

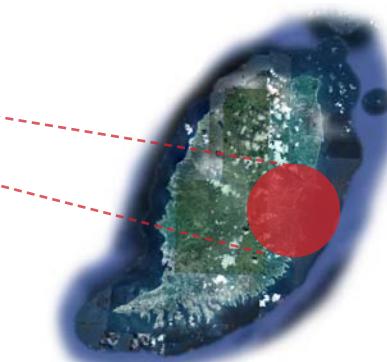
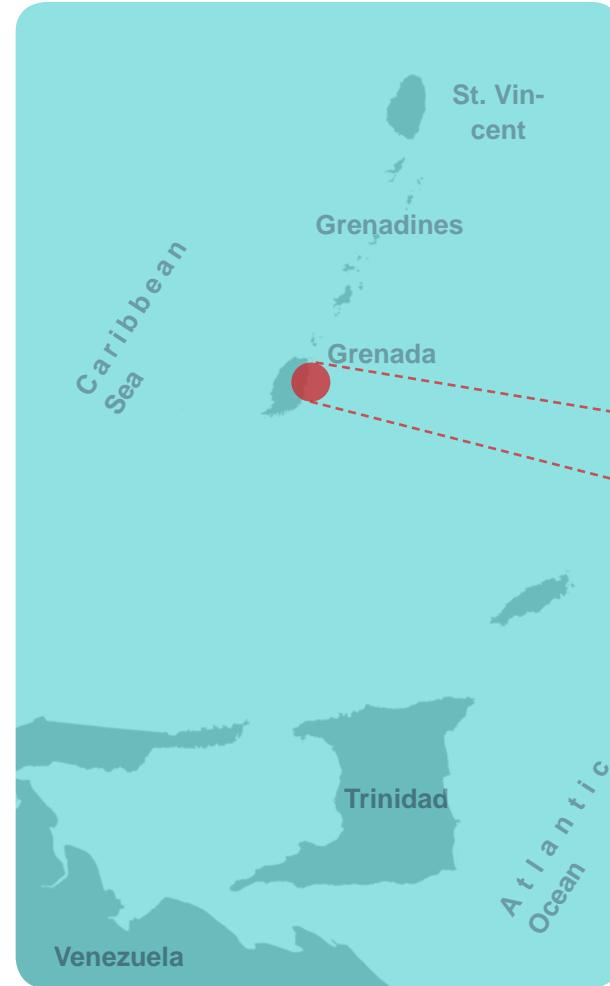
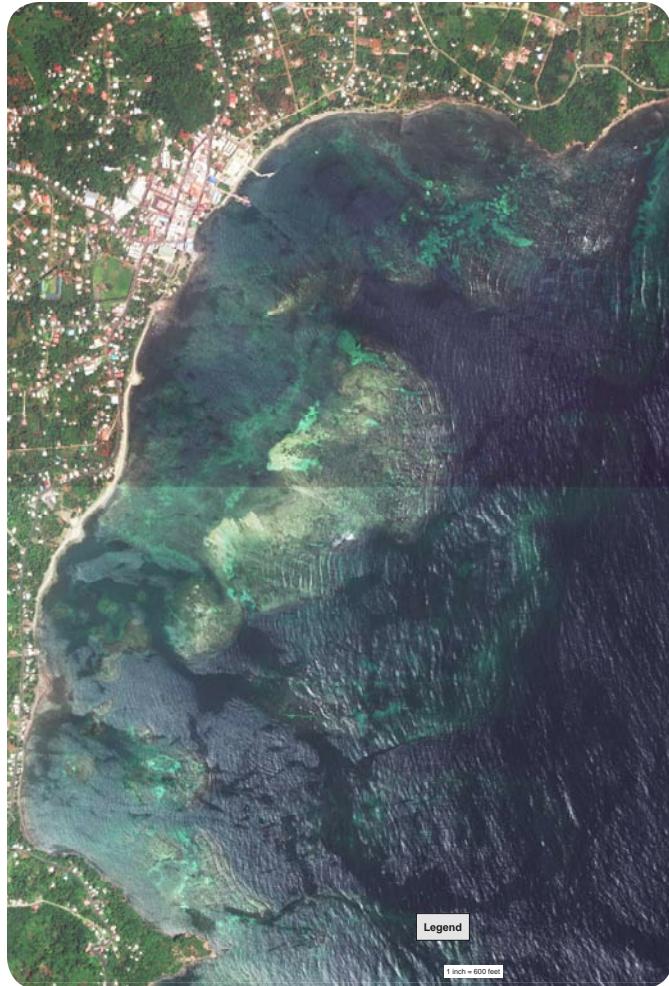
AT THE WATER'S EDGE

Nature Based Adaptation Concepts for Grenville Bay Grenada

Meeting notes from Miami planning sessions for Grenville Bay, Grenada

Planning Workshops Spring/Summer 2013

Prepared for The Nature Conservancy by ArquitectonicaGeo



Grenville Bay, Grenada

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The Nature Conservancy
Protecting nature. Preserving life.[™]

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At the Water's Edge (AWE)

Nature Based Adaptation Concepts for Grenville Bay, Grenada

Spring/Summer 2013
Miami, Florida and Grenville, Grenada

Project Partners:

Community of Greater Grenville Area

Department of Physical Planning

The Nature Conservancy

Department of Environment

Arquitectonica

Department of Fisheries

Red Cross Grenada

Geotechnical Investigation Services Inc

Grenada Fund for Conservation

National Disaster Management Agency (NADMA)

University of New Hampshire

AWE Leadership Program Graduates

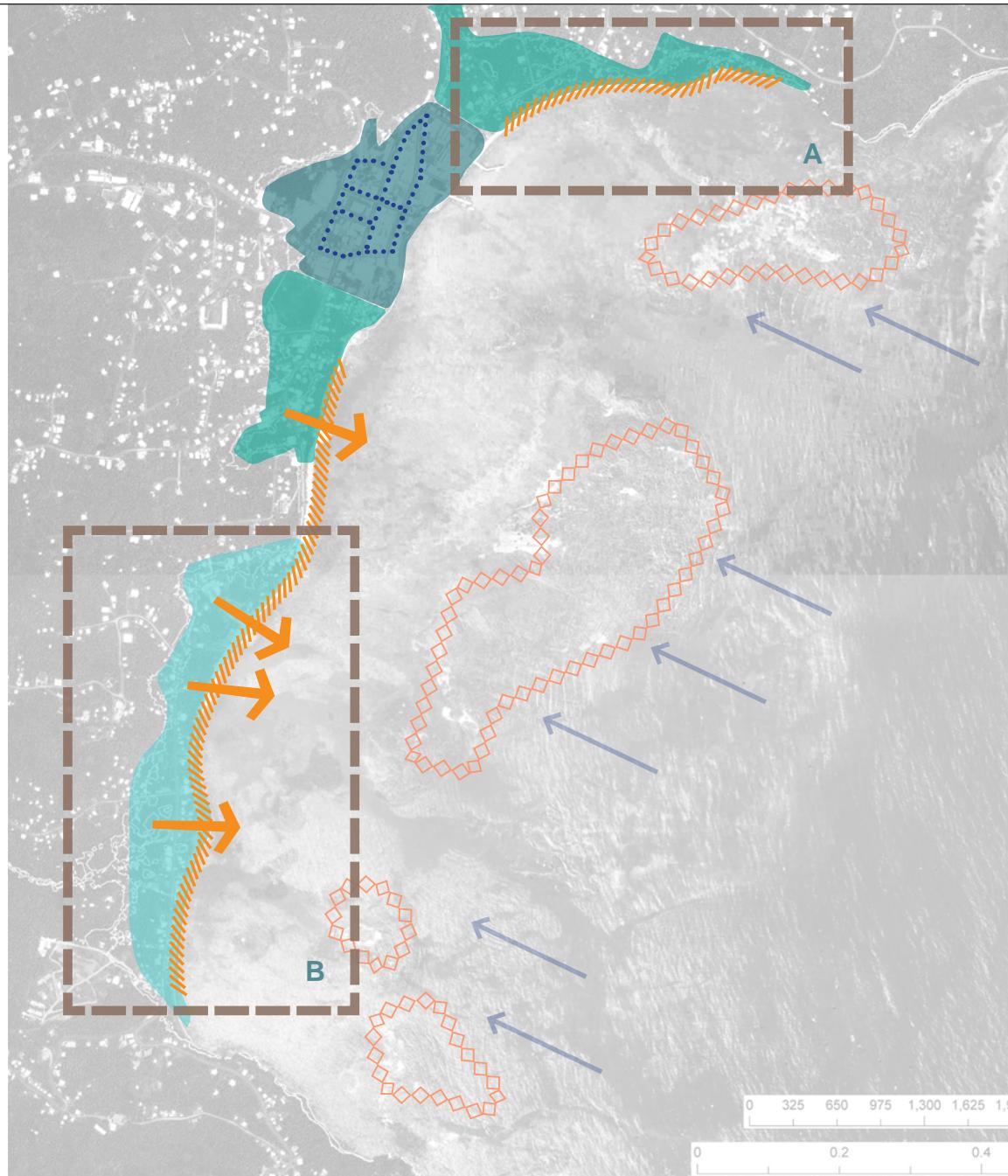
This Booklet was developed by ArquitectonicaGEO (Robert Lloyd, Jeremy Calleros-Gauger) and The Nature Conservancy (Vera Agostini, Ruth Blyther, Eddy Silva)

Background

This booklet outlines concepts aimed at reducing risk and vulnerability to climate change and coastal hazards in the community of Grenville Bay, Grenada. They reflect outcomes from a series of meetings held within the context of the At the Water's edge project, between TNC staff, local community, key stakeholders/experts, and government agencies and partner organizations. This planning process focused on developing a holistic suite of actions that can increase the ability of the people and ecosystems of Grenville Bay to adapt to climate change. The concepts include short, medium and long-term strategies and will require a diverse set of skills and support from a range of agencies, organizations and community groups.

Next Steps

A moderate amount of funding for the next two and a half years has been secured by The Nature Conservancy. Using these funds the concepts laid out herein will be further explored, refined and where appropriate expanded in the next phase of the project. Short-term actions will be implemented with the community and local contractors. A fundraising strategy will also be developed, with some actions jointly supported by partner agencies and organizations, some supported by TNC and others by partner agencies and organizations.



Vulnerabilities

Marine Flood Hazard

urban center

urban edge

sub-urban

..... Freshwater Flood Hazard

||||| Beach Erosion

→ Sediment Deposition

◇◇◇ Reef Zone

→ Wave Action

Social Vulnerability

A. Community

- Access to Telescope Beach
- Traditional gathering and social place

B. Livelihoods

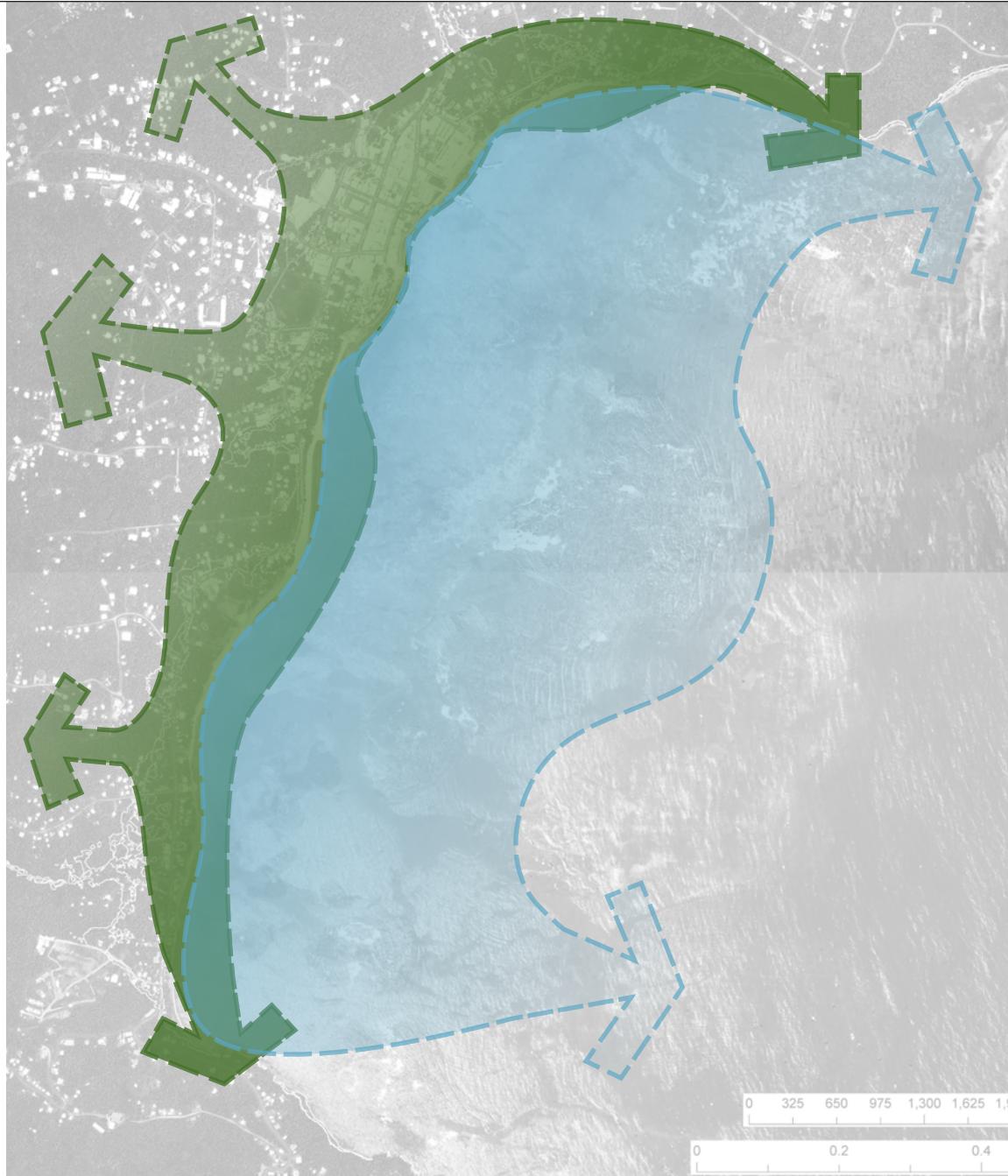
- Fishing boat moorage
- Sea Moss beds
- Forest products from coastal vegetation



Existing Conditions Grenville Bay



Photos: Juliana Castaño, TNC



“Living Edge”

Strengthen coastal community resilience through a series of linked actions and policies.

Greenway

Climate change will impact both seaward and upland zones of the Grenville Bay communities. Design with the help of the community a coastal “Greenway” corridor where specific positive actions combine to create a healthy and resilient place.



Blueway

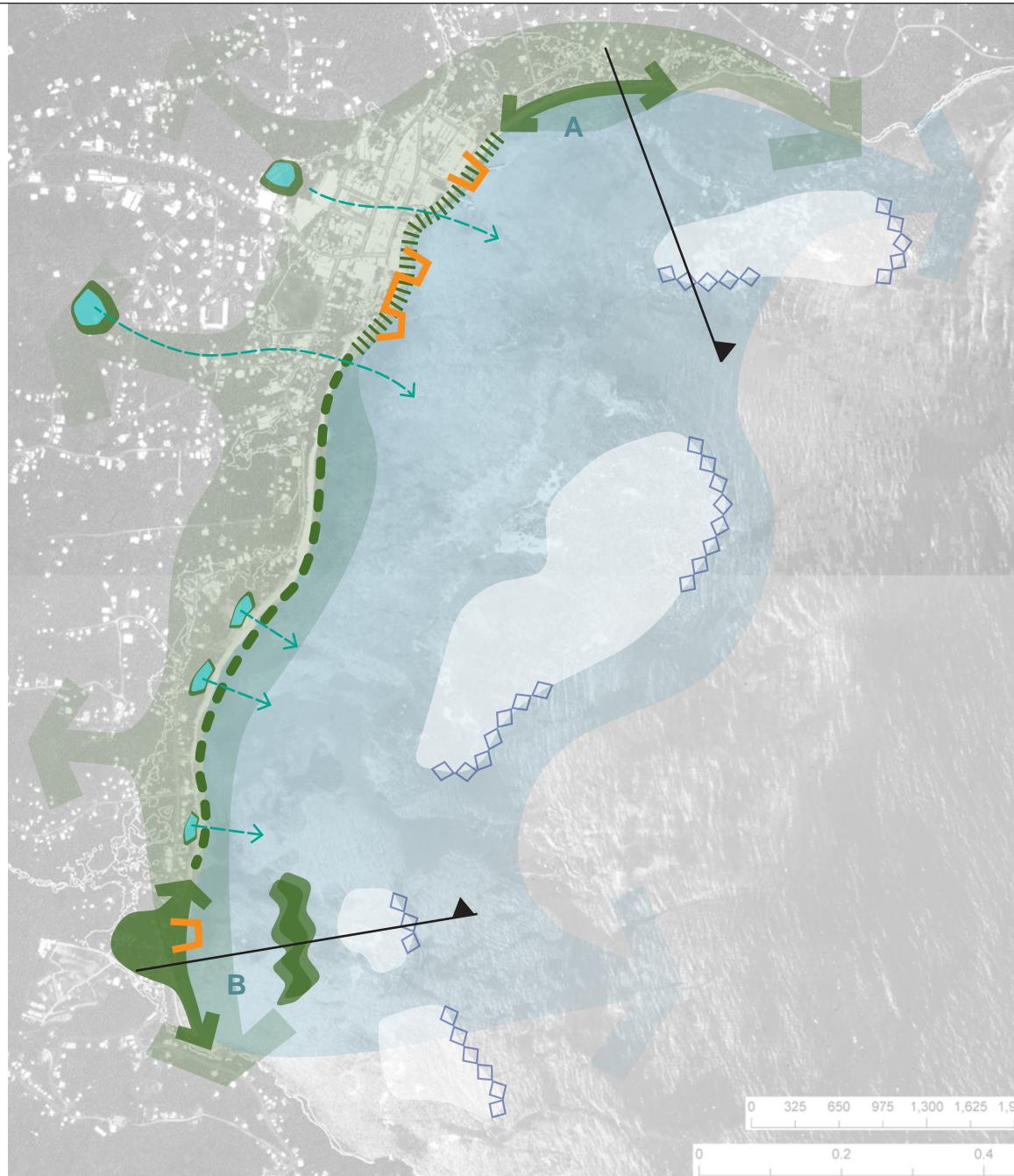
Consider the coastal stretch from reef to beach as the front garden of Grenville Bay communities. Develop a plan for short and longer term actions which will enhance the ecological resilience of the bay as well as its value to the community for recreation, livelihoods, and shoreline protection.

Greenway

Opportunities

Action	Potential Social Benefits	Potential Natural Benefits
<ul style="list-style-type: none"> Vegetation and tree planting Stormwater retention ponds 	<ul style="list-style-type: none"> Reduce flooding and control erosion Improve groundwater recharge and continuity of fresh water supply Facilitate community networking Create employment opportunities for planting and monitoring 	<ul style="list-style-type: none"> Improve water quality Moderate ground and water temperature Develop habitat structure Increase resilience to storm events
<ul style="list-style-type: none"> Update and enforce building and land-use regulations <ul style="list-style-type: none"> increase building setbacks and base elevation enable waterfront livelihoods while discouraging housing in flood-prone coastal zones 	<ul style="list-style-type: none"> Encourage safe housing outside most vulnerable areas Reduce damage from flooding Create jobs in design and construction of resilient housing and infrastructure 	<ul style="list-style-type: none"> Protect sensitive and buffer areas Improve groundwater flow, improve hydrology of natural water bodies
<ul style="list-style-type: none"> Gray-Green shoreline stabilization <ul style="list-style-type: none"> increase vegetated and naturally graded shoreline buffers add vegetative elements to traditional hard bulkheads and seawalls 	<ul style="list-style-type: none"> Minimize erosion Prevent flooding Provide protection without destroying natural shoreline character Protect community access to healthy and attractive water's edge 	<ul style="list-style-type: none"> Minimize erosion Protect or enhance shoreline habitat Increase ecosystem resilience by minimizing damage from storm events
<ul style="list-style-type: none"> Nearshore habitat enhancement <ul style="list-style-type: none"> construct mangrove planters design to allow for species migration over time 	<ul style="list-style-type: none"> Buffer anchorages and shoreline from erosive wave action Improve fisheries productivity and sustainability Create employment opportunities 	<ul style="list-style-type: none"> Add valuable mangrove habitat Protect sensitive nearshore habitat such as seagrass beds
<ul style="list-style-type: none"> Active reef enhancement <ul style="list-style-type: none"> stabilize reef boundaries provide structure for reef to adapt to changing water levels 	<ul style="list-style-type: none"> Buffer anchorages and shoreline from erosive wave action Support healthy reef ecosystems, provide fisheries and tourism benefits 	<ul style="list-style-type: none"> Increase adaptive capacity by allowing for species migration over time
<ul style="list-style-type: none"> Review and enforce fisheries management and marine protection plans and regulations 	<ul style="list-style-type: none"> Maintain healthy fishery for food, recreation, and commercial benefit 	<ul style="list-style-type: none"> Protect and enhance health and diversity of marine ecosystems, thus enhancing adaptive capacity

Bluelway



“Living Edge”

Strengthen coastal community resilience through a series of linked actions and policies.

Site-Specific Actions

Upstream

Stormwater ponds

- many small ponds form whole system
- reduces peak storm flows and flooding
- allows for growth of downstream vegetation

Water's Edge

Shoreline pilot project

- A** Telescope Beach public waterfront
- beach grading and planting
 - public amenities

- B** Soubise waterfront enhancements
- shoreline revegetation
 - fishing related facilities

Urban shoreline improvements

Public/private greenway

Resilient fishers infrastructure

- stable permanent structures
- allow for safe boat storage and repair
- stabilize adjacent shoreline

In the Bay

Mangrove planters

- create habitat
- protect shoreline

Selective reef enhancement

- help adapt to changing conditions
- help buffer wave action for inner bay



stormwater ponds

Minimize flooding and add habitat

A network of ponds and vegetated drainageways create a buffer against flooding and erosion. Water flow is stabilized allowing for healthier and more consistently vegetated riparian borders. Vegetated borders in turn provide shade and lower water temperatures.



vegetated seawalls

Infrastructure with nature

Maintain flood protection but add habitat and improve aesthetics in urban zones and where space is limited.



natural recreation areas

Facilities for Community and Eco-tourism Activities

Provide waterfront recreation opportunities for both residents and visitors while improving the health and stability of shoreline.



beach revegetation

Stabilizing structure

A diversity of healthy vegetation can stabilize underlying sand reducing erosion and maintaining capacity of dunes to protect from storm surges.



mangrove islands

Protected moorage

As second line of storm defence, constructed mangrove islands can provide a layer of protection inside the reef.



reef flat

Sea Moss farming

Coral growth could reinforce the reef crest, provide jobs, and act as a tourism attraction.

Other aquaculture projects should be explored for this area such as Sea Moss farming and Conch farming.



reef crest

Natural defense

Overall water quality improvements from seagrass and mangrove restoration may contribute to increased reef health. Improving reef structure may further enhance the first line of defense against storm surge.