COASTAL RESILIENCY STUDY
FDEP GRANT

BROWARD COUNTY ASCE LUNCHEON
DECEMBER 4, 2019

UF Levin College of Law
Conservation Clinic
UNIVERSITY of FLORIDA

LONGITUDE SURVEYORS

Bermello Ajamil & Partners

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Outline

- Background
- Field data and modeling results
- Adaptation Action Strategies/Engineering report
- Policy update and ordinance revisions
- Next steps

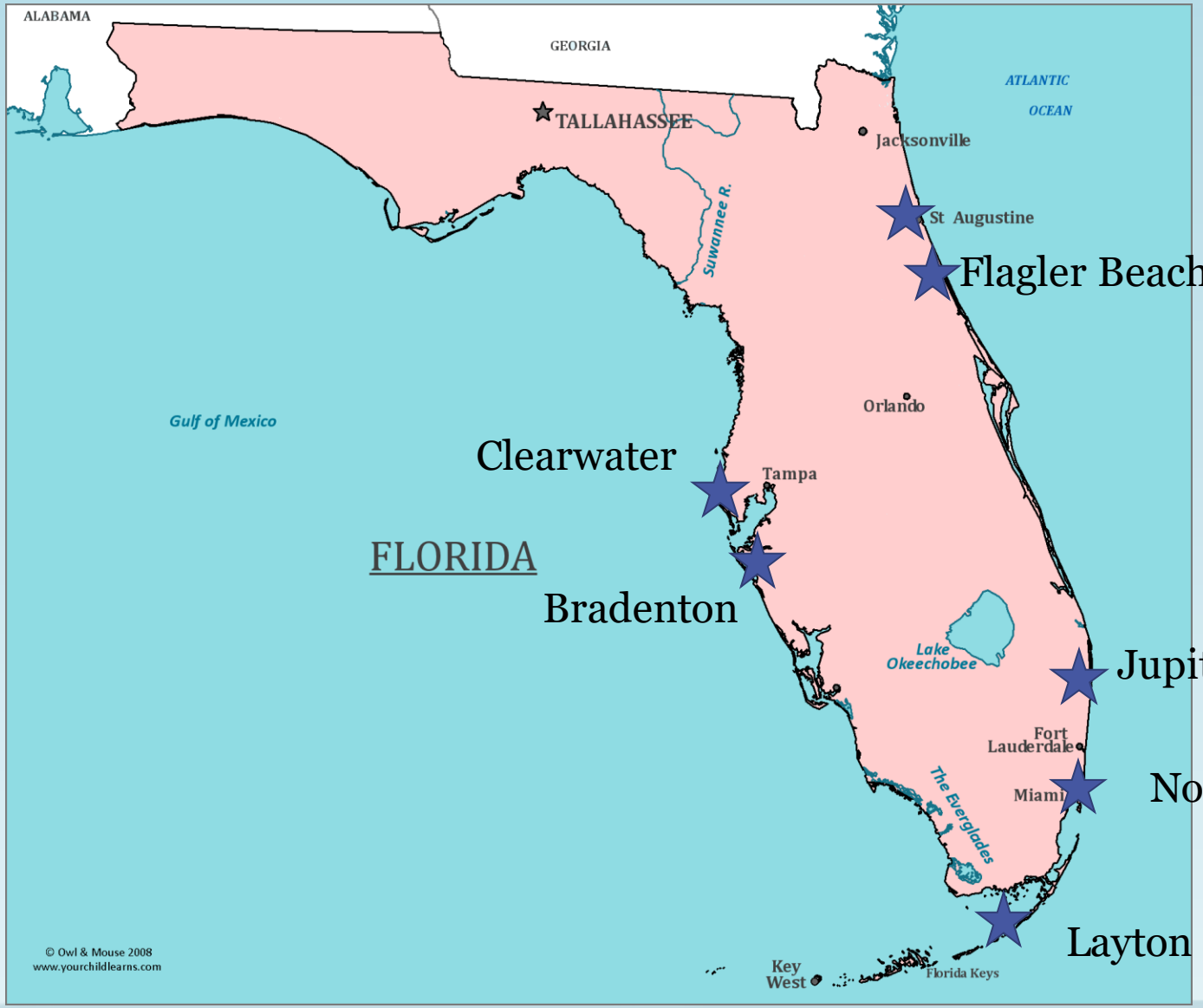
Background information

- On February 5, 2019, the City of Marathon receives FDEP Coastal Resilient Grant to complete 4 tasks:
  - 1. Data collection, mapping and modeling
  - 2. Outreach and public input
  - 3. Review and update the City's Comprehensive Plan and ordinances
  - 4. Engineering report and revised Code Ordinance
- Tasks 1, 3 and 4 were submitted on May 10, 2019
- Public meeting and input for Task 2 to be completed by June 10, 2019

9.27 sq. miles, current population of about 10,000 local residents and, about 4,600 households.

What is Florida's Peril of Flood Law?

- In May 2015, Former Governor Rick Scott signed the "peril of flood" statute into law.
- The statute requires local government's **to consider future flood risk** from storm surge and sea level rise in the coastal element of their comprehensive plans.
- Florida Statutes Section 163.3178(2)(f)(1) now includes **sea level rise** as one of the causes of flood risk that must be addressed in the "development and redevelopment principles, strategies, and engineering solutions" of coastal community's comprehensive plans to reduce flood risk.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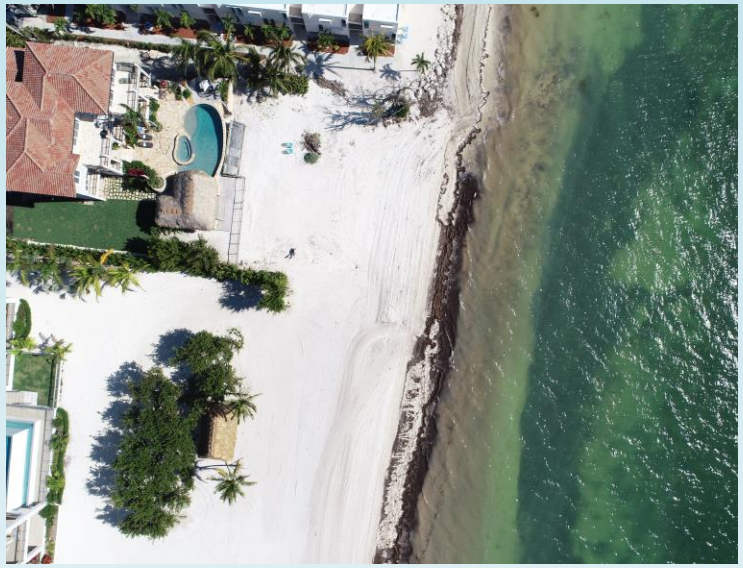
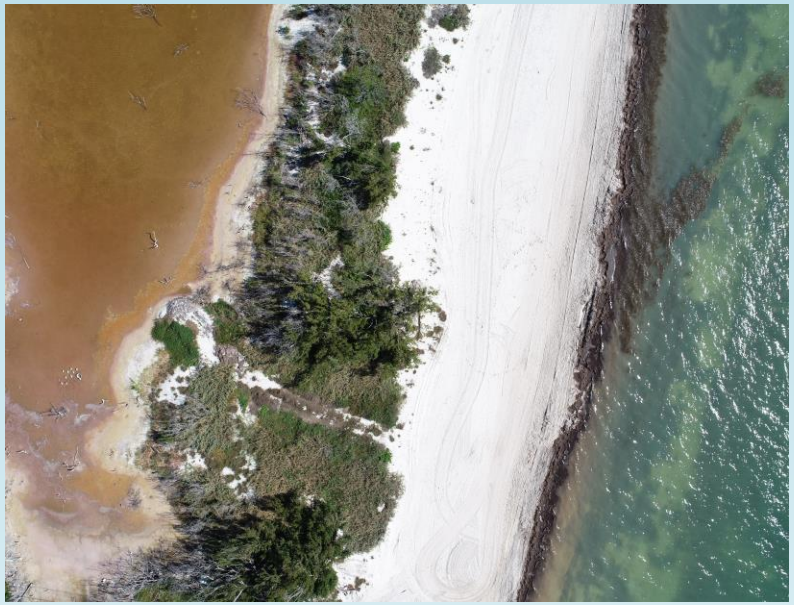
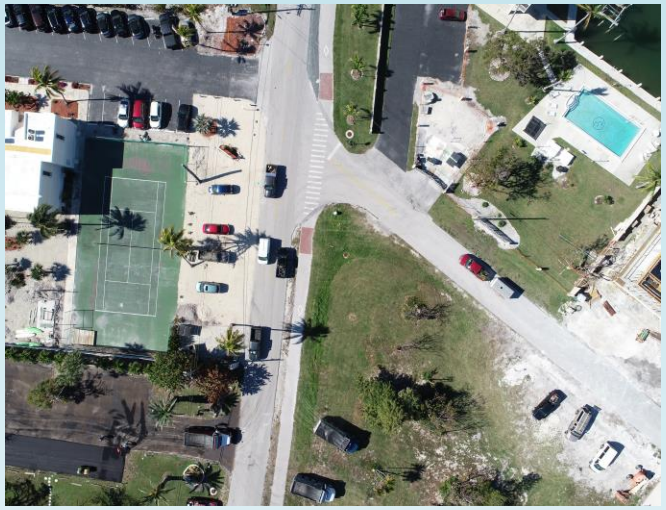
Task 1- Field Data and Modeling results







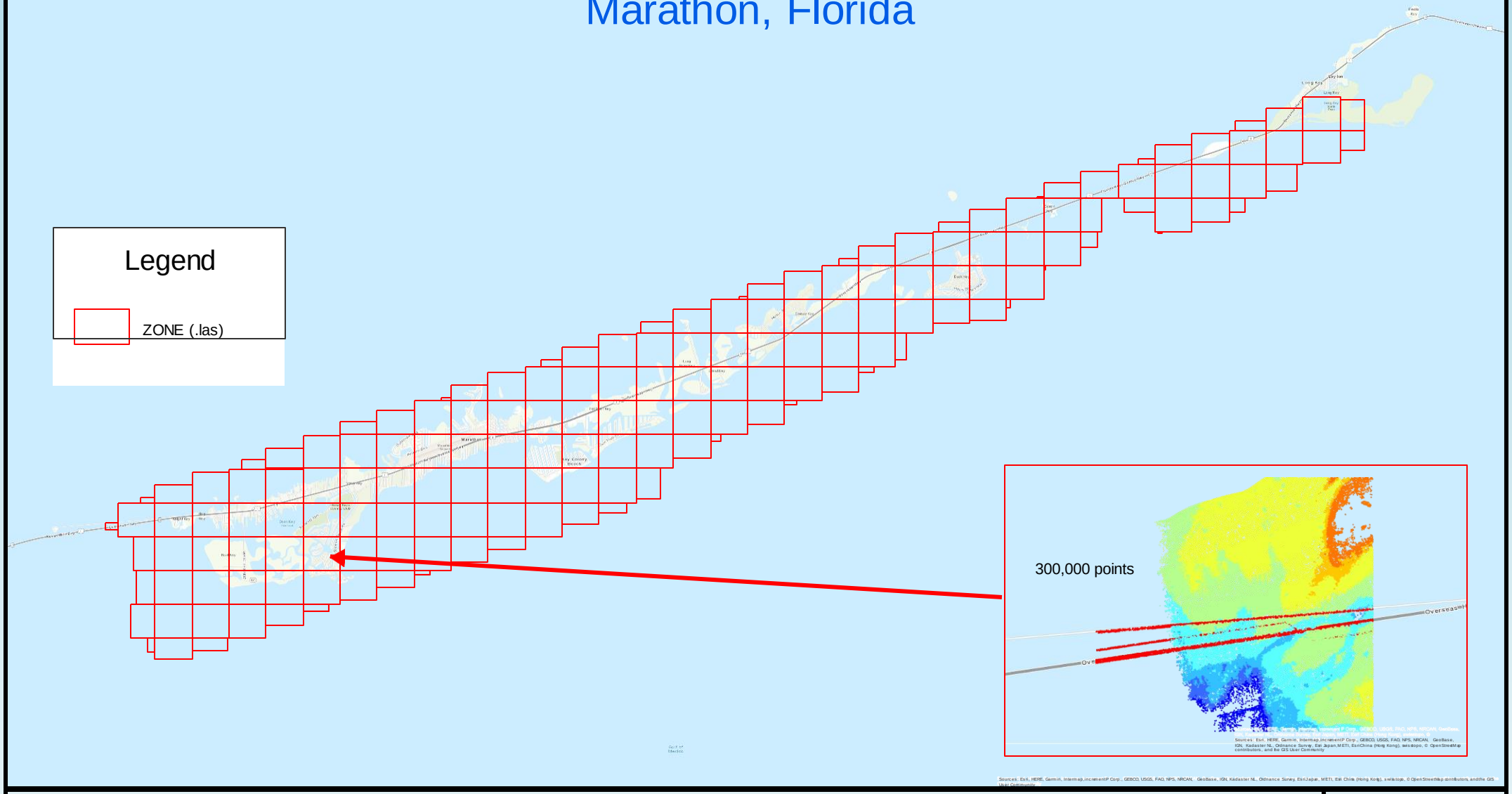
Field Data Collection- UAV

- Identify and create 50 acre zones throughout Marathon
- Program flight plans for each zone
  - Flight plans are put together at altitudes of approximately 200 feet amount to capture .4 resolution. Speed and overlap are also programmed at 75% and 10mph.
  - Specify NADIR (vertical) and Oblique (angled) imagery
    - NADIR imagery are images captured perpendicular to the ground
    - Oblique imagery is captured at angles (45 or 90) to generate Z value data
  - Specify imagery overlap to ensure no data is left out
  - File FAA waivers due to proximity to airport
  - Identify GCP (ground control points) that we will take coordinates from using a GPS or RTK sensor. GCPs will allow us to tag those points in the survey/imagery for accuracy (up to 1 cm)

Field Data Collection- UAV

- Executing flight plans
- Post Processing
  - Data is uploaded to produce a number of datasets
    - Use GCP's to accurately position model/topo spatially
    - Export data to useable filetypes
      - Digital elevation model
      - Orthomosaic aerial
      - Topography (contours, etc)
      - 3D model (OBJ and Point cloud)

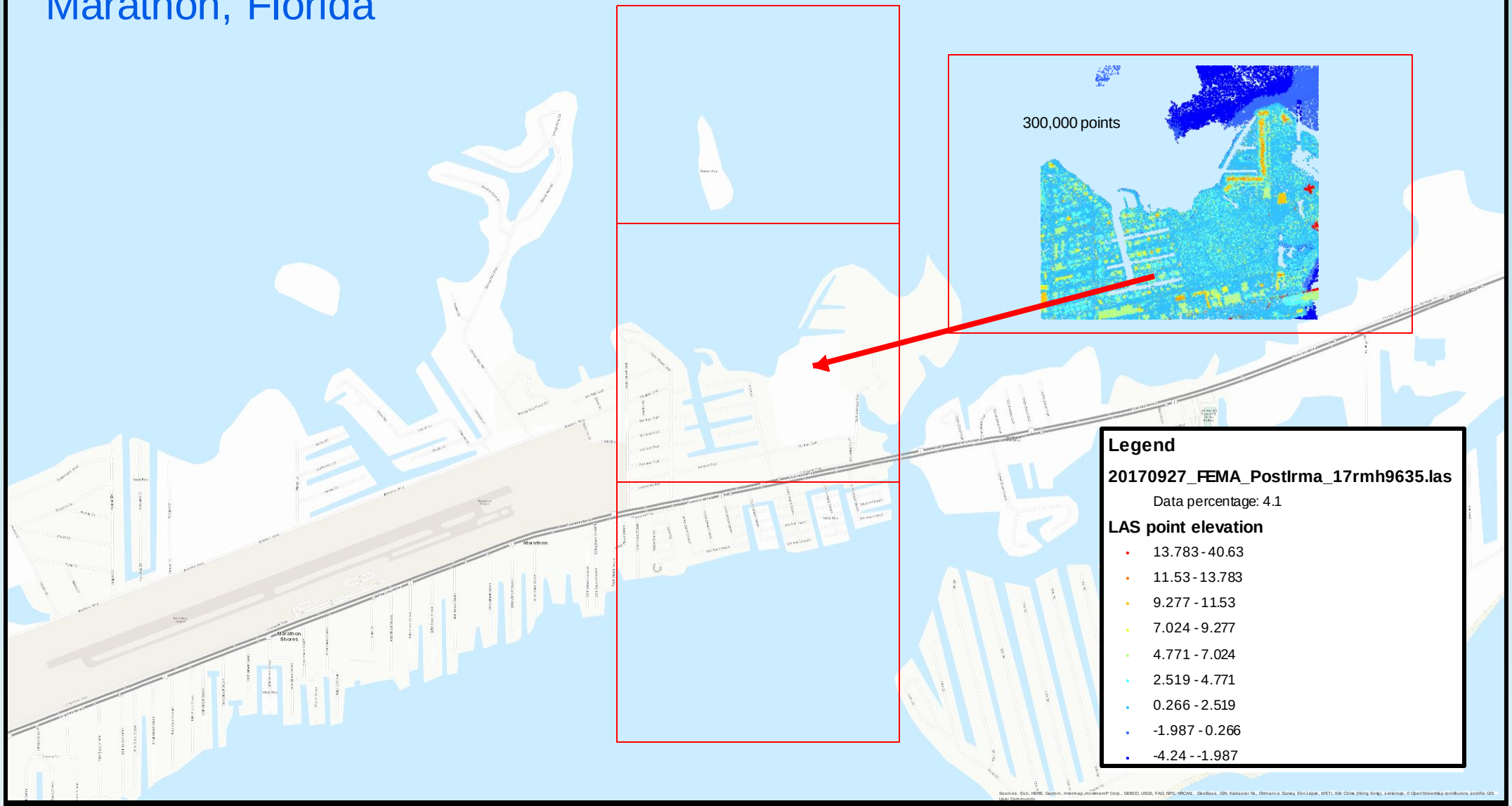
Marathon, Florida



Marathon Lidar Data - 171 Zones

3/14/2019

Marathon, Florida



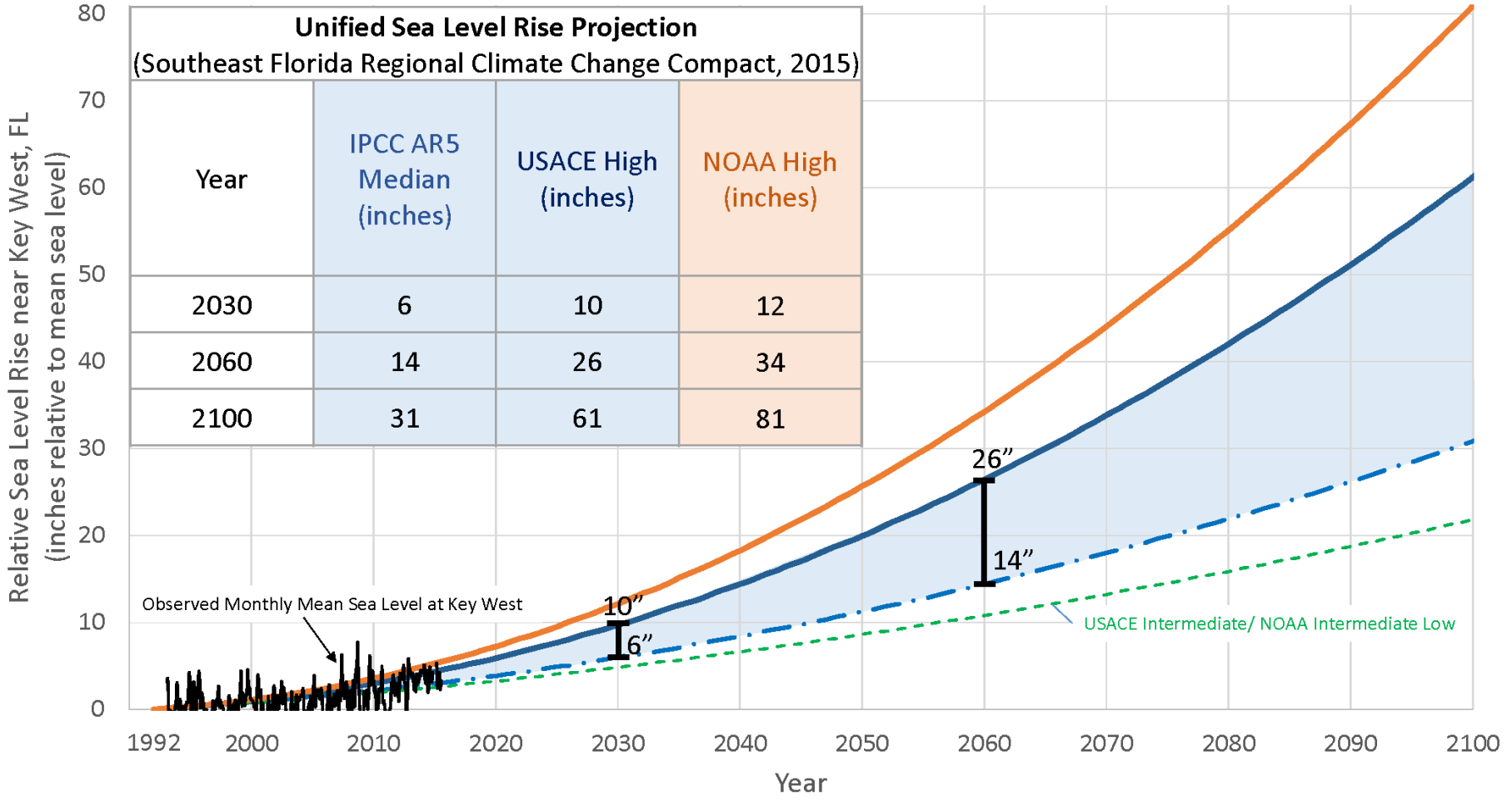
Marathon Lidar Data - Airport

3/14/2019

Sea Level Rise Projections

Unified Sea Level Rise Projection
(Southeast Florida Regional Climate Change Compact, 2015)

Year	IPCC AR5 Median (inches)	USACE High (inches)	NOAA High (inches)
2030	6	10	12
2060	14	26	34
2100	31	61	81



SOUTHEAST FLORIDA
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MODEL SCENARIO IPCC MHW 2030

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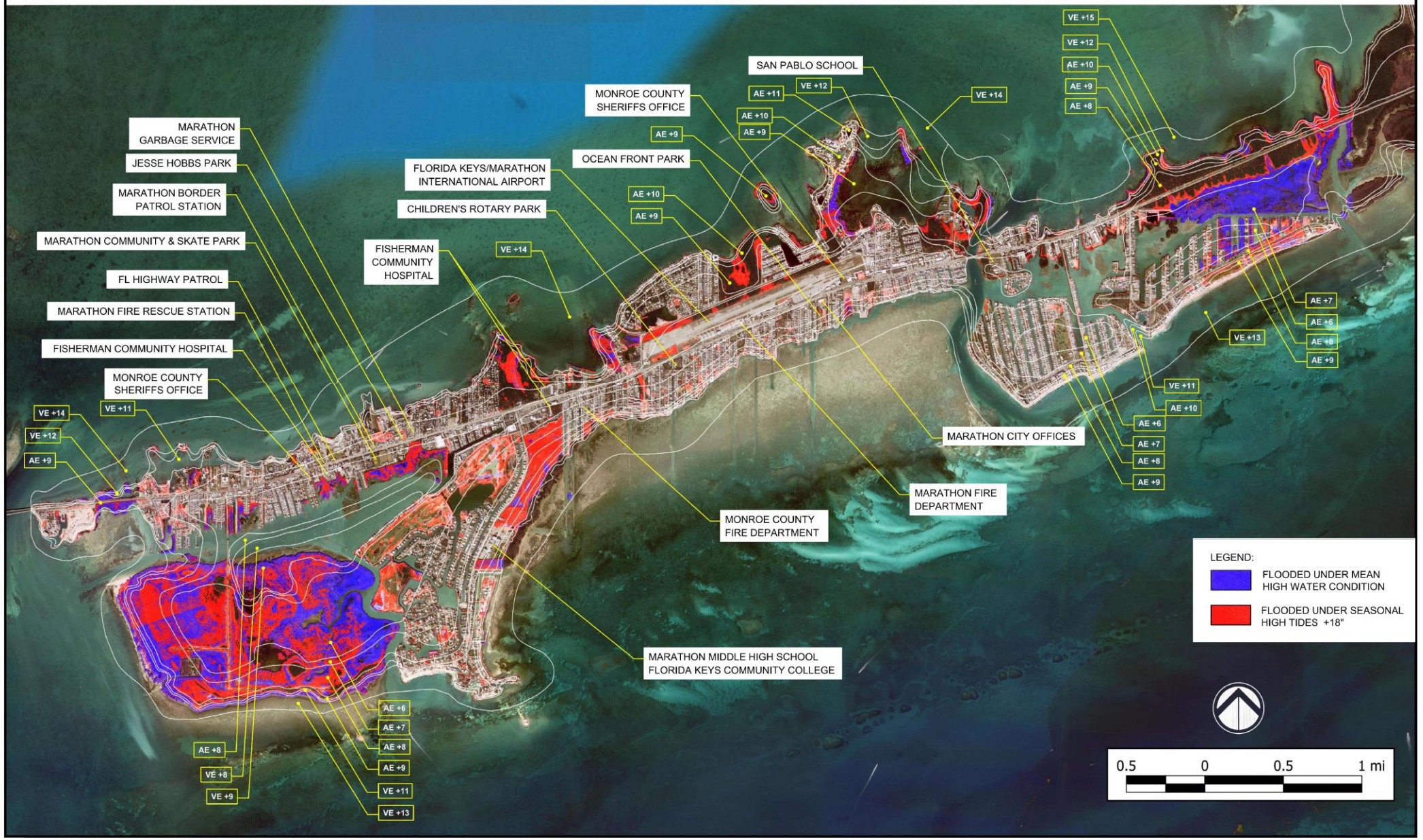
MODEL SCENARIO USACE MHW 2030



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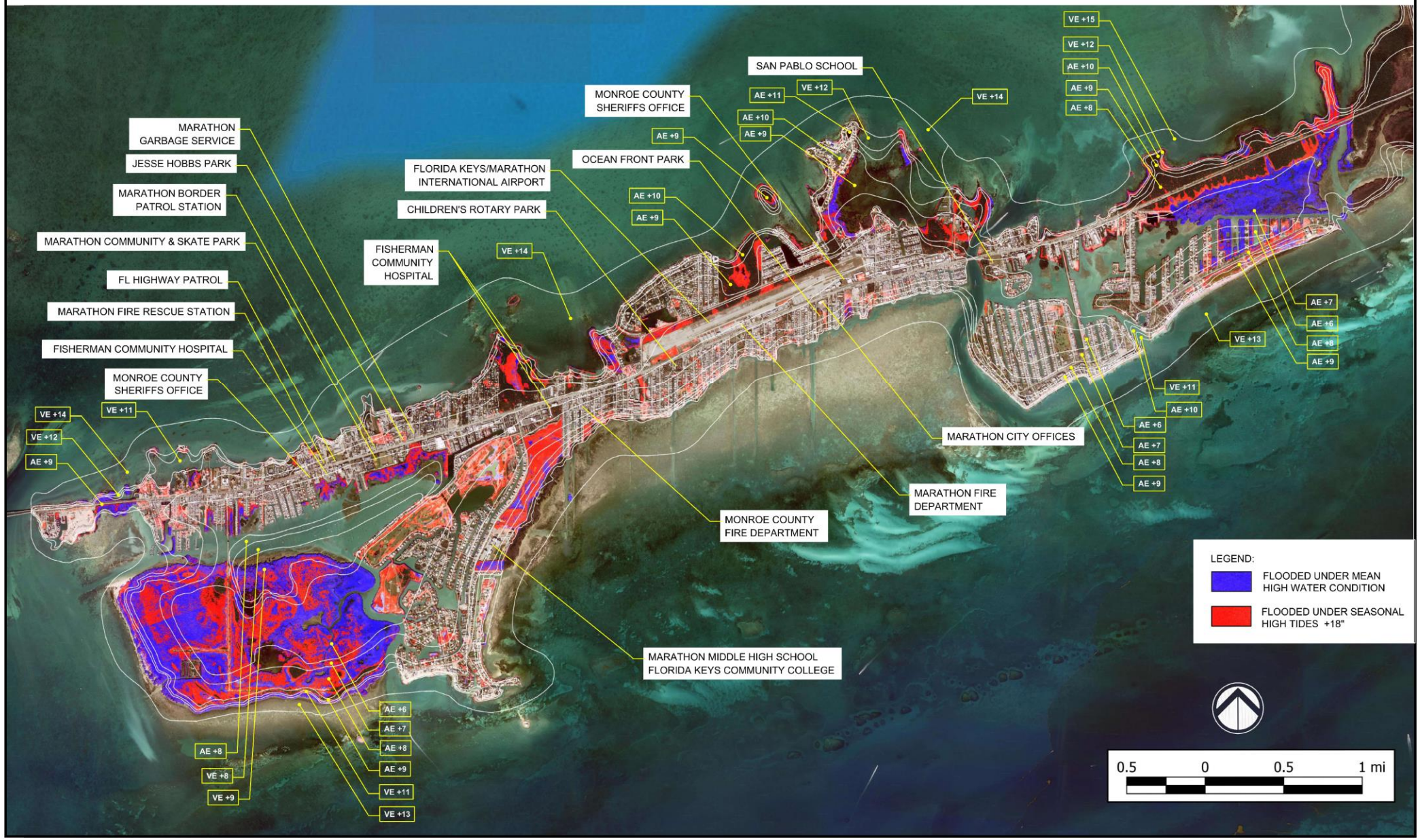
MODEL SCENARIO IPCC MHW 2060



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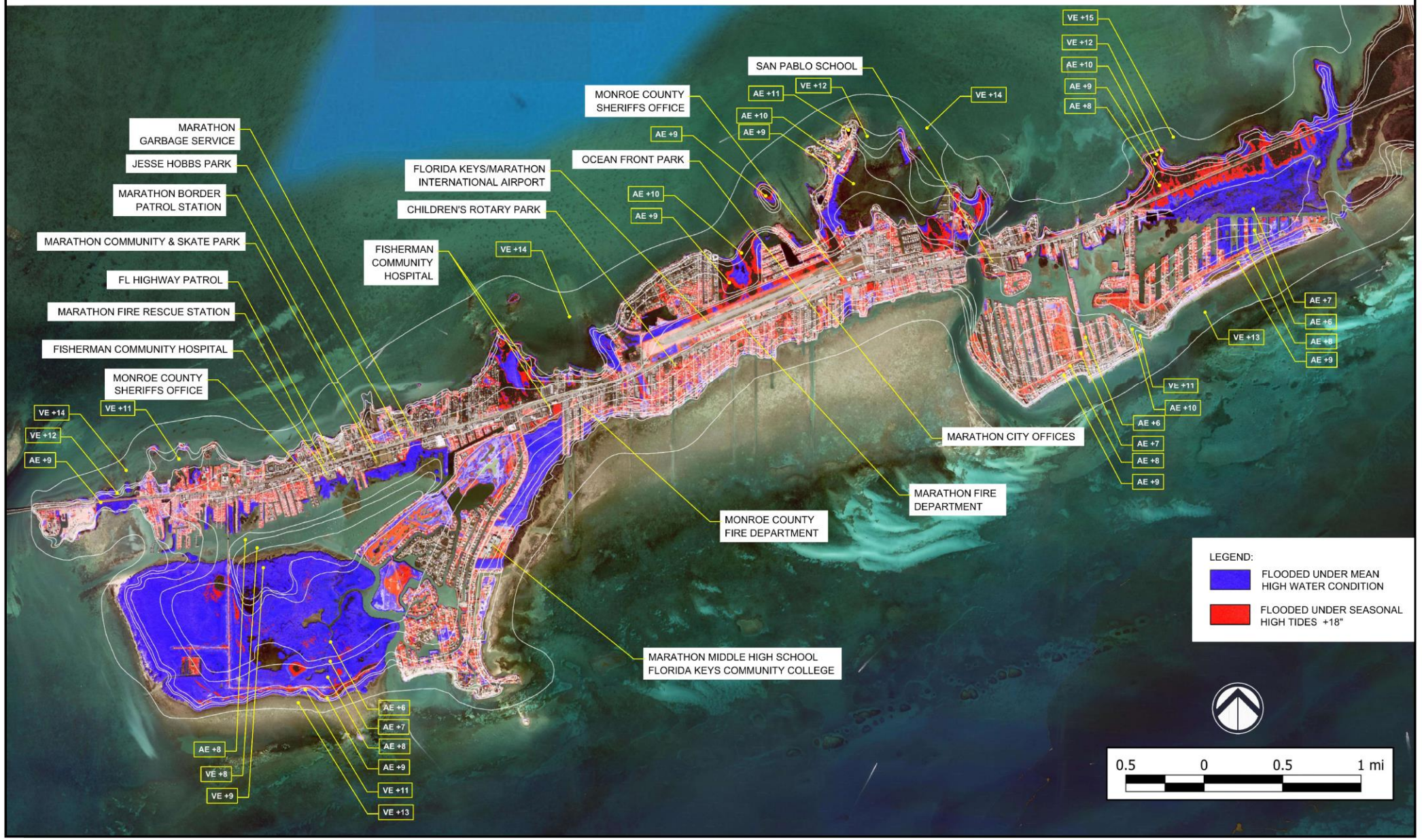

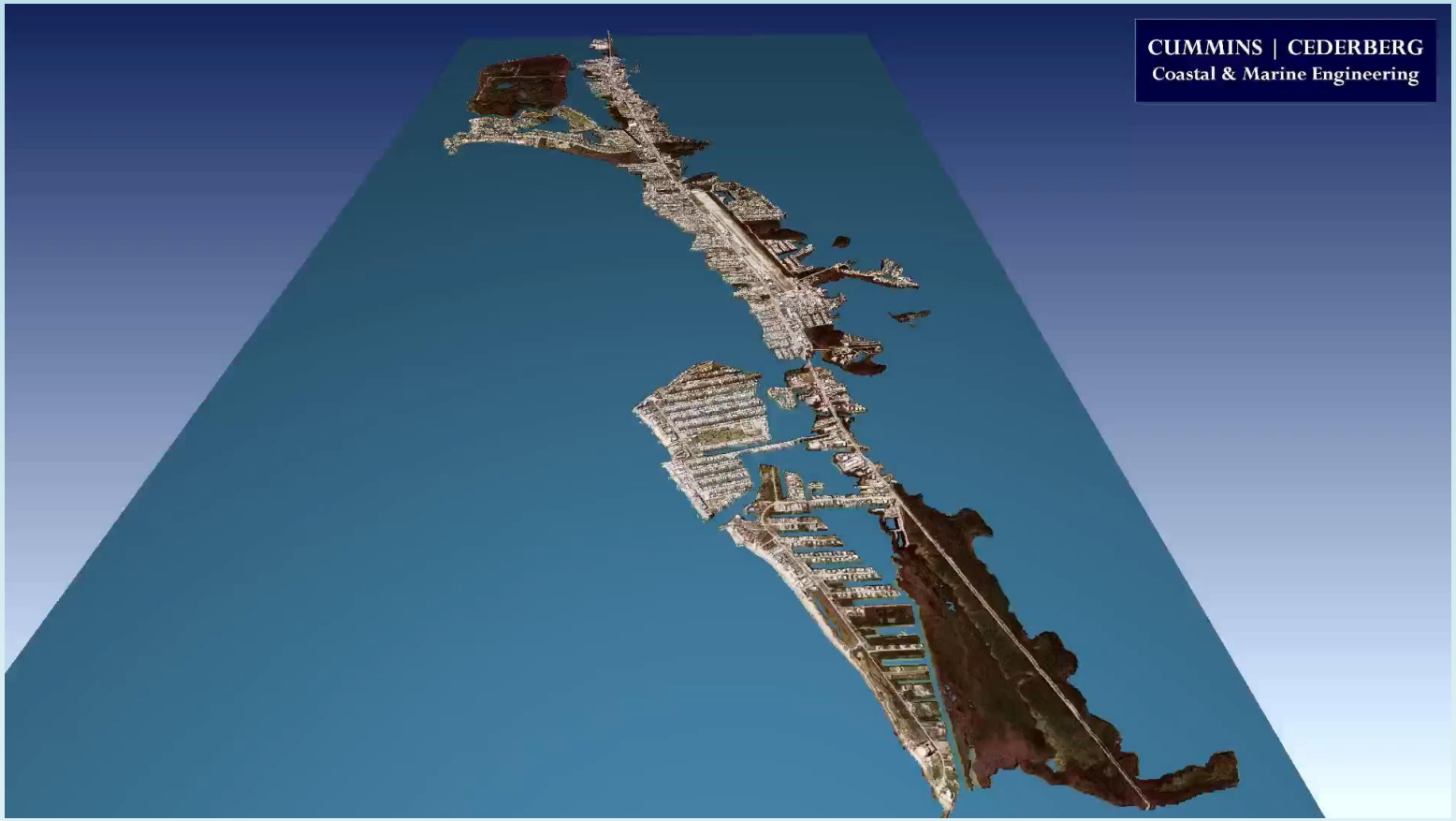
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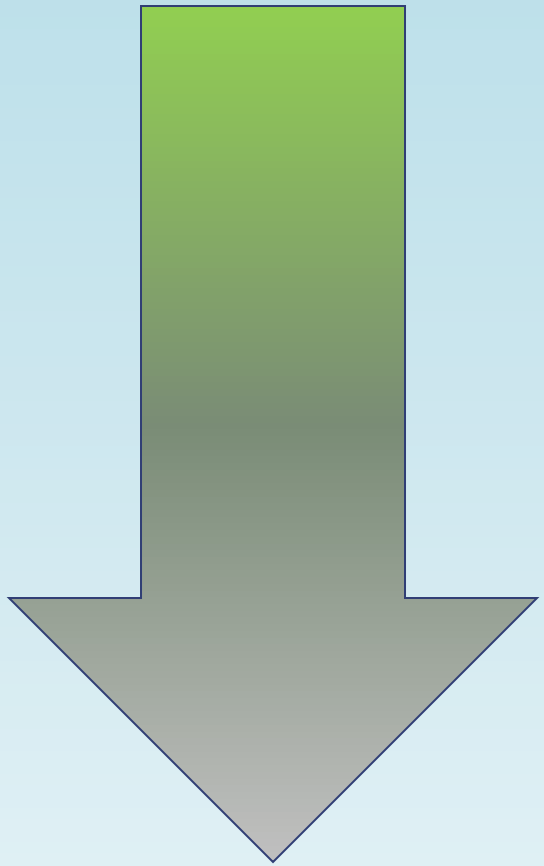
Task 3- Engineering Report

1. Identify adaptation strategies:
    I. Resiliency
    II. Protection
    III. Policy
    IV. Outreach
    V. Accommodation, Retreat, Avoidance
2. Ranking strategies
3. Recommendations

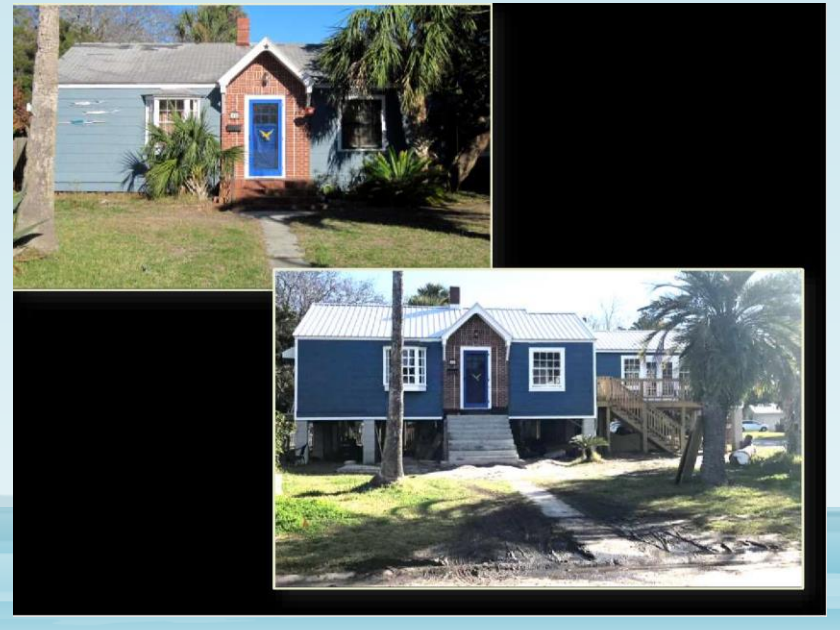
Tailoring Adaptation Strategies
From Green to Hard and Soft strategies

- Green infrastructures
- Living shorelines
- Elevation of infrastructures
- Flood-proof infrastructure
- Beach nourishment
- Shoreline armoring
- Seawalls
- Pump stations

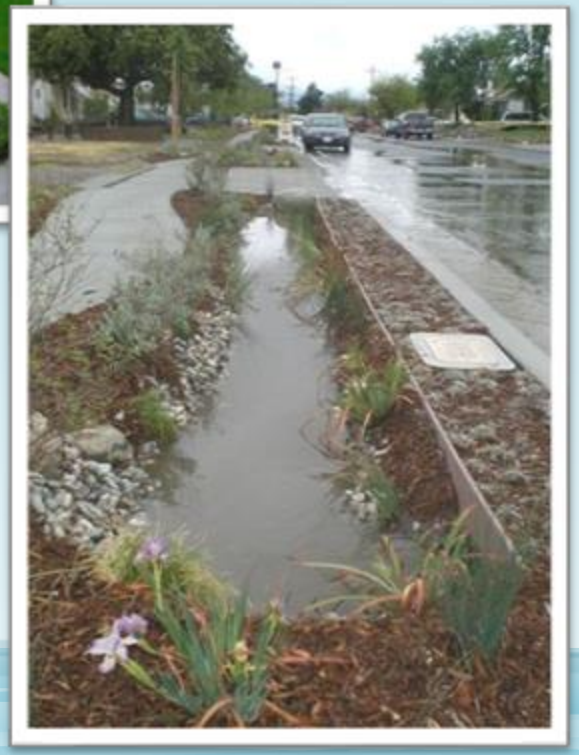


Resiliency/Green Strategies

- Green infrastructures
- Living shorelines
- Elevation of infrastructures
- Flood-proof infrastructure

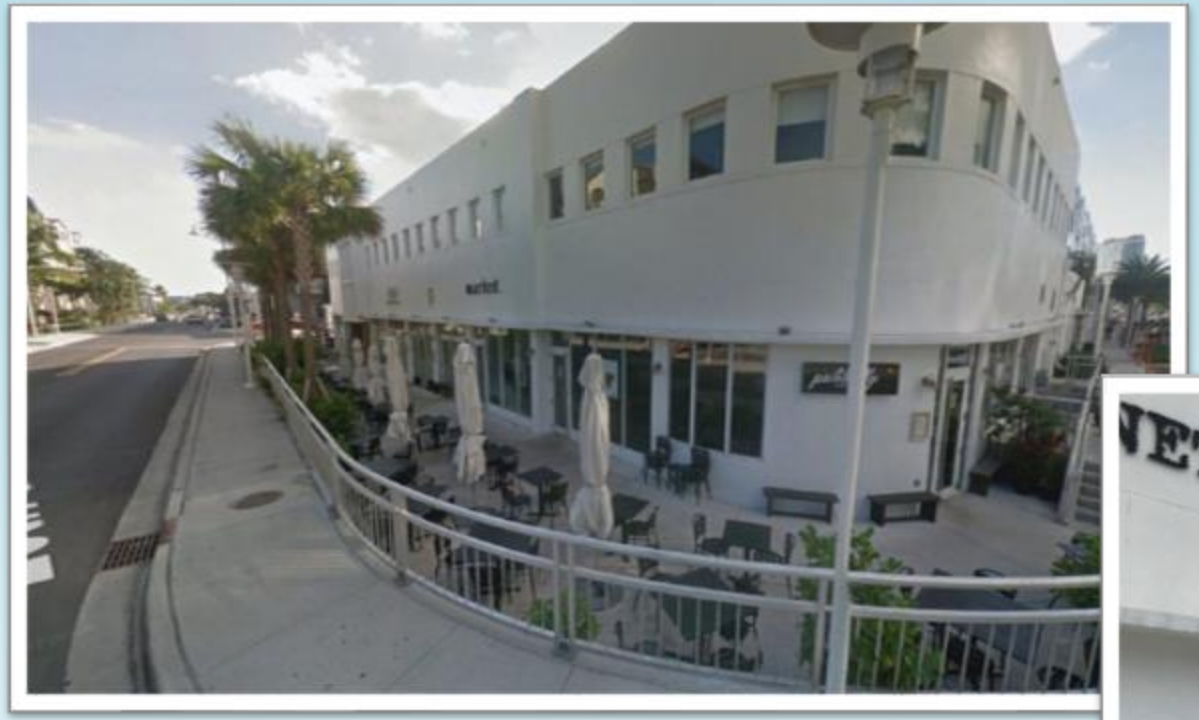


Green Infrastructure



Living Shorelines

Raise streets/buildings/infrastructure



Flood proofing infrastructure

Protection/Hard and soft strategies

- Beach nourishment
- Shoreline armoring
- Seawalls
- Pump stations

Beach Nourishment

Shoreline armoring

Sea walls

Flood pumps

Ranking criteria

Environmental	**Environmental Impacts**
	Adaptation
	Green Technology
	Susceptibility to Flooding
Financial	**Capital Cost**
	O&M
	Permit Complexity
	Construction Impacts
Social	**Public Acceptability**
	Aesthetics
	Reliability
	Operational Flexibility

Questions to Ask When Developing Policy

- How much more flooding is expected?
- What are the major pathways for future flooding?
- How will infrastructure vulnerability to flooding change?
- How will sea-level rise and extreme weather events impact water infrastructure?

Peril of Flood §163.3178, Florida Statutes

(2) **Each coastal management element shall contain**

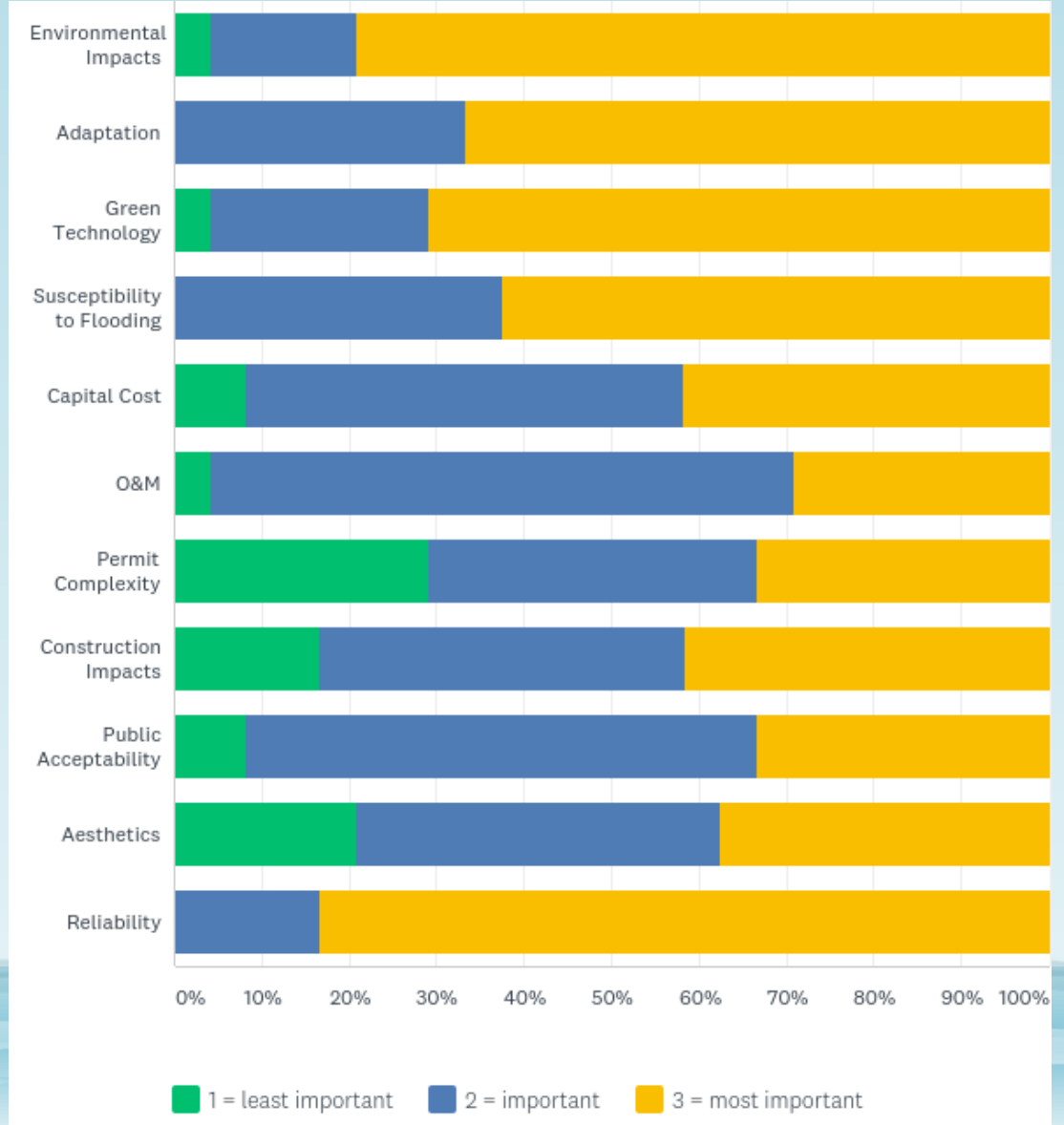
(f) A redevelopment component that outlines the principles that must be used to eliminate inappropriate and unsafe development in the coastal areas when opportunities arise. The component must:

1. Include development strategies, and engineering solutions that reduce the flood risk in coastal areas
2. Encourage the use of best practices that will result in the removal of coastal property from flood zones
3. Identify site development techniques that may reduce losses due to flooding
4. Be consistent with the flood-resistant construction requirements in the Florida Building Code
5. Require that any construction activities seaward of the coastal construction control lines established pursuant to s. 161.053 be consistent with chapter 161.
6. Encourage local governments to participate in the National Flood Insurance Program Community Rating System

Outreach meetings

Q10: From 1-3, please rank the following factors based on the GREEN INFRASTRUCTURES resilient alternative.

- Answered: 24 Skipped: 1



Recommendations

- Examine and address the role of insurance rates and availability.
- Leverage a strategy for economic development.
- Public Outreach. Gather information and build partnerships to raise public awareness and educate local residents, business owners, property managers, real estate professionals, and elected officials about the impact of sea level rise and flooding conditions.

Recommendations

- Determine the condition and service life of the existing shoreline.
- Research and enact planning policies that will mitigate the impact of stormwater drainage in both urban and coastal areas.
- Determine the environmental and economic impacts of raising roads, public areas, and other critical infrastructures.
- Develop a strategy for budgeting the monetary costs for adaptation. Specifically, research grants, allocations, and public incentives that will motivate homeowners and businesses to invest in adaptation.

Suggestion for Peril of Flood Compliant Provisions

- Incorporate “sea-level rise” in relevant objectives in the Conservation Element
- Include consideration of high tide flooding events (e.g. “king tides”)
- Add additional freeboard to the base flood elevation
- Creation of Adaptation Action Area

Recommendations- Next Steps

- Establish a proactive **Adaptation Action Plan**
- Identify the best solution, costs and effectiveness
- Determine condition of existing shoreline.
- Mitigate the impact of stormwater drainage
- Determine **environmental and economic impacts**

Recommendations- Next Steps

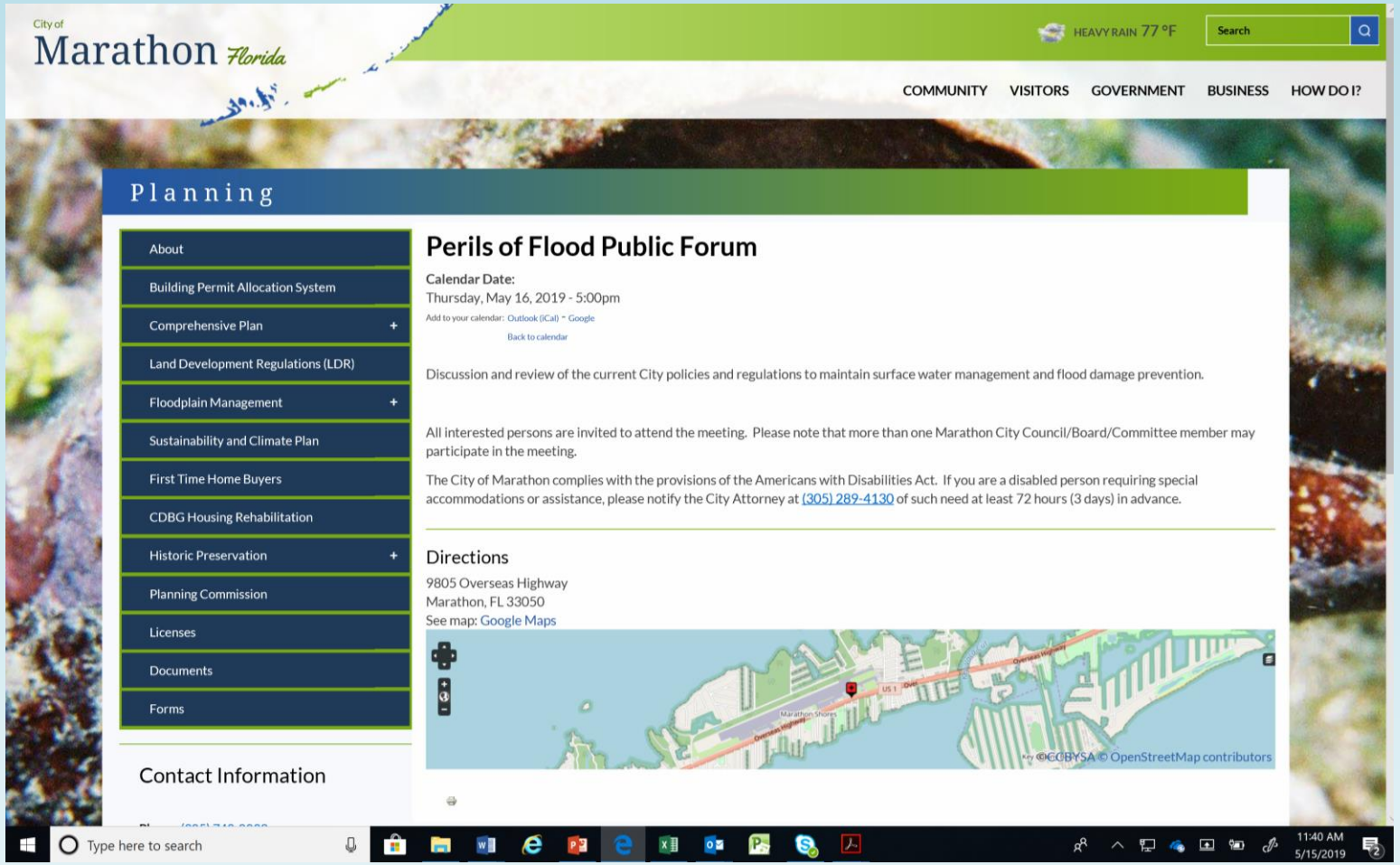
Identify the impact of SLR into the city infrastructure using GIS

Recruiting businesses focused on sea level rise and resiliency

Raise public awareness on impacts of SLR

Q&A

Q&A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Perils of Flood Public Forum
Calendar Date:
Thursday, May 16, 2019 - 5:00pm
Add to your calendar: Outlook (iCal) ~ Google
Back to calendar
Discussion and review of the current City policies and regulations to maintain surface water management and flood damage prevention.
All interested persons are invited to attend the meeting. Please note that more than one Marathon City Council/Board/Committee member may participate in the meeting.
The City of Marathon complies with the provisions of the Americans with Disabilities Act. If you are a disabled person requiring special accommodations or assistance, please notify the City Attorney at (305) 289-4130 of such need at least 72 hours (3 days) in advance.
Directions
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