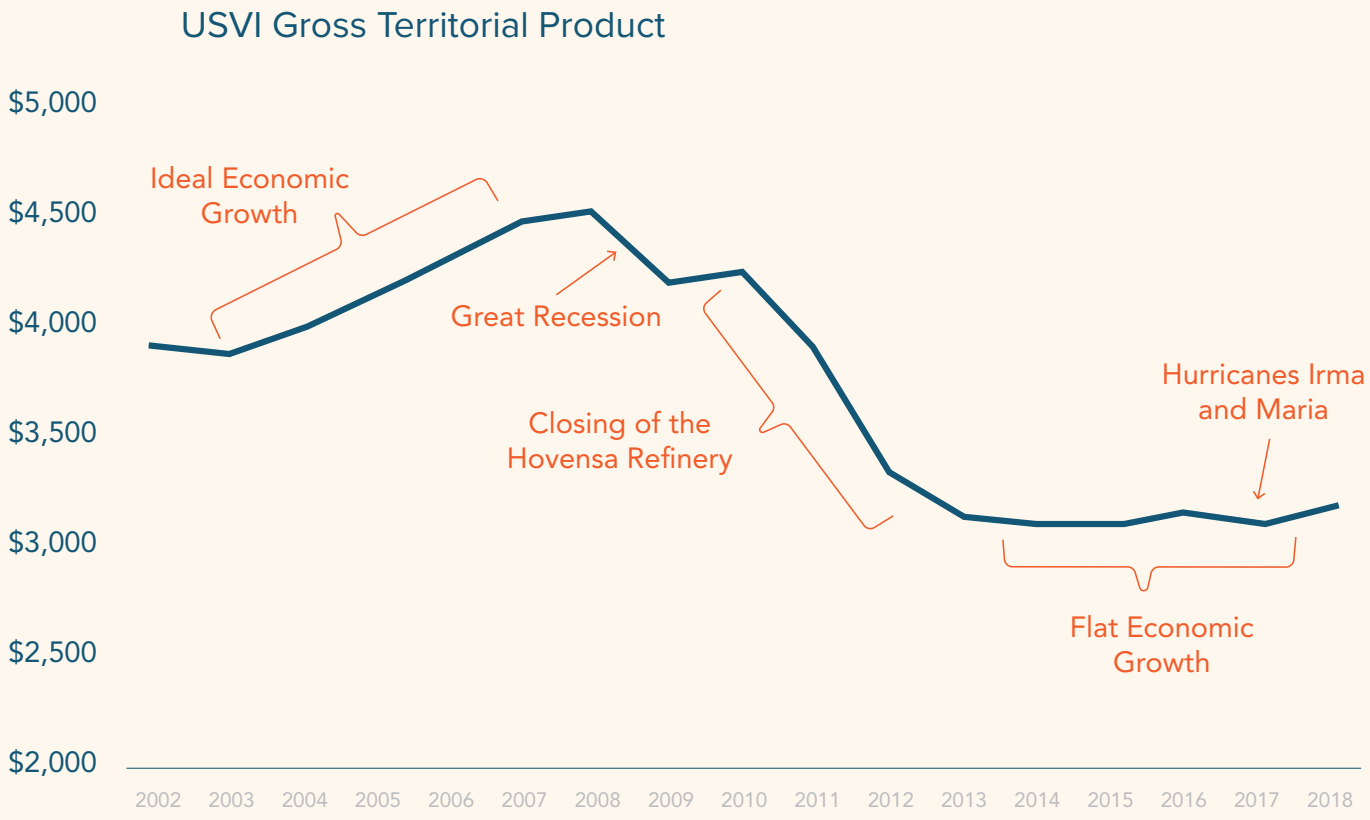
Residential 3 + Residential 4

The economy is not resilient due to repeated disruptions.

St. Thomas's economy offers strong opportunities for USVI residents and immigrants from Caribbean countries to work and build a livelihood. However, the past few decades have shown that the economy cannot withstand repeated disruptions, which will become more frequent with a changing climate.

This graph shows how the Gross Territorial Product, or GTP, has fallen and remained flat since the 2008 Great Recession and the shocks of the Hovensa Oil refinery closure and Hurricanes Irma and Maria that followed.

Sea level rise and climate change threaten much of the economy because its hotels, resorts, beaches, and water-based experiences are all directly reliant on proximity to the ocean. Despite providing only 15% of all jobs, the tourism industry accounts for 60-80% of the territory's GTP.



Data Source:: US Virgin Islands Vision 2040

Building after 2017 Storms, Source: CNN

The back-to-back category 5 storms Irma and Maria in 2017 had a serious impact on tourism. The number of hotels in St. Thomas and nearby St. John dropped from 27 to 16 between 2016 and 2018. Over these two years, tourism-related employment fell nearly 40%.

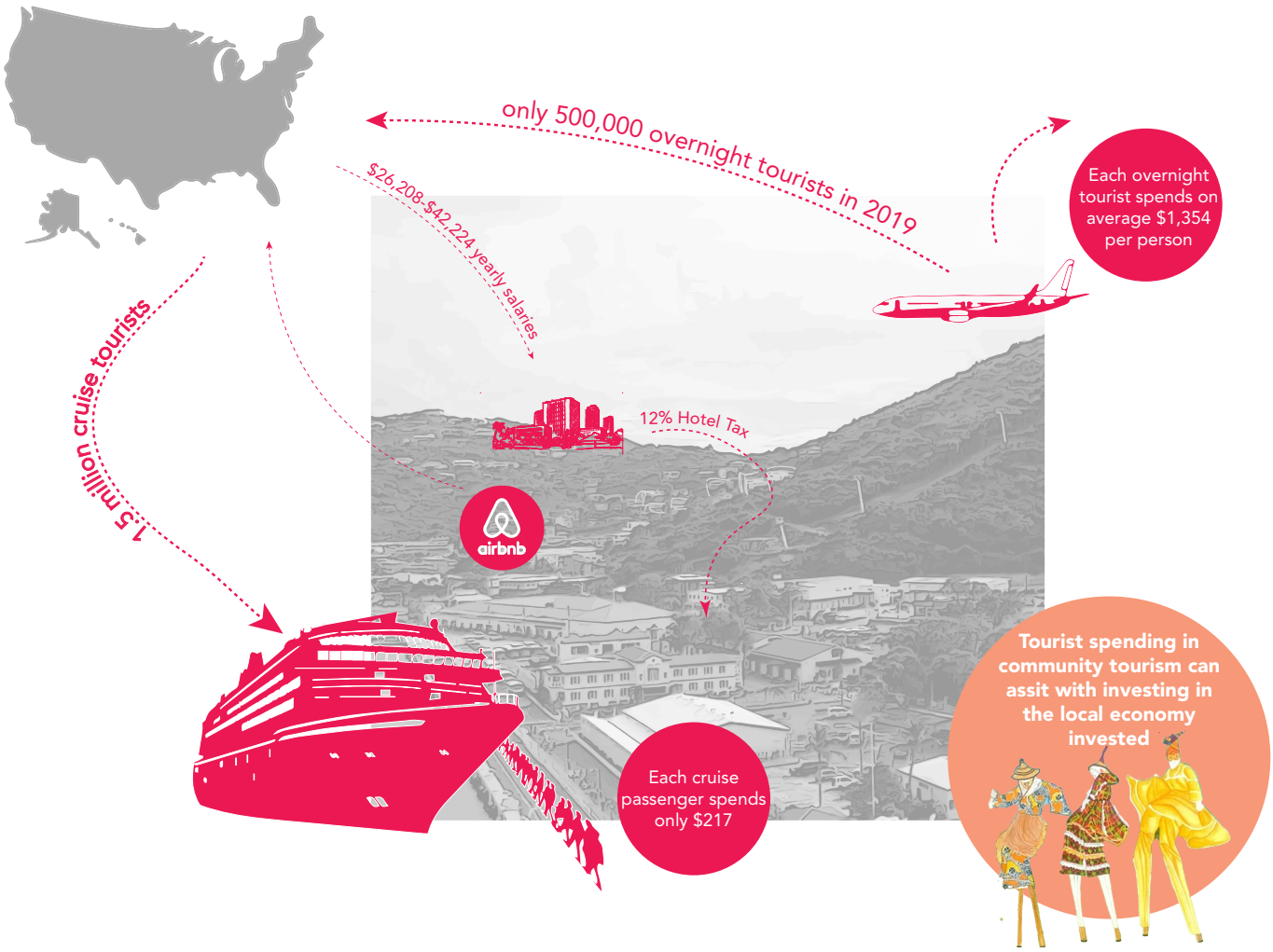
The tourism sector is a major employer in the USVI, making up about 15% of jobs for the territory. However, these jobs pay relatively less money than other sectors. The Accommodation and Food Services and Drinking Places sectors employ the most workers, but their salaries only average $812/per week and $504/per week respectively. The Construction and Professional and Technical Services sectors, meanwhile, pay over $1,000/per week.

Accommodation: $812/week
Food Services & Drinking Places: $504/week.

Construction: >$1,000/week
Professional and Technical Services: >$1,000/week.

Souce: USVI Bureau of Economic Research

Very little tourist money stays in the islanders' hands.



Data Source:
Bureau of Economic Research, "U.S. Virgin Islands Annual Tourism Indicators"
2019 US Virgin Islands Code Title 33 - Taxation and Finance,

Over 2 million tourists visited the territory's three islands in 2019. Of these, over 500,000 were overnight visitors, while the other roughly 1.5 million were cruise passengers and tourists arriving for day trips by air.

St. Thomas is the most visited island in the territory thanks to its international airport and cruise port. Most of the overnight tourists visiting St. Thomas and nearby St. John spend their time at one of 17 hotels, many of which are all-inclusive and therefore provide little

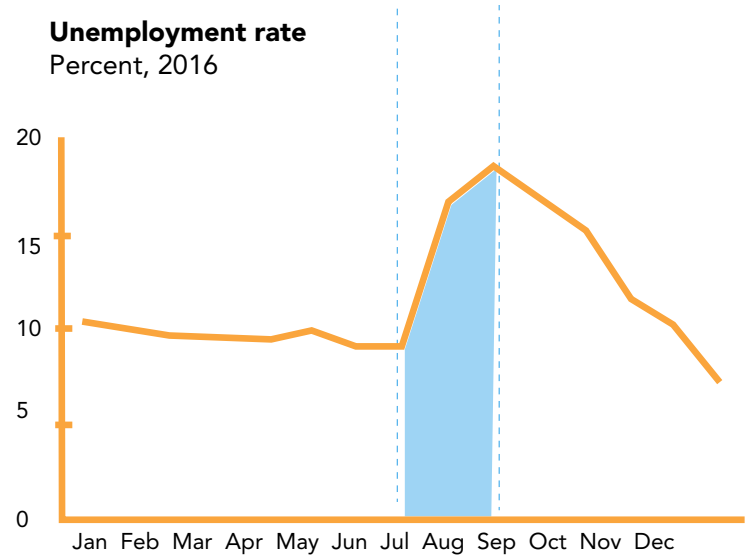
incentive for them to leave to explore the rest of the island's offerings. The employment at these hotels is large enough that 4 of the top 25 employers in the territory were hotels in 2019. As previously stated, these resorts are particularly vulnerable to sea level rise and extreme weather.

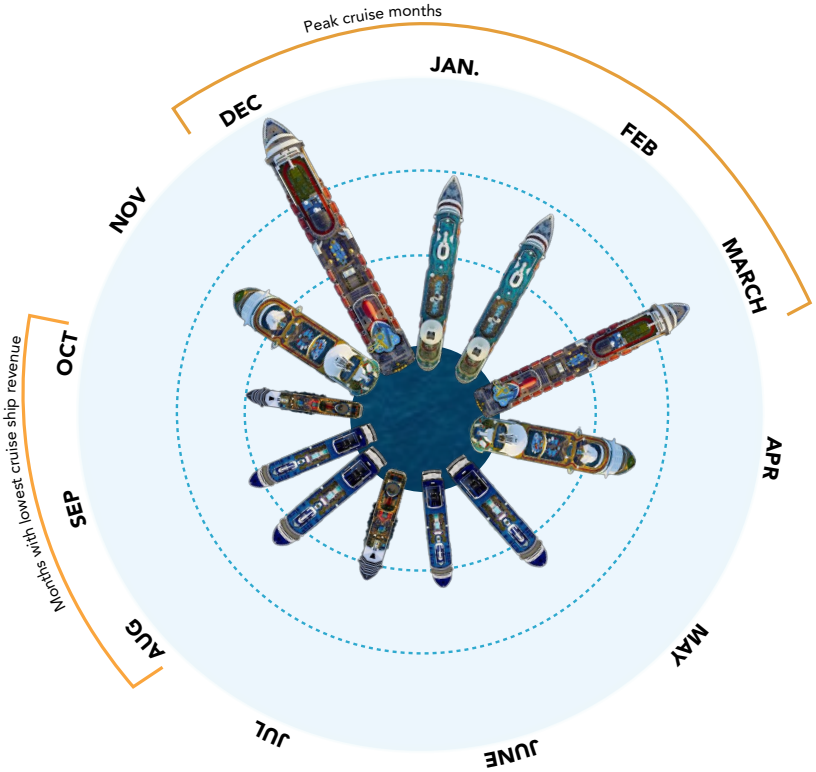
Many of the rest of the overnight tourists who opt not to stay in a hotel stay in one of St. Thomas's or St. John's nearly 300 condos for rent on platforms like Airbnb,VRBO, and HometoGo.

Most of the cruise tourists stop at the island for less than a day and are therefore limited in what they can experience. Many go directly into charlotte amalie to shop duty-free in the town's many jewelry, watch, fragrance, clothing, and other tourist-geared stores.

The differences between these cruise and overnight tourists are important to note. Overnight tourists spend on average $1,354 per person, while the average cruise passenger spends only $217.

The cruise industry is extremely seasonal, with the most popular months being December through March. The least popular months are August through October. This means the effects of the cruise industry on the economy vary widely depending on the season.





Data Source: Vinow Cruise Schedule, Bloomberg USVI Economy Report (Hurricane Recovery and Resilience Task Force)

Small business support is lacking.

Small business support on the island is lacking. A 2020 survey of USVI citizens found a rating of small business support at only 1.7 out of 4. Access to capital is an issue in starting a small business, too. There are several government-backed programs that offer financial support and other training for businesses, but their requirements and relatively low loan amounts limit the number of businesses they can reach.

Private capital is lacking, too. Banks are reluctant to lend to small start-ups without extensive vetting and there are currently no Community Development Financial Institutions operating in the USVI, which would be more willing to take on these riskier loans.

Charlotte Amalie boasts dense, walkable streets and a strong existing base of restaurants, galleries, and other cultural offerings. These are dwarfed, however, by the number of businesses geared towards the seasonal cruise economy. This leads to a town whose economy is unbalanced in favor of a fast-food-like tourism.

From our walking survey on Tuesday, October 12th, we found a storefront vacancy rate of roughly 33%, as shown in the map. Of the businesses that were open, many were geared toward tourists from the nearby cruise port.

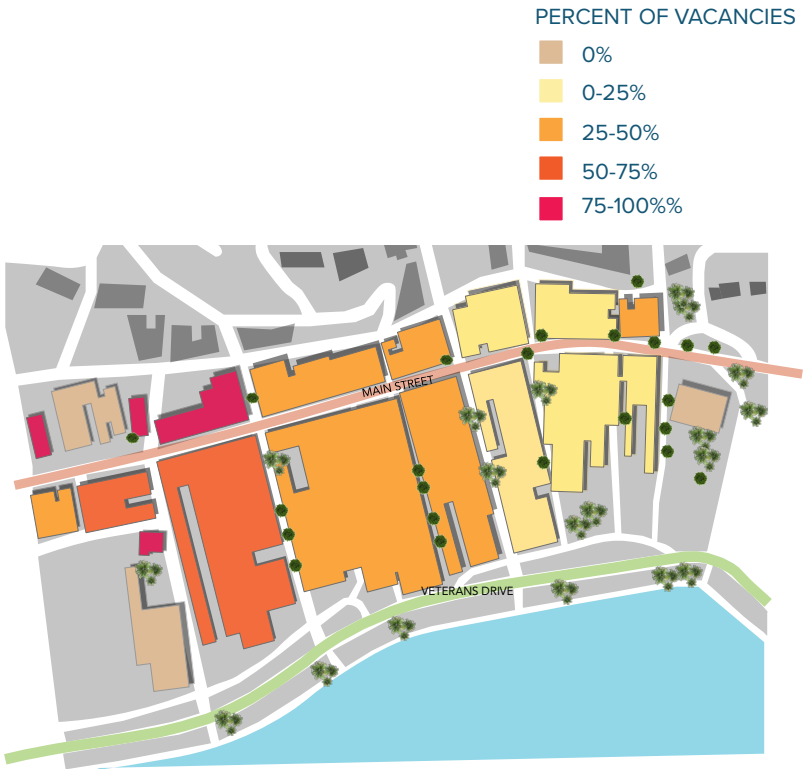
US Virgin Islands Vision 2040

There was a 33% vacancy rate in downtown Charlotte Amalie.

Charlotte Amalie caters to tourists.

This map shows the landmarks, parks, squares, and markets that contribute to Charlotte Amalie's rich history.

The core area that we walked through can be seen with building outlines colored near the center of the map. While this core has the lowest rates of vacancy, roughly 35% of the businesses in this area were jewelry stores alone. The call out for vacant properties points out the underutilized storefronts, alleys, and streets we observed within the core, but especially in the blocks due west.



There is a gap in workforce and training infrastructure.

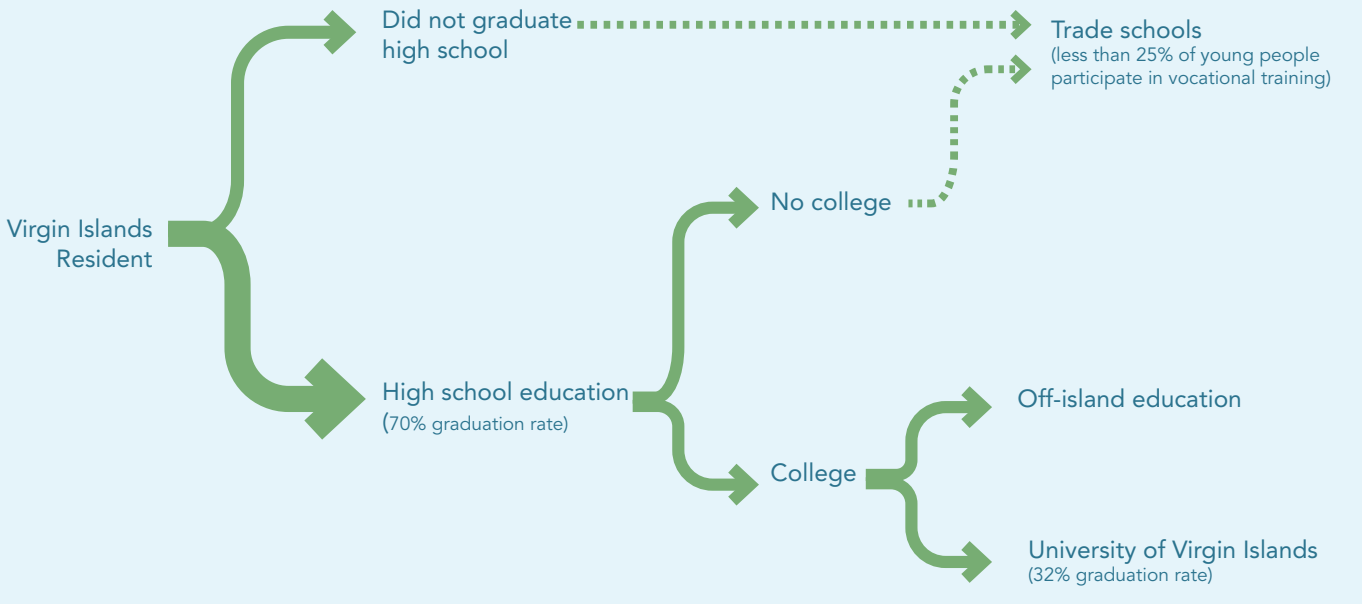
The majority of the territory's revenue is heavily tourism-dependent; however, the jobs and opportunities created for residents are disproportionate. There is a significant economic and workforce gap that is a direct barrier towards contributing to the diversification of the territory's economy. Of the territory's ten largest employers in 2016, six hotels and one retail store— sustained enough damage in the 2017 storms that they were not set to reopen until three years later in 2019. Due to the economic disruptions caused by the covid-19 pandemic, the island's unemployment rate rose to 11.2% as of August 2020. As a result of sea-level rise, tourism's top employers will continue to be directly impacted and subsequently leave a gap in the island's workforce.

One of the largest, current barriers to this goal is the quality of education on the island. In 2015, 77.2% of youth ages 18-24 had completed high school, compared to the U.S average of 84.1%. The University of the Virgin Islands provides a strong opportunity for residents to earn associates, bachelor's and master's degrees. However, there is a relatively low graduation rate at 32%. Besides UVI, there are few opportunities for apprenticeship and trade school programs. In the 2015-2016 school year, less than a quarter of young people between the ages of 16-24 engaged in some vocational training or apprenticeship. The only trade school in the territory was on St. Croix, but has unfortunately closed.

Sources: USVI Vision 2040, USVI Hurricane and Recovery and Taskforce Report, Workforce Development Issues in the U.S Virgin Islands

Sources: USVI 2040 Vision, Building Forward for Our Children Now! USVI Kids Count Data Book 2019, 2015 U.S. Department of Education's National Center for Education Statistics

Education Pipeline



The current workforce ecosystem focuses specifically on young people. This ecosystem does not cater to the existing adult working population. This is contributing to the mismatch of skills and available jobs, meaning that employers are finding it difficult to hire the skilled labor force to fill positions. We spoke to several people employed in the construction and agricultural sectors who expressed a desire to pass their skills on to the next generation. St. Thomas residents have a diverse set of skills, knowledge, and talent that can be leveraged in cultivating a vibrant economy.

A well-trained and productive workforce will be key in order to diversify the economy. In order to reach a 4% unemployment rate, the territory needs to add 1,093 new jobs annually over the next ten years.

The government has identified the targeted industries to contribute to economic diversification: Agribusiness, coastal ocean resources, health sciences, light manufacturing, professional/ technical services, renewable energy, research and development, and VI-style tourism. A vast majority of these jobs will require an education and skills development beyond high school, but that does not require a bachelor's degree.

Addressing current industry trends and demands, gaps in workforce programs and populations, and economic development potential of trades are critical towards providing opportunities for residents to seek meaningful employment on the island.

"Right now a lot of contractors, a lot of plumbers, a lot of electricians are getting older and none of the younger kids are learning these things"

- Hilroy Francis

VISION FOR ST. THOMAS

Saint Thomas will leverage its rich cultural fabric and unique natural resources to become a self-determined and thriving community which will be resilient to social, economic, and environmental shocks.

CATEGORIES OF ACTIONS

1. Safe multi-modal transportation networks
2. Equitable access to food and shelter
3. Thriving ecosystems and pristine natural resources
4. Sustainable waste management
5. A self-determined and diversified economy

Safe multi-modal transportation networks

St. Thomas will be adapted to the threats of climate change and will provide all residents and tourists with safe travel options.

In the US Virgin Islands Vision 2040 Plan, residents of St. Thomas ranked transportation infrastructure as the fourth lowest quality system. The island's hilly terrain, narrow roads, and lack of safe sidewalks make walkability an island-wide challenge. The island's coastal location makes it vulnerable to climate change. Sea level rise and flooding have an impact on major roads. However, as an island with spectacular scenery, a rich Caribbean culture, and dense geography, St. Thomas has the potential to explore a multimodal transportation system. Based on existing conditions and capacity of the island, this resilience plan has developed a vision that transportation infrastructure on St. Thomas will be adapted to the threats of climate change and will provide all residents and tourists with safe travel options.

Gradually shifting toward a multimodal transportation system, including promoting walking, biking, and taking transit, will be able to relieve residents' solely reliance on private vehicles, thereby reducing automobile induced equity and environmental issues. Such a shift will also benefit the local economy by boosting local sales and protecting the environment by containing emissions. Keeping the island's uniqueness and capacity in mind, this plan recommends three strategies:

First, prioritize pedestrians and bikers by creating pedestrianized streets in the core of Charlotte Amalie, and establishing parking and transit facilities at the edge of the core to accommodate all modes of transportation.

Second, increase walkability in residential area by changing roads and alleys into pedestrian-centered green alleys.

Third, redesign and implement green infrastructure on Veteran's Drive while conducting a managed retreat strategy.

1.1

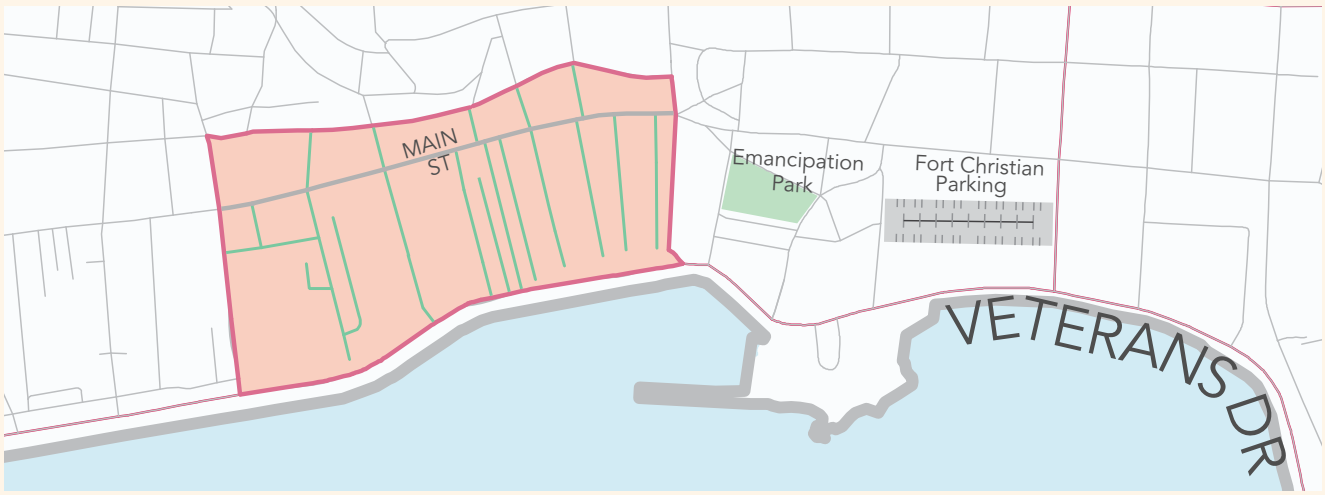
Make Charlotte Amalie's historic core walkable and resilient.

The core of Charlotte Amalie is occupied by retail stores and restaurants, which attract many residents and tourists to shop and dine here. Main Street is the primary road dominated by tourists. The part of Main Street in the core of Charlotte Amalie is currently in good condition, as the surface is tiled and has sidewalks on both sides. However, the existing sidewalks do not provide enough space for the current business and pedestrian flow.

Besides Main Street, some of the narrow, vehicle-occupied roads in the core of Charlotte Amalie are also difficult and unsafe for non-drivers to navigate.

This strategy suggests closing Main Street on weekends to allow locals and tourists to more safely visit the business district, as well as closing all north-south roads to automobiles and restricting on-street parking on these segments.

Pedestrian zones can increase economic activity. Cities such as Boston and Boise, started pedestrian-only zones during the pandemic and saw a boost in business in these zones. For instance, Boise's 8th Street businesses saw a 29 percent boost in consumer activity compared to the rest of the city after creating such pedestrian-only spaces.



Source: Laura Bliss, "Where Covid's Car-Free Streets Boosted Business," Bloomberg.com (Bloomberg, May 11, 2021), https://www.bloomberg.com/news/articles/2021-05-11/the-business-case-for-car-free-streets.

Road segments highlighted in green on the map are recommended to be closed to automobile traffic. These segments are also where the most of the historic core's restaurants and retail stores are. To provide safe multimodal transportation to all and boost sales, this plan proposes to limit car access on these roads and partially limit access on Main Street.

Though this strategy tries to make the island more accessible and bikeable by closing down certain roads to vehicles, it does not attempt to make it impassable for drivers. For those arriving by car, this strategy also proposes building a transit center and multi-floor parking structure at the Fort Christian parking lot. This area will serve as a hub for dollar rides and cab pick-ups and drop-offs.

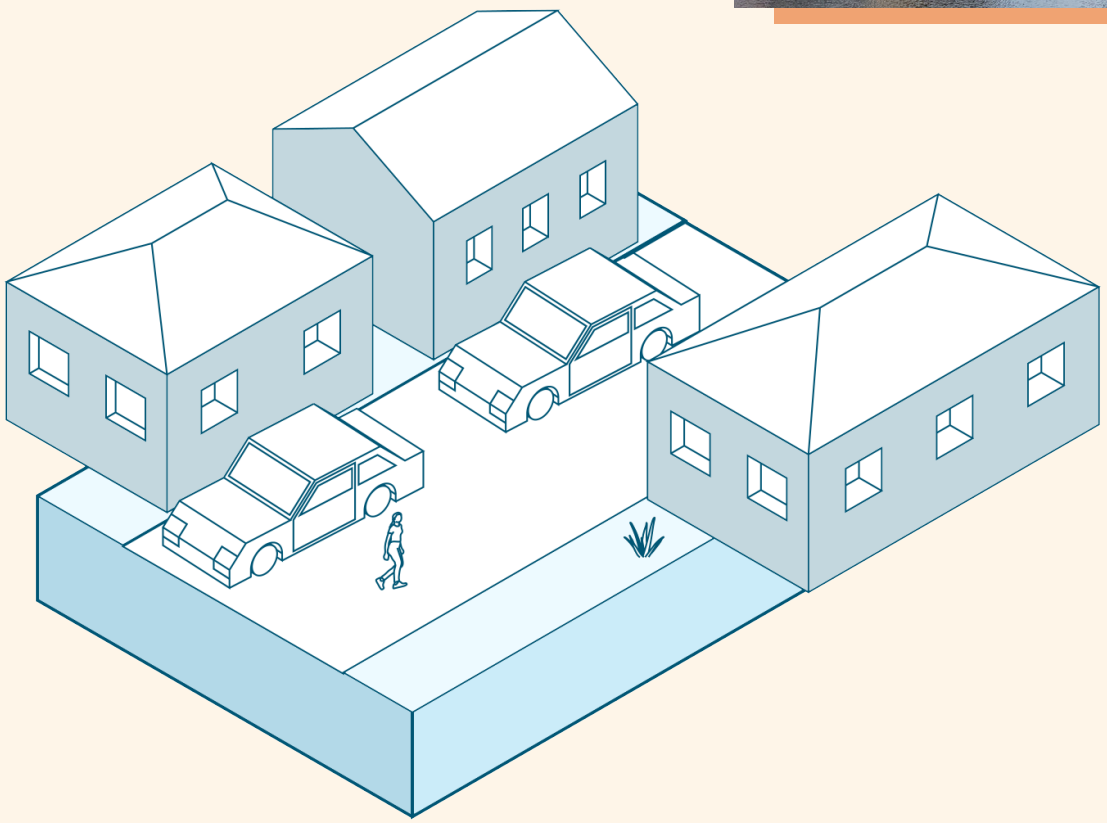
By directing on-street cars to the parking structure, some of the roads in Charlotte Amalie will have more capacity to accommodate traffic and be safer for pedestrians and bikers. Such alternations also aid in reducing the congestion and emissions commonly caused by vehicles stopping to drop off passengers.

1.2

Create residential streets that are safe for all users.

Only Veteran's Drive and the core of Charlotte Amalie have sidewalks. Lack of sidewalks makes it difficult and unsafe for travelers who wish to explore the communities. Additionally, the lack of sidewalks and the dominance of vehicles along sidewalks force pedestrians to walk on the vehicle lanes, which puts pedestrians at high risk.

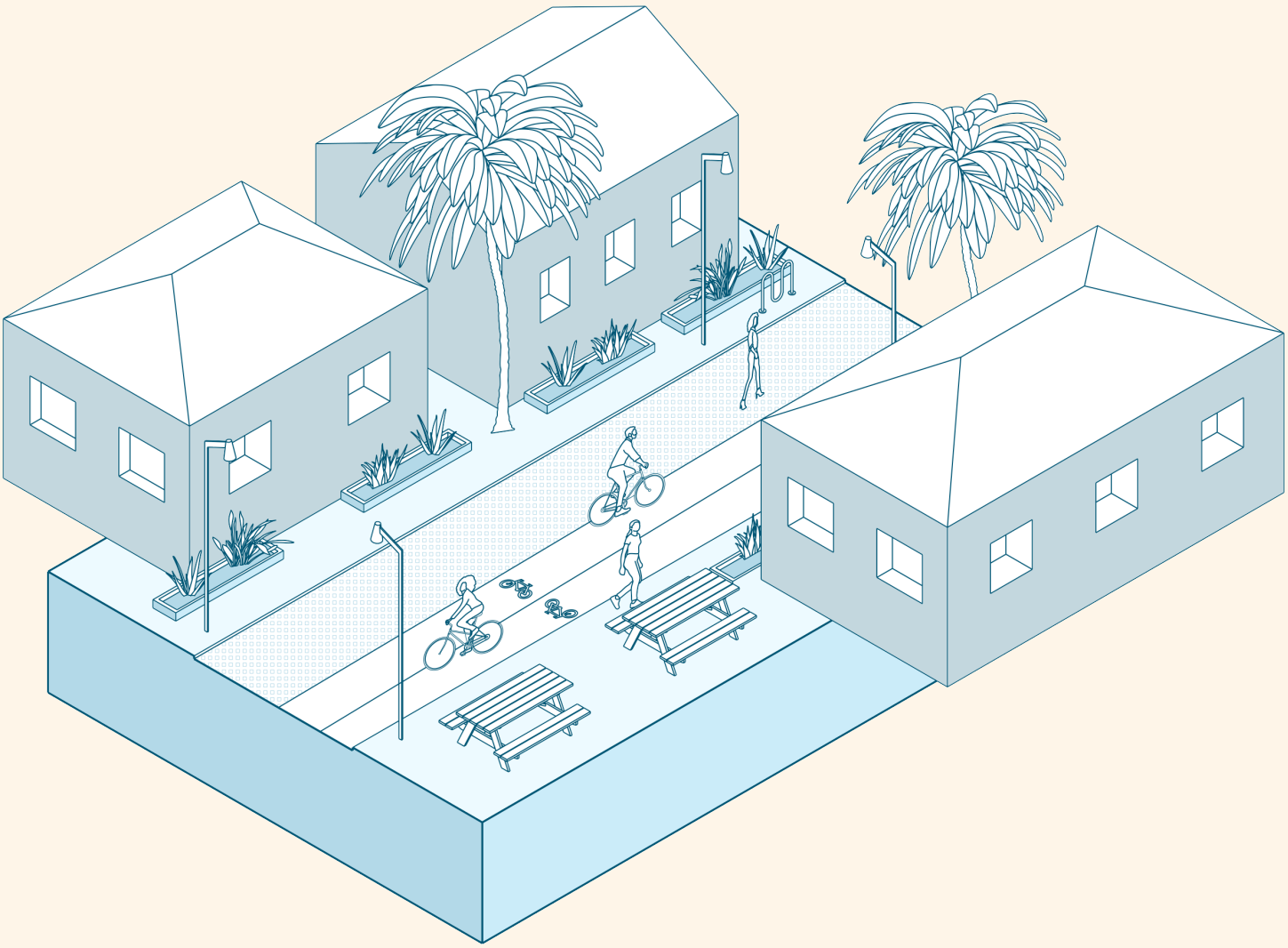
More than that, many road surfaces outside the core area have low rainwater absorption, which may cause flooding after storms. It is impractical to install at least 6 feet wide sidewalks on the majority of the streets due to the island's limited space.



The second strategy suggests converting some roads and alleyways in the residential neighborhoods into pedestrian-oriented green alleys to improve connection via multimodal transportation.

This strategy recommends adding greenery, biking infrastructures, amenities, paving the road with permeable materials to selected road segments, and making them pedestrian and bikers only. Such alternations intend to improve safety for non-drivers, mitigate stormwater runoff, and enhance the island's natural features throughout St. Thomas' neighborhoods.

With these changes, this plan expects to provide residents and tourists who wish to connect with the community with safer travel options while promoting the island's beauty. Therefore, facilitating a gradual shift in transportation behavior towards a multimodal system. Such change will also promote transportation equity by providing travel options for non-automobile users.



1.3 Redesign Veteran's Drive to become the true gateway to Charlotte Amalie.

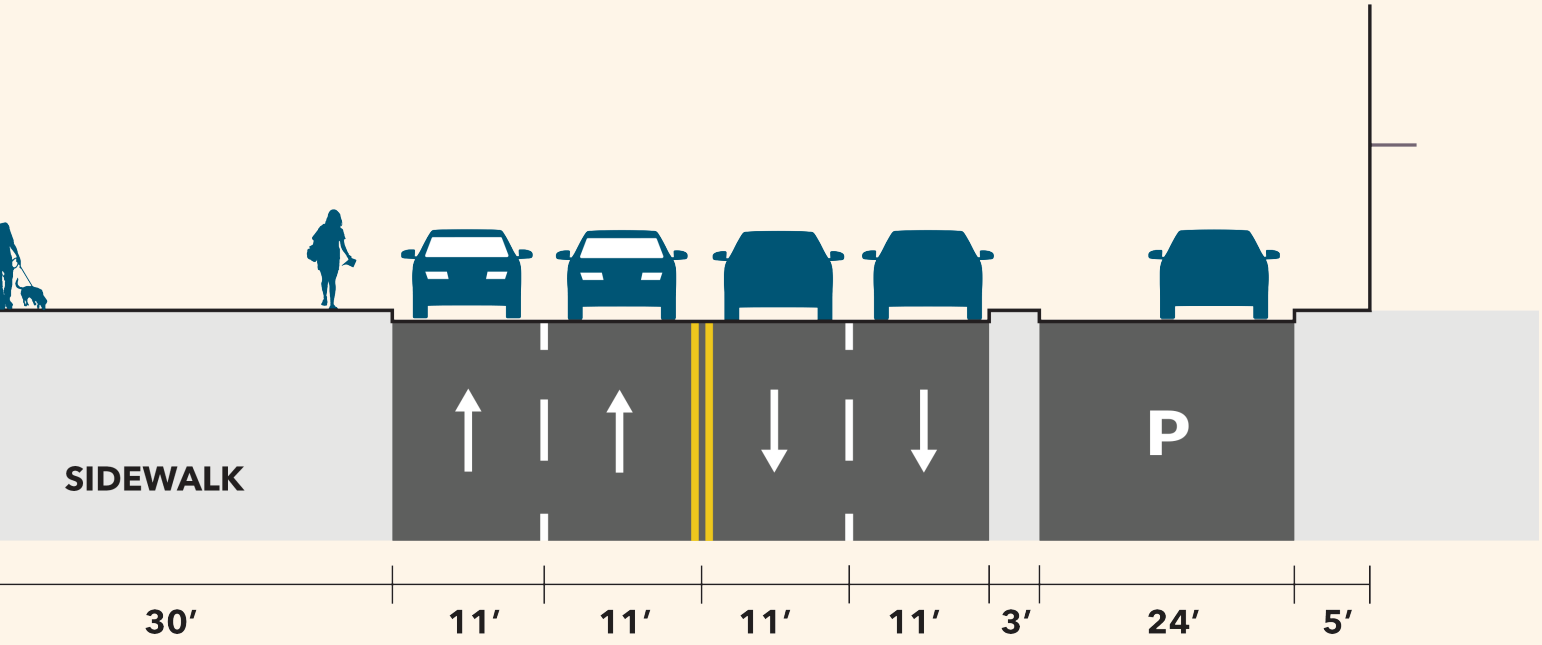
The first two strategies will promote a variety of transportation modes as alternatives to the automobile. Encouraging more walking, biking, and public transportation will alleviate current heavy traffic conditions, especially along major roads, allowing this plan to propose the third and the most long-term project.

The section of Veterans Drive in front of Charlotte Amalie will be inundated by 3 feet of sea-level rise, which might occur by 2050. Rather than constructing unsustainable grey infrastructure, like a concrete seawall, in an attempt to address sea-level rise, this plan proposes a retreat and redesign as a more cost-effective and environmentally resilient method of coastal protection.

Data source: NOAA analysis

Veteran's Drive will become the true gateway to Charlotte Amalie, a place where tourists and locals alike come to relax, connect, and move. The redesign will essentially replace the highway with a park, creating an uninterrupted fabric from the sea to the park to the historic core of Charlotte Amalie, no longer interrupted by a dangerous roadway.

Redesigning the waterfront of Charlotte Amalie will be a massive undertaking. But considering the inevitable facts of sea-level rise and more intense and frequent storms, this proposal will not only increase the resilience of one of Charlotte Amalie's most trafficked areas but will create a valuable amenity for the entire island. With all green infrastructure at the waterfront, this plan also expects to see it as functional protection to slow down water intrusion to downtown from the ocean and capture stormwater runoff from the hills.


SIDEWALK
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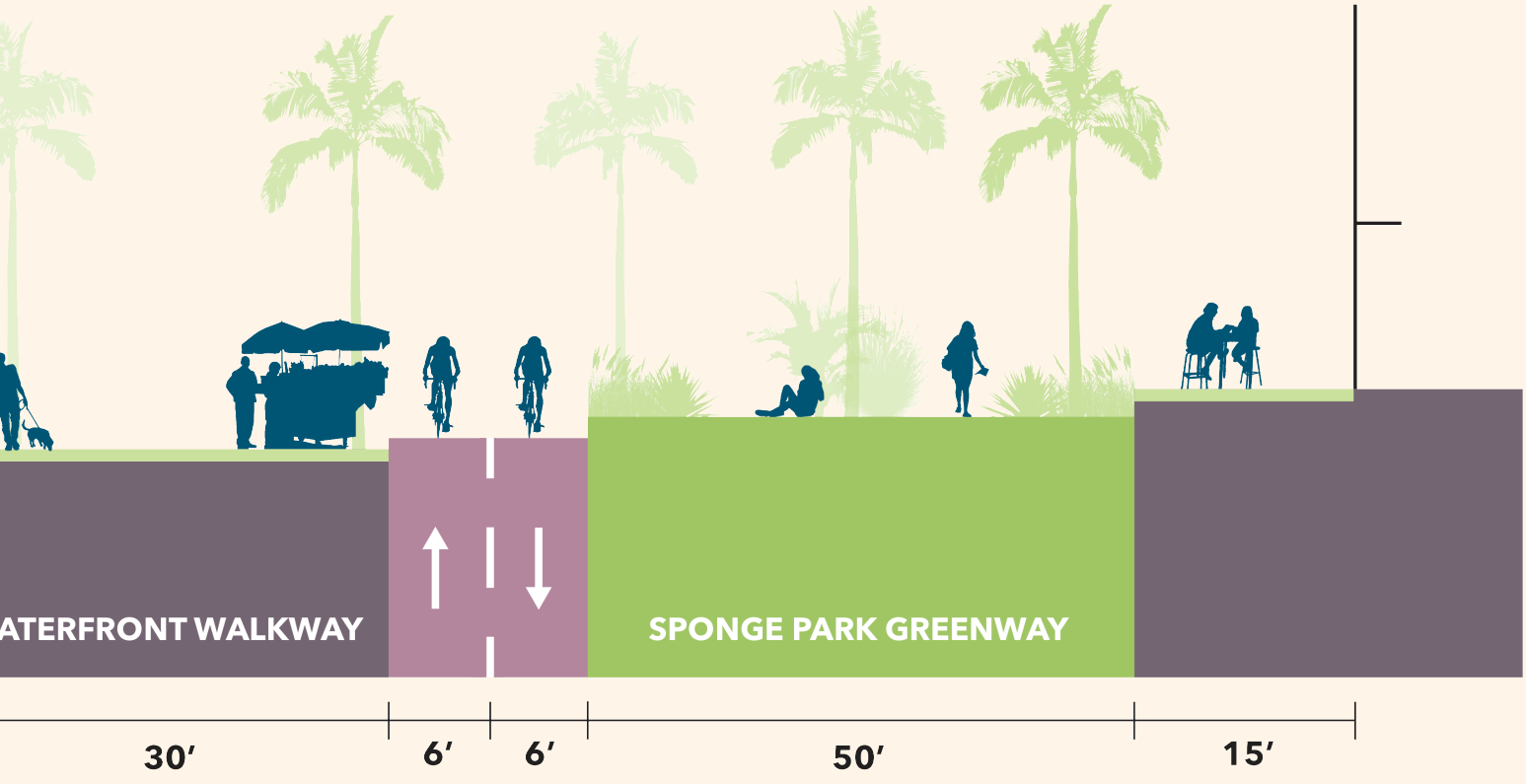
ATERFRONT WALKWAY
SPONGE PARK GREENWAY
30′
6′
6′
50′
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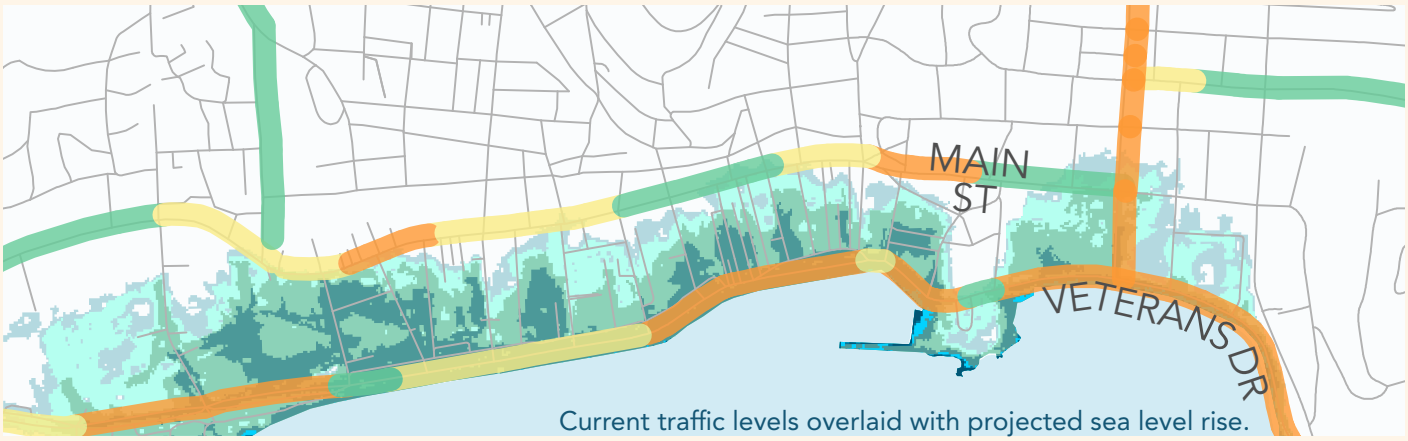
Implementation and funding

Implementation

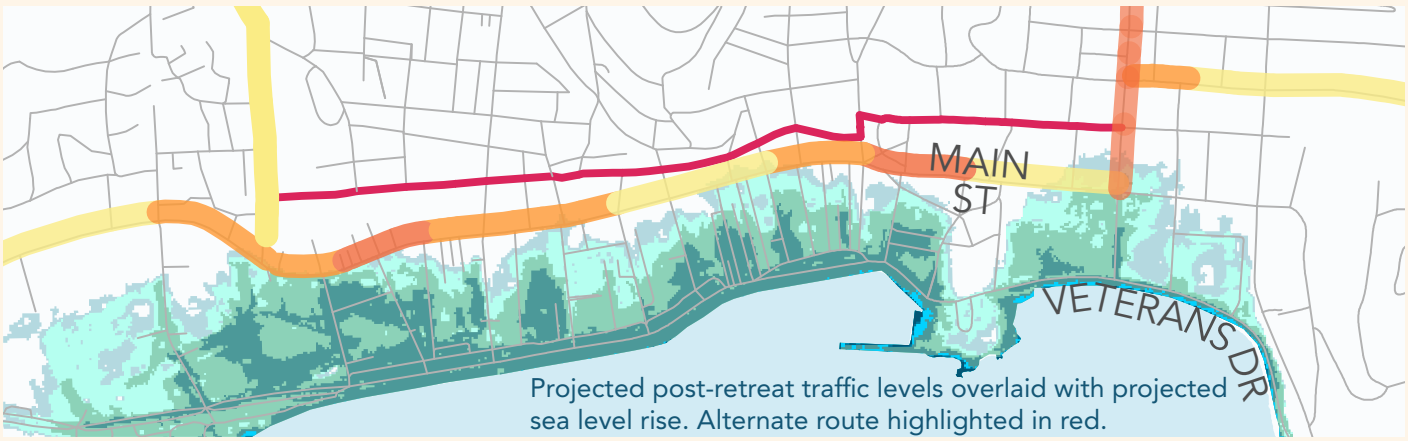
Both of the first and second strategy aim to promote multimodal transportation, thereby reduce resident's reliance on automobile, which buying opportunity for the third strategy to close down the part of Veterans Drive in front of Charlotte Amalie.

The first strategy will be implemented in three stages. The first phase involves building the parking structure and transit center at the Fort Christian parking lot to provide alternate modes of transportation to Charlotte Amalie's core while also accommodating vehicles parked along roads to prepare the core area for automobile closure. The second phase involves closing Main Street in Charlotte Amalie to automobiles on weekends. It is easy to close Main Street because it is in great condition for pedestrianization. The third phase involves closing the core area's north-south roads.

The second strategy will be carried out in two stages. Due to the scarcity of data on road conditions, this plan recommends conducting a field assessment to assess the conditions of alleys and roads as the first step in this strategy. The investigation will take into account the width of the road, traffic flow, pedestrian passage, and parking capacity. The second phase consists of adding greenery, paving the road with permeable materials, and installing bike ramps to ensure bike safety on selected



Current traffic levels overlaid with projected sea level rise.



Projected post-retreat traffic levels overlaid with projected sea level rise. Alternate route highlighted in red.

road segments.

The third strategy is a long-term recommendation that serves as a retreat from the waterfront. The first step in implementing this change is to close vehicle access to Veteran's Drive in front of Charlotte Amalie's core and redirect traffic flow on Veterans Drive to adjacent roads, such as Main Street. Redirecting traffic from Veterans Drive to Main Street, however, might put a significant strain on Main Street. This plan also recommends adjusting the less congested road Wimmelskafts Gade to the north of Main Street to accommodate some traffic flow to reduce such a burden. Rather than keeping the two-hour on-street parking along the streets, this plan suggests removing that parking and turning the road into a two-way street during peak hours. The second phase of this strategy is to remove the four-lane Veteran's Drive and replace it with a 30ft wide waterfront walkway, plus two six-feet lanes, plus a 50ft wide sponge park greenway to serve as a public green space as well as an infrastructure to prevent flooding in the core and absorb runoff from the island.

Source: https://www.grants.gov/learn-grants/grant-making-agencies/department-of-transportation.html

Source: https://www.fhwa.dot.gov/environment/air_quality/cmaq/

Funding

The funding source for prioritizing pedestrians and bikers in the core of Charlotte Amalie, establishing parking and transit facilities can be secured from the Surface Transportation Program (STP), which provides funds for fringe and corridor parking facilities, bicycle and pedestrian facilities, and intercity or intracity bus terminals and bus facilities. Another funding source is the Congestion Mitigation and Air Quality Improvement Program, which supports projects that benefit air quality or provide congestion relief.

The funding source for the safer residential streets program can be secured from the STP. FEMA's Hazard Mitigation Grant Program is another potential funding source for establishing green streets and alleys because these streets will also serve a role to absorb run-offs and mitigate flooding.

Potential funding sources for redesigning Veteran's Drive include the Community Development Block Grant (CDBG), and the Building Resilient Infrastructure and Communities (BRIC). Both programs offer grants for hazard mitigation projects.

Person Capacity Per Lane By Mode

Source: NACTO

Equitable access to food and shelter

In an attempt to address the previously discussed issues, we envision a St. Thomas where Housing and food are affordable, accessible, and benefit the island equitably. Integrated rental housing and increased density will curate walkable mixed-use developments. High quality shelter will protect residents from natural hazards, while also allowing new and longstanding farmers to thrive on accessible land.

We conducted a suitability analysis to determine the best locations for new housing development based on the following factors:

1. The ideal parcel size (which is determined by the zoning code),

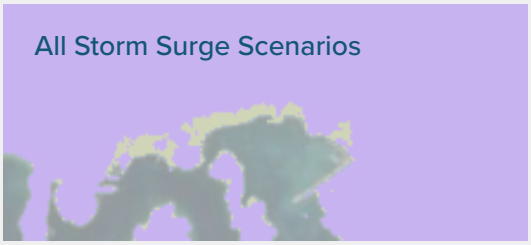
2. Areas of the island that are not significantly impacted by different environmental hazard scenarios,

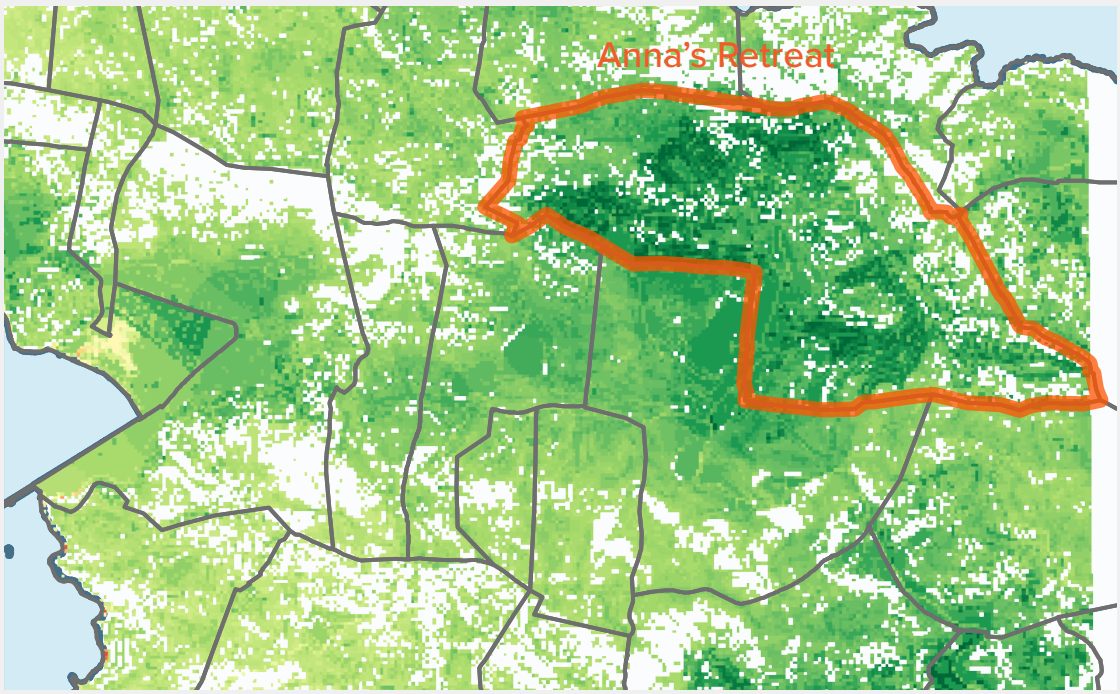
3. A desirable slope percentage,

4. Land in close proximity to bus stops and commercial centers.

All of those factors were combined and weighted evenly and areas with the highest score of 10 were set in dark green on this map.

 Image Source: NBC News



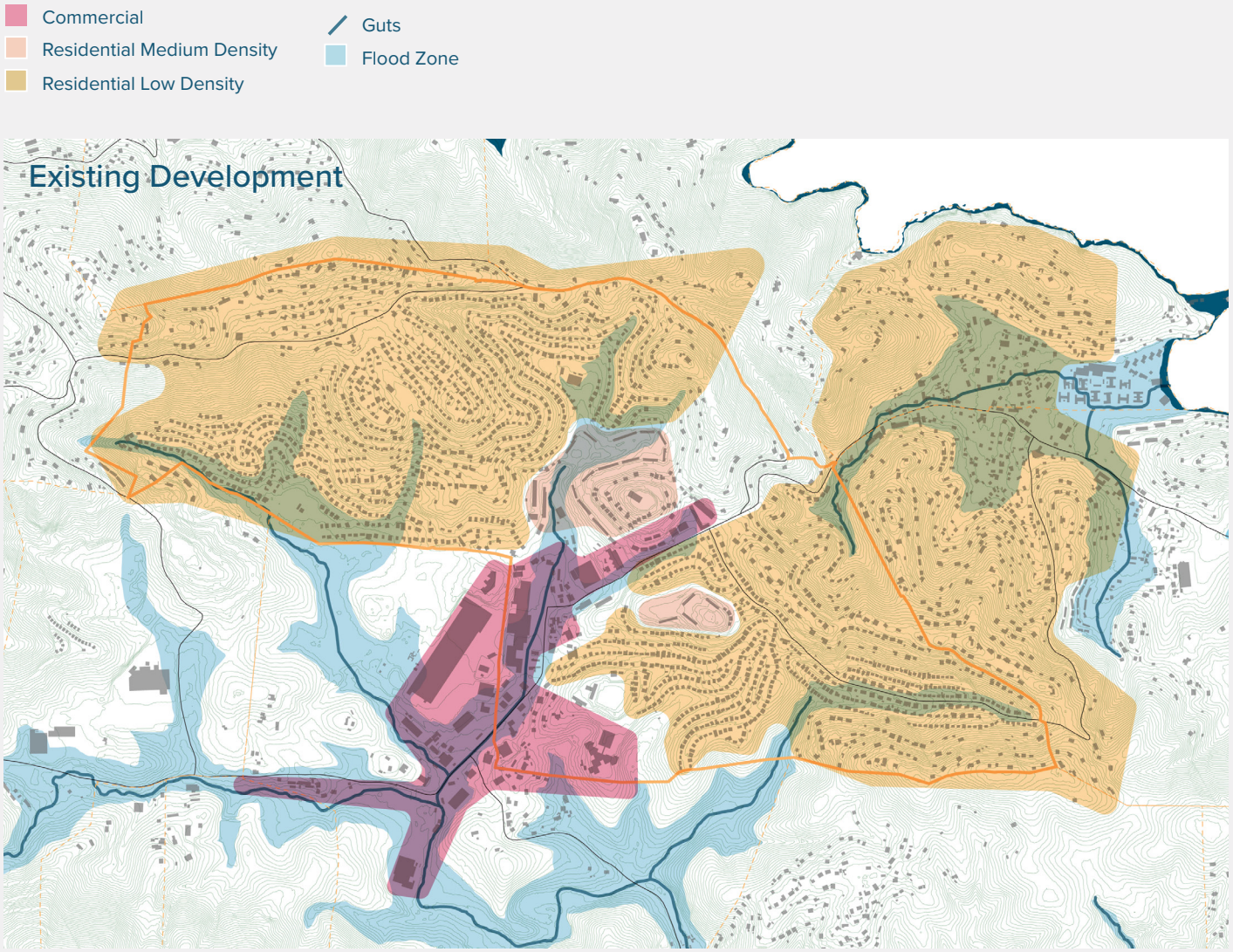


Better Site Suitability

2.1

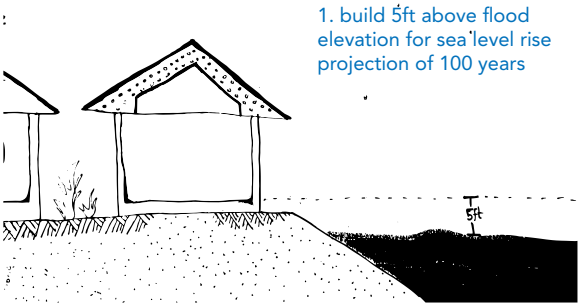
Build more density with mixed use development.

On this map, the commercial area are shown in pink, and the residential areas in shades of yellow. We think that parts of the existing commercial areas could be redeveloped into walkable mixed-use developments with higher density housing units. However, new developments should be careful to navigate existing flood zones --which were are seen here in blue—by relying on flood informed building techniques and design. These new developments would also serve the dual purpose of building more affordable housing to help alleviate some of the rental housing demand while serving as public space with food retailers. The safe crosswalks and streetscape improvements we outlined in the previous transportation section of our plan can also help meet the needs of the surrounding community within walking distance.

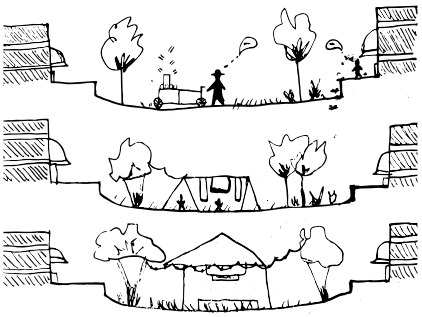


Source: UPenn Studio

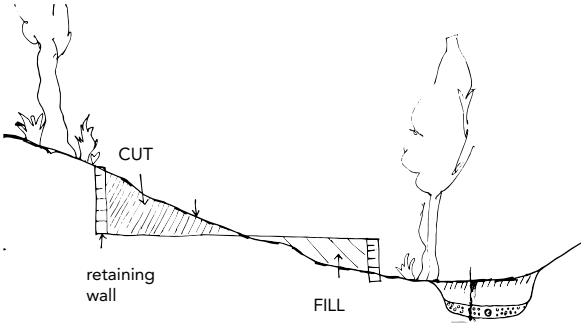
Mixed-Use Building Guidelines



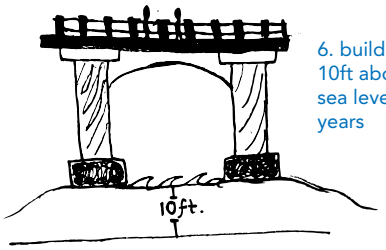
1. build 5ft above flood elevation for sea level rise projection of 100 years



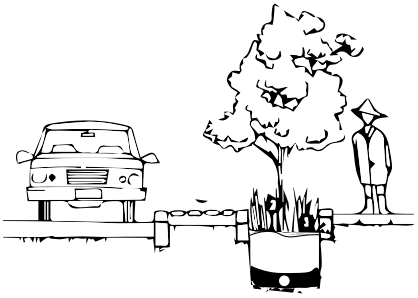
5. common green spaces within mixed use development



2.. Use a cut floor ratio

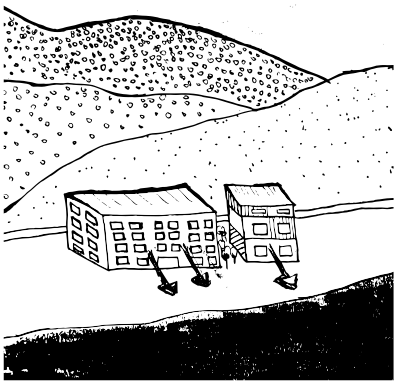


6. build critical infrastructure 10ft above flood elevation for sea level rise projection of 100 years

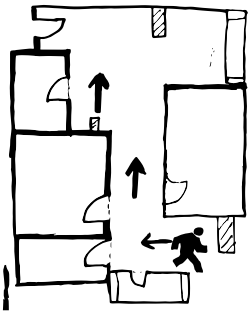


3. implement stormwater management practices

7. curate common programming with retail on the 1st floor



4. 15ft setback from floodplain

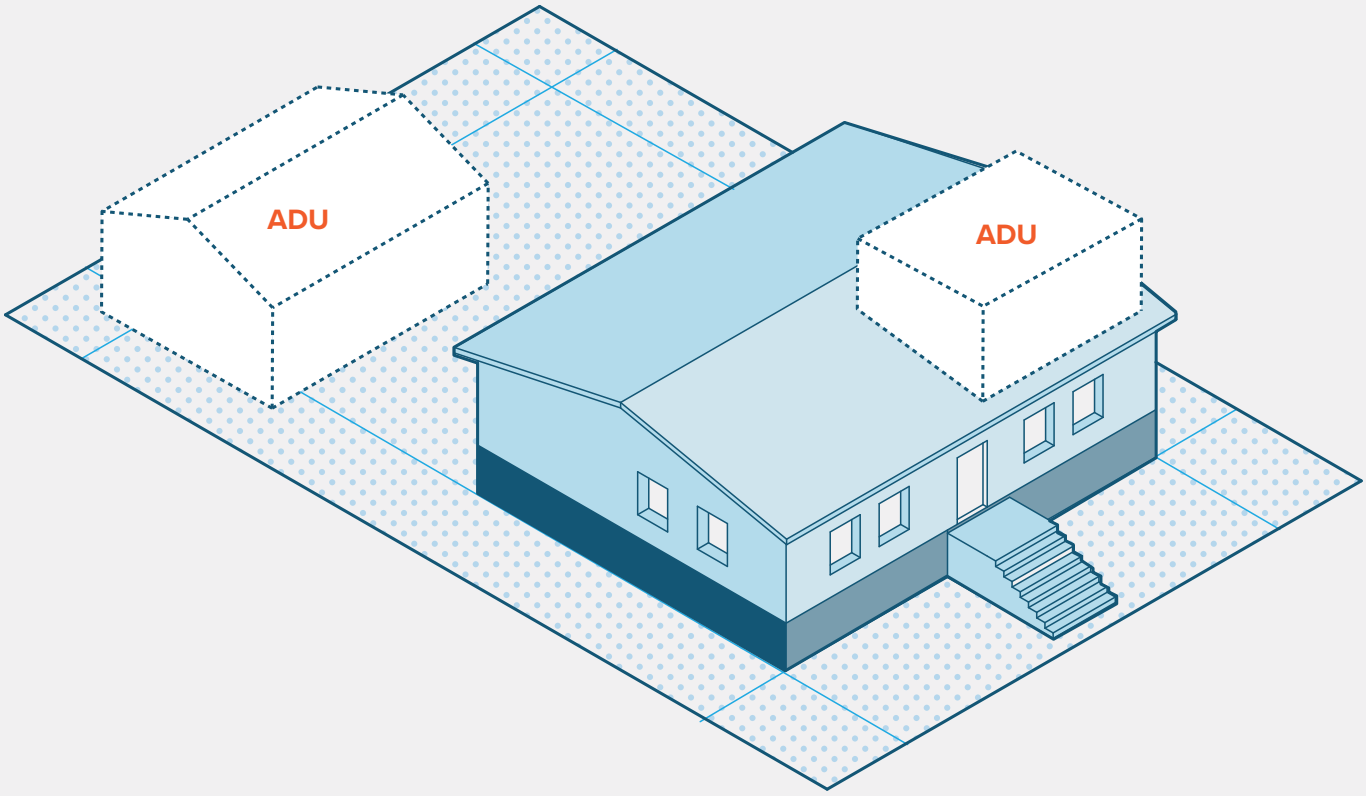


8. Establish clear wayfinding and emergency routes

2.2

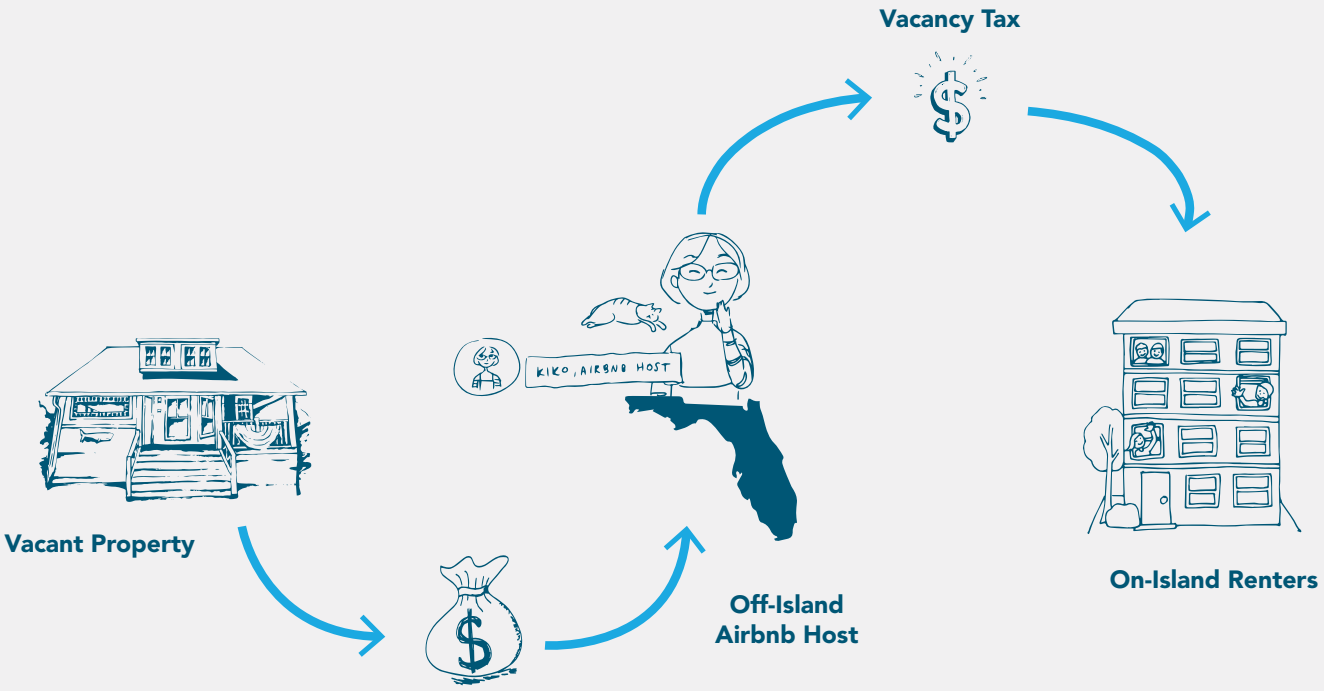
Foster density with ADUs .

Acessory Dwelling Unit or ADU programs can develop more practical housing for the elderly, disabled, and young professional demographics in markets that are dominated by single family homes. In some areas - these types of units are called granny flats and are marketed as a good model for multigenerational housing. These accessory housing units could be built outside of the existing housing unit, within it, or as an extension to it. ADUs offer an affordable construction option because they don't require new utilities to be laid and are located on existing lots ----removing land cost as a factor. Looking to several precedents in the US, there could be a loan program to fund a portion of the cost of the ADU construction or conversion if they are rented at affordable rates. This program also recognizes that this is probably done informally in many instances and can give homeowners assistance to bring units up to code and formal rental agreements providing renters with tenant rights.



2.3

Create rental assistance fund with vacancy tax revenues.



With this strategy, we aim to impose a tax on residents with second homes in the territory, ideally targeting individuals that purchase properties for seasonal use, to later list them on vacation rental websites like Airbnb. The funds garnered from this additional tax would be dedicated towards a rental assistance program, offering grants to cost-burdened low-income renters. Additionally, we recommend that the entire territory adopts a policy to require formal registration through the Department of Licensing and Consumer Affairs for all rental homes, and not just vacation rentals, using the data to ensure individuals in these units are not exploited. Caribbean populations from other countries and other non-citizens often fall out of eligibility for federally funded affordable housing assistance, so the proposed rental assistance fund would also aim to accommodate the needs of these populations that are essential to the island's community.

2.4

Implement a voluntary buyout program.

The Department of Planning and Natural Resources (DPNR) informed us that the U.S. Army Corps of Engineers jeopardizes the safety of homeowners without a clear title or deed, as these individuals are ineligible for buyouts, or monetary offers in exchange for the army corps removing their housing unit to allow for infrastructure projects to be built —further endangering already vulnerable homes. For the homes that are bought out, owners are only given offers based on what their properties are worth, which may not be sufficient to relocate or buy a new home... leading to an overall loss in affordable housing units. Thankfully, the Virgin Island's housing finance authority recently announced plans to explore a voluntary acquisition or buyout program in their Community Development Block Grant- Mitigation (CDBG-MIT) action plan, though we recommend creating a voluntary buyout program that prioritizes high-risk areas. Smith Bay, an estate that was found to be at risk by our social vulnerability index, could be designated as one of the first target areas to offer homeowners and renters assistance and housing counseling resources to relocate, as more than 30 homes here are exposed to the effects of tsunami inundation, sea level rise, and other scenarios.

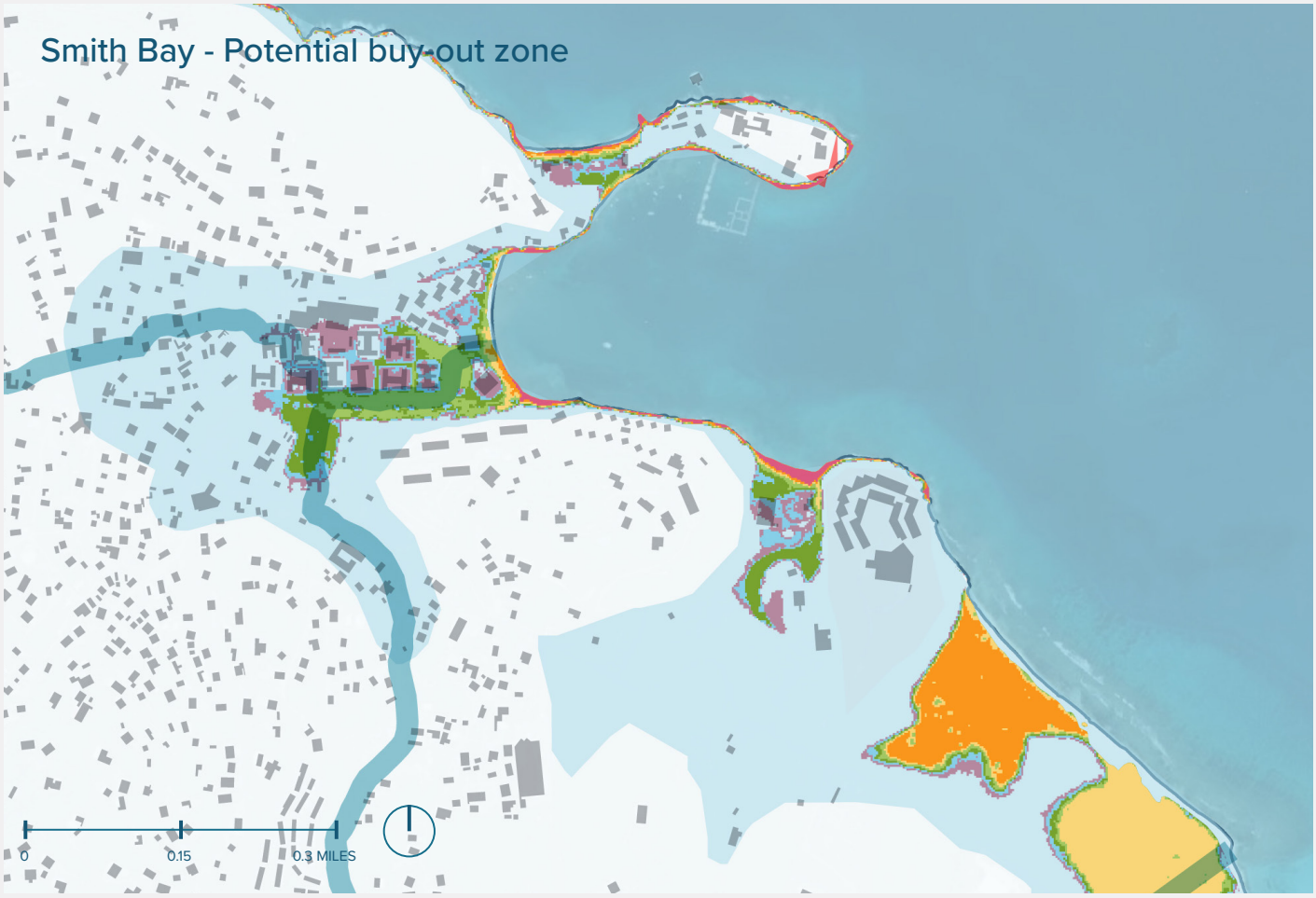
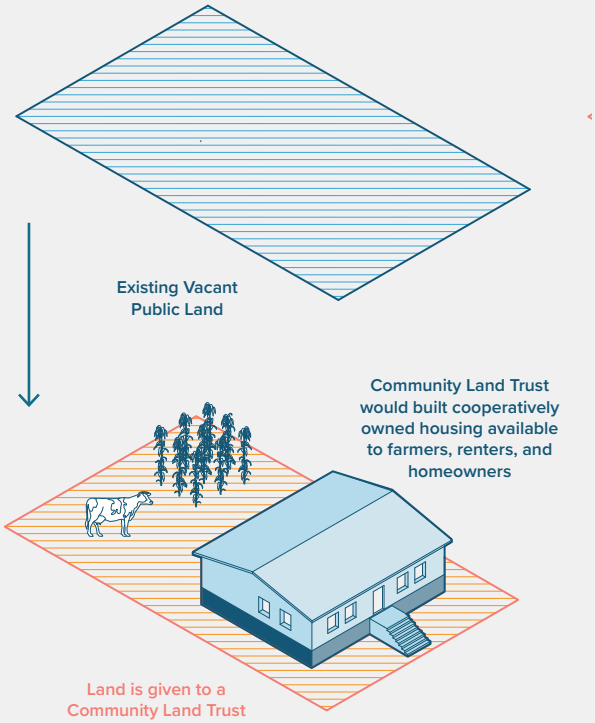
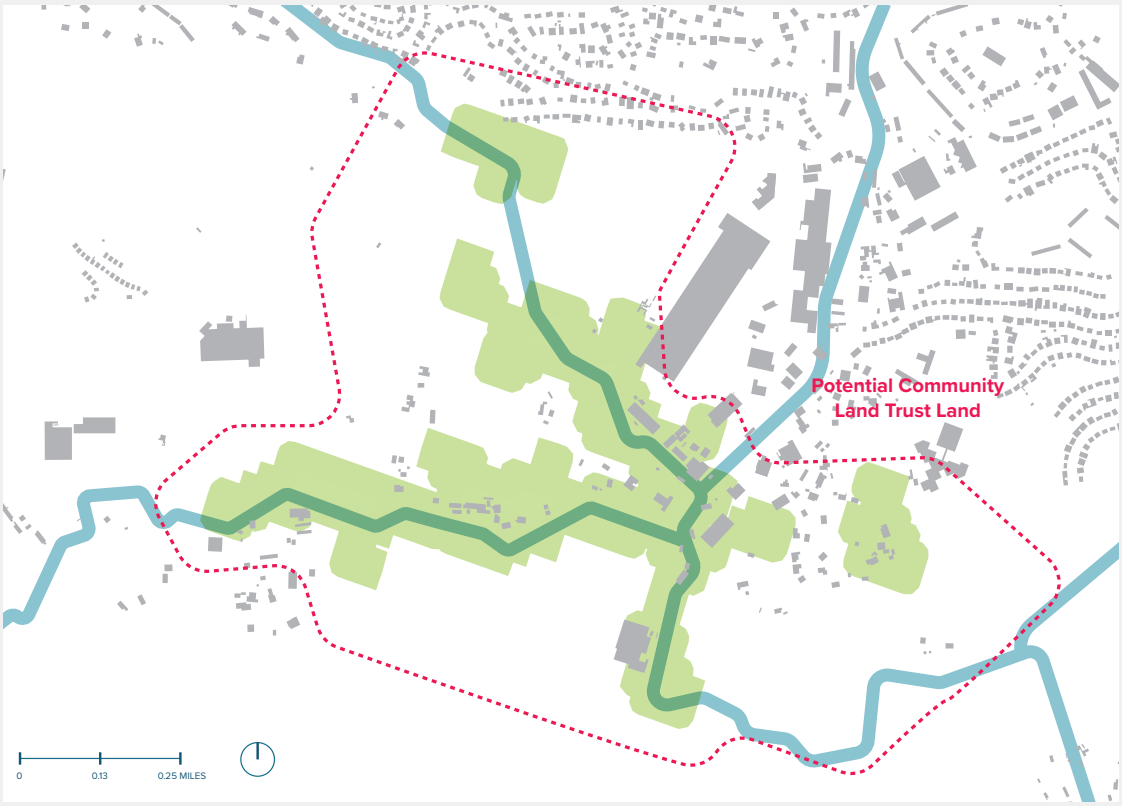


Image Source: USVI DPNR

2.5 Create a community land trust.

We were inspired by the Cuban government's land leasing program, which allows farmers to build homes on government owned land leased for agricultural purposes. However, in the context of the Virgin Islands, we thought that a community land trust, or CLT, would be the best approach to address both housing, land and food unaffordability simultaneously. We propose establishing a CLT with climate-resilient homes on a site identified as suitable for agricultural use and with territory owned parcels---which will be transferred to an independent, non-profit corporation, focused on providing affordable options for homeownership, rental housing, and small-scale farming opportunities. The CLT's bylaws will stipulate that the land must only be used for affordable housing and agricultural development, and limited to households earning low-to-moderate incomes.





Data Source:Soil Survey Geographic Database (SSURGO), U.S. Department of Agriculture and Urban Development

Implementation and funding

The recommendations detailed above should be viewed as complementary to the ongoing efforts to address the island's housing and food unaffordability crisis. The Virgin Islands Housing Finance Authority (VIHFA) and the Virgin Islands Housing Authority (VIHA) have already used CDBG-DR funding from the Department of Housing and Urban Development to rebuild and construct affordable housing developments destroyed during the 2017 hurricanes. Additional funds for climate resilient housing will be available in the form of CDBG-MIT funds. As such, VIHFA and VIHA would be well positioned to lead the construction of mixed-use developments in areas identified by our site suitability analysis. Density on the island can be further improved with the development of the ADU program, which could be administered in partnership with the Building Permits Division of the Department of Planning and Natural Resources (DPNR) and VIHA. The Department of Licensing and Consumer Affairs already manages the distribution of short-term rental licenses, and can implement the recommended long-term permit. The Office of the Tax Collector within the Lieutenant Governor's Office manages all of the territory's taxes, and will carry out the collection of the vacancy tax on second homes. The Voluntary Buyout program could be implemented by both the Virgin Islands Emergency Management Authority (VITEMA) and the Division of Environmental Protections within the Department of Planning and Natural Resources (DPNR). And finally, the Community Land Trust initiative can be carried out with support from the Environmental Protection Agency (EPA)'s Environmental Justice Collaborative Problem-Solving Cooperative Agreement Program, the U.S. Department of Agriculture's Community Food Project grant, private donations and fundraising efforts, along with loans from finance institutions.

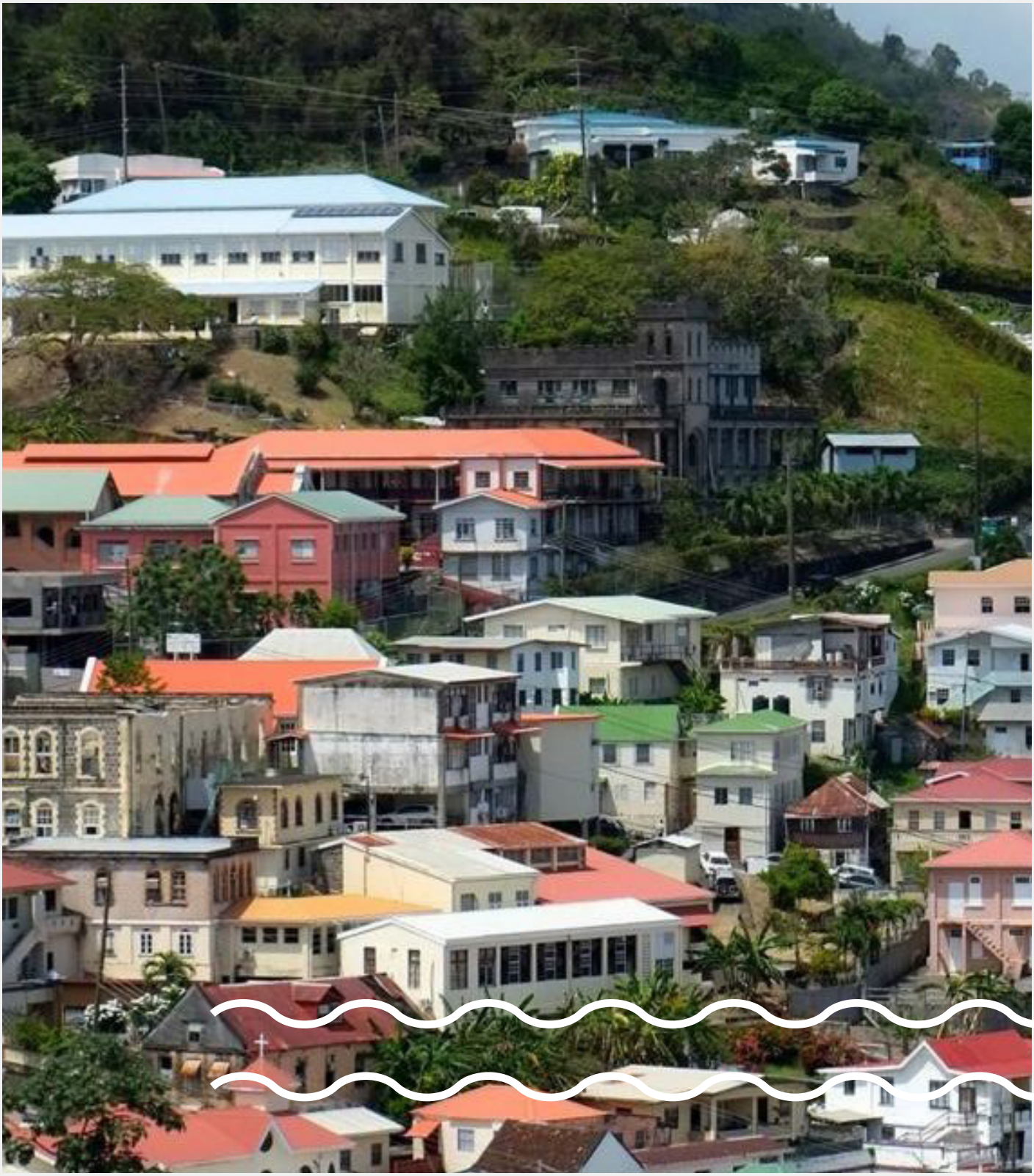


Image Source: US Virgin Island Housing Authority

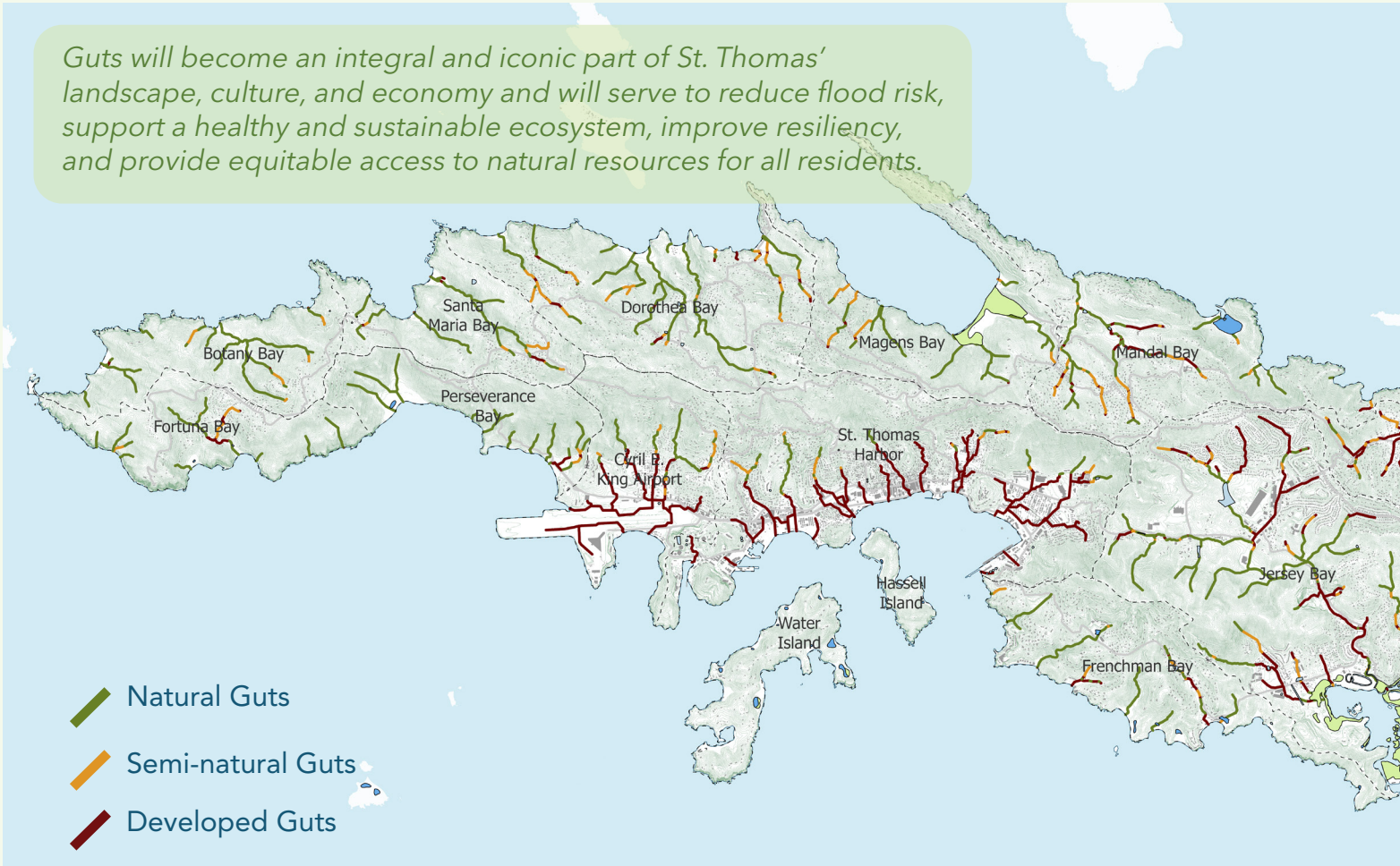
Thriving ecosystems and pristine natural resources

While guts have had a historically critical role in the island's natural and social ecosystems, that role has quickly deteriorated with the onset of development, climate change, and associated pollution. This leaves a clear opportunity to protect and restore guts to their natural beauty and functionality in order to better serve the island's residents and protect the island's environmental integrity.

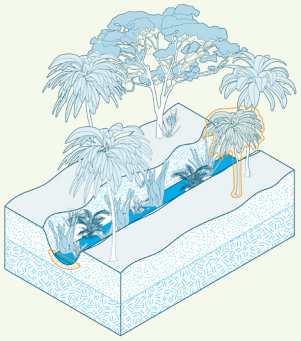
Throughout the island, there are many different guts in several states of health; guts in more rural areas, such as those in the western and northern parts of the island, are typically healthier than those within urban centers such as Charlotte Amalie. In such urbanized areas, some guts have been channelized and sometimes even completely buried.

We have classified the different stages of gut health in order to better tailor our strategies to the needs of each gut. There are several different modern-day typologies of guts influenced by development patterns, which include natural, semi-natural, semi-developed, channelized, and tunneled guts. Each of these typologies carry their own distinct challenges and opportunities. On St Thomas, 51% of guts are natural, 12% are semi-natural, and 37% of guts are either semi-developed, channelized, or tunneled.

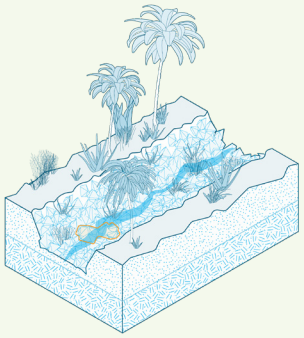
Guts will become an integral and iconic part of St. Thomas' landscape, culture, and economy and will serve to reduce flood risk, support a healthy and sustainable ecosystem, improve resiliency, and provide equitable access to natural resources for all residents.



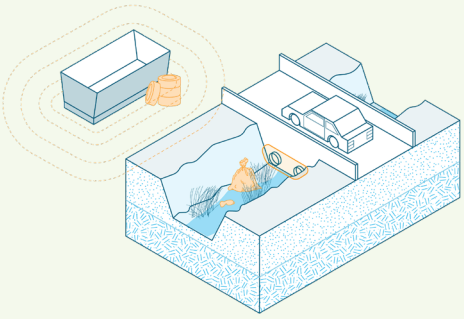
Natural



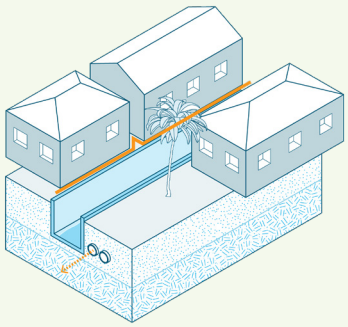
Semi-natural



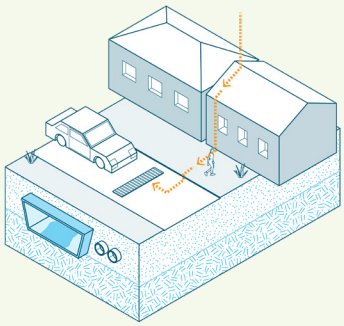
Semi-developed



Channelized

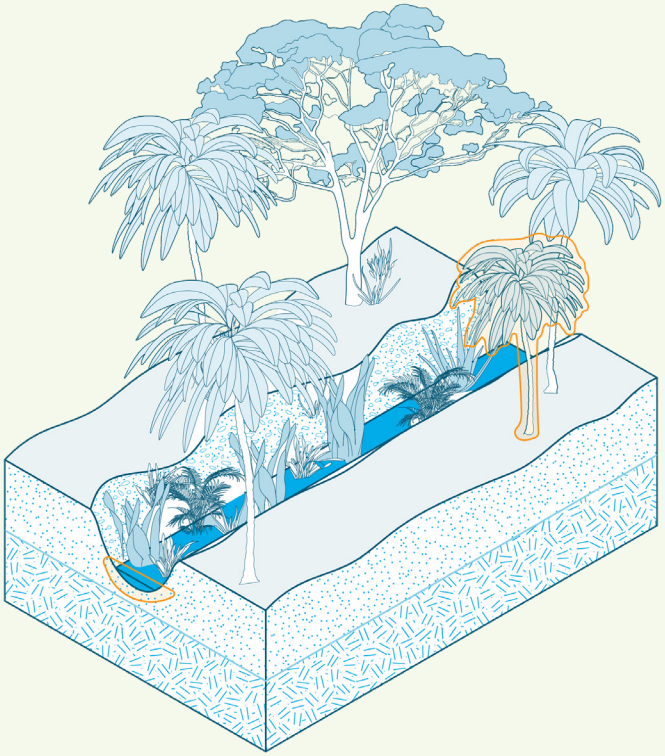


Tunneled



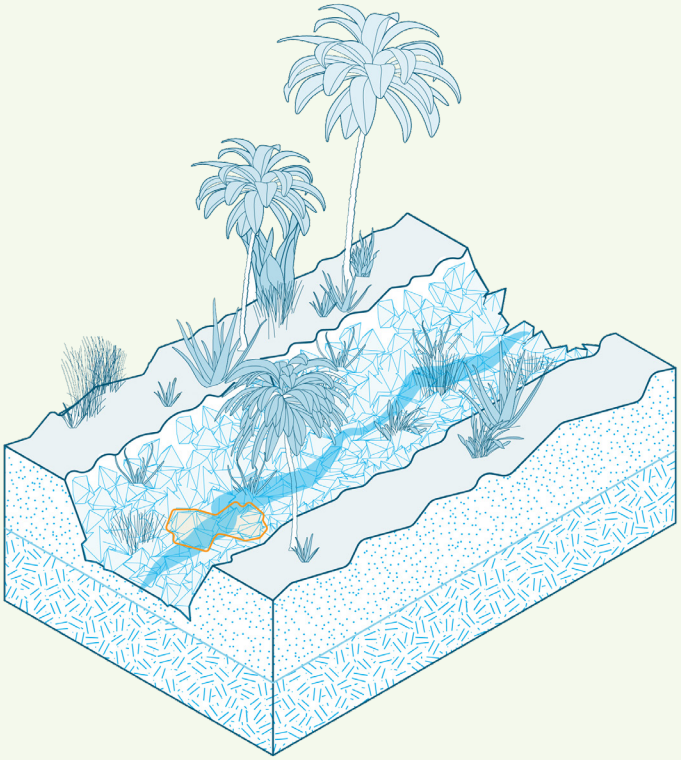
Developed

Gut typologies



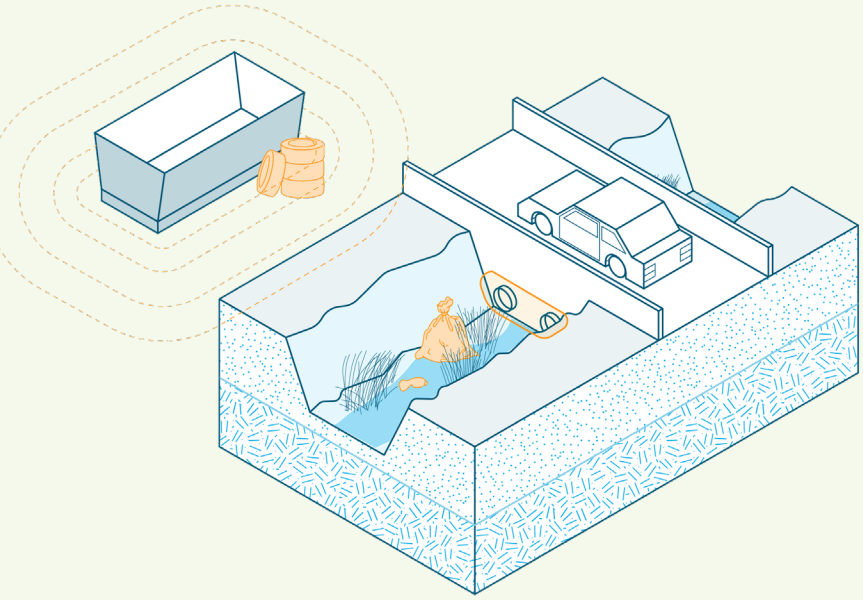
Natural Guts

Natural guts are unspoiled by development. These guts remain an important habitat for some of the St Thomas's significant flora and fauna and provide corridors for wildlife migration. Natural guts are usually found in forested and largely undeveloped areas of St. Thomas, such as in the west and north parts of the island.



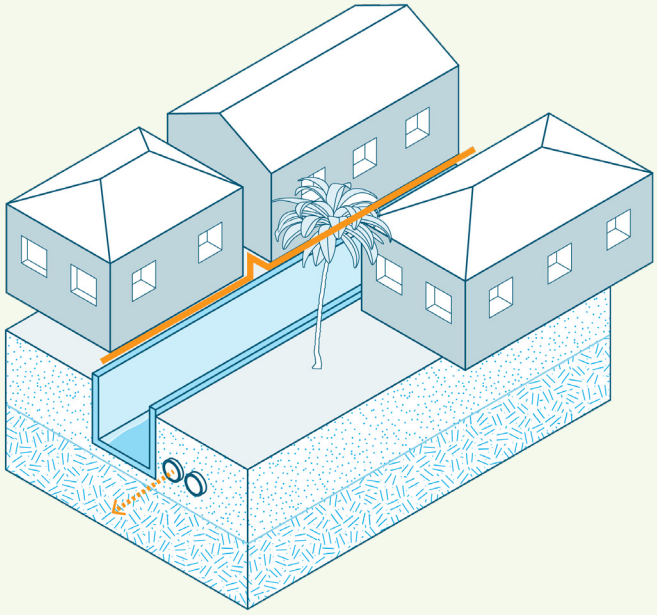
Semi-natural Guts

Semi-natural guts have been somewhat impacted by development due to the presence of buildings within their 30-foot buffer zone, but mostly retain their natural functionality. This type of gut can be found throughout the island, especially within higher elevation areas.



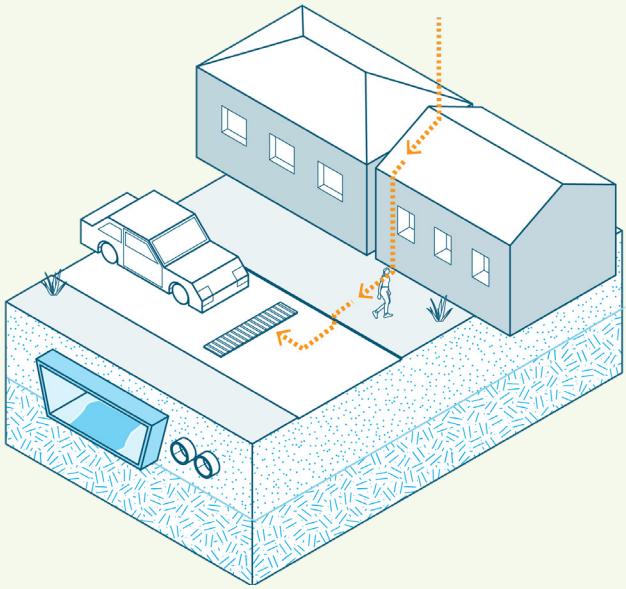
Semi-developed guts

Semi-developed guts are those which have been encroached upon by development, leading to impairment of their natural ecosystem services. We identified this typology through an analysis of the presence of guts within developed landcover areas.



Channelized guts

Channelized guts have been completely encased in concrete and have both higher flow velocities and greatly reduced ecosystem functionality. They are most commonly found within highly urbanized areas of the island and in areas adjacent to roadways.

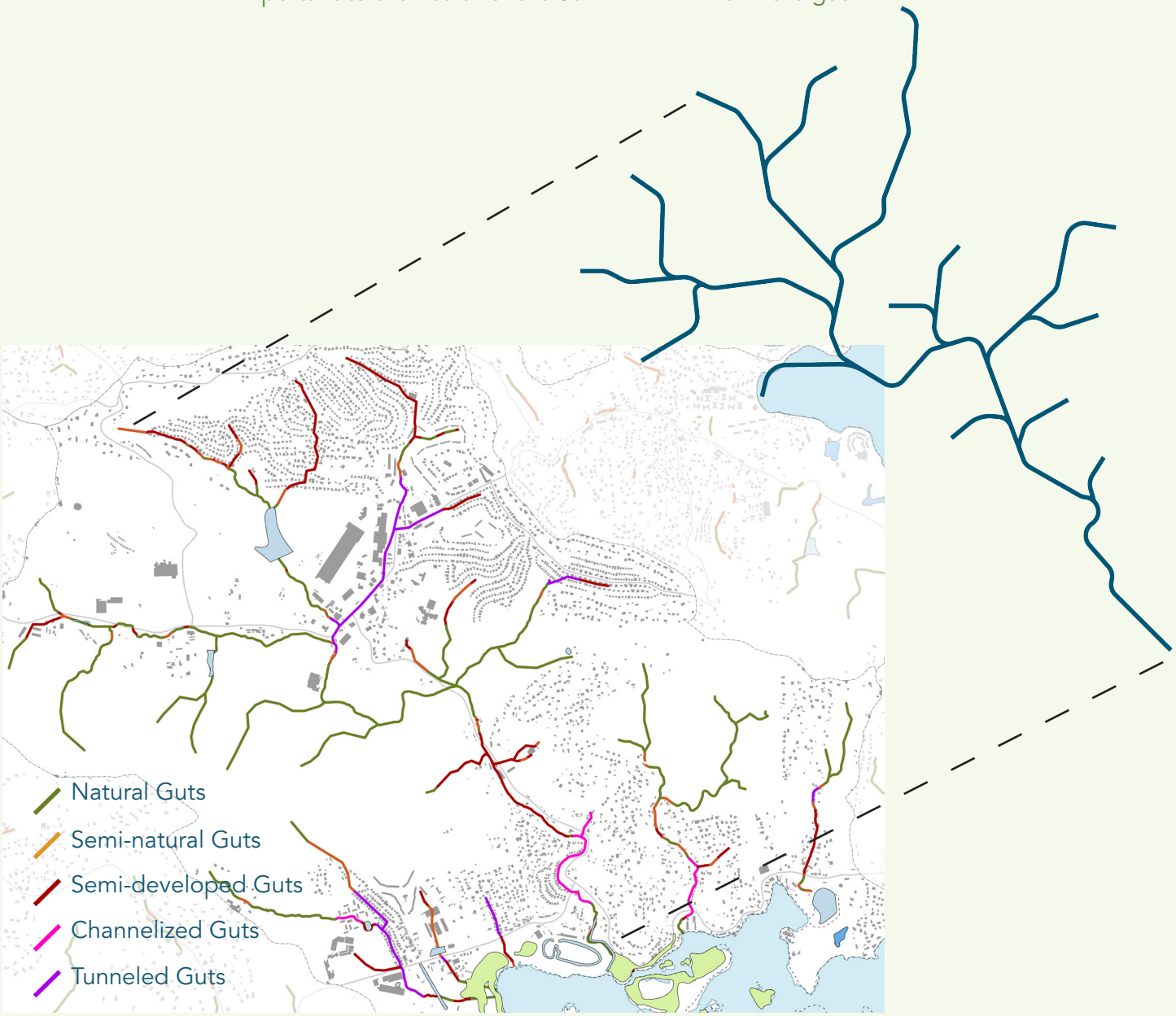


Tunneled guts

Tunneled guts essentially act as stormwater sewer systems. They are most prevalent in the highly developed Charlotte Amalie area, and are completely invisible due to the fact that they are buried beneath the streets.

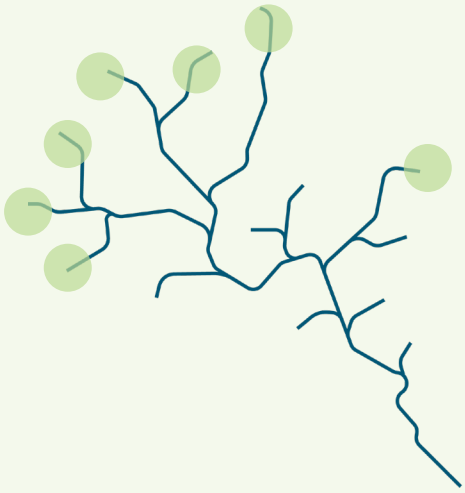
Pilot project: Turpentine Run

Our pilot project for addressing the many issues and opportunities inherent to gut ecosystems will focus on Turpentine Run, the only perennial stream on St. Thomas. It is approximately two miles long and drains the Jersey watershed, which is the largest on the island. We have focused on this gut in particular because it contains all five typologies of development and because it is critically important to the health of the St. Thomas East End Reserve. Development pressures are particularly prevalent in Turpentine Run: intensive development in the upper reaches of its watershed has led to large-scale deforestation and an increase in impervious surface areas. To address the threats of increasing urbanization near Turpentine Run, we propose a variety of strategies which will be tailored to the level of development within the gut.

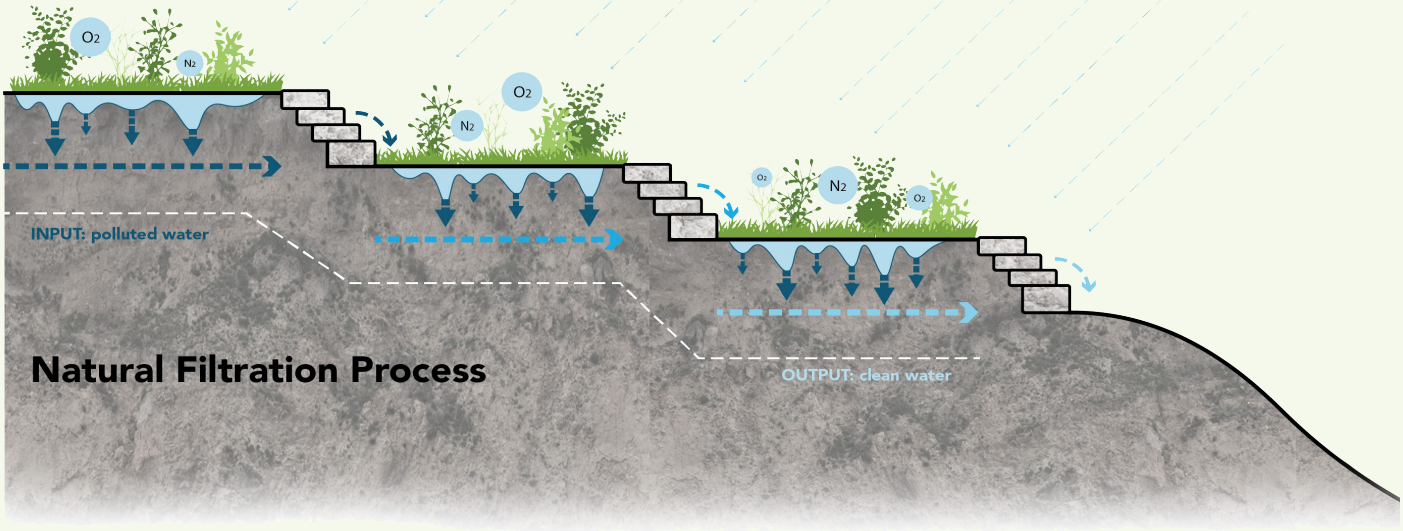


3.1

Introduce upstream terracing to reduce flow velocities.



Terracing is a traditional land-forming technique historically used by farmers to capture water to use for irrigation. However, this is not the only purpose of terracing; upstream terraces can not only create links to agriculture, but can also pool and retain water to reduce the velocity and volume of flow during major storm events to reduce downstream flooding, and can act as constructed wetlands to filter pollutants. We recommend the construction of such terraces throughout the upper topographies of Turpentine Run, particularly within its smaller tributaries.



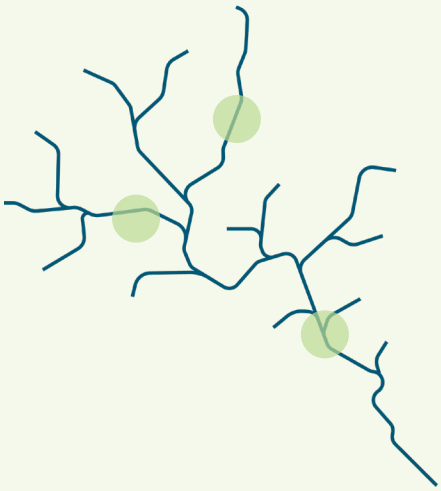
3.2

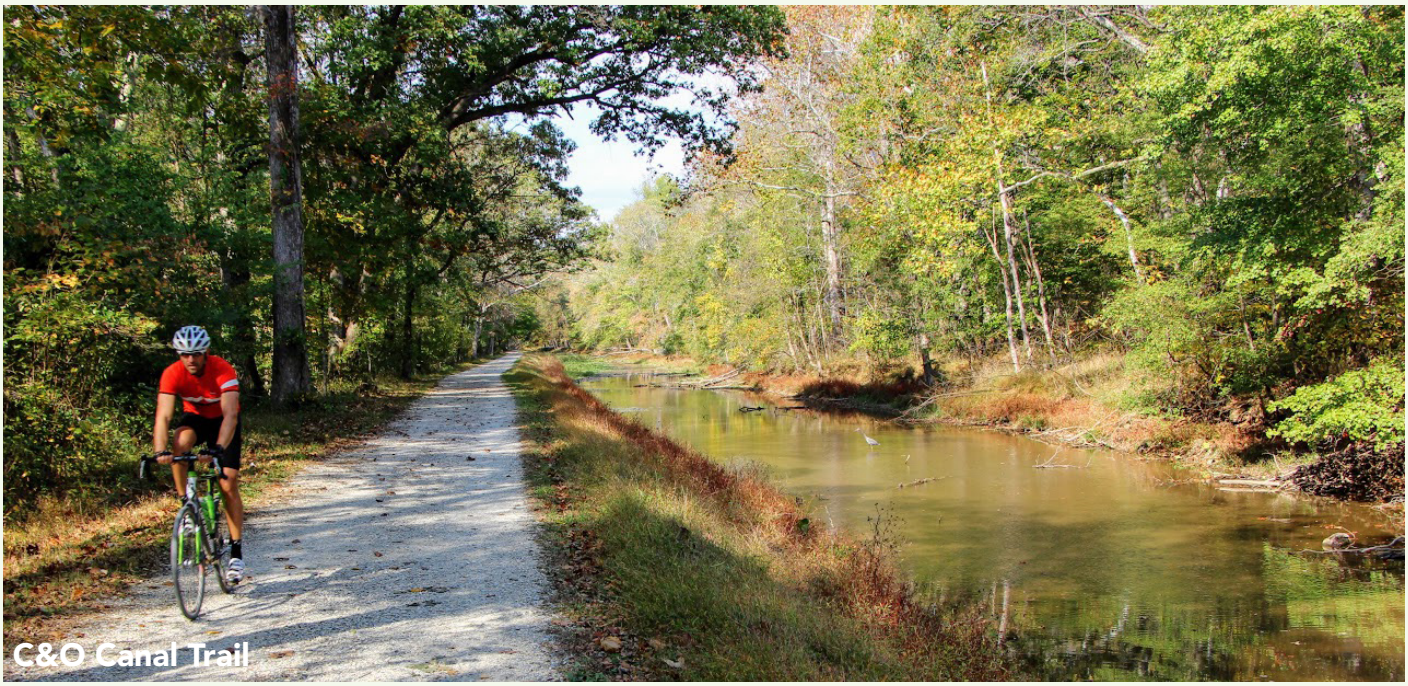
Create parks and trail systems oriented around guts.

A park system following the contours of guts throughout the island will incorporate a trail network, act as a gateway to nature and recreational opportunities, foster scientific engagement and learning, promote stewardship of water resources, and can provide connections for communities which may otherwise be cut off by auto-dominated road lanes in a way that harkens back to how guts were used as modes of transportation by Amerindian tribes.

Image sources:
VITAL News (top)
C&O Canal Trust (bottom)

Trail being created along a gut in Saint Croix



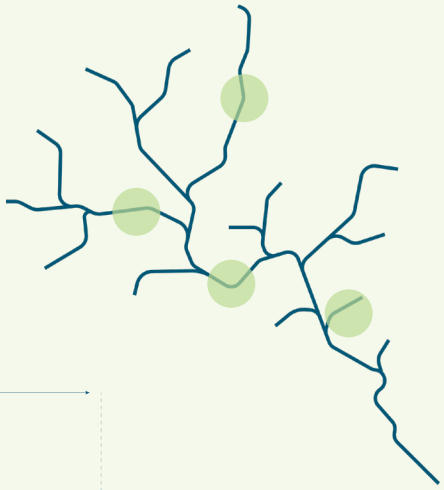


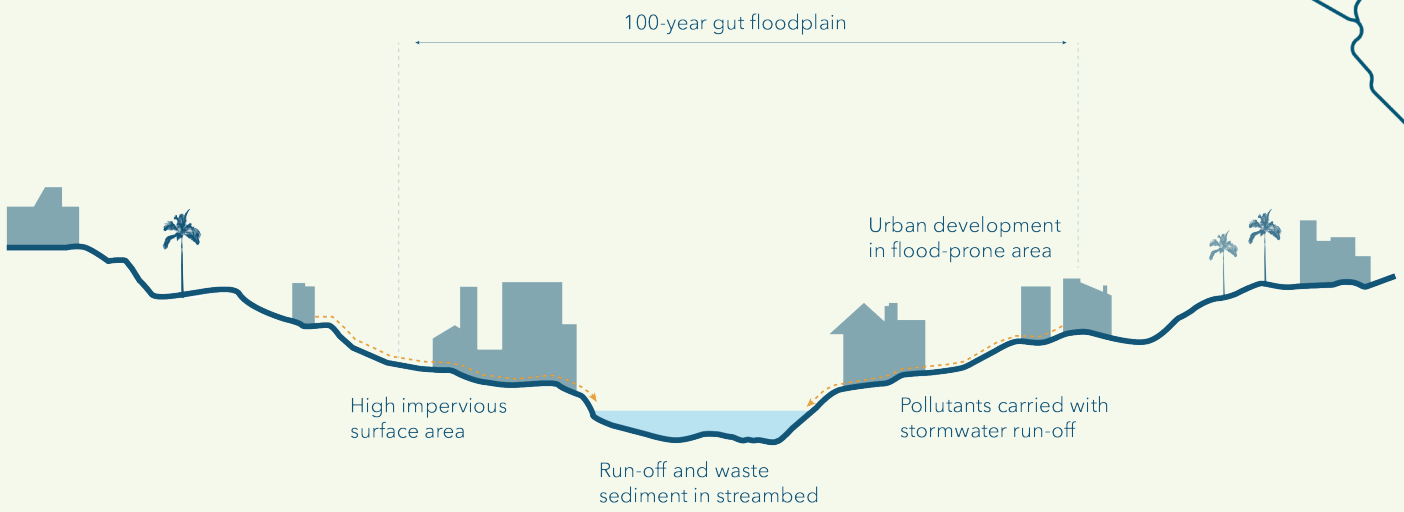
C&O Canal Trail

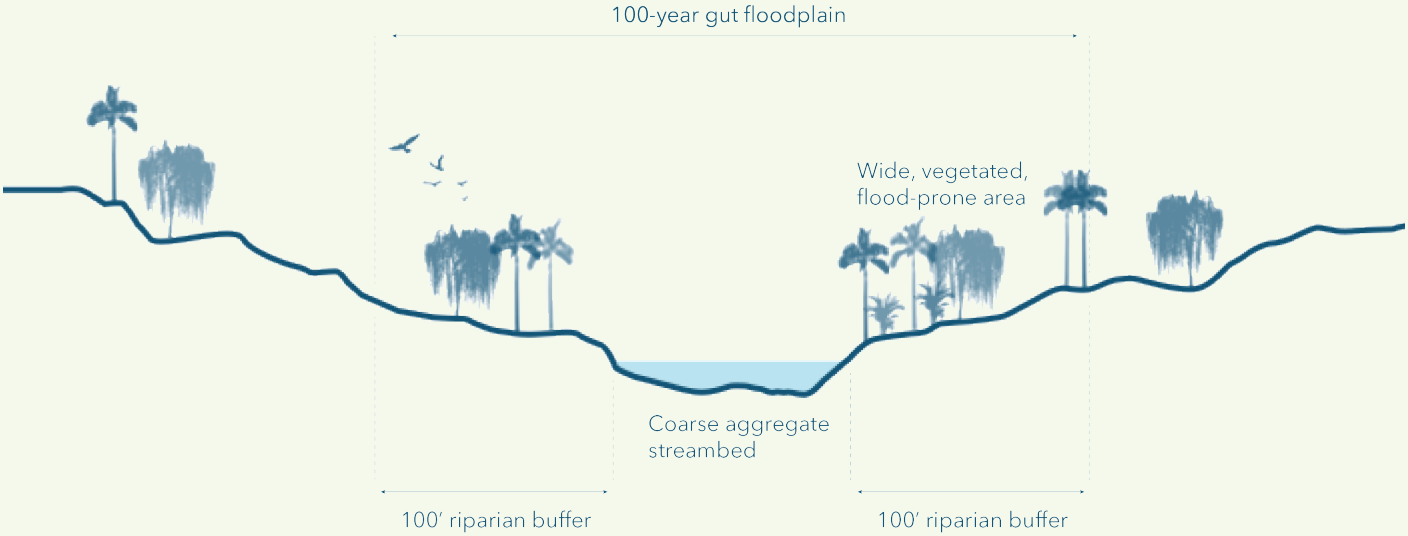
3.3

Conserve and reclaim floodplains to protect both humans and nature.

Conserving existing natural guts can help to retain irreplaceable habitat for native wildlife as well as the natural filtration and flood mitigation properties of guts, while reclaiming and restoring properties within floodplains can reduce loss of life and property in extreme flood events. With this in mind, we propose a moratorium on new development within floodplains, endorse the earlier stated strategy to create a voluntary property buyout program for properties within floodplains, and a gut restoration and maintenance program to be included with the workforce development initiative which will be discussed in section five of the recommendations.



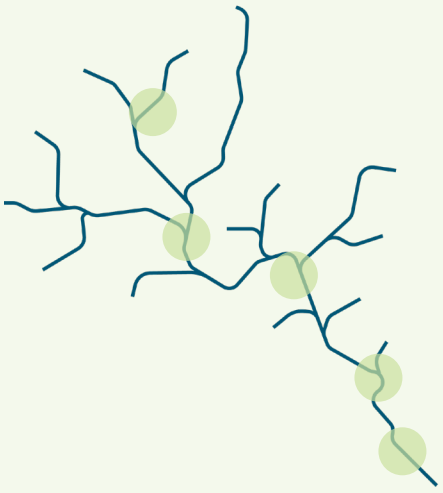


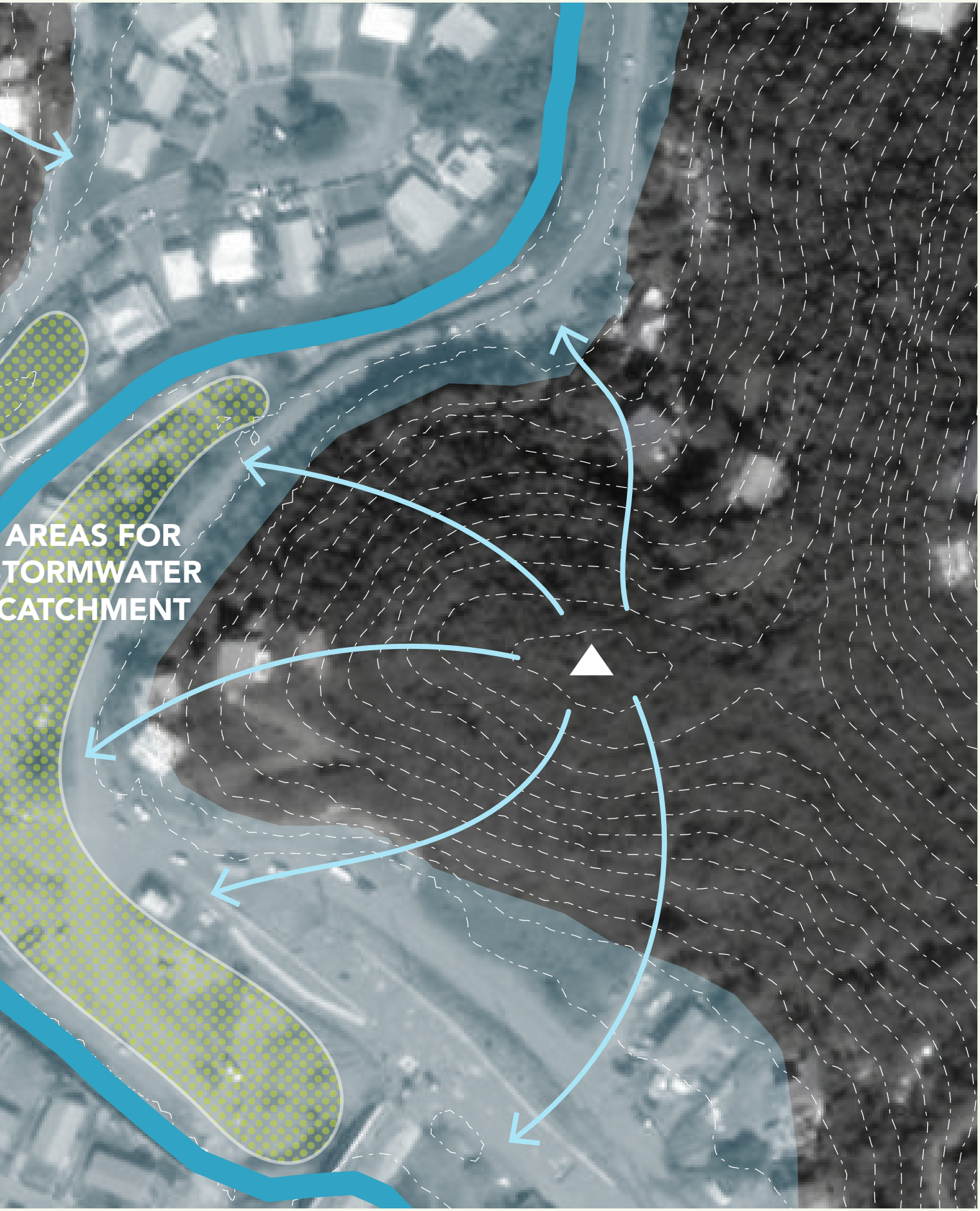


3.4

Mitigate stormwater runoff to preserve the health of downstream ecosystems.

The over-development of lands upstream of, and adjacent to, guts has created an increase in the volume and velocity of stormwater runoff entering gut watercourses. Stormwater runoff can contain pollutants and sediment which threaten the health of downstream ecosystems. To address this issue, we propose a stormwater management ordinance for all new developments, a stormwater management fee for commercial properties, and the identification of potential riparian buffer zones along developed or hardened guts to absorb runoff.

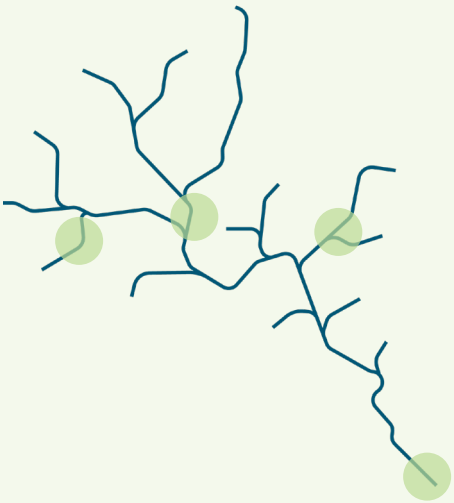


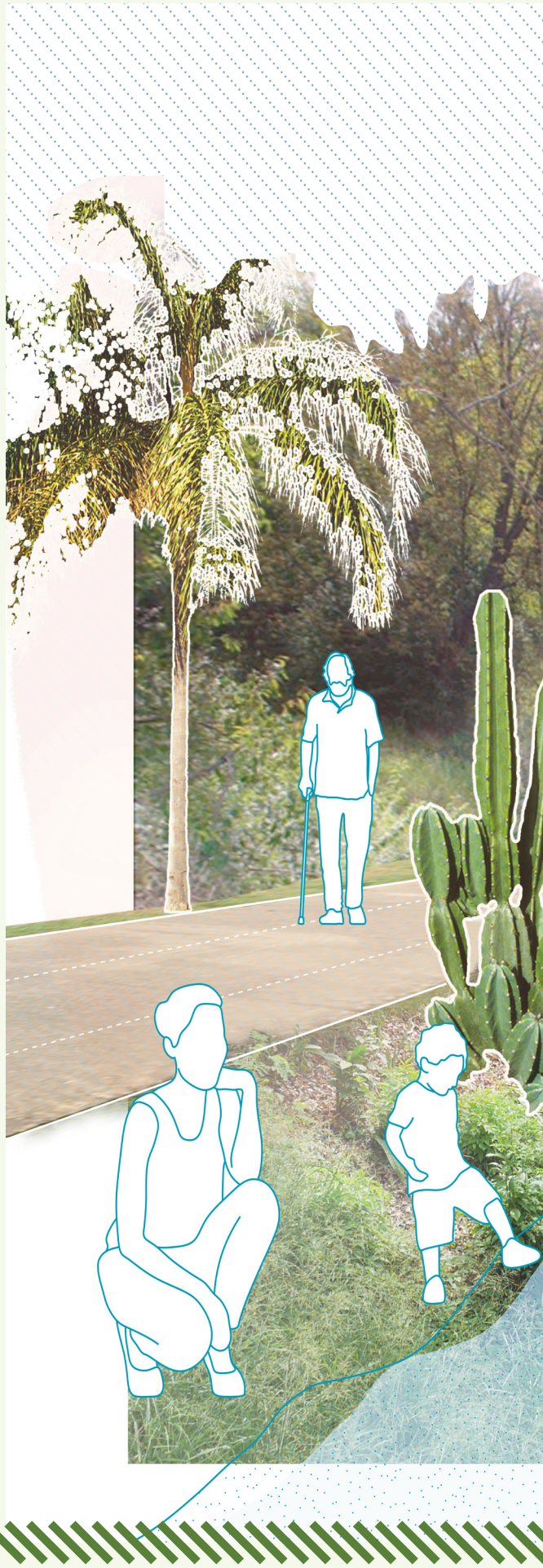

AREAS FOR
TORMWATER
CATCHMENT

3.5

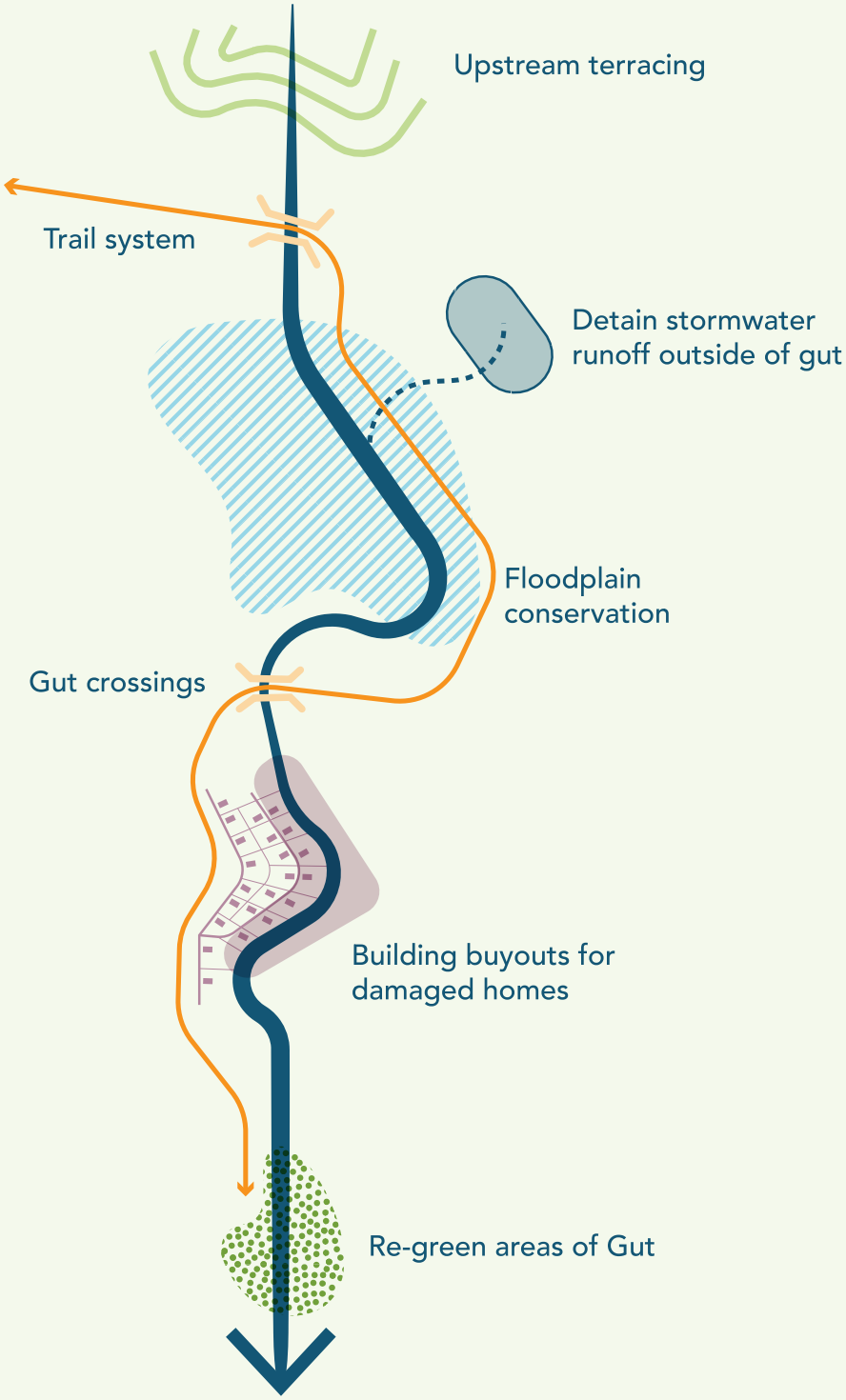
Establish a gut restoration and maintenance team to foster gut stewardship.

To maintain natural and restored guts, we propose the implementation of a gut restoration and maintenance organization to be housed within the workforce development program which will be expanded upon later in this plan. This organization will be responsible for green stormwater infrastructure maintenance along guts, trail maintenance for the gut park system, replanting native species along semi-natural and semi-developed guts, maintenance of restored floodplains surrounding guts, and the installation of upstream terraces.





Implementation and funding



Implementation

To implement these strategies, robust partnerships will be necessary. The Department of Public Works (DPW) has a current program to clear major guts in urbanized areas at the beginning of hurricane season, and therefore would make an excellent partner for gut maintenance and stewardship initiatives. The Virgin Islands Department of Agriculture (VIDA) could work with the many farmers in Bordeaux estate who already terrace guts for agricultural purposes to offer their expertise to a large-scale gut terracing initiative.

The Virgin Islands Emergency Management Authority (VITEMA) will be a strong partner for implementing a property buyout program for homes within gut floodplains. The buyout program can be overseen by the Division of Environmental Protections within the Department of Planning and Natural Resources (DPNR). AmeriCorps provides funding and other non-monetary forms of assistance to programs such as PowerCorps PHL, and has been identified as an excellent partner for the implementation of the gut maintenance workforce development program.

The Environmental Association of St. Thomas – St. John can partner with the Virgin Islands Trail Alliance Corporation as well as the DPNR to design, build, and maintain a gut trail and park system.

The DPNR will also be a crucial partner for crafting and enforcing floodplain reclamation and building moratorium policies as well as for designing stormwater management ordinances and working with the Virgin Islands Water and Power Authority (WAPA) to assess a stormwater management fee to fund stormwater infrastructure.

Funding

A diverse mixture of local, state, federal, and nonprofit funding will fund these strategies. FEMA funding can be used to fund portions of the property buyout program. FEMA grants including the Building Resilient Infrastructure and Communities (BRIC) grant and the Flood Mitigation Assistance (FMA) grant will be critical for funding floodplain reclamation strategies.

Because guts are technically classified as wetlands, they are eligible for funding through 5 Star Wetland and Urban Waters Restoration grant programs, National Coastal Wetlands Conservation grants, and Wetland Program Development grants.

Due to their proximity to the coast, gut-oriented projects can also attain funding from the National Coastal Zone Management (CZM) program's many grants. Finally, due to their classification as watercourses, they are eligible for monies from the Clean Water State Revolving Fund, Water Pollution Control (Section 106) grants, and Section 319 Nonpoint Source Management grants.

Sustainable waste management

Waste management is an integral part of island-wide sustainability and resiliency. Adopting efficient waste management techniques will be beneficial to the environment, the economy, and the people of St. Thomas as a whole.

Recycling is a large missing piece of waste management on St. Thomas. If a recycling program were to be implemented on the island, a $6million annual profit could be realized. We acknowledge that there have been several calls for an island-wide recycling program, such as the one outlined by the USVI Hurricane Recovery and Resilience Task Force in a 2018 report. However, while we support the implementation of such an initiative, we believe that it may not be feasible at this time due to a lack of funding and a lack of global interest in receiving and processing recyclable materials.

Our vision for waste management on St. Thomas utilizes a diverse mix of strategies and a focus on re-use of materials to divert waste flows away from Bovoni and improve the health and safety of residents and the environment.

We have compiled a list of proposals and ideas that will guide St. Thomas towards a more sustainable future. These include:

1. Conducting a periodic waste assessment;
2. Acquiring micro biodigesters to combat excess food and environmental waste;
3. Improving the conditions of the bin sites;
4. Optimizing waste transport;
5. Constructing a Sustainable Building Community Center
6. Piloting a Waste Re-use Arts Program (WRAP)

4.1

Conduct periodic waste assessment to identify areas for improvement.

The Periodic Waste Assessment portion of our proposal will build off of Caribbean Green Technology Center's Waste Characterization and Sustainable Materials Management Analysis reports. This assessment will create accountability across the island and track where changes need to be made.

The Periodic Waste Assessment will start with conducting assessments by sectors:

- Hotels/resorts
- Restaurants
- Cruise Ships
- Development (Construction)
- And Agriculture

We propose to Implement a fee structure to enforce reporting supported by local government as well as set waste reduction goals for top producing sectors. The fees will subsidize bin collection and sorting operations.

4.2

Acquire micro biodigesters to combat excess food and environmental waste.

Another waste management technique we are proposing is the deployment of micro-scale biodigesters at farms, restaurants, and hotels to process food and paper waste in order to lessen the organic waste stream entering the Bovoni Landfill while providing valuable fertilizer to local farmers.

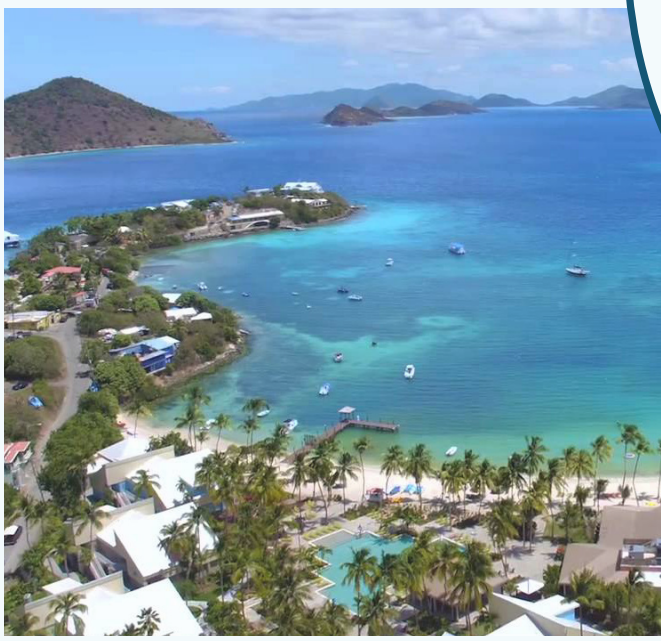
Biodigesters mimic human anaerobic digestive systems; using bacteria to quickly and efficiently break down organic matter, which can then be converted to nutrient-rich fertilizer. They can process food waste, plant matter, and paper. Micro-scale biodigesters can manage organic inputs of 135 to 960 pounds per day, and can produce 100 to 730 gallons per week of liquid organic fertilizer. A 2019 waste categorization study found that in a given day, roughly 440 pounds of paper and food waste end up in the Bovoni landfill.

Data Source: U.S. Virgin Islands 2019 Residential Waste Characterization. (2019). University of the Virgin Islands; Caribbean Green Technology Center; RRS.
Image Source: St Thomas Source, VIConnection, WordPress, Biovert Protein, SARE, EcoMENA, VIConnection

Given the fact that a micro-scale biodigester can handle twice that volume per day and that food waste comprises nearly 16% of the island's total waste stream while paper waste contributes nearly 8%, this one recommendation could reduce the waste stream on the island by up to 24% annually.

Tourism and Agriculture are the industries that could benefit most from biodigesters. These industries account for a large percentage of organic waste on St. Thomas. Margaritaville is one of the largest hotels and waste producers on the island. In Bordeaux Estate, the agricultural jewel of the island, farmers have said that they need more fertilizer. Biodigesters could be an efficient and affordable way to provide that much-needed resource to improve food sovereignty outcomes on St. Thomas.

Inputs: 135 to 960 pounds per day of organic waste



Tourism industry (e.g. Margaritaville)

Reduce the waste stream on the island by up to 24% annually

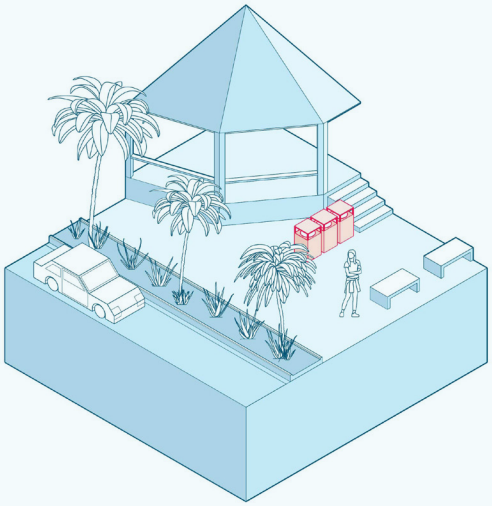
Outputs: 100 to 730 gallons per week of liquid organic fertilizer

Agriculture industry (e.g. Bordeaux)

4.3

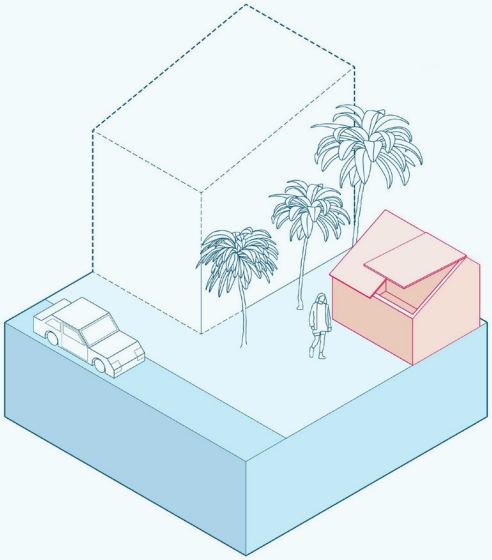
Improve the conditions of the bin sites through a variety of methods.

While diverting waste streams from the landfill is important, so too is the collection of that waste. The bin sites on St. Thomas need to be re-designed in order to become viable for the local communities and surrounding eco-systems. The bin site redesigns will be based on a human scale and various existing site conditions.



Small Bins

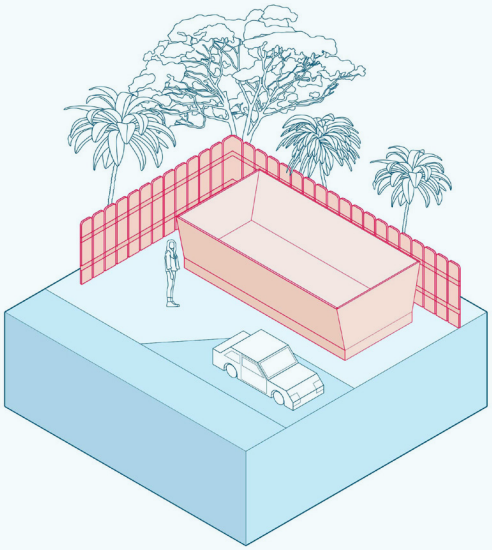
In public spaces, the bins will be small containers that can be accessed by pedestrians. The bins will be designated and separated based on waste type.



Mid-sized Bins

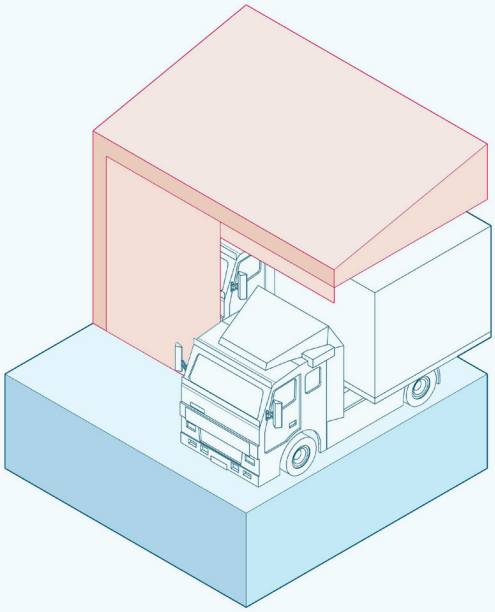
In the residential areas, the bins will be mid-sized dumpster bins with closable lids to prevent polluting the surrounding area with waste runoff. These bins can be accessible by way of car or on foot.

Image Source: House Beautiful, Arrow Sanitary Service, Fortress Building Products, ISM Waste and Recycling



Large Bins

For the bins in more remote locations, we propose a larger dumpster with a surrounding fence that will mitigate illegal dumping and protect the natural landscape from waste runoff. These bin sites will be accessible by car due to its location next to the major roads.



Transfer Stations

Lastly, the transfer station will be equipped with a place for trash sorting in order to reduce Bovoni's capacity pressure. The trash will be placed, collected, sorted, and stored awaiting transfer to its respective final destinations.

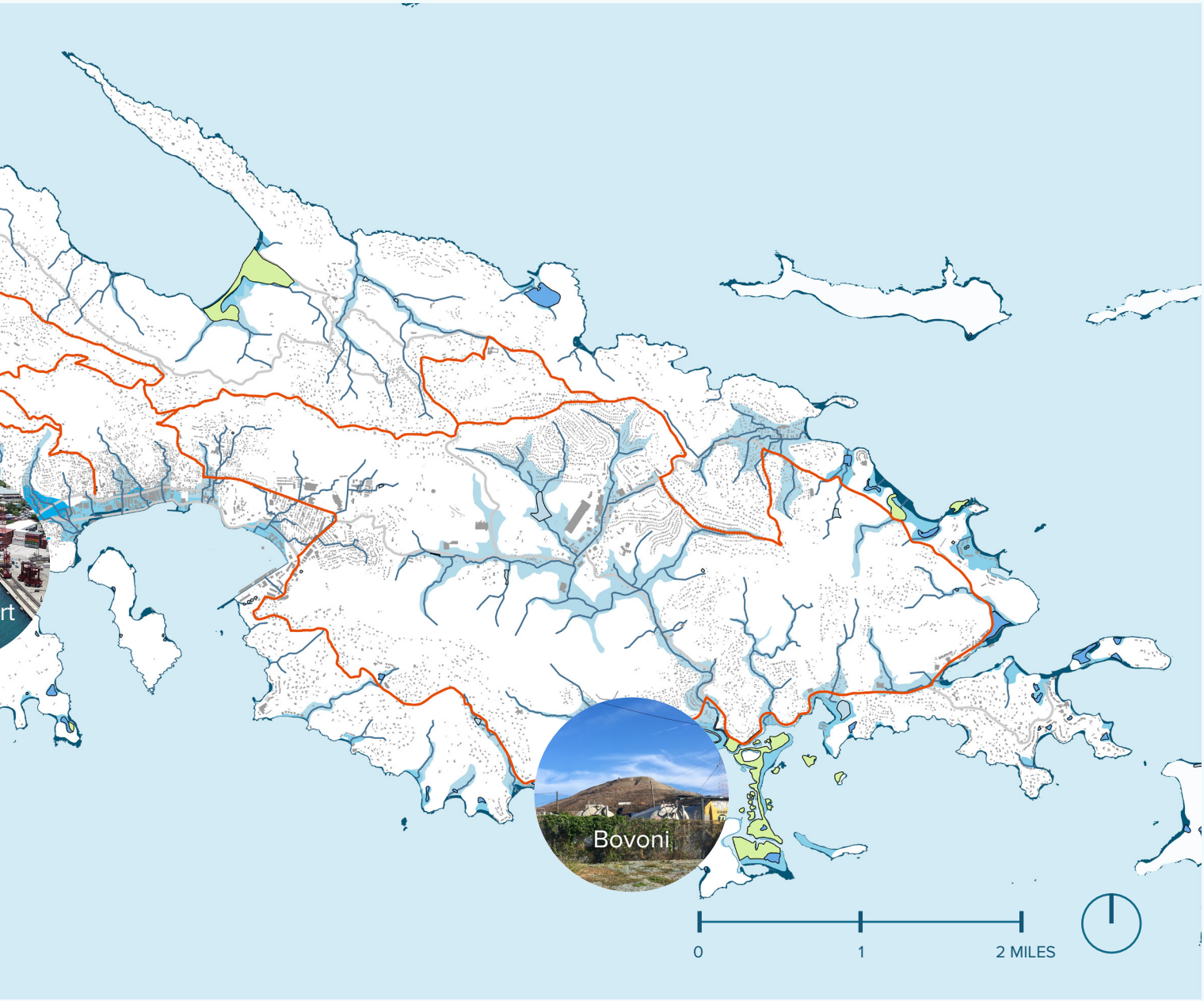
4.4

Optimize Waste Transport via efficient collection routes.

Currently a significant portion of the routes being used for trash collection are in flood risk zones and polluted guts as well as waterways throughout the island.

The orange lines shown on the map depict all major road routes which have a minimal risk of flooding and are far away from natural resources (guts, watersheds, etc.) and can be utilized by trash collection entities. Concentrating trash transport through major roads will minimize pollution and health impacts that result from the current sites. Establishing a Transfer Station next to Crown Port, which is an industrial cargo port, or the Bovoni Landfill will make it easier to transport reusable waste.

Image Source:
St. Thomas Source
Data Source:
DPNR


Bovoni
0
1
2 MILES

4.5

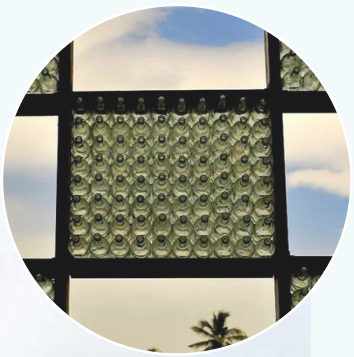
Construct a Sustainable Building Community Center to educate locals about reuse of waste materials.

Source:
MyShelter Foundation
Image Source:
INHABITAT.com

The Sustainable Community Center is directly modeled after Island Green's Sustainable Living Center. This center will be constructed entirely of recycled waste materials such as scrap metals, plastic and glass bottles, as well as organic waste to set inside the foundation walls. This project will serve as an example of how the island can reuse waste in artistic and practical ways.

An example of this kind of work is shown here with a school that is constructed entirely of bottles in the city of San Pablo, Philippines organized by MyShelter Foundation. The organizers incentivized the local community to recycle their plastic bottles in return for this permanent learning center that their children will utilize for decades to come.

The potential locations for this project could be for the center of Charlotte Amalie where it could serve as a welcoming presence for the local community as well as tourists who visit the downtown, in emancipation park near the transit center, or near turpentine run.



"Bottle School" organized by MyShelter Foundation in San Pablo, Philippines

4.6

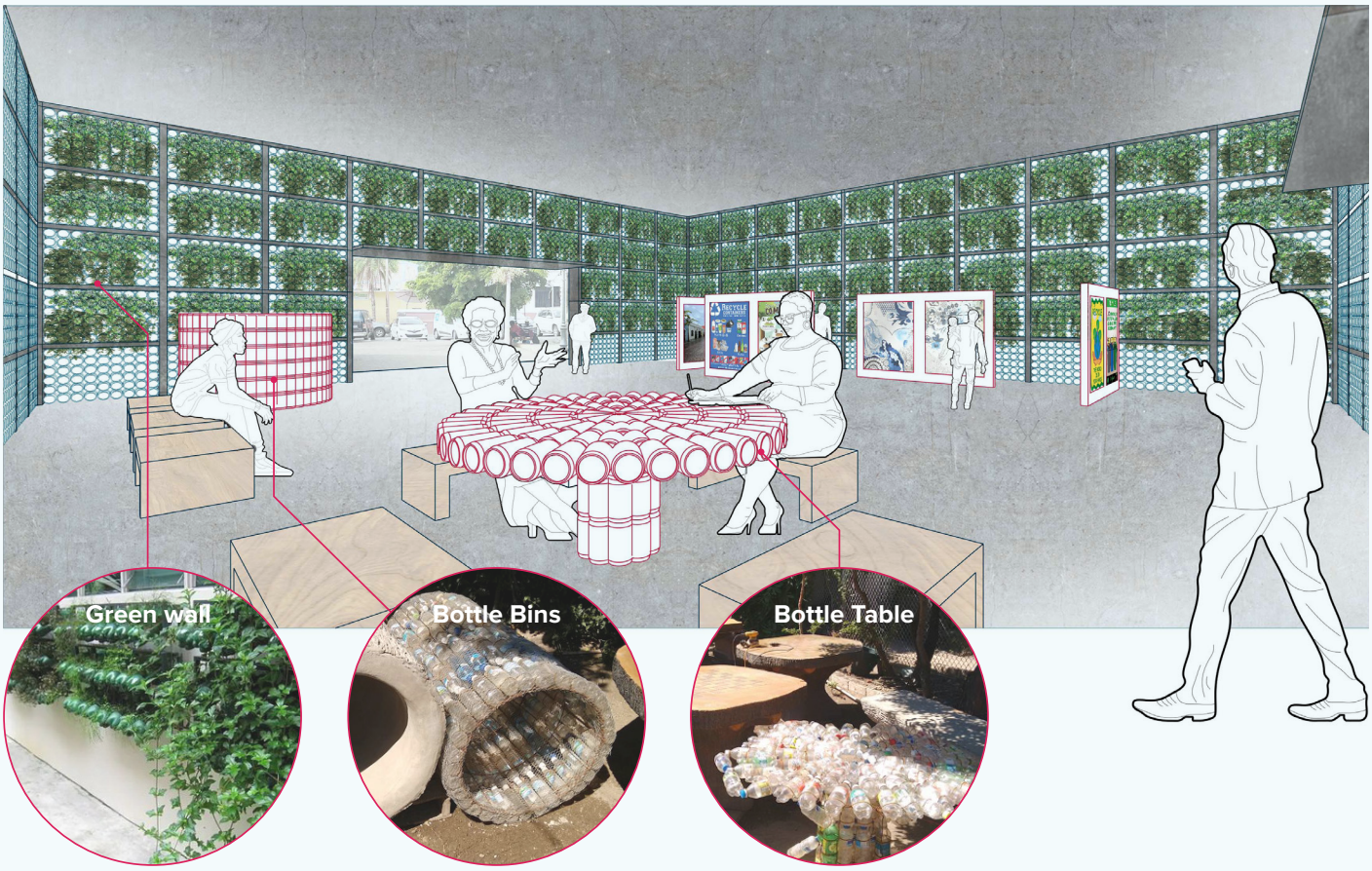
Pilot a Waste Re-use Arts Program (WRAP) to provide engaging workshops.

The Waste Reuse Arts Program (WRAP) will be run inside of the Sustainable Community Center. This pilot program will help educate residents and tourists on the island on recycling best practices and ways to repurpose recycled materials as well as serve as a community asset and tourist attraction.

The WRAP program will include:

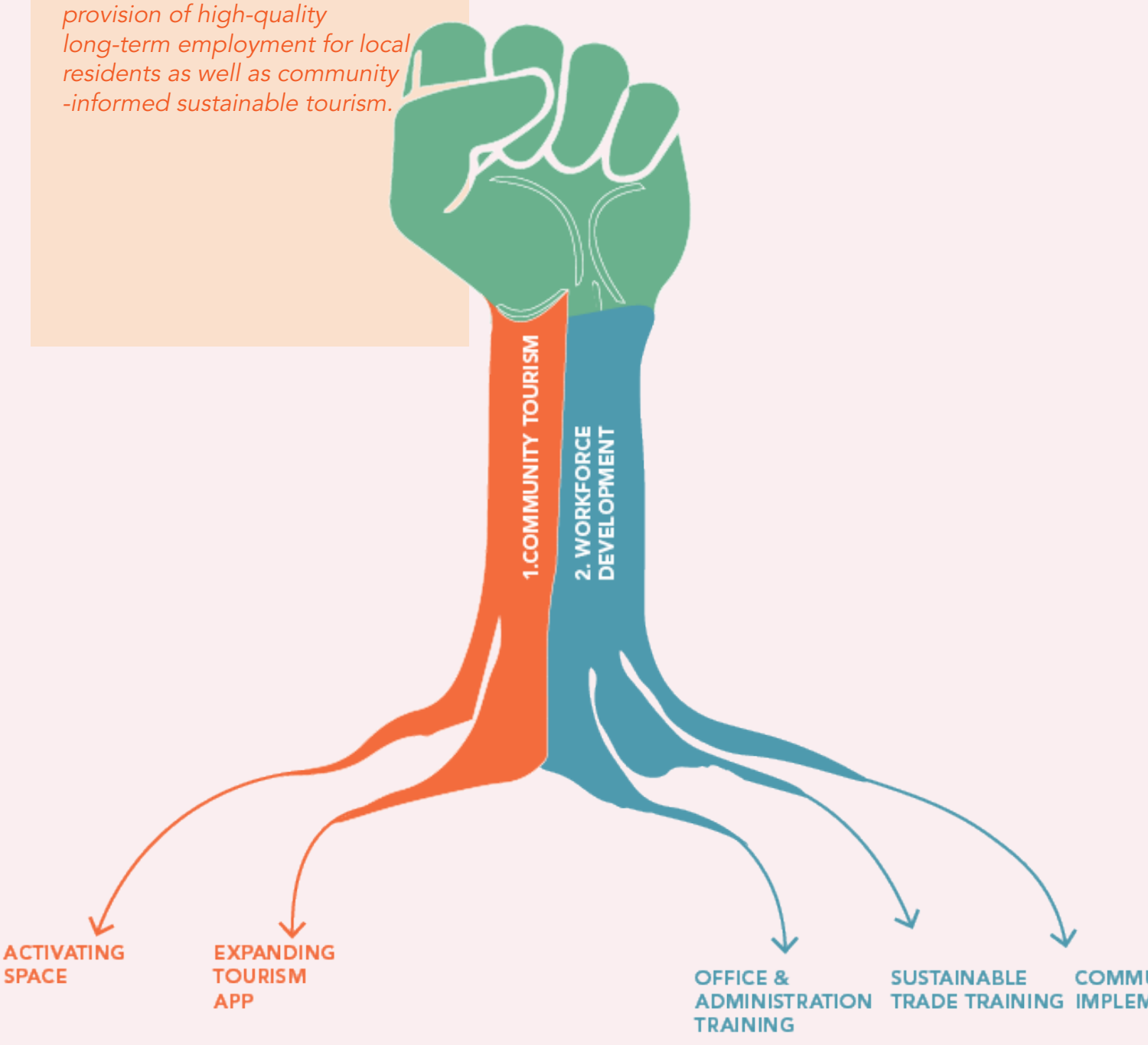
- Workshops highlighting the Chaney art form, a traditional artistic style on the island, will use recyclable beach debris and turn them into jewelry pieces.
- Art installations by local artists using recyclable materials.
- Large informational columns created by local students that explain the impacts of waste reduction and re-use of waste on the environment and how it's imperative for a viable future on the island.

The Sustainable Community Center will foster an environmentally-conscious mindset that can inspire collective action to change the waste flows island-wide.



A self-determined and diversified economy

Our vision is that St Thomas will have a diverse, equitable, and resilient economy, focused on the provision of high-quality long-term employment for local residents as well as community -informed sustainable tourism.



5.1

Community Tourism

Tourist sharing an experience with local resident

Euromonitor International, "DIVERSIFICATION OF CARIBBEAN TOURISM EXPERIENCES"

Image Source: Peter Greenberg Worldwide

Evidence shows there is an economic benefit to attracting more overnight guests to stay on the island due to their increased spending. Not only that, but there is a benefit to attracting the kind of overnight tourist who wishes to leave their hotel to experience the island's social, cultural, and artistic offerings, rather than just water-based experiences. This would begin a shift towards a tourist economy less centralized on the island's resorts and Charlotte Amalie's limited offerings of luxury goods geared towards cruise tourists.

This shift can be carried out by promoting local small businesses that offer cultural and artistic experiences for these new tourists. Market research on community tourism shows that 79% of US tourists would be interested in doing community-based tourism in the Caribbean once they became aware of the term. These tourists also indicated they would be willing to pay an average of $300 per activity.

UNITY
MENTATION

5.1

Activate Space

Charlotte Amalie is the gateway to St. Thomas and the rest of the Virgin Islands. As the capital of the territory, the largest urban center on St. Thomas, and thanks to its proximity to much of the island's historical landmarks, Charlotte Amalie is the ideal location to pilot a program intended to boost the island's community tourism sector.

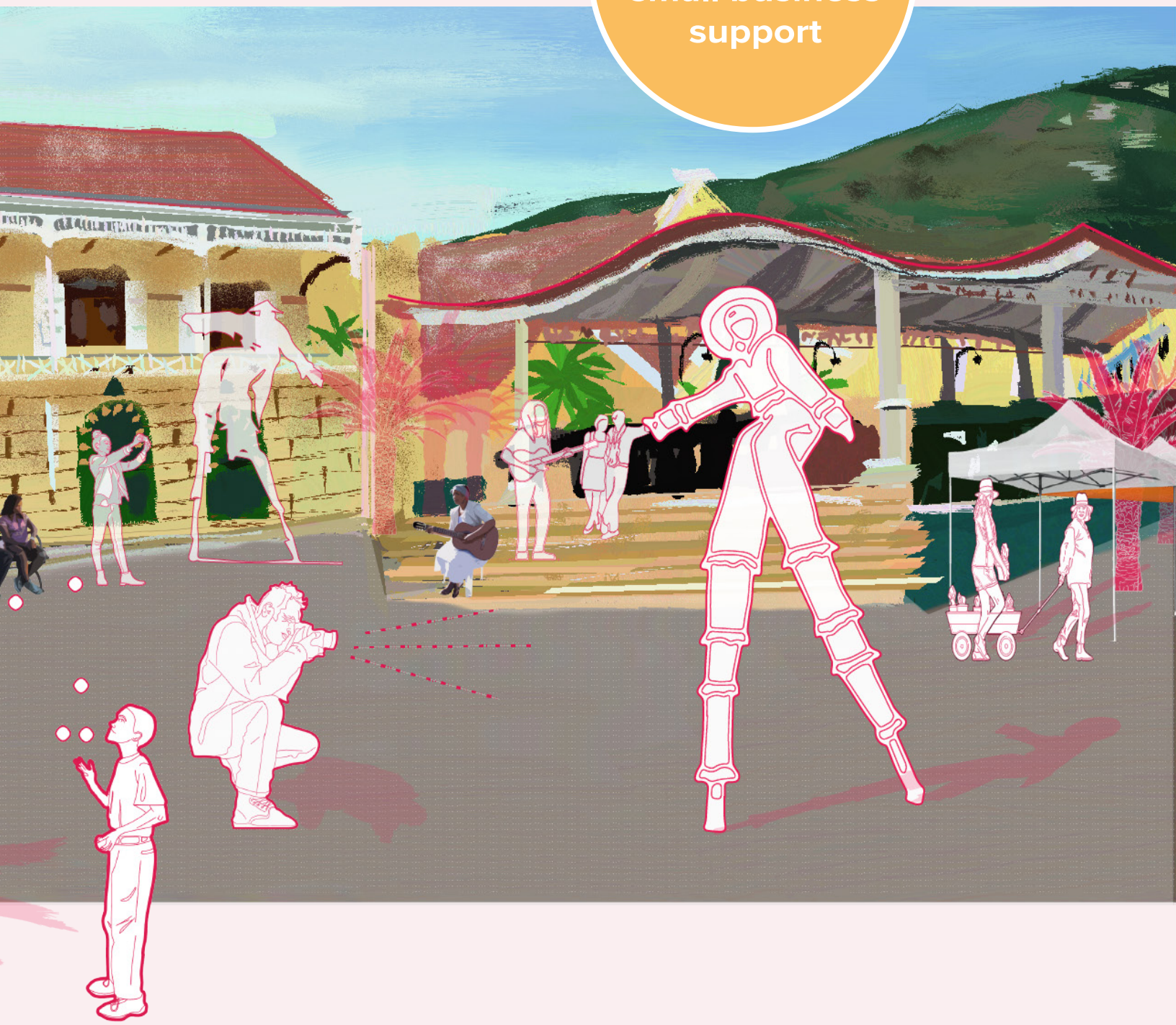
Therefore, for our first community tourism strategy we envision a Charlotte Amalie that, with proper support, can work better for residents through increased offerings useful to them, as well as more offerings for tourists interested in the island's culture and heritage, leading to more gainful employment for residents.

This can be achieved through strategic activation of underutilized space throughout the town by working with businesses and land owners.

These spaces would then be activated through community owned small businesses centered on food, art, music, locally crafted goods, fresh food vendors, and community kitchens. Other industries to be targeted for these spaces could include the nightlife economy, more farmers markets, office spaces to attract daytime workers to town, and festivals meant to activate the public spaces. These uses will blend with the town through enhanced wayfinding, which is currently lacking.

The result of these efforts will be a Charlotte Amalie no longer reliant on the cruise industry, but one with offerings for overnight tourists wanting to experience community tourism and St. Thomas residents who wish to work in and participate in their capital city's success.

1.7 out of 4.0 rating for small business support



5.2 Expansion of the current tourism app

There is also a need to improve connectivity both between entrepreneurs and with entrepreneurs to local consumers, tourists, and capital. To achieve this, we envision an expansion of the current "Visit USVI" app. The app as it stands now provides information and maps to tourists about restaurants, beaches, hotels, historic sites, and other activities on the island. This app can be expanded to contain many features of the "Quipu" app -- a startup from Colombia that is reinventing the way local small business markets function.

Any seller or service provider can use Quipu and offer their products to the community. Examples include home-kitchens, small crafts, clothing, and home services. Once business has been conducted through the app, even if the final payment is in cash, the vendors build a credit score within the app that, over time, can qualify them for microloans provided directly by Quipu or their community finance partners.

A similar model can be adopted in St. Thomas through the Visit USVI app. Not only will tourists and residents be able to navigate the island's many offerings, they will be able to purchase goods and services directly through the app that provide direct financial benefit to local entrepreneurs. With the right community finance partners, this model would also go a long way towards bridging the gap in start-up financing that currently exists.

> "An app like Quipu can work in any city where there's an informal economy with a local partner, so [St.Thomas] is a perfect place for this. The app can help leave money on the island"
>
> - Mercedes Bidart, Founder of Quipu

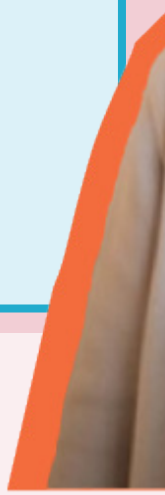
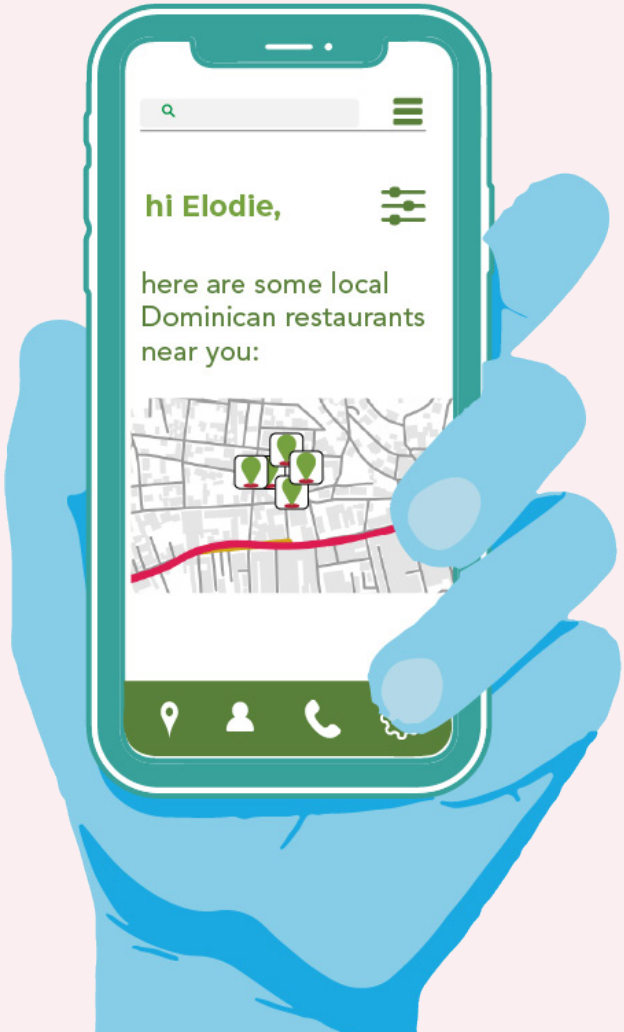
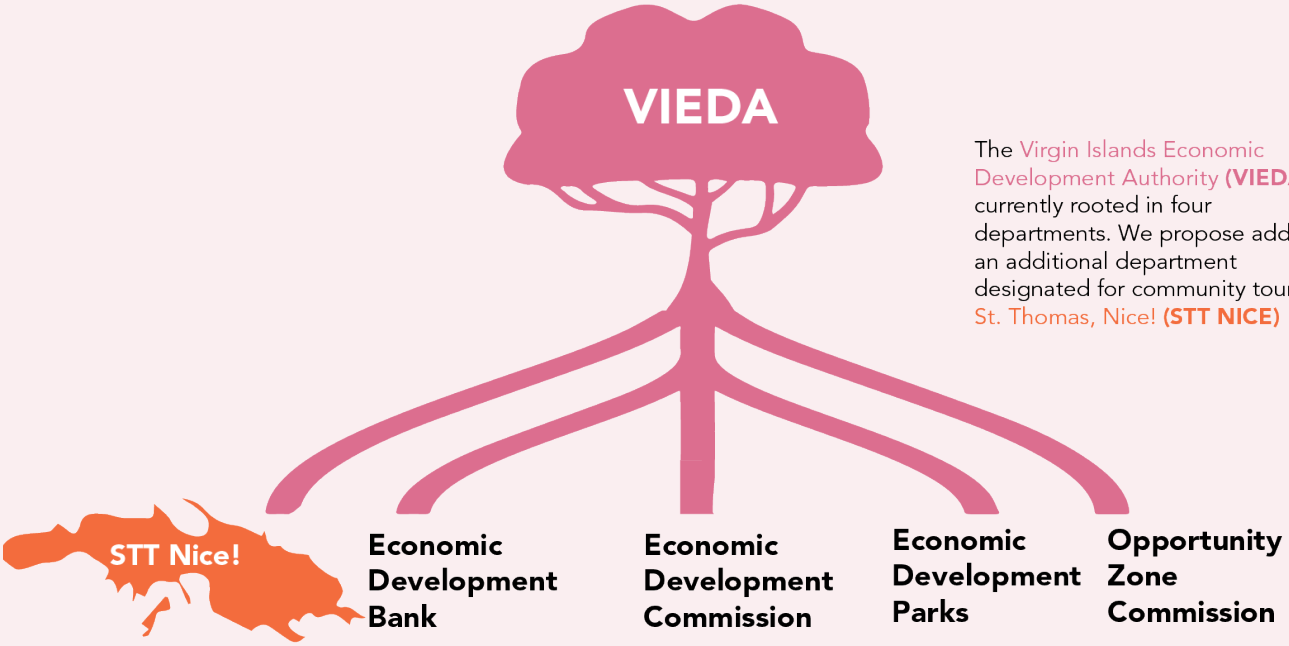


Image Source: El Popular


hi Elodie,
here are some local Dominican restaurants near you:

Implementation and funding



The Virgin Islands Economic Development Authority **(VIEDA)** is currently rooted in four departments. We propose adding an additional department designated for community tourism - St. Thomas, Nice! **(STT NICE)**

We believe these two strategies – the reshaping of Charlotte Amalie as well as the island's small business market – are important first steps to achieving a tourism economy based on St. Thomas's people and history, rather than solely on its climate-vulnerable beaches, hotels, and cruise industry.

Implementation

To achieve these goals, we envision a new branch under the USVI Economic Development Authority (USVIEDA) to carry out these tasks, called "St. Thomas Nice" — a reference to the common colloquialism heard around the Island.

This authority will have the task of reshaping of Charlotte Amalie by purchasing and renovating underutilized locations and providing subsidized incubator spaces for community tourism focused small businesses. The authority will also work with the implementation of the pedestrianization plan and transit center proposed earlier.

There is a potential for a business improvement district under St. Thomas Nice, too. This nonprofit would be funded by local property owners and government financing that allow it to improve the local economy through tourism marketing and festival promotion, wayfinding through new signage, advertisement of new businesses and vacancy opportunities, and the physical greening of the town to enhance its beauty and capture stormwater runoff.

St. Thomas Nice! will also be responsible for partnering with the Department of Tourism, which runs the Visit USVI app, to craft a marketplace feature similar to that of the Quipu app.

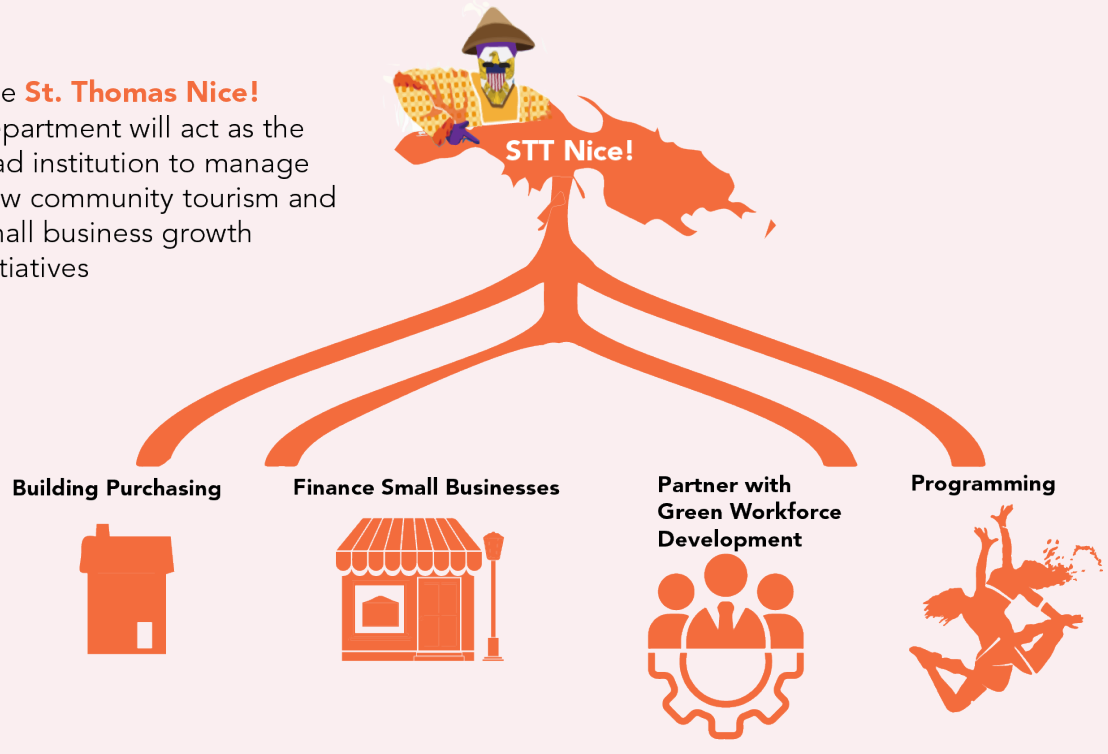
Community control is a crucial part of the community tourism model. Working groups of business interests, community groups, and financial partners will sit on the board of the authority in order to promote community participation. These groups will be critical in the periodic reevaluation of the authority's plan for the town and a valuable gauge of successes and areas of improvement.

Funding

Funding for St. Thomas Nice's programs can be secured through the reappropriation of existing government funding towards the Economic Development Authority, reallocation of funds from the Tourism Department, and through rethinking how the 12.5% hotel tax revenue is allocated.

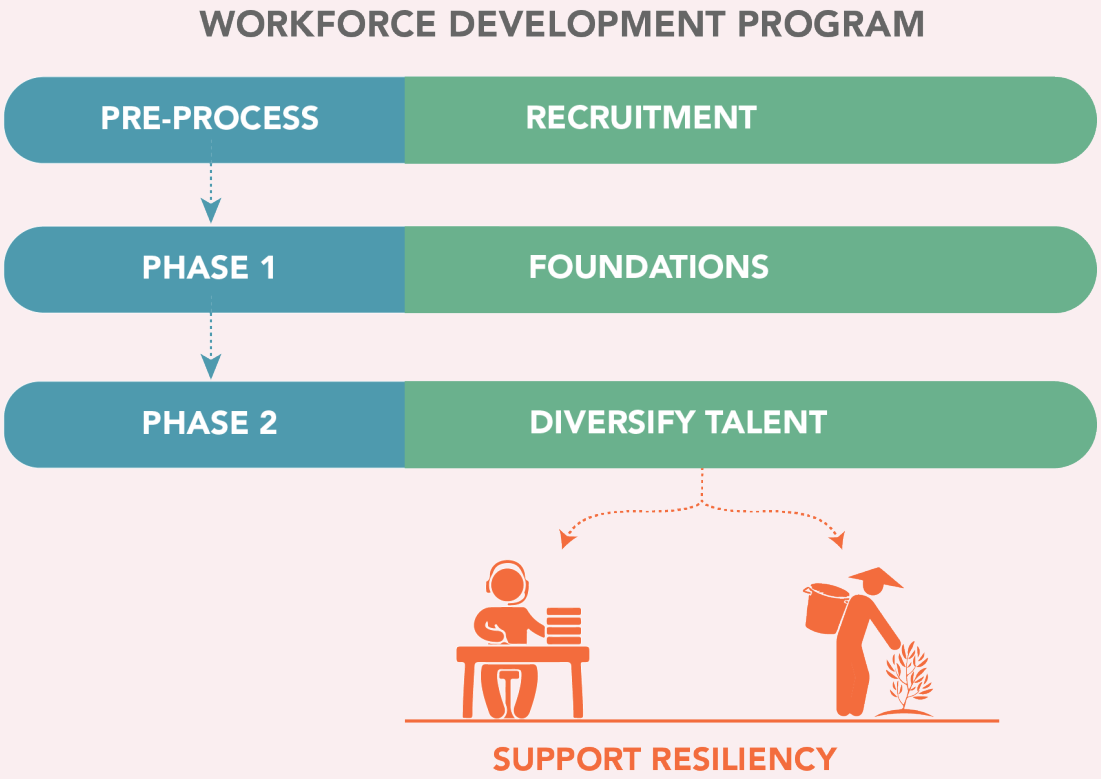
As it stands now, the 12.5% hotel tax revenue is allocated to the Tourism Advertising Revolving Fund, Agriculture Revolving Fund, The Department of Education for high school sports travel, the Department of Sports, Parks and Recreation, and towards the development of sports tourism, including horse racing. The economic benefits of this allocation towards sports tourism warrants further investigation to see if it might be of higher use going towards community tourism uses. Additionally, not all condo rental companies (with the exception of Airbnb) pay the Hotel Tax. Negotiating some form of tax payment from these platforms would boost the revenue generated from the Hotel Tax.

The **St. Thomas Nice!** department will act as the lead institution to manage new community tourism and small business growth initiatives



5.3

Workforce Development Program



PowerCorps PHL, 2015 Survey of Businesses, USVI Vision 2040

PowerCorps Philadelphia, The Philadelphia Citizen, William Penn Foundation 2015 Survey of Businesses

Based off of projected industry and skills demands, we propose the creation of a new workforce development program. Through this program, our vision is that St. Thomas' economy will have diverse and robust opportunities, with a focus on the trade and professional workforce industries, that will continue to build a more resilient island. We identified two main routes to achieve this vision: an Office and Administrative route and a Sustainable Trades route. In addition, both routes will support the implementation of other projects discussed earlier. The first phase of the model is the foundations phase, where students participate in a four-month-long basic workforce development skills program to learn soft skills such as customer service, time management, and reliability, which have been identified as hiring barriers by employers. In addition, this phase will expose participants to career options through community service focused on supporting green infrastructure, renewable energy, agriculture, and exploring professional career routes. Upon successful completion of the program, students are placed in immersive, career-specific, individual placement work experiences hosted by employer partners.

The model for the program is based off of the success of PowerCorps Philadelphia, a 4 to 18-month long paid workforce development program that uses environmental service as the vehicle to teach career and technical skills. PowerCorps utilizes a cross-sector collaborative approach to partner with the Parks & Recreation Department, the Water Department, and multiple partners in the public and private sectors to build opportunities and pathways for disengaged youth by addressing key environmental challenges and preparing them for meaningful careers. The strategy will build off of this model by gearing the program towards the adult workforce on St. Thomas as well.

1st Route: Office Administrative & Tech Skills

The skills offered in the office and administrative skills route will prepare participants for occupations that will be in highest demand in the next 12 to 24 months. These skills have been identified by the government and will meet current workforce gaps in administrative support occupations.

Participants will gain skills in:

- Digital literacy
- Accounting
- Project management
- Customer service
- Office Management
- Sales

Based on our conversations with leaders on St. Thomas, a great barrier towards implementing past plans and policy strategies is the limited capacity of a trained technical workforce. The office and administrative route will focus on the project management skills required to create the capacity for the implementation and enforcement of plans and policies across the island. Cross-sector employer partnerships and engagement in the private and public sector will be critical for participants to gain on the ground experience and seek employment post-graduation.

TRAINING

ROUTE 1: OFFICE ADMINISTRATION & TECH

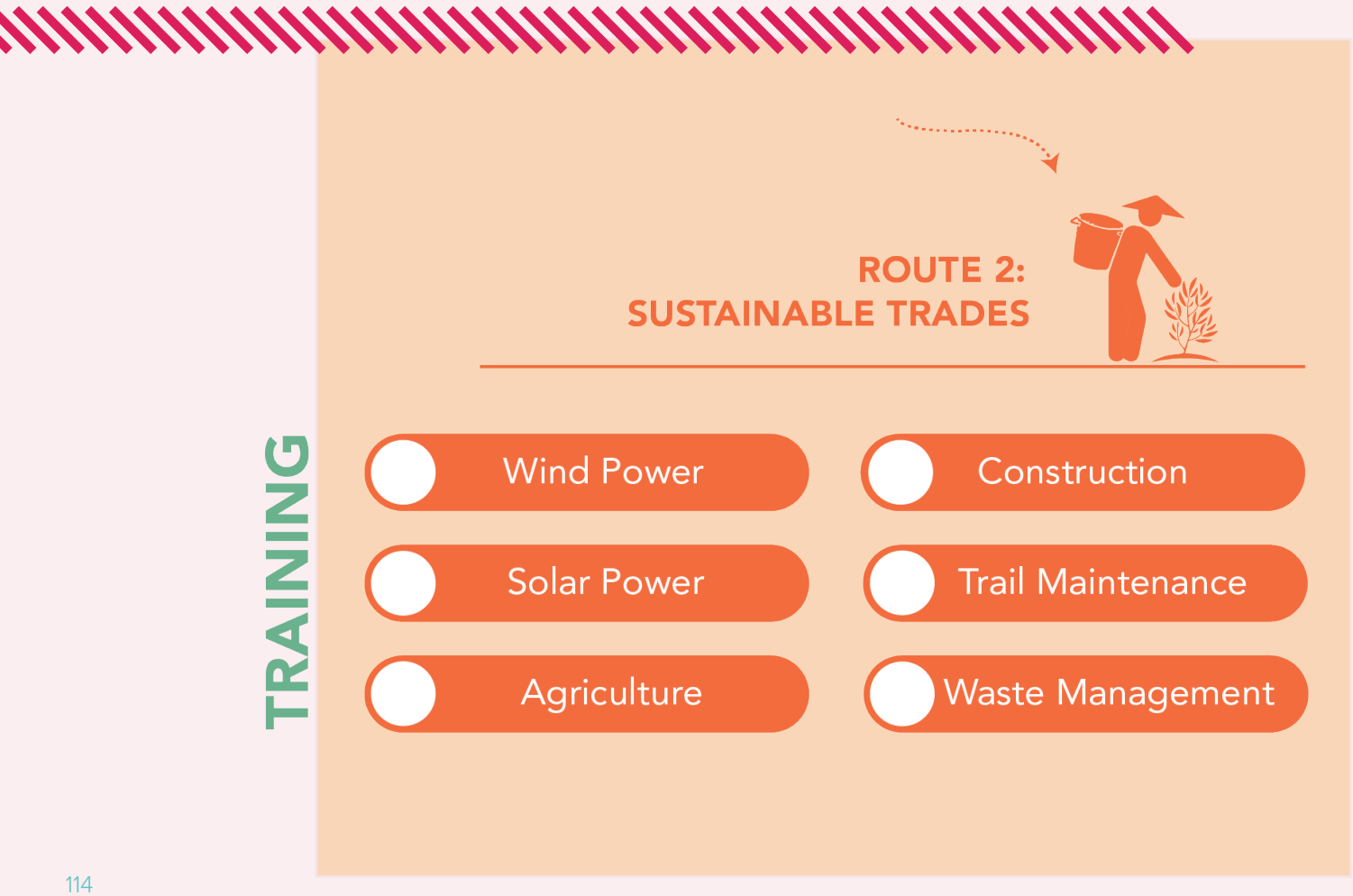
- Digital Literacy
- Accounting
- Project Management
- Customer Service
- Office Management
- Sales

2nd Route: Sustainable Trades Skills

ProSolar USVI, Advance Power LLC, Southern Sustainable Agriculture Research and Education

The sustainable trades route will focus on three gaps in the economy and workforce. First, the program will develop the required skills to meet the government identified industries needed to diversify and grow the economy. Second, it will prepare a workforce that will contribute to the sustainability of St. Thomas under the increasing vulnerability of climate change. And third, as discussed thus far through the proposed projects, there is great urgency to build resilient infrastructure and the sustainable trades route will develop the capacity and workforce needed to implement the previously proposed projects in this resilience plan.

The government has set the goal of increasing renewable energy to 75% of total energy consumption, up from the current 1%. There is a strong potential for preparing a workforce with the skills needed in the renewable energy sector. Other currently feasible training programs include sustainable construction and sustainable agriculture. Potential employers on the island include ProSolar USVI, Carib Solar Tech, and Photon Energy. As well as Advance Power LLC, who are currently working on building a wind power generation plant for WAPA at Bovoni Point.



"Bovoni Point Wind Turbines Looking Northwest"

In addition, the sustainable trades route will prepare participants to implement the proposed projects included in previous categories of action, such as:

- Waste management,
- Gut restoration and maintenance program, and
- Green stormwater infrastructure installation and maintenance

The projects discussed thus far have great potential of improving resiliency under impending climate change impacts. Unlocking the economic development potential of these projects is an opportunity to foster talent diversity, job creation, small business support, and greener, more livable communities.

Implementation

The implementation of the workforce development project will be possible through a cross-sector collaboration between the following partners.

The University of the Virgin Islands is a key anchor educational institution on the island which offers a variety of post-secondary education and resources for residents.

My Brother's Workshop is a non-profit focusing on serving at-risk and high-risk young people in the USVI by offering mentoring, counseling, paid job training, education, and job placement

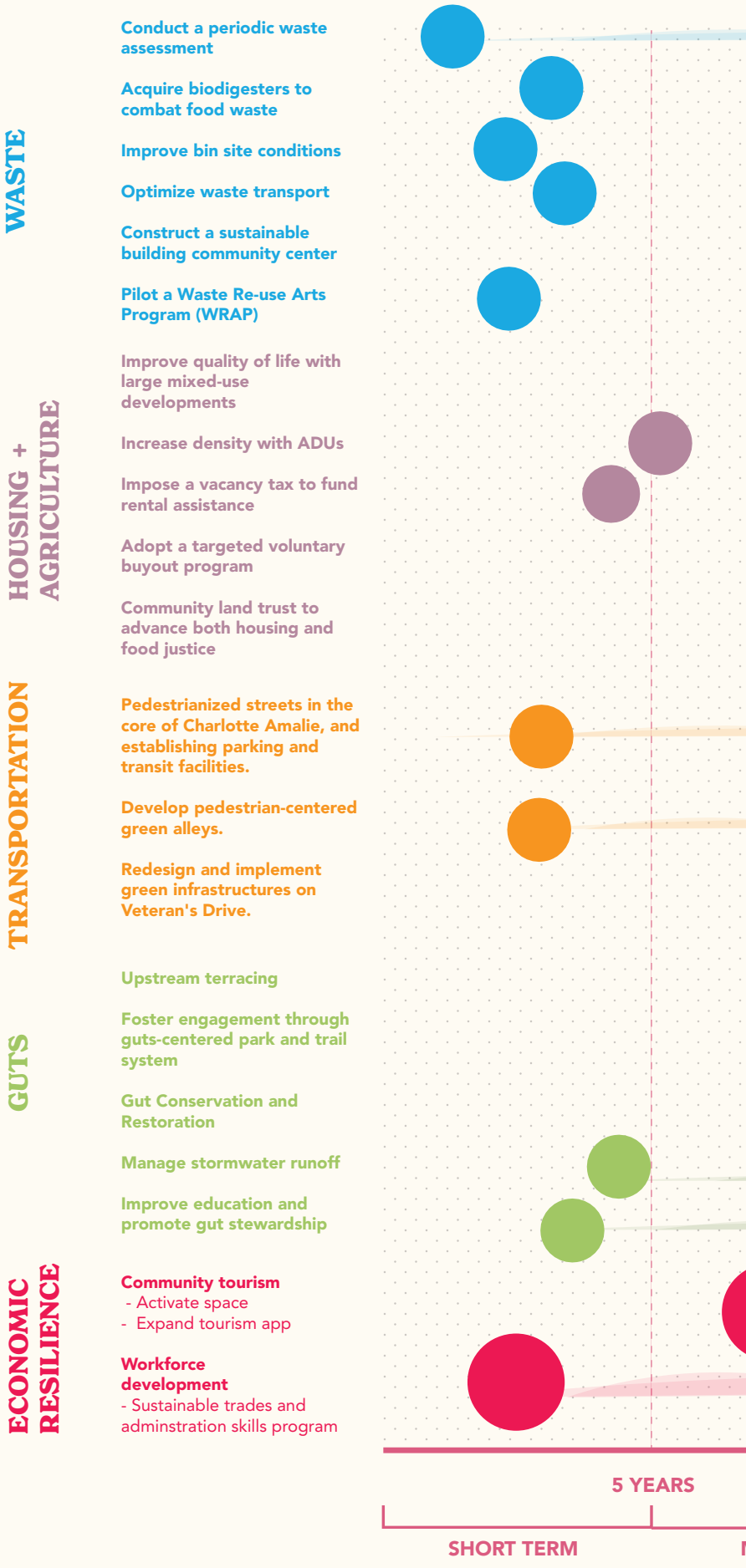
Lastly, the Department of Labor offers programs and services designed to develop, protect and maintain a viable workforce across the territory.

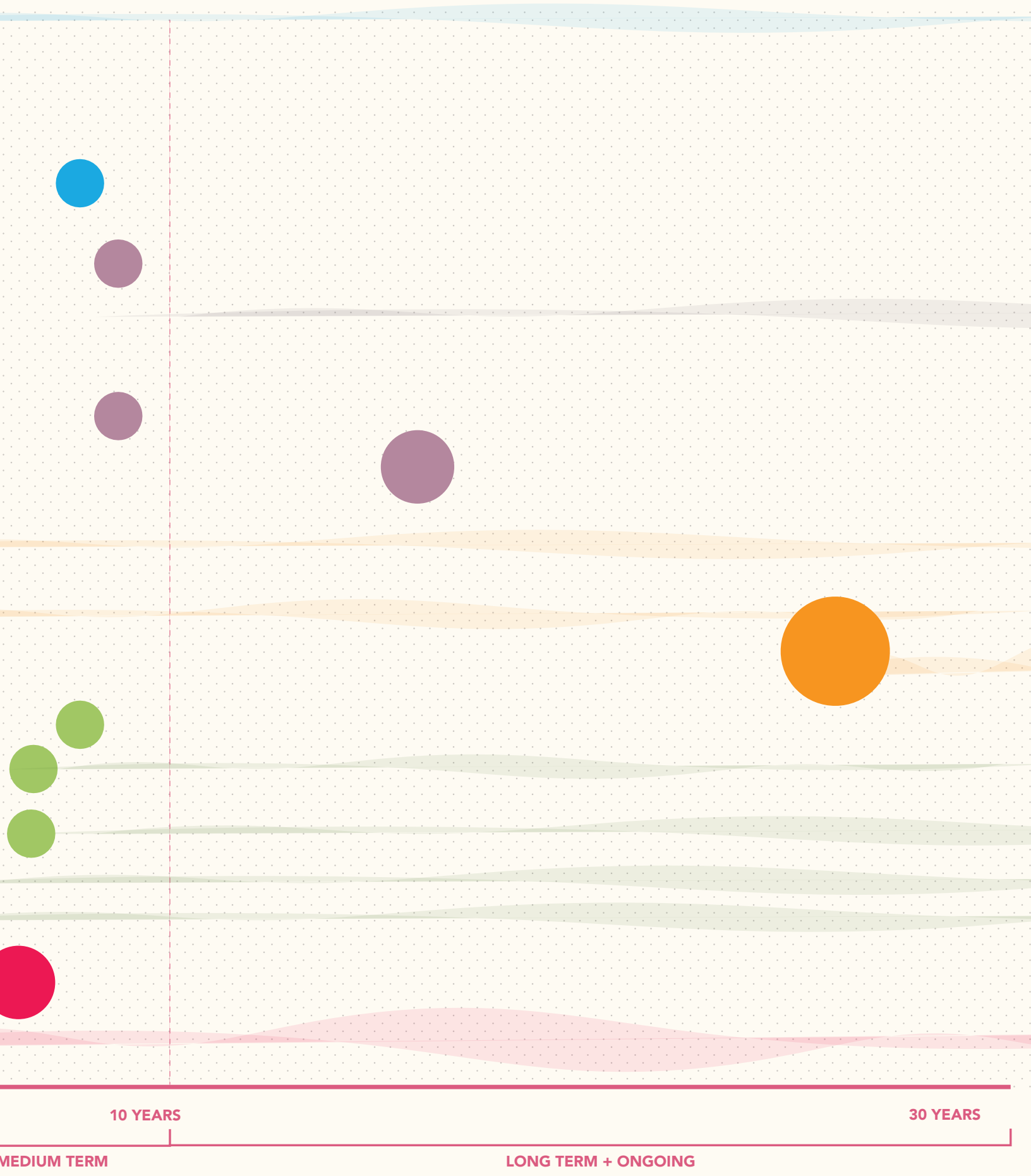
Robust stakeholder and cross-sector partnerships are critical for the successful implementation of a workforce development program. The convening of multiple stakeholders and partners will help to identify the existing gaps in the workforce ecosystem and effectively collaborate on providing career pathways for residents.

MyBrother'sWorkshop, , USVI Department of Labor, University of Virgin Islands

Implementation Time Horizons

As shown in the timeline, the majority of the proposals within each category of action is estimated to be implemented in the short term. In addition, about half of these proposals will be implemented and conducted on an on-going basis. Overall, implementation for most if not all of the projects will depend on securing financial support, substantial funding sources, and trusted partnerships.



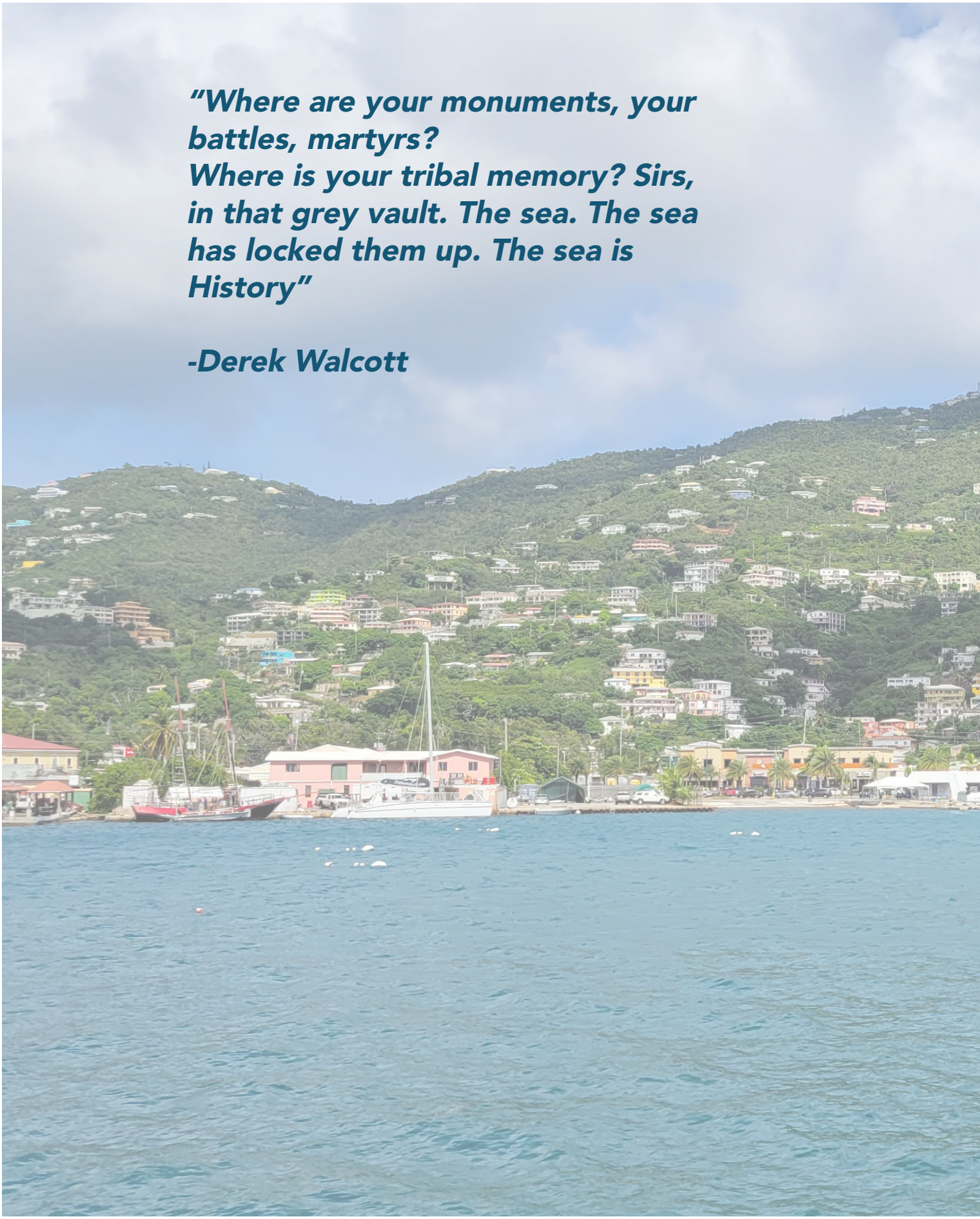

10 YEARS
30 YEARS
MEDIUM TERM
LONG TERM + ONGOING

Funding Sources


oint Source Management Program
lution Control (Section 106) Grants
lands Conservation Grants
Surface Transportation Profram (STP)
n Mitigation and Air Quality Improvement Program
d and Urban Waters Restoration Grants
Infrastructure and Communities (BRIC)
EMA- Building Resilient Infrastructure
BG-MIT
CDBG-DR
USVIEDA, Tourism, and Tourism Tax Budgets
Community Foundation of the Virgin Islands
EDA Competitive Tourism Grant
Workforce Innovation and Opportunity Act
US Department of Energy (DOE)
Office of Energy Efficiency and Renewable Energy
Federal Energy Management and Program Training (FEMP)
Americorps

"Where are your monuments, your battles, martyrs?
Where is your tribal memory? Sirs, in that grey vault. The sea. The sea has locked them up. The sea is History"

-Derek Walcott



A successful climate resilience plan must be grounded in the history of the island and its people.

The vision of the St. Thomas Resilience Plan is to support Saint Thomas to leverage its rich cultural fabric and unique natural resources to become a self-determined and thriving community which will be resilient to social, economic, and environmental shocks.

The five categories of action laid out in the plan are not meant to be comprehensive solutions to the issues we identified, but rather pilot programs that begin to move the island in a more resilient direction given the future of climate change. St. Thomas's citizens are strong, diverse, and know their island better than anybody. We hope the St. Thomas Resilience Plan will meaningfully contribute to the existing body of work centered around the island's long-term health, safety, and resiliency.