RESILIENT CEDAR KEY / PORT ST. JOE

A MODEL FOR COMMUNITY-UNIVERSITY PARTNERSHIPS TO ADVANCE CLIMATE ADAPTATION

2024 Symposium on Flooding Adaptation | October 29, 2024

Florida Department of Environmental Protection

Sea Grant Florida

UF College of Design, Construction & Planning
UNIVERSITY of FLORIDA

UF Florida Institute for Built Environment Resilience
UNIVERSITY of FLORIDA

FLORIDA RESILIENT CITIES

COMMUNITY-UNIVERSITY PARTNERSHIPS

Communities can leverage university-based research and faculty expertise to create data-driven plans that articulate flood risk-reduction goals, develop realistic adaptation actions, and catalyze future resources for implementation.

UF COLLEGE OF DESIGN, CONSTRUCTION + PLANNING

Faculty ***expertise*** in hazard mitigation + climate adaptation

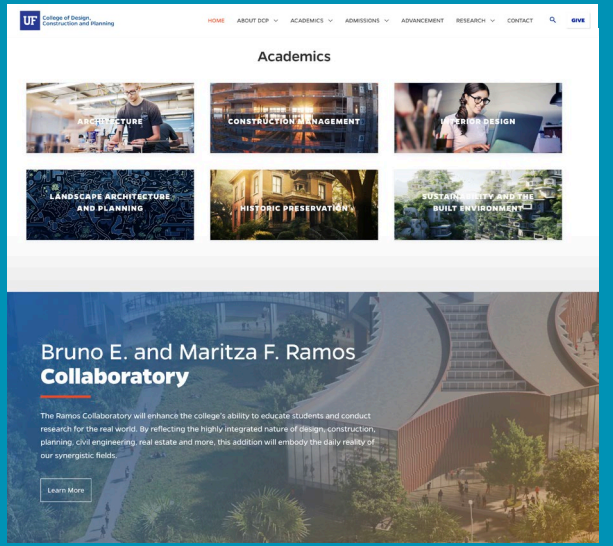
- Planning, architecture, landscape architecture, construction management, historic preservation, fire + emergency services

Research integrates ***new technology + innovation***

- AI, interactive mapping applications, digital twins for spatial analysis, visualization, and communications

Serving the public **is in our mi**ssion

- As Land Grant / Sea Grant institution, UF is dedicated to supporting communities across Florida



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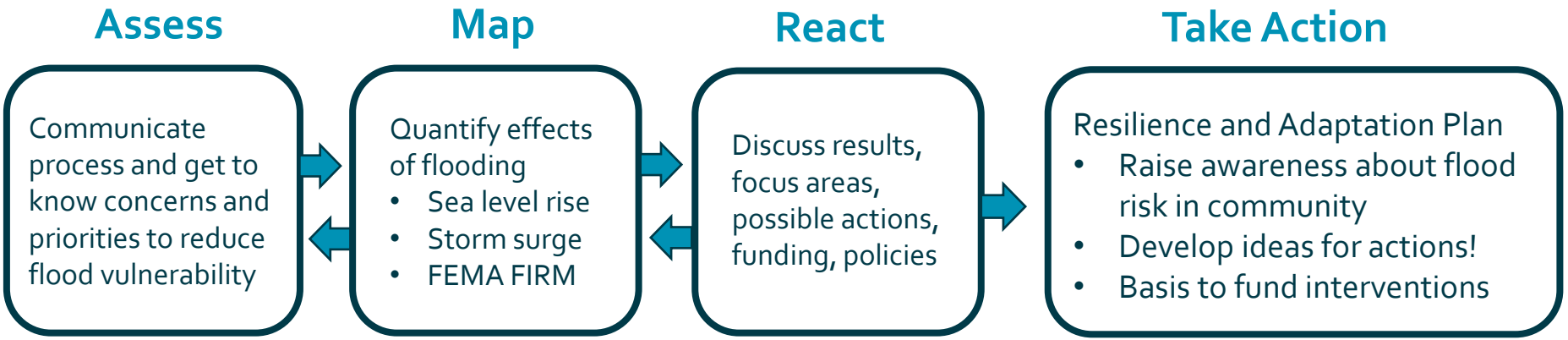
Case Study 1- Resilient Cedar Key

Partnership between:

- City of Cedar Key
- UF Florida Institute for Built Environment Resilience (FIBER)
- UF Center for Landscape Conservation Planning (CLCP)
- UF Shimberg Center for Housing Studies
- UF/IFAS Nature Coast Biological Station
- UF/IFAS Food and Resource Economics Dept.
- Florida Sea Grant

Action-Focused Planning Process

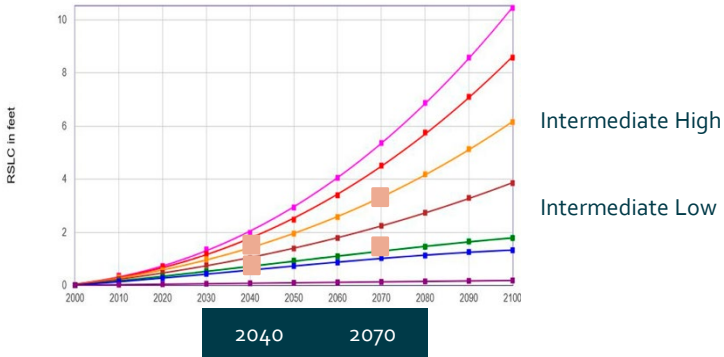


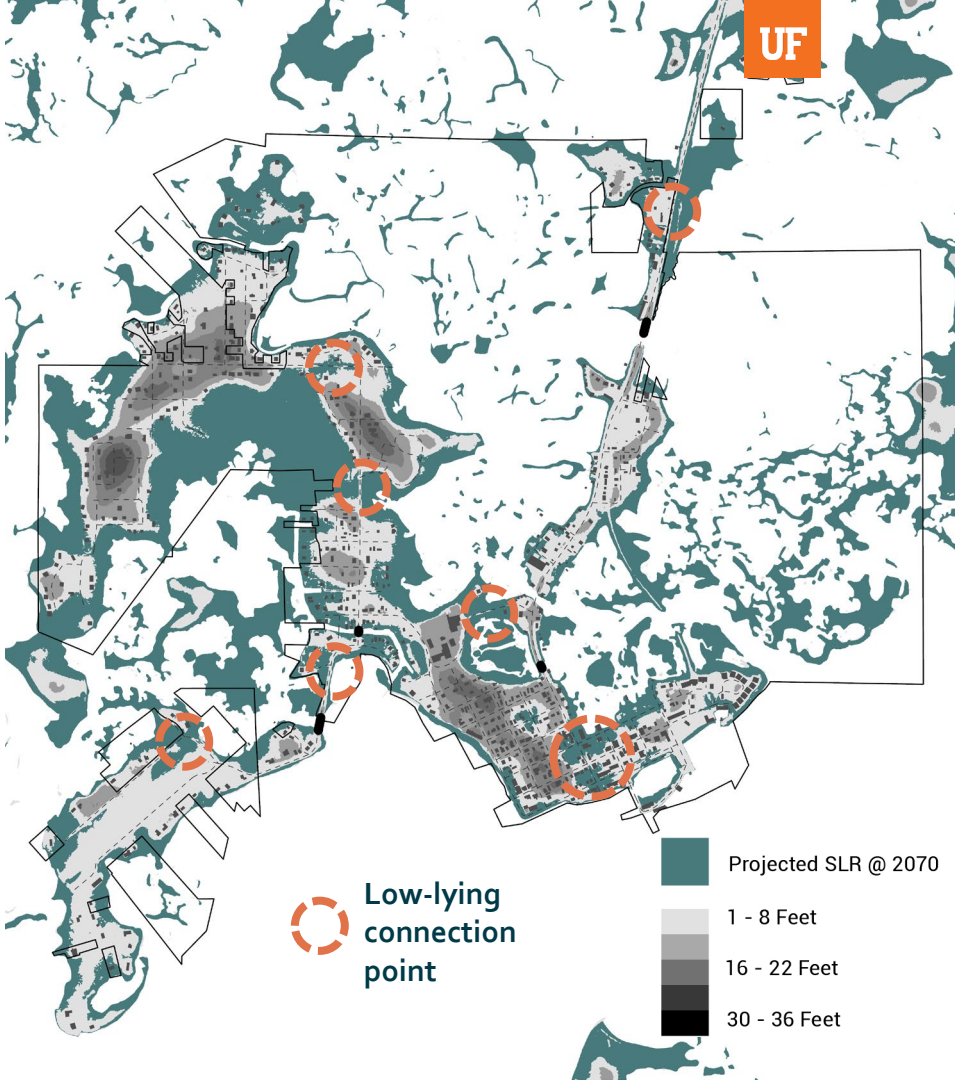
Vulnerability Assessment

Included several flood hazards in response to FDEP requirements and community interests:

- High-tide flooding
- 1-year, 2-year, 10-year return events
- FEMA 100-year floodplain
- Category 1, 3, 5 hurricanes
- Sea level rise (NOAA Intermediate High, 2040/2070)

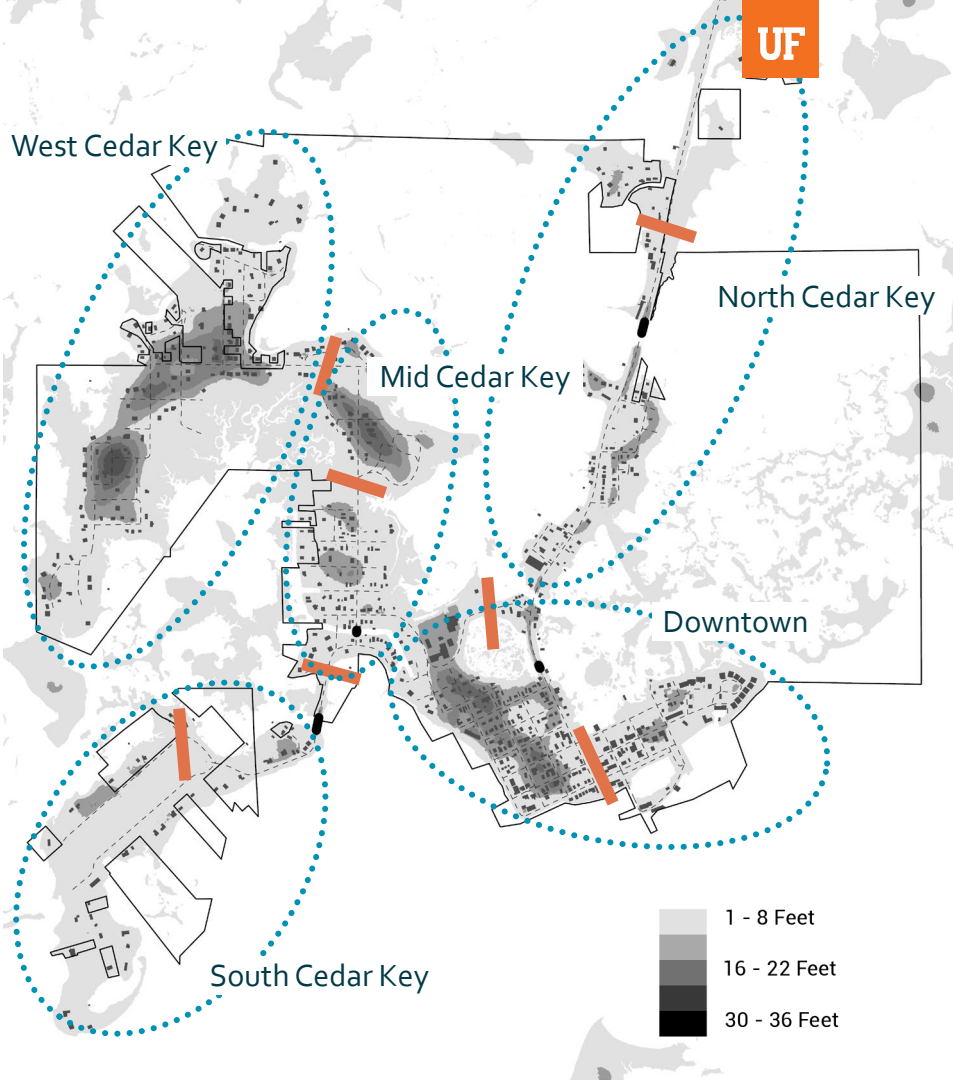
Planning Horizons (NOAA 2017)

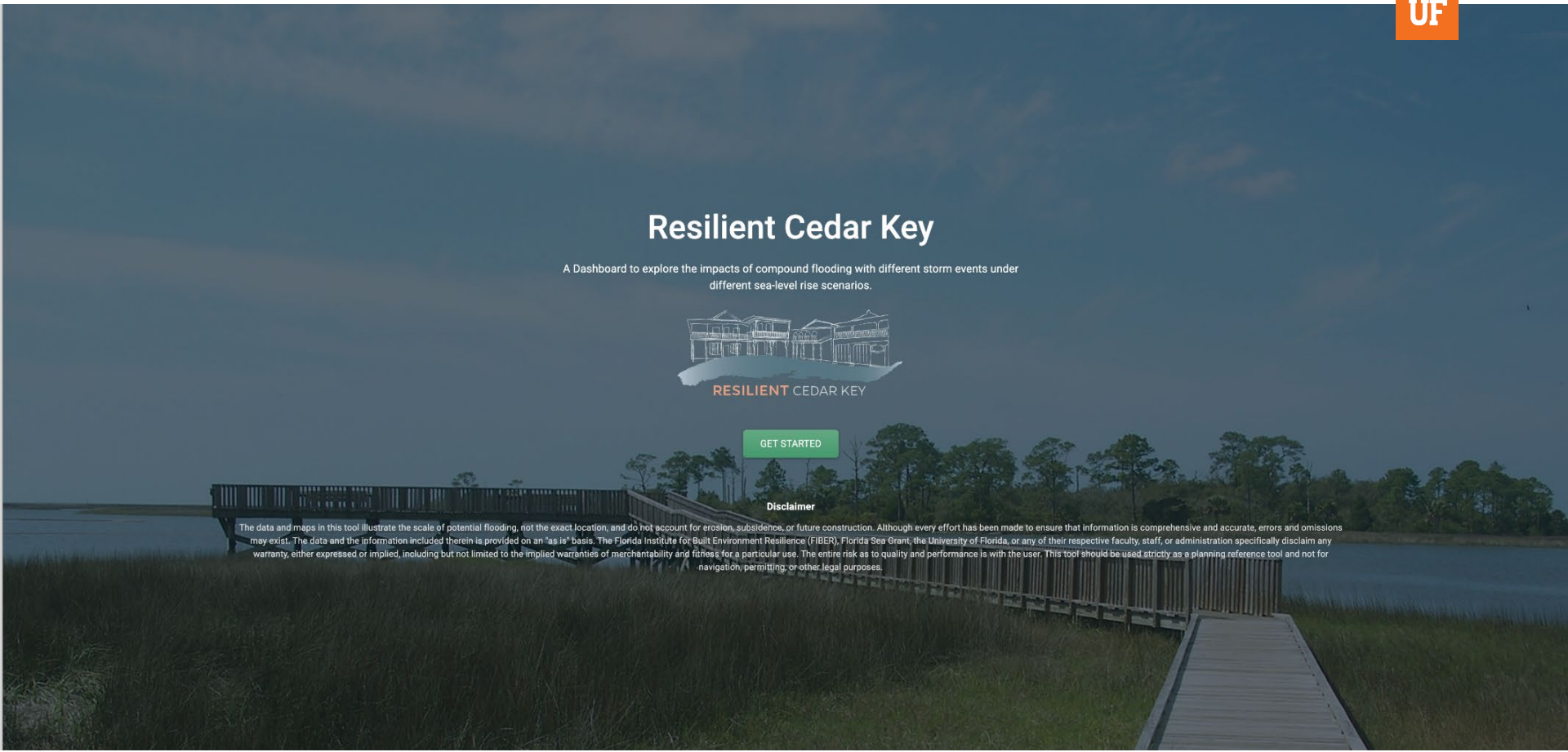




Study Areas

- Given these natural breaks across the island, the city can also be seen through a collection of interdependent sub-geographies.
- The Cedar "Keys" study areas shaped analysis and drove adaptation planning:
    - Downtown CK
    - Mid-CK
    - North CK
    - South CK
    - West CK
    - Also, inland areas (Levy county)





https://resilientcedarkey.web.app/

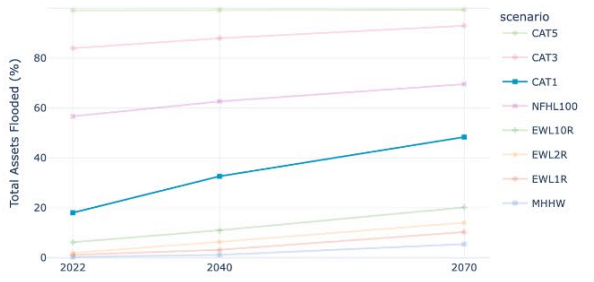
Resilient Cedar Key

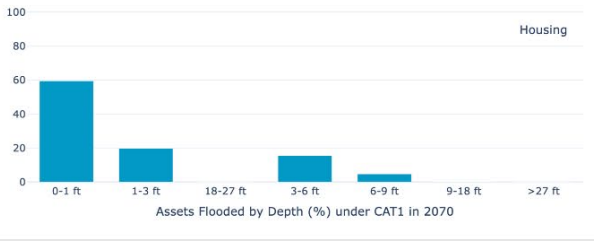
HOUSING | TRANSPORTATION | CRITICAL INFRASTRUCTURE | COMMUNITY SERVICES | NATURAL & CULTURAL | LOCAL ECONOMY | ADAPTATION

Affordable Housing

Overview: Cedar Key is a historic community with a range of housing stock, ages, construction types, and economic values. This housing stock traditionally supported a diverse community across race, age, and economic status.

Challenges: Like many coastal communities in Florida, Cedar Key has seen property values rise substantially in recent years, making housing unaffordable to many people. Coupled with increased risk from rising tides/coastal flooding, structure age, and costs of upkeep, Cedar Key's housing stock is vulnerable to storm damage as well as conversion to short-term rental properties.





Scenario
CAT5
CAT3
CAT1
NFHL100
EWL10R
EWL2R
EWL1R
MHHW

Projection Year
2022
2040
2070

Overarching Themes

Theme:

Cedar Key is an archipelago.

Approach:

Restore Hydrologic Connectivity

Theme:

Cedar Key depends on its transportation network.

Approach:

Strengthen Transportation Network

Theme:

Cedar Key is a collection of diverse districts.

Approach:

Tailor Adaptation Actions for Diverse Districts

Theme:

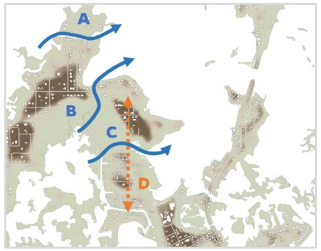
Cedar Key's natural systems have defined its identity and will sustain its future.

Approach:

Preserve Natural Systems and Functions that Sustain the Local Economy

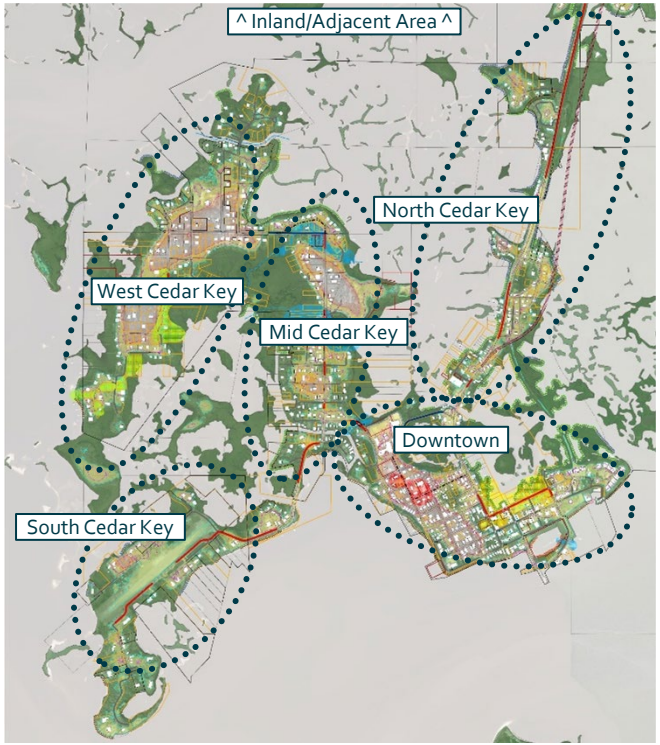
Adaptation Action Areas + Project Priorities

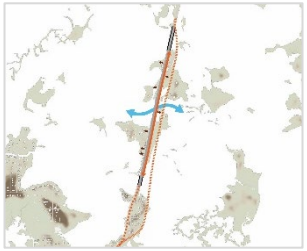
Downtown
"Reconnect and Redefine"



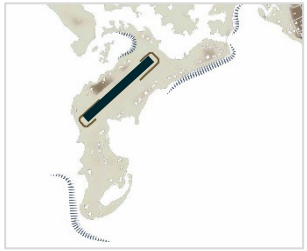
Mid CK
"Restore Keys Hydrology"

West CK
"Individual Action, Collective Impact"

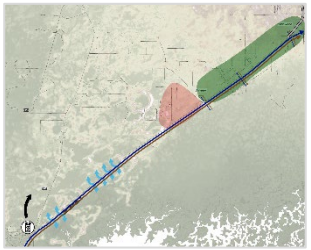




North CK
Local + Regional Connections

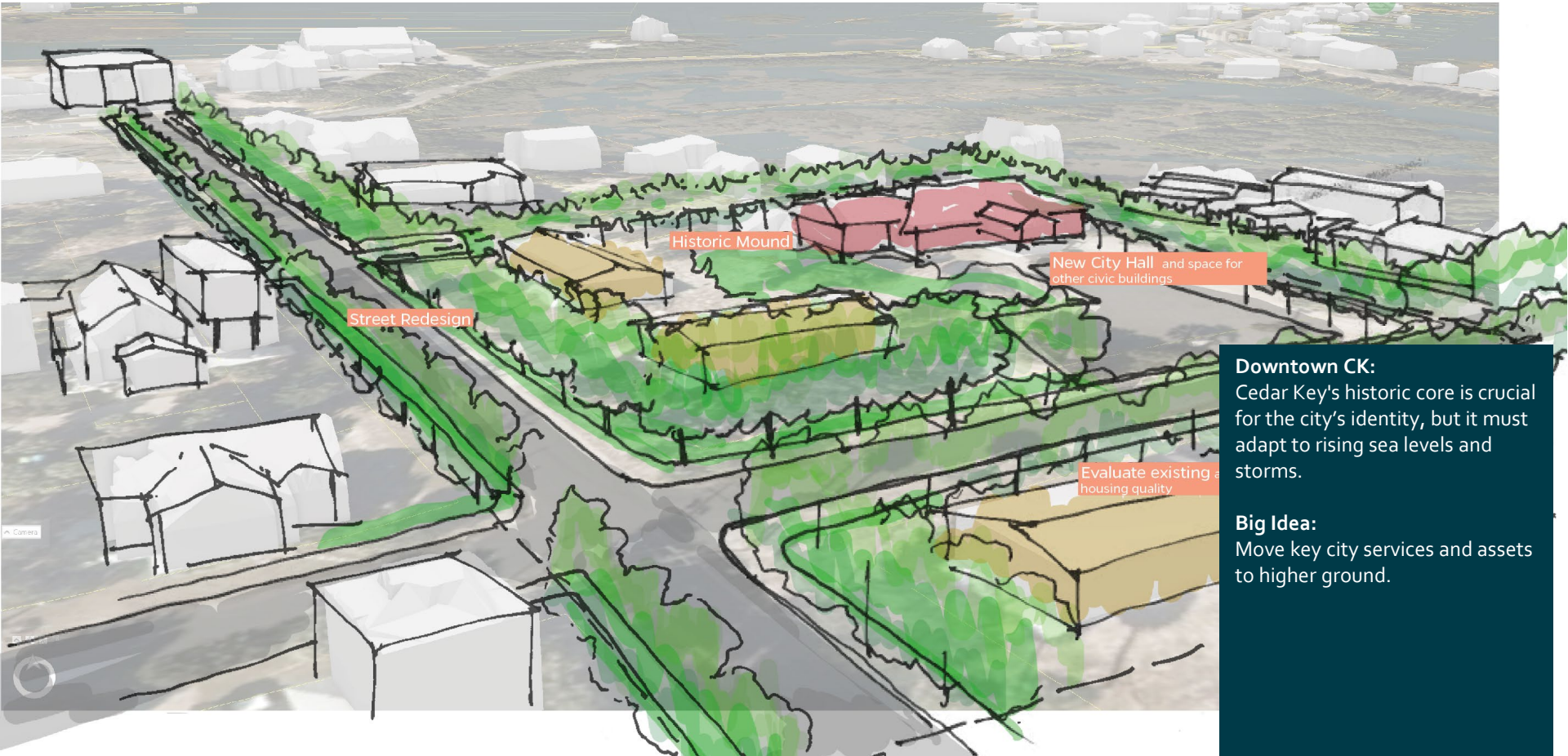


South CK
Infrastructure & Shorelines



Inland Area
"Protect and Plug-In"

Redefining Downtown- A New Civic Center



Downtown CK:
Cedar Key's historic core is crucial for the city's identity, but it must adapt to rising sea levels and storms.

Big Idea:
Move key city services and assets to higher ground.

Redefining Downtown- Priority Projects

1. Relocation of City Hall, library, emergency and community services, etc. to higher ground by Community Center

2. Redevelop areas of higher ground for more mixed income/affordable housing in vicinity of G St. and 6th St.

3. Restore hydrologic connectivity along Whiddon Ave. at west side of CK School

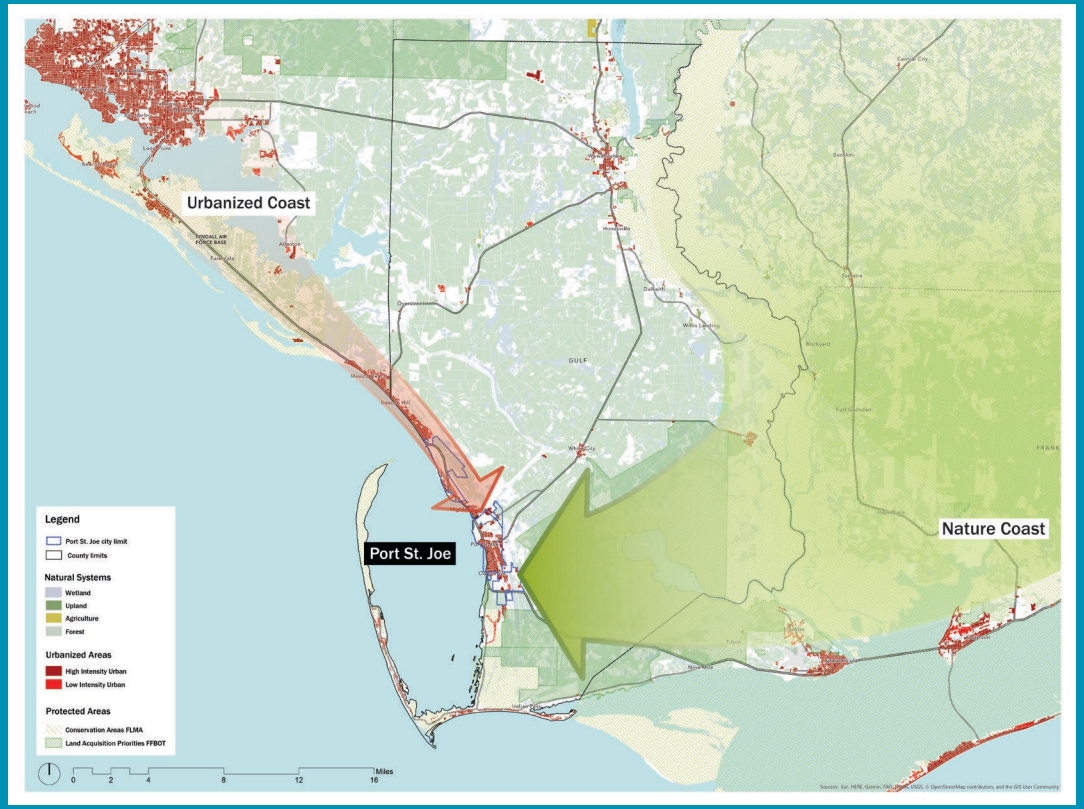
Downtown

Moving Forward

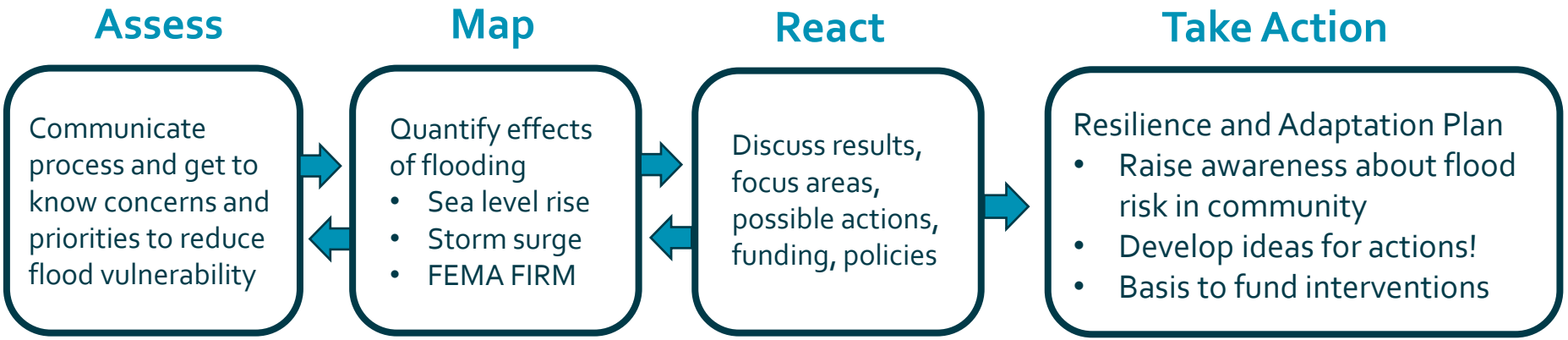
- Linking adaptation plan with City's CRA plan
- Catalyzing mitigation projects:
  - Relocation of City Hall & other city departments
  - Land acquisition grants
  - Prioritization of FEMA relief funds
    - Identifying target properties for buyout offers
- Preparing future applications for infrastructure funds

Case Study 2- Port St. Joe

The Context



Planning Process



Collective Mapping

Resilient Port St. Joe WebApp

Adaptation Plan Spatial Framework
Adaptation Overlays

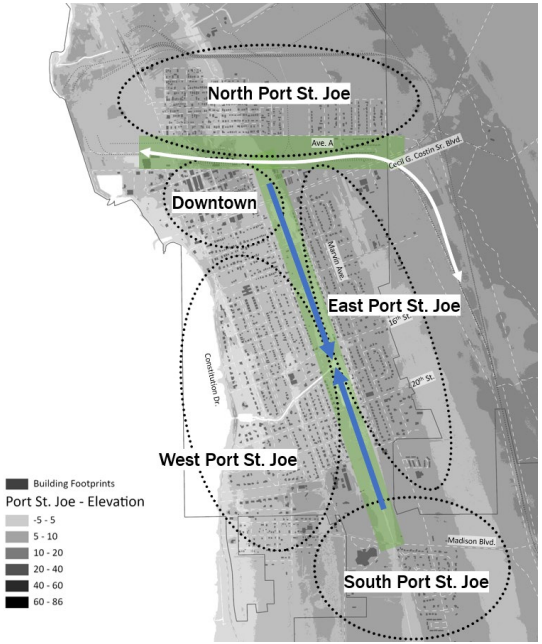
Community Input

Collective Mapping

Category	Asset
Housing	**Complementary sources**
	Assisted Housing Inventory - Levy Clip
	Naturally occurring affordable housing (NOAH)
Transportation	**FDEP Requirements**
	airports
	bridges
	bus terminals
	ports
	major roadways
	marinas
	rail facilities
	railroad bridges
Critical infrastructure	**FDEP Requirements**
	wastewater treatment facilities and lift stations
	stormwater treatment facilities and pump stations
	drinking water facilities
	water utility conveyance systems
	electric production and supply facilities
	solid and hazardous waste facilities
	military installations
	communications facilities
	disaster debris management sites
Critical community and emergency facilities	**FDEP Requirements**
	schools, colleges and universities
	community centers
	correctional facilities
	disaster recovery centers
	emergency medical service facilities
	emergency operation centers
	fire stations
	health care facilities
	hospitals
	law enforcement facilities
	local government facilities
	logistical staging areas
	affordable public housing
	risk shelter inventory
	state government facilities
Natural, Cultural, and Historic Resources	**FDEP Requirements**
	conservation lands
	parks
	shorelines
	surface waters
	wetlands
	historical and cultural assets

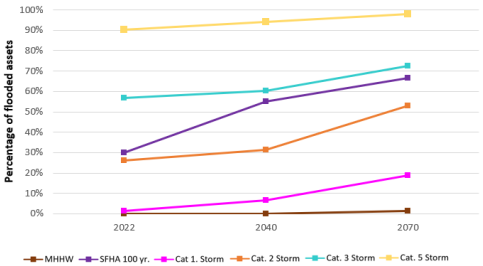
Vulnerability Assessment

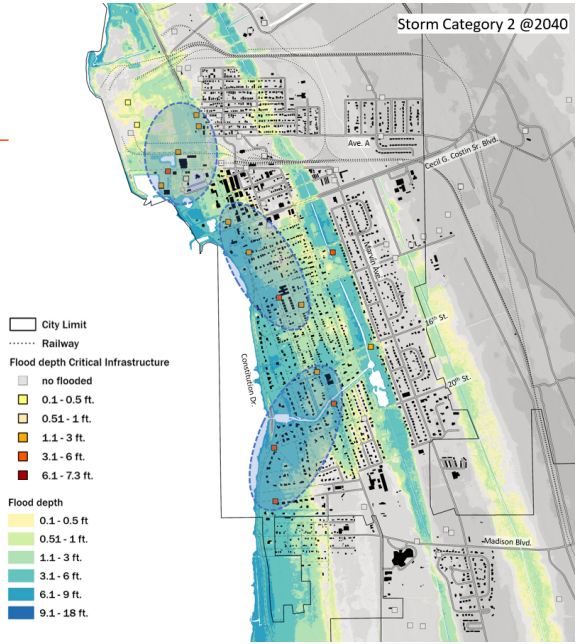
Results



Critical Infrastructure Exposure Analysis

- By 2040, a Category 2 storm will flood over **30% of critical infrastructure**, by 2070 this percentage rises to over **50%** (almost **double of flooded assets** in 2022).
- By 2040, a Category 3 storm will flood almost **60% of critical infrastructure**, with several assets including lift stations, hazardous waste facilities, and communication facilities getting over 3ft and even 6ft of water.





Vulnerability Assessment

Results

Zone 1, Downtown

Critical assets inventory, exposure levels

Asset Name	Address	Asset Class	Asset Type	Asset Elevation ft NAVD88	CURRENT					2040 Scenario					2070 Scenario				
					access	100-YR	CAT-1	CAT-2	CAT-3	CAT-5	SLR	100-YR	CAT-1	CAT-2	CAT-3	CAT-5	SLR	100-YR	CAT-1	CAT-2	CAT-3	CAT-5
PORT ST JOE MARINA	340 Marina Dr	CI	HAZARDOUS WASTE FACILITY	0		2.60	0.62	4.34	11.29		3.88		1.90	5.62	12.57		5.72	0.02	3.74	7.46	14.41	
PORT ST JOE MARINA	340 Marina Dr	CI	STORMWATER FACILITY	0		2.64		0.66	4.38	11.34		3.92		1.94	5.66	12.62		5.76	0.06	3.78	7.50	14.46	
PORT ST JOE MARINA INC	340 Marina Dr	TRANSP	MARINA	0		2.70		0.71	4.43	11.39		3.94		1.99	5.71	12.67		5.62	0.12	3.83	7.55	14.51	
MASONIC LODGE - PORT SAINT JOE 111 F & AM	214 Reid Ave	CCASF	COMMUNITY CENTER	0.55					1.85	8.84		2.05		-0.55	3.15	10.12		3.85			1.31	4.97	11.50	
PORT ST JOE FIRE DEPARTMENT	404 Williams Ave	CCASF	FIRE STATION	0.53					2.24	9.25		0.76		-0.12	3.52	10.53		2.60			1.72	5.36	12.37	
PORT ST JOE POLICE DEPT - O'HALL	1001 Cecil G Costin Sr Blvd	CCASF	LAW ENFORCEMENT FACILITY	0.53		0.25			2.24	9.25		1.53		0.65	4.28	11.29		3.37		2.49		6.13	13.14	
GULF COUNTY SUPERVISOR OF ELECTIONS	401 Long Ave	CCASF	GOVERNMENT FACILITY	0.58					0.42	7.44		0.43			1.70	8.72		2.45		-0.11		3.54	10.56	
MILLER AGENCY INC	First Street & Garrison Ave	CI	HAZARDOUS WASTE FACILITY	0.58						3.76						0.06						-0.31	6.90	
ALVAREZ LAWMAN S A SSOC INC	816 E 4Th St Ste E	CI	HAZARDOUS WASTE FACILITY	0.53						2.72						-4.00							5.84	
AN RAILWAY LLC	301 E 1St St	CI	HAZARDOUS WASTE FACILITY	0.57					0.11	7.10		0.25			1.39	8.38		2.09		-0.43		3.23	10.22	
ST JOE AUTO PARTS CO INC	201 Long Ave	CI	HAZARDOUS WASTE FACILITY	0.61					0.26	7.25		0.40			1.54	8.53		2.27		-0.27		3.36	10.37	
CVS PHARMACY #5246	110 W Highway 98	CI	HAZARDOUS WASTE FACILITY	0.75					0.00	-1.02		-7.01			-4.72	0.26		-5.97		-6.54		-4.60	2.10	
GULF COAST'S WILD PERFORMANCE	412 Monument Ave	CI	HAZARDOUS WASTE FACILITY	0.55		2.03		0.74	4.36	11.37		3.91		1.99	5.64	12.61		5.75	0.02	3.83	7.46	14.40	
PORT THEATER	314 Reid Ave	NCAHR	HISTORIC STRUCTURE	0.53		0.02		-0.27	3.39	10.38		1.90		1.01	4.66	11.66		3.74		2.05	6.50	13.50	
PORT ST JOE POLICE DEPARTMENT	1001 Cecil G Costin Ave	CCASF	LAW ENFORCEMENT FACILITY	0.53		-0.52			2.24	9.25		1.53		0.65	4.28	11.29		3.37		2.49		6.13	13.14	
CHURCHES	218 Long Ave	NCAHR	NONHOUSING TPB POINTS	0.58					0.91	7.91					2.19			2.93		0.38	4.03	11.03		
CHURCHES	475 Third St.	NCAHR	NONHOUSING TPB POINTS	0.58					0.46	7.45					1.73			2.46		-0.04	3.57	10.57		
CHURCHES	510 E 4Th St.	NCAHR	NONHOUSING TPB POINTS	1.75					-0.33	6.69					0.95			1.69		-0.87	2.79	9.61		
FAMILY LIFE CHURCH	325 Reid Avenue	NCAHR	RELIGIOUS FACILITY	0.48		-0.45			2.31	9.32		0.63		-0.05	3.59	10.60		2.67		1.79	5.43	12.44	
SHORELINE MEDICAL GROUP, P. A.	419 Baltzell Avenue	CCASF	HEALTH CARE FACILITY	0		3.59		1.66	5.31	12.32		4.07		2.54	6.59	13.60		6.71	0.96	4.76	8.43	15.44	
CAPE SAN BLAS LIGHTHOUSE	200 Miss Zola's Dr	NCAHR	HISTORIC STRUCTURE	0		3.94		1.88	5.56	12.56		5.12		3.16	6.84	13.84		6.96	1.25	5.00	8.66	15.68	
PORT ST JOE CITY MARINA - JOE MARINA	340 Marina Dr	PARKS	PARKS	0	1.46	3.94	1.88	5.56	12.56		1.97	5.12	2.01	3.16	6.84	13.84	1.99	6.96	1.25	5.00	8.66	15.68		
SAND HILLS POND PARK	116 Hurlbertview Dr	NCAHR	PARKS	0	0.45	5.34	3.57	5.33	6.44	13.62		1.97	6.46	2.27	4.32	7.92	14.90	1.46	6.29	2.66	4.57	9.76	16.74	
SHIPYARD COVE/ MADDOX PARK	195 Captain Fred's Pl	NCAHR	PARKS	0	0.33	7.51	1.43	5.04	6.73	15.72		0.89	8.79	2.60	6.32	10.01	17.00	1.32	10.43	4.43	6.16	11.65	18.64	
BAY WALK PARK AND GULF COUNTY WELCOME CENTER	502 Monument Ave	NCAHR	PARKS	0		6.16	1.32	4.21	7.66	14.86			7.46	1.77	5.49	9.16	16.16	1.20	9.36	3.57	7.55	11.00	18.00	
BALTZELL POND PARK	404 Baltzell Ave	NCAHR	PARKS	0		6.32	1.74	4.36	8.04	15.04			7.60	2.71	5.66	9.32	16.32	1.66	9.44	3.74	7.50	11.16	18.16	
DR JOE PARK	224 Williams Ave	NCAHR	PARKS	0		1.55			2.79	9.79		2.72			0.55	4.07	11.07		4.56		2.26	5.91	12.91	
PORT ST JOE CITY HALL PARK	305 C G Costin Blvd	NCAHR	PARKS	0		1.03		0.36	3.76	10.80		2.31			1.42	5.06	12.08		4.15	0.14	3.26	6.90	13.92	
FIRST BAPTIST CHURCH OF PORT SAINT JOE	102 Third Street	NCAHR	RELIGIOUS FACILITY	0		2.97		0.65	4.31	11.31		3.85			1.93	5.59	12.59		5.99		3.77	7.43	14.43	
HRS GULF CO PUBLIC HEALTH UNIT	401 Long Avenue	CI	SOLID WASTE FACILITY	0.58					0.52	7.54		0.70			1.60	8.42		2.54		-0.01	3.64	10.66		
CSX TRANSPORTATION NORTHERN RAILROAD	100 Railroad Shop Rd	CI	HAZARDOUS WASTE FACILITY	0.58					0.12	7.10		0.30			1.50	8.40		2.10		-0.17	3.34	10.32		
AN RAILWAY LLC		CI	WASTEWATER TREATMENT FACILITY	0.57					0.12	7.10		0.30			1.50	8.40		2.10		-0.17	3.34	10.32		
EASTERN SHIPBUILDING GROUP INC	341 Howard Rd	CI	HAZARDOUS WASTE FACILITY	0		1.30		0.37	4.09	11.01		2.58		1.65	5.36	12.29		4.42		3.49	7.20	14.13		
ST JOSEPH LAND & DEV CO	Garrison Ave & Us Hwy 71	CI	HAZARDOUS WASTE FACILITY	0					4.33						0.61						0.37	7.46		
AMERADA HESS CORP	First Street & Baltzel Avenue	CI	HAZARDOUS WASTE FACILITY	0		0.55			3.30	10.27		1.63		0.89	4.56	11.55		3.67		2.73	6.42	13.39		
LONG AVE WATER AND SEWER PROJECT		CI	STORMWATER FACILITY	0					1.04	8.04		1.23			2.34	9.32		3.07		0.52	4.16	11.16		
PS.010 - MARINA DRIVE LIFT STATION	404 Marina Dr	CI	LIFT STATION	0		4.10		3.15	6.66	13.81		5.38		4.43	8.14	15.09		7.22		6.27	9.96	16.93		
PS.040 - 1ST STREET MASTER LIFT STATION	110 Dewit Langdon Dr	CI	LIFT STATION	0					0.62	7.81		0.99			2.10	9.09		2.83		0.29	3.94	10.93		

Transportation Street Network, Housing , a nd Economy & Tourism assets are displayed only as summary's in the critical assets categories table.

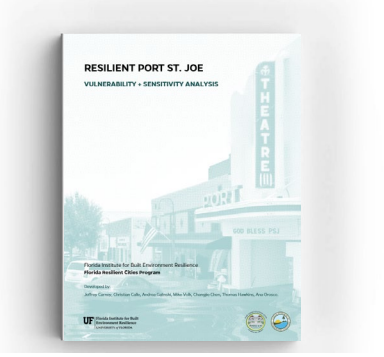
ASSET CLASS LEGEND

CCASF - CRITICAL COMMUNITY AND EMERGENCY FACILITIES
CI - CRITICAL INFRASTRUCTURE
NCAHR - NATURAL, CULTURAL, AND HISTORICAL RESOURCES
TRANSP - TRANSPORTATION

Zone 1, Downtown

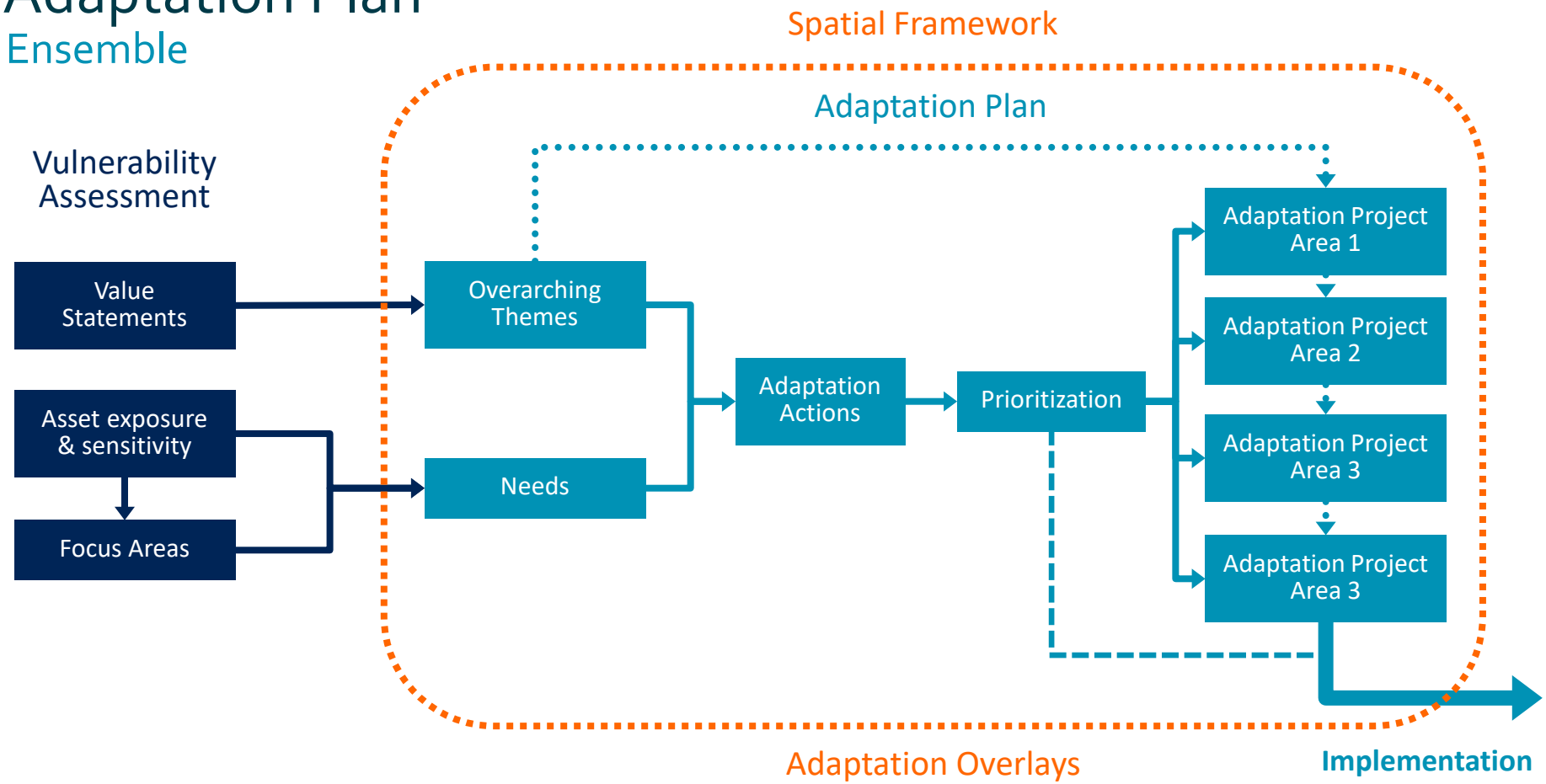
Critical assets categories, exposure levels

	Current							
	Mean Higher High Water	100-Year	Category 1 Hurricane	Category 2 Hurricane	Category 3 Hurricane	Category 5 Hurricane	Sea Level Rise	100-Year
Zone 1 - Downtown - Housing								
No Impact	100.0%	100.0%	100.0%	100.0%	10.0%	0.0%	100.0%	32.5%
Low	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%	0.0%	22.5%
Medium	0.0%	0.0%	0.0%	0.0%	55.0%	0.0%	0.0%	37.5%
High	0.0%	0.0%	0.0%	0.0%	10.0%	100.0%	0.0%	7.5%
Flooded Housing Buildings	0.0%	0.0%	0.0%	0.0%	90.0%	100.0%	0.0%	67.5%
Zone 1 - Downtown - Transportation								
No Impact	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Low	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Medium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
High	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Flooded Transportation Assets	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Zone 1 - Downtown - Critical Infrastructure								
No Impact	100.0%	64.7%	100.0%	70.6%	23.5%	5.9%	100.0%	23.5%
Low	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Medium	0.0%	0.0%	0.0%	0.0%	5.9%	11.8%	0.0%	11.8%
High	0.0%	35.3%	0.0%	23.5%	64.7%	94.1%	0.0%	64.7%
Flooded Critical Infrastructure Assets	0.0%	35.3%	0.0%	29.4%	76.5%	94.1%	0.0%	76.5%
Zone 1 - Downtown - Critical Community and Emergency Facilities								
No Impact	100.0%	50.0%	100.0%	83.3%	0.0%	0.0%	100.0%	0.0%
Low	0.0%	16.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Medium	0.0%	16.7%	0.0%	0.0%	16.7%	0.0%	0.0%	50.0%
High	0.0%	16.7%	0.0%	16.7%	83.3%	100.0%	0.0%	50.0%
Flooded Critical Community and Emergency Fac	0.0%	50.0%	0.0%	16.7%	100.0%	100.0%	0.0%	100.0%
Zone 1 - Downtown - Natural, Cultural and Historical Resources								
No Impact	78.6%	21.4%	64.3%	35.7%	0.0%	0.0%	78.6%	21.4%
Low	0.0%	7.1%	0.0%	7.1%	7.1%	0.0%	0.0%	0.0%
Medium	0.0%	7.1%	0.0%	0.0%	14.3%	0.0%	0.0%	7.1%
High	21.4%	64.3%	35.7%	57.1%	78.6%	100.0%	21.4%	71.4%
Flooded Natural, Cultural and Historical Resourc	21.4%	78.6%	35.7%	64.3%	100.0%	100.0%	21.4%	78.6%



Adaptation Plan

Ensemble



Adaptation Plan

Principles

Theme 1: Port St. Joe's Land Morphology Role in Flood Mitigation.

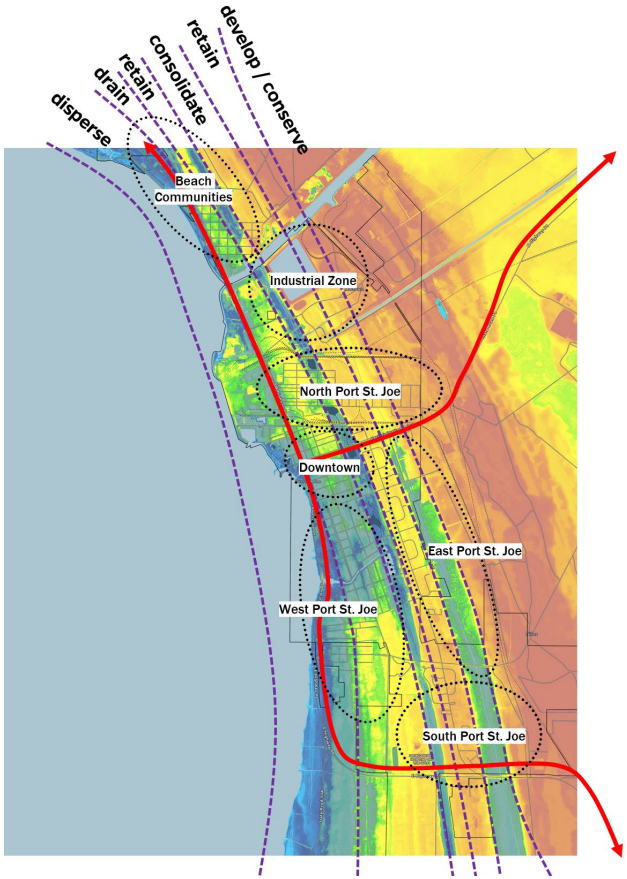
Approach: Enhance Hydrologic Conditions

Theme 2: Vulnerability of Main Transportation Routes to Severe Flooding

Approach: Strengthen Transportation Network

Theme 3: Diversity of Districts in Port St. Joe

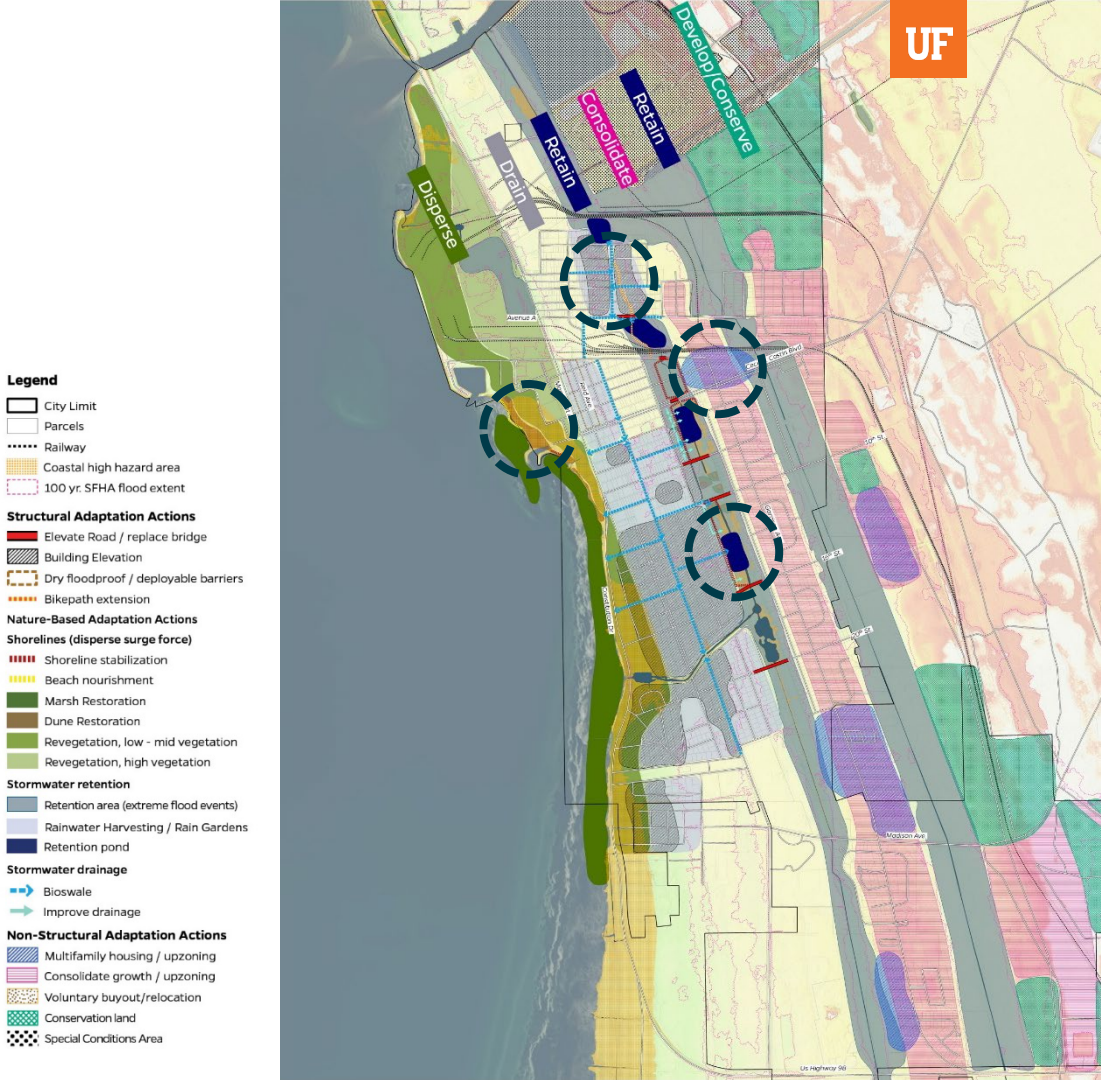
Approach: Tailor Adaptation Actions for Diverse Districts



Adaptation Plan

Spatial Framework

Port St. Joe's topographic bands, consisting of ridges and low swale areas, influence flood patterns and vulnerability based on elevation. The Spatial Framework assigns each band a specific zone—disperse, drain, retain, consolidate, develop/conserve, or special conditions—with tailored flood strategies that leverage the city's unique hydrologic and topographic features.



Adaptation Plan

Spatial Framework

Re-structure Marina Drive, ensure connectivity

Sand Hills Pond Park, Shipyard Cove, and Maddox Park

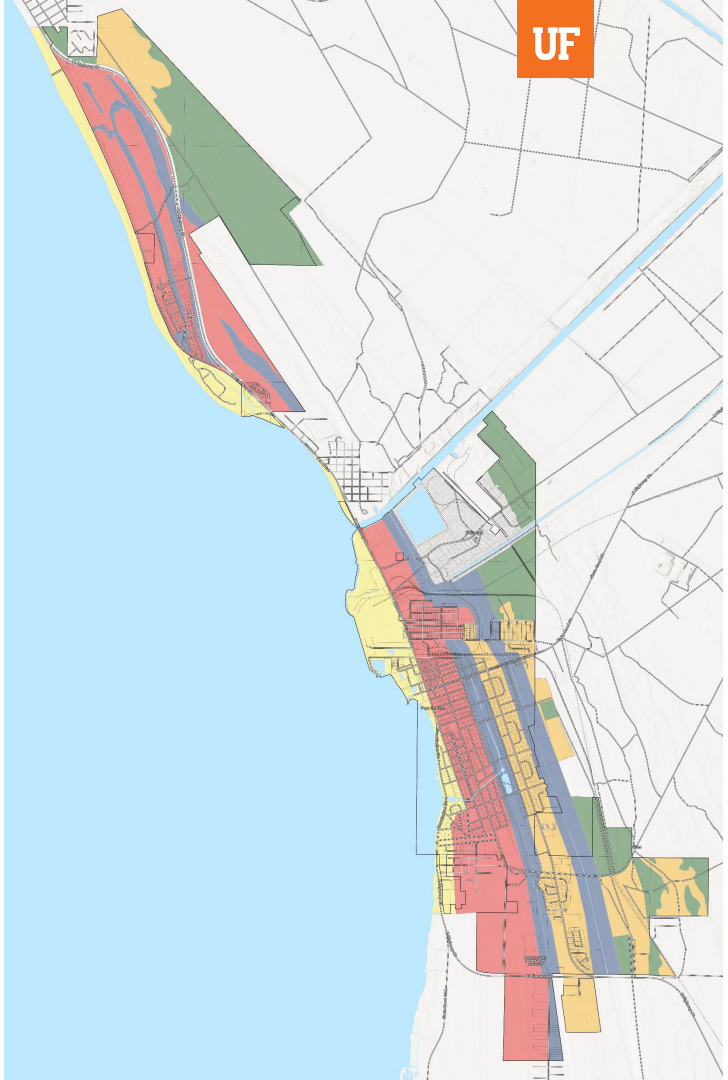
1. marsh restoration
2. beach nourishment
3. dune restoration and retrofit revetment
4. mix low vegetation and deciduous trees
5. high vegetation

6. Dry floodproof Reid Ave.

Adaptation Plan

Adaptation Overlays

- The **disperse** overlay applies to the land closest to the coast and involves bolstering infrastructure and defenses from waves, rising ocean waters, and extreme storm events.
- The **drain** overlay covers low-elevation areas that need improved drainage.
- The **retain** overlay covers areas that could benefit from increased water retention capacity and natural condition restoration.
- The **consolidate** overlay involves encouraging future growth in high-elevation areas with low flood vulnerability and good accessibility.
- The **conserve** overlay focuses on preserving ecosystem functions and managing building development.
- The "**special conditions**" designation focuses on improving stormwater drainage and retention for certain facilities with preexisting nonconforming uses.




UF
Dry floodproof
historical core
High vegetation
Low-High vegetation
Dune restoration
Beach nourishment
Marsh restoration

THANK YOU

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