05.12.2021

LAND REGULATORY RESPONSE TO SEA-LEVEL RISE

FINAL REPORT AND KEY RECOMMENDATIONS

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fccd+r florida center for community design and research

City of Tampa Florida

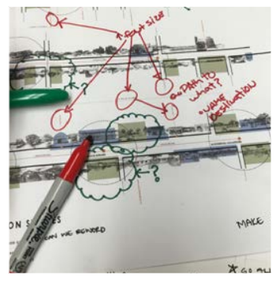
THE FLORIDA CENTER FOR COMMUNITY DESIGN + RESEARCH

The Florida Center's mission is to assist the citizens of Florida in the creation of more livable and sustainable communities.

History
The Florida Center has worked with over 100 communities on more than 150 projects.





SEA-LEVEL RISE

“In the next century, the majority of America’s publicly owned tidal shorelines could be replaced by a wall, not because anyone decided that this should happen but because no one decided that it should not.”

- James Titus, from Rising Seas, Coastal Erosion, and the Takings Clause: How to Save Wetlands and Beaches Without Hurting Property Owners (1998)

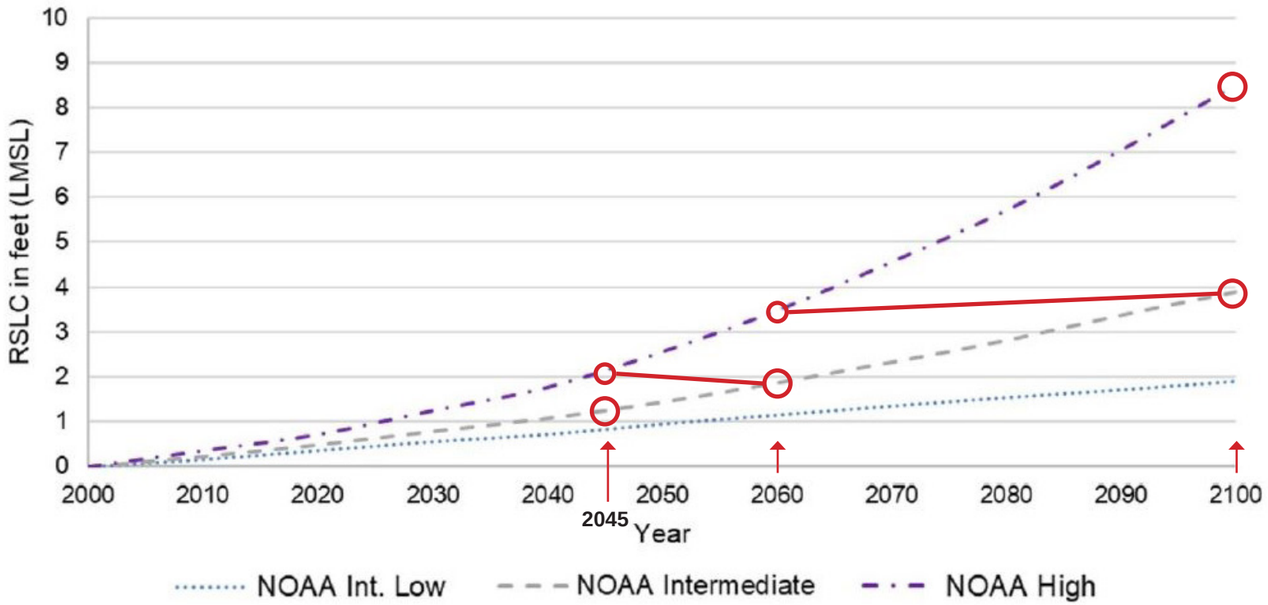
Final results of this study are *recommendations*, not enacted policy.

SEA-LEVEL RISE

ANALYSIS

SEA-LEVEL RISE

Sea-level Rise Projections



Sea-level rise projections from the Tampa Bay Regional Resiliency Coalition's Climate Science Advisory Panel recommendations (2019).

2045 Intermediate: 1.26'

2045 High / 2060 Intermediate: 1.87'

2060 High / 2100 Intermediate: 3.90'

2100 High: 8.50'

Scenarios used for this study. Elevation gain is from the year 2000.

SEA-LEVEL RISE

According to the Recommended Projections of Sea Level Rise in the Tampa Bay Region report (CSAP, 2019), the heights and likelihood of each scenario are as follows:

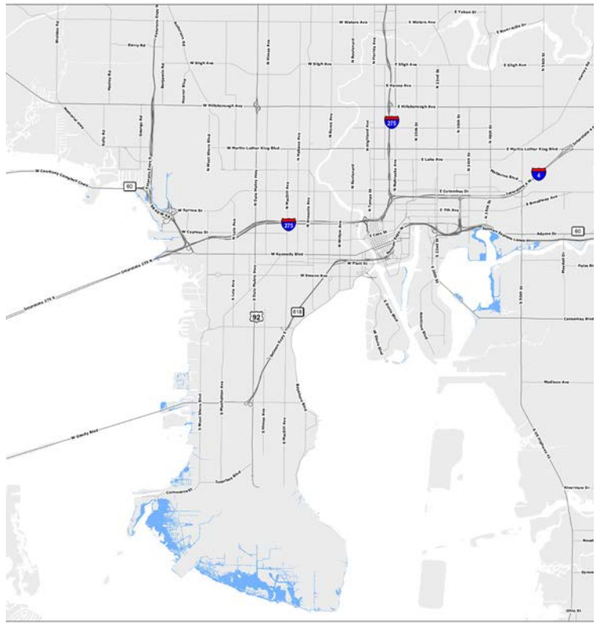
- **“NOAA Intermediate Low (1.9 feet by 2100): This scenario represents a slight increase in the rate of SLR. Low end of very likely range if greenhouse gas emissions continue current trends (RCP8.5).**

- **NOAA Intermediate (3.9 feet by 2100): This scenario represents a moderate increase in the rate of SLR. High end of likely range if greenhouse gas emissions continue current trends (RCP8.5).**

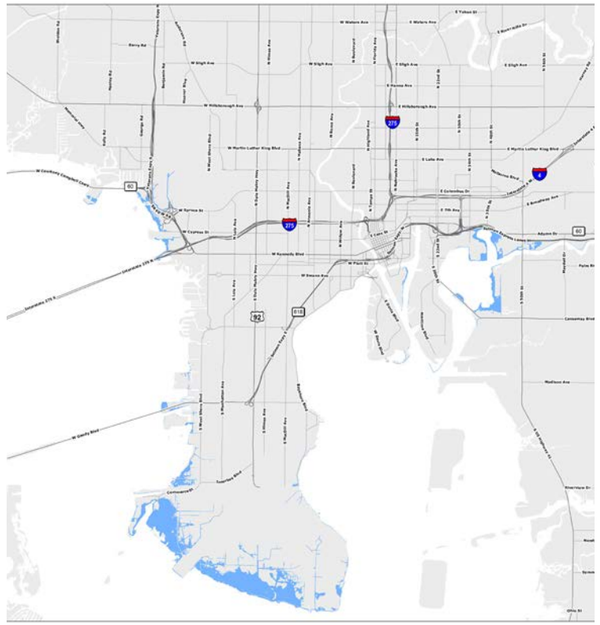
- **NOAA High (8.5 feet by 2100): This scenario represents a significant increase in the rate of SLR. High end of very likely range if greenhouse gas emissions continue current trends (RCP8.5) and when accounting for possible ice sheet instabilities.” (CSAP, 2019)**

SEA-LEVEL RISE

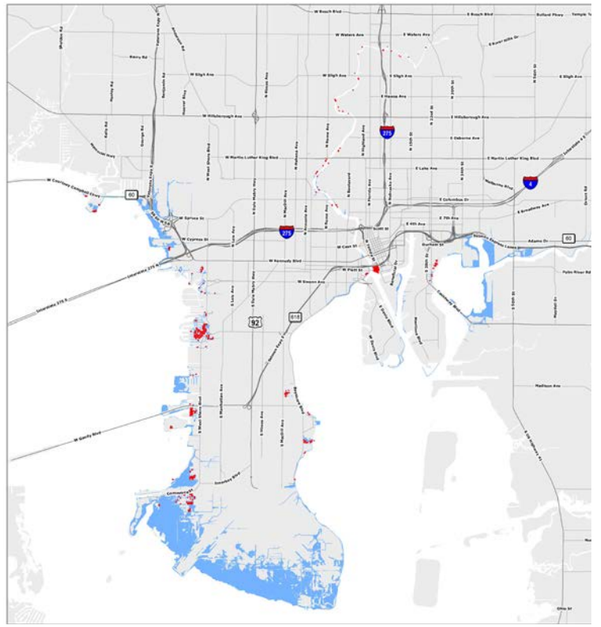
Sea-level Rise Scenarios



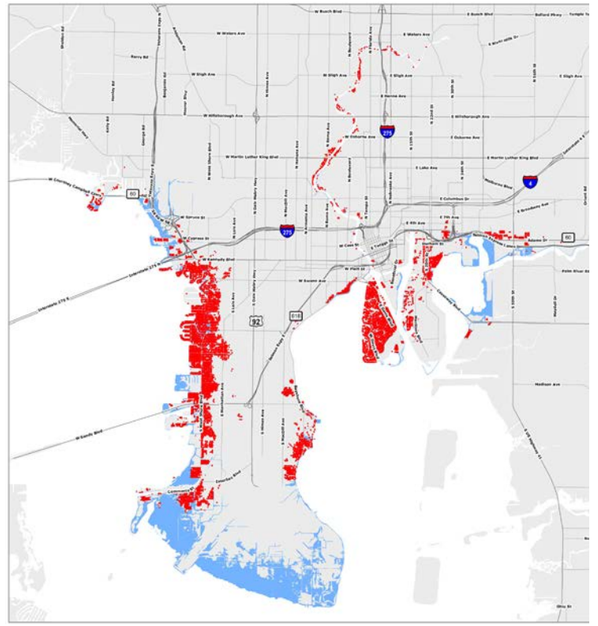
2045 Intermediate (1.26’ SLR)



2045 High / 2060 Int. (1.87’ SLR)



2060 High / 2100 Int. (3.90’ SLR)



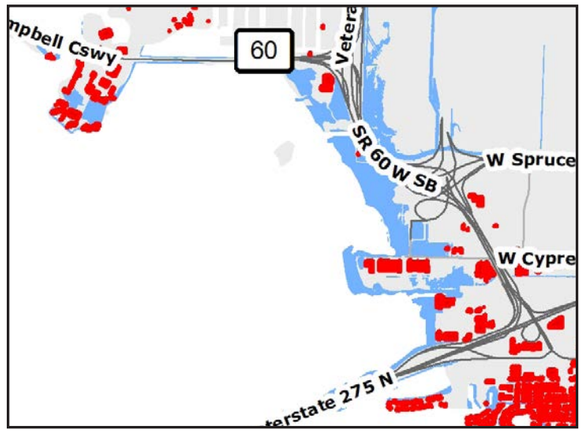
2100 High (8.50’ SLR)

Sea-level rise projections from the Tampa Bay Regional Resiliency Coalition’s Climate Science Advisory Panel recommendations (2019).

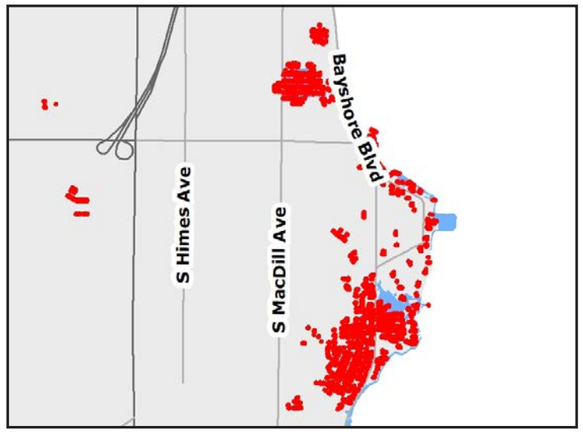
http://www.tbrpc.org/wp-content/uploads/2019/05/CSAP_SLR_Recommendation_2019.pdf

SEA-LEVEL RISE

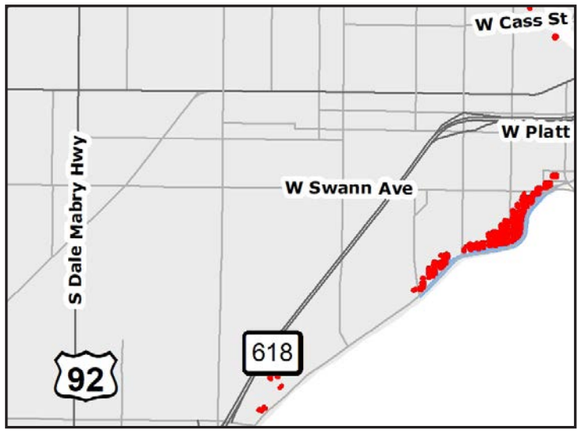
Spatial Characterization of Vulnerable Properties



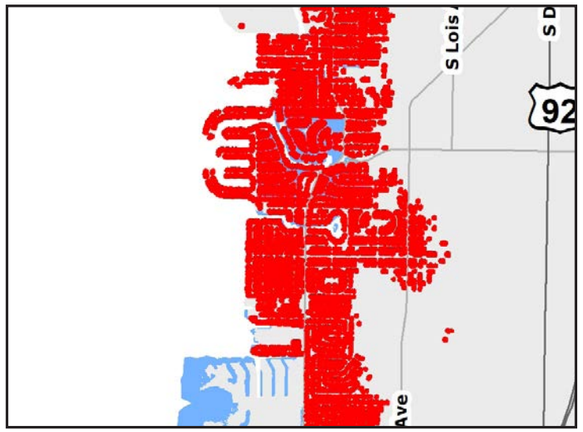
***'Dispersed' properties**, near Fish Creek. All scenarios shown are the 2100 High at the same scale.*



***'Clustered' properties**, near Ballast Point.*



***'Linear' properties**, near Spanishtown Creek, northern Bayshore Boulevard.*

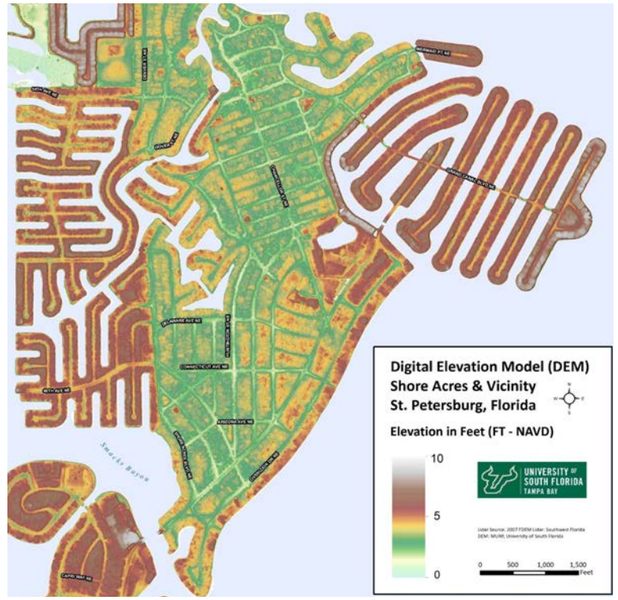


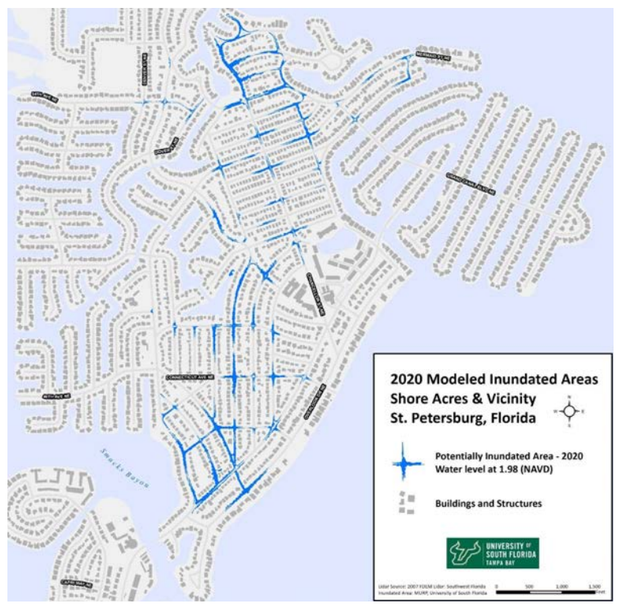
***'Saturated' properties**, near John Branch and South West Shore Boulevard.*

SEA-LEVEL RISE

Seasonal High Tide Flooding:
Shore Acres Neighborhood, St. Petersburg, Florida

Elevation map/model



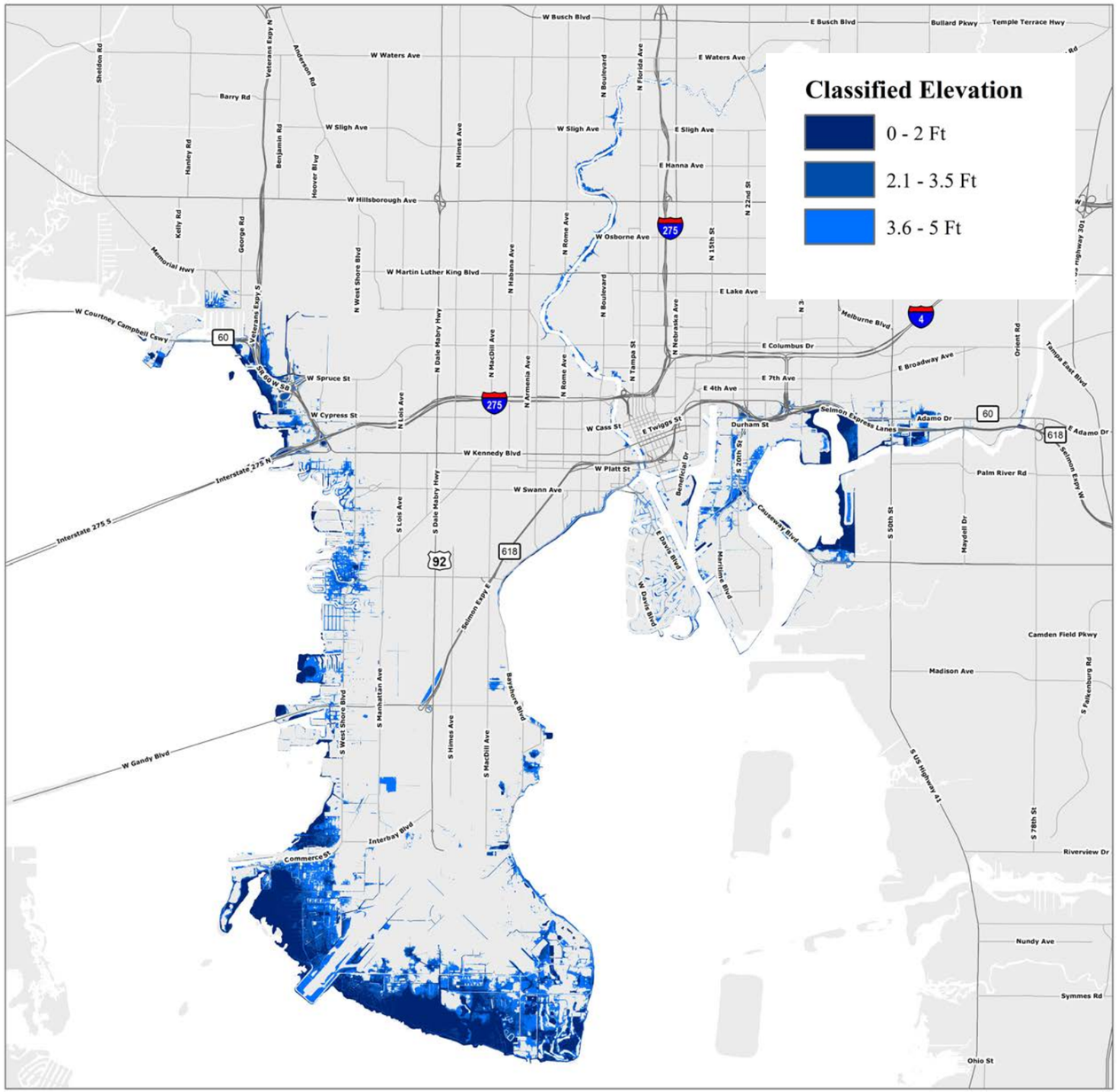


2020 Flooded Areas

Images from 'Modeling Sea-level Rise with Tidal Floods in Shore Acres Neighborhood of St. Petersburg,' showing seasonal flooding from high tides in September, 2020 (Fernandez, 2020).

SEA-LEVEL RISE

Current LIDAR Elevations



Potential seasonal flooding, now and in the next 20-80 years

2020

30 Years

60 Years

Year	NOAA Int-Low (feet)	NOAA Intermediate (feet)	NOAA High (feet)
2000[3]	0	0	0
2030	0.56	0.79	1.25
2040	0.72	1.08	1.77
2050	0.95	1.44	2.56
2060	1.15	1.87	3.48
2070	1.35	2.33	4.56
2080	1.54	2.82	5.71
2090	1.71	3.38	7.05
2100	1.90	3.90	8.50

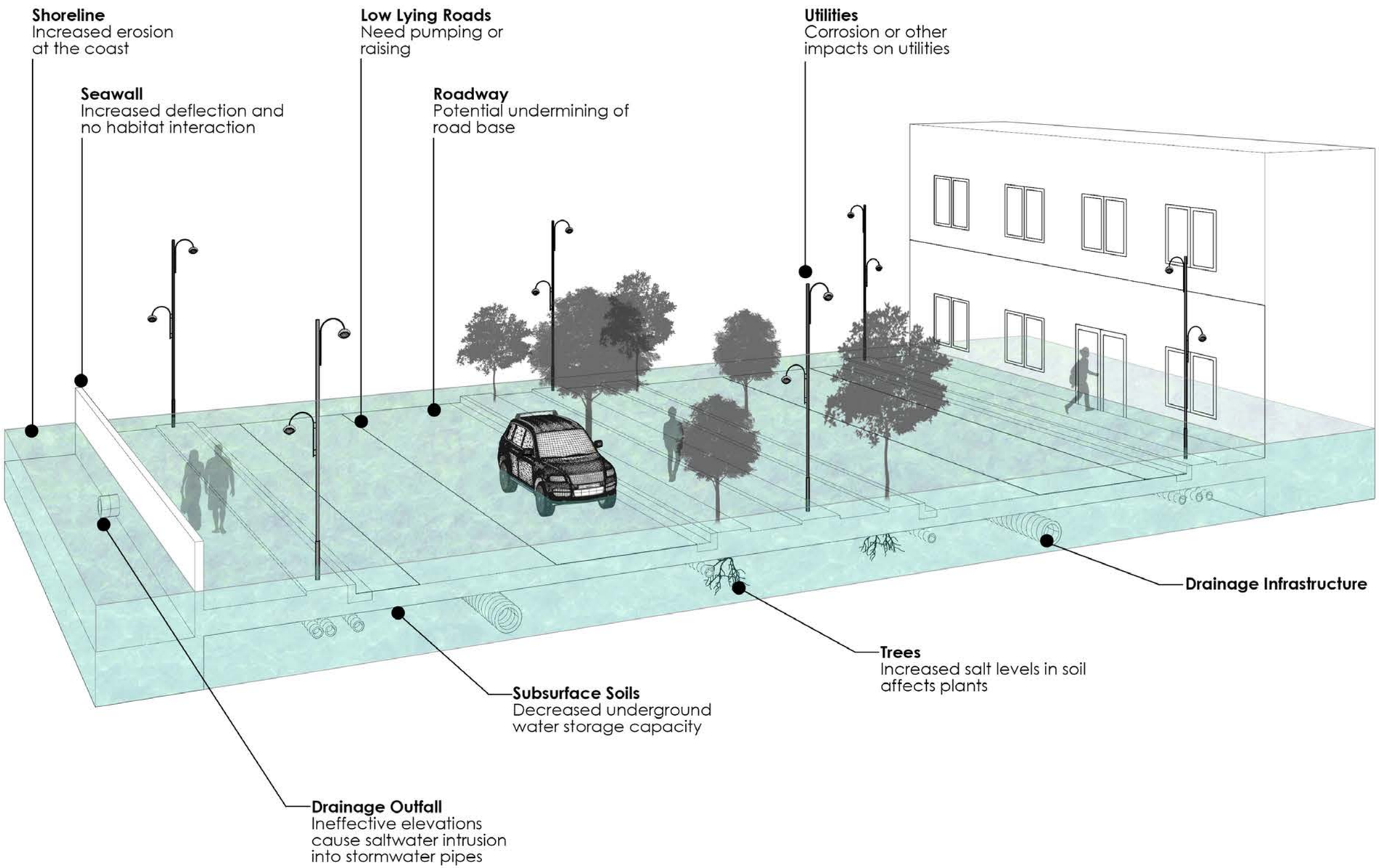
CSAP projections chart (2019)

(Left) Areas that may possibly be experiencing high tide flooding (in darkest blue), or where this type of flooding can be expected in the near future.

(Above Right) The projected flood scenarios from the Climate Science Advisory Panel (CSAP, 2019), highlighting elevations that may be associated with seasonal floods.

SEA-LEVEL RISE

Initial Impacts



SEA-LEVEL RISE

TYPES OF POLICY

SEA-LEVEL RISE

City-wide Policy

FEMA Flood Zones

Overlay Zones

SEA-LEVEL RISE

KEY RECOMMENDATIONS

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1. Building Toward the Future

Tampa Riverwalk

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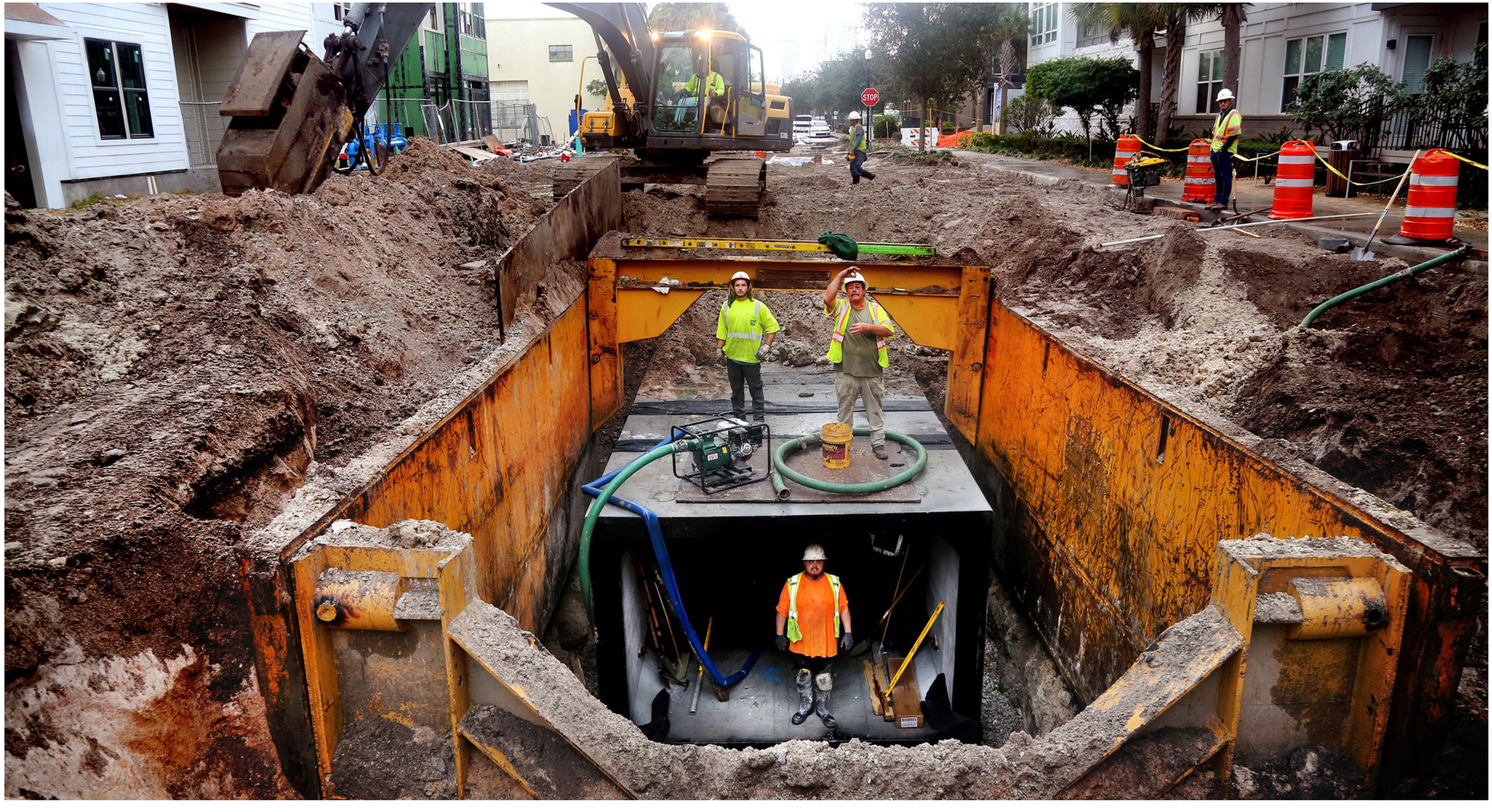
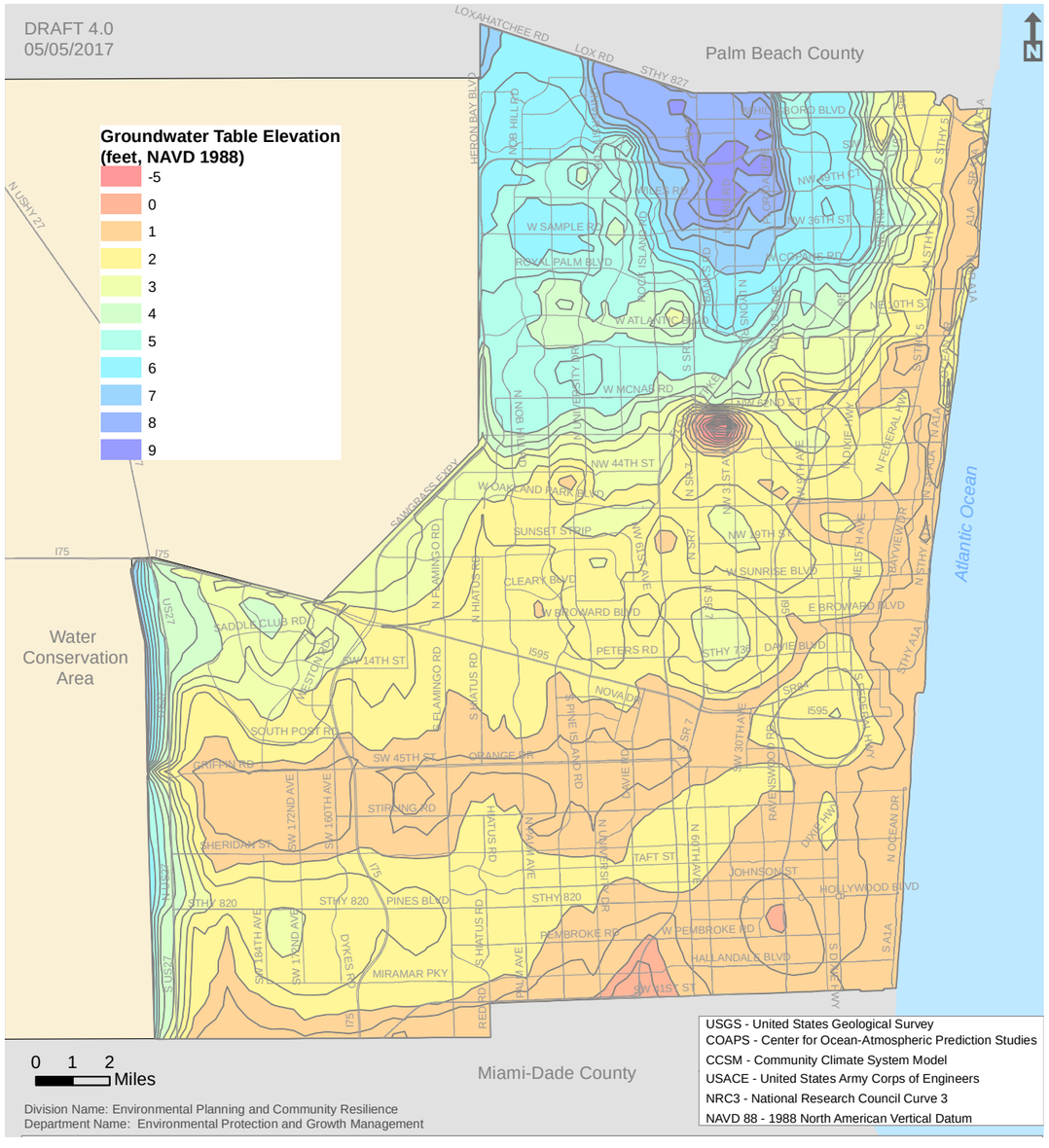
1. Building Toward the Future



Stormwater pipes. Image by Douglas R. Clifford, Tampa Bay Times. https://www.tampabay.com/news/tampa/2020/12/27/tampa-addresses-chronic-flooding-as-climate-challenges-loom/

KEY RECOMMENDATIONS

1. Building Toward the Future

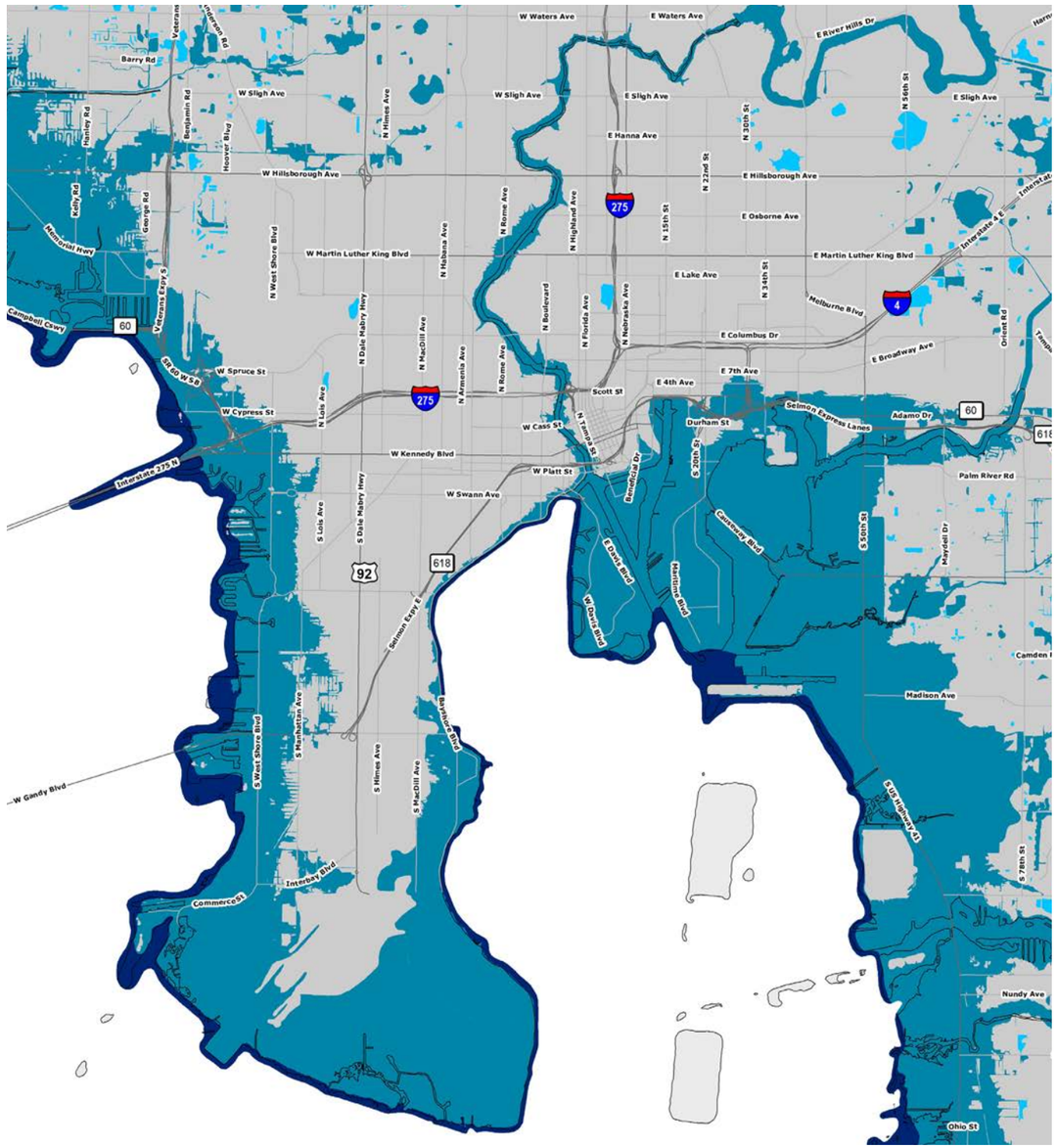


Broward County 'Future Conditions Average Wet Season Groundwater Elevation Map' (2017)

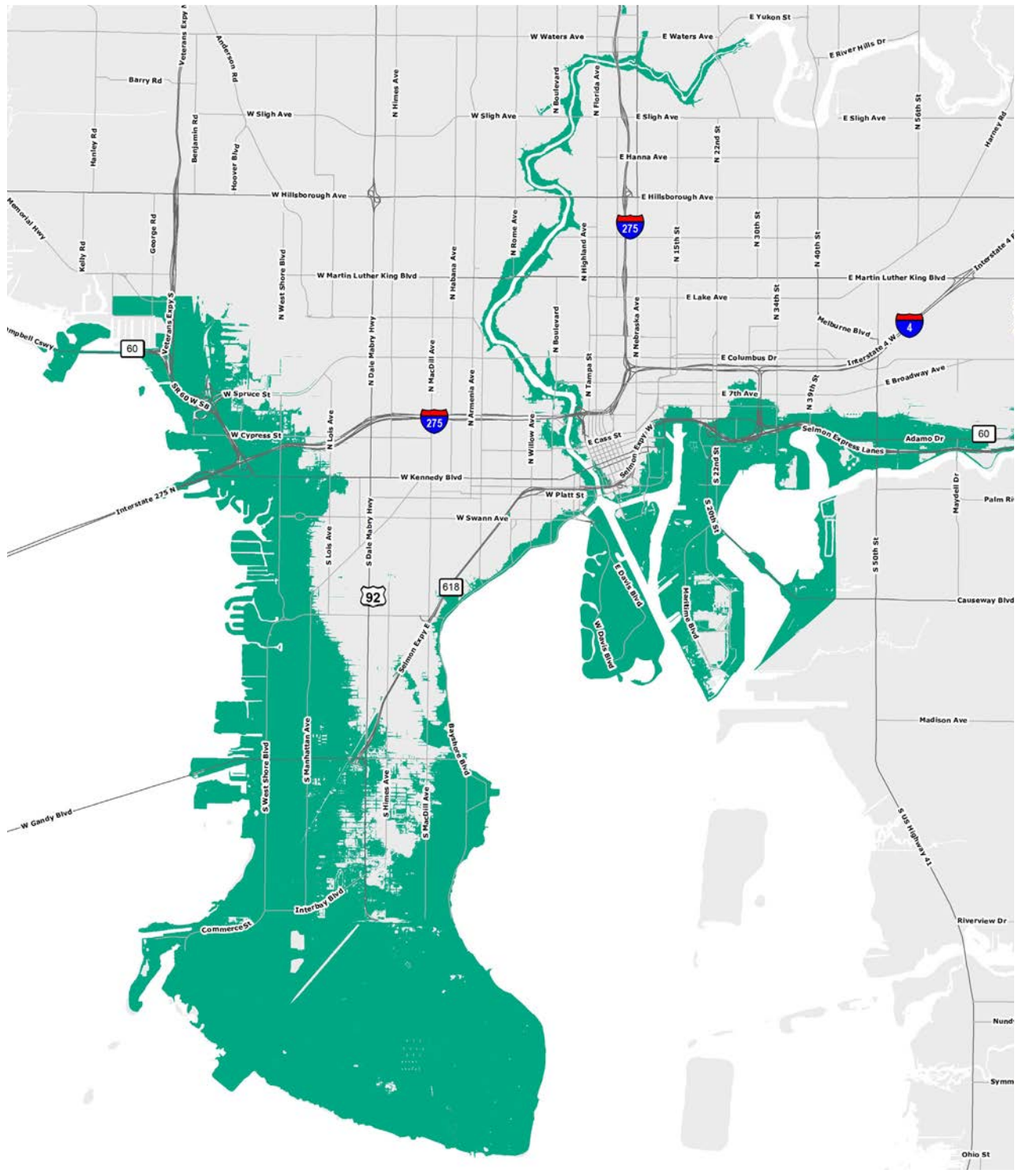
Typical drainage pond

KEY RECOMMENDATIONS

1. Building Toward the Future



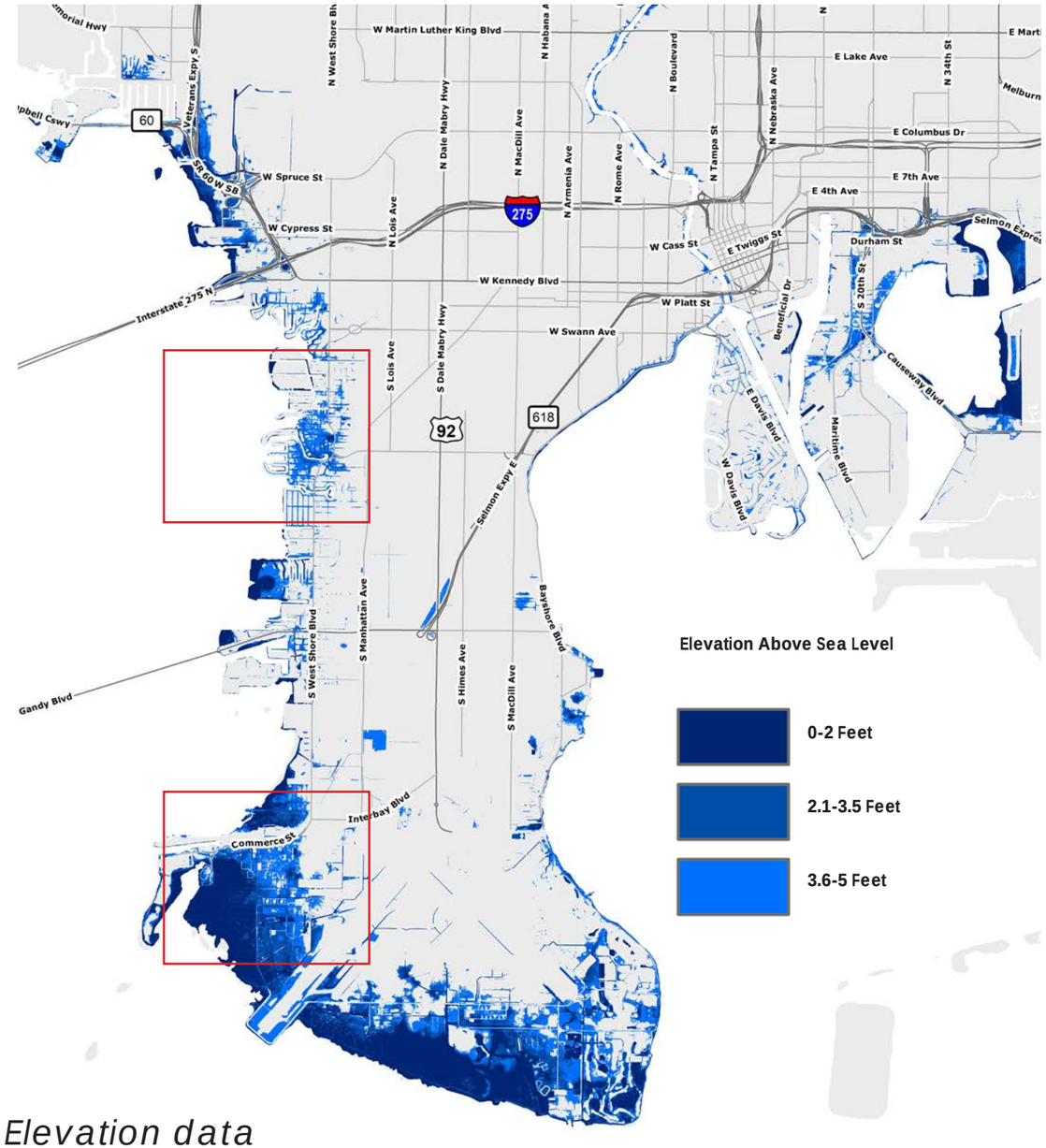
Current FEMA Flood Zones

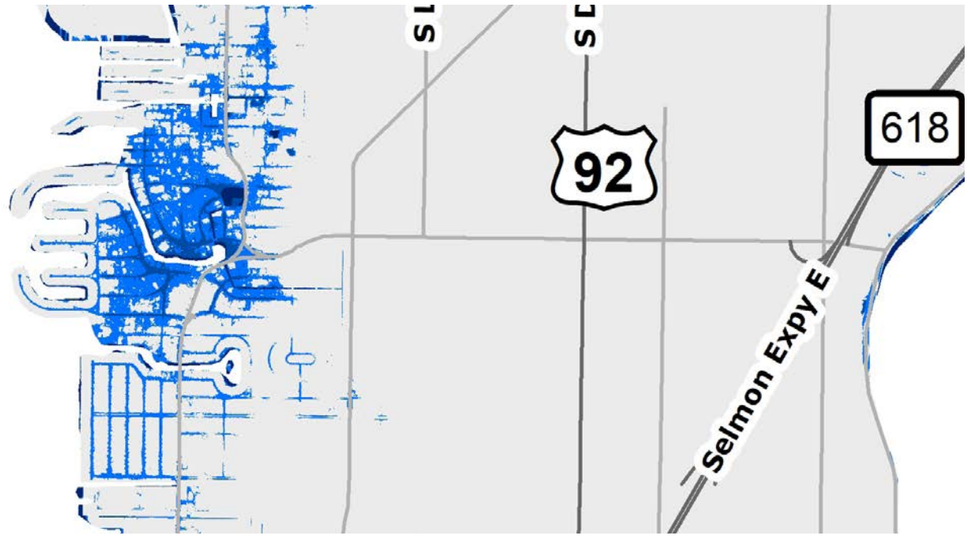


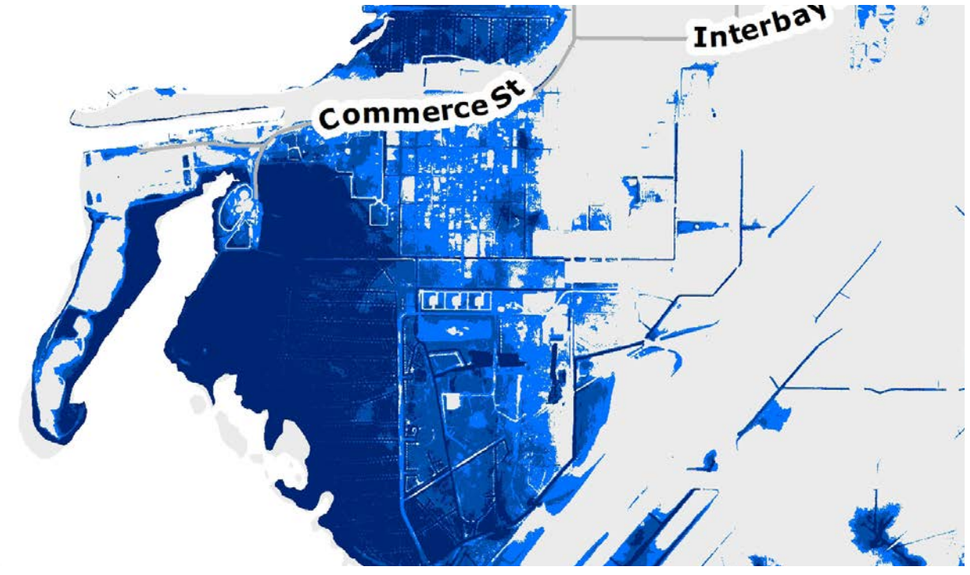
Current FEMA Flood Zones + 2060 High / 2100 Intermediate SLR Scenario

KEY RECOMMENDATIONS

2. Establishing Adaptation Action Areas



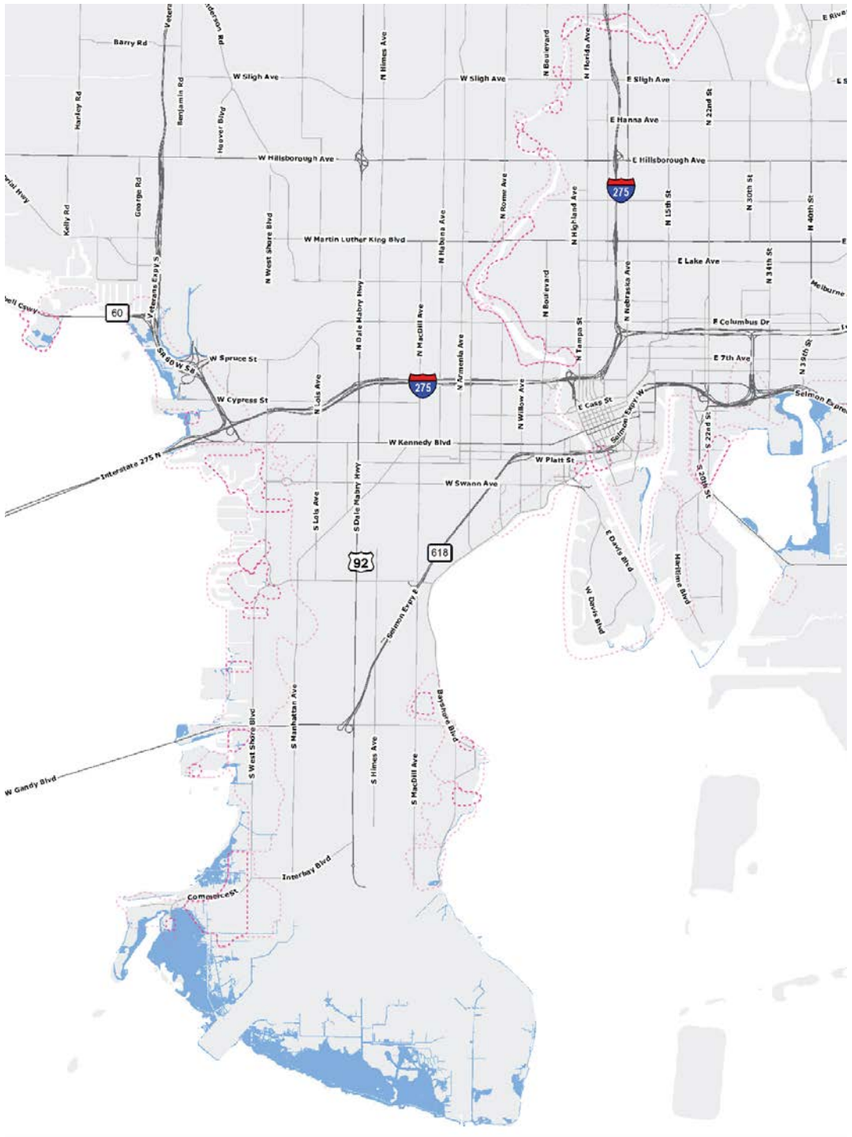




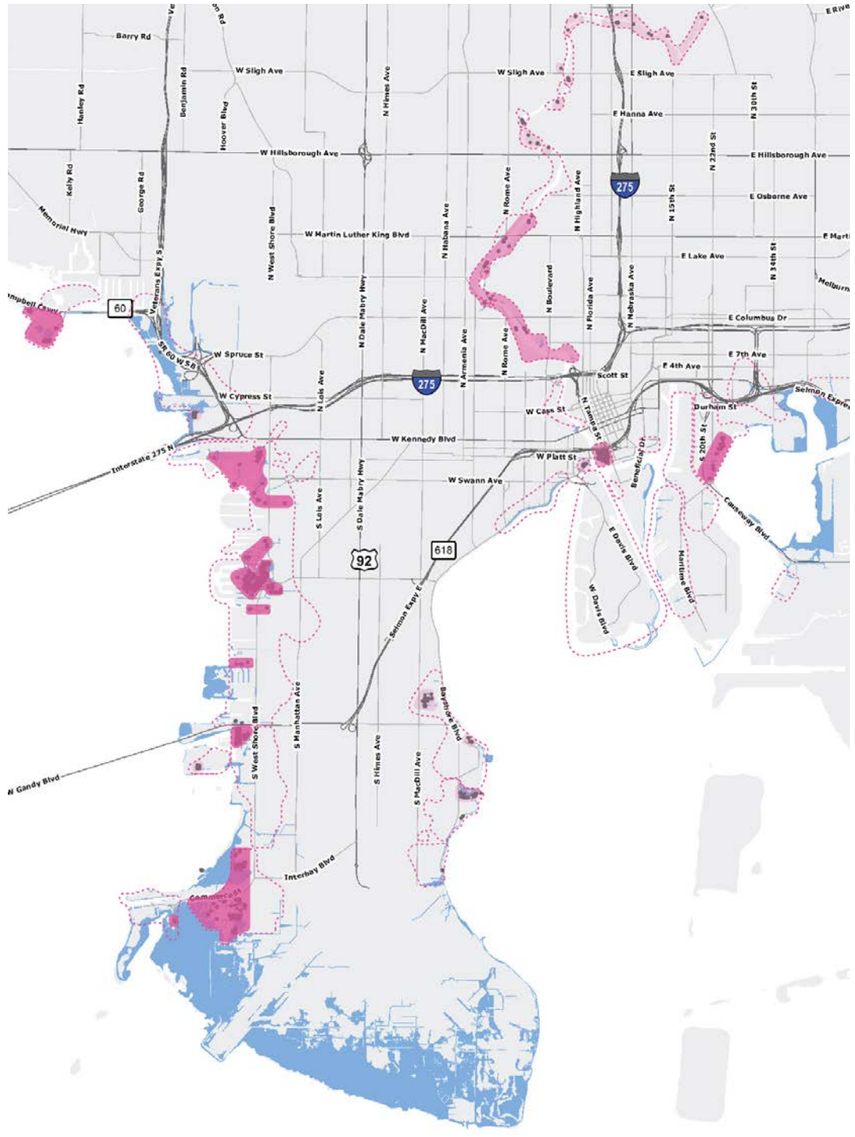
Elevation data

KEY RECOMMENDATIONS

3. Establishing Overlay Zones



2045 High / 2060 Intermediate Scenario



2060 High / 2100 Intermediate Scenario

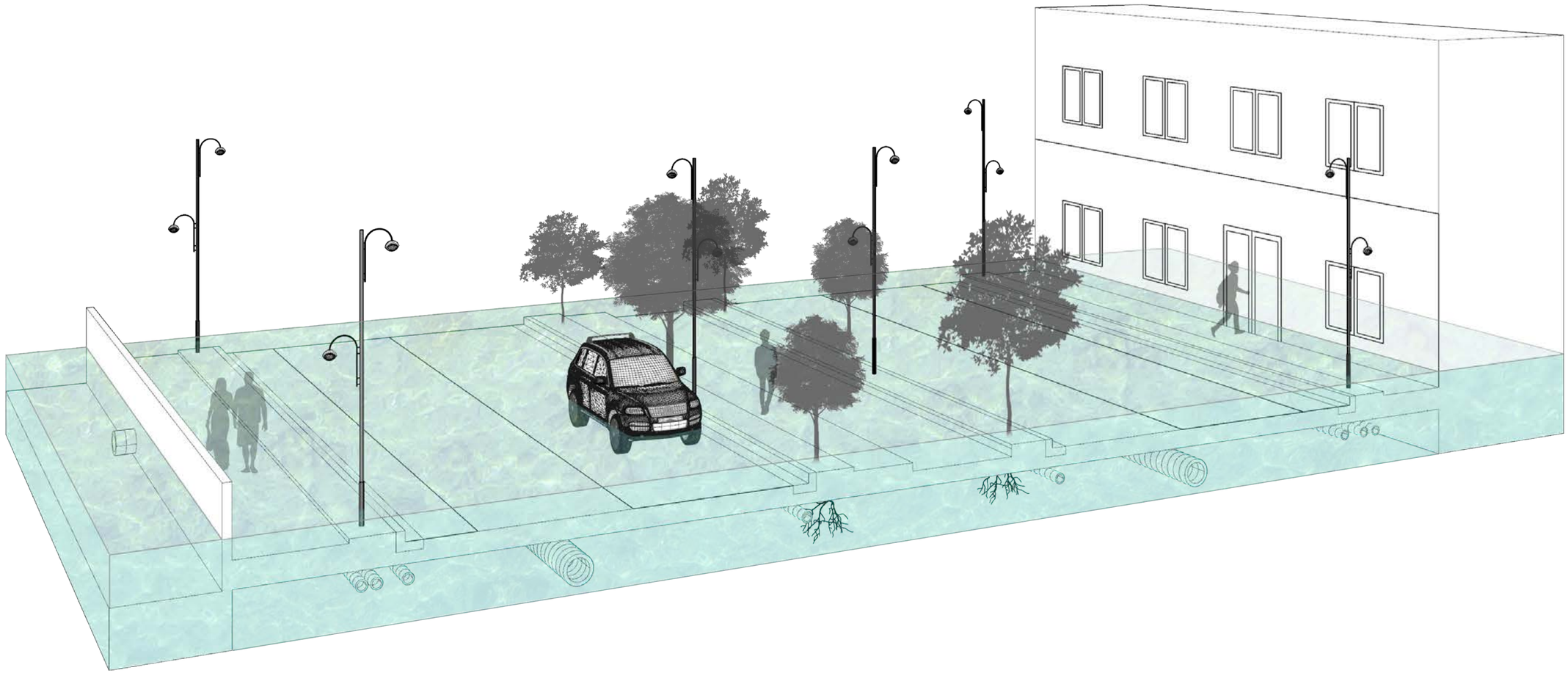
Areas for:

- *Protection*
- *Accommodation*
- *Density Decrease and Habitat Restoration*

Community clusters with similar spatial attributes and levels of impact from sea-level rise.

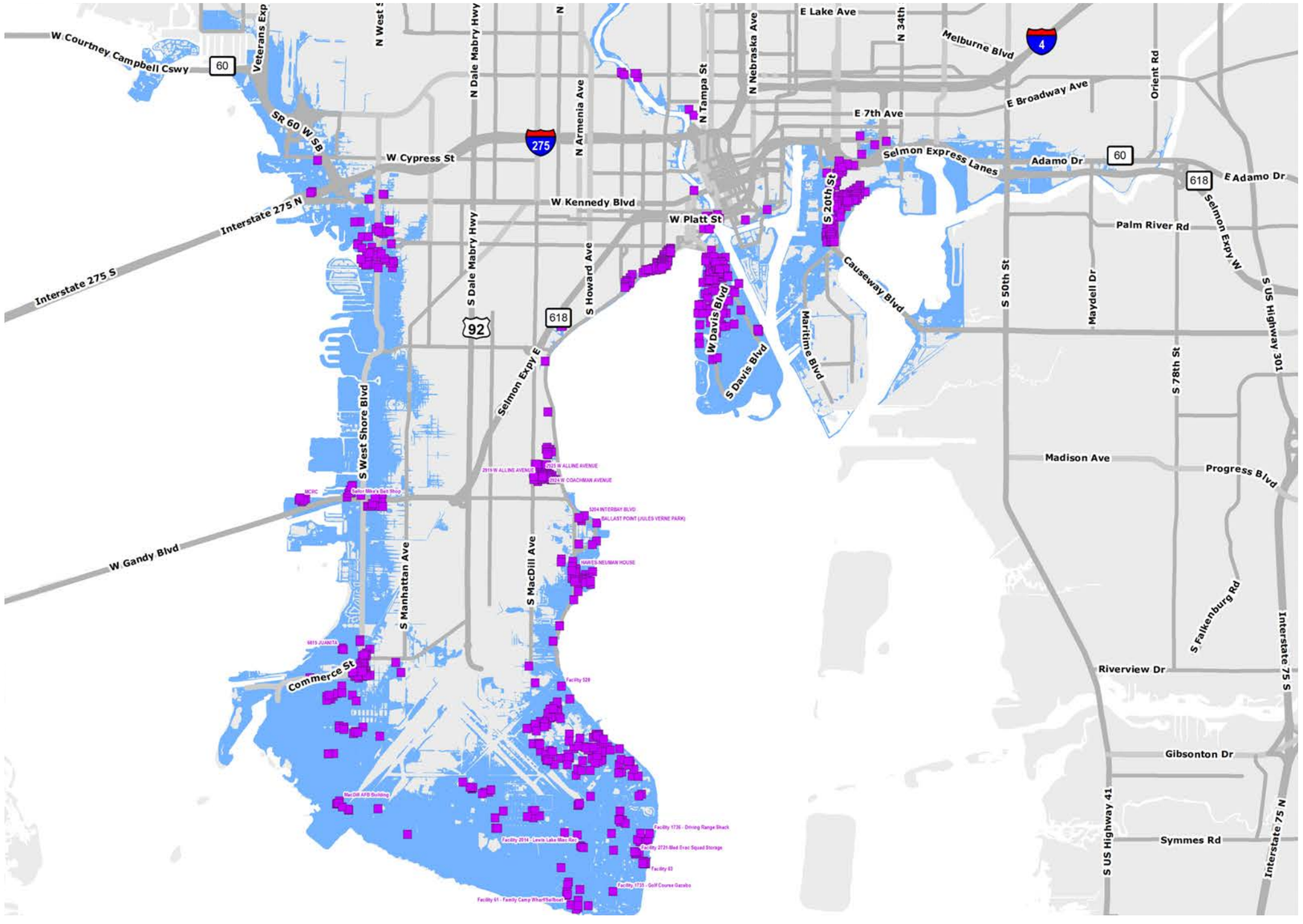
KEY RECOMMENDATIONS

4. Identify Critical Infrastructure and Vulnerable Utilities



KEY RECOMMENDATIONS

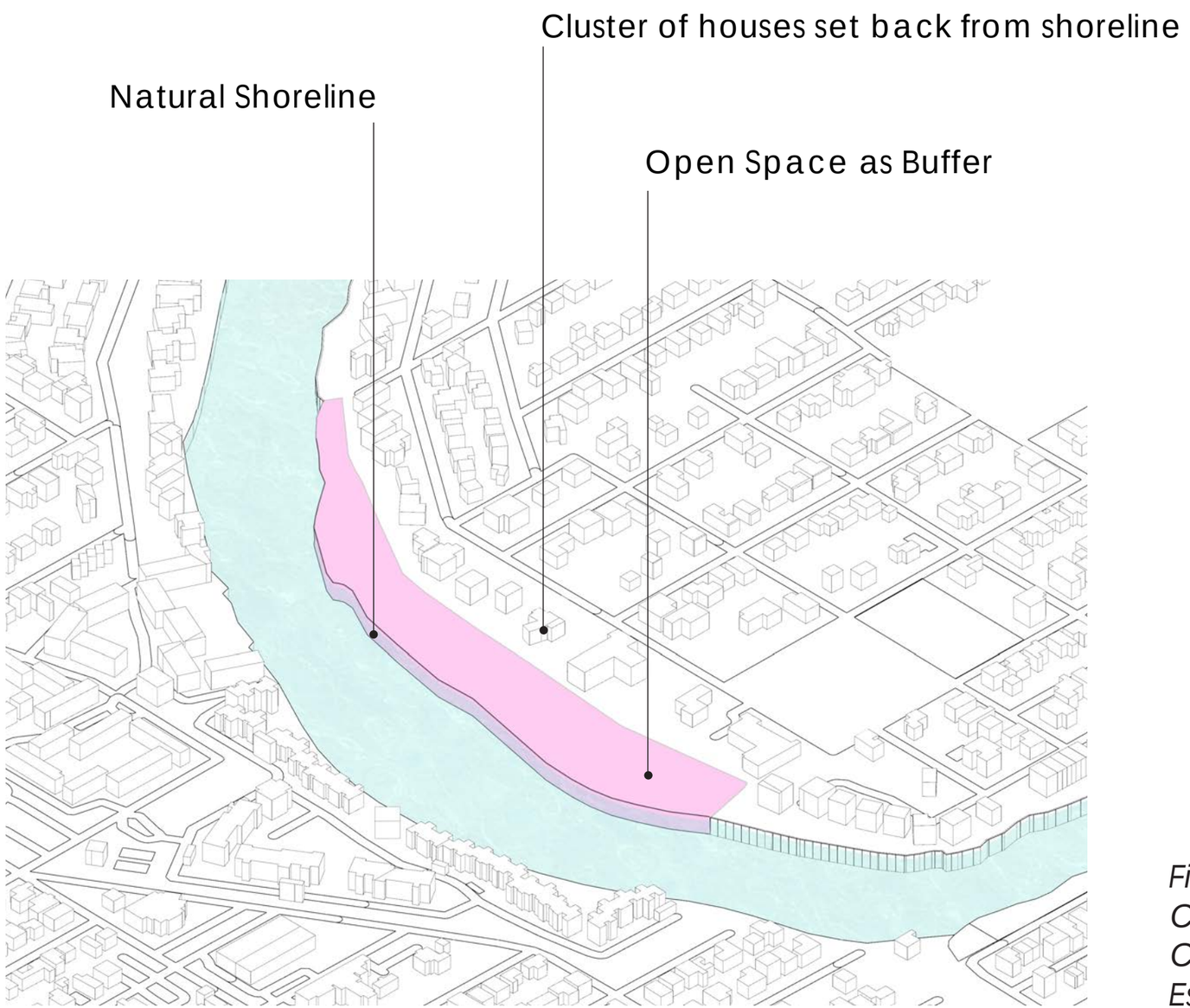
4. Identify Critical Infrastructure and Vulnerable Utilities



2100 High Scenario with historically designated structures

KEY RECOMMENDATIONS

5. Promoting Flexibility through Landscape Systems



Find opportunity areas for:
Converting sea walls to living shorelines
Creating surface storage and conveyance of water
Establishing buffers

KEY RECOMMENDATIONS

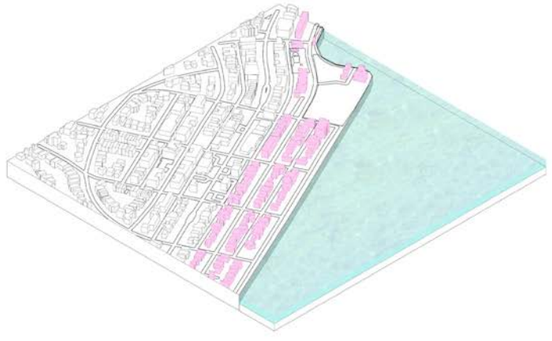
5. Promoting Flexibility through Landscape Systems

Image from Climate Ready Boston (2017), by Stoss Landscape Urbanism

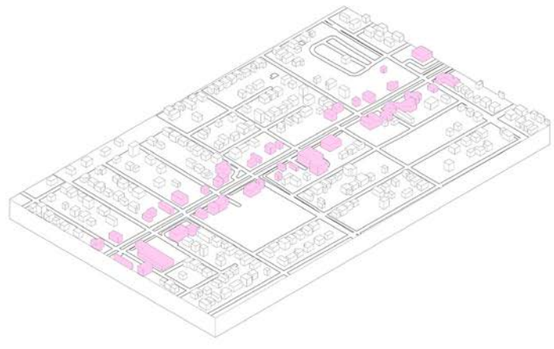
KEY RECOMMENDATIONS

6. Evaluate the Feasibility of a Coordinated Transfer of Development Rights Program

Sending Area

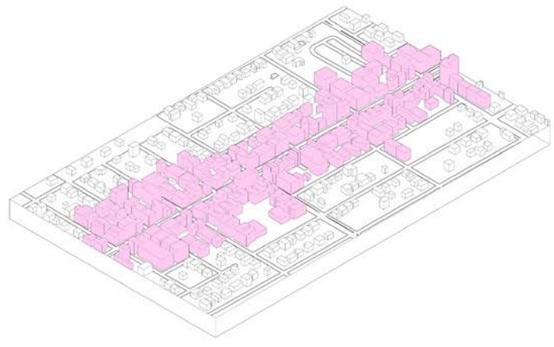


Receiving Area



Proposed Sending Area

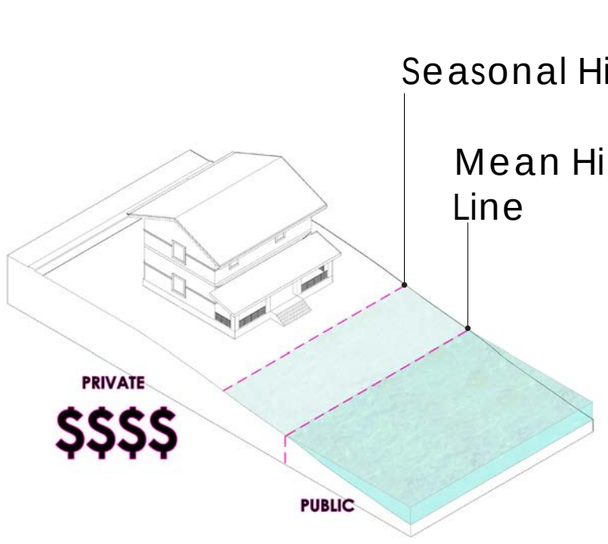
Proposed Receiving Area

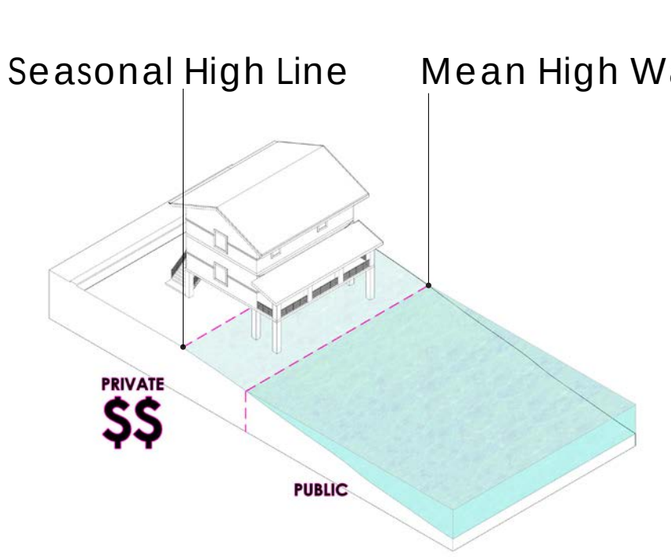


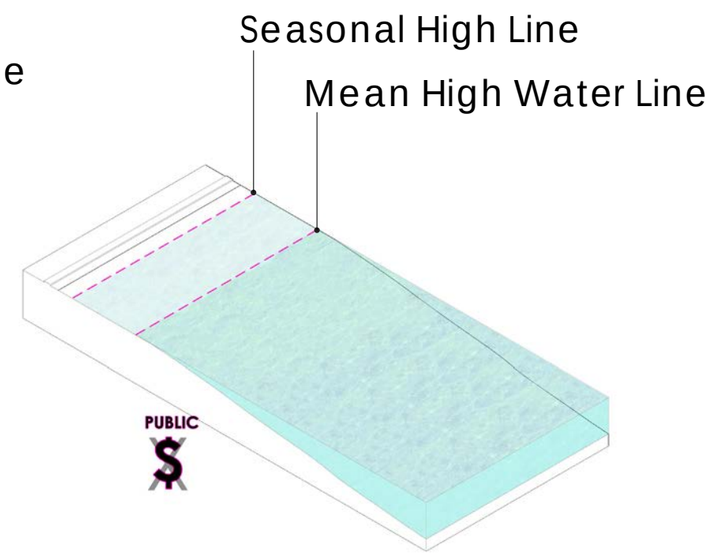
This report identifies a Transfer of Development Rights (TDR) Program as the most suitable method for the City of Tampa to direct growth, either toward or away from specific areas, under the current conditions of planning and governance. TDRs establish a free market method of coordinating density and can be used to support communities that find themselves in the precarious situation of unexpected environmental change.

KEY RECOMMENDATIONS

7. Find Opportunities to Create Rolling Easements







Through the regulatory concept of "Rolling Easements," property is purchased for conservation purposes by the municipality (or a part of the property), or it is purchased by another entity and transferred to municipal ownership. However the occupant is able to stay until the property is unsuitable for inhabitation.

KEY RECOMMENDATIONS

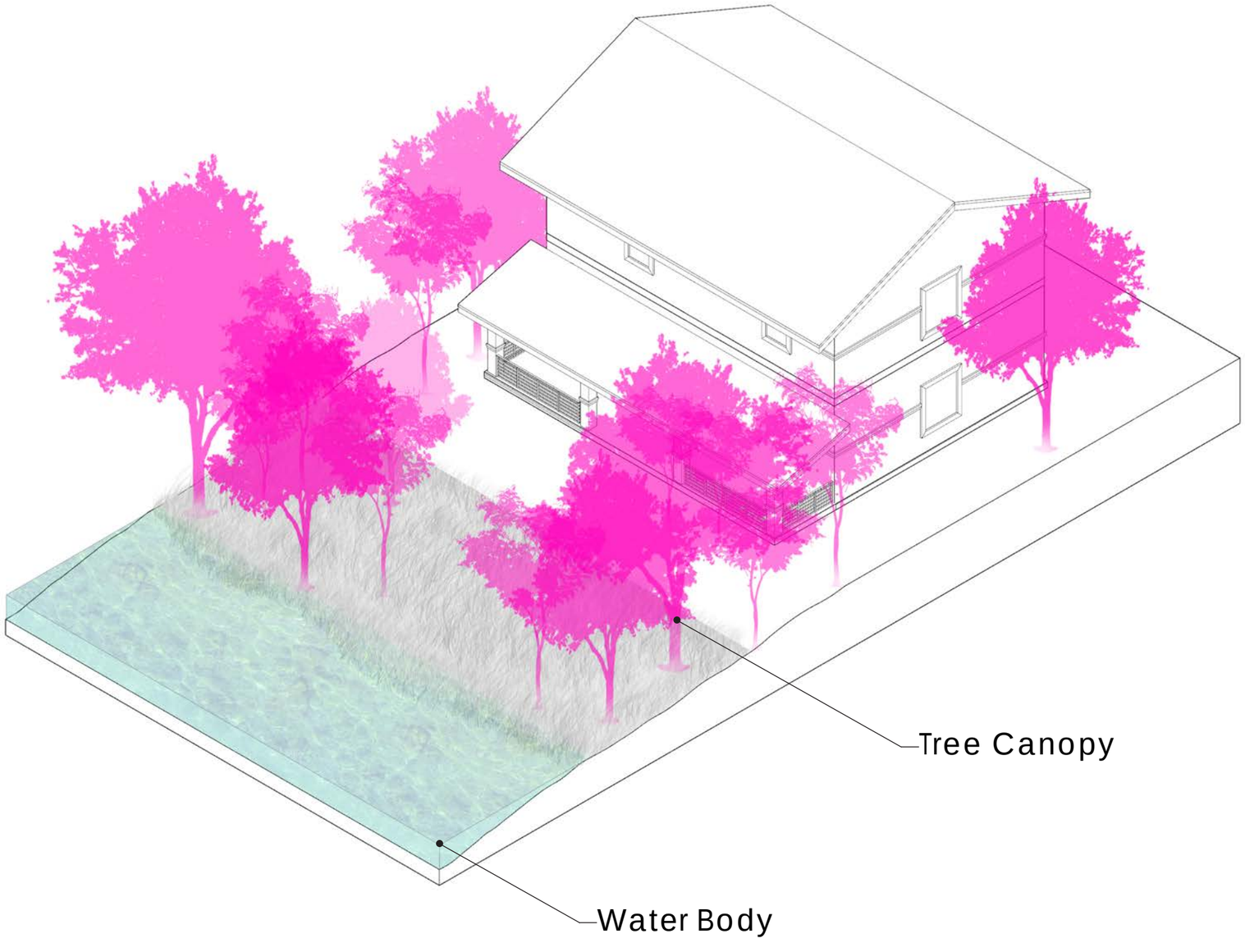
8. Education and Information

- *Create an ongoing sea-level rise education program.*
- *Evaluate community acceptance of disclosure policies through the Comprehensive Planning process.*
- *Create a digital database of flood elevation certificates that is publicly accessible.*

IMAGE FROM SAN FRANCISCO PLANNING
HTTPS://SFPLANNING.ORG/SEA-LEVEL-RISE-ACTION-PLAN#VULNERABILITY-ZONE

KEY RECOMMENDATIONS

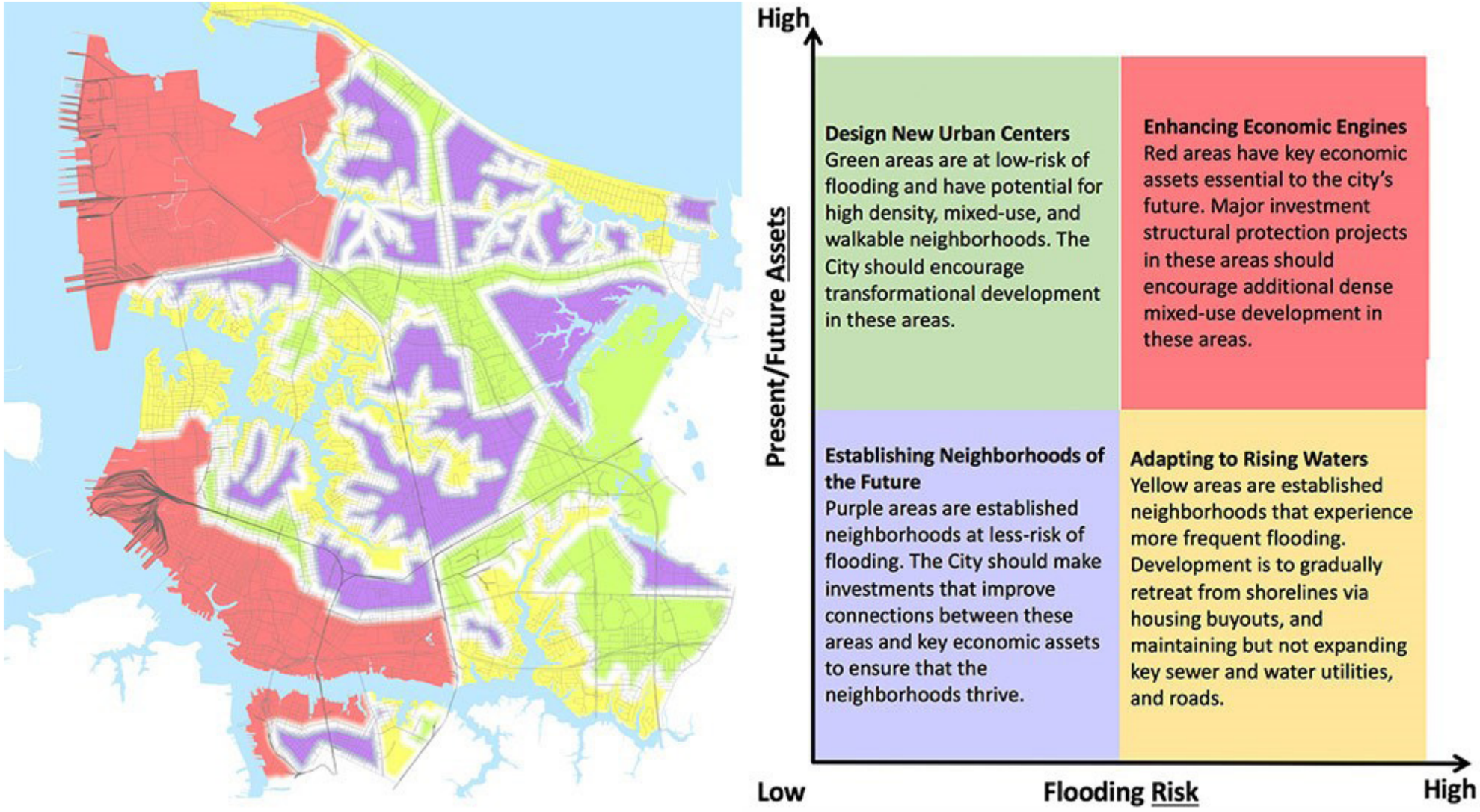
9. Reducing Greenhouse Gas Emissions



Preserving and promoting tree canopy can help to absorb carbon and to mitigate energy use and reflective heat. Sea grass meadows, mangrove forests, salt marshes and salt barrens, all to be found abundantly in Tampa Bay, are areas of intense carbon sequestration (Sherwood et al., 2019)

KEY RECOMMENDATIONS

10. Planning the City of the Future



Norfolk divided the city into 4 planning zones

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QUESTIONS / COMMENTS

05.12.2021

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