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VILLAGE OF ESTERO COMPREHENSIVE VULNERABILITY ASSESSMENT & ADAPTATION PLAN

Final Presentation



Village of ESTERO

AGENDA

- Vulnerability Assessment
  - Approach
  - Results: Asset Types at Risk
- Focus Areas
- Adaptation Strategies
- Conclusion and Findings



VULNERABILITY ASSESSMENT APPROACH



Data Collection

- *Village infrastructure data*
- *State critical asset inventory*
- *Flood and non-flood hazard scenarios*
- *Two Public Outreach Meetings*



Exposure Analysis

- *17 Scenarios*
- *% of assets exposed*
- *% of land area exposed*
- *Flood depth by scenario at each asset*



Sensitivity Analysis

- *Rank assets based on consequence of failure of those assets, depth threshold, and rate of return of each scenario*



Review of Priority Vulnerable Assets

- *Prioritization*
- *Potential Adaptation Strategies*
- *Identify Focus Areas*

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ASSET TYPES AT RISK

CURRENT (100-YR) STORM SURGE

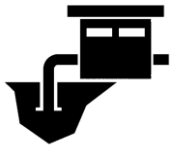


Roads

Max depth

9 ft

17%
impacted



Lift Stations

Depth

6 ft

10%
impacted



Communication Facilities

Depth

1 ft

11%
impacted



Bridges

Depth

1 ft

10%
impacted



Bus Stations

Depth

2 ft

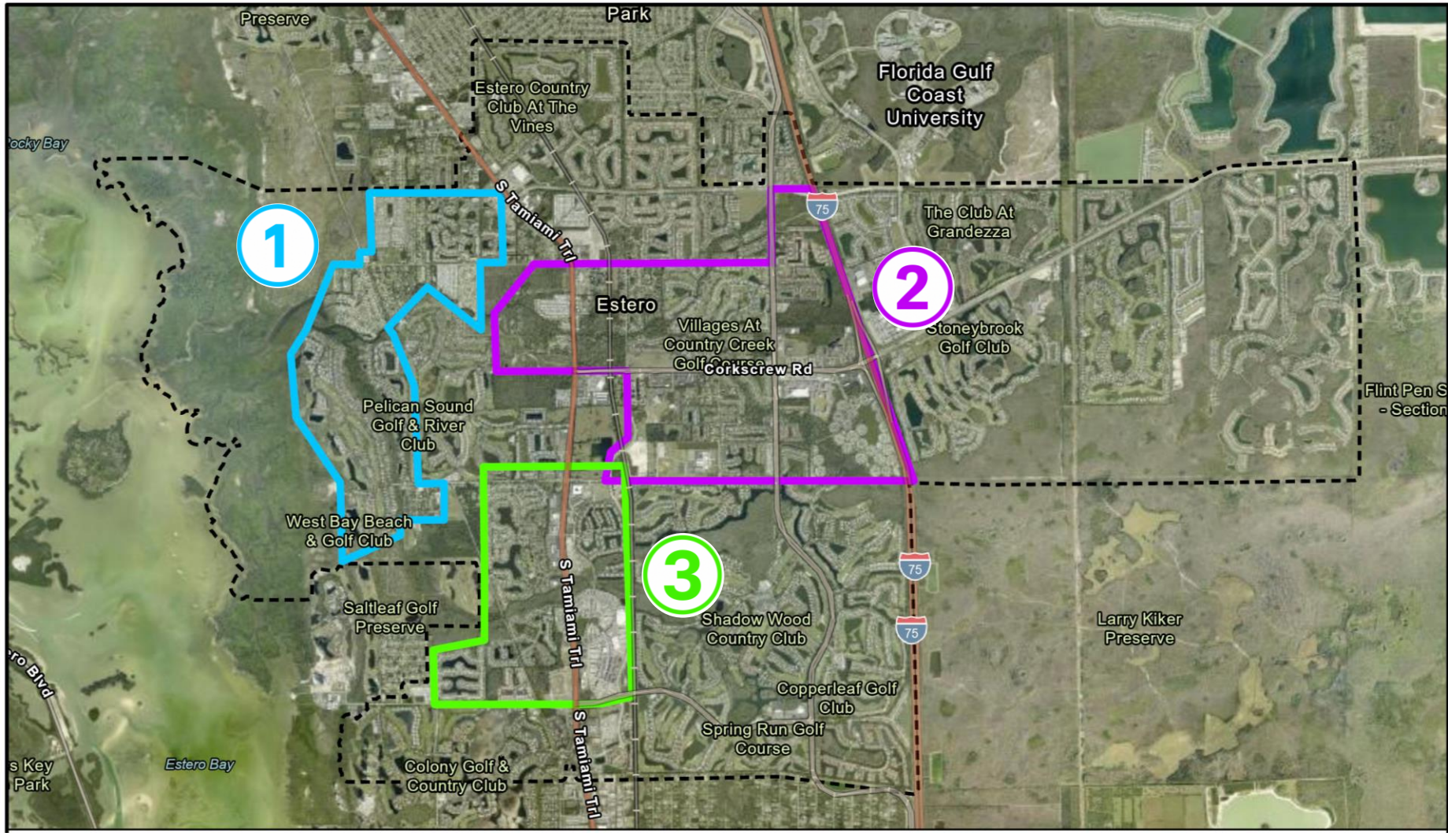
6%
impacted

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FOCUS AREAS

Three focus areas were identified based on large concentration of at-risk assets:

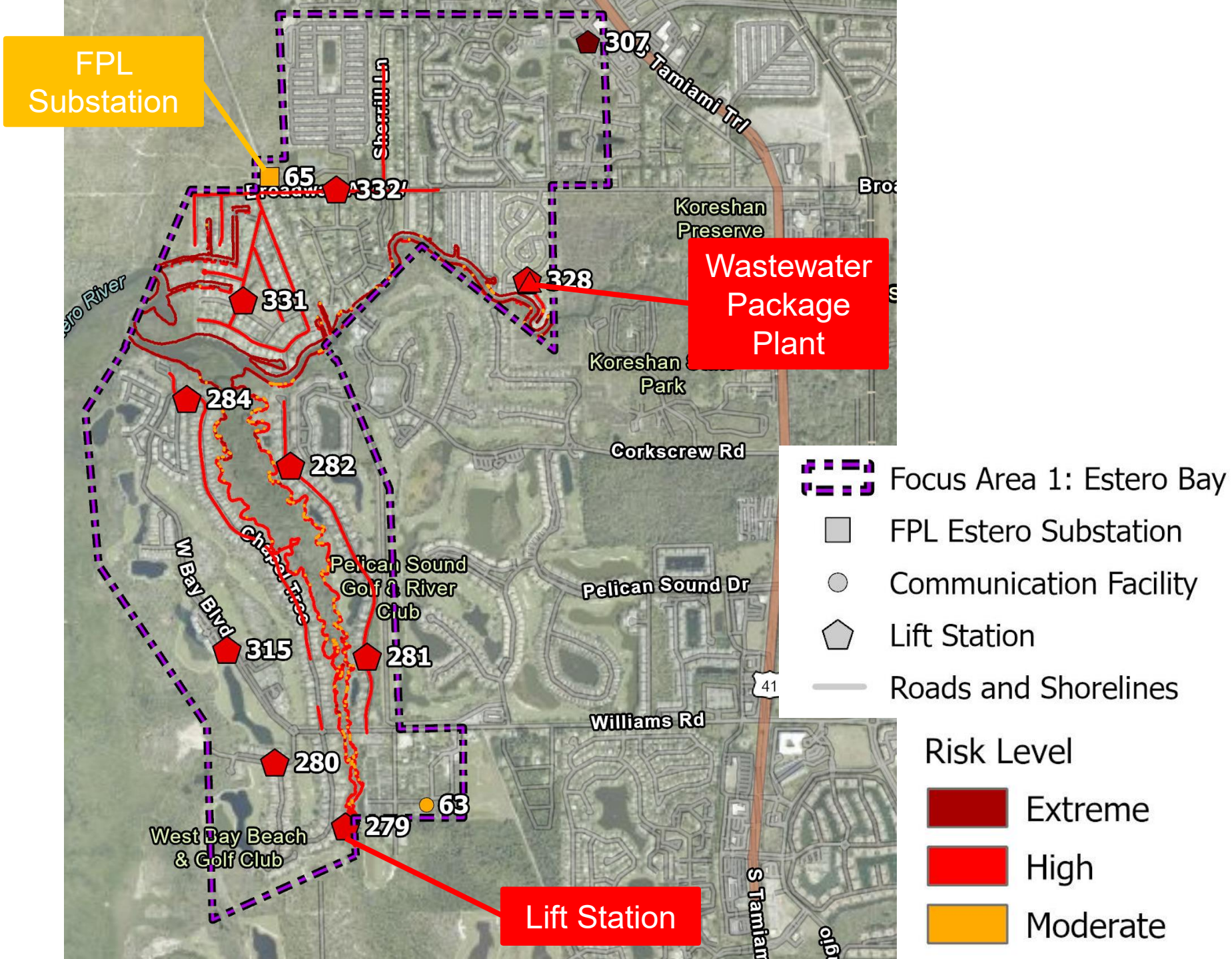
- *Focus Area 1:* ***Estero Bay Front***
- *Focus Area 2:* ***Village Center & Corkscrew Corridor***
- *Focus Area 3:* ***Fountain Lakes & Coconut Point***



FOCUS AREA #1

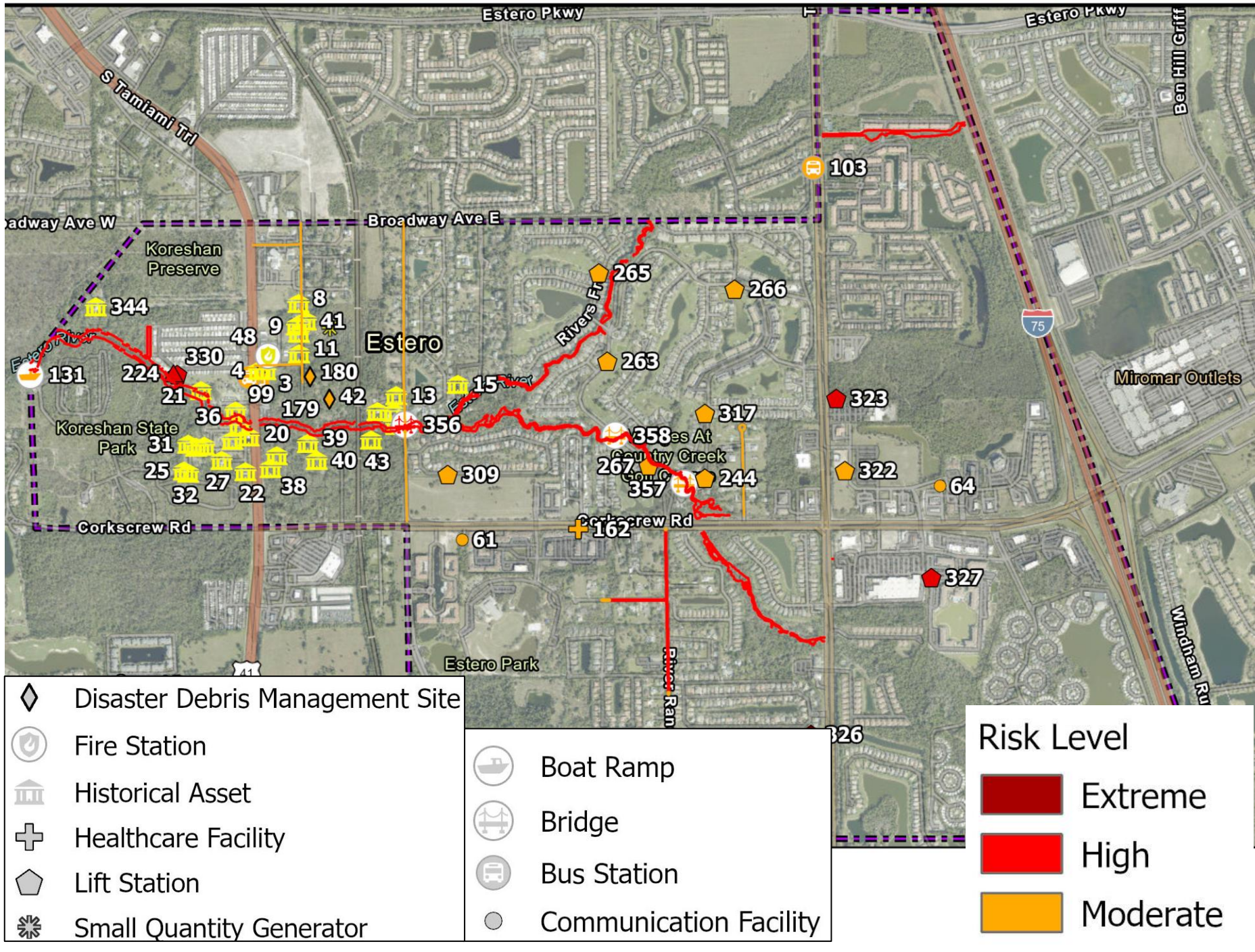
- Mostly residential
- Many parcels in special flood hazard zone or below the BFE
- Hazards of concern: surge& tide

- Vulnerable assets:
  - ✓ Lift stations
  - ✓ Village-owned and private roads
  - ✓ Mobile home parks
  - ✓ Package plants
  - ✓ A cell Tower
  - ✓ FPL Estero substation
  - ✓ Parcels and shorelines along the Estero river



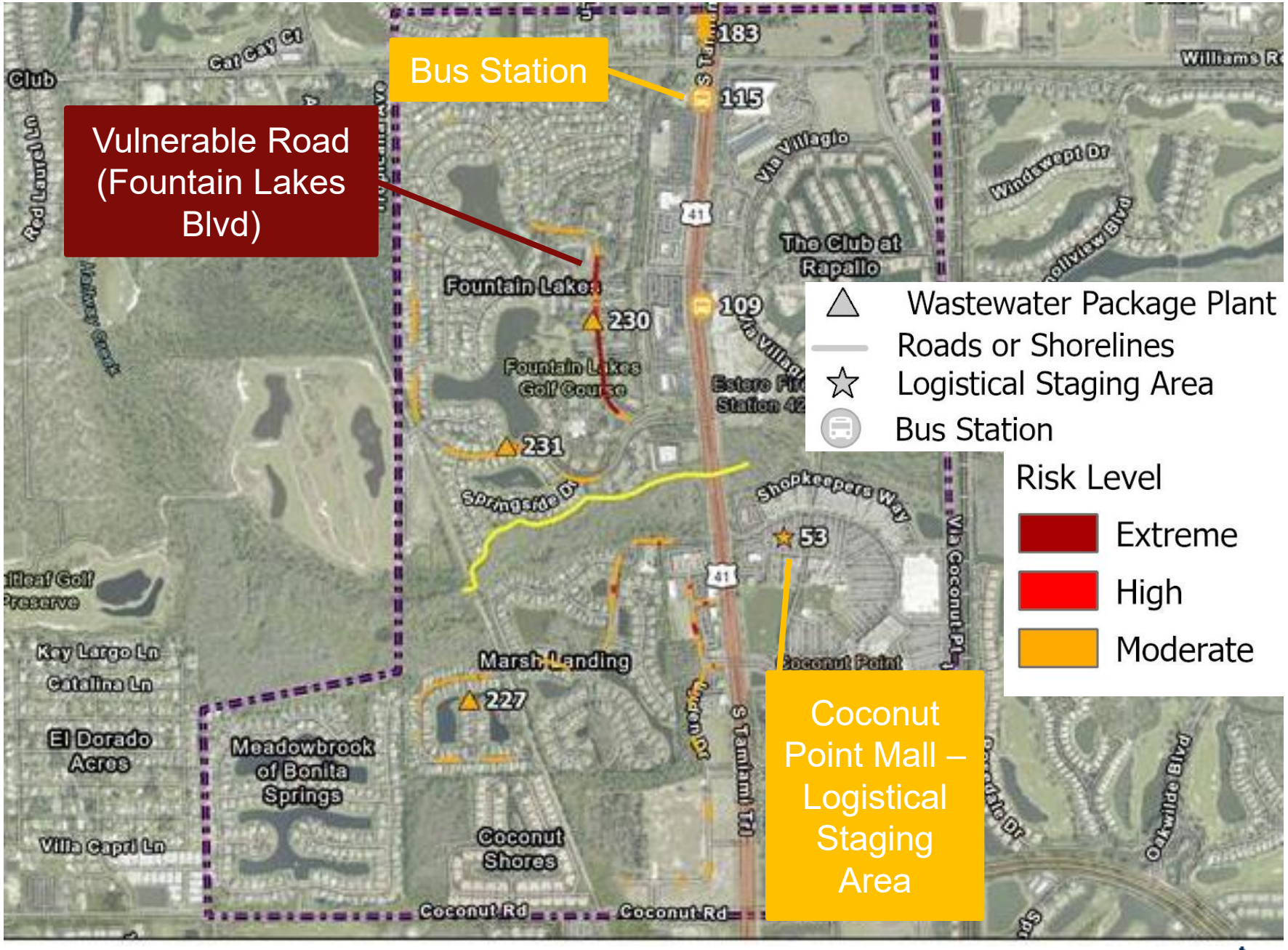
FOCUS AREA #2

- Central core of the Village
- Vulnerable to both surge and rainfall
- Vulnerable assets:
  - ✓ Historical assets
  - ✓ Lift stations
  - ✓ Package plants
  - ✓ Bus stations
  - ✓ Boat Ramp at Koreshan State Park
  - ✓ Multiple private healthcare facility
  - ✓ Two cell towers
  - ✓ Multiple bridges
  - ✓ Parcels and shorelines along the Estero river.

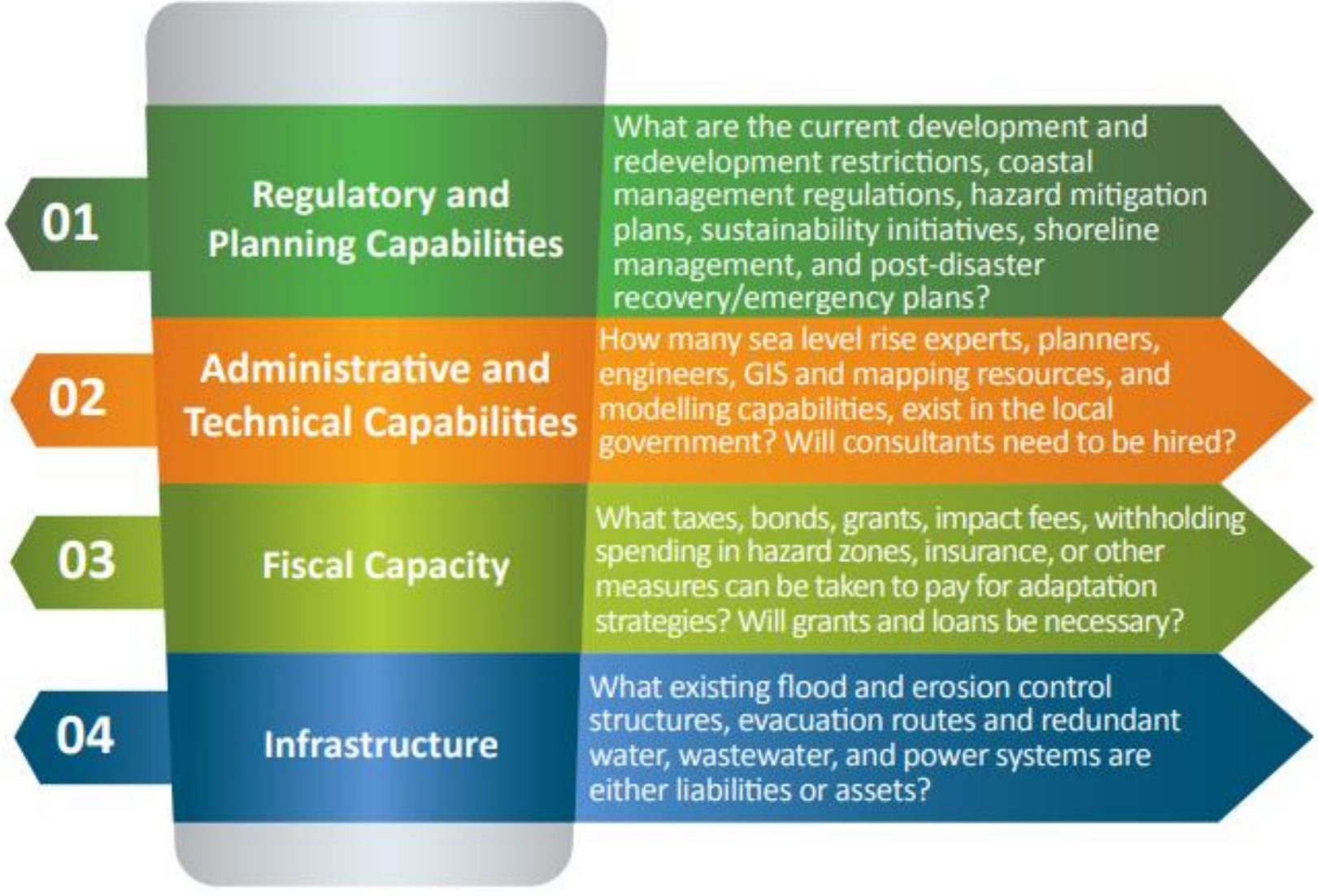


FOCUS AREA #3

- Mostly residential
- Hazards of concern: Extreme heat, wildfires, rainfall
- Vulnerable assets:
  - ✓ Lift station
  - ✓ Private roads
  - ✓ One control valve
  - ✓ Bus terminals
  - ✓ Coconut Mall, acting as a logistical staging area



ADAPTATION PLANNING STEPS



ONGOING PROJECTS

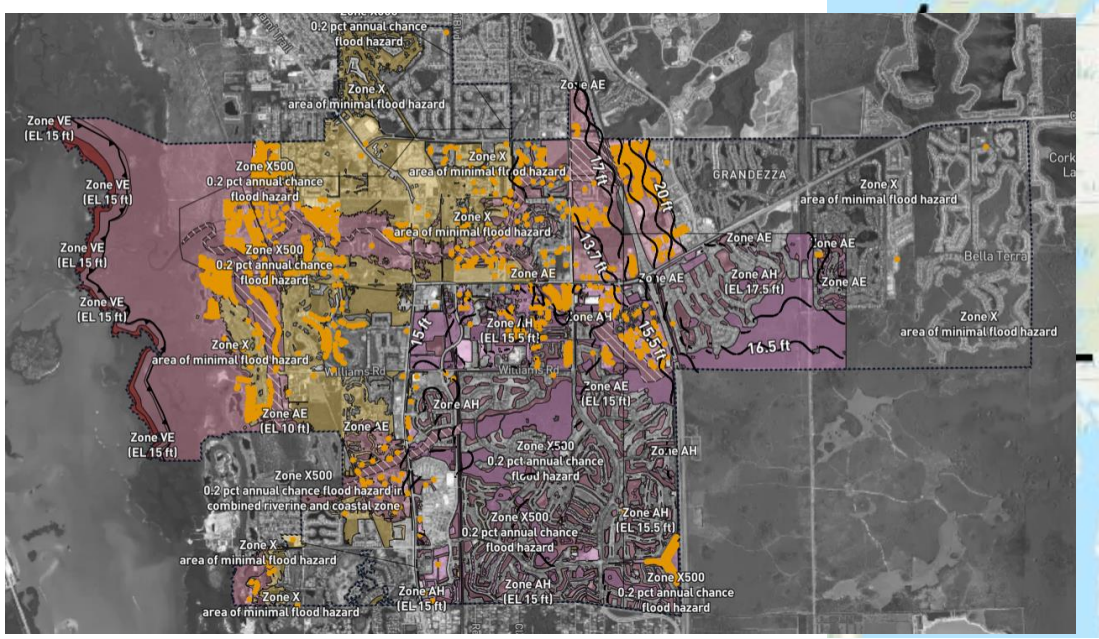
- Three Oaks Parkway & I-75 (behind the post office):
  - 72 acres acquired
  - 25-acre flood mitigation pond
- Estero River North Branch Creek Restoration
  - Restore hydraulic connection
- Drainage Improvements for Broadway Ave West project
  - Stormwater runoff and overtopping mitigation

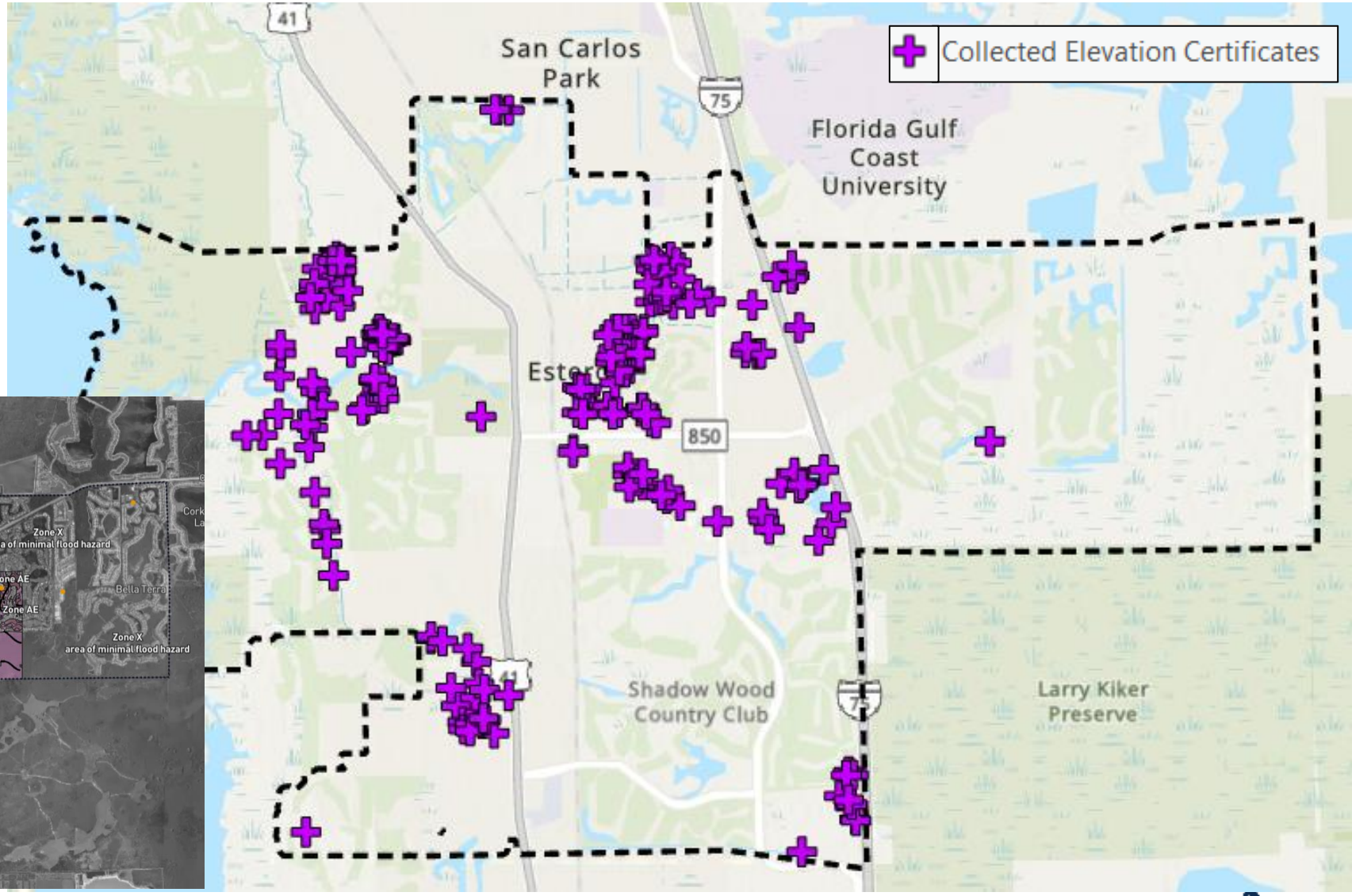


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ACTIVE FLOODPLAIN MANAGEMENT

- As part of project, total of **237** Elevation Certificates were collected for structures located within the special flood hazard areas





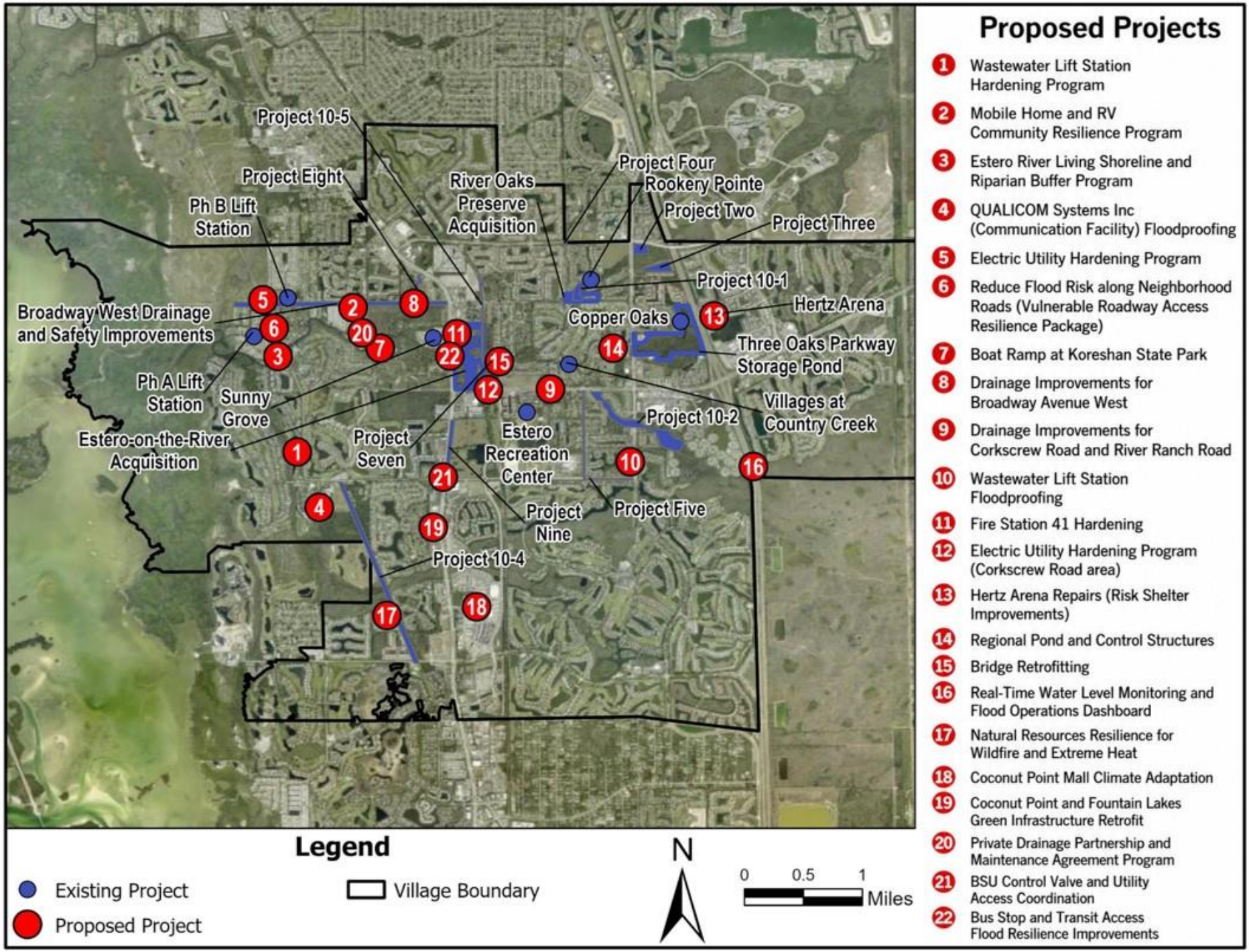
https://esterofl.withforerunner.com/explore

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ADAPTATION STRATEGIES

Category	Purpose	Examples
Protection 	Reduce flood entry, wave energy, scour, or direct damage.	Floodwalls, sump pumps, debris deflectors, scour reinforcement, berms, living shorelines.
Accommodation 	Modify assets to function with flooding or recover quickly.	Elevated control panels, elevated pads, flood-resistant materials, floating docks.
Avoidance 	Guide new development or critical functions away from higher hazard areas.	Shoreline setbacks, overlay policies, revised siting criteria, easements, open space preservation.
Managed relocation or Retreat 	Move highly vulnerable structures or functions when protection or accommodation is not cost-effective.	Buyouts, land swaps, voluntary relocation, repositioning critical equipment.

EXISTING & PROPOSED PROJECTS



RANKED ADAPTATION PROJECTS

Project ID	Project Title	Public Safety Subtotal	Criticality Subtotal	Feasibility Subtotal	Value Subtotal	Total Score	Rank
FA2-P2	Drainage Improvements for Broadway Avenue West	26	18	42	14	**102**	**1**
FA2-P4	Wastewater Lift Station Hardening Program	32	24	28	14	**100**	**2**
FA2-P8	Regional Pond and Control Structures	33	6	42	12	**95**	**3**
FA1-P1	Wastewater Lift Station Hardening Program	32	24	24	12	**94**	**4**
FA3-P3	Coconut Point / Fountain Lakes Transit and Stormwater Green Infrastructure Retrofit	36	12	32	12	**94**	**5**
FA2-P3	Drainage Improvements for Corkscrew Road / River Ranch Road	20	18	36	14	**90**	**6**
FA3-P1	Natural Resources Resilience for Wildfire and Extreme Heat	42	8	20	18	**90**	**7**

Higher score
=
Higher priority

* Color scale used in this table is not the same as risk levels presented on other slides

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PROPOSED ADAPTATION PROJECTS

Focus Area 1



Focus Area 1 - Project 3

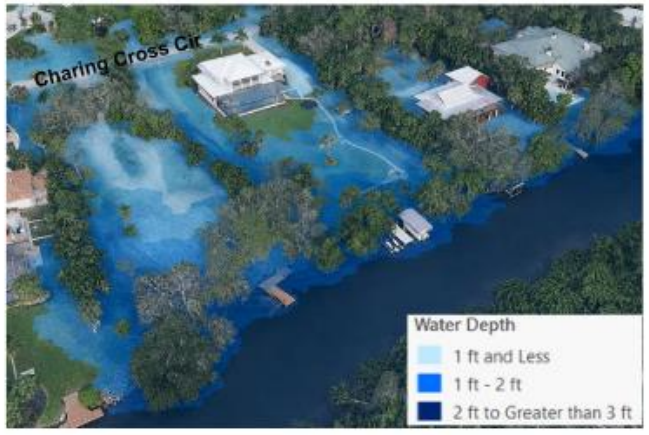
Estero River Living Shoreline and Riparian Buffer Program

Project Description

This project is focused on shorelines, waterfront parcels, and adjacent infrastructure within along the Estero River. The 2026 Vulnerability Assessment identified these shoreline assets as recurring at-risk resources under storm surge, tidal flooding, compound flooding, erosion, and future sea level rise scenarios. These conditions threaten the long-term stability of shorelines and adjacent parcels, and may increase vulnerability of adjacent roads, utilities, natural resources, and waterfront properties.

Approximately **3,100 linear feet of seawall gaps** were identified along the north shore of the Estero River where improvements could help **reduce up to 3 feet of tidal flooding by 2050,** in the waterfront parcels and **nearby roads like Charing Cross Circle**. This project proposes to advance a coordinated nature-based and hybrid shoreline resilience program that may include targeted gap closures, living shoreline treatments, riparian buffer restoration, river dredging, wetland enhancement, and nearshore breakwater evaluation to maintain protection capacity as sea level rises. Project development will require coordination among the Village of Estero, South Florida Water Management District, Lee County, and adjacent property owners and will be supported through conceptual design, permitting evaluation, habitat baseline assessments, cost estimating, and long-term monitoring planning.

Projected 2050 Tidal Flooding Conditions



Location & Proposed Adaptation



Primary Hazard(s)

Tidal flooding, storm surge, erosion, sea level rise

Implementation Timeline

Short-term | Mid-term | Long-term

Estimated Cost

$ $ $

$7,100,000

Alignment with Existing Plans

- Village of Estero Comprehensive Plan
- FEMA Narrative
- South Lee County Watershed Initiative Modeling Report

Potential Funding Sources

Resilient Florida; NOAA; NFWF; FWC coastal habitat grants; USACE CAP 206; FDEP coastal programs.

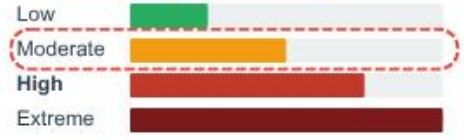
Asset Owner/ Responsible Entity

Private, Village of Estero can support a private seawall policy

Priority Rating

- Low
- Medium
- High

Vulnerability of Assets



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PROPOSED ADAPTATION PROJECTS

Focus Area 2



Focus Area 2 - Project 3

Drainage Improvements for Corkscrew Road / River Ranch Road

Project Description

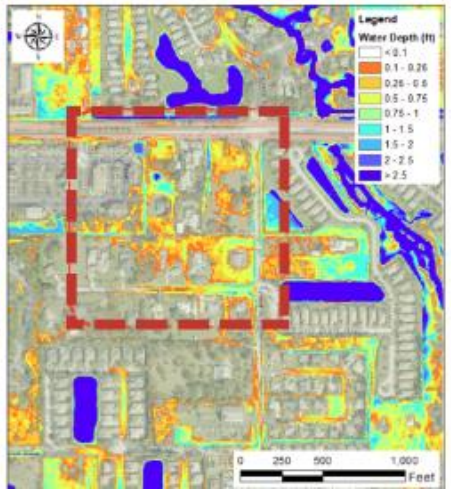
The Corkscrew Road and River Ranch Road intersection is vulnerable to rainfall and compound flooding that can affect roadway access, nearby neighborhoods, utility assets, and emergency response routes. In parallel with the existing River Ranch Road Improvements project, this project recommends advancing backflow prevention from the Estero River during extreme storm conditions. Modeled flooding indicates a potential flow path from the Estero River South Branch through adjacent wetlands (shown in black polygon on the bottom left image), across River Ranch Road, and toward Coralee Avenue; therefore, backflow prevention near the Estero Preserve Run cul-de-sac is recommended. The 2026 Stormwater Modeling Update also showed that increased pipe size and/or additional barrels could provide substantial flood mitigation, supporting further refinement of the existing drainage improvement effort (bottom right image).

The project also aims to evaluate green infrastructure or additional storage where right-of-way, drainage patterns, and adjacent land uses allow. Utility assets near the intersection, including the control box southeast of the intersection, were surveyed and found to have critical electrical components above the 100-year flood elevation; therefore, near-term floodproofing or elevation is not expected to be needed.

Existing Conditions Rainfall Flooding



Reduced Rainfall Flooding with Drainage Improvements



Location



Primary Hazard(s)

Rainfall, compound flooding, roadway overtopping

Implementation Timeline

Short-term | Mid-term | Long-term

Estimated Cost

$ $ $

$560,000

Alignment with Existing Plans

- VA Stormwater report finding
- Village of Estero Stormwater Master Plan
- Estero River, Imperial River, & Springs Creek Storm Assessment Summary Report

Potential Funding Sources

Resilient Florida, FEMA BRIC, FEMA HMGP, FDOT programs

Asset Owner/ Responsible Entity

Village of Estero

Priority Rating

- Low
- Medium
- High

Vulnerability of Assets

Low
Moderate
High
Extreme

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PROPOSED ADAPTATION PROJECTS

Focus Area 3



Focus Area 3 - Project 1 (Village-Wide)

Natural Resources Resilience for Wildfire and Extreme Heat



Project Description

This project is a Village-wide strategy with a focus in Focus Area 3, where conservation lands are adjacent to developed areas and urban heat island zones, and where wildfire and heat sensitivity is highest within the Village. The project proposes to support vegetation management, defensible buffer creation, fuel-load reduction, and restoration of disturbed natural areas to reduce wildfire risk while preserving habitat, shade, and cooling benefits.

The project would also encourage replanting and landscape restoration after development and redevelopment, particularly where conservation land edges have been disturbed or fragmented. Native replanting, canopy enhancement, and restoration of buffer areas would help reduce wildfire exposure at the interface between natural lands and developed areas while supporting long-term natural systems health.

Because this project is primarily nature-based and non-structural, implementation would likely involve coordination among the Village, property owners, conservation land managers, fire-rescue partners, and redevelopment applicants. The project can also support broader resilience goals by improving natural resource protection, reducing edge vulnerability, and helping offset heat-related impacts throughout the Village, with initial priority in Focus Area 3.

Potential Funding Sources

- FEMA Hazard Mitigation Assistance
- Florida Forest Service wildfire mitigation or community forestry programs
- FDEP or regional conservation / restoration grants
- Lee County / regional resilience or hazard mitigation funding Local CIP funding

Proposed Adaptation



Primary Hazard(s)

Wildfire and Extreme Heat

Priority Rating

- Low
- **Medium**
- High

Implementation Timeline

Short-term | Mid-term | Long-term

Estimated Cost

$$ $100,000

Alignment with Existing Plans

- 2018 Village of Estero Comprehensive Plan
- 2022 Lee County Joint Local Mitigation Strategy
- 2025 Estero LMS Progress Report
- 2025 Lee County Coastal Flood Adaptation Plan

Vulnerability of Assets



IMPLEMENTATION SCHEDULE

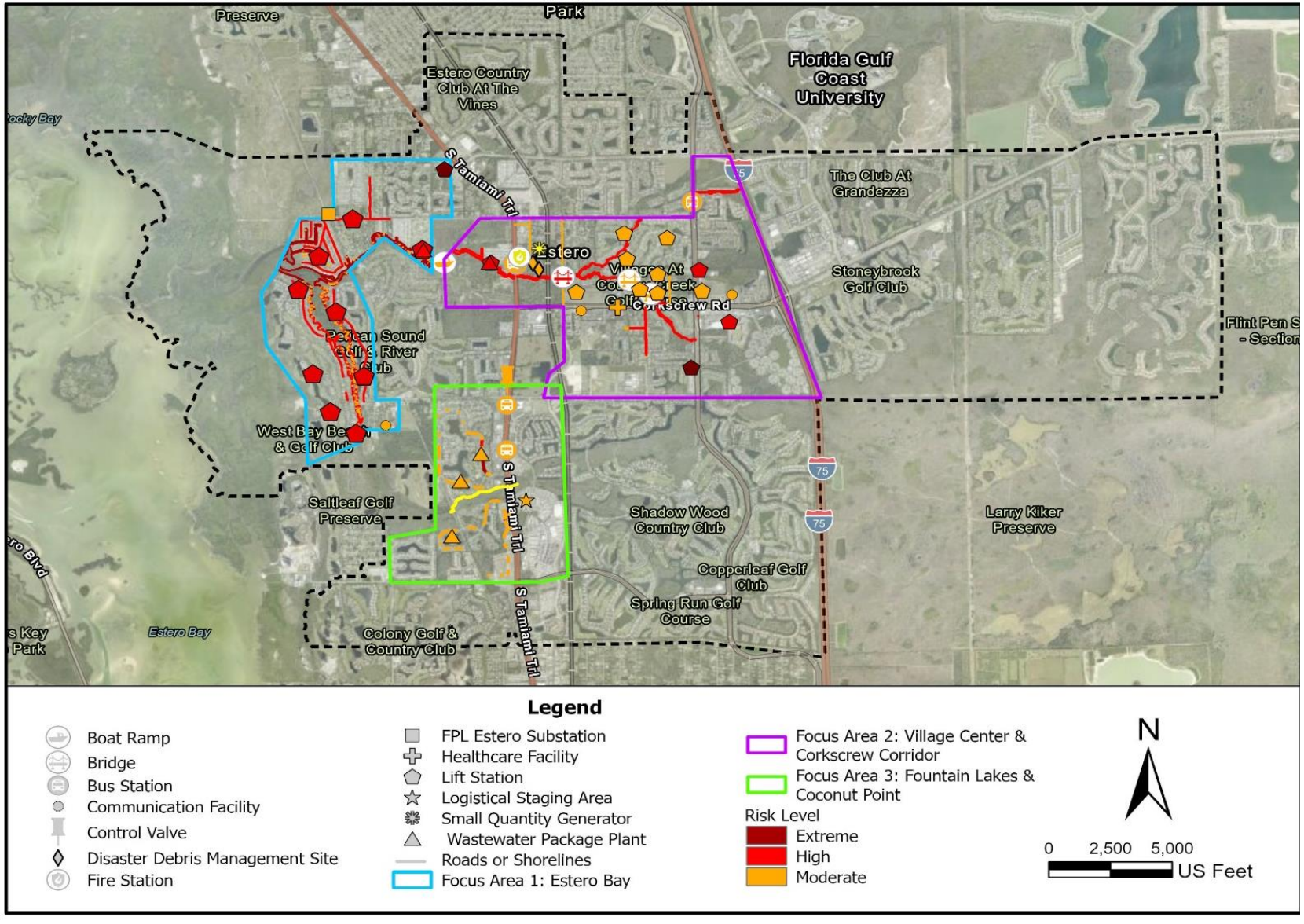
Rank	Project	Focus Area	Implementation Window	Funding Recommendation
1	Drainage Improvements for Broadway Avenue West	2	1–2 years	Advance quickly using Village capital/stormwater funds for design and match; pursue Resilient Florida, FEMA HMGP/BRIC, and EPA CWSRF where eligible.
2	Wastewater Lift Station Hardening Program	2	1–5 years	Package as a utility resilience project; pursue FEMA HMGP/BRIC/FMA, EPA CWSRF, HUD CDBG-MIT/DR, Resilient Florida, and utility capital budgets.
3	Regional Pond and Control Structures	2	1–3 years advancement; phased design/construction	Treat as a flagship grant project; pursue Resilient Florida, FEMA HMGP/BRIC, SWFWMD CFI, USACE CAP 205, and local stormwater funds.
4	Wastewater Lift Station Hardening Program	1	1–2 years for priority verification; phased implementation	Use VA results to coordinate utility-owner implementation; pursue Resilient Florida, FEMA HMGP/BRIC/FMA, EPA CWSRF, HUD CDBG-MIT, and utility budgets.
5	Coconut Point / Fountain Lakes Transit and Stormwater Green Infrastructure Retrofit	3	5–30 years; begin pilot planning earlier	Phase into pilot segments; pursue Resilient Florida, FEMA HMGP/BRIC, EPA green infrastructure programs, NOAA, FDOT TAP, LeeTran/FTA funds, and private cost share.

IMPLEMENTATION SCHEDULE

Rank	Project	Focus Area	Implementation Window	Funding Recommendation
6	Drainage Improvements for Corkscrew Road / River Ranch Road	2	1–5 years	Advance with stormwater/transportation funds; pursue Resilient Florida, FEMA HMGP/BRIC, FDOT programs, and Village capital/stormwater funds.
7	Natural Resources Resilience for Wildfire and Extreme Heat	3	1–2 years	Start as a low-cost, high-readiness program; pursue Florida Forest Service, FEMA HMA, FDEP conservation/restoration grants, Lee County resilience funds, and local CIP.
8	Reduce Flood Risk Along Neighborhood Roads	1	5–30 years; begin survey and ownership coordination earlier	Split into public/private segments; pursue Resilient Florida, FEMA HMGP/BRIC, FDOT programs, HUD CDBG-MIT, local transportation/stormwater funds, and private cost share.
9	Bridge Retrofitting: Sandy Lane and South Tamiami Trail Bridges over Estero River	2	1–5 years	Begin with hydraulic/structural evaluation; pursue Resilient Florida, FEMA HMGP/BRIC, FDOT/local transportation funds, and USACE where eligible.
10	Estero River Living Shoreline and Riparian Buffer Program	1	1–5 years for design/permitting; phased implementation	Position as a nature-based resilience package; pursue Resilient Florida, NOAA, NFWF, FWC/FDEP habitat programs, USACE CAP 206, and private shoreline cost share.

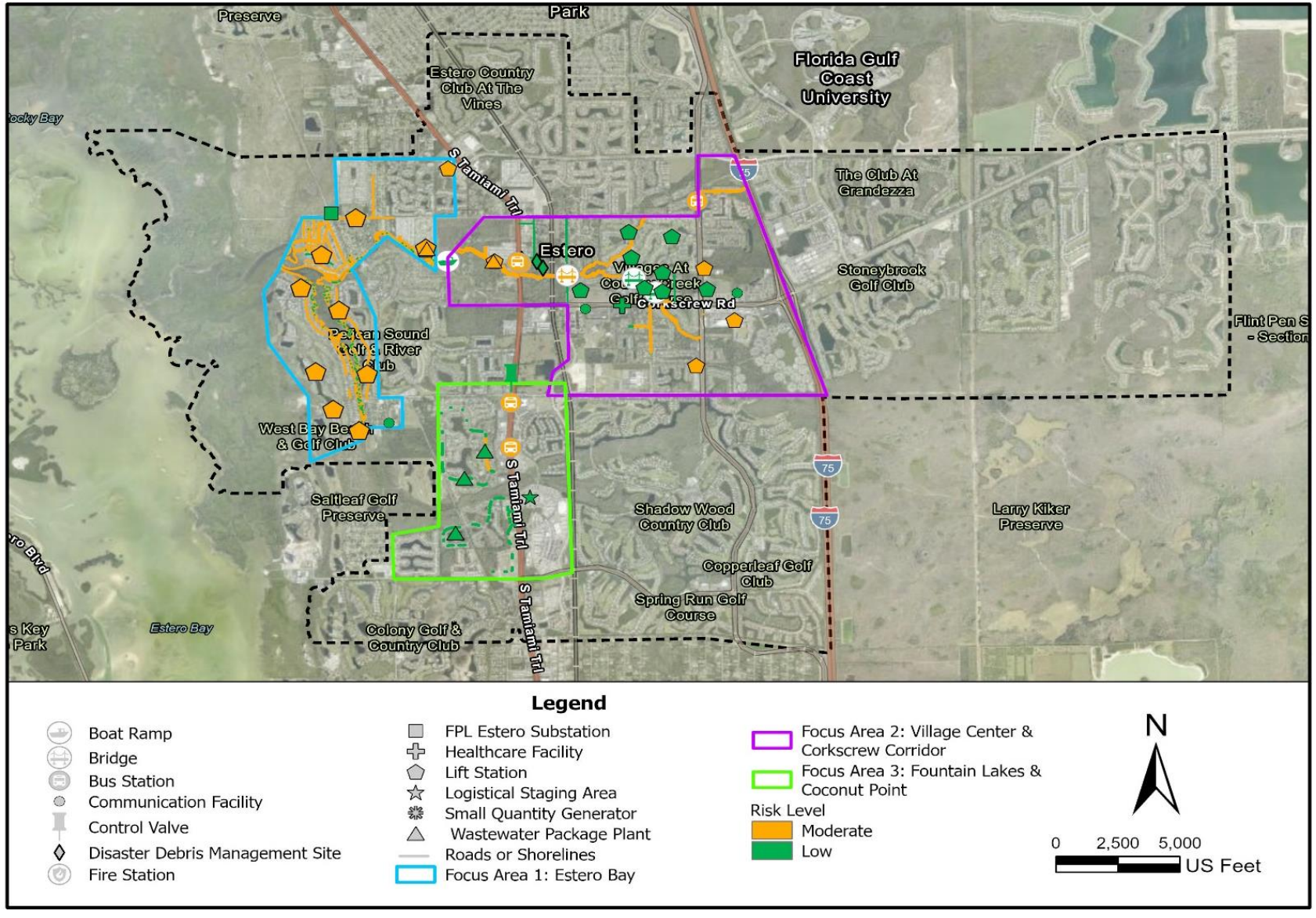
BEFORE & AFTER ADAPTATION

Before Adaptation



BEFORE & AFTER ADAPTATION

After Adaptation



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QUESTIONS

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In Pursuit of Better.