# RESILIENT CEDAR KEY

## ADAPTATION PLAN

UF Florida Institute for Built Environment Resilience

**Florida Resilient Cities Program**

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# ADAPTATION PLAN

## INTRODUCTION

In response to the increasing challenges facing Cedar Key due to chronic flooding and the threat of future extreme flood events, the Resilient Cedar Key adaptation plan will serve as a spatial framework outlining individual actions and practical projects designed to mitigate flood impacts; it will also provide suggestions on the policies and funding mechanisms that can support individuals and community-wide protective measures. At its core, the plan aims to minimize the adverse effects of flooding based on strategic objectives, data-driven analyses, and a comprehensive approach to the identification of impactful actions.

The foundation of this plan is deeply rooted in the Cedar Key community's perspectives, valuing the community's deep relationship with their environment and recognizing what matters most to residents, and understanding how their vital assets are affected by flooding. This community-centric approach ensures that the adaptation actions and projects are not only feasible but also resonate with the values and needs of Cedar Key's residents.

We first set out the key themes that have informed the development of this plan, along with our objectives (approaches) in addressing these themes. We then divide the city into a series of 6 spatially specific zones, and characterize the adaptation needs in each based on their unique vulnerabilities. Within each zone we identify a series of adaptation actions (projects) that can be taken, organized by asset category (e.g. transportation, critical infrastructure, natural resources, etc.). Finally, we assign priorities to these actions based on the number of residents served, the time required to complete the action, and the potential for reducing risk.

## OVERARCHING THEMES

The forthcoming section outlines our approach to Cedar Key's adaptation plan, detailing the framework and key objectives to enhance the community's capacity to withstand and recover from flooding events, thereby promoting a resilient and sustainable future for all its members.

### Theme 1: Cedar Key is an archipelago.

**Approach:** Restore Hydrologic Connectivity

Cedar Key consists of a historically multi-island archipelago. Restoring the hydrologic connectivity among the islands is essential to reduce the stress on adjacent shorelines and diminish the overall flood risk by facilitating managed water flow through the area.

### Theme 2: Cedar Key depends on its transportation network.

**Approach:** Strengthen Transportation Network

The transportation infrastructure, encompassing bridges and primary roads, is vital to residents' daily functions. The objective is to maintain strong and reliable connectivity, especially during lower-level chronic flooding situations, while also establishing contingency routes to facilitate safe evacuations during emergencies.

### Theme 3: Cedar Key is a collection of diverse districts.

**Approach:** Tailor Adaptation Actions for Diverse Districts

Cedar Key comprises a variety of distinct districts, each with its unique characteristics, vulnerabilities, strengths, and environmental contexts. Adaptation strategies are customized to address the specific needs and attributes of each district, aiming to respect and preserve their identities while enhancing their resilience to flooding.

### Theme 4: Cedar Key's identity and local economy are strongly sustained by its natural systems.

**Approach:** Preserve Natural Ecosystems that Sustain the Local Economy

The identity and economic well-being of Cedar Key are rooted in its natural ecosystems. Protecting these critical environmental assets is imperative for the community's sustained prosperity.

## DESCRIPTION OF NEEDS

The prior vulnerability assessment's exposure and sensitivity analysis helped to define specific needs that will shape the adaptation actions to mitigate flood risks, which will be detailed further in the document. The following section breaks down these requirements by each city zone and asset category.

### Zone 1, Downtown

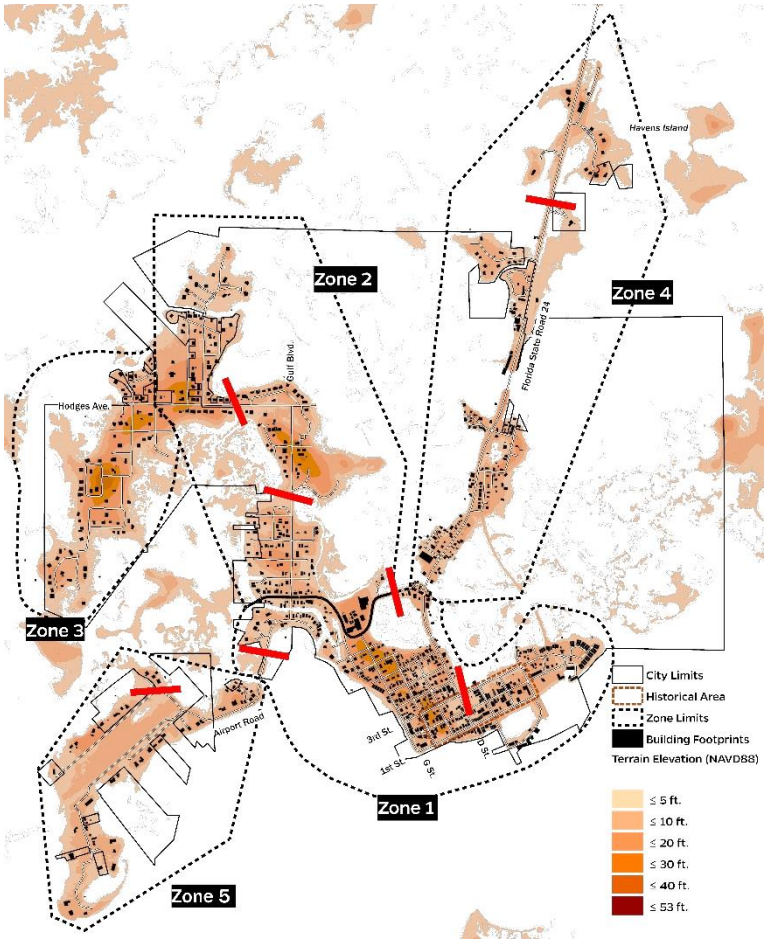


*Figure 1. Cedar Key, zone distribution*

Historic and crucial to its identity, downtown Cedar Key is the most densely developed with many local businesses, as well as the highest number of homes (owner-occupied and rentals). The key needs are to maintain connectivity by elevating roads; moving key city services to higher ground; elevating and/or floodproofing homes, businesses, and critical facilities; and enhancing wetlands in the "back bay" area to improve water quality/provide wave attenuation while promoting recreational opportunities, ecotourism amenities, and enhancing the local economy. Specific needs include:

- *Maintaining the connectivity of the east side of downtown and the rest of the city through Whiddon Ave is essential. This is not just for regular operations but also for functioning emergency services and efficient evacuation during extreme flood events.*
- *Ensure connectivity to the eastern side of downtown to the boat ramps, hospitality services area, and residencies.*

- *In the short term, elevating all essential electrical equipment in the wastewater plant is also crucial. This measure is to prevent damage and ensure the plant can continue to operate after extreme flood events, thereby preventing potential environmental and human health hazards.*
- *In the long-term, shift to regional wastewater management through the Waccasassa Water and Wastewater Cooperative (W3C) so the highly vulnerable wastewater plant can be decommissioned.*
- *Reinforce boat ramp dock structures to withstand the impact of storm surge and maintain access to water for aquaculture activities.*
- *Floodproof or relocate main key community emergency facilities, including the police department, post office, and fire station, to higher ground.*
- *Elevate historical structures. When elevating buildings is not feasible, use wet or dry floodproof to ensure their resilience against flooding.*
- *Elevate homes along D St. (1st - 4th St.), surroundings intersection 5th - E St., Canal Whiddon Ave. - Palmetto Dr.*

**Zone 2, Mid Cedar Key**

Mid Cedar Key is a residential area with a relatively high percentage of owner-occupied homes; it also includes many important community services such as the CK School, CK Cemetery, and Cemetery Point Boardwalk. The varied terrain has areas of high ground and lower spots vulnerable to flooding where water naturally flows through. Along with key needs for road elevation and hydrologic connectivity projects, this section of town has strong potential for housing development/redevelopment on higher ground. This is especially needed for clusters of older, very vulnerable mobile homes along Gulf Blvd. Specific needs include:

- *Ensure functionality of Gulf Blvd., Hodges Ave., and Gulf Blvd. bridge at the canal during extreme high tide events.*
- *Elevate electrical controls at lift stations to prevent damage and ensure continuous operation.*

- *Restore hydrologic connectivity at Cemetery Point, Hodges Ave, and Rye Key to enhance drainage and reduce flooding.*
- *Prepare Cemetery Park for tidal flooding by implementing appropriate drainage measures.*
- *Protect the shoreline from erosion by implementing nature-based features on vulnerable sections to enhance resilience against flooding.*
- *Reinforce boat ramp dock structures to withstand the impact of storm surge and maintain access to water for aquaculture activities.*
- *Elevate and retrofit vulnerable homes in areas adjacent to Gulf Blvd. (Canal - Indiana Ave.), Andrews Cir., and areas adjacent to SW 120th Pl. This area has a considerable number of mobile homes.*
- *Focus attention on mitigation and/or redevelopment of older, vulnerable mobile home parcels.*
- *Increase residential development/redevelopment on areas of higher ground.*

**Zone 3, West Cedar Key**

West Cedar Key is less densely populated and comprised primarily of relatively larger residential properties; the significant asset is the State Museum. The area's needs focus on enhanced awareness about mitigation/adaptation activities that can be undertaken by individual property owners to address long-term flood risks and ecosystem change. Specific needs include:

- *Raise awareness about local road maintenance duties/plans and emergency service access in the context of the long-term increase in chronic flood hazards..*
- *Implement land conservation efforts to limit new development, protect unbuilt areas, and preserve natural flood buffers.*
- *Ensure connectivity through Watson Circle, which facilitates evacuation routes during flood events.*
- *Elevate homes in adjacent areas on the north side of Hodges Ave.*

### Zone 4, North Cedar Key

North Cedar Key is the main connection to the mainland via State Road 24, and it is also the location of many local businesses, tourist attractions, aquaculture facilities, and key boat ramps; however, this roadway is dangerously low in certain sections and floodwaters can cut off access entirely. Here, needs focus on the elevation of State Road 24 (or building a new road) and maintaining continued access to adjacent boat ramps/aquaculture facilities. Specific needs include:

- *Ensure connectivity of the town to the mainland through Florida State Road 24.*
- *Elevate Florida State Road 24 low-lying sections or consider an elevated bypass route to the east.*
- *Integrate adjacent land uses to the new road level to ensure connectivity and minimize potential disruptions during flood events.*
- *Reinforce boat ramp dock structures to withstand the impact of storm surge and maintain access to water for aquaculture activities.*
- *Elevate buildings on both sides of Florida State Road 24.*

### Zone 5, South Cedar Key

South Cedar Key houses a number of residential properties, of which about half are owner-occupied; the major critical asset in the area is the Cedar Key airport. Here, connectivity to the airport and promotion of awareness about growing flood risks and mitigation/adaptation activities for property owners are needed. Specific needs include:

- *Raise awareness about local road maintenance duties/plans and emergency service access in the context of the long-term increase in chronic flood hazards.*
- *Implement measures to protect the airport runway from extreme high tide flooding to ensure continued functionality and safety.*
- *Elevate or otherwise protect Airport Rd., SW Airport Rd, and 136 Pl. to safeguard transportation access and prevent disruption during chronic flood events.*

### Zone 6, Influence Area

Inland of Cedar Key, in Levy County, many people live in small towns and unincorporated areas due to the lack of affordable housing on the island. In addition, there are important infrastructure/critical assets located in this area, which will likely only grow more important with increasing flood hazards. Specific needs include:

- *Relocate or floodproof the electric substation and water plant to prevent disruption of essential services after extreme flood events.*
- *In the near-term, implement measures to protect the pump control room of water wells from flooding to maintain water supply reliability.*
- *In the long-term, shift to a regional water and wastewater supply project through W3C to secure safe drinking water and sanitary sewer access.*
- *Ensure the satellite solid waste facility is adequately protected from flooding to prevent environmental contamination and health hazards.*
- *Elevate and improve drainage along Florida State Road 24 in the area.*
- *Address social vulnerability within neighborhoods in the Sumner area to ensure equitable access to resources and resilient development practices to reduce flood risk.*

# ADAPTATION ACTIONS

In response to the distinct needs identified within Cedar Key's different zones, the adaptation plan focuses on detailing actions for flood hazard mitigation while more holistically planning for long-term adaptation strategies that enhance the community's environment, economy, and quality of life. The adaptation actions specifically focus on restoring Cedar Key's natural hydrology, maintaining connectivity, enhancing ecologic infrastructure, and safeguarding homes, businesses, and critical infrastructure. These adaptation actions are consistent with the adaptation strategies recommended by the Florida Adaptation Planning Guidebook: Protection, Accommodation, Retreat, and Avoidance.

The following table, informed by FEMA's resources, serves as a catalog of potential actions organized by asset category applicable to Cedar Key's needs. This provides a range of potential project options for reducing flood risk. This list of actions is then refined to identify possible priority projects in Cedar Key that effectively reduce flood risk and support a comprehensive approach to adaptation planning.

Community Adaptation Actions

| Asset Category | Adaptation action |
|---|---|
| Transportation | Road Network<br>Road Stabilization<br>*Reshape roadway*<br>*Improve runoff capacity to the sides*<br>*Build shoulder protection*<br>*Preserve subgrade of getting water saturated* |
| | Reduce flood hazard<br>*Increase roadway elevation*<br>*Embankment creates a dam, ensure flow under it maybe not the best option if it gets often flooded*<br>*Road relocation*<br>*Useful for small sections, where wave action occurs. Costly intervention* |
| | Road embankments<br>*Protect embankment slopes*<br>*Riprap, material resist erosion, low slope, necessary to facilitate plant growth*<br>*Bioengineered slope, deep-rooting vegetation*<br>*Change embankment slope*<br>*Reduce erosion* |
| | Culverts<br>*Increase capacity*<br>*Pipe, box, open bottom box, precast arc, bridged* |

| | |
|---|---|
| Transportation | *Replace culvert with a bridge*<br>*Increase ditch capacity*<br>Bridges<br>*Increase bridge length*<br>*Build bridge*<br>Piers and Boardwalks<br>*Retrofit and reinforce structure*<br>*Protect, replace piles*<br>Boat ramps<br>*Retrofit and reinforce structure*<br>*Protect, replace piles*<br>*Reinforce revetments near boat ramp*<br>*Disperse wave energy protect boarding dock* |
| Critical Infrastructure | Drinking Water System<br>Water Intake<br>*Elevate or Relocate*<br>*Pump houses*<br>*Floodproof*<br>*Flood wall or berm to protect the facility, pumps to redirect water away, check valves*<br>*Provide redundant systems*<br>*Backup wiring and controls*<br>Booster stations and pumps, power supplies, electrical controls<br>*Elevate or Relocate*<br>*Instrumentation, computers*<br>*Floodproof*<br>*Flood barriers outside buildings*<br>*Flood shields on openings*<br>*Provide redundant systems*<br>*Backup wiring and controls*<br>Wastewater Treatment Systems<br>Wastewater treatment plant<br>*Elevate or relocate*<br>*Elevate process tanks, instrumentation controls*<br>*Protect or divert*<br>*Reroute flood water, pumps to drain water*<br>*Flood proof*<br>*Barriers, flood shields electrical components in water-resistant closets*<br>*Backup Systems*<br>Lift stations<br>*Elevate*<br>*Control panels, extent vent*<br>*Lines above design flood elevation*<br>*Protect or divert*<br>*Divert away surge using green infrastructure*<br>*Flood proof*<br>*Temporary or permanent barriers, fully submersible pumps*<br>*Components and circuitry in water-resistant cabinets*<br>*Backup Systems*<br>Stormwater Network<br>*Green infrastructure*<br>*bioretention cells and rain gardens* |

| | |
|---|---|
| Critical Infrastructure | *individual rain capture*<br>***Gray infrastructure***<br>*upgrade pipes*<br>*control valves* |
| | Electric Power Generation, Transmission and Distribution<br>Substations<br>*Elevate and Strengthen Systems*<br>*Elevate control house*<br>*Floodproof open air components*<br>*Floodwall* |
| | Communication towers and antennas<br>Equipment shelter<br>*Elevate equipment*<br>*Elevate equipment shelter. If shelter is not available, mount it on tower above design flood elevation* |
| Critical Community and Emergency Facilities | Community and Emergency Buildings<br>Structure<br>***Relocate building***<br>*Normally limited to small non-residential buildings, most expensive measure*<br>***Elevate foundation***<br>*Open shallow foundations, not slab-on-grade, normally requires foundation reinforcement*<br>***Convert or abandon first floor***<br>*Lowest floor should have flood resistant materials,possibility of addition extra floor depends on structural conditions.* |
| | Retrofit structure<br>***Anchor***<br>*Improve resistance to horizontal forces, ground anchors and cross bracing.*<br>***Upgrade wall and window systems*** |
| | Flood proof<br>***Wet flood-proof***<br>*Crawl spaces, allow water enter and exit*<br>***Dry floodproof***<br>*Seal buildings outside walls, flood shiedls, seal openings*<br>*Build a flood wall around building*<br>*Backflow control valves* |
| | Utility Systems<br>HVAC, Electrical, Plumbing<br>***Elevate or relocate***<br>*Elevate compressors, anchored platforms*<br>***Dry floodproof***<br>***Wet floodproof***<br>***Seal or isolate***<br>*Seal caps for tanks, check valves*<br>***Secure***<br>*Tanks, prevent flotation and movement* |
| Natural and Cultural Resources | Shorelines<br>Structural Stabilization<br>***Revetments***<br>*Protect shoreline from erosion*<br>***Detached breakwaters***<br>*Disperse wave energy, sediment deposit along shoreline* |

| | |
|---|---|
| | Non-structural Stabilization<br>*Living shorelines, marsh and mangrove restoration*<br>*Protect against erosion*<br>*Restore ecosystem functions*<br>*Low maintenance stability*<br>*Beach nourishment + groin field*<br>Hydro connectivity restoration<br>Land Conservation buyouts |

## Individual Adaptation Actions

| Asset Category | Adaptation action |
|---|---|
| Economy and Housing | Housing and economy buildings<br>Structure<br>***Relocate building***<br>*Normally limited to small non-residential buildings, most expensive measure*<br>***Elevate foundation***<br>*Open shallow foundations, not slab-on-grade, normally requires foundation reinforcement*<br>***Convert or abandon first floor***<br>*Lowest floor should have flood resistant materials, possibility of addition extra floor depends on structural conditions.* |
| | Retrofit structure<br>***Anchor***<br>*Improve resistance to horizontal forces, ground anchors and cross bracing.*<br>***Upgrade wall and window systems*** |
| | Flood proof<br>***Wet flood-proof***<br>*Crawl spaces, allow water enter and exit*<br>***Dry floodproof***<br>*Seal buildings outside walls, flood shields, seal openings*<br>*Build a flood wall around building*<br>*Backflow control valves* |
| | Landscape<br>***Stormwater collection***<br>*rain gardens individual rain capture* |
| | Utility Systems<br>HVAC, Electrical, Plumbing<br>***Elevate or relocate***<br>*Elevate compressors, anchored platforms*<br>***Dry floodproof***<br>***Wet floodproof***<br>***Seal or isolate***<br>*Seal caps for tanks, check valves*<br>***Secure***<br>*Tanks, prevent flotation and movement* |

*Table 1. Compilation of Community and Individual Adaptation Actions applicable to Cedar Key adaptation needs. Source: FEMA, "Hurricane and Flood Mitigation Handbook for Public Facilities,"(2022). FEMA, "Building Community Resilience with Nature Based Solutions,"(2021).*

# PRIORITIZATION

Based on the exposure and sensitivity analysis conducted through the vulnerability assessment, we understand that sea-level rise (SLR) and escalating flood risks will impact various Cedar Key assets in differing ways. These effects will manifest over various timeframes, ranging from the immediate next year to the forthcoming decades. Therefore, it is crucial to prioritize the adaptation efforts to address these changing risks over time.

Our proposed prioritization includes a scale that considers three key parameters: benefit extent, implementation timeframe, and project feasibility.

- ***Benefit extent:*** *This parameter refers to the spatial extent as a general proxy for the number of residents that would benefit from the proposed action.*
- ***Implementation timeframe:*** *This parameter assesses the time period at which an action can be implemented.*
- ***Project feasibility:*** *Evaluated using the FEMA Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE) criteria, this parameter incorporates seven critical attributes: social, technical, administrative, political, legal, economic, and environmental aspects. Each criterion encompasses several factors, which draw on the vulnerability analysis and other informational sources from the community and task force stakeholders.*

We have categorized each parameter into a practical three-tier scale, representing the most favorable (green), moderate (orange), and least favorable (red) conditions for implementing adaptive actions that are 1) broader in scale, 2) able to be implemented more quickly, and 3) more feasible. The accompanying table provides the details of each evaluation parameter.

| | | | |
|---|---|---|---|
| Action extent | | | |
| | City | Neighborhood | Block |
| | Influence on several districts, overall city | Influence on a district or several blocks | Influence on surrounding parcels or city block |
| Implementation timeframe | | | |
| | Short-Term | Mid-Term | Long-Term |
| | 1 - 3 year | 3 - 5 years | > 5 years |
| Risk reduction feasibility | | | |
| | Favorable | Intermediate | Less favorable |
| | The STAPLEE method does not yield a quantitative result, as the number of parameters for each criterion may differ with each adaptation action. Instead, we propose three feasibility levels that reflect an overall interpretation of the results of all criteria. | | |

*Table 2. Parameters and prioritization scale for the implementation of adaptation actions.*

## ADAPTATION ACTIONS BY ZONE, ASSET CATEGORY AND PRIORITIZATION PARAMETERS

The subsequent tables outline a series of adaptation actions organized by zone. Each table categorizes the actions according to the type of asset involved and includes factors for prioritization

# Zone 1 – Downtown Cedar Key

| Asset Category | Asset Type | N. | Adaptation Action | Benefit Extent | Feasibility STAPLEE | Implementation Timeframe |
|---|---|---|---|---|---|---|
| Transportation | Street network | 1 | Elevate 3rd and D St. | Neighborhood | Favorable | mid-term |
| | | 2 | Elevate 2nd St. | Neighborhood | Favorable | long-term |
| | | 3 | Elevate Whiddon Ave. at east side Elementary School | Neighborhood | Intermediate | mid-term |
| | | 4 | Elevate Whiddon Ave. at west side Elementary School | Region | Intermediate | mid-term |
| | | 5 | Elevate, protect erosion Airport Rd. Gulf Blvd. bridge | Neighborhood | Less favorable | long -term |
| | Boat ramp | 6 | Reinforce structure boarding docks boat ramps marina | Region | Intermediate | mid-term |
| Critical Infrastructure | Wastewater plant 3rd St. | 7 | Elevate electrical panels wastewater plant (some low elevation) | City | Favorable | mid-term |
| | | 8 | Backup systems wastewater plant | City | Favorable | mid-term |
| | | 9 | Relocate wastewater treatment plant / connection pipeline Bronson | City | Intermediate | long-term |
| | Lift stations | 10 | Elevate Electrical Panel Lift Station D St. | Neighborhood | Favorable | short-term |
| | Wastewater network | 11 | Replace components to avoid saltwater intrusion | Block | Favorable | short-term |
| | Hazardous waste locations | 12 | Elevate hazardous waste container (west coast auto center) | Region | Favorable | short-term |
| Community and Emergency Facilities | Post office | 13 | Relocation | City | Intermediate | mid-term |
| | City Hall | 14 | Relocation | City | Favorable | mid-term |
| | Police Department | 15 | Relocation | City | Intermediate | mid-term |
| | Fire Department | 16 | Relocation | City | Intermediate | mid-term |
| | | 17 | Dry floodproof existing buildings (if uses are not relocated) | Block | Less favorable | short-term |
| | | 18 | Elevate utilities existing buildings (if uses are not relocated, dry floodproof not possible) | Block | Favorable | short-term |
| Natural, Cultural and Historical Resources | Cedar Key Historical Society Museum | 19 | Dry / Wetfloodproof / Elevate utility systems | Region | Less favorable | short-term |
| | Cedar Key Public Library | 20 | Dry / Wetfloodproof / Elevate utility systems | Neighborhood | Less favorable | short-term |
| | United Methodist Church | 21 | Dry / Wetfloodproof / Elevate utility systems | Neighborhood | Less favorable | short-term |
| | Historic buildings | 22 | Dry / Wetfloodproof / Elevate utility systems | Block | | private assets |
| | Lil Shark Park | 23 | Anchor elements, urban furniture | Neighborhood | | private assets |
| | | 24 | Improve drainage Lil Shark Park | Region | Favorable | short-term |
| | Shorelines | 25 | Shoreline 3rd St. | | | |
| | | 26 | Shoreline G St. | Neighborhood | Favorable | short-term |
| | | 27 | Shoreline 1st St. / Dock St. | Neighborhood | Intermediate | mid-term |
| | | 28 | Reconnect hydrology at Whiddon Avenue | Neighborhood | | |
| Tourism and Economy | Aquaculture facilities along D St., Commerce 2nd St. and Dock St. | 29 | Dry / Wetfloodproof / Elevate utility systems | Neighborhood | | private assets |
| Housing | Housing along D St. (1st - 4th St.), surroundings intersection 5th - E St., Canal Whiddon Ave. - Palmetto Dr. | 30 | Housing elevation and floodproof measures | Neighborhood | | private assets |

Actions Based on Shoreline Management Master Plan

## Zone 2 – Mid Cedar Key

| Asset Category | Asset Type | N. | Adaptation Action | Benefit Extent | Feasibility STAPLEE | Implementation Timeframe |
|---|---|---|---|---|---|---|
| Transportation | Boat ramp | 31 | Reinforce structure boarding docks Anchor Hole boat ramp at Hodges Ave. | Region | Favorable | mid-term |
| | Street network | 32 | Bridge Gulf Blvd. at Cemetery | Region | Intermediate | long-term |
| | | 33 | Road elevation Gulf Blvd. intersection Hodges Ave. | Region | Intermediate | long-term |
| | | 34 | Road re-structure Andrews Cir. (temporary detour flood days) | Neighborhood | Favorable | long-term |
| | | 35 | Bridge Rye Key Dr. | Neighborhood | | private asset |
| Critical Infrastructure | Lift stations | 36 | Elevate Lift Stations' Electrical Panel L2, L3, L4, L5 ,L6 | Block | Favorable | mid-term |
| | Wastewater network | 37 | Replace components wastewater network, avoid saltwater intrusion | Block | Favorable | short-term |
| Critical Community and Emergency Facilities | Cedar Key Cemetery | 38 | Improve drainage, relocation grave areas high exposure | City | Less favorable | mid-term |
| | Bishop Point Cemetery | 39 | Improve drainage, relocation grave areas high exposure | Block | | private asset |
| | Hearn Family Cemetery | 40 | Improve drainage, relocation grave areas high exposure | Block | | private asset |
| Natural, Cultural and Historical Resources | Boardwalk Cemetery Point Park | 41 | Reinforce structure | Region | Favorable | short-term |
| | Gulf Blvd. at Cemetery | 42 | Reconnect hydrology | Region | Favorable | long-term |
| | Rye Key at Rye Key Dr. | 43 | Reconnect hydrology | Neighborhood | | private access |
| | CK Museum State Park Kayak Launch | 44 | Actions Based on Shoreline Management Master Plan | Neighborhood | state owned asset | mid-term |
| Housing | Adjacent areas Gulf Blvd. (Canal - Indiana Ave.), Andrews Cir. and adjacent area SW 120th Pl. | 45 | Housing elevation and floodproof measures | Neighborhood | | mid-term |

## Zone 3 – West Cedar Key

| Asset Category | Asset Type | N. | Adaptation Action | Benefit Extent | Feasibility STAPLEE | Implementation Timeframe |
|---|---|---|---|---|---|---|
| Transportation | Street network | 46 | Elevate Watson Cir. segement Anna St. - Susan St. | Neighborhood | Favorable | long-term |
| | | 47 | Elevate Margery St. | Block | Intermediate | long-term |
| | | 48 | Bridge Hodgson Ave. segment Margery St. - Jernigan Ave. | Block | Intermediate | long-term |

## Zone 4 – North Cedar Key

| Asset Category | Asset Type | N. | Adaptation Action | Benefit Extent | Feasibility STAPLEE | Implementation Timeframe |
|---|---|---|---|---|---|---|
| Transportation | Boat ramp | 49 | Construct and Reinforce structure boarding dock boat ramps at Shell Pile | Neighborhood | Favorable | short-term |
| | Boat ramp | 50 | Reinforce structure boarding docks & boat ramps Bridge #4 | Neighborhood | Intermediate | mid-term |
| | Street network | 51 | Elevate FL State Road 24, segment SW 154 Ave. - Channel #3 | Region | Intermediate | long-term |
| | | 52 | Elevate FL State Road 24, segment Pine St. - Marina II | Region | Intermediate | long-term |
| | | 53 | Alternate bridge State Rd. 24 | Region | Intermediate | long-term |
| Critical Infrastructure | Lift stations | 54 | Elevate electrical panel lift station FL State Road 24 | Neighborhood | Favorable | short-term |
| Critical Community and Emergency Facilities | Food pantry | 55 | Relocation | City | Intermediate | long-term |
| Tourism and Economy | Aquaculture facilities | 56 | Reinforce structure boarding docks | Neighborhood | | private asset |
| Housing | Homes FL State Rd. 24 | 57 | Housing elevation and floodproof measures | Neighborhood | | mid-term |

## Zone 5 – South Cedar Key

| Asset Category | Asset Type | N. | Adaptation Action | Benefit Extent | Feasibility STAPLEE | Implementation Timeframe |
|---|---|---|---|---|---|---|
| Transportation | George T Lewis Airport rnwy | 58 | Flood barriers (earth levees, concrete walls, movable barriers) | Region | Intermediate | mid-term |
| | Street network | 59 | Elevate Airport Rd. at east runway end | Neighborhood | Intermediate | long-term |
| | | 60 | Elevate / protect from erosion SW 133 St. at east runway end | Block | Intermediate | long-term |
| | | 61 | Elevate / protect low lying intersection SW Airport Rd - 136 Pl | Block | Intermediate | long-term |
| Housing | Homes on both sides of State Rd. 24 | 62 | Housing elevation and floodproof measures | Neighborhood | | mid-term |

## Zone 6 – Influence Area

| Asset Category | Asset Type | N. | Adaptation Action | Benefit Extent | Feasibility STAPLEE | Implementation Timeframe |
|---|---|---|---|---|---|---|
| Transportation | Street network | 63 | Elevate sections 326 County Road (SW 78Pl.) | Region | Intermediate | long-term |
| | | 64 | Elevate sections State Rd. 24 | Region | Intermediate | long-term |
| | | 65 | Culverts State Rd. 24. Reconnect hydrology | Neighborhood | Intermediate | long-term |
| | | 66 | Widen County Road 345 (connection to Chiefland) | Region | Intermediate | long-term |
| Critical Infrastructure | Electric substation | 67 | Elevate control room | Region | Favorable | mid-term |
| | Electric substation | 68 | Dry flood proof open air equipment | Region | Favorable | mid-term |
| | Electric substation | 69 | Relocation | Region | Favorable | long-term |
| | Water plant | 70 | Elevate control room | City | Favorable | mid-term |
| | Water plant | 71 | Secure fuel storage tank | City | Favorable | mid-term |
| | Satellite Solid Waste Facility | 72 | Flood barriers (earth levees) | Region | Favorable | mid-term |
| | Wastewater network | 73 | Connect to pipeline Bronson | Region | Favorable | long-term |
| Tourism and Economy | aquaculture facilities at Rd. 347 and commerce at State Rd. 24 | 74 | Building elevation and floodproof measures | Neighborhood | | private asset |
| Housing | Homes at Sumner | 75 | Housing elevation and floodproof measures | Neighborhood | | mid-term |

*Table 3. Recommended adaptation actions categorized per Zone, Asset Category, and prioritization parameters*

## ADAPTATION ACTIONS ORGANIZED BY PRIORITY

| Zone N. | Asset Category | Asset Type | N. | Adaptation Action | Benefit Extent | Feasibility STAPLEE | Implementation Timeframe |
|---|---|---|---|---|---|---|---|
| 1 | Natural, Cultural and Historical Resources | Lil Shark Park | 24 | Improve drainage Lil Shark Park | Region | Favorable | short-term |
| 1 | Critical Infrastructure | Hazardous waste locations | 12 | Elevate hazardous waste container (west coast auto center) | Region | Favorable | short-term |
| 2 | Natural, Cultural and Historical Resources | Boardwalk Cemetery Point Park | 41 | Reinforce structure | Region | Favorable | short-term |
| 2 | Transportation | Boat ramp | 31 | Reinforce structure boarding docks Anchor Hole boat ramp at Hodges Ave. | Region | Favorable | mid-term |
| 6 | Critical Infrastructure | Electric substation | 67 | Elevate control room | Region | Favorable | mid-term |
| 6 | Critical Infrastructure | Electric substation | 68 | Dry flood proof open air equipment | Region | Favorable | mid-term |
| 6 | Critical Infrastructure | Satellite Solid Waste Facility | 72 | Flood barriers (earth levees) | Region | Favorable | mid-term |
| 1 | Transportation | Street network | 1 | Elevate 3rd and D St. | City | Favorable | mid-term |
| 1 | Critical Infrastructure | Wastewater plant 3rd St. | 7 | Elevate electrical panels wastewater plant (some low elevation) | City | Favorable | mid-term |
| 1 | Critical Infrastructure | Wastewater plant 3rd St. | 8 | Backup systems wastewater plant | City | Favorable | mid-term |
| 6 | Critical Infrastructure | Water plant | 70 | Elevate control room | City | Favorable | mid-term |
| 6 | Critical Infrastructure | Water plant | 71 | Secure fuel storage tank | City | Favorable | mid-term |
| 1 | Community and Emergency Facilities | City Hall | 14 | Relocation | City | Favorable | mid-term |
| 6 | Critical Infrastructure | Electric substation | 69 | Relocation | Region | Favorable | long-term |
| 6 | Critical Infrastructure | Wastewater network | 73 | Connect to pipeline Bronson | Region | Favorable | long-term |
| 1 | Transportation | Street network | 4 | Elevate Whiddon Ave. at west side Elementary School | Region | Favorable | long-term |
| 2 | Transportation | Street network | 32 | Bridge Gulf Blvd. at Cemetery | Region | Favorable | long-term |
| 2 | Transportation | Street network | 33 | Road elevation Gulf Blvd. intersection Hodges Ave. | Region | Favorable | long-term |
| 1 | Critical Infrastructure | Lift stations | 10 | Elevate Electrical Panel Lift Station D St. | Neighborhood | Favorable | short-term |
| 2 | Critical Infrastructure | Lift stations | 36 | Elevate Lift Stations' Electrical Panel L2, L3, L4, L5 ,L6 | Neighborhood | Favorable | short-term |
| 4 | Critical Infrastructure | Lift stations | 54 | Elevate electrical panel lift station FL State Road 24 | Neighborhood | Favorable | short-term |
| 1 | Natural, Cultural and Historical Resources | Shorelines | 26 | Living shoreline G St. | Neighborhood | Favorable | short-term |
| 4 | Transportation | Boat ramp | 49 | Construct and Reinforce structure boarding dock boat ramps at Shell Pile | Neighborhood | Favorable | short-term |
| 1 | Critical Infrastructure | Wastewater network | 11 | Replace components to avoid saltwater intrusion | Block | Favorable | short-term |
| 1 | Community and Emergency Facilities | Fire Department | 18 | Elevate utilities existing buildings (if uses are not relocated, dry floodproof not possible) | Block | Favorable | short-term |
| 2 | Critical Infrastructure | Wastewater network | 37 | Replace components wasterwater network, avoid saltwater intrusion | Block | Favorable | short-term |

*Table 4. Asset Priority Group 1*

| Zone N. | Asset Category | Asset Type | N. | Adaptation Action | Benefit Extent | Feasibility STAPLEE | Implementation Timeframe |
|---|---|---|---|---|---|---|---|
| 1 | Transportation | Boat ramp | 6 | Reinforce structure boarding docks boat ramps marina | Region | Intermediate | mid-term |
| 1 | Community and Emergency Facilities | Post office | 13 | Relocation | City | Intermediate | mid-term |
| 1 | Community and Emergency Facilities | Police Department | 15 | Relocation | City | Intermediate | mid-term |
| 1 | Community and Emergency Facilities | Fire Department | 16 | Relocation | City | Intermediate | mid-term |
| 1 | Critical Infrastructure | Wastewater plant 3rd St. | 9 | Relocate wastewater treatment plant/connection pipeline Bronson | City | Intermediate | long-term |
| 4 | Transportation | Street network | 51 | Elevate FL State Road 24, segment SW 154 Ave. - Channel #3 | Region | Intermediate | long-term |
| 4 | Transportation | Street network | 52 | Elevate FL State Road 24, segment Pine St. - Marina II | Region | Intermediate | long-term |
| 4 | Transportation | Street network | 53 | Alternate bridge State Rd. 24 | Region | Intermediate | long-term |
| 5 | Transportation | George T Lewis Airport Runway | 58 | Flood barriers (earth levees, concrete walls, movable barriers) | Region | Intermediate | long-term |
| 6 | Transportation | Street network | 63 | Elevate sections 326 County Rd. (SW 78Pl.) | Region | Intermediate | long-term |
| 6 | Transportation | Street network | 64 | Elevate sections State Rd. 24 | Region | Intermediate | long-term |
| 6 | Transportation | Street network | 66 | Widen Rd. 345 (connection to Chiefland) | Region | Intermediate | long-term |
| 4 | Critical Community and Emergency Facilities | Food pantry | 55 | Relocation | City | Intermediate | long-term |
| 1 | Natural, Cultural and Historical Resources | Shorelines | 25 | Shoreline restoration 3rd St. | Neighborhood | Favorable | mid-term |
| 1 | Natural, Cultural and Historical Resources | Shorelines | 27 | Shoreline detached breakwaters G St. | Neighborhood | Favorable | mid-term |
| 1 | Transportation | Street network | 2 | Elevate 2nd St. | Neighborhood | Favorable | long-term |
| 2 | Transportation | Street network | 34 | Road re-structure Andrews Cir. (temporary detour flood days) | Neighborhood | Favorable | long-term |
| 1 | Natural, Cultural and Historical Resources | Shorelines | 28 | Reconnect hydrology at Whiddon Avenue | Neighborhood | Favorable | long-term |
| 2 | Natural, Cultural and Historical Resources | Gulf Blvd. at Cemetery | 42 | Reconnect hydrology | Neighborhood | Favorable | long-term |
| 1 | Natural, Cultural and Historical Resources | Cedar Key Historical Society Museum | 19 | Dry / Wetfloodproof / Elevate utility systems | Region | Less favorable | short-term |
| 1 | Natural, Cultural and Historical Resources | Cedar Key Public Library | 20 | Dry / Wetfloodproof / Elevate utility systems | Neighborhood | Less favorable | short-term |
| 1 | Natural, Cultural and Historical Resources | United Methodist Church | 21 | Dry / Wetfloodproof / Elevate utility systems | Neighborhood | Less favorable | short-term |
| 1 | Community and Emergency Facilities | Fire Department | 17 | Dry floodproof existing buildings (if uses are not relocated) | Block | Less favorable | short-term |
| 2 | Critical Community and Emergency Facilities | Cedar Key Cemetery | 38 | Improve drainage, relocation grave areas high exposure | City | Less favorable | mid-term |

*Table 5. Asset Priority Group 2*

| Zone N. | Asset Category | Asset Type | N. | Adaptation Action | Benefit Extent | Feasibility STAPLEE | Implementation Timeframe |
|---|---|---|---|---|---|---|---|
| 2 | Housing | Adjacent areas Gulf Blvd. (Canal - Indiana Ave.), Andrews Cir. and adjacent area SW 120th Pl. | 45 | Housing elevation and floodproof measures | Neighborhood | | mid-term |
| 4 | Housing | Homes both sides FL State Rd. 24 | 57 | Housing elevation and floodproof measures | Neighborhood | | mid-term |
| 5 | Housing | Homes on both sides of State Rd. 24 | 62 | Housing elevation and floodproof measures | Neighborhood | | mid-term |
| 6 | Housing | Homes at Sumner | 75 | Housing elevation and floodproof measures | Neighborhood | | mid-term |
| 1 | Transportation | Street network | 3 | Elevate Whiddon Ave. at east side Elementary School | Neighborhood | Intermediate | mid-term |
| 4 | Transportation | Boat ramp | 50 | Reinforce structure boarding docks & boat ramps Bridge #4 | Neighborhood | Intermediate | mid-term |
| 2 | Natural, Cultural and Historical Resources | CK Museum State Park Kayak Launch | 44 | Shoreline restoration | Neighborhood | State-owned asset | mid-term |
| 1 | Transportation | Street network | 5 | Elevate, protect erosion Airport Rd. Gulf Blvd. bridge | Neighborhood | Less favorable | long -term |
| 3 | Transportation | Street network | 46 | Elevate Watson Cir. segment Anna St. - Susan St. | Neighborhood | Intermediate | long-term |
| 5 | Transportation | Street network | 59 | Elevate Airport Rd. at east runway end | Neighborhood | Intermediate | long-term |
| 6 | Transportation | Street network | 65 | Culverts State Rd. 24. Reconnect hydrology | Neighborhood | Intermediate | long-term |
| 3 | Transportation | Street network | 47 | Elevate Margery St. | Block | Intermediate | long-term |
| 3 | Transportation | Street network | 48 | Bridge Hodgson Ave. segment Margery St. - Jernigan Ave. | Block | Intermediate | long-term |
| 5 | Transportation | Street network | 60 | Elevate / protect from erosion SW 133 St. at east runway end | Block | Intermediate | long-term |
| 5 | Transportation | Street network | 61 | Elevate / protect low-lying intersection SW Airport Rd - 136 Pl | Block | Intermediate | long-term |
| 1 | Natural, Cultural and Historical Resources | Lil Shark Park | 23 | Anchor elements, urban furniture | Neighborhood | | private assets |
| 1 | Tourism and Economy | Aquaculture facilities along D St., Commerce 2nd St. and Dock St. | 29 | Dry / Wetfloodproof / Elevate utility systems | Neighborhood | | private assets |
| 1 | Housing | Housing along D St. (1st - 4th St.), surroundings intersection 5th - E St., Canal Whiddon Ave. - Palmetto Dr. | 30 | Housing elevation and floodproof measures | Neighborhood | | private assets |
| 2 | Transportation | Street network | 35 | Bridge Rye Key Dr. | Neighborhood | | private assets |
| 2 | Natural, Cultural and Historical Resources | Rye Key at Rye Key Dr. | 43 | Reconnect hydrology | Neighborhood | | private assets |
| 4 | Tourism and Economy | Aquaculture facilities | 56 | Reinforce structure boarding docks | Neighborhood | | private assets |
| 6 | Tourism and Economy | aquaculture facilities at Rd. 347 and commerce at State Rd. 24 | 74 | Building elevation and floodproof measures | Neighborhood | | private assets |
| 1 | Natural, Cultural and Historical Resources | Historic buildings | 22 | Dry / Wetfloodproof / Elevate utility systems | Block | | private assets |
| 2 | Critical Community and Emergency Facilities | Bishop Point Cemetery | 39 | Improve drainage, relocation grave areas high exposure | Block | | private assets |
| 2 | Critical Community and Emergency Facilities | Hearn Family Cemetery | 40 | Improve drainage, relocation grave areas high exposure | Block | | private assets |

*Table 6. Asset Priority Group 3*

# ADAPTATION PLAN. SPATIAL FRAMEWORK

The spatial framework provides a comprehensive overview of all planned adaptation measures within Cedar Key's city limits and the influence area. This framework categorizes adaptation actions into structural and non-structural types, detailing their spatial relationships, scope of intervention, and the flood scenarios influencing their design parameters. Critical aspects of larger projects, such as land conservation and potential redevelopment areas, are highlighted by showing municipal and vacant parcels, illustrating potential areas where these projects could be implemented.

Additionally, the framework identifies which sections of the road network will require modifications to manage chronic future flooding. Roads are prioritized as high or low priority based on their importance within the street network. High-priority roads are essential for connecting any of the city's six zones, while low-priority roads serve as secondary routes. Roads marked as 'no intervention' are those that will experience future flooding but are not considered for upgrades.

Concerning non-structural adaptation actions that involve shorelines, the location and type of interventions should follow the guidelines set forth in the "Cedar Key Living Shoreline Master Plan."

Furthermore, the spatial framework delineates specific adaptation needs for each zone in Cedar Key, tailored to their unique geographic and urban characteristics. This framework is built on the "Description of Needs" by translating them into potential projects and focal points for adaptation in each zone.

### Zone 1, Downtown Cedar Key

Downtown Cedar Key faces significant challenges due to extreme high tides, particularly impacting transportation and critical infrastructure. Key adaptation measures include elevating street segments vital for connecting various city zones and ensuring uninterrupted connectivity during chronic flooding. Additionally, civic buildings and services like the police department, post office, fire station, and crucial facilities such as the wastewater plant are at

risk. Strategies to mitigate these risks include floodproofing, elevating buildings, and relocating essential services to safer areas, specifically to a redevelopment zone in the community center neighborhood around F and G Streets. These actions will be further detailed in the Adaptation Project Areas section.

The southwest edge of Downtown Cedar Key, particularly around G and all 1st Street, has been identified as highly vulnerable, mainly due to its low elevation and exposed position along the Bayou. The adaptation actions for this area must follow the shoreline master plan recommendations.

One critical transportation connection is Whiddon Ave the northwest side of Cedar Key School. This road segment is vulnerable to extreme tidal conditions and is part of the route that connects zones 2, 3, and 5. The recommended actions to protect this segment from tidal flooding include replacing a section of Whiddon Avenue with a bridge and raising the road level to safeguard against flooding during extreme high tides. To enhance water flow and reduce shoreline pressure, restoring the east-to-west hydro connectivity from the inner canal to the east shoreline is recommended.

Several housing areas in Downtown Cedar Key are particularly susceptible to a storm surge and 100-year flood events. It is recommended to conduct a preliminary assessment to identify which buildings are suitable to be elevated. This assessment should also gather information

*Figure 2. Diagram adaptation strategy for Zone 1, Downtown Cedar Key*

on homeowners' willingness to participate and provide an estimation of referential costs. These preparatory steps will be crucial for applying for funding on a zone basis, facilitating obtaining the necessary financial support.

Furthermore, it is vital to enhance the resilience of the city's boat ramps, essential for supporting aquaculture and outdoor recreational activities—critical components of Cedar Key's local economy. Evaluating the need to reinforce the ramp surfaces, entry points, and adjacent docks is recommended to protect against the forces of surges.

### Zone 2, Mid Cedar Key

Gulf Blvd is a crucial link in Zone 2, serving a substantial portion of Cedar Key's housing stock. The primary adaptation strategies for this zone include elevating road sections in Gulf Blvd. and enhancing hydrological connectivity. These actions will enable natural flooding in low-lying areas while maintaining uninterrupted access to transportation. Details of these adaptation actions will be elaborated in the "Adaptation Action Areas" section of the report.

### Zone 3, West Cedar Key

In Zone 3 of Cedar Key, the adaptation plan is centered on preserving shoreline land to enhance flood protection. This involves developing policies that promote land conservation and educating the community on individual measures to enhance stormwater management, flood defense, and the preservation and restoration of landscapes. Further details on these adaptation actions will be provided in the "Adaptation Action Areas" section of the report.

### Zone 4, North Cedar Key

Zone 4 is pivotal for Cedar Key, serving as a vital artery for accessibility and economic activity. Florida State Road 24, running through this zone, is a crucial infrastructure component for the entire city. It is the only access point to Cedar Key from the mainland and the primary evacuation route. Additionally, this road is essential for the shellfish aquaculture industry, which heavily relies on it for accessing boat ramps that lead to lease sites. These ramps are either directly accessible from Florida State Road 24 or utilized by the industry when traveling

from the mainland. Moreover, a significant number of wholesalers are situated along Florida State Road 24, relying exclusively on this corridor to transport their shellfish to buyers.

Projections suggest that by 2040, Florida State Road 24 will likely face flooding during extreme tidal conditions, a situation that strong winds could further aggravate. Such flooding poses a severe threat to the usual accessibility of the town, potentially disrupting both daily life and the operations of the aquaculture industry. Furthermore, residential properties located mainly on the eastern side of Florida State Road 24 are not elevated and, therefore, are at high risk of flooding during storm surge events, stressing the need for immediate and effective flood management strategies.

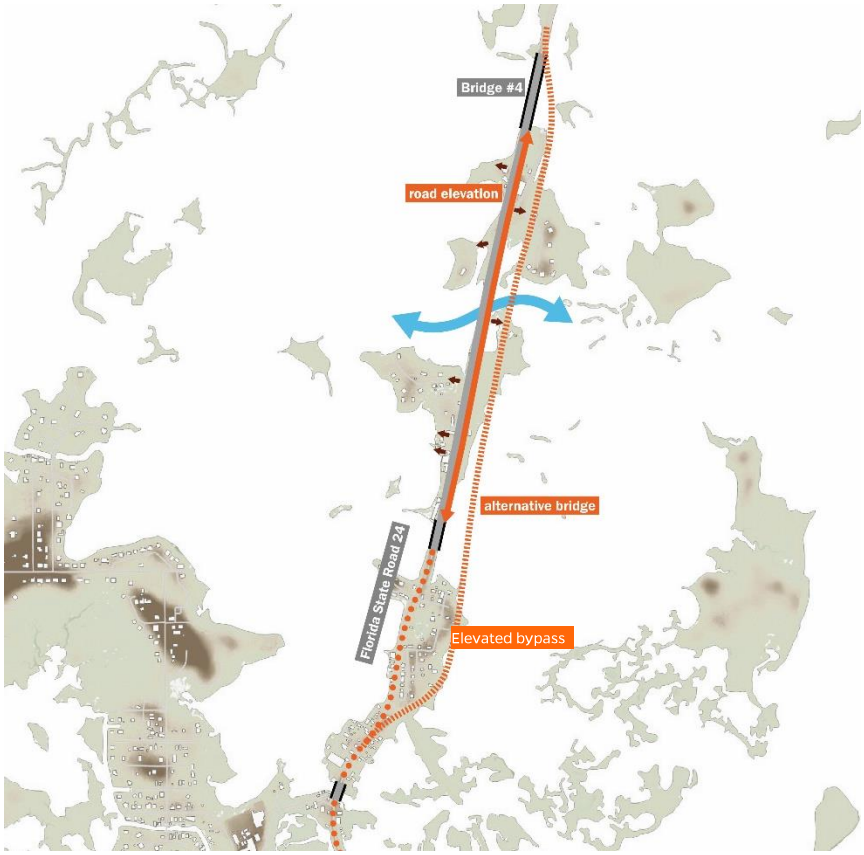


*Figure 3. Diagram adaptation strategy for Zone 4, North Cedar Key*

Enhancing connectivity in this area is a primary focus, with two potential adaptation strategies for Florida State Road 24 under consideration. The first strategy involves elevating the entire section of road that spans between the bridges over canals #4 and #3 and specific sections near the CK Marina and around the CK Railroad Trestle Nature Trail. This approach poses

several challenges, especially in maintaining road functionality during construction. The narrowness of the surrounding area may preclude the feasibility of temporary lanes, complicating construction logistics. Furthermore, integrating the elevated road with existing adjacent facilities on both sides poses significant complementary challenges.

The second recommended strategy proposes the construction of an elevated bypass that would directly connect the mainland to Cedar Key, circumventing the Havens and Sunset Point islands. While this option involves significant infrastructure development, it offers the potential to transform the current Florida State Road 24 into a local road. This would likely boost local commerce and the aquaculture industry by reducing through traffic and repurposing the existing roadway for local use.

Regarding the residential zones on the east side of Florida State Road 24, it is recommended that coordinated efforts for home elevation per zone should be implemented similar to those mentioned for the downtown area. The same recommendations also apply to the boat ramps.

**Zone 5, South Cedar Key**

South Cedar Key is primarily a residential zone, home to a large piece of infrastructure: the airport. Currently underutilized, the airport accommodates a helipad, adding critical functionality. However, both ends of the runway are vulnerable to chronic flooding, necessitating significant interventions by the County to ensure its continued viability. To mitigate flooding risks at the airport, constructing flood barriers, specifically earth levees, is recommended at both ends of the runway. This measure would help safeguard the infrastructure against the increasing threat of tidal flooding.

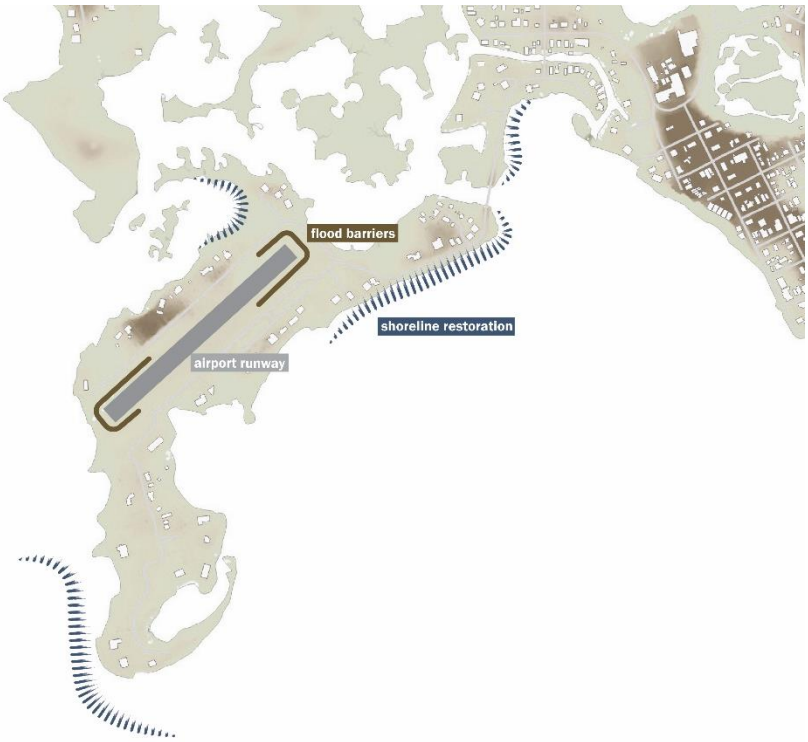


*Figure 4. Diagram adaptation strategy for Zone 5, South Cedar Key*

Projections also indicate that most of SW Airport Road, extending to the west side of the runway, will experience flooding during extreme tidal events. Anyway, given the underutilization of the airport and its proximity to the shoreline, the practicality of elevating the entire road is questionable due to potentially significant impacts on the natural landscape. With future connectivity challenges expected due to chronic tidal flooding, a strategic shift is advised to discourage housing development in this area.

### Zone 6, Influence Area

Zone 6 meets three crucial functions for Cedar Key: it provides essential utility services (electricity and water), offers housing for the local workforce, and hosts several wholesale aquaculture facilities.

The adaptation strategy for utilities includes retrofitting the collection and distribution facilities. A critical long-term objective is relocating the electricity substation northwards to reduce storm surge risks, with immediate recommended measures including elevating vulnerable equipment or constructing physical barriers around facilities. Additionally, it is recommended to elevate the water treatment plant and well control rooms to protect against flooding.

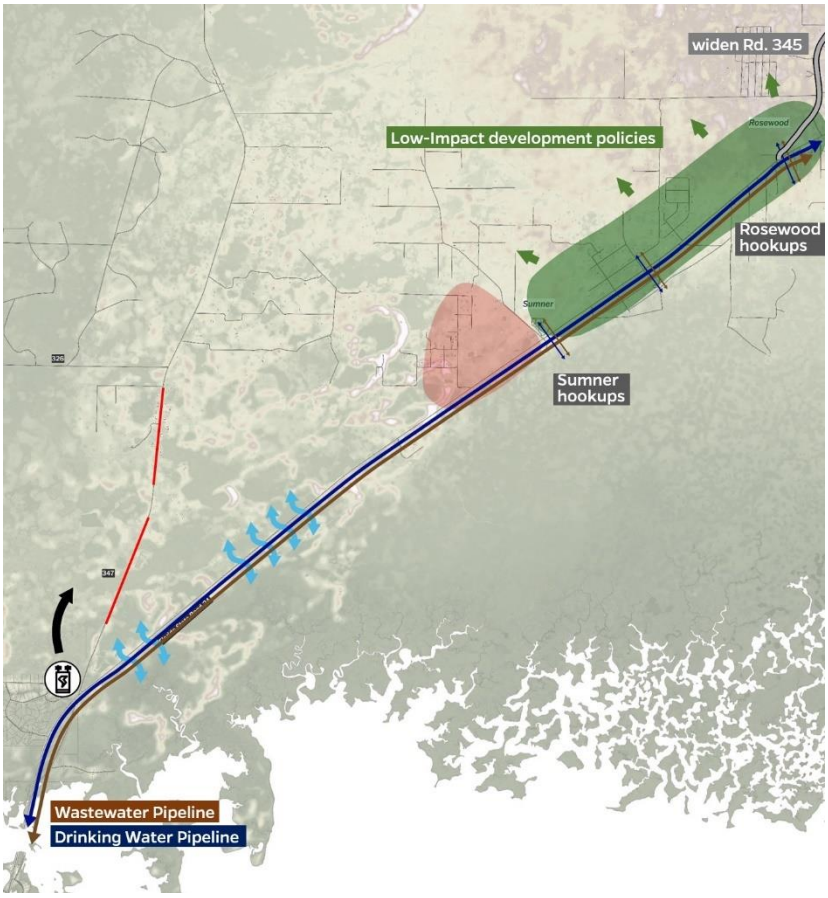


*Figure 5. Diagram adaptation strategy for Zone 6, Influence Area*

Transportation infrastructure improvements are also necessary. Increasing the elevation of specific sections of County Road 347 between Florida State Road 24 and SW 78 Place, along with parts of Florida State Road 24 between County Road 347 and Rosewood, is advised. Efforts should also focus on restoring hydrological connectivity where Florida State Road 24 works as a levee. Widening County Road 345, a key route to Chiefland, is proposed to improve connectivity and resilience.

Concerning development in Sumner and Rosewood, while plans exist to connect these areas to the Bronson water and wastewater pipeline, caution is recommended against further

southwest expansion to avoid increased flood vulnerability. Instead, low-impact development policies and consolidating existing development should be prioritized to ensure sustainable growth and reduce environmental impacts.

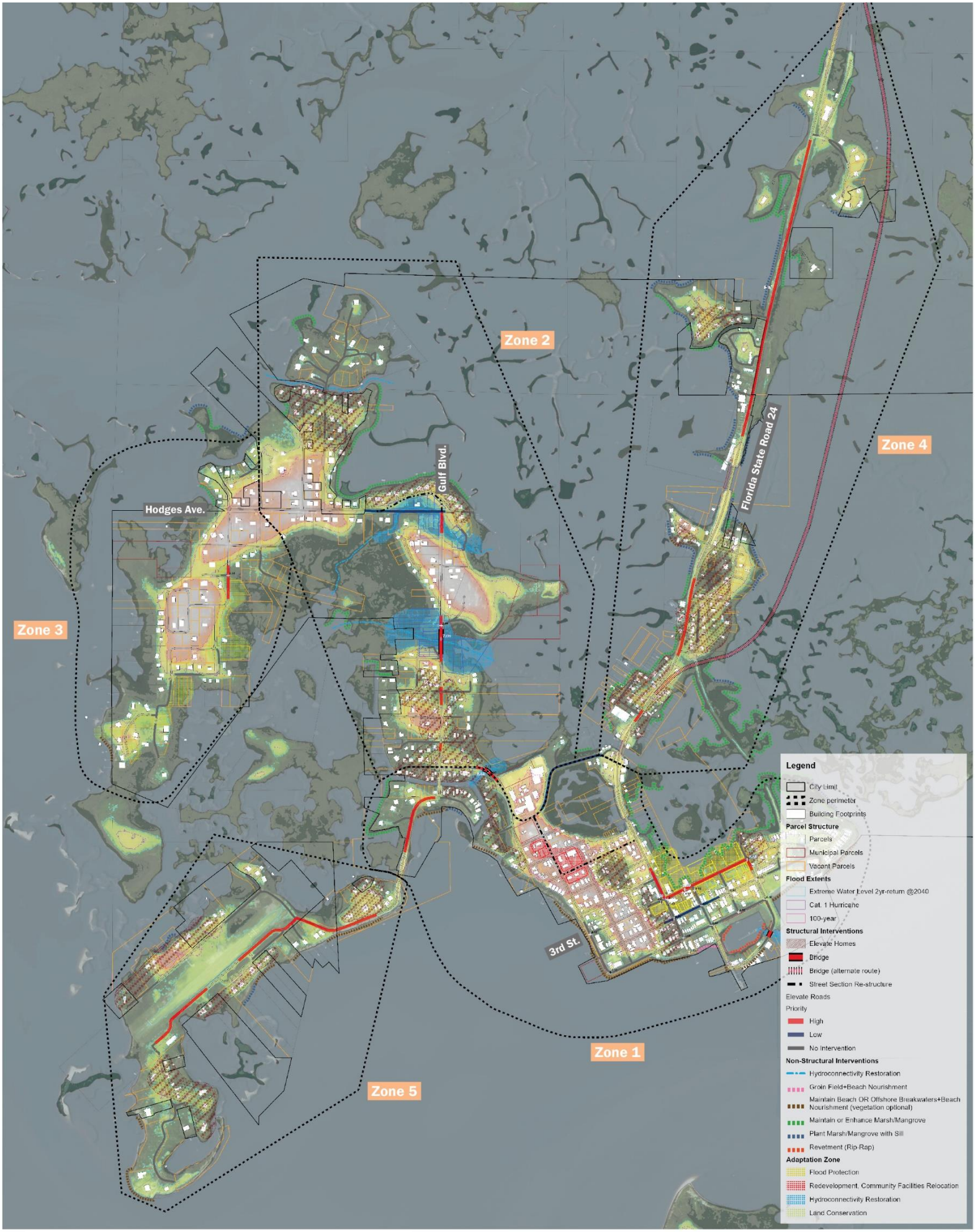


*Figure 6. Adaptation Plan, Spatial Framework*

# ADAPTATION PROJECT AREAS

The adaptation plan introduces four focal projects, each targeting different adaptation needs and reflecting the most widespread vulnerability issues across the islands. Designed to be replicable, these projects serve as practical examples of how adaptation can be approached in similar contexts.

The projects are carefully structured to tackle flood mitigation and provide broader community benefits and are based on focus areas identified in the Cedar Key Vulnerability Assessment. They aim to lessen the risks and potential damage to crucial city assets while also enhancing the area's spatial quality. By doing so, they potentially can introduce new social and economic dynamics in the community and enrich public life. These initiatives not only address immediate site-specific flood concerns but also contribute to the overall improvement and resilience of the community, embodying the core objectives of the adaptation plan.

Below is the description of the location and focus of each adaptation project:

- *Project 1: Historic Core Downtown. Ensure Connectivity*
- *Project 2: New Civic Center. Relocation and Redevelopment*
- *Project 3: Gulf Blvd. and Hodges Ave. Restore Hydrologic Connectivity*
- *Project 4: West Cedar Key. Land Conservation*

## PROJECT 1: HISTORIC CORE DOWNTOWN

### Reconnecting and Relocating Downtown

Cedar Key's historic core is central to the city's identity but confronts substantial connectivity challenges from its susceptibility to nuisance flooding and severe flood events. In response, the Downtown Cedar Adaptation Project is focused on ensuring robust future connectivity by addressing the three following components:

## Transportation Connectivity

Maintaining access to the boat ramps and hospitality areas on the east side of downtown is crucial for Cedar Key's normal functioning during future chronic flooding conditions. Elevating key road sections has been identified as a viable solution to ensure uninterrupted access.

### Road elevation strategy

D Street and 3rd Street have been targeted for elevation in downtown Cedar Key. D Street is a primary accessibility route to downtown from the mainland, and 3rd Street, located close to the shoreline and bordered by vacant parcels, offers ideal conditions for this type of intervention with minimal impact on neighboring properties.

The design for the elevation of these roads was informed by a flood scenario projecting an extreme water level with a 2-year return period (EWL 2yr.) for the year 2040. Community feedback during outreach meetings confirmed that this scenario closely mirrors the extreme tidal conditions accompanied by high winds that the town typically faces. Based on these inputs, the roads will be elevated to 6.49 feet above the North American Vertical Datum of 1988 (NAVD88), including an additional foot of freeboard to manage higher water levels effectively.

The elevation strategy includes installing culverts under the raised roads to allow tidal waters to flow through, reducing the impact on downtown. Additionally, the vacant parcels south of 3rd Street will be transformed into floodable green spaces, serving as natural buffers and stormwater retention areas.

### Complementary Flood Mitigation Measures

While the creation of a levee to elevate 3$^{rd}$ Street will enhance transportation connectivity, areas like 2$^{nd}$ Street will still experience natural flooding. Therefore, complementary measures, such as elevating buildings where feasible, preventing development on vulnerable parcels, and implementing wet floodproofing strategies alongside utility elevation, are recommended to protect the infrastructure from regular flooding events.

## Nature-based solutions for stormwater infrastructure

As part of the efforts to elevate D and 3rd Streets, several complementary measures need to be implemented to enhance stormwater management and environmental resilience. These include establishing a flood buffer on the south of 3rd Street, restoring the shoreline, and retrofitting the parking areas at D and 3rd Streets.

### Flood Buffer and Conservation Efforts

The city has begun acquiring parcels around 3rd Street to establish a flood buffer zone. A key objective for the mid-term is relocating the wastewater plant and then designating the land for conservation. This area's final stage involves developing stormwater retention and green space for passive recreation, enhancing the area's ecological and recreational appeal.

### Parking Area Improvements

The parking areas at D and 3rd Streets will be prone to continuous flooding. To address this, improving the drainage systems within these areas is crucial to ensure efficient water runoff after flood events. Enhancing these systems will minimize the duration and impact of flooding on this infrastructure.

### Shoreline Restoration

The road elevation project's proximity to the shoreline offers a unique opportunity to implement the shoreline master plan for downtown Cedar Key. This effort includes mangrove restoration along the north side of 3rd Street and the east side of D Street. Elevating the road alters the original topography and would create potential landscape impacts, so integrating riprap into the elevated road to prevent erosion and complement mangroves with sills would add stability and ecological benefits to the intervention.

The restoration of the shoreline is intended not only to reestablish a natural connection between the community and the waterfront but also to enhance the green retention area, transforming it into a vibrant public amenity. This revitalized space is expected to attract visitors and stimulate economic activity, enriching the downtown area's appeal and vitality.

## Wastewater plant safety measures

The wastewater treatment plant in Cedar Key is situated in one of the lowest-elevation areas of the city, making it highly vulnerable to flooding. This vulnerability necessitates urgent actions to enhance its resilience against extreme weather events.

### Short-Term Resilience Enhancements

In the short term, it is imperative to undertake an urgent retrofit of the plant. This retrofit will involve elevating all critical equipment to safeguard it from potential flood damage. Although the control rooms and treatment tanks are already elevated, they remain at risk during severe storms.

### Mid-Term Strategy

For a sustainable long-term solution, it is recommended to engage with the Waccasassa Water and Wastewater Cooperative (W3C) to explore regional wastewater management options. This collaboration could enable the decommissioning of Cedar Key's highly vulnerable wastewater facility, shifting operations to a more secure location.

### Impact on Local Industries

The uninterrupted operation of the wastewater plant is vital for the shellfish aquaculture industry, which is sensitive to water quality. Wastewater discharges can close Shellfish Harvesting Areas (SHAs), affecting shellfish safety and marketability. While the industry can manage short-term closures, such as those caused by heavy rainfall, prolonged closures lasting several months can severely impact growers. These extended closures prevent revenue generation from shellfish harvests and sales, increase mortality rates due to extended time in the water, and reduce earnings as shellfish grow beyond their optimal market size. Such long-term closures have previously led to significant financial losses in the industry, as evidenced by the impacts of harmful algal blooms on the Southwest Florida shellfish aquaculture industry (Adams, 2017).


*Figure 7. Project 1: Reconnecting and Relocating Downtown*

## PROJECT 2: NEW CIVIC CENTER

### Relocation and Redevelopment

The historic core of Downtown Cedar Key hosts many community and emergency facilities, cultural buildings, and commercial uses. Due to its location, this area is prone to regular flooding, threatening the normal operation of these essential services in the future. The urgent need to relocate the most critical community and emergency facilities to higher ground is crucial to ensure that the city can maintain continuous operations, regardless of flood conditions and in the aftermath of extraordinary flood events.

The proposed adaptation project area is located at City Hall (old community center) in the western part of downtown. This area boasts advantageous elevation and transportation connectivity, making it less vulnerable to most flood scenarios. The project involves relocating essential community services and redeveloping parcels to accommodate both new and existing uses.

### Relocation

The relocation strategy involves moving critical community services, such as City Hall, the Police Department, the Fire Station, and the Post Office, to the redevelopment area. This effort was initiated with the relocation of City Hall services following Hurricane Idalia. This adaptation action safeguards essential city services by situating them in a less vulnerable location.

### Redevelopment

The redevelopment efforts are centered on enhancing land-use efficiency in the least vulnerable area of downtown. This involves increasing the building capacity for housing and integrating new uses relocated from the historic core.

### Focus area

The targeted redevelopment area includes the block where the new City Hall (formerly the Community Center) is located, along with the public housing parcels at 6th and G Streets and adjacent vacant parcels.

### Road Network Adjustments

With the anticipated increase in uses and population density, the area is expected to receive a higher flow of people and traffic. G and 6th Streets, in particular, will require modifications to accommodate these changes. This need is intensified because Whiddon Avenue is likely to experience flooding near CK School during extreme tidal events, making G and 6th Streets critical for maintaining access to and from the west side of the city. Consequently, a comprehensive redesign of these streets is necessary to include adequate lane width, parking spaces, enhanced sidewalks, and improved pedestrian infrastructure, along with street planting.

## Planning Process and Stakeholder Engagement

Conducting a specific planning process for the area is recommended, starting with initial discussions with landowners and stakeholders to gauge their interest and discuss the adaptation project's recommendations. These discussions will help define the scope and specifics of the potential redevelopment area. Following this, a detailed planning process should be conducted to pinpoint specific needs, establish new development conditions, and outline the various phases of the redevelopment. This phase will also include exploring potential planning mechanisms and funding options to support the project's implementation.


*Figure 8. Project 2: Relocation and Redevelopment*

## PROJECT 3: GULF BLVD. AND HODGES AVE

### Restore Hydrologic Connectivity

Cedar Key, an archipelago composed of several small islands, has experienced significant alterations in its original topography due to its urbanization process and the development of a street grid over time. Some street segments, especially located in low-lying areas, often conflict with the natural hydrological processes, leading to recurring connectivity issues under various flood conditions.

Three specific locations have been identified with transportation connectivity issues where the street network disrupts natural flooding: Gulf Blvd. at the Cemetery access and Hodges Ave. at Andrews Cir., which are crucial connectors in Zones 2 and 3, and SW 165th Ter./Rye Key Dr., providing private access to the Rye Key area.

The primary goals of Project 3 are first to restore hydrologic connectivity across the islands, reducing the conflict of natural flooding with the transportation infrastructure, and second to ensure transportation connectivity.

To achieve these objectives, the project will involve acquiring land for conservation purposes and adjusting existing road infrastructure. These interventions are designed to reduce the hydrological impact of the road network and restore natural flooding through vacant areas on the island. This project will also serve as a pilot, establishing a replicable process that can be applied to other emerging areas of concern on the islands.

### Land Conservation

The restoring hydrologic connectivity project will focus on areas affected by altering natural flooding due to road infrastructure, not only the road sections directly affected by flooding but also their surrounding areas. The aim is to convert these areas into conservation land.

#### Parcel Identification

This project's initial phase involves assessing the parcel configuration within the target areas. General considerations include identifying the parcels involved, current use, land development conditions, and ownership structure. The area around Gulf Blvd at the

Cemetery encompasses 29 parcels—1 municipal and 28 privately owned by 7 different owners. Hodges Ave involves 11 parcels owned by 7 different owners, and Rye Key can be addressed as a private road.

### Acquisition

Transforming these areas into conservation land will primarily involve acquiring these parcels. In cases where direct acquisition is not feasible, alternative mechanisms will be employed to ensure these areas are preserved from development. The relatively small number of owners involved with Gulf Blvd and Hodges Ave should facilitate the acquisition process.

### Zoning Adjustments

Given that most of the targeted parcels are currently zoned for residential use, rezoning them for conservation purposes is imperative. This change will protect the areas from future development, allowing them to serve as natural buffers and help maintain the natural flow of water across the archipelago.

## Infrastructure

Gulf Boulevard is an essential part of the road network in Cedar Key, providing connectivity for 25% of the homes in the area and a key. To ensure transportation connectivity and allow natural flooding through the islands, the adaptation project area focuses on three critical road infrastructure interventions:

### Bridge at Cemetery Access

The section of Gulf Blvd near Cemetery Access poses significant landscape and transportation challenges posed by expected flooding conditions. Currently functioning as a levee, it disrupts natural flooding patterns and presents a connectivity issue due to its low elevation and high flood risk.

To address these challenges, the proposed infrastructure solution involves replacing the current road segment with a bridge. The new bridge would span from the Gulf Blvd and Indiana Ave intersection to the north side of Cemetery Access, ensuring continuity of road connectivity while allowing natural water flow beneath.

### Road Elevation

The second significant flooding challenge involves the extreme north of Gulf Blvd. area, including Andrews Circle and Hodges Avenue. Due to the topographic characteristics of this area, floodwaters typically originate from the southwest, impacting a large swath along Hodges Avenue and flowing over the road towards the east shoreline of the island.

Elevating both Gulf Blvd and Hodges Avenue would cover an extensive stretch of road and could be both costly and have a significant impact on the landscape. To address this adaptation action efficiently, a more resource-effective strategy involves elevating only the critical segment of Gulf Blvd. This elevation will be supplemented with culverts installed beneath the road, facilitating water flow and drainage towards the east shoreline, thus mitigating flood risks while minimizing environmental and economic costs.

### Road Restructure Strategy

In conjunction with the elevation of Gulf Blvd., Andrews Circle will function as an alternative route when Hodges Avenue is inundated by extreme tidal flooding. It is essential, therefore, to reconfigure Andrews Circle to accommodate two-way traffic effectively and ensure a seamless connection to Hodges Avenue. This redesign will enhance traffic flow and provide a reliable detour, improving overall accessibility of Zone 2 and 3 and safety during flood events.

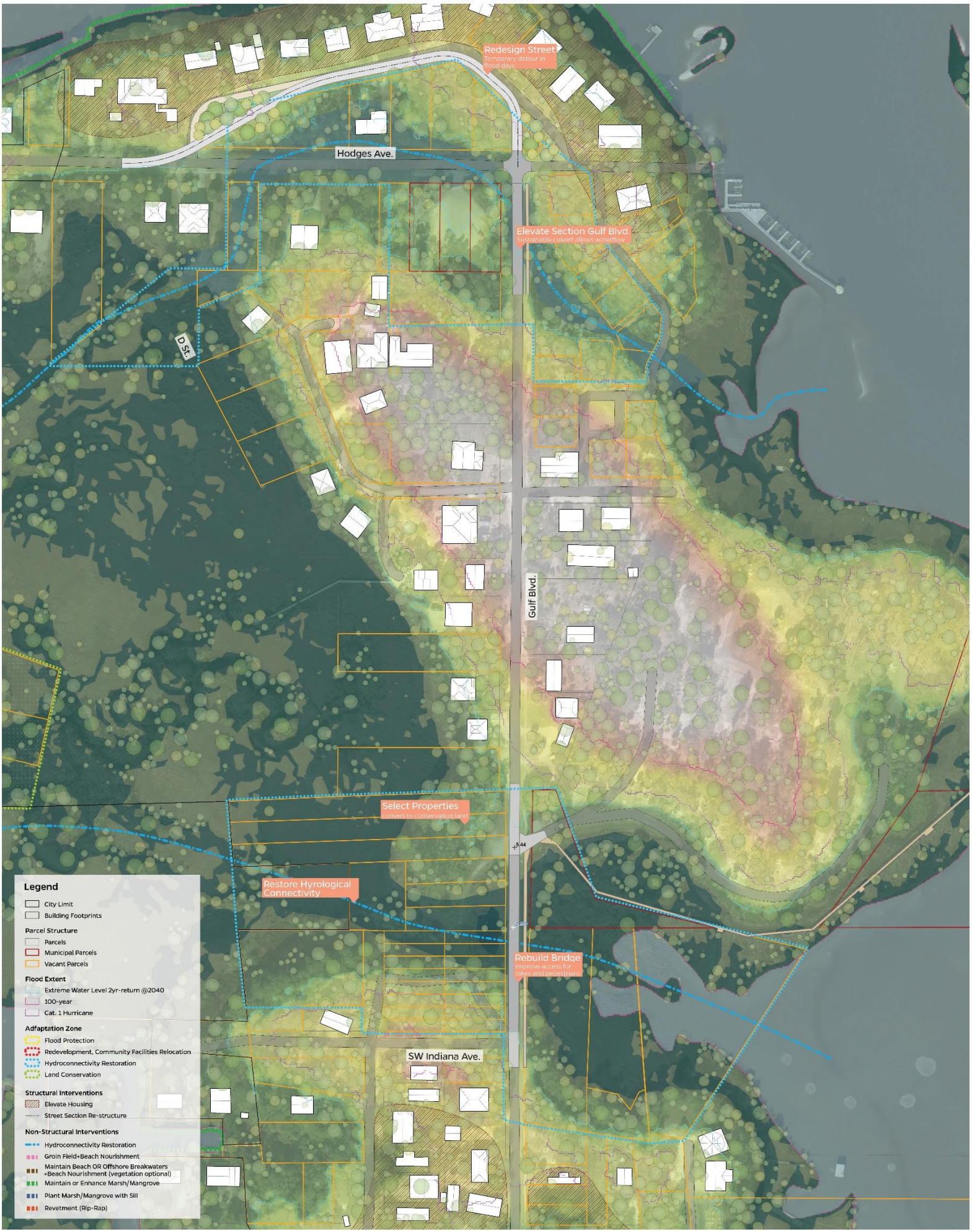


*Figure9. Project 3: Restore Hydrological Connectivity*

## PROJECT 4: WEST CEDAR KEY

### Land Conservation

West Cedar Key is characterized by significant undeveloped areas. It features fewer residential structures than other areas, with the majority elevated to mitigate flood risks. The area's geography includes a substantial shoreline stretch ideal for conservation efforts. By prioritizing land conservation along these coastal margins, the community can enhance the protection of natural habitats and lessen storm damage in the developed areas.

The adaptation strategy for this zone should focus on developing a robust program dedicated to increasing the amount of land designated as protected along the shoreline. The program should include the following components:

#### Land Conservation Target

Define specific areas for conservation based on their flood exposure defined in the Vulnerability Assessment, current land conditions and availability.

#### Engagement with Landowners

Engage in discussions with private landowners to leverage all available instruments and incentives that encourage voluntary land protection, thus reducing the need for extensive resources devoted to direct land acquisition.

#### Policy Instrumentalization and Funding

Implement and enhance policies and identify funding opportunities to facilitate land acquisition efforts by local government.

#### Work with Conservation Organizations

Collaborate with conservation organizations to support them in securing funding for purchasing vacant land to be transformed into protected conservation areas.

#### Strengthen Development Regulations

Implement more stringent regulatory requirements for new developments near shorelines.

### Innovate Acquisition Strategies

Develop innovative strategies for private land acquisition for private conservation, such as adopting a "lot next door" program. This would allow for below-market purchases of adjacent lots, earmarked for conservation or recreational uses.

These actions facilitate a non-infrastructural adaptation approach, enhancing the ecological resilience of West Cedar Key. This proactive conservation effort will help safeguard the area's natural resources and ecological functionality, contributing to a more resilient future for the community.


*Figure 10. Project 4: Land Conservation*

# IMPLEMENTING THE ADAPTATION PLAN

## POLICY NEEDS AND RECOMMENDATIONS

The following table shows the overarching adaptation measures for each adaptation planning zone within Cedar Key and how each of those measures conforms to the goals and objectives listed in the relevant elements of Cedar Key's Comprehensive Plan. It should be noted that the Comprehensive Plan does not appear to have been drafted with an emphasis on adaptation to either recurrent or episodic flooding and sea level rise. As a result, in some cases the relationship between the Plan and the adaptation planning measure can be viewed as implicit and interpretive, particularly at the level of Plan Objectives. In some instances, the determination of conformance is left at the level of Goals.

Zone 1

| *ADAPTATION PLAN* | COMPREHENSIVE PLAN |
|---|---|
| ***Measure 1:*** *Maintain the connectivity of the east side of downtown and zones 2, 3, and 5 through Whiddon Ave is essential. This is not just for regular operations but also for functioning emergency services and efficient evacuation during extreme flood events.* | Element 2: Transportation<br><br>Goal 2: To maintain the existing City roadway network and parking facilities, correct existing network deficiencies and provide economical, efficient, safe, and environmentally sound transportation facilities to ensure that the City area traffic operates above acceptable levels of service.<br><br>Objective 2-1 |
| ***Measure 2:*** *In the short-term, elevating all essential electrical equipment in the wastewater plant is also crucial. This measure is to prevent damage and ensure the plant's operation continues after extreme flood events, thereby preventing potential environmental and human health hazards* | Element 3: Infrastructure<br><br>Sub-Element 3A: Sanitary Sewer<br><br>Goal 3A: The Cedar Key Water and Sewer District and the City shall protect public health and safety by providing adequate sewer collection, treatment<br><br>and disposal systems.<br><br>Objective 3A-1:<br><br>Deficiencies in sewer treatment and capacity<br><br>shall be corrected through the following policies.<br><br>Element 8: Intergovernmental Coordination<br><br>Goal 8: To coordinate this comprehensive plan and all official acts of the elected officials with all other affected units of |

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| | government.<br><br>**Objective 8-1:** Continue to coordinate with City Comprehensive Plan with the plans of Cedar Key Water and Sewer District… |
| ***Measure 3:*** *In the long-term, pursue regional wastewater management through the Waccasassa Water and Wastewater Cooperative (W3C) so the highly vulnerable wastewater plant can be decommissioned.* | Element 3: Infrastructure<br><br>Sub-element 3A: Sanitary Sewer<br><br>**Objective 3a-2** The City and Cedar Key Water and Sewer District shall cooperate in meeting or controlling future sewer treatment needs by jointly preparing annual summaries of capacity and demand.<br><br>Element 8: Intergovernmental Coordination<br><br>**Goal 8:** To coordinate this comprehensive plan and all official acts of the elected officials with all other affected units of government.<br><br>**Objective 8-1:** Continue to coordinate with City Comprehensive Plan with the plans of Cedar Key Water and Sewer District… |
| ***Measure 4:*** *Reinforce boat ramp dock structures to withstand the impact of storm surge and maintain access to water for aquaculture activities.* | Element 9: Capital Improvements<br><br>**Goal 9:** To continue throughout the planning period to provide public services and facilities in a timely and efficient manner through the use of sound fiscal policies.<br><br>**Objective 9-2:** the City shall limit public expenditures that subsidize development in coastal high hazard areas by maintaining existing facilities and services at current capacity, except as provided to correct existing deficiencies, for recreational needs, and to provide for public health, safety and welfare.<br><br>(Note: The inability of public dock structures to withstand storm surge would be considered an existing deficiency under this objective). |
| *Flood-Proof or relocate main community emergency facilities, including the police department, post office, and fire station, to higher ground* | Not addressed in Comprehensive Plan |
| *Elevate historical structures. When elevating buildings is not feasible, use wet or dry floodproof to ensure their resilience against flooding.* | Element 10: Historic Preservation<br><br>**Goal 10:** To identify, preserve, protect, acquire, rehabilitate, and otherwise endeavor to ensure the continuity of the cultural resources of the City for Further Generations<br><br>**Objective 10-3:** The City shall continue to encourage the rehabilitation of deteriorating historic structures.<br><br>**Objective10-5:** The City shall actively seek funding from all |

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| | available sources to acquire, rehabilitate and promote historic resources. |
| *Elevate homes along D St. (1st - 4th St.), surroundings intersection 5th - E St., Canal Whiddon Ave. - Palmetto Dr.* | Element 6: Housing<br><br>Goal 6: To enhance the cost-effective availability and affordability of housing for present and future residents of the City in accordance with income level and with emphasis on self-sufficiency, quality of life and environment, health, safety, the public good and private property rights.<br><br>Objective 6-2: The City shall continue to identify unsafe buildings and provide technical assistance in the elimination or rehabilitation of such unsafe structures, including structural and aesthetic improvement consistent with the character and resources of the community.<br><br>(Note this objective was likely drafted with other issues in mind, but flooding vulnerability could be characterized as an unsafe condition warranting rehabilitation) |

## Zone 2

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| *Ensure functionality of Gulf Blvd., Hodges Ave., and Gulf Blvd. bridge at the canal during extreme high tide events.* | Element 2: Transportation<br><br>Goal 2: To maintain the existing City roadway network and parking facilities, correct existing network deficiencies and provide economical, efficient, safe, and environmentally sound transportation facilities |
| *Elevate electrical controls at lift stations to prevent damage and ensure continuous operation.* | Element 3: Infrastructure<br><br>Sub-element 3A- Sanitary Sewer<br><br>Objective 3A-1: Deficiencies in sewer treatment and capacity shall be corrected |
| *Restore hydrologic connectivity at Cemetery Point, Hodges Ave, and Rye Key to enhance drainage and reduce flooding.* | Element 4: Conservation and Coastal Management<br><br>Goal 4: To conserve, protect, restore and use the natural resources of the City in a manner which will sustain the working/fishing village character and shoreline of the City for future generations and to protect human life, manage and protect coastal resources, limit the use of public funds for private developments within Coastal High Hazard Area and restrict development which hasa negative impact on coastal zones.<br><br>OBJECTIVE 4-15: Best Practices Development and Redevelopment Principles, Strategies and Engineering Solutions |

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| *Prepare Cemetery Park for tidal flooding by implementing appropriate drainage measures.* | Element 3: Infrastructure<br><br>Sub-element 3D: Drainage<br><br>Goal 3D: The City shall provide and maintain adequate drainage facilities for Cedar Key.<br><br>Element 5: Recreation & Open Space<br><br>Goal 5: To maintain and develop a variety of recreation facilities and/or programs and insure adequate open space to satisfy the existing and future needs of the City.<br><br>Objective 5-1: Public access to recreation areas and open space shall be ensured. The City shall provide and maintain a system of public recreation facilities adequate to meet the needs of current and projected populations. |
| *Protect the shoreline from erosion by implementing nature-based features on vulnerable sections to enhance resilience against flooding.* | Element 4: Conservation & Coastal Management<br><br>Goal 4:<br><br>Objective 4-8: Shoreline Protection.<br><br>Protection of the shoreline shall be achieved by establishing a coastal construction setback line, adopting coastal construction regulations and standards, limiting construction of seawalls, and initiating beach and marsh restoration studies and plans.<br><br>(Note: Living Shoreline Master Plan was adopted into comp plan, but does not appear in 2018 Laws of Cedar Key)document) |
| *Reinforce boat ramp dock structures to withstand the impact of storm surge and maintain access to water for aquaculture activities.* | Element 9: Capital Improvements<br><br>Goal 9: To continue throughout the planning period to provide public services and facilities in a timely and efficient manner through the use of sound fiscal policies.<br><br>Objective 9-2: the City shall limit public expenditures that subsidize development in coastal high hazard areas by maintaining existing facilities and services at current capacity, except as provided to correct existing deficiencies, for recreational needs, and to provide for public health, safety and welfare. |
| *Home elevation in areas adjacent to Gulf Blvd. (Canal - Indiana Ave.), Andrews Cir. and areas adjacent to SW 120th Pl.* | Element 6: Housing<br><br>Goal 6: To enhance the cost-effective availability and affordability of housing for present and future residents of the City in accordance with income level and with emphasis on self-sufficiency, quality of life and environment, health, safety, the public good and private property rights. |

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| | **Objective 6-2:** The City shall continue to identify unsafe buildings and provide technical assistance in the elimination and rehabilitation of such unsafe structures, including structural and aesthetic improvement consistent with the character and resources of the community.<br><br>(Note this objective was likely drafted with other issues in mind, but flooding vulnerability could be characterized as an unsafe condition warranting rehabilitation) |

## Zone 3

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| *Raise awareness about future risk conditions by informing the public about local road maintenance duties/plans and emergency service access notices. (Communications)* | Not addressed in comprehensive plan |
| *Implement land conservation efforts to protect unbuilt areas, limit development, and preserve natural flood buffers to reduce potential flood damage.*<br><br>*Conservation/Coastal Management)* | **Element 4: Conservation & Coastal Management**<br><br>**Goal 4:** To conserve, protect, restore and use the natural resources of the City in a manner which will sustain the working/fishing village character and shoreline of the City for future generations and to protect human life, manage and protect coastal resources, limit the use of funds for private development within the Coastal High Hazard Area and restrict development which has a negative impact on coastal resources.<br><br>**Objective 4-8.7:** Where natural environments have been degraded, especially shoreline environments, the City shall take steps to promote the restoration and enhancement of these areas through such measures as preparation of resource management plans and cooperating with other private and/or government agencies. Where such sites are privately owned, public acquistion shall be be considered |
| *Ensure connectivity through Watson Circle, which facilitates access and evacuation routes during flood events. (Transportation)* | **Element 2: Transportation**<br><br>**Goal 2:** To maintain the existing City roadway network and parking facilities, correct existing network deficiencies and provide economical, efficient, safe, and environmentally sound transportation facilities to ensure that the City area traffic operates above acceptable levels of service. |
| *Elevate buildings in adjacent areas on the north side of Hodges Ave* | **Element 6: Housing**<br><br>**Goal 6:** To Enhance cost-effective availability and affordability of housing for present and future residents of the City in accordance with income level and with emphasis on self-sufficiency, quality of life and environment, health, safety, the public good and private property rights. |

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| | **Objective 6-2:** The City shall continue to identify unsafe buildings and provide technical assistance in the elimination and rehabilitation of such unsafe structures, including structural and aesthetic improvement consistent with the character and resources of the community. |

## Zone 4

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| *Ensure connectivity of the town to the mainland through State Road 24.*<br><br>*Intergovernmental Coordination; Transportation Element)* | **Element 2: Transportation**<br><br>**Goal 2:** To maintain the existing City roadway network and parking facilities, correct existing network deficiencies and provide economical, efficient, safe, and environmentally sound transportation facilities to ensure that the City area traffic operates above acceptable levels of service.<br><br>**Element 8: Intergovernmental Coordination**<br><br>**Goal 8:** To coordinate this comprehensive plan and all other official acts of the elected officials with all other affected units of government. |
| *Elevate Florida State Road 24 low-lying sections or consider an elevated bypass route to the east.*<br><br>*Transportation; Intergovernmental Coordination)* | **Element 2: Transportation**<br><br>**Goal 2:** To maintain the existing City roadway network and parking facilities, correct existing network deficiencies and provide economical, efficient, safe, and environmentally sound transportation facilities to ensure that the City area traffic operates above acceptable levels of service.<br><br>**Objective 2.3:** The City shall continually coordinate the City transportation system with the Florida Department of Transportation. Adopted Work Program and transportation plans of Levy County.<br><br>**Element 8: Intergovernmental Coordination:** To coordinate this comprehensive plan and all other official acts of the elected officials with all other affected units of government.<br><br>**Goal 8:** To coordinate this comprehensive plan and all other official acts of the elected officials with all other affected units of government. |
| *Integrate adjacent land uses to the new road level to ensure seamless connectivity and minimize potential disruptions during flood events.* | CRA (unsure about this one) |
| *Reinforce boat ramp dock structures to withstand the impact of storm surge and maintain access to water for aquaculture activities.* | **Element 9: Capital Improvements**<br><br>**Goal 9:** To continue throughout the planning period to provide public services and facilities in a timely and efficient |

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| | manner through the use of sound fiscal policies.<br><br>**Objective 9-2:** the City shall limit public expenditures that subsidize development in coastal high hazard areas by maintaining existing facilities and services at current capacity, except as provided to correct existing deficiencies, for recreational needs, and to provide for public health, safety and welfare. |
| *Elevate buildings and adjacent areas on both sides of State Road 24.* | Not address in Comprehensive Plan except with respect to housing. |

## Zone 5

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| *Raise awareness about future conditions by informing the public about local road maintenance duties/plans and emergency service access notices.* | Not addressed in comprehensive plan |
| *Implement measures to protect the airport runway from extreme high tide flooding to ensure continued functionality and safety. (communications)* | **Element 3: Infrastructure**<br><br>**Sub-Element 3D: Drainage**<br><br>**Goal 3D:** The City shall provide and maintain adequate drainage facilities for Cedar Key. |
| *Elevate or protect Airport Rd., SW Airport Rd, and 136 Pl. to safeguard vital transportation access routes and prevent disruption during chronic flood events.*<br><br>*(Transportation; intergovernmental coordination)* | **Element 2: Transportation**<br><br>**Goal 2:** To maintain the existing City roadway network and parking facilities, correct existing network deficiencies and provide economical, efficient, safe, and environmentally sound transportation facilities to ensure that the City area traffic operates above acceptable levels of service.<br><br>**Objective 2.3:** The City shall continually coordinate the City transportation system with the Florida Department of Transportation. Adopted Work Program and transportation plans of Levy County.<br><br>**Element 4: Conservation & Coastal Management**<br><br>**Goal 4:** To conserve, protect, restore and use the natural resources of the City in a manner which will sustain the working/fishing village character and shoreline of the City for future generations and to protect human life, manage and protect coastal resources, limit the use of funds for private development within the Coastal High Hazard Area and restrict development which has a negative impact on coastal resources. |

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| | OBJECTIVE 4-10: Evacuation time for a category three storm or greater shall be clearance of the islands seaward of No. 4 bridge within eight hours of an evacuation order. |

## Zone 6

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| *Relocate or floodproof the electric substation and water plant to prevent disruption of essential services after extreme flood events.* | Element 8: Intergovernmental Coordination: To coordinate this comprehensive plan and all other official acts of the elected officials with all other affected units of government.<br><br>Goal 8: To coordinate this comprehensive plan and all other official acts of the elected officials with all other affected units of government. |
| *In the near-term, implement measures to protect the pump control room of water wells from flooding to maintain water supply reliability.* | Element 8: Intergovernmental Coordination: To coordinate this comprehensive plan and all other official acts of the elected officials with all other affected units of government.<br><br>Goal 8: To coordinate this comprehensive plan and all other official acts of the elected officials with all other affected units of government. |
| *In the long-term, pursue regional water and wastewater supply project through W3C to secure safe drinking water and sanitary sewer access.* | Element 8: Intergovernmental Coordination: To coordinate this comprehensive plan and all other official acts of the elected officials with all other affected units of government.<br><br>Goal 8: To coordinate this comprehensive plan and all other official acts of the elected officials with all other affected units of government. |
| *Ensure the satellite solid waste facility is adequately protected from flooding to prevent environmental contamination and health hazards.* | Element 8: Intergovernmental Coordination: To coordinate this comprehensive plan and all other official acts of the elected officials with all other affected units of government.<br><br>Goal 8: To coordinate this comprehensive plan and all other official acts of the elected officials with all other affected units of government. |
| *Elevate and improve drainage along Florida State Road 24 in the area. (Intergovernmental Coordination)(Drainage subelement, Goal 3D)* | Element 8: Intergovernmental Coordination: To coordinate this comprehensive plan and all other official acts of the elected officials with all other affected units of government.<br><br>Goal 8: To coordinate this comprehensive plan and all other official acts of the elected officials with all other affected units of government.<br><br>GOAL 3D |

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| *Address social vulnerability within neighborhoods in the Sumner area to ensure equitable access to resources and adequate development practices to reduce flood risk.* | **Element 8: Intergovernmental Coordination:** To coordinate this comprehensive plan and all other official acts of the elected officials with all other affected units of government.<br><br>**Goal 8:** To coordinate this comprehensive plan and all other official acts of the elected officials with all other affected units of government. |

## FUNDING INSTANCES

Funding for resilience projects is available from a variety of sources at the federal, state, and local levels. These funds often come with certain requirements but are not tied to specific adaptation measures. A recommended starting point for accessing these funds is the Resilient Florida Program, which supports a broad spectrum of initiatives. These initiatives can range from conducting vulnerability assessments and revising comprehensive plans to creating projects, strategies, and policies aimed at preparing communities for future flooding and sea level rises. Larger infrastructure projects may qualify for federal funds through agencies like FEMA or the Federal Highway Administration (FHWA). However, it is essential to note that many grants are highly competitive due to budget limits and the nationwide eligibility of states. Generally, the state departments manage the application process for these grants.

For smaller or individual projects, financial support may come in the form of low-interest loans, subsidized by federal and state funds, or through specialized grants that consider the unique aspects of the project context or its ownership. While FEMA grants are usually allocated only in response to presidentially declared disasters, Florida should be eligible for these funds following hurricanes Ian and Idalia.

The Urban Ocean Lab's interactive table offers up-to-date information, including the types of actions supported, timelines, and details on the funding available. Another valuable resource is the table from the American Flood Coalition, which presents funding options catering to a wider range of project budgets.

## ADAPTATION ACTIONS AND FUNDING

After the vulnerability assessment is completed, most of the listed projects will need to go through a design professional. Once design is completed along with a feasibility study and a projected budget, implementation funding can be pursued. Considerations for funding source should include: project scale, budget, matching funds, impact to the community, priority level. Grants such as BRIC, Resilient Florida, and RAISE, cover a variety of different types of resiliency projects, while U.S. Fish and Wildlife, for example, will target proposals that focus on conservation and maintenance of wildlife.

Typical Adaptation Actions across all the Zones in Cedar Key

| Category | Measure | Funding |
|---|---|---|
| Transportation | Road elevation | Rebuilding American Infrastructure with Sustainability \| Equity (RAISE) Discretionary Grants \| FHWA |
| | Elevate Bridges | Rebuilding American Infrastructure with Sustainability \| Equity (RAISE) Discretionary Grants \| FHWA |
| | Build Bridges | Rebuilding American Infrastructure with Sustainability \| FHWA |
| | Road improvement (widen section, improve sidewalks, create parking areas) | Rebuilding American Infrastructure with Sustainability \| Equity (RAISE) Discretionary Grants \| FHWA |
| | Retrofit boat ramps (reinforce boarding structures) | Rebuilding American Infrastructure with Sustainability \| Equity (RAISE) Discretionary Grants |
| Critical Infrastructure | Retrofit wastewater plant equipment | Interagency Nonstructural Flood Risk Management Projects \| Rural Development Water and Environmental Programs |
| | Relocate wastewater plant | Interagency Nonstructural Flood Risk Management Projects \| Rural Development Water and Environmental Programs |
| | Wastewater network improvements (retrofit lift stations, replace components to avoid salty water infiltration) | Rural Development Water and Environmental Programs |
| | Stormwater network improvements (implement check valves, build retention areas) | Clean Water State Revolving Fund; Water Infrastructure Finance and Innovation Act Program |
| | Waterplant retrofit (elevate control rooms, elevate equipment) | Interagency Nonstructural Flood Risk Management Projects \| Rural Development Water and Environmental Programs |
| Community Facilities | Relocation (City Hall, Police Department, Fire Department, Post Office, City Library) | Interagency Nonstructural Flood Risk Management Projects |
| | Wet floodproofing | Interagency Nonstructural Flood Risk Management Projects |
| | Dry floodproofing | Interagency Nonstructural Flood Risk Management Projects |

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| | Elevate utilities | State Community Development Block Grant Program |
| Natural Cultural Assets | Marsh and mangrove restoration | Vegetation and Watershed Management Projects (Federal) \| Watershed and Flood Prevention Program |
| | Revetment | BRIC \| Resilient Florida |
| | Sea wall | BRIC \| Resilient Florida |
| | Detached breakwaters | U.S. Fish and Wildlife Service Coastal Program \| Watershed and Flood Prevention Program |
| | Hydroconnectivity restoration | U.S. Fish and Wildlife Service Coastal Program \| Watershed and Flood Prevention Program |
| | Beach nourishment + groin field | U.S. Fish and Wildlife Service Coastal Program \| Watershed and Flood Prevention Program |
| | Land Conservation buyouts | |
| Economy and Housing (building assets) | Building Elevation | Gulf County Local Housing Assistance Plan |
| | Wet floodproofing | Gulf County Local Housing Assistance Plan |
| | Dry floodproofing | |
| | Voluntary buyout | |
| | Building relocation | Interagency Nonstructural Flood Risk Management Projects |
| | Flood insurance | |

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