



# C-8 BASIN RESILIENCY: S-28N COASTAL STRUCTURE & PUMP STATION

August 14, 2025





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# Opening Remarks

Mayor Jerome Charles

Village of Miami Shores







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# Introductions

Carolina Maran, Ph.D., P.E.,

Division Director, Flood Control & Water Supply Planning

Chief of District Resiliency

SFWMD





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# C-8 Basin Resiliency: S-28 Coastal Structure Improvements

Carolina Maran, Ph.D., P.E.,  
Division Director, Flood Control & Water Supply Planning  
Chief of District Resiliency  
SFWMD

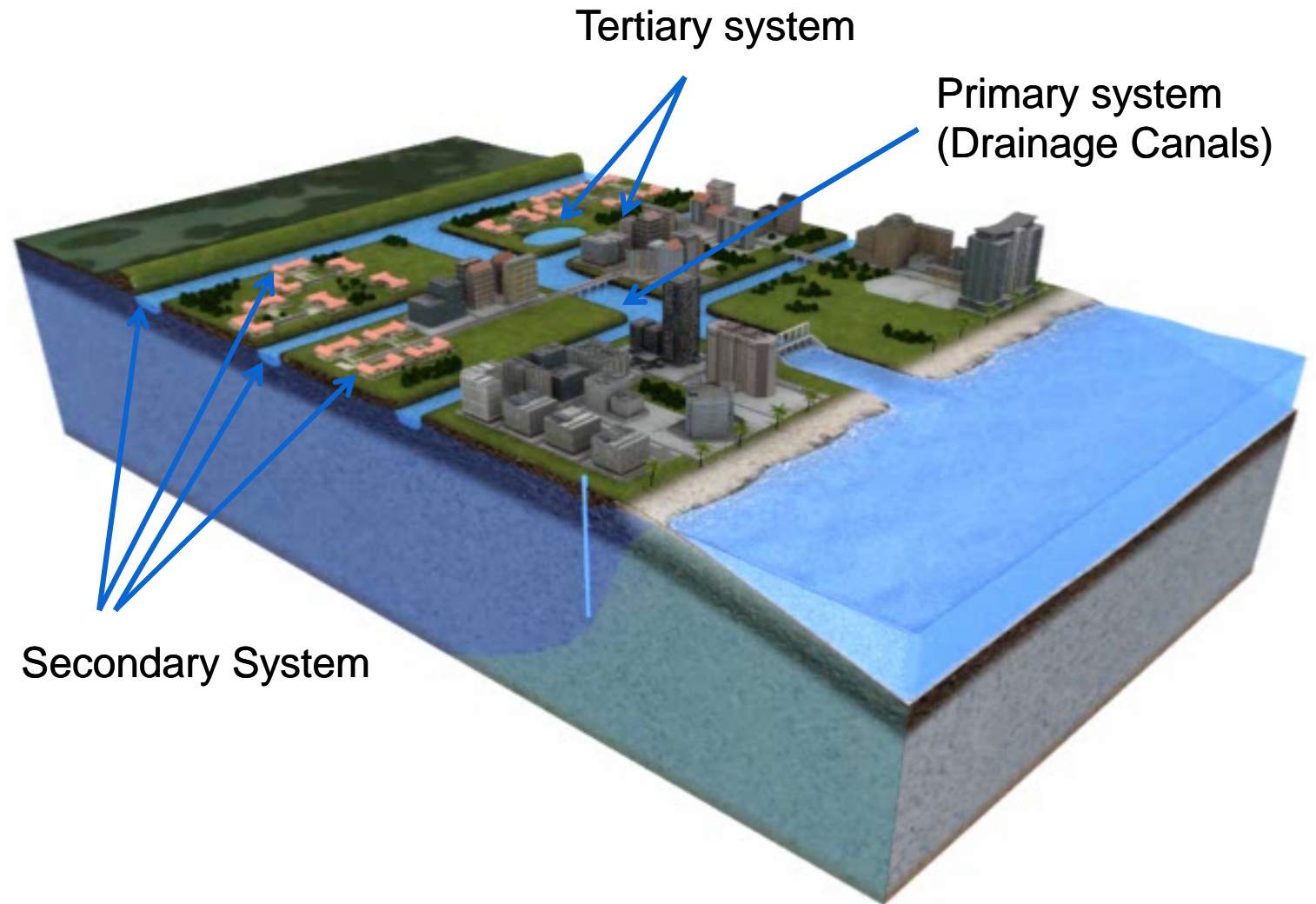
Octavio Castillo, P.E.,  
Engineering & Construction Project Manager  
SFWMD





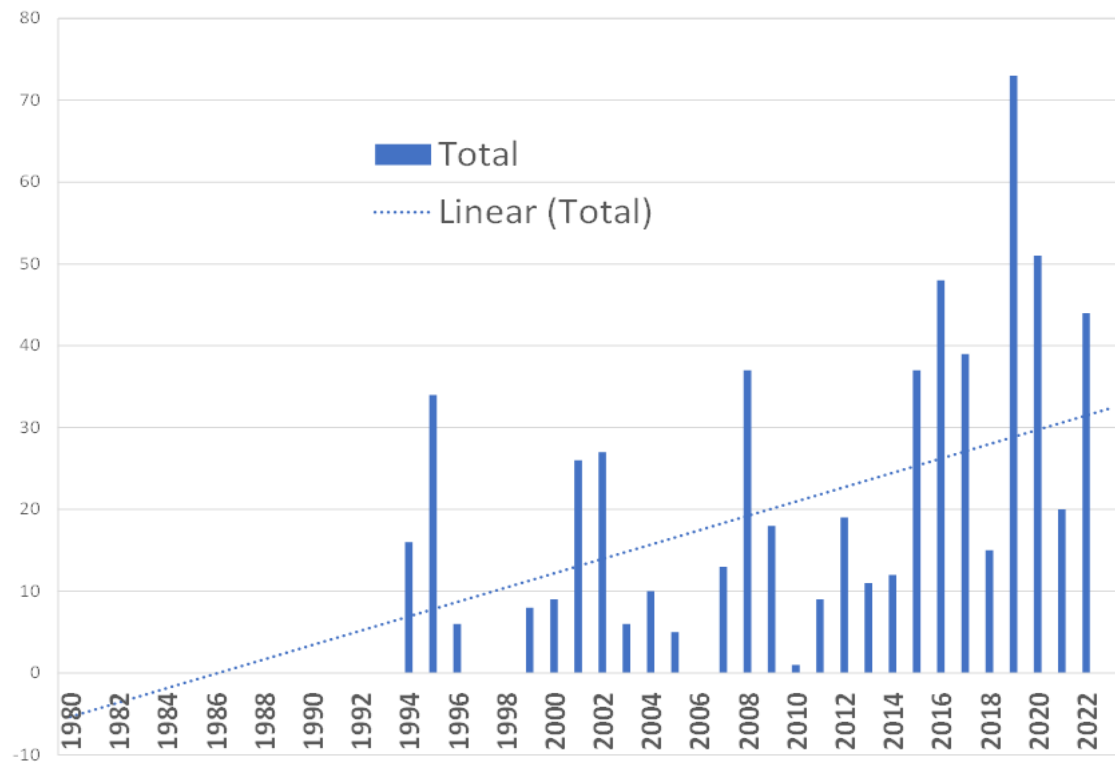
# Flood Protection Responsibility

- Primary
  - **USACE**
  - **SFWMD**
- Secondary
  - Local Governments
  - Special Districts
- Tertiary
  - Homeowners Associations
  - Private Landowners



# Changed Conditions

S28 - Number of Days in a Year where TW > HW



## Coastal Structure Gate Overtop

(Saltwater moving inland, bypassing the top of the gate of the salinity coastal structure)

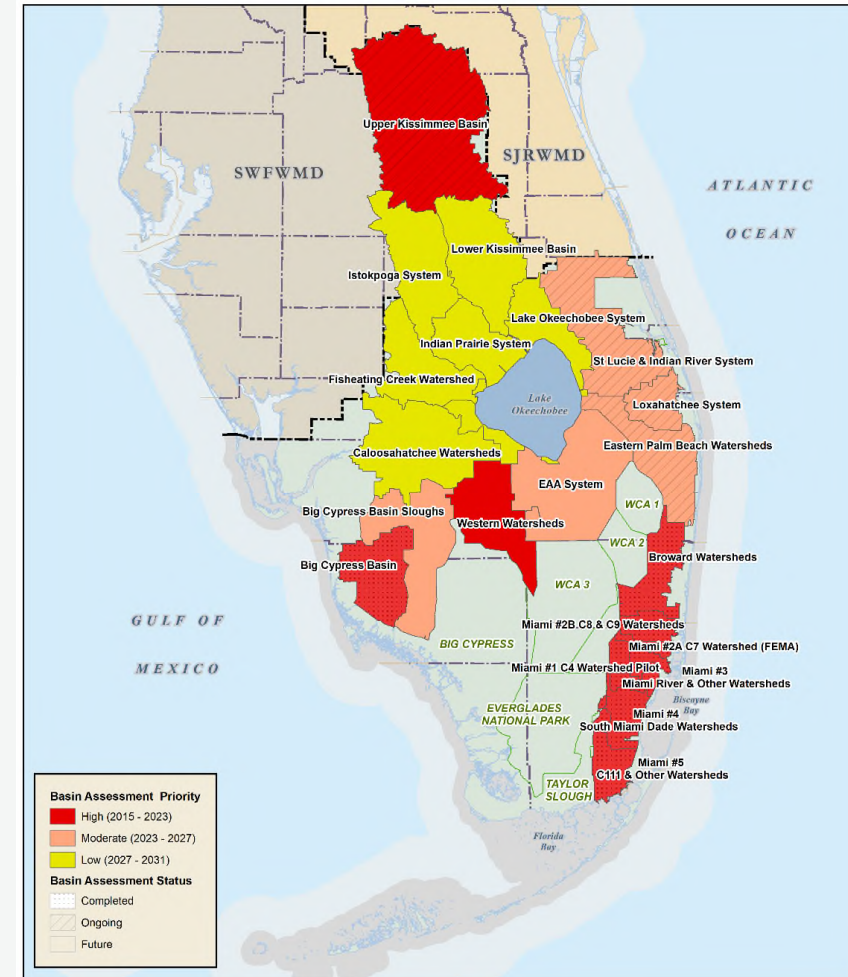
High Tide Season 2019



# Flood Protection Level of Service (FPLoS) Program

SFWMD's strategy for assessing system wide flood protection for current and future conditions, the impacts of land development, sea level rise and changing climate on flood control infrastructure

- Pre-defined performance metrics: canal stages, discharge capacity, overland flood inundation and duration
- Support decision making on prioritizing and sequencing infrastructure investments through various funding opportunities, such as:
  - C&SF Flood Resilience
  - FEMA/FDEM HMGP (pre- and post-storm)
  - FDEP Resilience Florida
  - FL Commerce



# Districtwide Resiliency Projects

FPLOS  
Phase II  
Studies

Project recommendations from advanced modeling studies

- Includes specific project recommendations such as properly sized engineering and nature-based solutions

FPLOS  
Phase I  
Studies

Project recommendations from flood vulnerability assessments

- No-regret strategies (storm surge barriers forward pumps)

Event  
Response

Project recommendations from extreme events

- i.e., Hurricane Ian flooding events in the upper Kissimmee Basin

CIP Projects

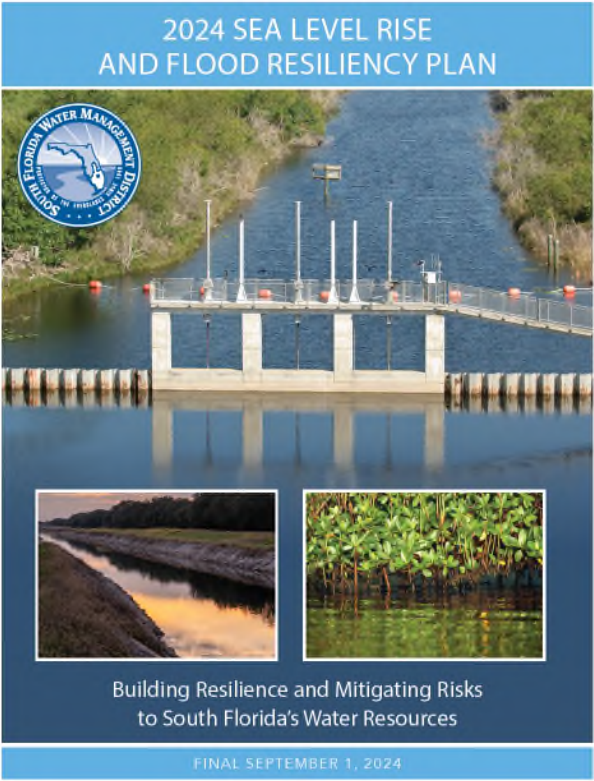
Project recommendations that are based on CIP needs

- Water control infrastructure improvements

Innovative  
Projects

Project recommendations that are new and innovative

- Nature-Based Solutions
- Renewable energy projects
- Sometimes result from grant funding requirements





# Resiliency Plan Public Comments

## Thanks for the comments received as part of public comment period



### 2025 Sea Level Rise and Flood Resiliency Plan Public Workshop Highlights

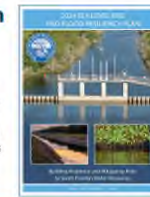
The Sea Level Rise and Resiliency Plan by the South Florida Water Management District (District) is a strategic roadmap to reduce the risks of sea level rise, flooding, extreme storm events and other evolving conditions on South Florida's critical assets, water management operations, water supplies and water resources. The District is also making significant infrastructure adaptation investments that are needed to continue to successfully implement its mission of safeguarding and restoring South Florida's water resources and ecosystems, protecting communities from flooding, and ensuring an adequate water supply for all of South Florida's needs. Working to ensure the region's water resources and ecosystems resiliency, now and in the future, is part of everything the District does.

#### Bringing Stakeholders Together

As part of the 2025 Sea Level Rise and Flood Resiliency Plan Update, the District organized four public workshops. These workshops brought together over 220 stakeholders representing 100 organizations across the region. Meetings were held in four locations: Lower East Coast, Upper East Coast, Southwest Coast, and Kissimmee River Basin.

#### Why We Came Together

These in-person workshops brought together key stakeholders to engage in meaningful discussions, share insights, and provide early feedback on the 2025 Sea Level Rise and Flood Resiliency Plan Update. The workshops served as an opportunity to explore available tools, resources, and information, including the latest Resilient Florida Program updates from the State of Florida, and to ensure the Plan update reflects the diverse needs and priorities of our local communities.



#### Key Outcomes

- As a region, we need to align local and regional flood risk projects and priorities. Regional collaboration is key to our shared success.
- The District shares technical resources to support local governments to design and implement projects. Leveraging already available data, models, and tools will lead to improved results and more effective action.
- South Florida's water management system is complex and has many players that must continue to collaborate closely. Aligning projects through collaboration and data-driven decision-making is essential to reduce costs and implementation time.
- Nature-based solutions should be prioritized where possible for projects at various levels. Using nature for flood risk reduction can provide additional community benefits.

#### Our Commitment to Collaboration

- Our communities recognize the urgent need for action, and we must work together to find the best solutions.
- **Collaboration Increases Effectiveness:** A well-planned combination of structural measures – designed to reduce flood risk regionally without shifting it to neighboring communities – and non-structural measures, such as living with water, elevating structures, and hardening infrastructure, ensures a sustainable and effective approach to flood risk management.
  - **Collaboration Optimizes Solutions:** Effective resource allocation maximizes impact, ensuring that flood risk reduction efforts are strategic, efficient, and aligned with long-term resilience goals.
  - **Collaboration Expands Funding Opportunities:** Coordinated efforts strengthen project positioning for competitive funding, increasing access to critical financial resources for resilience and adaptation initiatives.

#### Shared Goals

- The importance of resilience was underscored, as flooding risks pose significant threats to communities, economies, and ecosystems. Building resilience through collaborative efforts is crucial to:
- Protect property and lives
  - Support economic growth and stability
  - Preserve environmental resources

#### Our State Partners

This collaboration is supported by the Department of Environmental Protection's Resilient Florida Program, the Florida Flood Hub for Applied Research and Innovation and the Statewide Office of Resilience within the Governor's Office. Our community recognizes and appreciates the significant resources available to advance resilience projects across Florida from those programs, along with the Hazard Mitigation Programs at the Florida Department of Emergency Management.

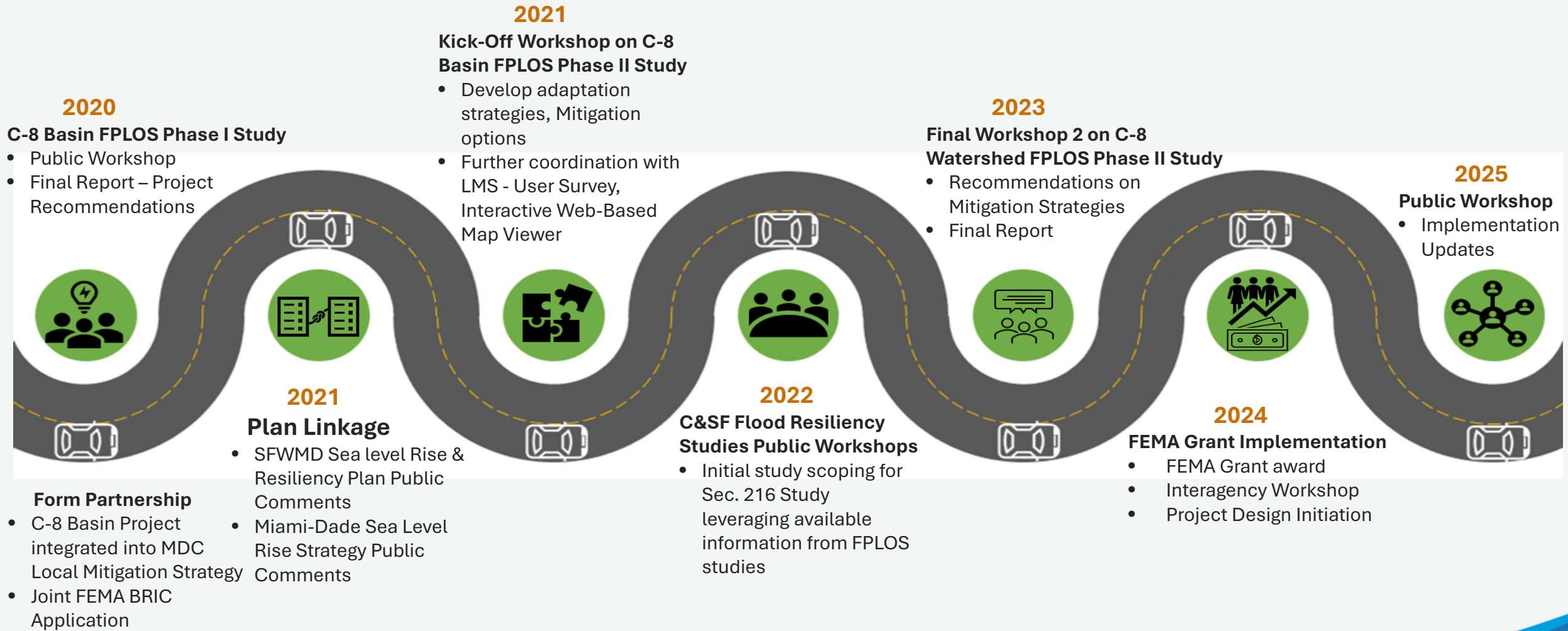


The District's resiliency efforts include advancing scientific data and research to ensure the District's resiliency planning and implementation projects are founded on the best available science and robust technical analyses. These efforts are in collaboration and cooperation with regional, state and federal agencies, local and tribal governments, non-governmental entities, universities, and citizens throughout Central and Southern Florida.

[SFWMD.gov/Resiliency](https://sfwmd.gov/Resiliency)



# Stakeholder Engagement Roadmap





# C-8 Basin – Water Management / Operations

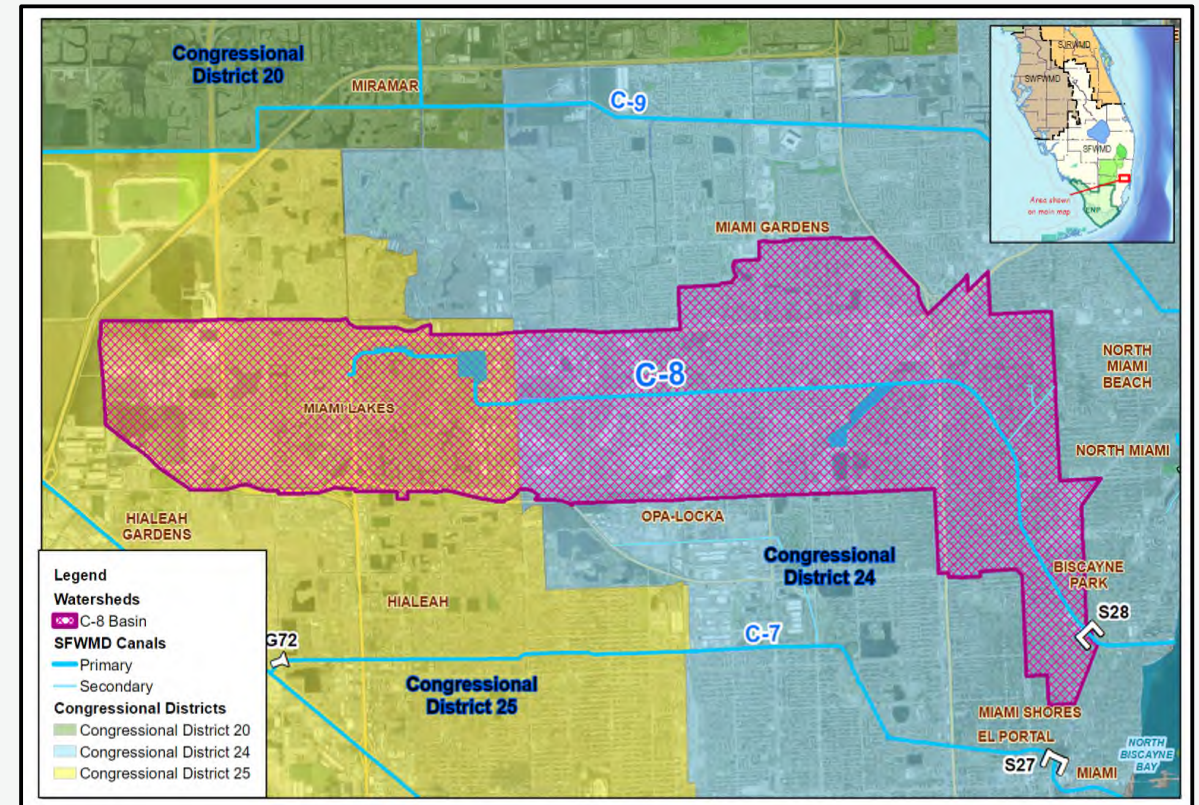
- Primary Flood Control Features:
  - C-8 Canal and S-28 Coastal Structure
  - S-28 conveys floodwaters by gravity to Biscayne Bay
  - Managed by SFWMD
- Secondary Canals:
  - Managed by Miami-Dade County
- Tertiary Flood Control Features:
  - Managed by HOAs, private landowners, local governments



# C-8 Basin Resiliency Project

Basin-wide strategy:

- Reduce flood risks due to rainfall and sea level rise
- Protect water resources and prevent saltwater intrusion
- Existing coastal structure replacement
- Restore original discharge capacity of the coastal structures and add flexibility by adding forward pumps
- Increase the basin's flood protection level of service



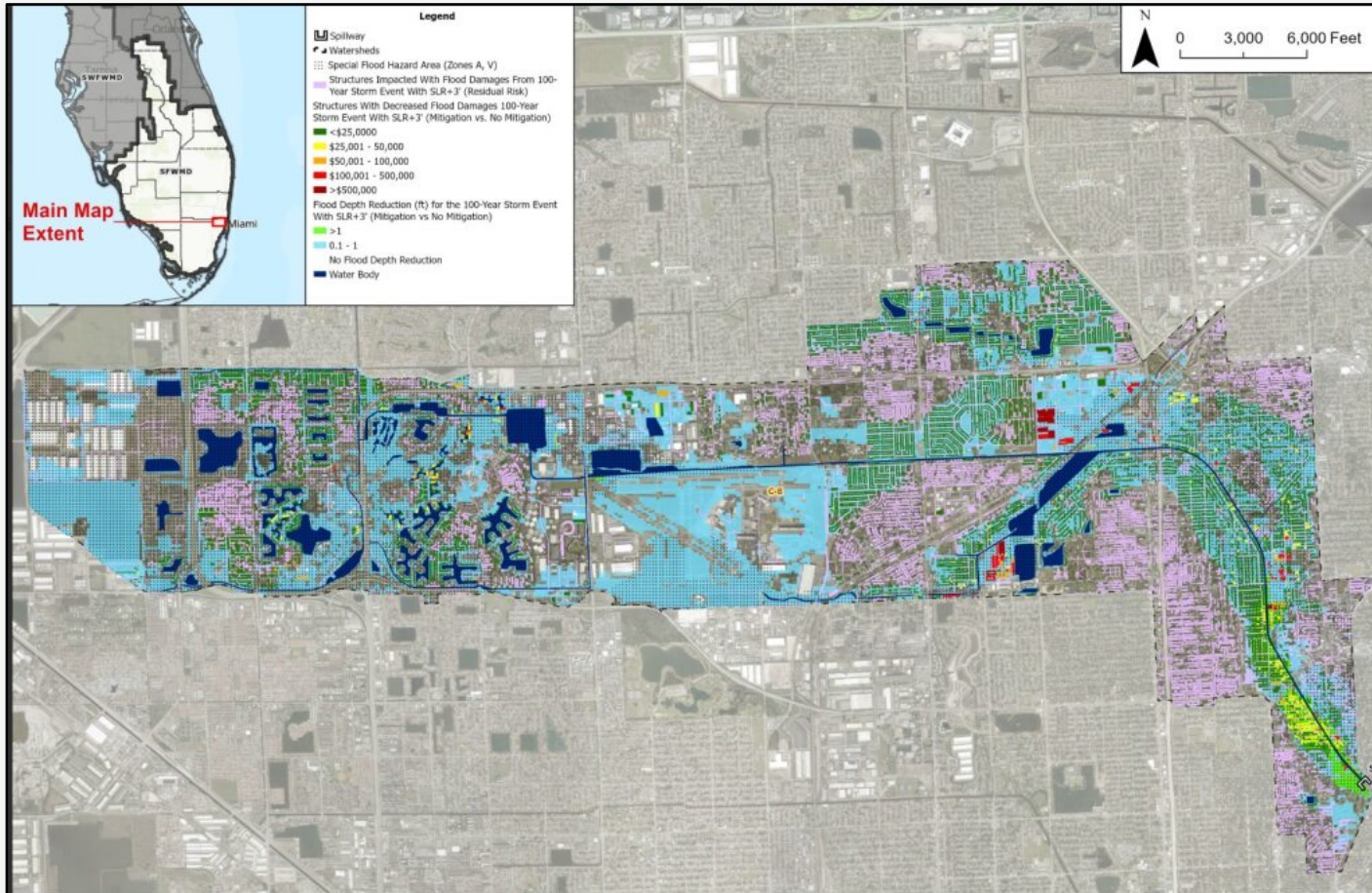


# Project Overview





# Mitigation Effectiveness

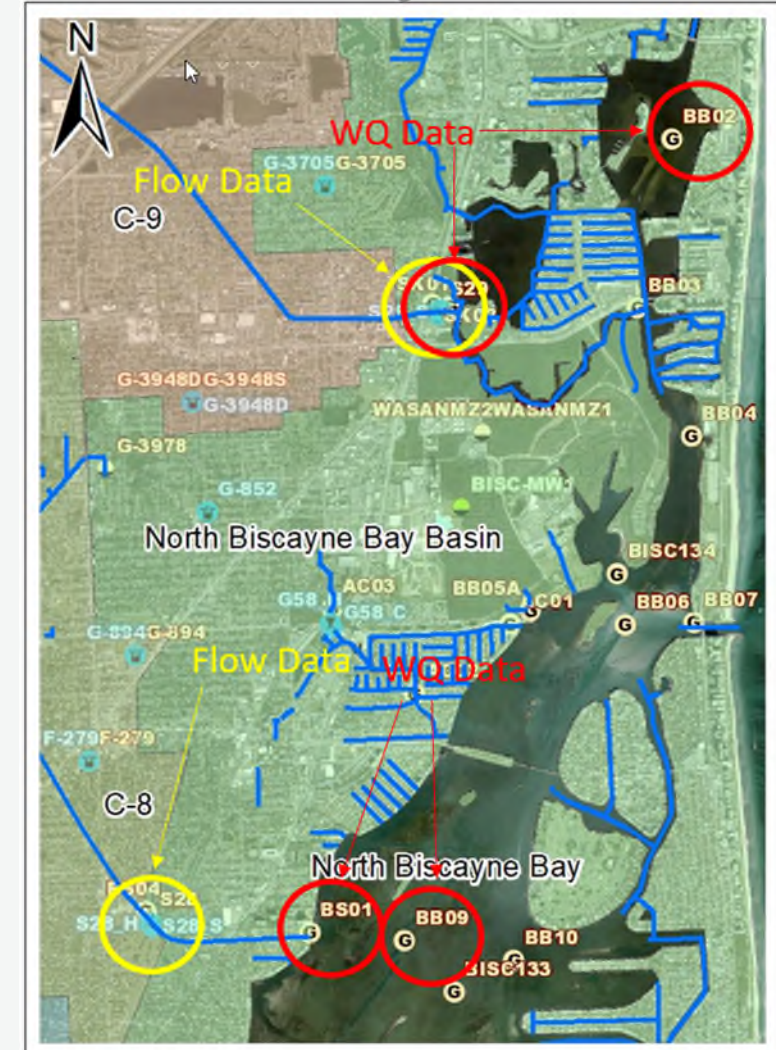


- Provide benefits to 132,000+ residents in 8 Municipalities:
  - Village of Miami Shores
  - Village of Biscayne Park
  - City of Hialeah
  - City of Miami Gardens
  - Town of Miami Lakes
  - City of North Miami
  - City of Opa-Locka
  - City of North Miami Beach
- Greater than 3x return on investment in avoided annual property flood damages



# Water Quality on North Biscayne Bay – FPLOS Study

- Completed evaluation of potential impacts on water quality to North Biscayne Bay from proposed mitigation projects
- No additional water quality impacts compared to existing conditions for proposed mitigation strategies; no increase in total discharges
- SFWMD Collaborating with MDC on WQ: Reasonable Assurance Plan, Biscayne Bay Commissions, Innovative Tech Project



# S-28 Structure Replacements

- Demolition of ~70-year-old existing structure
- More robust, corrosion resistant coastal structure with elevated gates
- Both structure and pump station controls elevated above damaging flood levels
- Storm surge protection
- Lower risk, longer structure lifespan
- Tying S-28 structure to higher ground elevations





# S-28N Forward Pump Station

- New Forward Pump Station
  - Supplement S-28 Structure by restoring design discharge capacity
  - Sub-Components
    - 3 - 500 CFS Electric Pumps
    - Generator Back up Power
    - Debris Collection System (reduces pollution to Biscayne Bay)

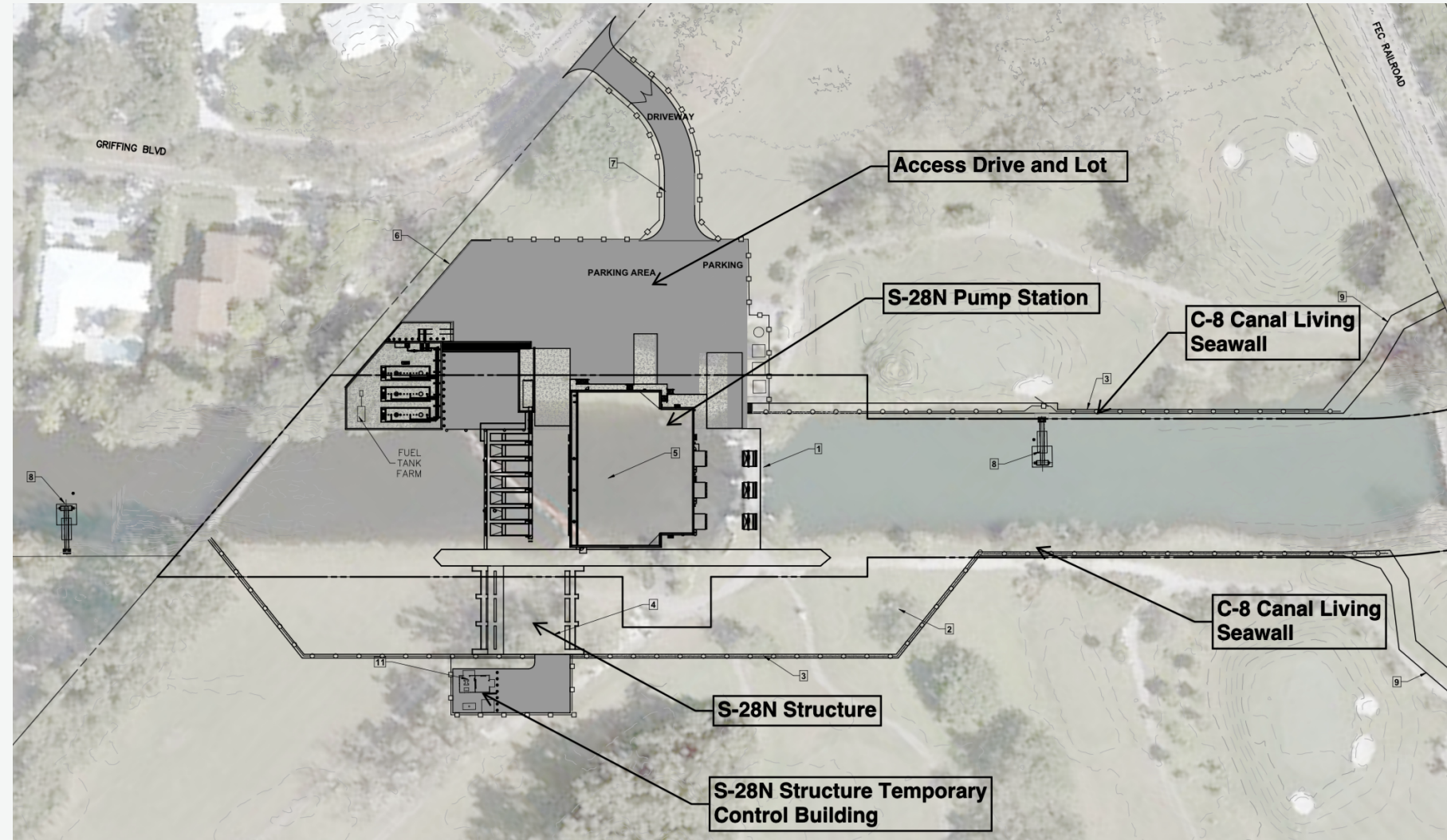


**Existing Pump Station & Structure  
near Miami Airport**

# Proposed Site

## Design Considerations:

- Limiting impacts to the Miami Shores Golf Course
- Minimize Pump Station Building footprint and height to the maximum extent possible.
- Increases flood protection with tie-back
- Separation of the Golf Course and PS for public safety, operation and added security







## 3-Dimensional Rendering – Looking South





## 3-Dimensional Rendering – Looking North



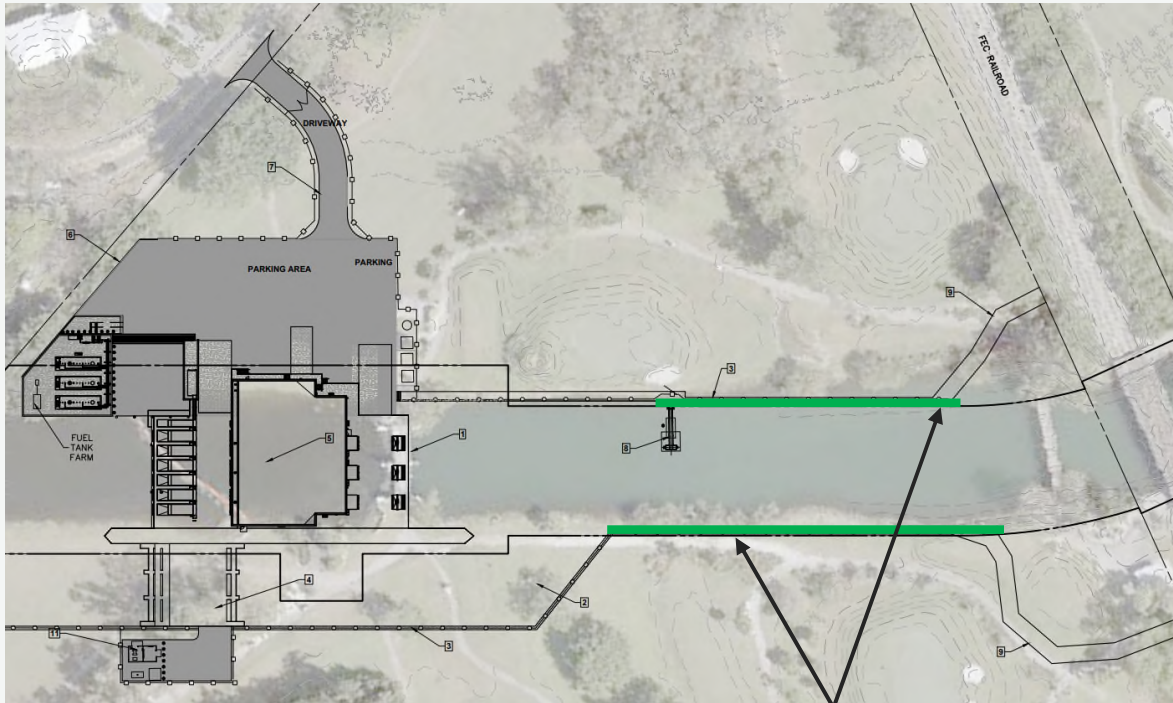


## 3-Dimensional Rendering – Looking Downstream



# Living Seawalls in C-8 Canal Downstream of the Pump Station

## Sample Project in Miami



**Approximate Limits of  
Living Seawalls**



**Sample Marine  
Growth on Seawall**





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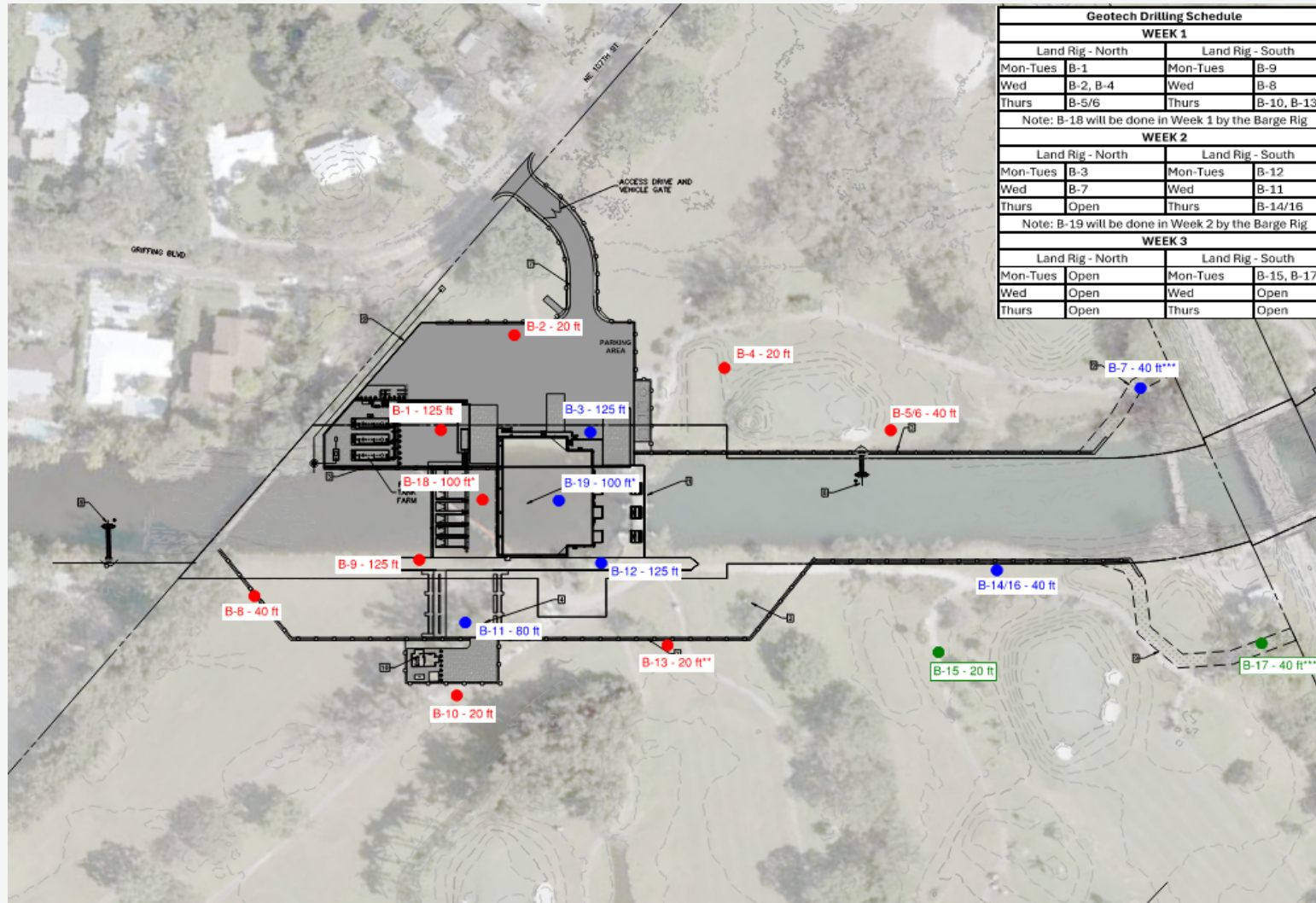
# Upcoming Geotechnical & Field Investigation Plan

Logan Whitehouse

Senior Civil Water Resources Engineer,  
HDR Inc.



# Geotechnical Investigation Plan



Geotech Drilling Schedule			
WEEK 1			
Land Rig - North		Land Rig - South	
Mon-Tues	B-1	Mon-Tues	B-9
Wed	B-2, B-4	Wed	B-8
Thurs	B-5/6	Thurs	B-10, B-13
Note: B-18 will be done in Week 1 by the Barge Rig			
WEEK 2			
Land Rig - North		Land Rig - South	
Mon-Tues	B-3	Mon-Tues	B-12
Wed	B-7	Wed	B-11
Thurs	Open	Thurs	B-14/16
Note: B-19 will be done in Week 2 by the Barge Rig			
WEEK 3			
Land Rig - North		Land Rig - South	
Mon-Tues	Open	Mon-Tues	B-15, B-17
Wed	Open	Wed	Open
Thurs	Open	Thurs	Open



# Geotechnical Investigation Plan



# Geotechnical Investigation Plan

- **Schedule**

- Beginning August 18, golf course to be closed Monday-Thursday for 2 consecutive weeks to allow access for site testing
- Week 3, golf course will not be closed and work is to occur while play is ongoing

- **Equipment**

- 2 land-based drill rigs (15 land bores)
- 1 barge-mounted drill rig (2 water bores)

Geotech Drilling Schedule			
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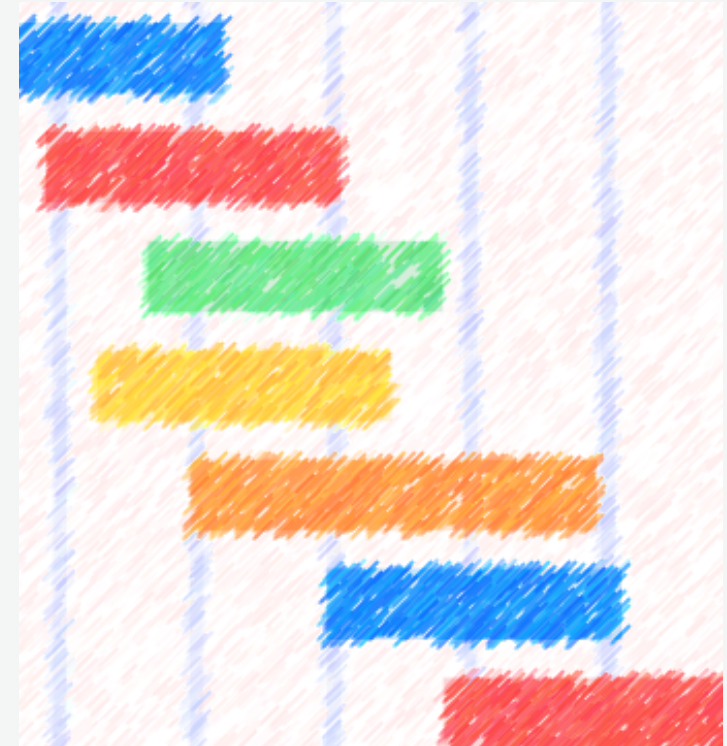


# Geotechnical Investigation Plan - Equipment



# Project Status Updates

- Topographic Survey – Complete
- Geotechnical Investigation - 8/18 start
- Design – Ongoing
- Refinement of Basin-wide H&H Models – Complete
- CFD Modeling & Physical Modeling - Ongoing







05

# C-8 Basin Resiliency: Secondary Canal Bank Enhancements

Christian Kamrath, CFM

Resilience Program Manager, Office of Environmental Risk &  
Resilience, Miami-Dade County





# ADDRESSING SEA LEVEL RISE + FLOOD RISKS

## ADAPTATION ACTION AREAS + U.S. ARMY CORPS BACK BAY STUDY

### Miami-Dade County Office of Environmental Risk and Resilience

Loren Parra, Chief Resilience Officer

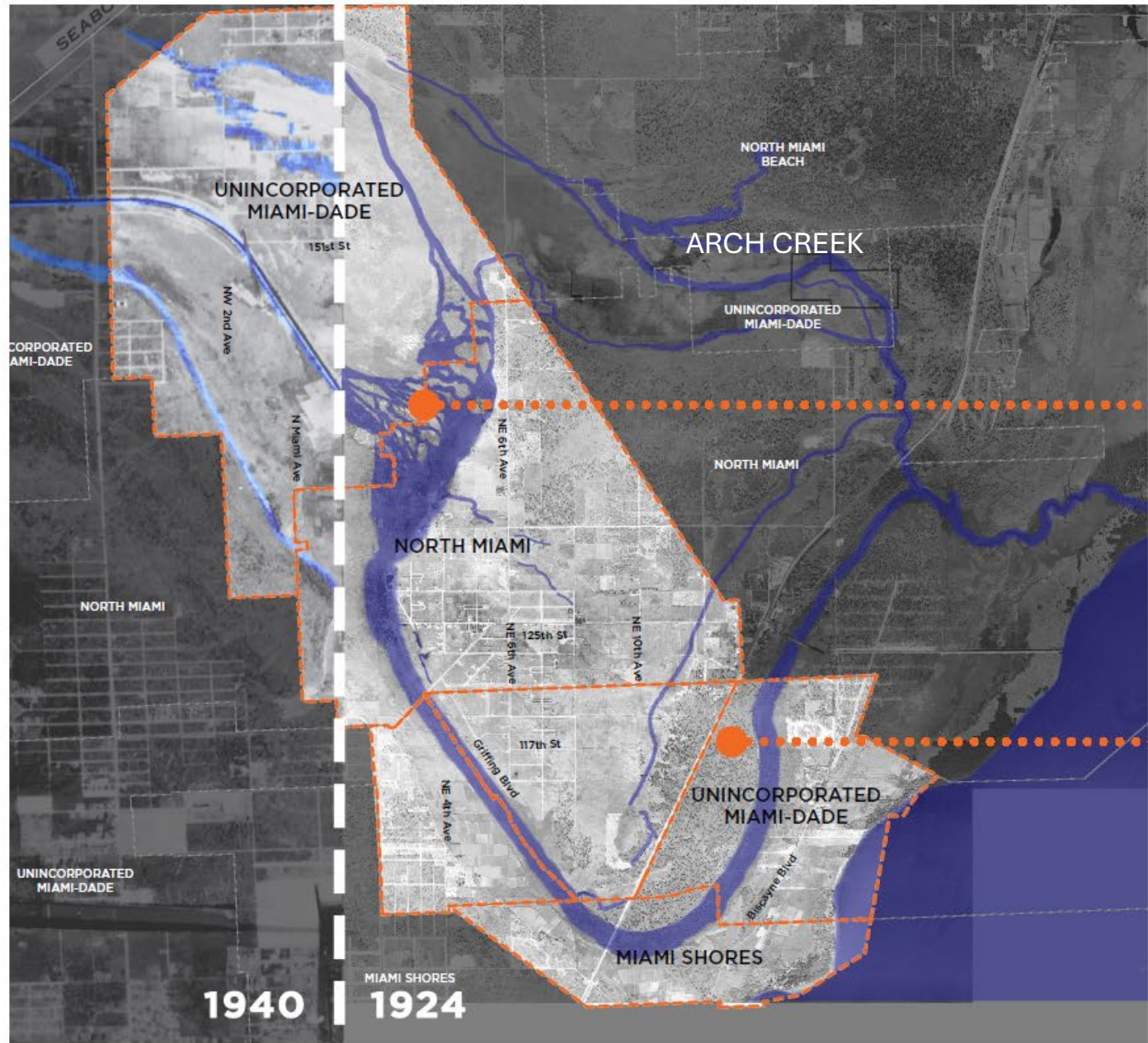
Christian Kamrath, Resiliency Program Manager

Robert Colón, Resiliency Coordinator





# BISCAYNE CANAL 1924 AERIAL IMAGE



LOW GROUND: HISTORIC WET PRAIRIE



HIGH GROUND: HISTORIC PINE ROCKLAND









# MIAMI-DADE COUNTY **BACK BAY** COASTAL STORM RISK MANAGEMENT FEASIBILITY STUDY



## Background + Update

Christian Kamrath, Miami-Dade County

# Regional Integration

## Strengthening Systems Through U.S. Army Corps Studies



Everglades  
(CERP & BBSEER)

'Back Bay' CSRM Study

Central and Southern Florida (C&SF) '216' Resiliency Study  
*emphasis on canal system & salinity control structures*

'Beach' CSRM Reauthorized  
in 2022  
*renourishment & dune enhancement*

Miami Harbor  
Navigation  
Improvement

Key Biscayne  
CSRM  
*Combined ocean front  
& back bay study*



PARKS & CONSERVATION LANDS



AGRICULTURE



WESTERN & SOUTHERN SUBURBS



SLOUGHS



THE RIDGE



MAINLAND BAYFRONT



ISLAND BAYFRONT



ISLAND OCEANFRONT



OFFSHORE



Mainland

Islands

<u>Other Efforts:</u>	SFWMD Level of Service (LOS)	County & Municipal Resilience, Stormwater Master Plans, etc.	Biscayne Bay Reasonable Assurance Plan
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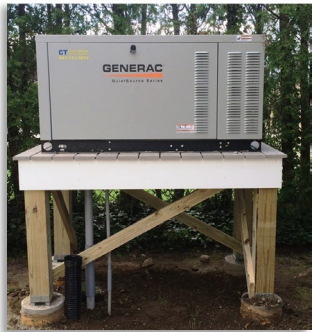


# WHAT IS THE BACK BAY STUDY?



## OPPORTUNITY:

Explore different ways to manage risk in vulnerable communities from hurricane **coastal storm surge flooding + waves** at different scales such as ...



### Adapt Individual Buildings (Non-Structural)

To reduce impacts during a flood...

- Floodproof critical infrastructure assets
- Floodproofing commercial buildings
- Elevating residential buildings



### Nature-Based Solutions

To help reduce impacts during a flood & support environment + economy year-round...

- Coral/hybrid reefs
- Dune reinforcement
- Living shorelines
- Mangrove/wetland restoration
- Human-made island enhancements

Long Term ... ???

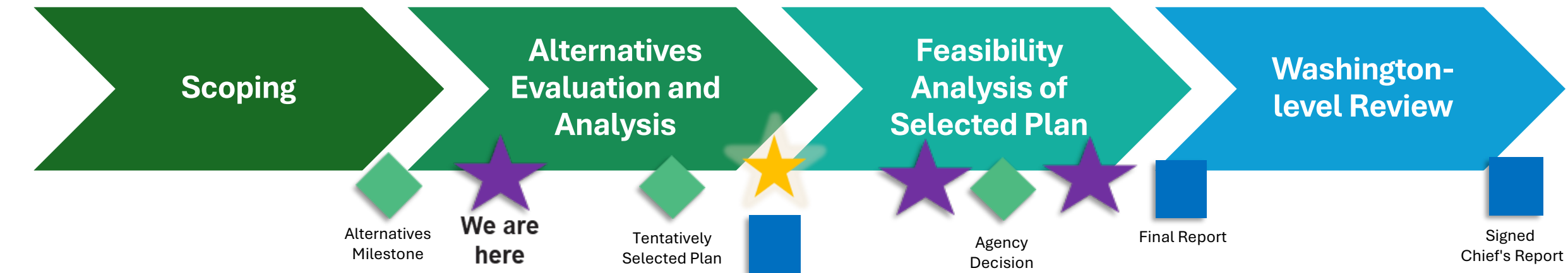


### Structural Measures

To control and keep water out...

- Elevated berm or levee
- System of flood gates and walls

# THE FEASIBILITY STUDY PROCESS



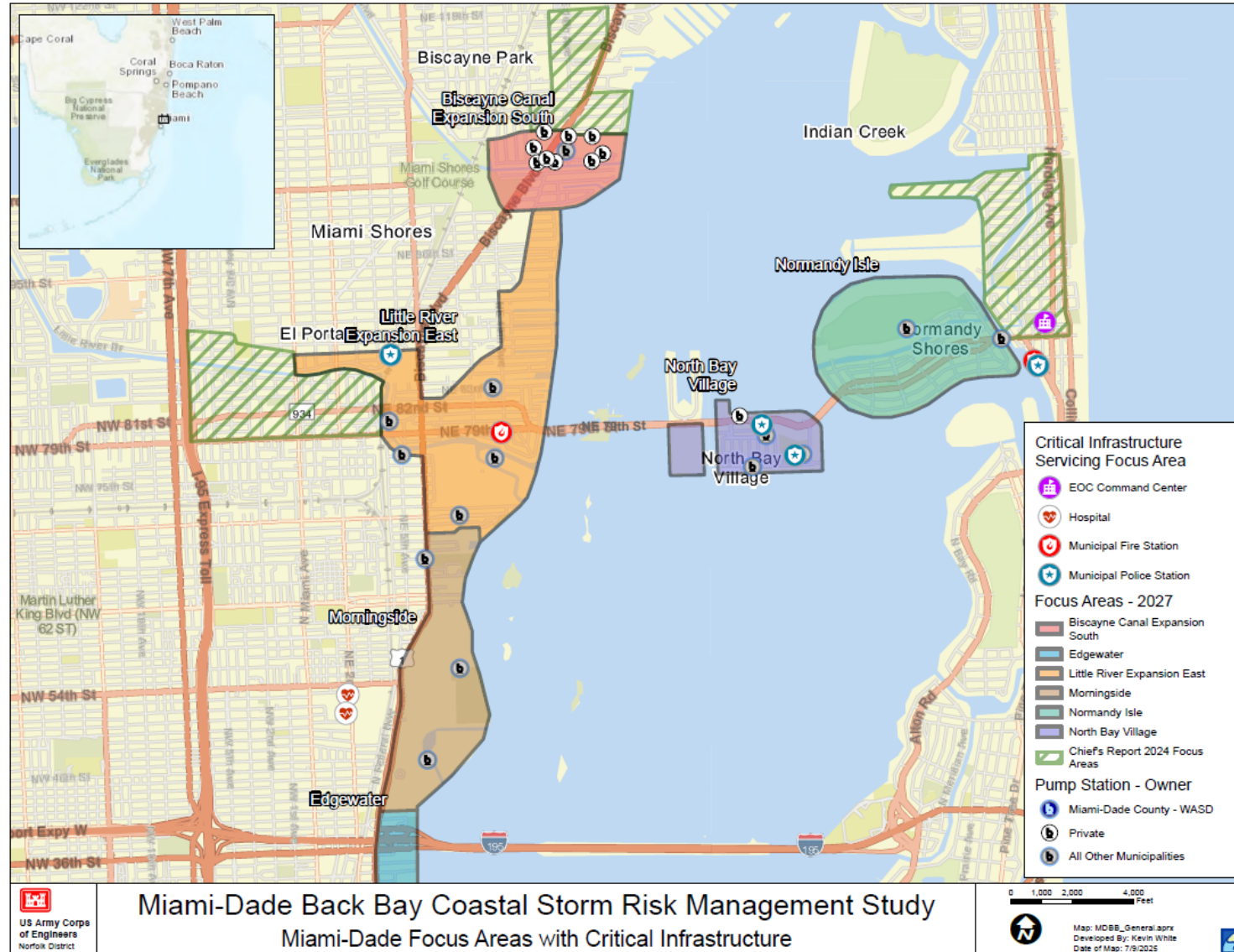
Milestone	Tentative Date
Continuing Study Kick-off	Aug. 2024
Virtual Webinar	Oct. 28, 2024
In-person Public Scoping Meeting	Nov. 13, 2024
Alternatives Milestone Meeting	Jan. 17, 2025
USACE Site Visits + Public Meetings	July 21-28, 2025
<b>Tentatively Selected Plan Meeting</b>	<b>Feb. 26, 2026</b>
Public Release of Draft Report	April 22, 2026
Command Validation Milestone Meeting	Aug. 20, 2026
Final Report Submittal	Apr. 3, 2027
Signed Chief's Report	Aug. 2, 2027

**Key**

- Decision Milestone**
- Product Milestone**
- Opportunities for NEPA Public Input**
- Opportunities for Informal Public Engagement**



# IDENTIFYING NEW FOCUS AREAS – NORTH MIAMI-DADE



## 2024 Focus Area:

- Biscayne Shores (Unincorporated MDC)

## New Focus Areas:

- Biscayne Canal Expansion South
- Little River Expansion East
- Morningside
- Normandy Isle
- North Bay Village



# Back Bay Study Next Steps

- **Virtual Information Session for Municipalities**
  - TBD: Likely September 2025
- **Public Release of Draft Report**
  - Anticipated April 2026 for formal comment period

For additional inquiries and questions, please email:

- USACE: [MDBB-CSRStudy@usace.army.mil](mailto:MDBB-CSRStudy@usace.army.mil) or
- MDC: [resilience@miamidade.gov](mailto:resilience@miamidade.gov)

To view all past meeting presentations, recordings, and study materials, please visit the USACE Website:

<https://www.saj.usace.army.mil/MiamiDadeBackBayCSRFeasibilityStudy>



**Your continued support and collaboration is critical**

Miami-Dade County  
Office of Environmental Risk and Resilience  
<https://miamidade.gov/resilience>





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Q&A





07

# Closing Remarks

Carolina Maran, Ph.D., P.E.,

Division Director, Flood Control & Water Supply Planning

Chief of District Resiliency

SFWMD





# Next Steps

Starting Next Week:

- Geotechnical Investigation and Sampling

Future Actions:

- Complete Design
- Additional Public Consultations
- Initiate Construction – mid to late 2026
- Coordinate construction sequencing with Village of Miami Shores golf course renovation



# Final Considerations and Coordination with Key Project Partners

- Ongoing Coordination with Village of Miami Shores
  - Golf Course re-design input and timeline
  - Align schedules and project implementation
- Additional Public Input as project phases are being advanced
- Ongoing Coordination with Miami-Dade County, including Coastal Studies







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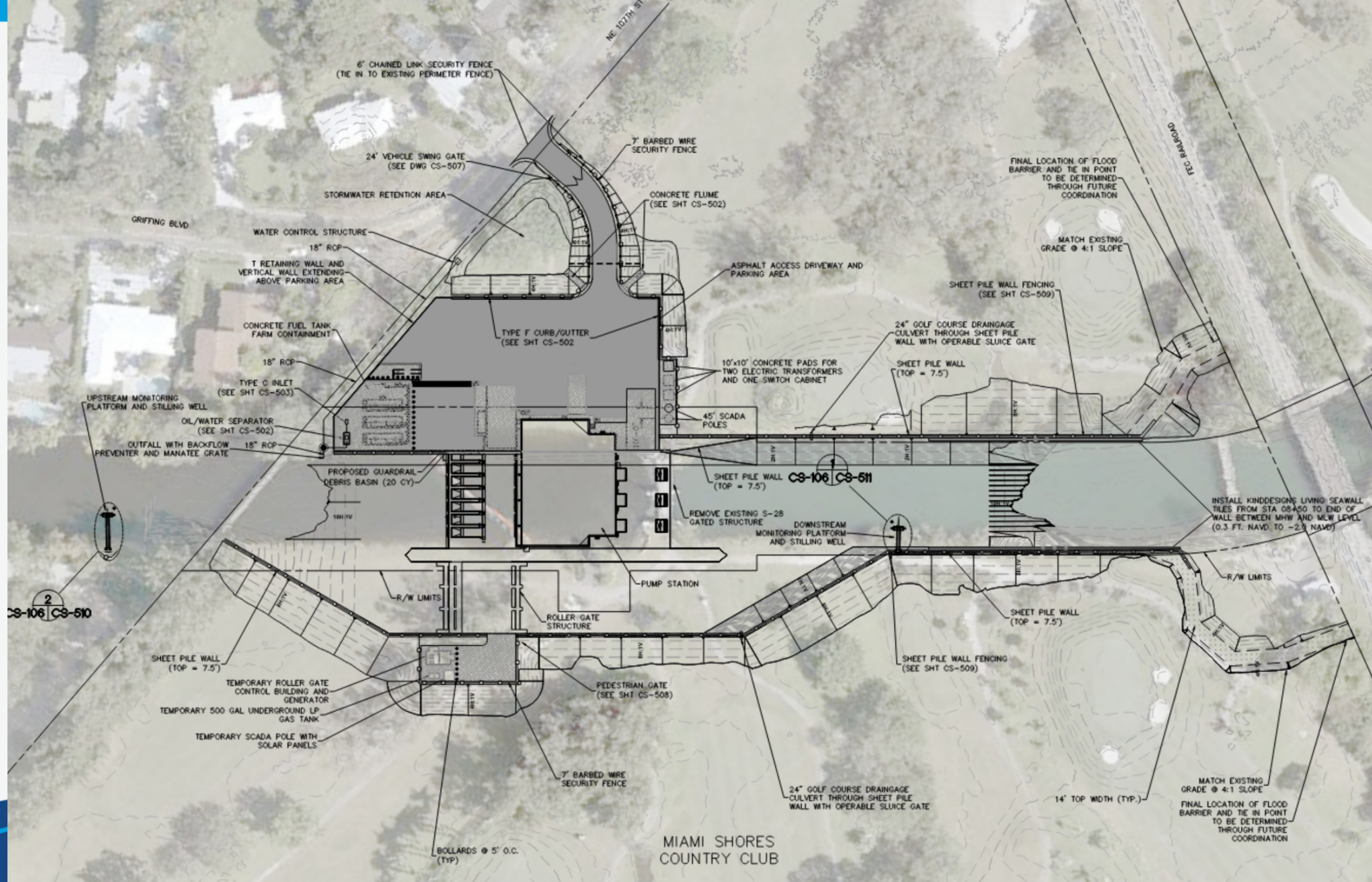
# Adjourn

Contact Us: [resiliency@sfwmd.gov](mailto:resiliency@sfwmd.gov)

# Thank you for your participation!









# Construction Sequencing/Schedule

Item	Start Date	End Date
Notice to Proceed / Mobilization	Spring 2026	Summer 2026
Gated Structure	Summer 2026	Spring 2028
Pump Station	Spring 2028	Summer 2031
Close-Out	Summer 2031	Winter 2031

# Project Permitting & Status

- Environmental Permit Applications Submitted for:
  - FDEP Individual Permit
  - USACE Section 404 Permit
- Addressing through Permitting Process:
  - Cultural Resources Assessment
  - Wetland/Other Surface Water Assessment
  - Comprehensive Species and Habitat Evaluation
- Any conditions for compliance shall be included in the final design plans, narrative and project implementation actions.



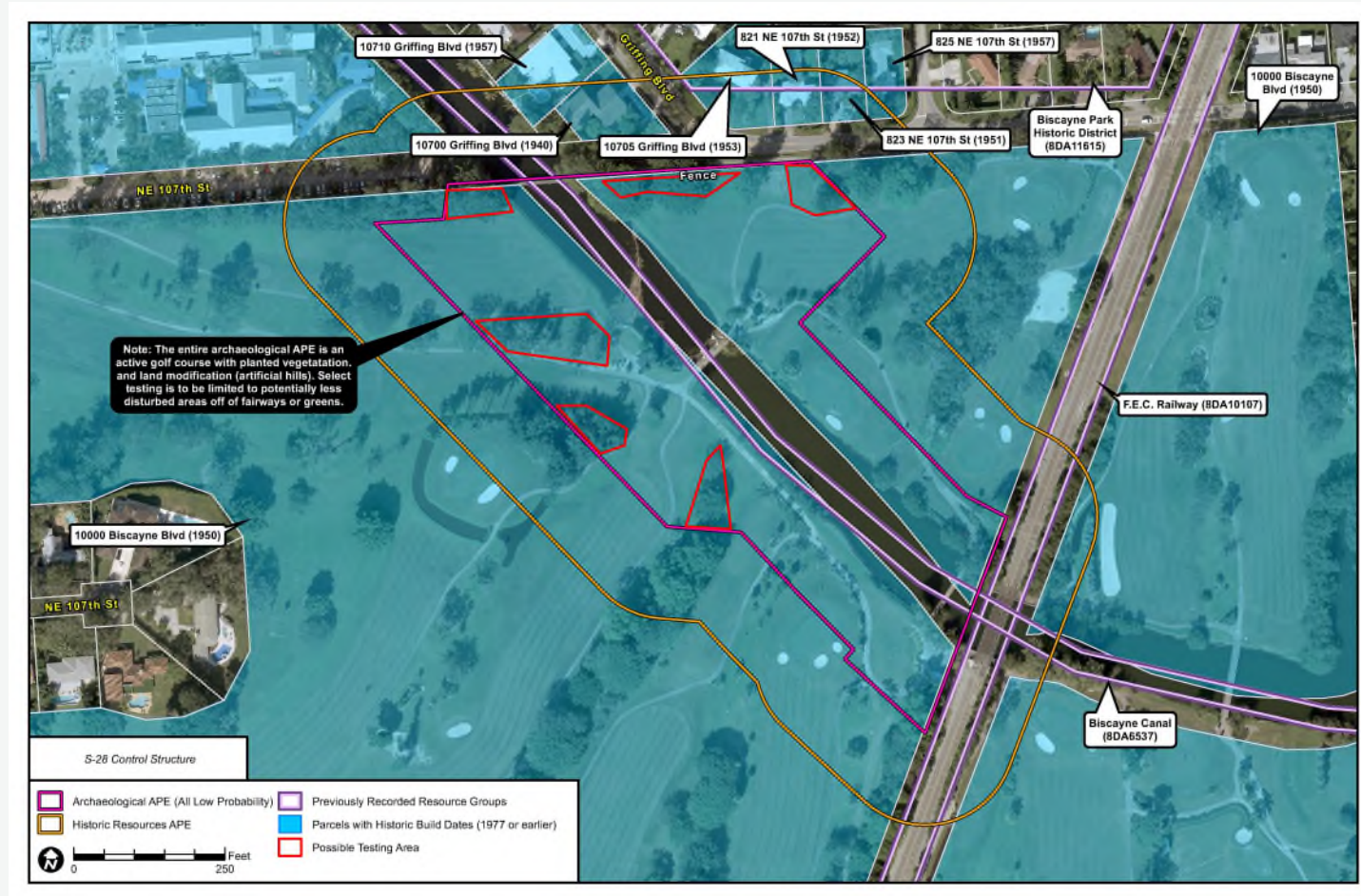
US Army Corps  
of Engineers®  
Jacksonville District





# Cultural Resources Survey Field Work Plan

- Historic Golf Course – access needed to at least portions of the golf course to document with photos.
- Required for Sec. 404 Permit Compliance by National Historical Preservation Act
- **Red Polygons:** Excavate at least a couple of judgmental shovel tests in less disturbed portions of the golf course that were not bulldozed when the golf course was built
- **Blue Shaded Area:** Need to be documented with a Florida Master Site File (FMSF) form
- Labels with FMSF Number: previously recorded historic properties and will need to be re-recorded during the survey
- Coinciding with boring locations





# Environmental Sampling Plan

- Less Intrusive than the geotechnical sampling
- To be conducted in the immediate vicinity of four of the geotechnical borings during the same period
- Samples to be collected in accordance with FDEP SOPs using a stainless-steel hand augur.
- The samples will be analyzed for EPA required parameters

