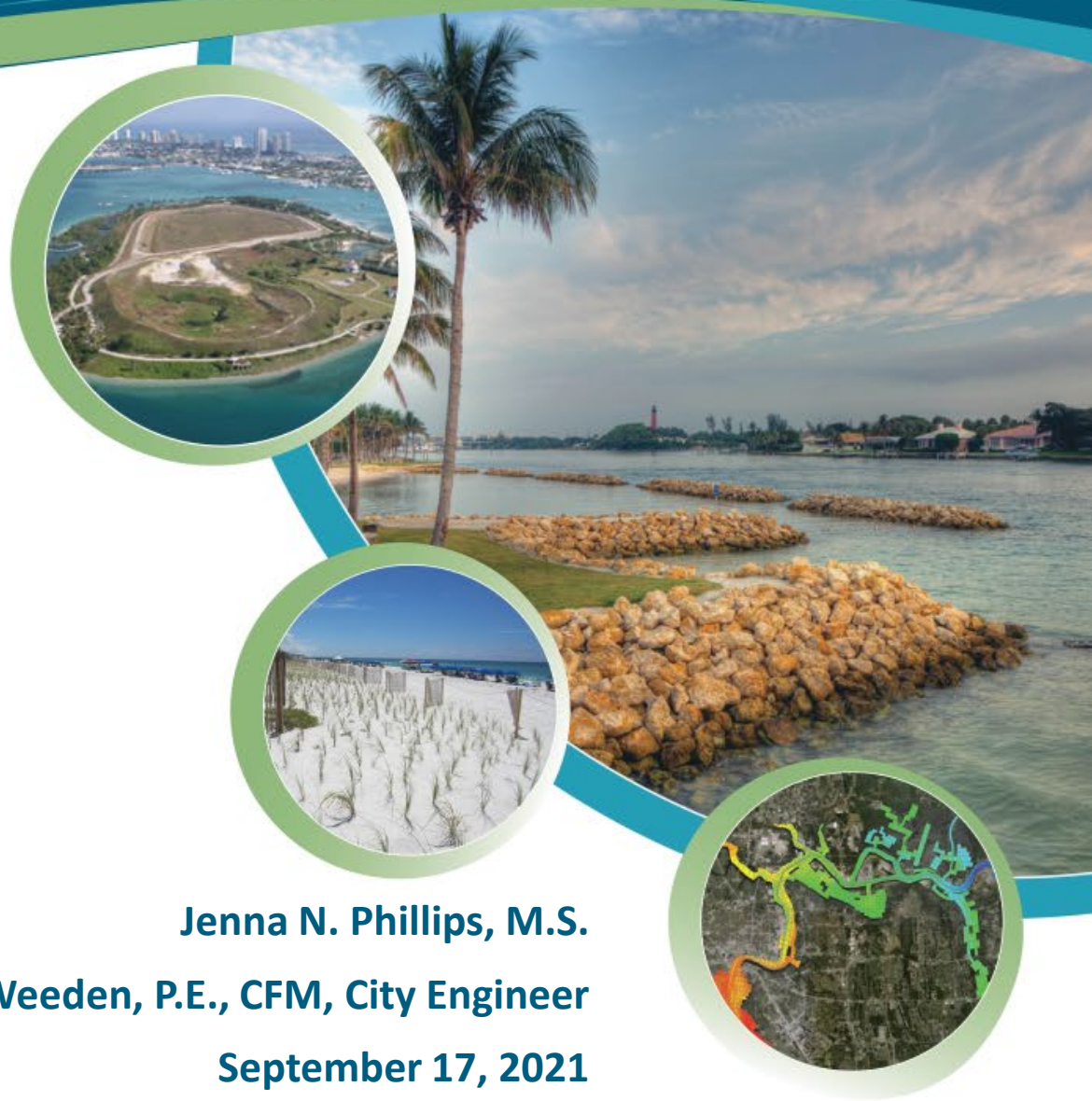
TAYLOR ENGINEERING, INC.

A More Resilient Venice

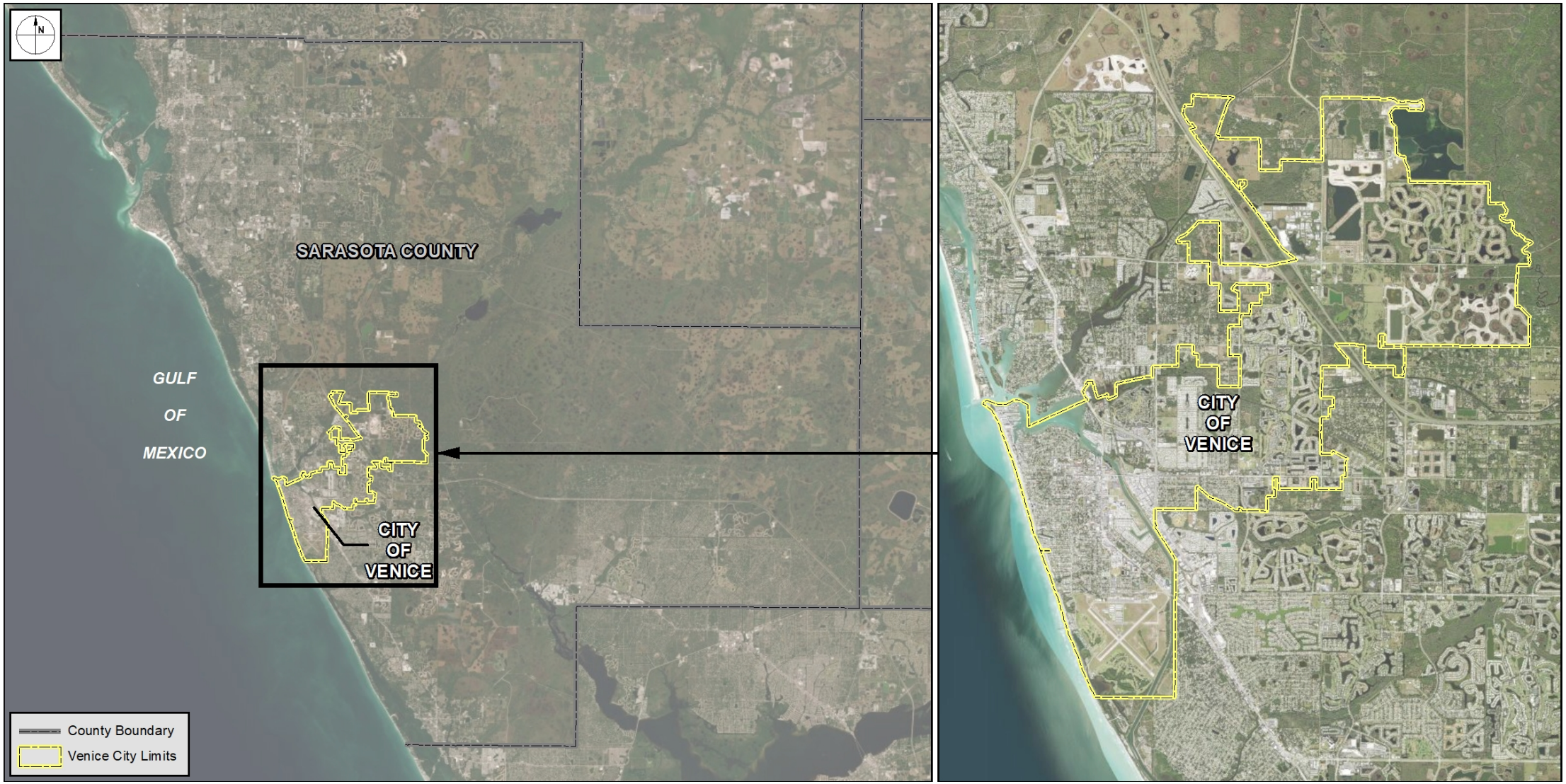


Jenna N. Phillips, M.S.

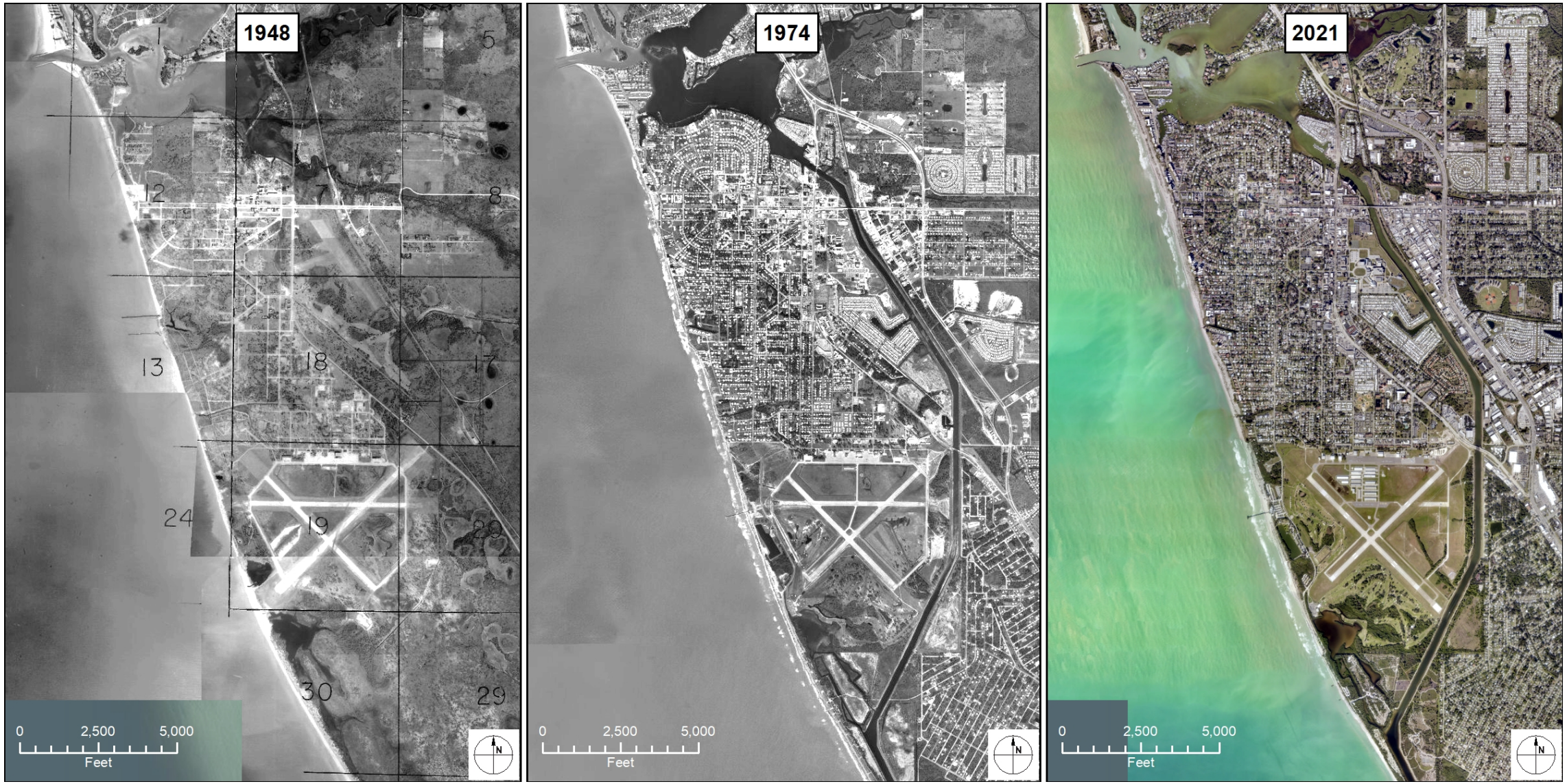
Kathleen Weeden, P.E., CFM, City Engineer

September 17, 2021

Overview & Location



History of Venice



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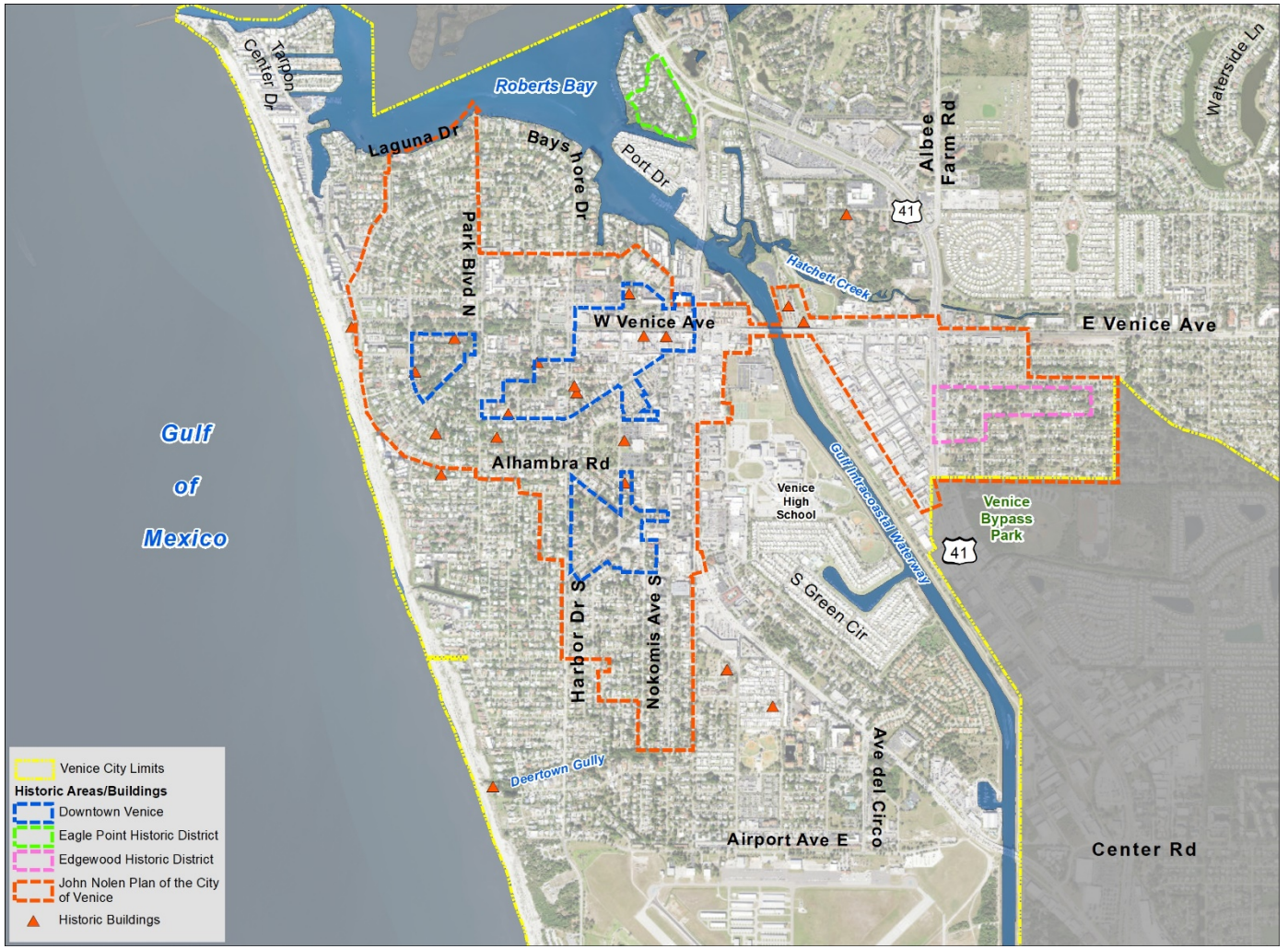
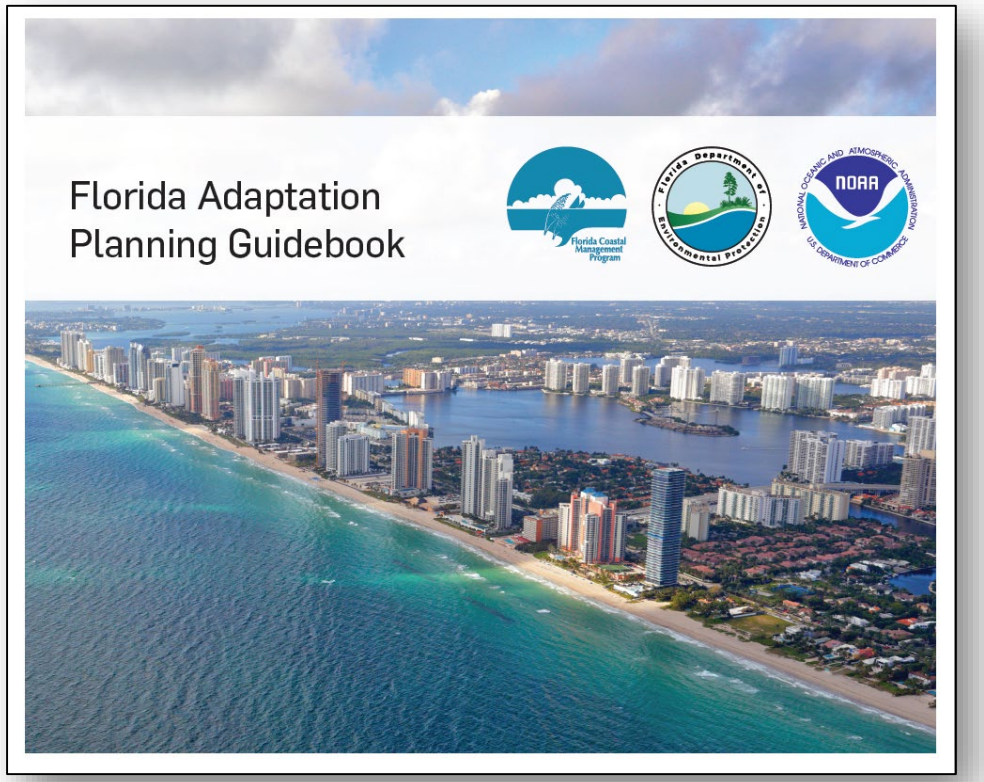


Project Background

- Study funded by FL Resilient Coastlines Program (FRCP) Grant
  - Grant for Resilience Planning
  - FRCP is within FL Dept of Environmental Protection
- Work accomplished:
  - Background Review & Data Identification
  - Vulnerability Assessment for City Infrastructure
  - Adaptation and Resilience Strategies
  - Community Outreach and Stakeholder Engagement
  - Final Resilience Plan Report

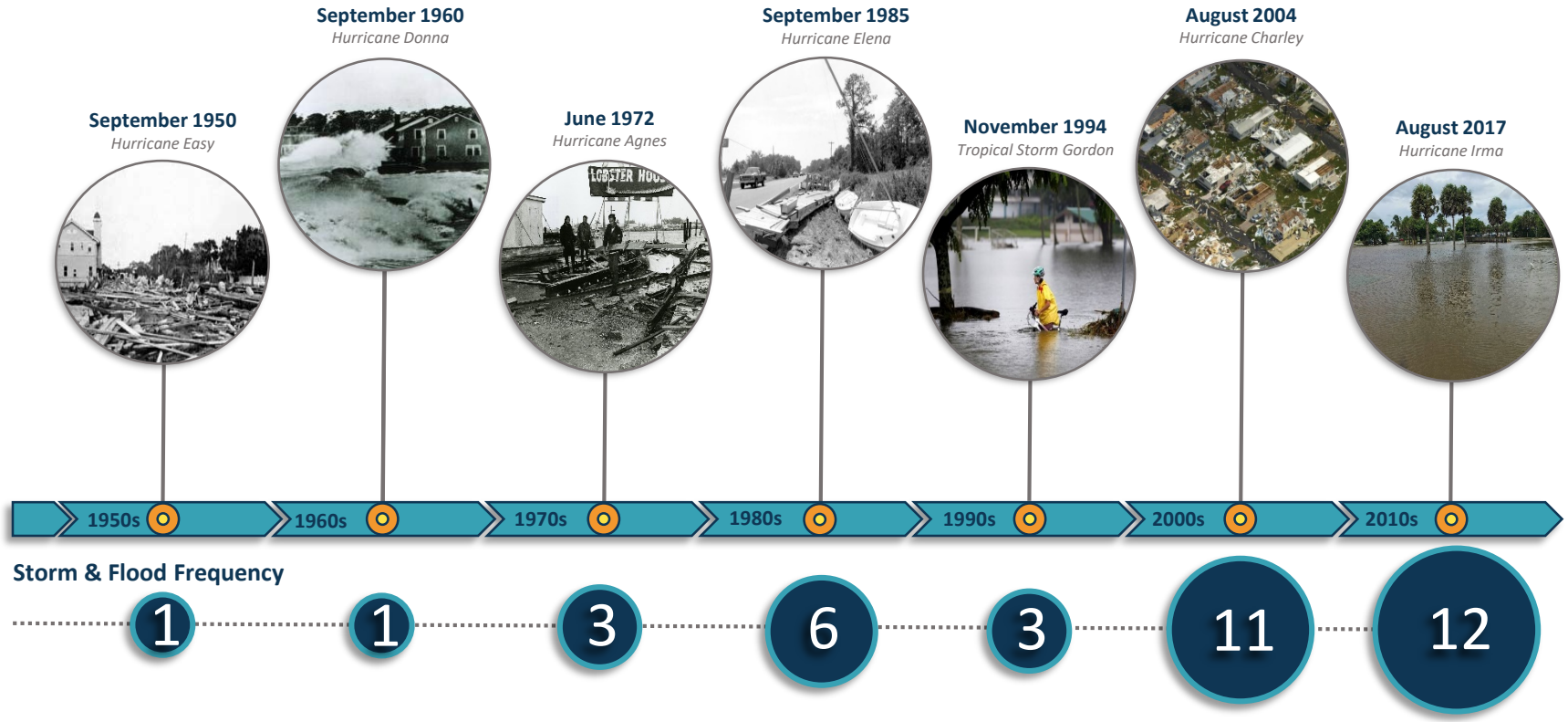
Source: floridadep.gov/ResilientCoastlines

FRCP Planning Guidance



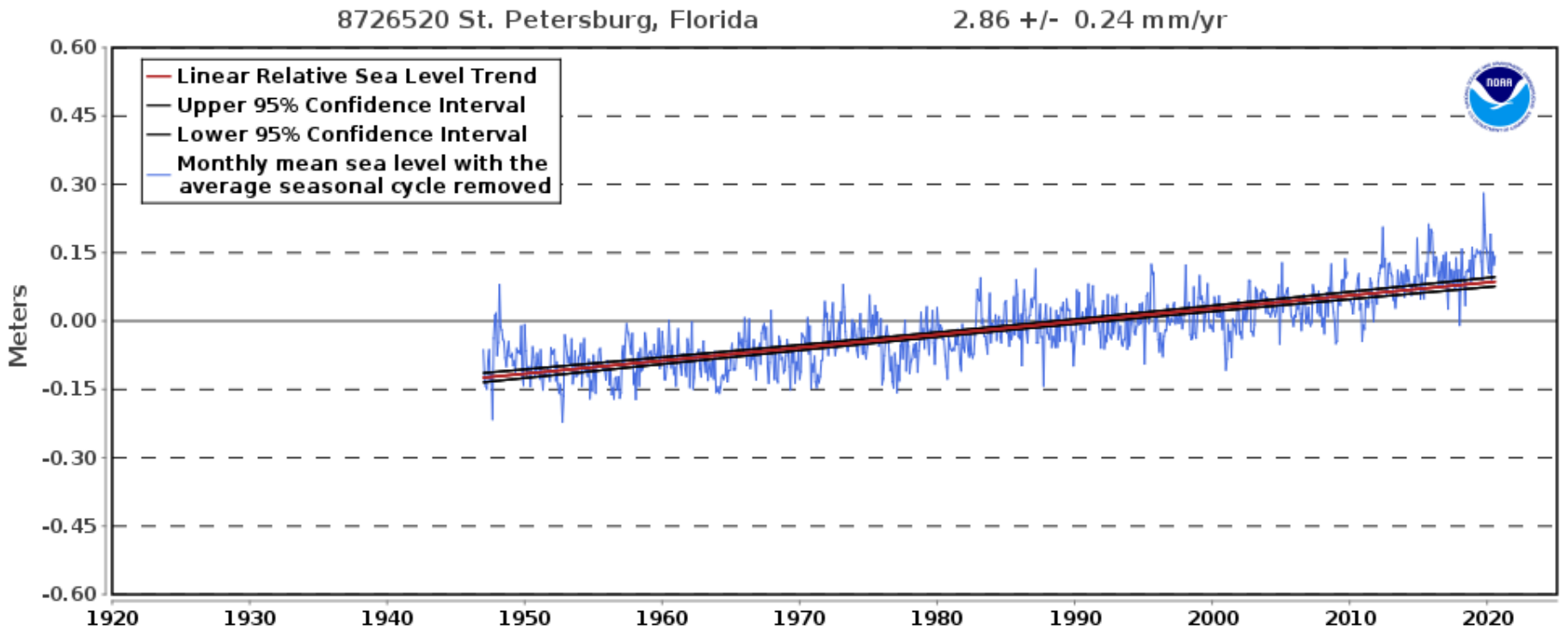
Source: floridadep.gov/rcp/florida-resilient-coastlines-program

Historical Storm Trends



History of Storm & Flood Events Impacting the City of Venice

Sea Level Trend

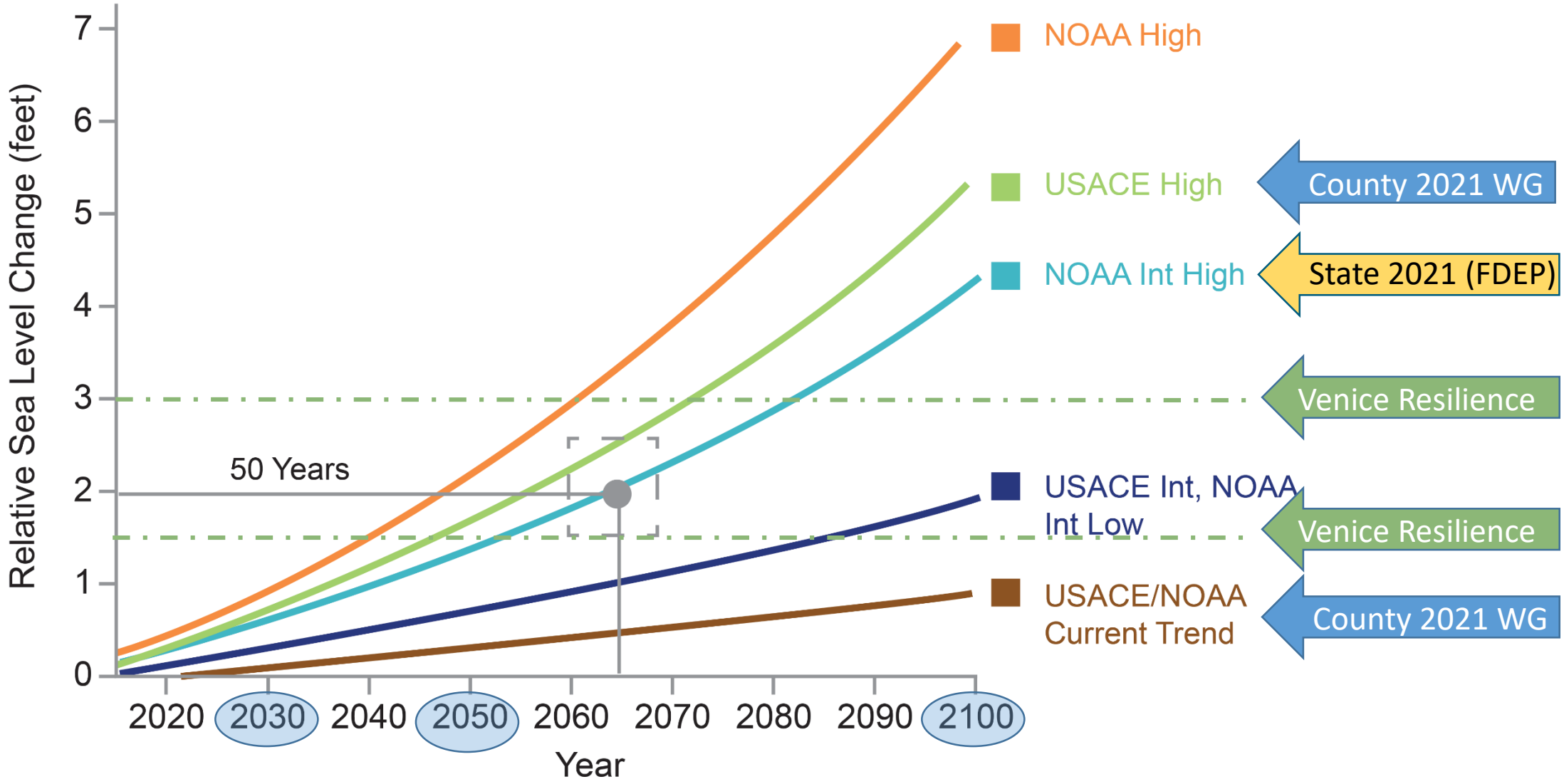


- Data at the St Petersburg NOAA Tide Gauge has been collected continuously since 1947
- This historic data shows a trend of about ~1 ft of rise over 100 yrs
- Global SLR is ~ 3mm per year, similar to this

Sea Level Projections Used in Other Local Studies

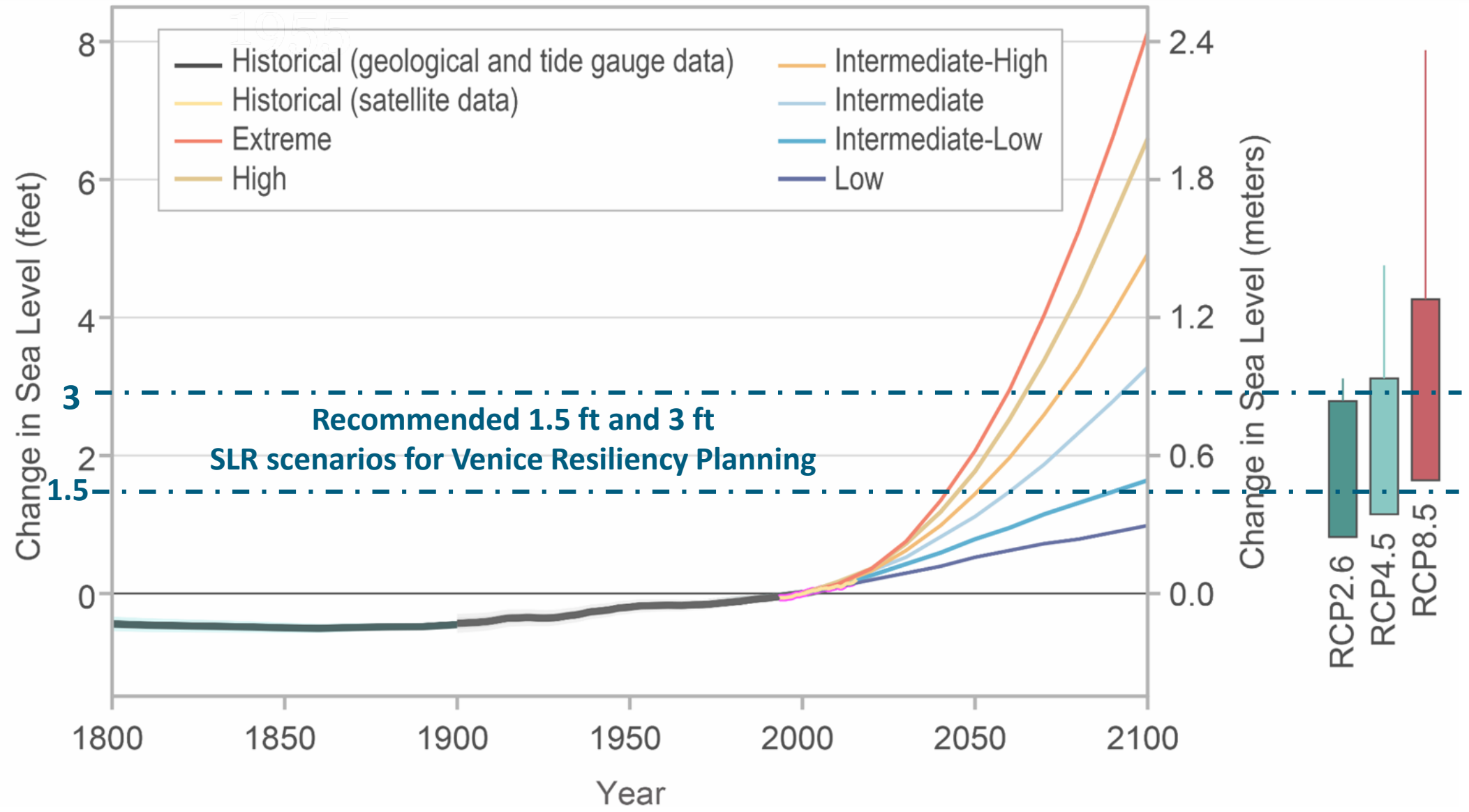
- Sarasota County Post Disaster Redevelopment Plan (2015)
  - Mapped 1 to 4 ft of sea level rise and a Category 1 storm surge
- City of Sarasota Climate Adaptation Plan (2017)
  - Studied 1 ft, 2 ft, 4 ft, and 6 ft of sea level rise above current MSL
  - Estimated 1 ft to 1.5 ft increase of sea level by 2050 (NOAA Low to NOAA Intermediate)
- Tampa Bay Regional Planning Council's Climate Science Advisory Panel (2019)
  - Estimates 1 ft to 2.5 feet by 2050 and 2 to 8.5 feet by 2100
  - Recommended using NOAA Intermediate and High scenarios as most likely
- Tampa Bay Transportation Pilot - US DOT Federal Highway Administration (2020)
  - Recommended using NOAA Intermediate-Low scenario at 2045
- Sarasota County Sea Level Rise Working Group (2021)
  - Assessed facilities at USACE Low and High sea level rise scenarios at 2030, 2050, 2100
- SW FL Regional Planning Council Climate Planning - Florida Gulf Coast University
  - (ongoing - due in 2021)

Comparison of Sea Level Projections



Source: Fourth National Climate Assessment (2018)

Sea Level Trends and Projections



Source: Fourth National Climate Assessment (2018) and IPCC AR5 (2013)

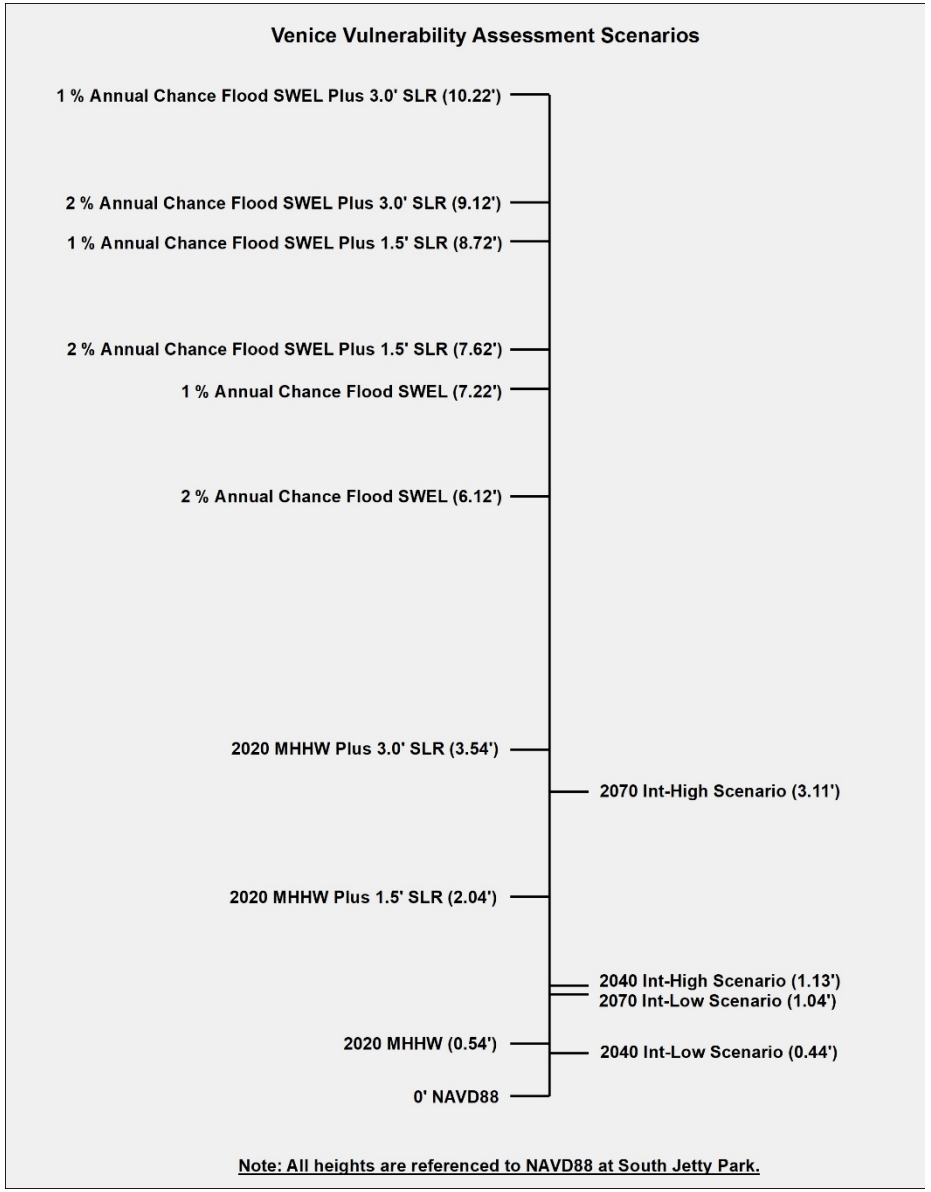
Likelihood of Occurrence

- Based on carbon emissions
  - RCP2.6 - dramatic reduction of carbon emissions
  - RCP4.5 - modest reduction
  - RCP8.5 - no change

Sea Level Rise Scenario	RCP2.6	RCP4.5	RCP8.5
Low (0.3m)	94%	98%	100%
Intermediate-Low (0.5m)	49%	73%	96%
Intermediate (1m)	2%	3%	17%
Intermediate-High (1.5m)	0.4%	0.5%	1.3%
High (2m)	0.1%	0.1%	0.3%
Extreme (2.5m)	0.05%	0.05%	0.1%

Source: Sweet et al (NOAA 2017 Technical Report CO-OPS 083)

City's Update to 2021 Plan



Coastal Flooding Vulnerability Assessment

Data Inputs:

- Location of Asset
- Elevation of Land & Asset
- Ownership (City/County/Private)
- Historic Status

Flood Scenarios:

- MHHW (Nuisance Flooding)
- 1.5 ft & 3 ft Sea Level Rise
- 2% (50-yr) & 1% (100-yr) Annual Chance Storm Surge Flooding

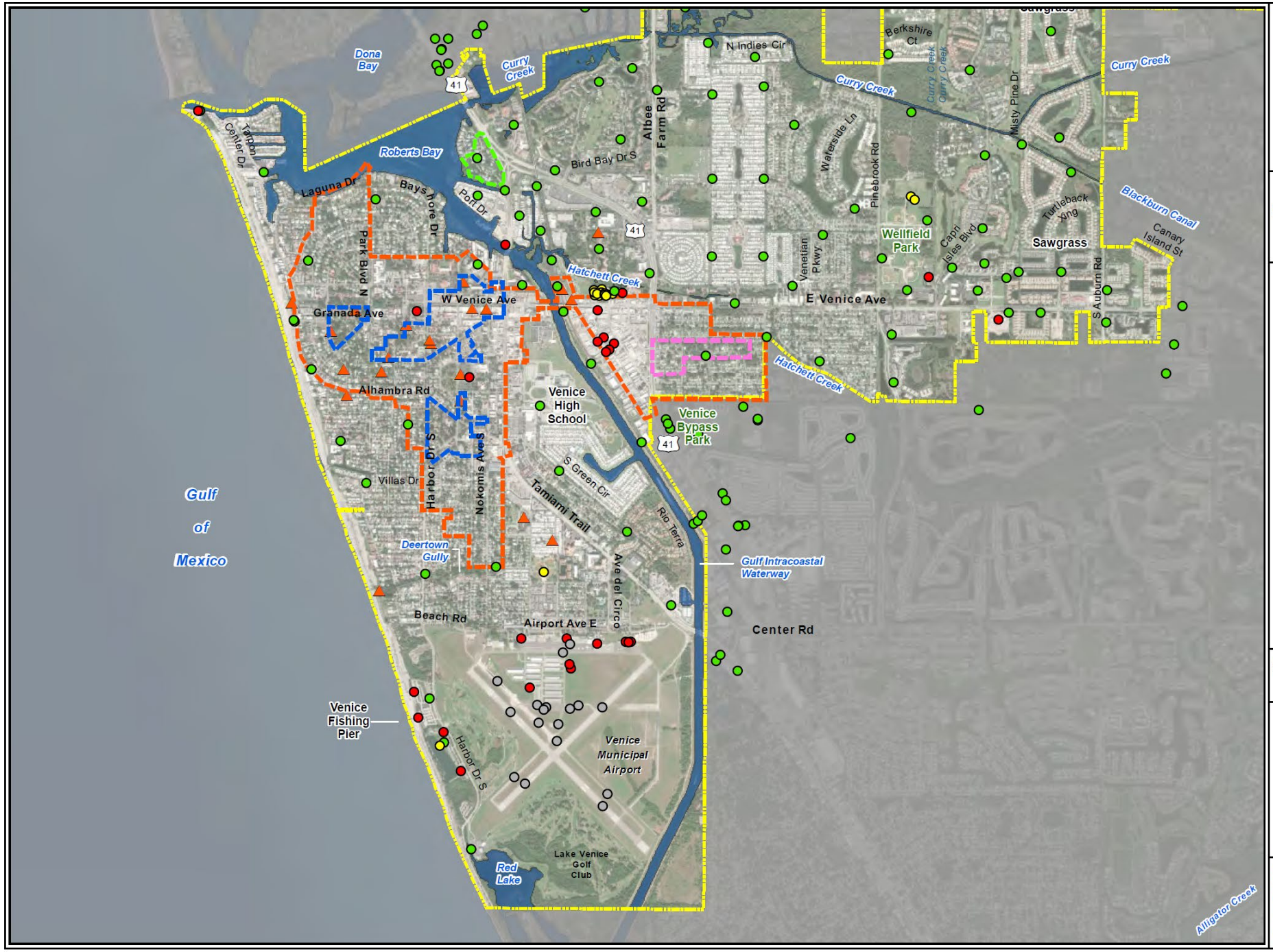
Categorized List of Vulnerable Assets:

- Critical & Essential Publicly-Owned Facilities
- Historic Structures
- Historic Districts

Flood Scenarios Analyzed

- GIS-based analysis
- Assessed 9 different scenarios
- Compared elevations of City's chosen coastal infrastructure to each flood scenario

Flood Inundation Scenarios	
1	2020 water level (MHHW)
2	1.5 ft sea level rise
3	3 ft sea level rise
4	2020 water level (MHHW) + 2% annual chance flood (50 yr)
5	1.5 ft sea level rise + 2% annual chance flood (50 yr)
6	3 ft sea level rise + 2% annual chance flood (50 yr)
7	2020 water level (MHHW) + 1% annual chance flood (100 yr)
8	1.5 ft sea level rise + 1% annual chance flood (100 yr)
9	3 ft sea level rise + 1% annual chance flood (100 yr)



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MEAN HIGHER HIGH WATER CRITICAL PUBLIC INFRASTRUCTURE AND HISTORIC AREAS WITHIN CITY LIMITS

Legend

- Venice City Limits

Critical Infrastructure

- Building
- Utilities Buildings
- Utilities Infrastructure
- Runway/Parking

Historic Areas/Buildings

- Downtown Venice
- Eagle Point Historic District
- Edgewood Historic District
- John Nolen Plan of the City of Venice
- Historic Buildings

Return Period

- Mean Higher High Water

0 2,500 5,000
FEET

N

SARASOTA COUNTY, FL

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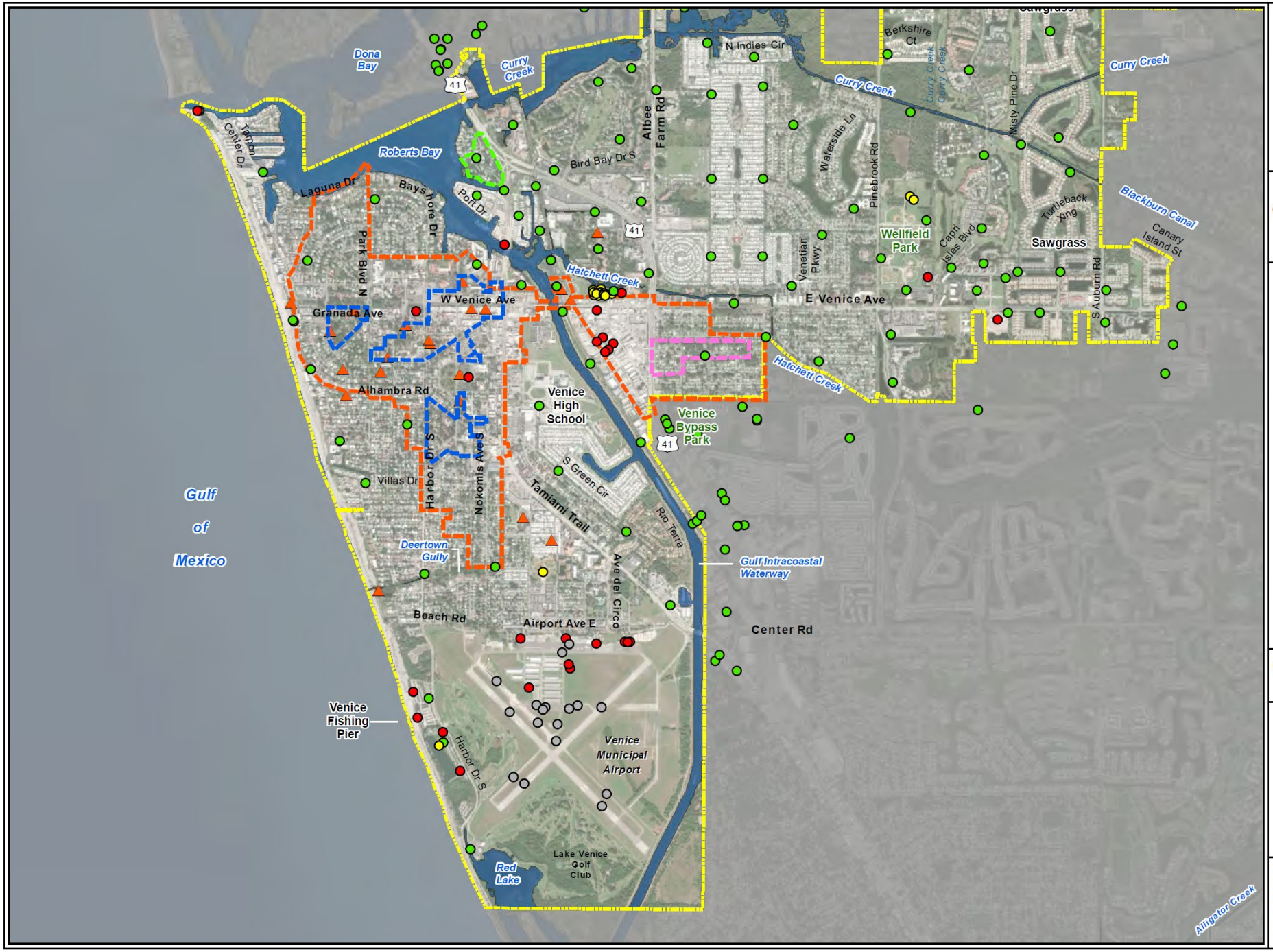

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1.5' OF SEA LEVEL RISE CRITICAL PUBLIC INFRASTRUCTURE AND HISTORIC AREAS WITHIN CITY LIMITS

Legend

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Critical Infrastructure

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- Runway/Parking

Historic Areas/Buildings

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Return Period

- 1.5' of Sea Level Rise

0 2,500 5,000
FEET

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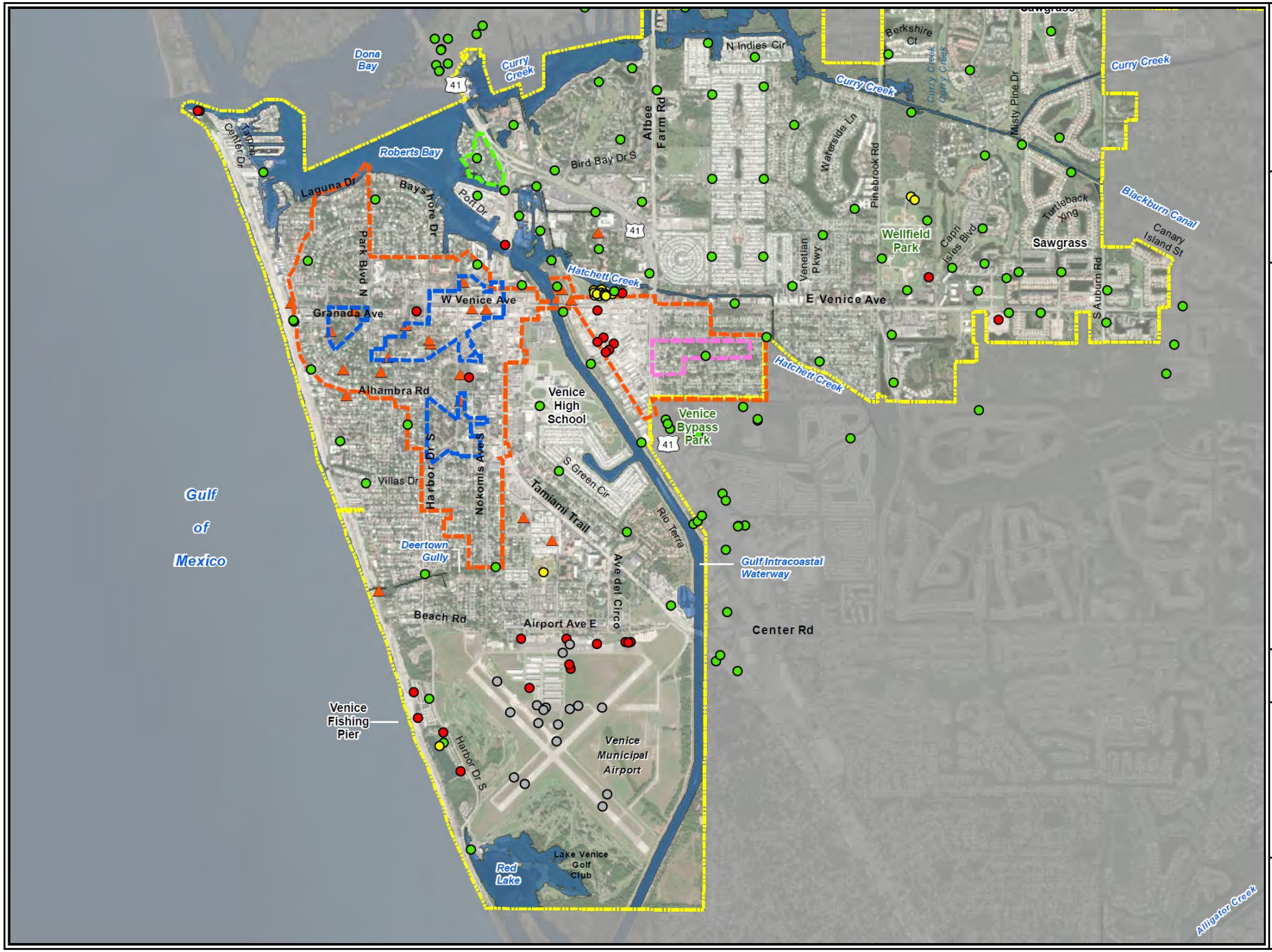

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3' OF SEA LEVEL RISE
CRITICAL PUBLIC INFRASTRUCTURE
AND HISTORIC AREAS
WITHIN CITY LIMITS

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- Utilities Infrastructure
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Return Period

- 3' of Sea Level Rise

0 2,500 5,000
FEET

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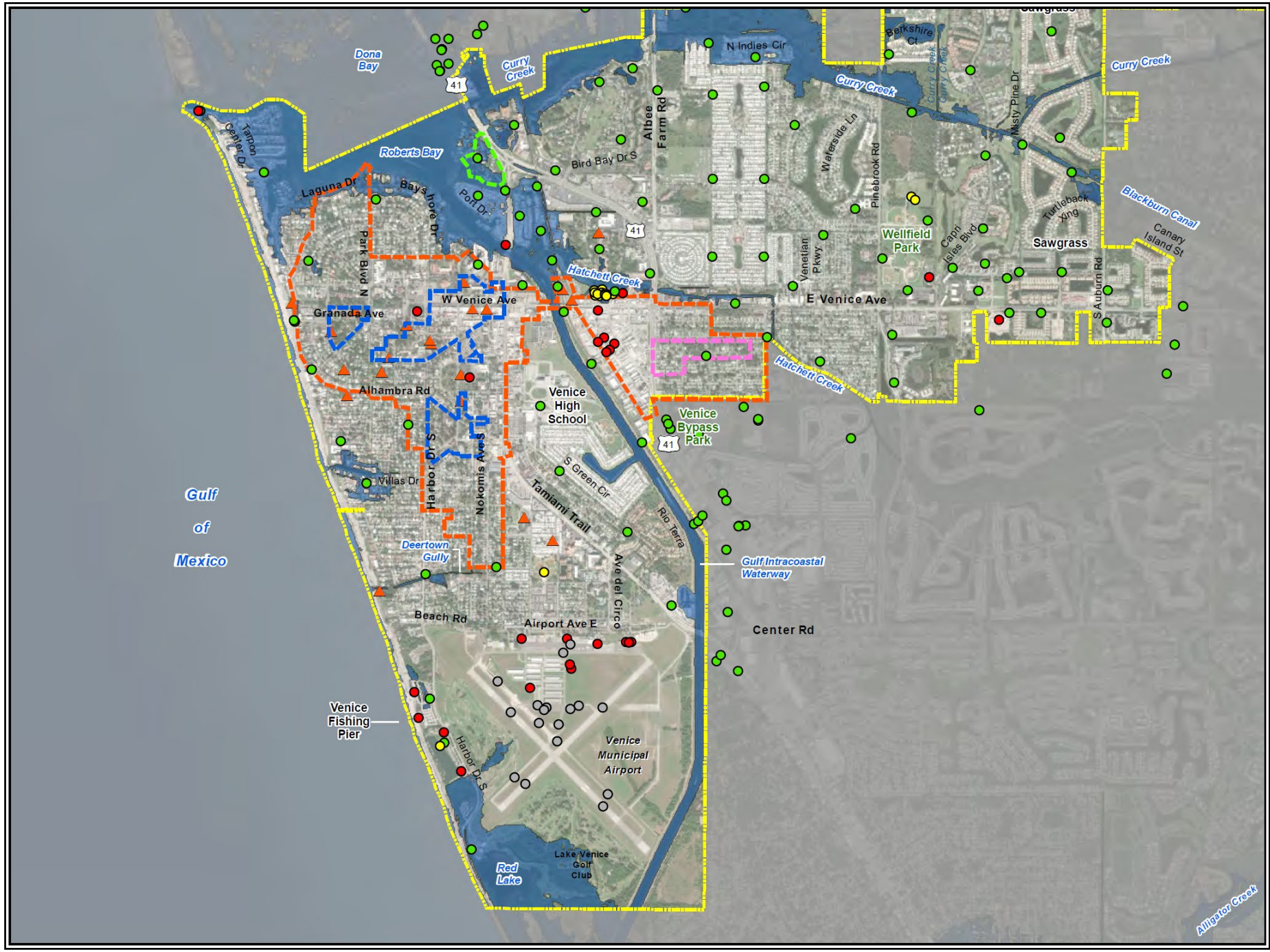

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2% ANNUAL CHANCE SWEL CRITICAL PUBLIC INFRASTRUCTURE AND HISTORIC AREAS WITHIN CITY LIMITS

Legend

- Venice City Limits

Critical Infrastructure

- Building
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- Utilities Infrastructure
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Historic Areas/Buildings

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Return Period

- 2% Annual Chance SWEL

0 2,500 5,000
FEET

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SARASOTA COUNTY, FL

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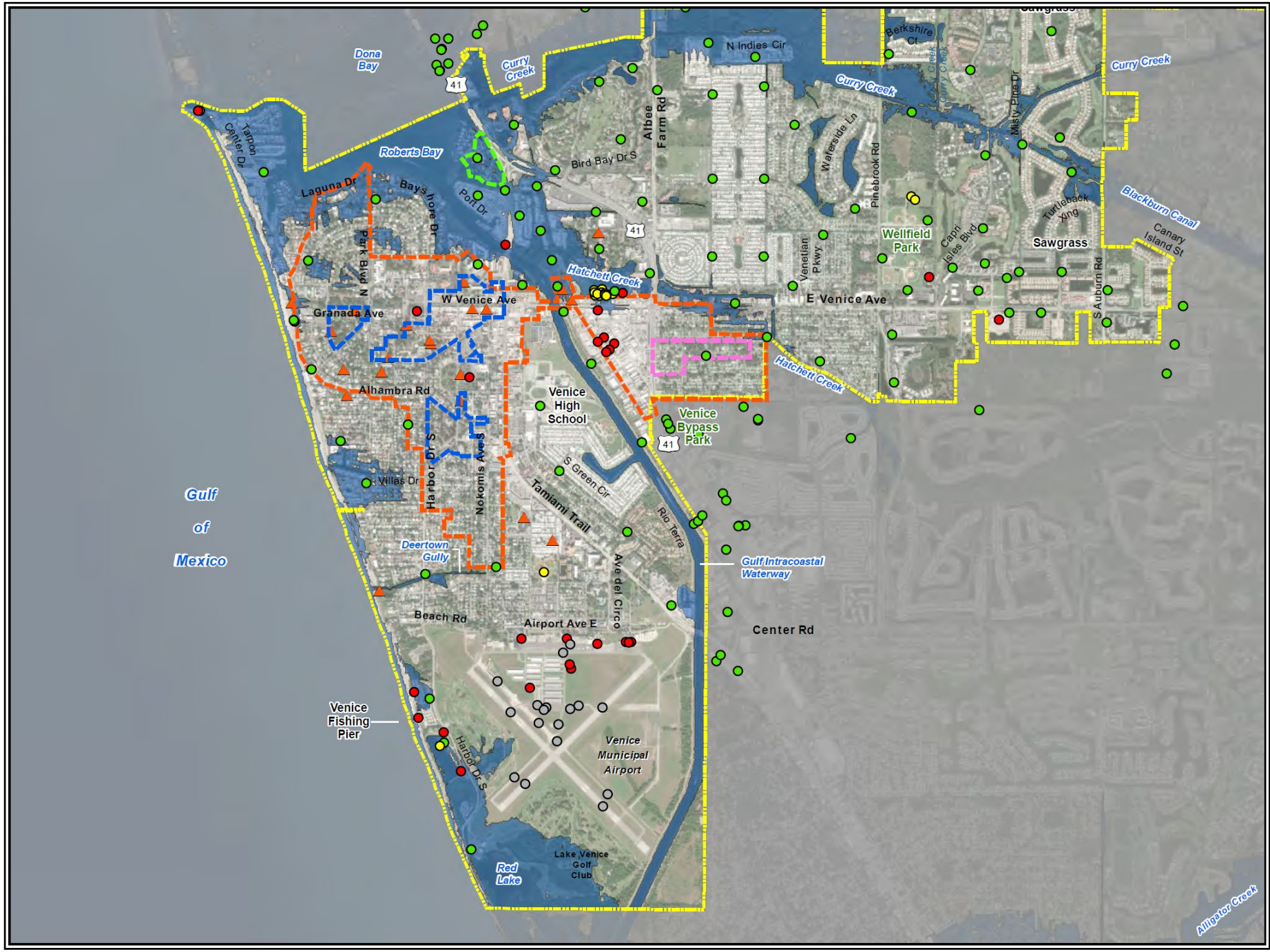

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2% ANNUAL CHANCE SWEL PLUS 1.5' OF SEA LEVEL RISE CRITICAL PUBLIC INFRASTRUCTURE AND HISTORIC AREAS WITHIN CITY LIMITS

Legend

- Venice City Limits

Critical Infrastructure

- Building
- Utilities Buildings
- Utilities Infrastructure
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Historic Areas/Buildings

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Return Period

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0 2,500 5,000
FEET

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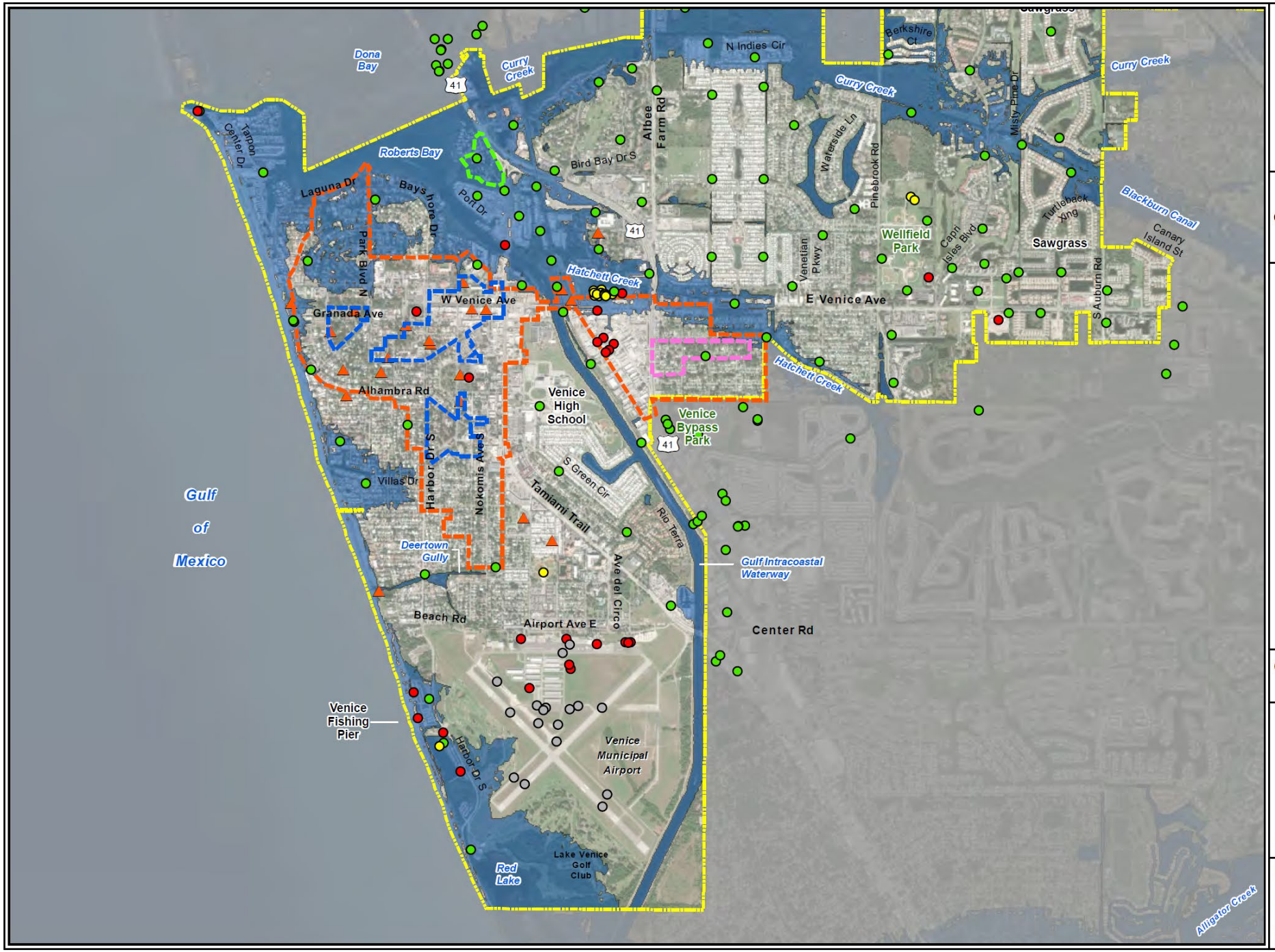

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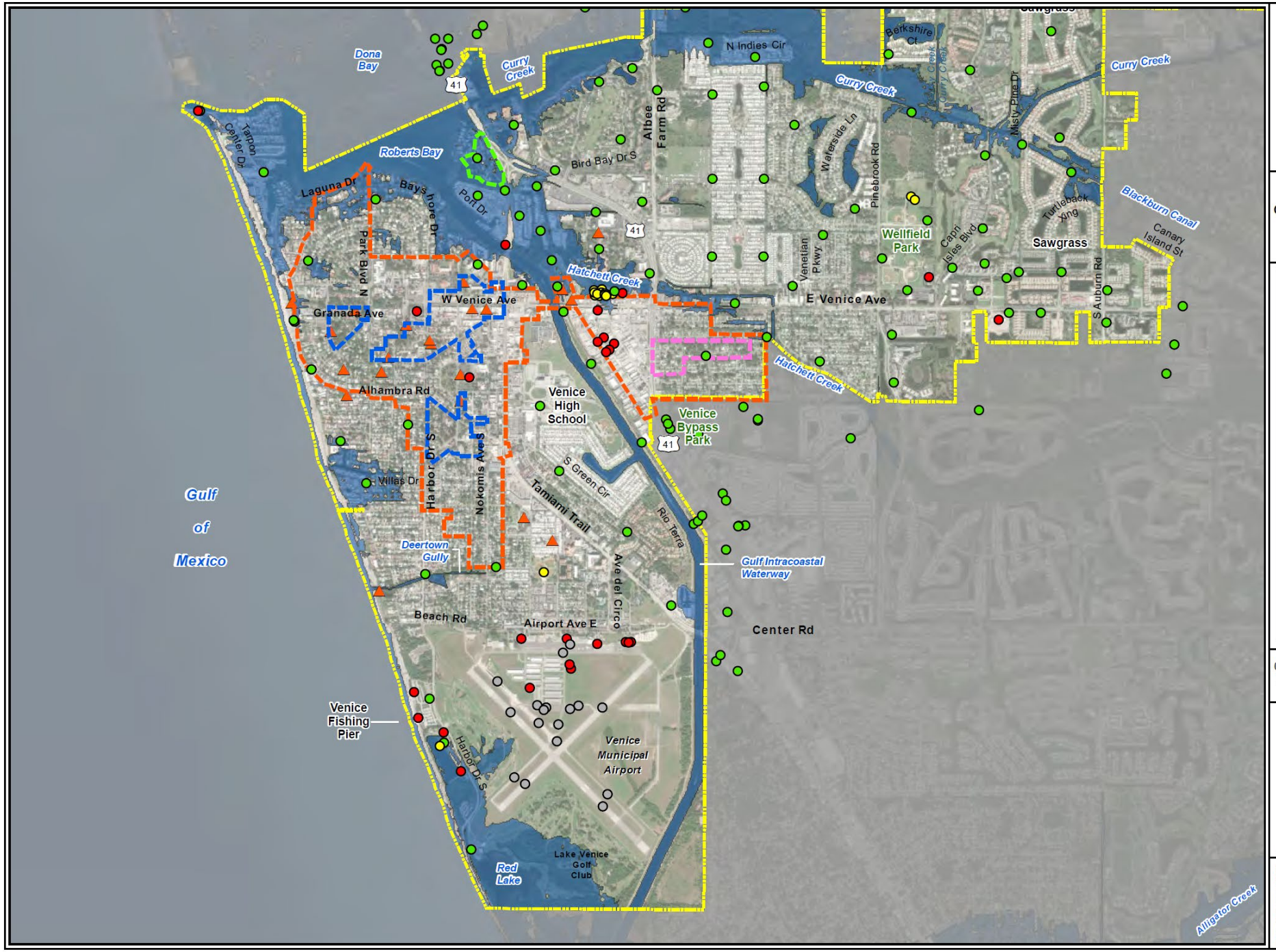

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1% ANNUAL CHANCE SWEL CRITICAL PUBLIC INFRASTRUCTURE AND HISTORIC AREAS WITHIN CITY LIMITS

Legend

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Critical Infrastructure

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- 1% Annual Chance SWEL

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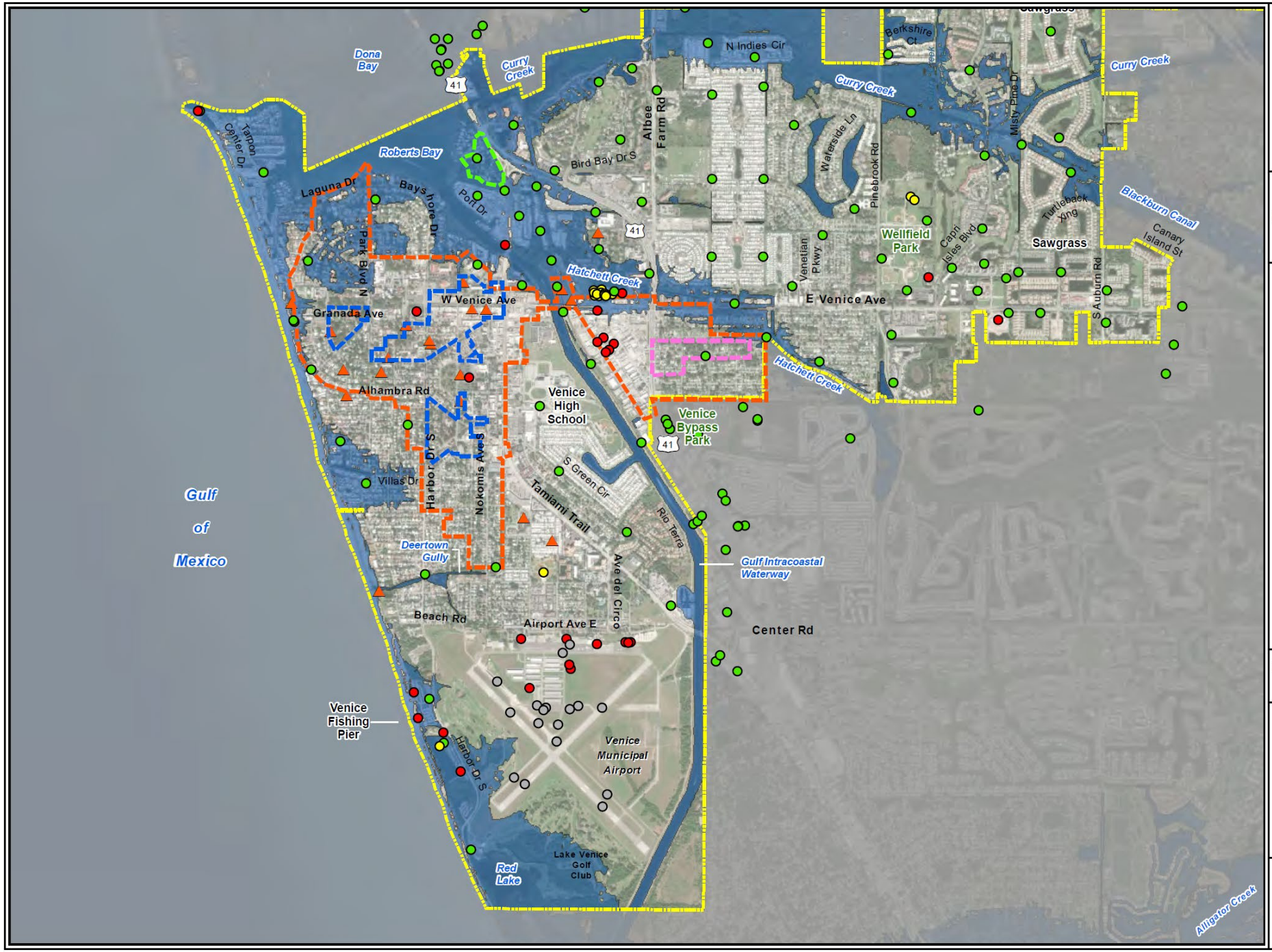

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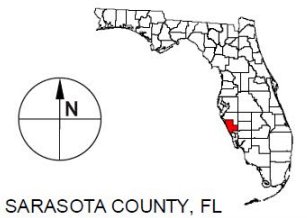

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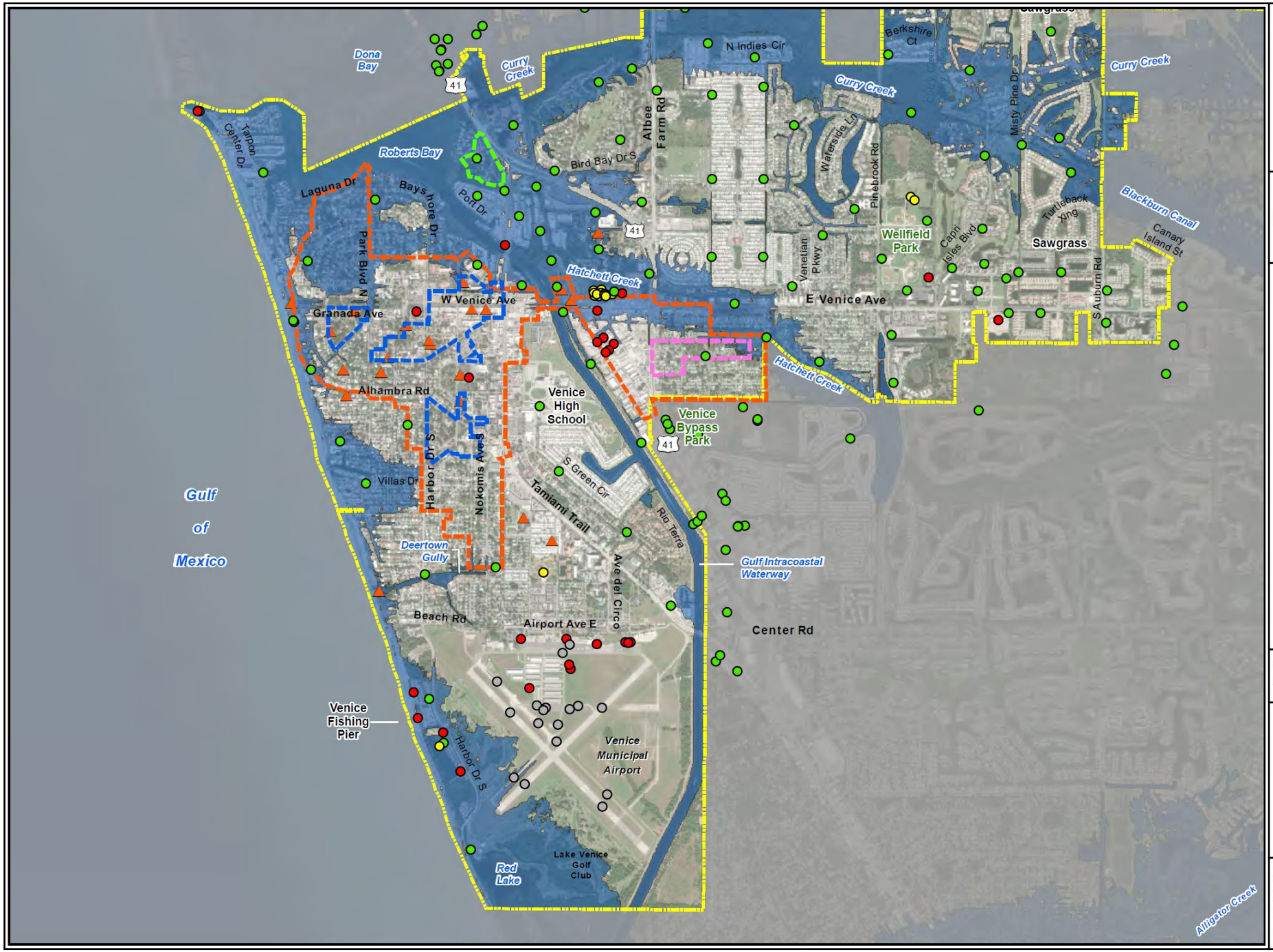

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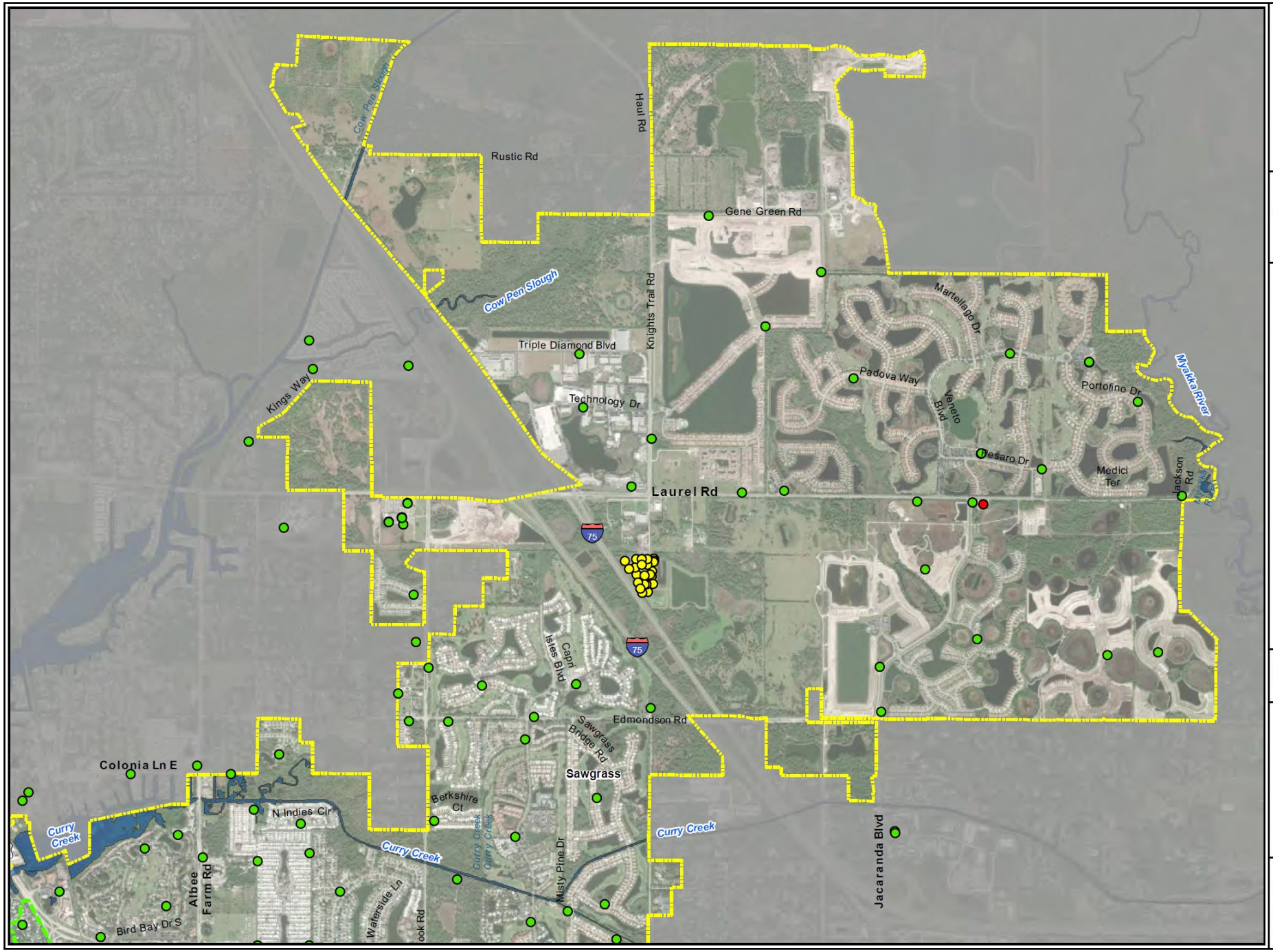

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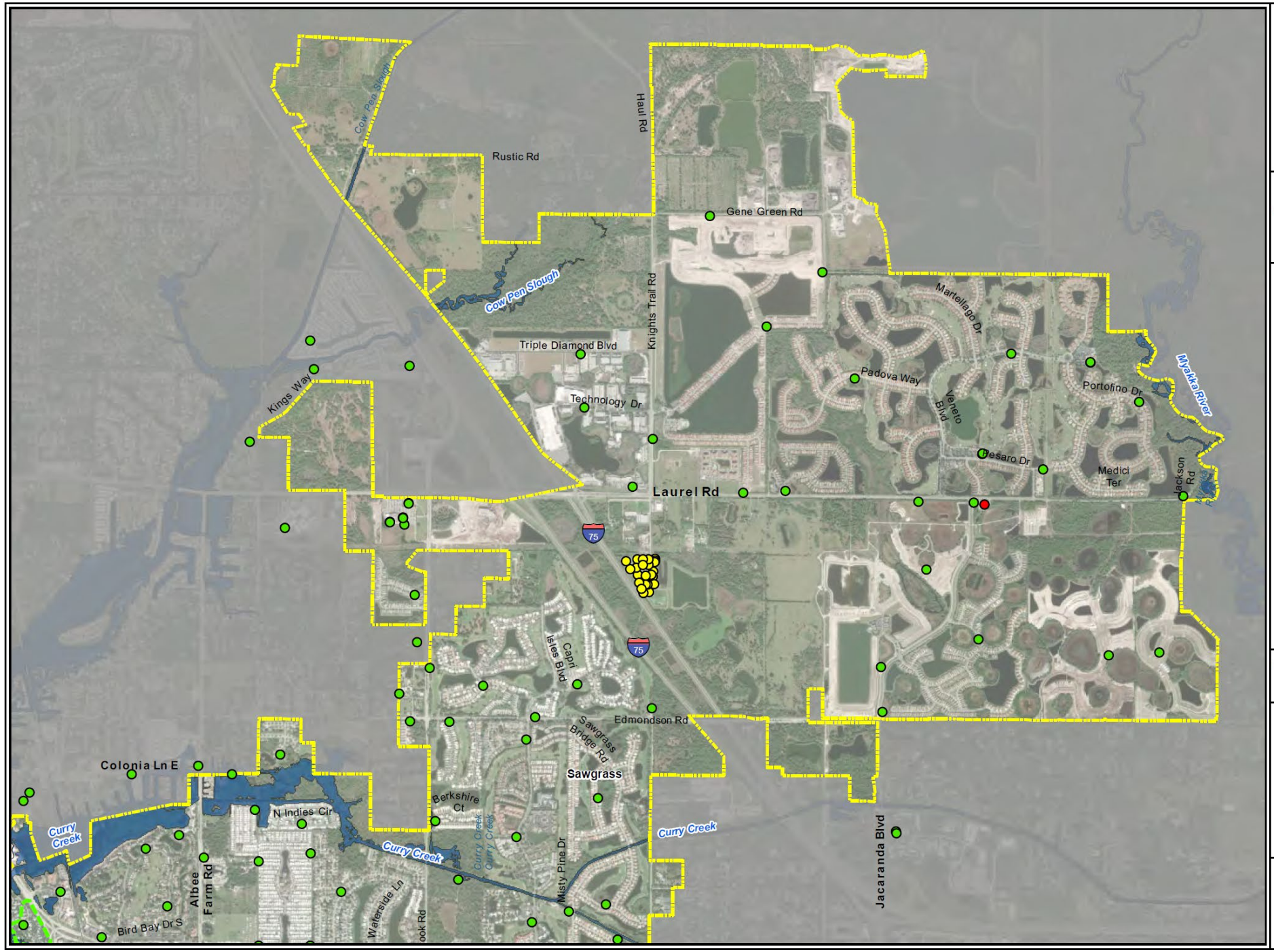

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3' OF SEA LEVEL RISE CRITICAL PUBLIC INFRASTRUCTURE AND HISTORIC AREAS WITHIN CITY LIMITS

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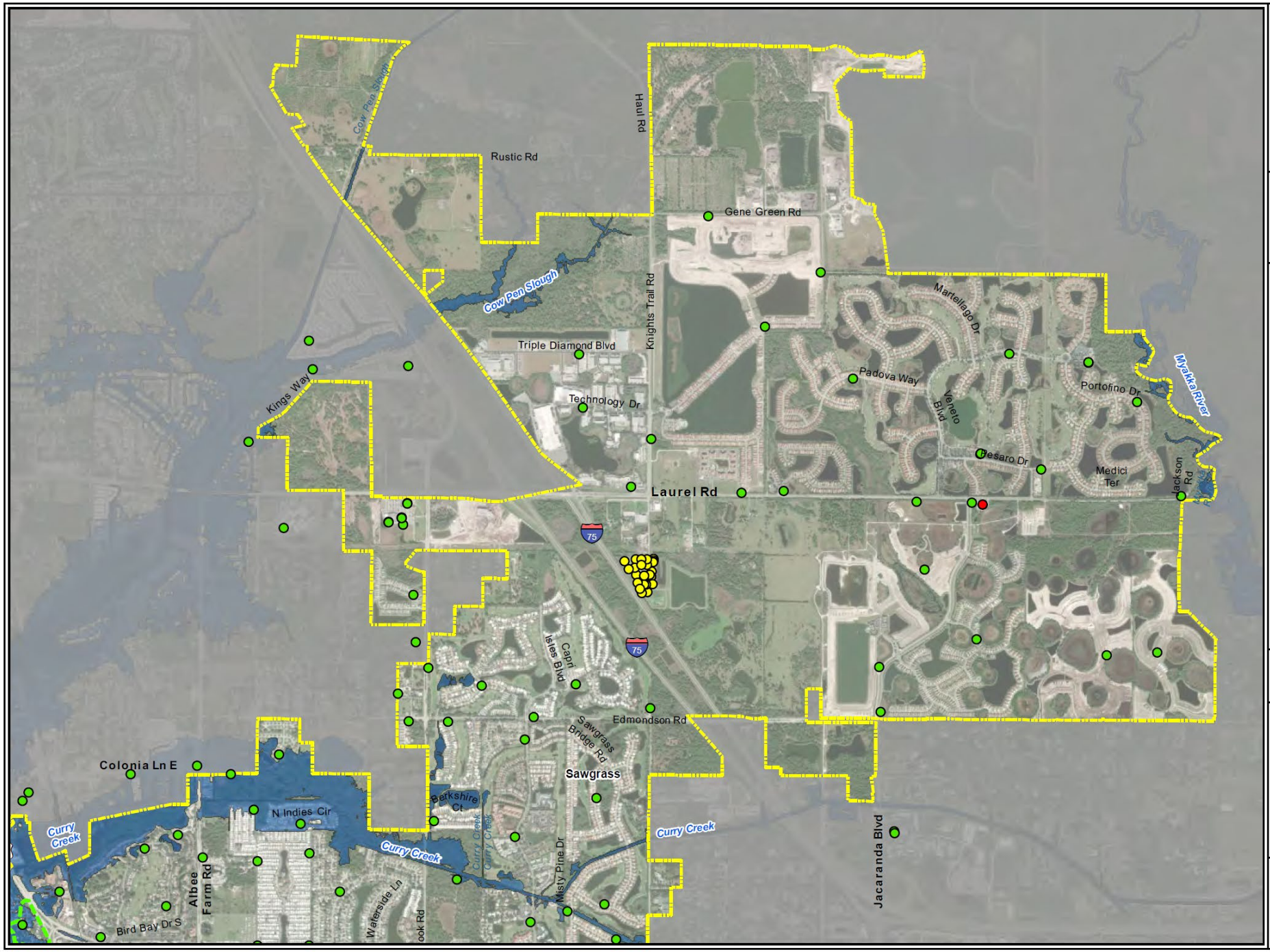

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2% ANNUAL CHANCE SWEL CRITICAL PUBLIC INFRASTRUCTURE AND HISTORIC AREAS WITHIN CITY LIMITS

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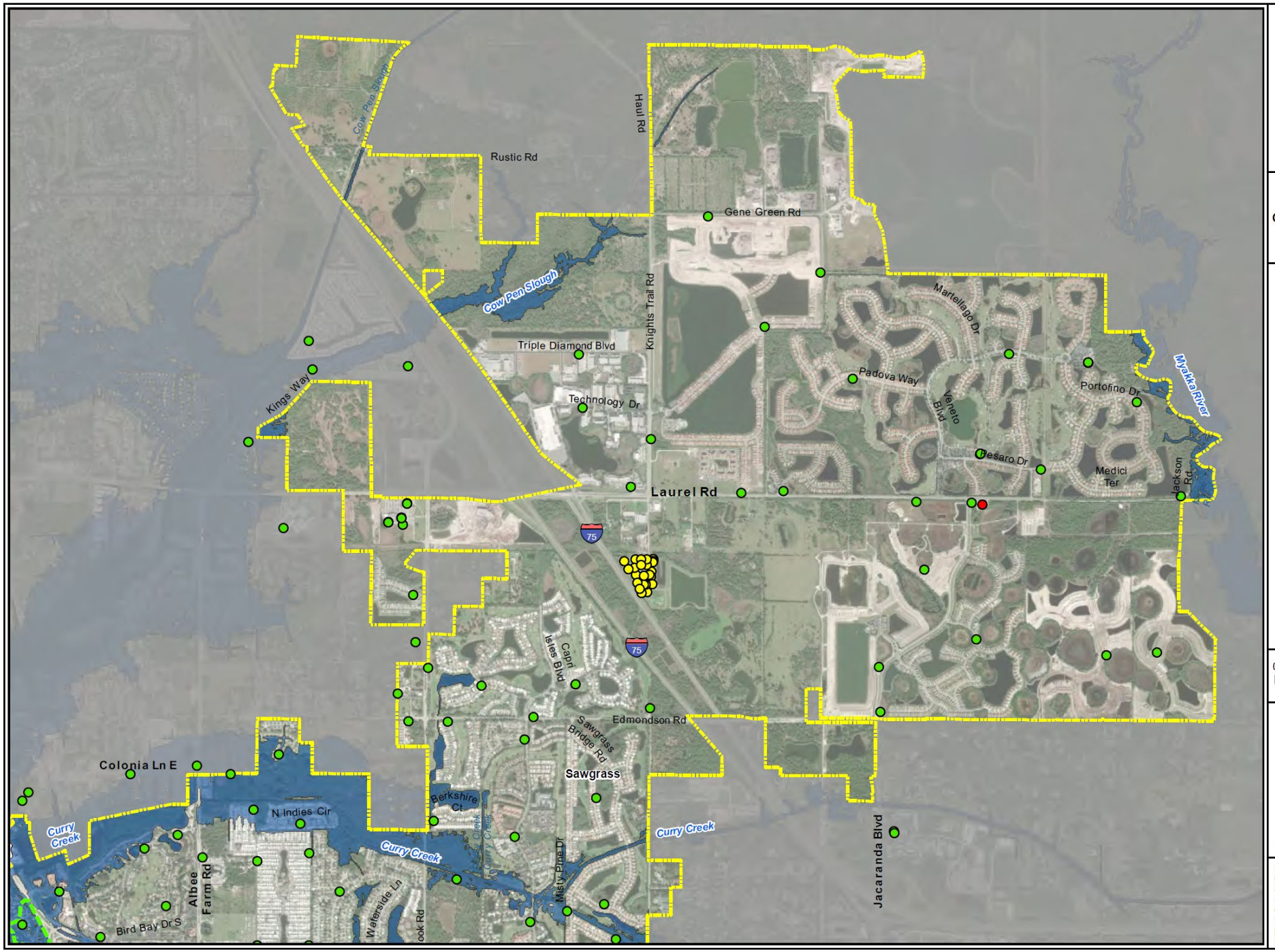

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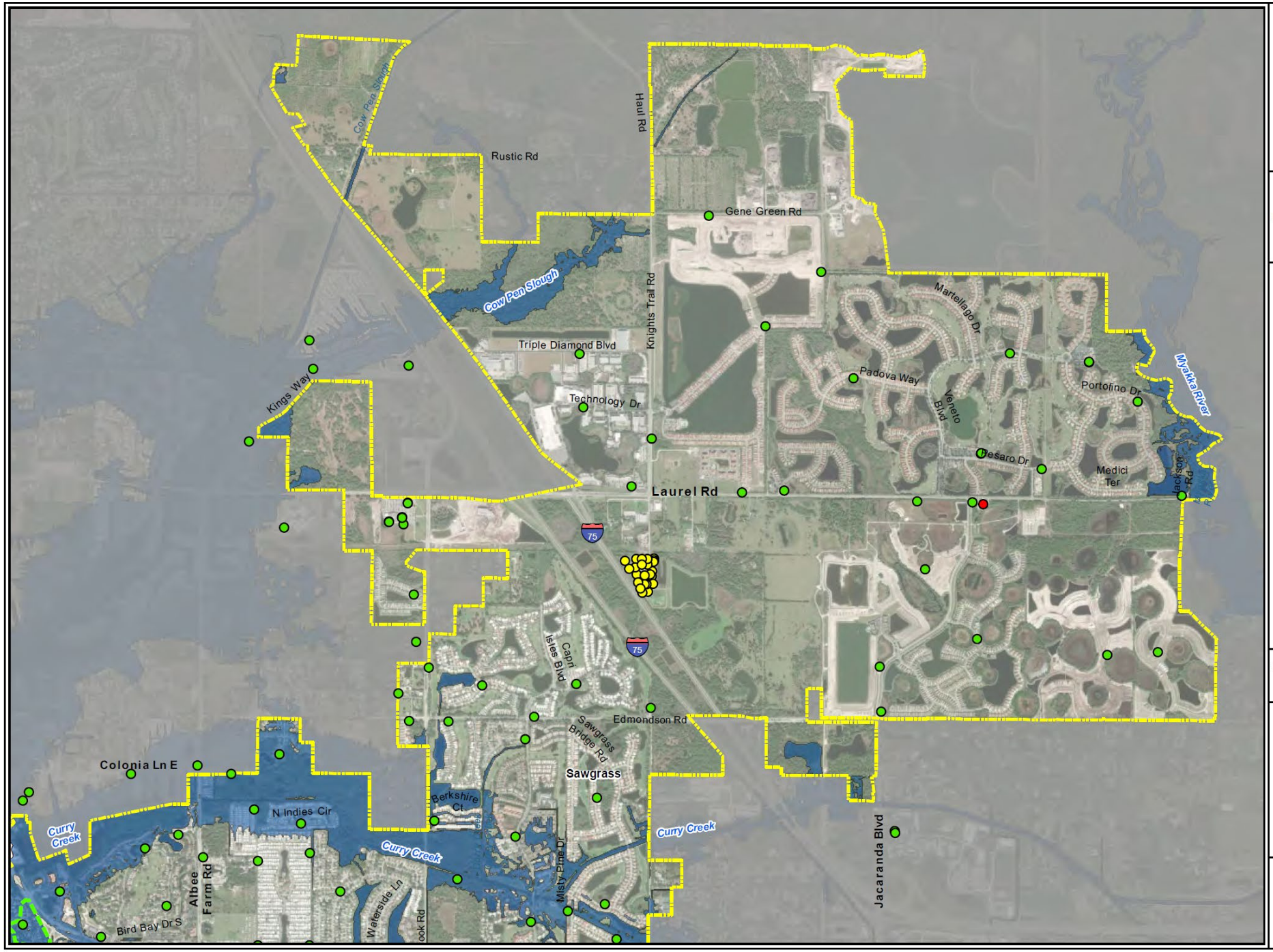

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- Downtown Venice
- Eagle Point Historic District
- Edgewood Historic District
- John Nolen Plan of the City of Venice
- Historic Buildings

Return Period

- 2% Annual Chance SWEL plus 3' SLR

0 2,500 5,000
FEET

N

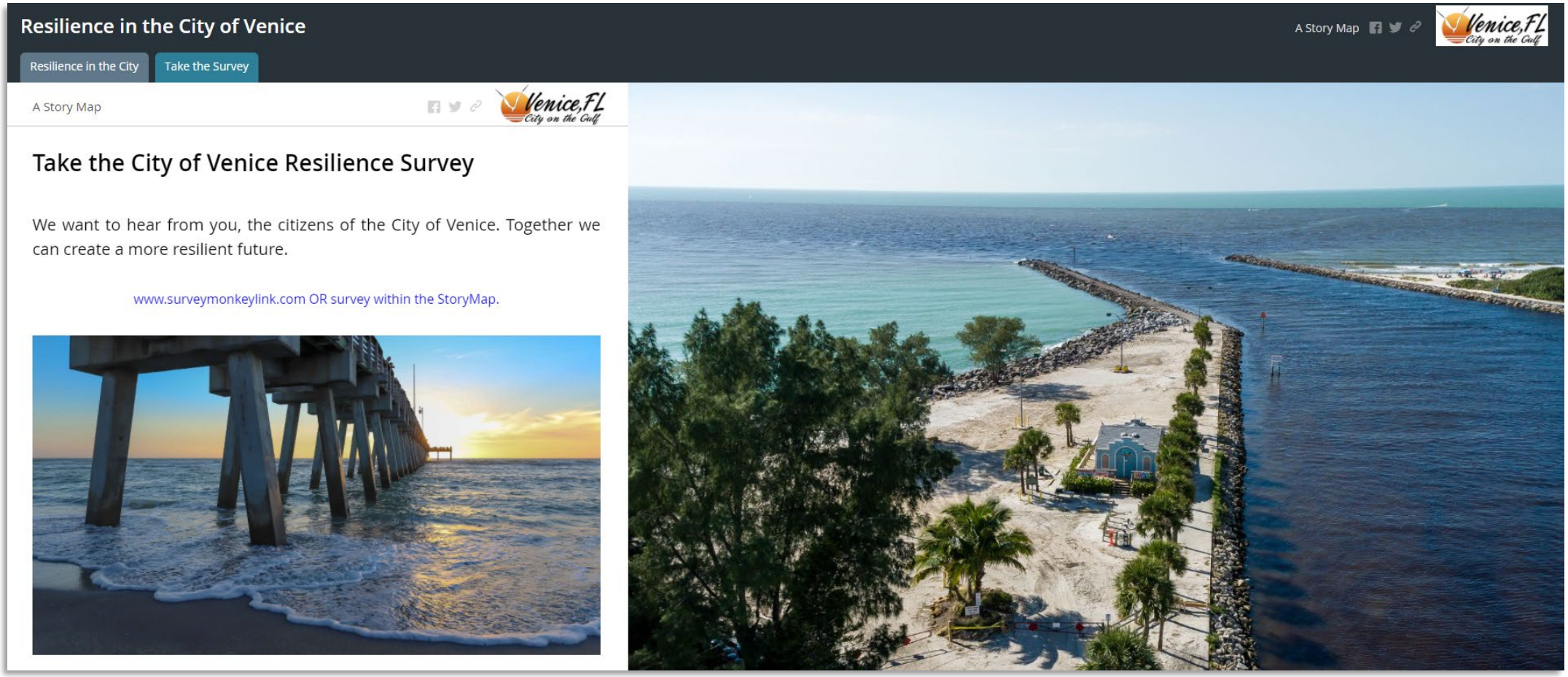
SARASOTA COUNTY, FL

Disclaimer: This figure is not intended to show the exact location of flooding and does not account for all variables affecting future flooding such as ground water impacts, changing precipitation patterns, future construction, or erosion. As such, actual future flooding may differ from this graphic. This graphic should be used strictly as a planning reference tool and not for navigation, permitting, insurance rating, or other legal or regulatory purposes.

Summary of Vulnerability Analysis

	Total Number of Assets Evaluated (or Square Ft for District)	1.5 ft SLR	3.0 ft SLR	2% Annual Chance Flood	1% Annual Chance Flood	1.5 ft SLR + 2% Annual Chance	1.5 ft SLR + 1% Annual Chance	3.0 ft SLR + 2% Annual Chance	3.0 ft SLR + 1% Annual Chance
Critical Assets	258	0%	2%	11%	16%	16%	22%	23%	34%
Historic Assets	21	0%	0%	0%	10%	10%	19%	19%	24%
Edgewood Historic District	1,224,335	0%	0%	0%	0%	0%	0%	0%	9%
Eagle Point Historic District	653,998	2%	7%	72%	96%	99%	94%	100%	100%
John Nolen Plan	34,595,339	0%	0%	0%	0%	0%	0%	0%	23%
Downtown Venice ACD	4,994,235	0%	0%	0%	0%	0%	0%	0%	1%

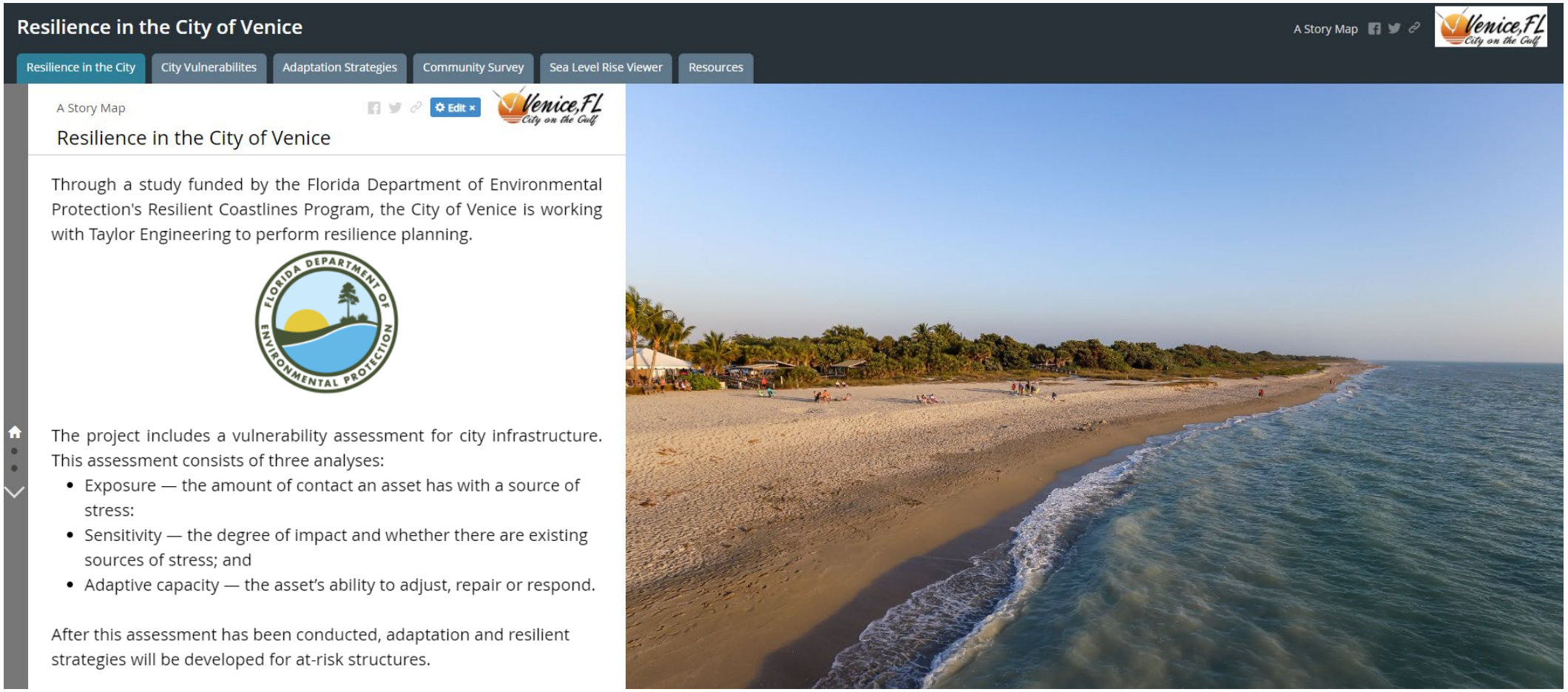
Public Outreach - Resilient Venice StoryMap Website



Two Phase Rollout of StoryMap

- Phase I: Project Introduction & Survey Link
- Phase II: Full Interactive StoryMap

Public Outreach - Resilient Venice StoryMap Website

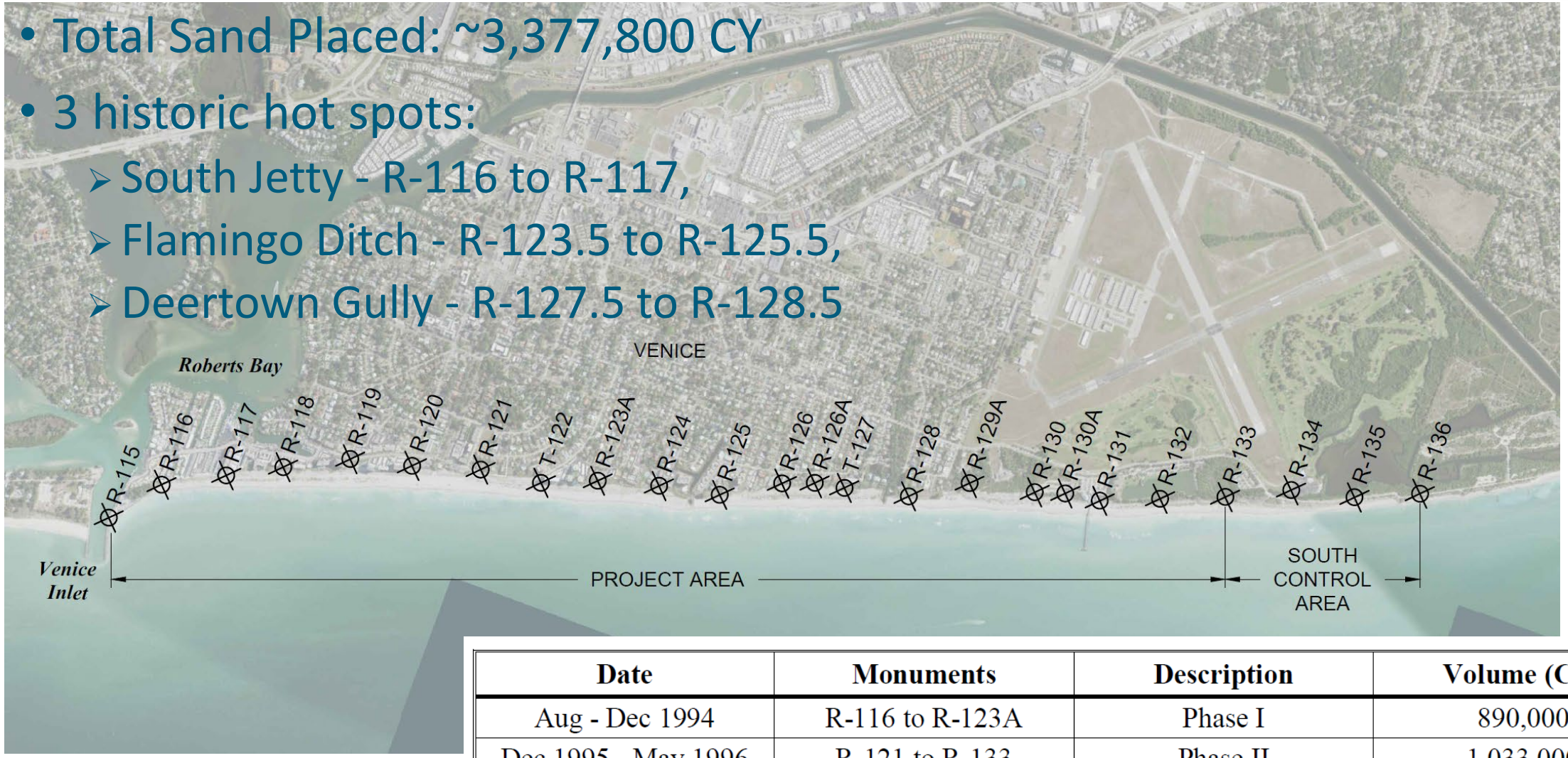


- Project Overview: Adaptation and Resilience Defined
- Vulnerable Infrastructure: Overview and Highlights
- Adaptation Strategies: Outline Opportunities
- Sea Level Rise Viewer
- Survey Results: Citizen Priorities
- Resources: City, Regional, and National Resources

https://covfl.maps.arcgis.com/apps/MapSeries/index.html?appid=aec4f90244b6434c972ad314bff78fc3

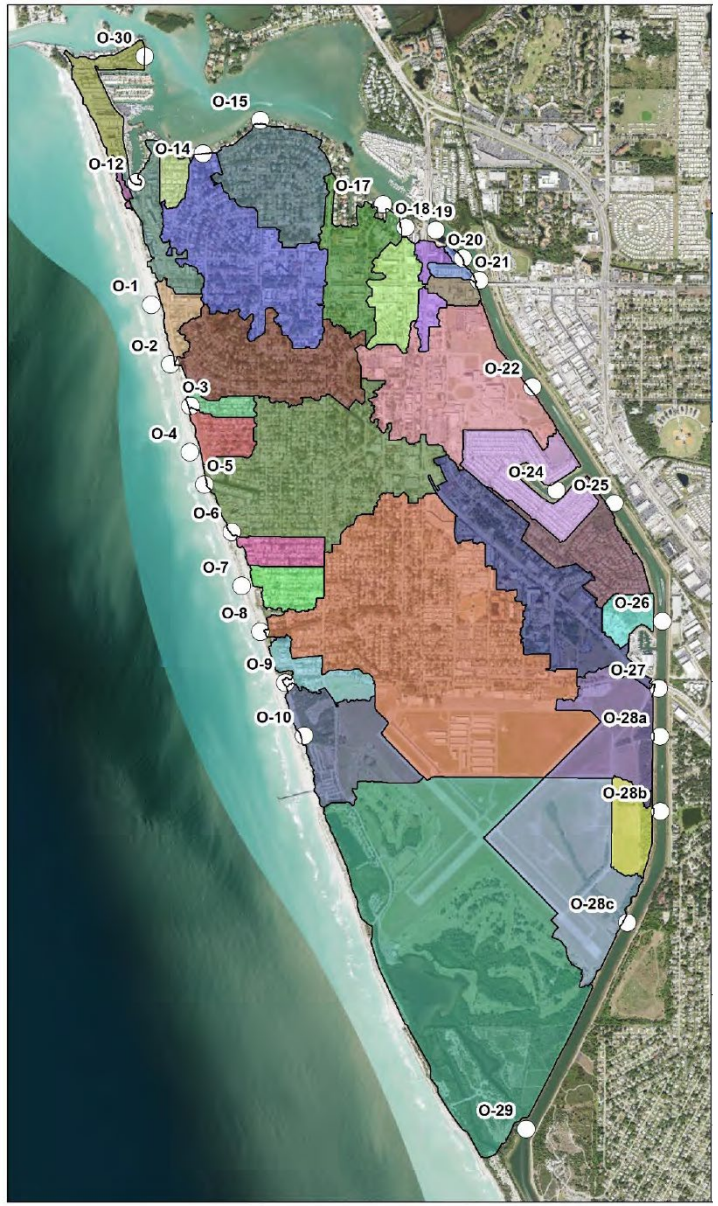
Adaptation: Beach Renourishment

- Total Sand Placed: ~3,377,800 CY
- 3 historic hot spots:
  - South Jetty - R-116 to R-117,
  - Flamingo Ditch - R-123.5 to R-125.5,
  - Deertown Gully - R-127.5 to R-128.5



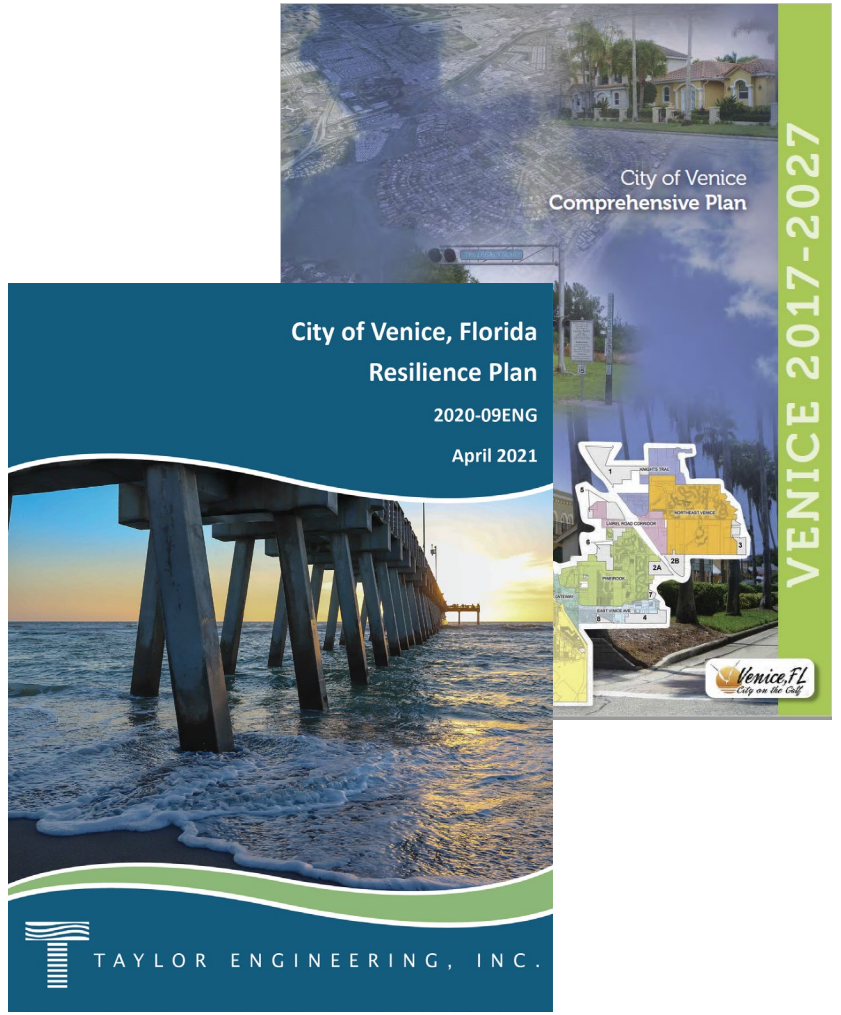
Date	Monuments	Description	Volume (CY)
Aug - Dec 1994	R-116 to R-123A	Phase I	890,000
Dec 1995 - May 1996	R-121 to R-133	Phase II	1,033,000
June - Aug 2005	R-116 to R-133	First Maintenance	672,208
January - April 2015	R-116 to R-133	Second Maintenance	782,600*

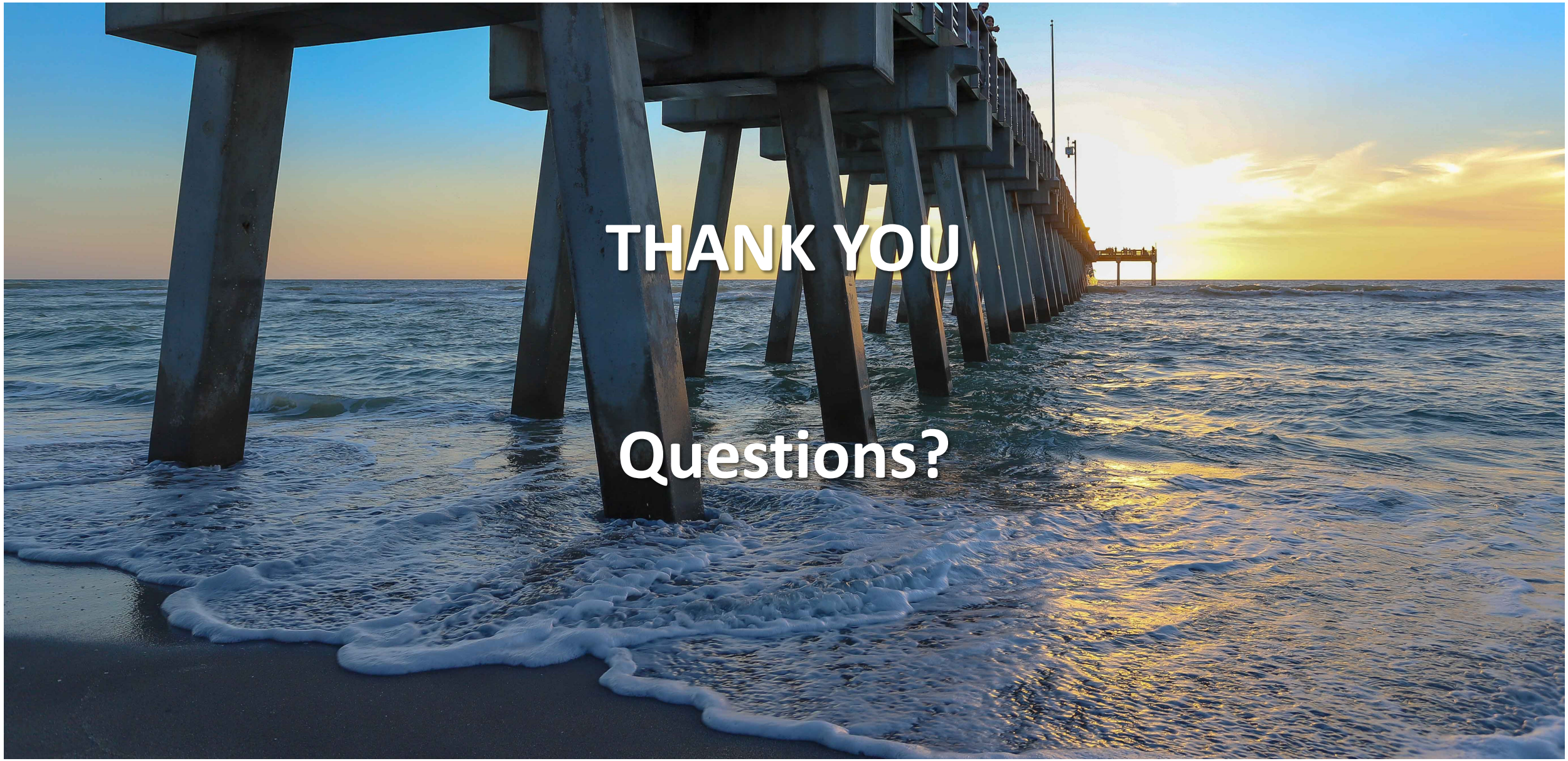
Adaptation: Stormwater Improvements



Next Steps

- Identify and Prioritize Projects
  - Remove/Reduce Outfall pipes along beach
  - Tarpon Center Drive Seawall Improvements
  - Stormwater System Upgrades
  - Water Treatment Plant Protection
- Utilities AWIA Risk & Resiliency Assessment (underway)
- Pursue Funding via Grant Opportunities
- Pursue Public-Private-NGO Partnerships
- Add Resilience to Comprehensive Plan
- Update Resilience Plan With New Data





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