

Proposed Minimum Seawall Height Policy

Broward County Environmental Planning and Community
Resilience Division



Current Need for a Range of Investments

Increased Free Board



Sea Walls and Flood Barriers



Tidal Valves



Regional Water Storage



Elevating Roads and Critical Infrastructure



Stormwater Systems



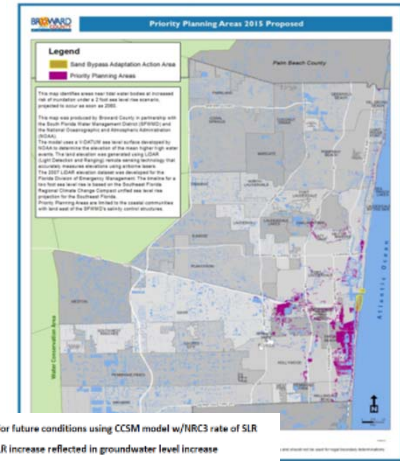
Broward Resilience from Planning to Implementation



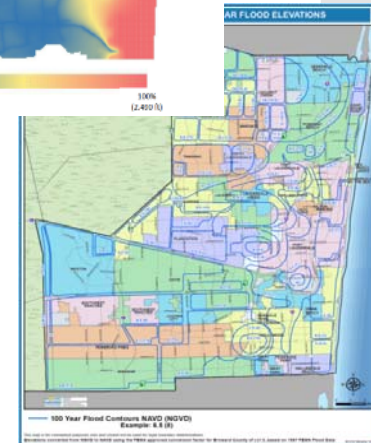
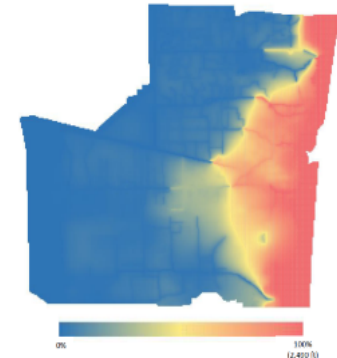
- Planning Requirements
 - Land Use Planning
 - Comprehensive Planning
 - Unified Sea Level Rise Projection

- Updating Standards
 - Drainage infrastructure (2017)
 - Tidal flood barriers (2018/2019)
 - Finished floor elevations (2019)

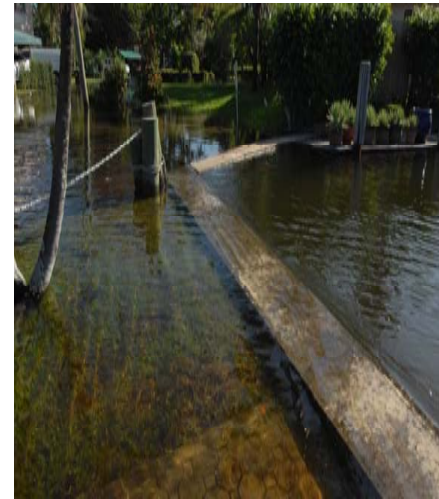
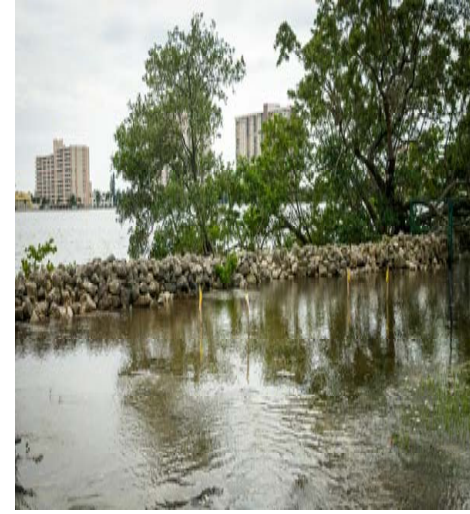
- Countywide Resilience Plan (2020-2022)



Wet-Season average for future conditions using CCSM model w/NRCC rate of SLR
Percent of SLR increase reflected in groundwater level increase



Tidal Flooding and Existing Shorelines

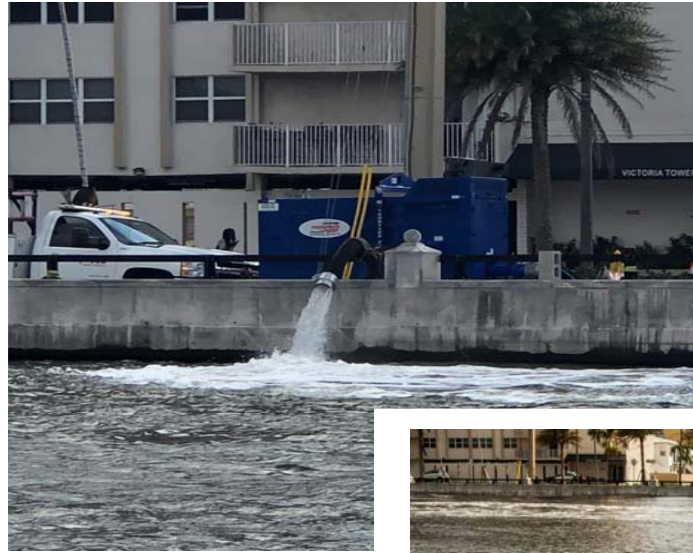


Water Management

Ensure safety and level of service of roads,

Protect property and local economy,

Minimize volume of water that must be pumped out of neighborhoods at greater cost



Proposed Policy

- Uniform standard for seawalls and flood barriers to mitigate high tide flooding through 2070
- Require **5 feet NAVD by 2050**
 - High frequency storm surge protection provided (~1 foot)
 - Some economic losses avoided.
- Allow for **4 feet NAVD until 2035**
 - Future tidal flooding avoided, through 2070
 - Limited or no surge protection

Proposed Land Use Plan Policy 2.21.7

Requires:

- Municipalities to adopt regionally consistent top elevations for seawalls, banks and berms
- Adoption **within 2 years** of effective date
- Standards to be consistent with model ordinance
 - Chapter 39, Article XXV County Code of Ordinances
- **Not applicable to oceanfront beaches**

Model
Ordinance,
Ch. 39-XXV

Application:

- Intertidal waterways, **not oceanfront**
- New construction or substantial rehabilitation (more than 50% in length/cost)
- Permitting of fixed infrastructure
- Water trespass onto adjacent property or public right-of-way
- Requires remedy of “public nuisance”

Model Ordinance, Ch. 39-XXV

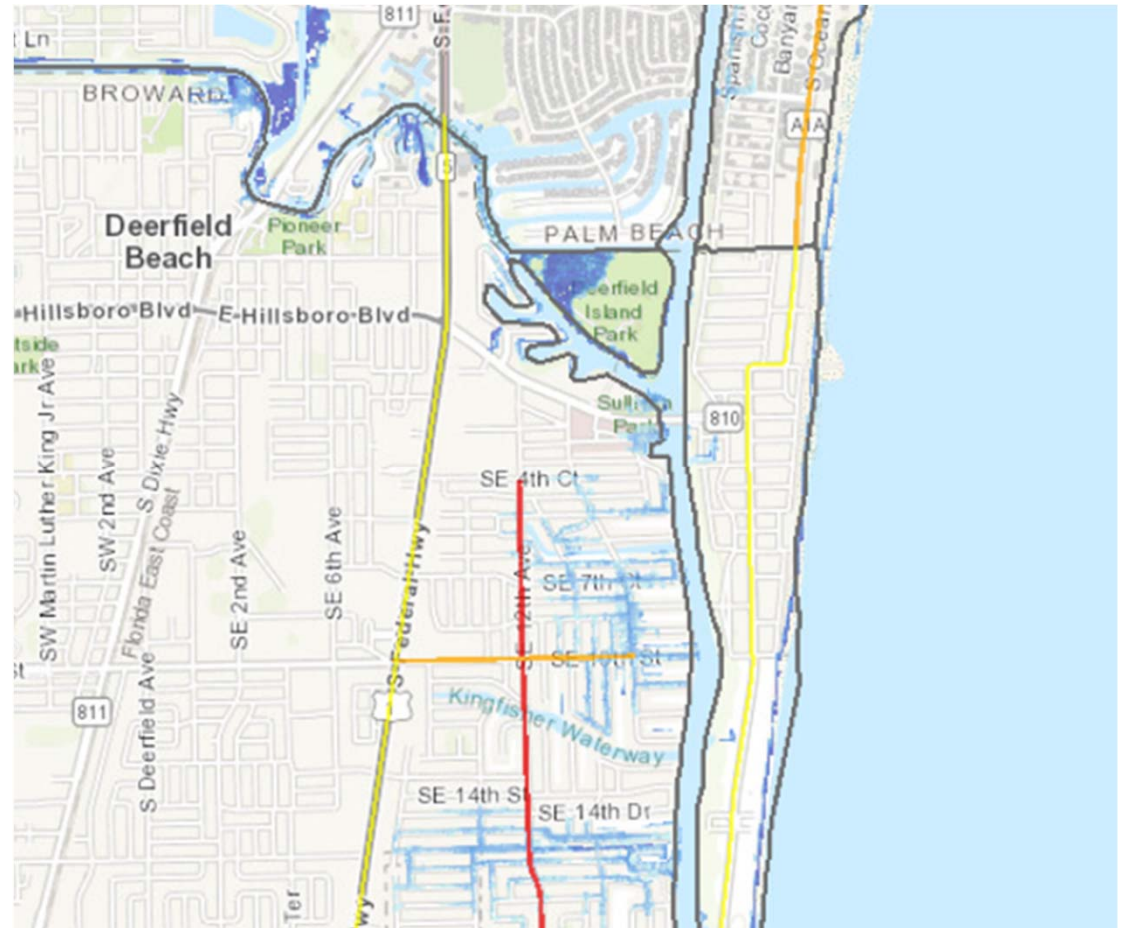
- Applicable to new and improvements to more than 50% of length of shoreline structures
- Permit applications before Jan 1, 2035 →
 - 4 ft NAVD if designed to adapt to 5 ft NAVD by 2050
- If cited, must demonstrate repair progress within 60 days and complete within 1 year
- Constructed to adjoin and prevent gaps
- Constructed with rip-rap or habitat enhancement
- **Installation of seawall not required**, must prevent flood trespass
- Allows automated barriers, but automation cannot require daily human intervention.

Water Levels

Today			Year 2060		
Typical High Tide	King Tide	Surge (33% occurrence annually)	Typical High Tide	King Tide	Surge (33% occurrence annually)
0.4	1.5 to 1.8	< 2.5	2.6	3.7 to 4	< 4.7

Units in Feet NAVD88
(North American Vertical Datum, fixed reference point)

Vulnerable Shorelines



<https://sls.geoplan.ufl.edu/beta/viewer/>

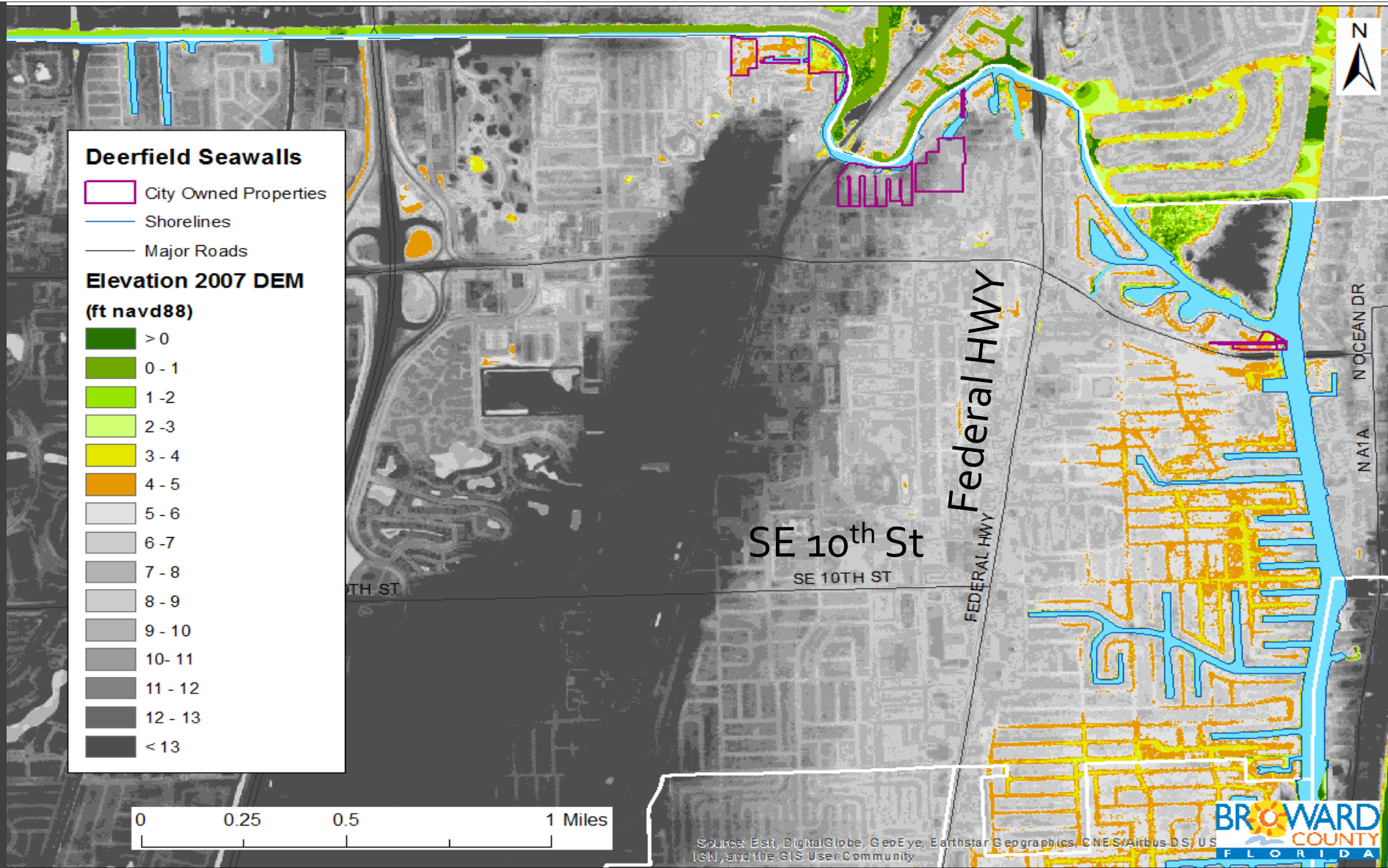


Deerfield Seawalls

- City Owned Properties
- Shorelines
- Major Roads

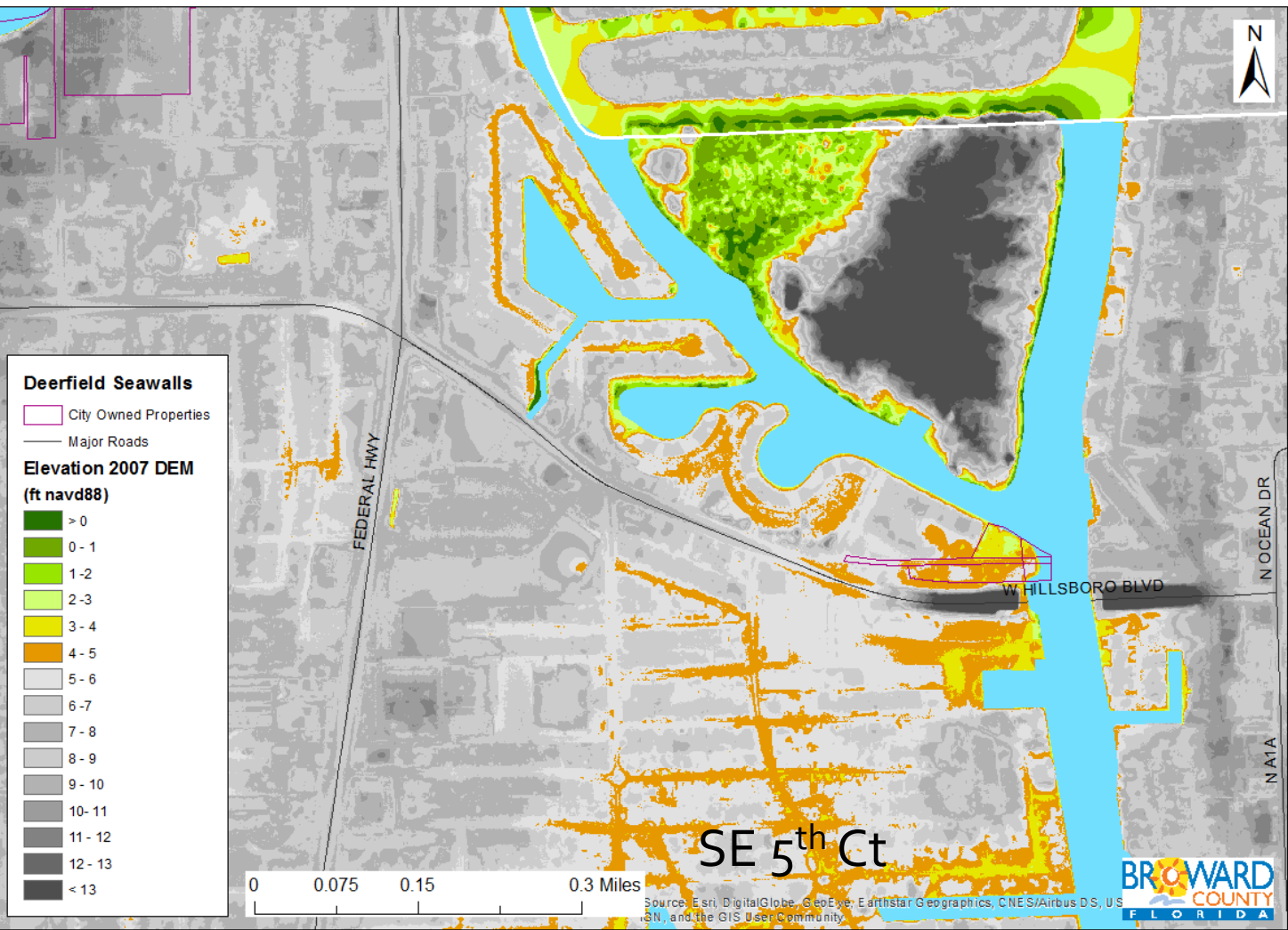
Elevation 2007 DEM
(ft navd88)

> 0
0 - 1
1 - 2
2 - 3
3 - 4
4 - 5
5 - 6
6 - 7
7 - 8
8 - 9
9 - 10
10 - 11
11 - 12
12 - 13
< 13



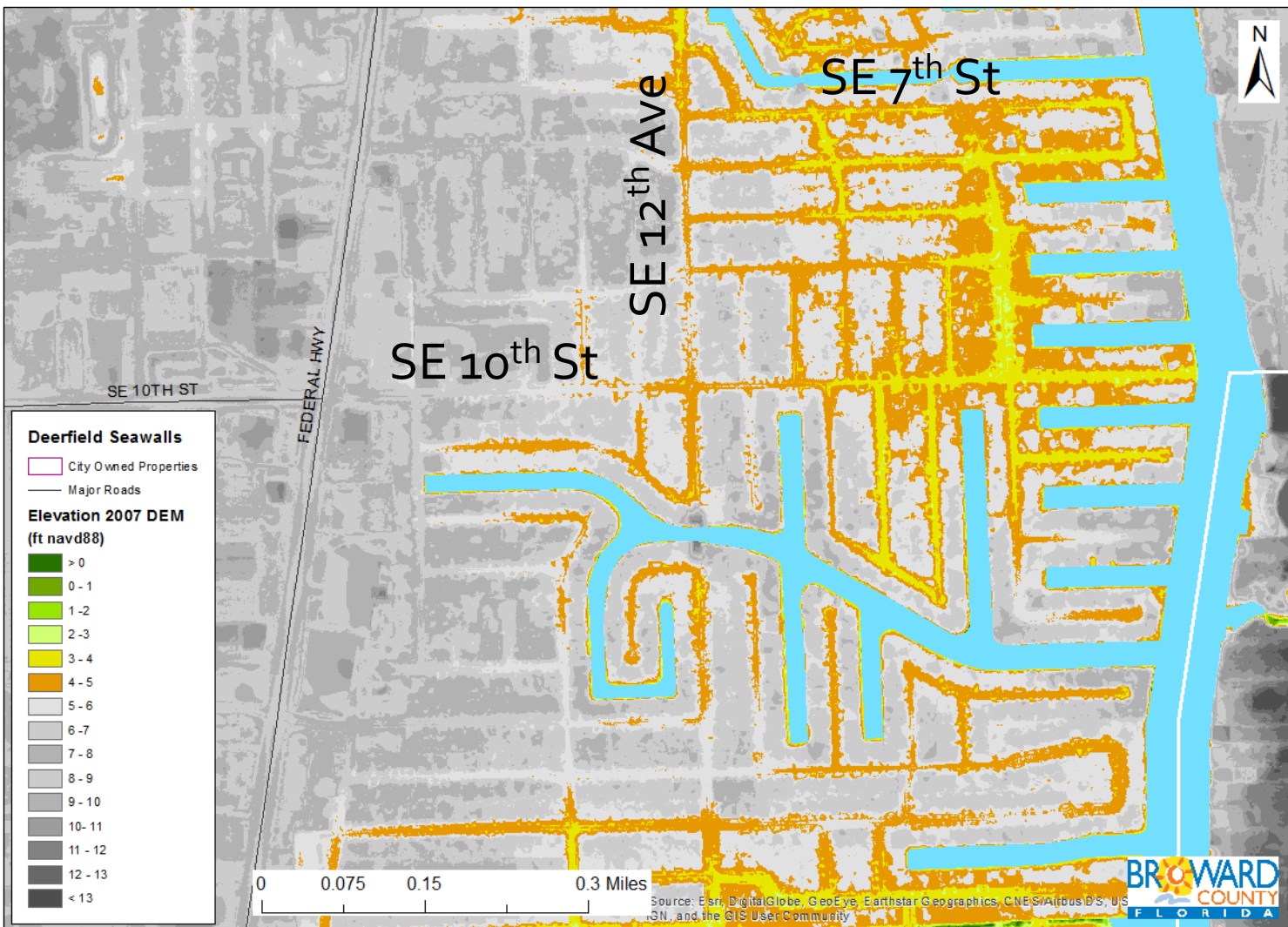
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community





Shaded yellow/green represents elevations below 4 feet NAVD where water could trespass if connected to intracoastal.

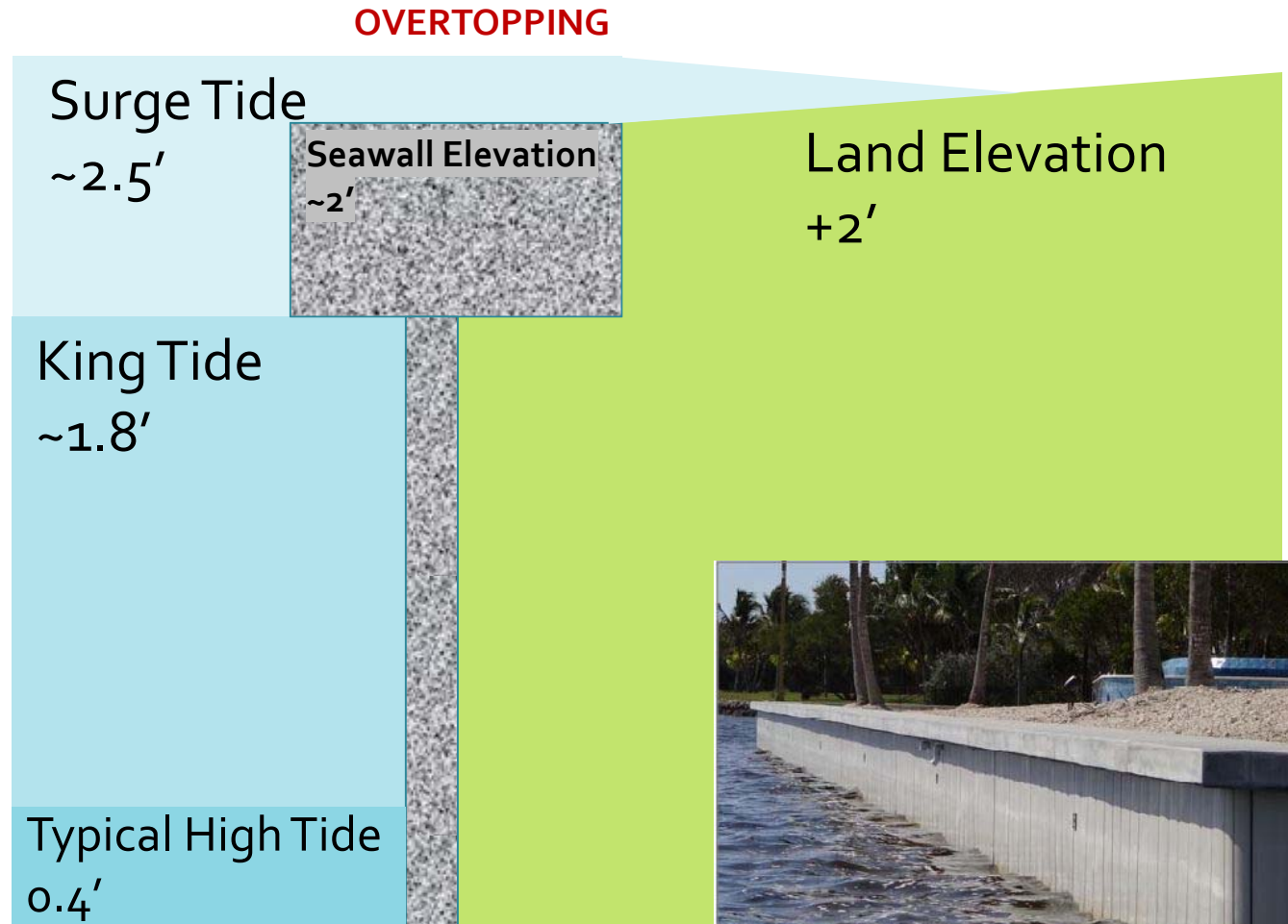
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Seawall Height Diagram



Units in Feet NAVD88

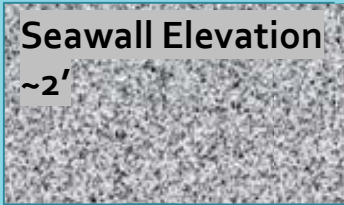


Overtopping in 2060

OVERTOPPING

Typical High Tide

2.6'



Seawall Elevation
~2'

Land Elevation
+2'

Units in Feet NAVD88

Future Coastal Flood Modeling

USACE, 2018

Water level Scenarios

- King Tide in 2060
 - **3- 4 feet NAVD**
- King Tide in 2060 plus 3 year return interval storm surge
 - **5 feet NAVD**
- King Tide in 2060 plus 20 year return interval storm surge
 - **6 feet NAVD**

Seawall Adaptation

- Existing
 - **Minimum -1.6 ft to 1 ft NAVD**
 - **Average 2.5 to 3 feet NAVD**
- **Fill gaps** to average or city ordinance
- Raise all walls to **4 feet** NAVD
- Raise all walls to **6 feet** NAVD

Raise seawalls to 4 feet NAVD

*Seawalls raised to 4' NAVD

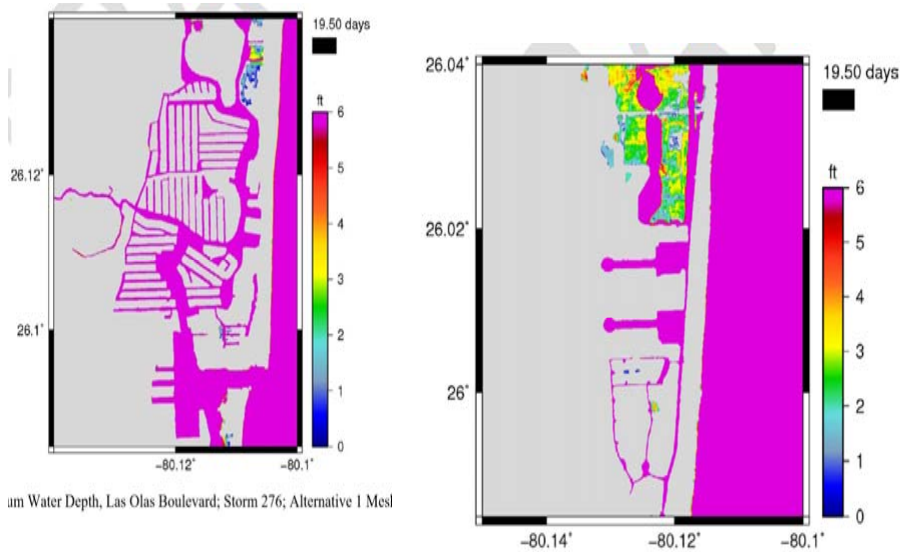
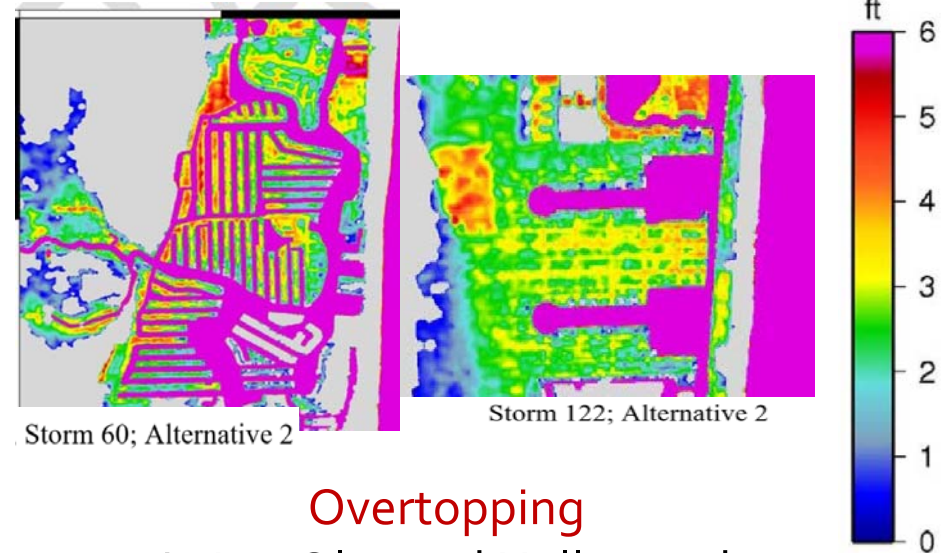


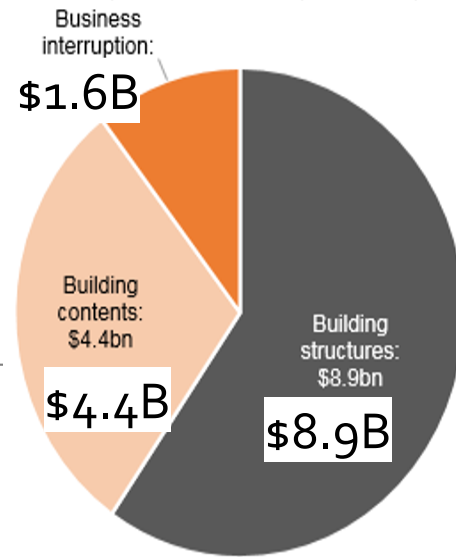
Figure 5.30 Maximum Water Depth, Hollywood Lakes; Storm 276; Alternative 2 Mesh Configuration

No Overtopping
during King Tide 2060

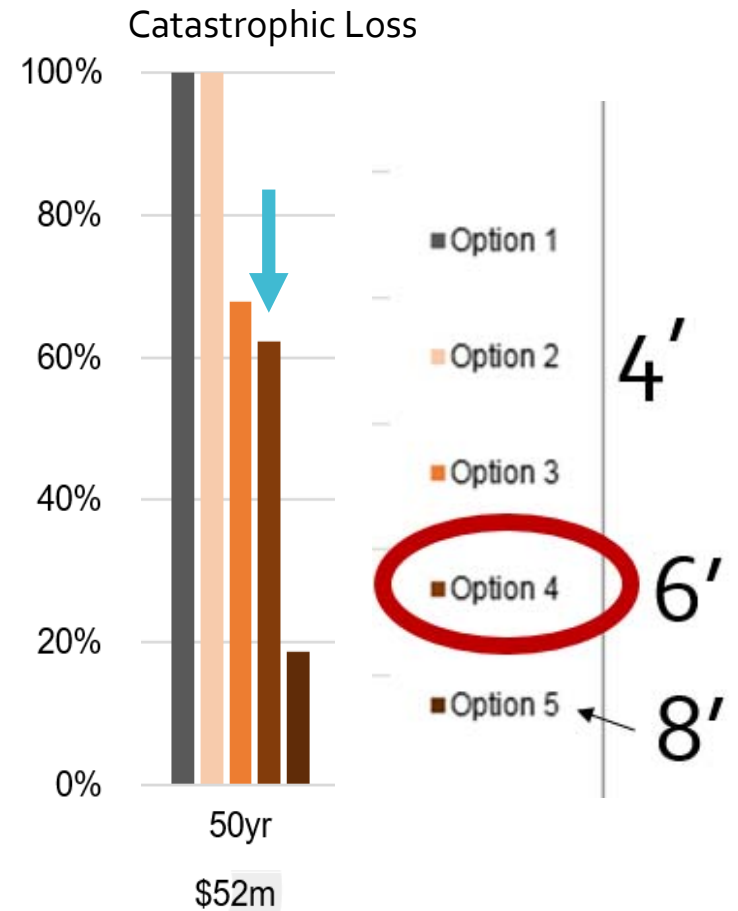


Overtopping
in Las Olas and Hollywood
with small storm surge

Economic Risk \$Billions



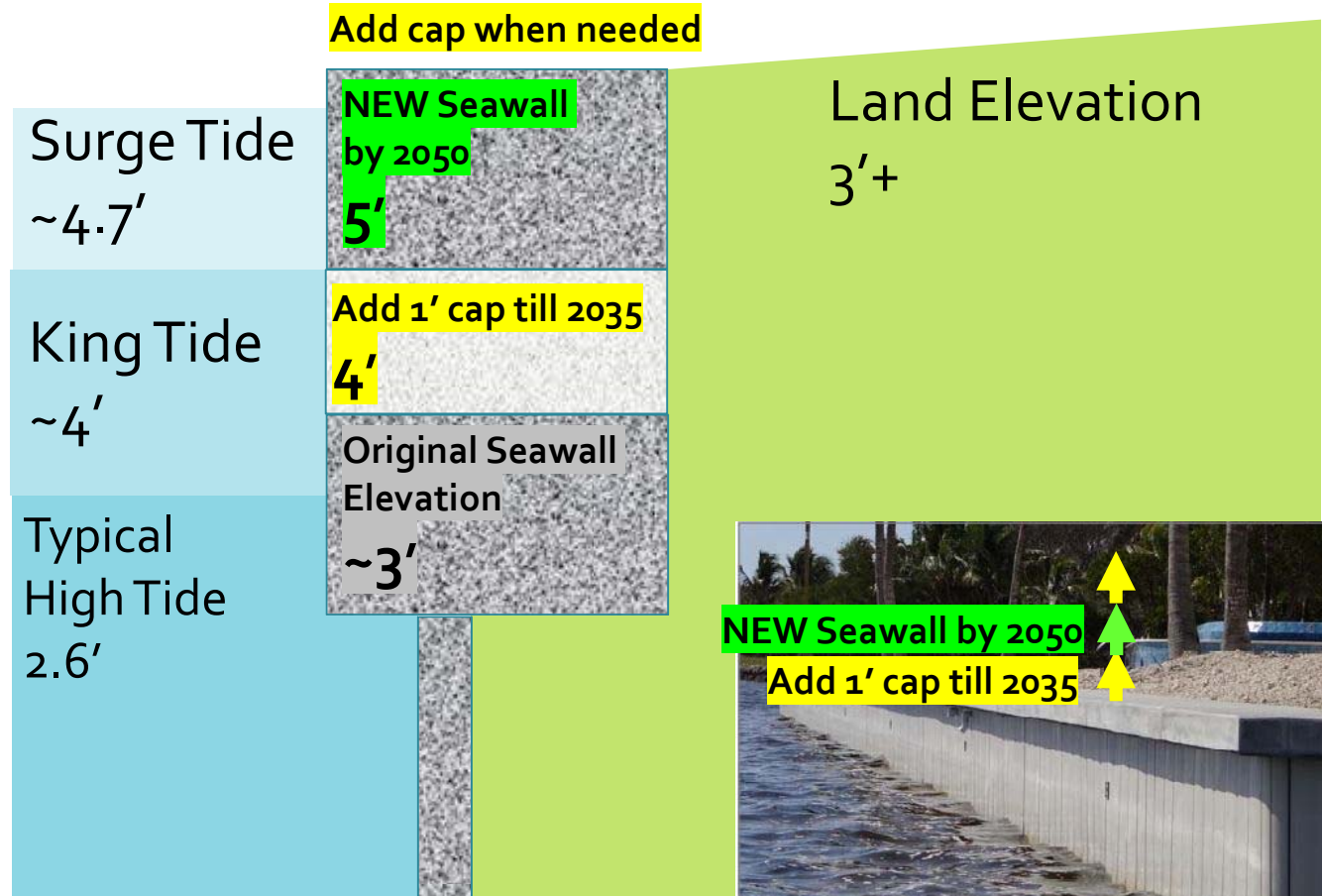
Seawalls >4' provide some economic loss protection even from catastrophic storms today



Information was provided by the County's Consultant, Risk Management Solutions, Inc. (RMS). In no event shall RMS (or its affiliated companies) be liable or direct, indirect, special, incidental or consequential damages with respect to any decisions or advice made or given as a result of the contents of the Information or use thereof. The full report (once complete) with the complete disclaimer statement, will be available on the County's webpage located at <http://www.Broward.org/NaturalResources/Pages/Default.aspx>.

Example Adaptation

NO OVERTOPPING



Units in Feet NAVD88

Potential Costs

- **Concrete Cap**
 - \$60- 120/ linear foot of shoreline
- **New Seawall**
 - \$450-2150/ linear foot of shoreline
- **Reinforced Berms/ living shorelines**
 - \$850-1300/ linear foot of shoreline
- **Drainage infrastructure to manage stormwater**

Resilient Shorelines

SEAWALL REPLACEMENT ALTERNATIVES THAT ENHANCE FLOOD PROTECTION, HABITAT, AND YOUR PROPERTY VALUE



By the year 2060, sea level is expected to increase over 2 feet



Replace wall with resilient living shoreline rather than seawall only



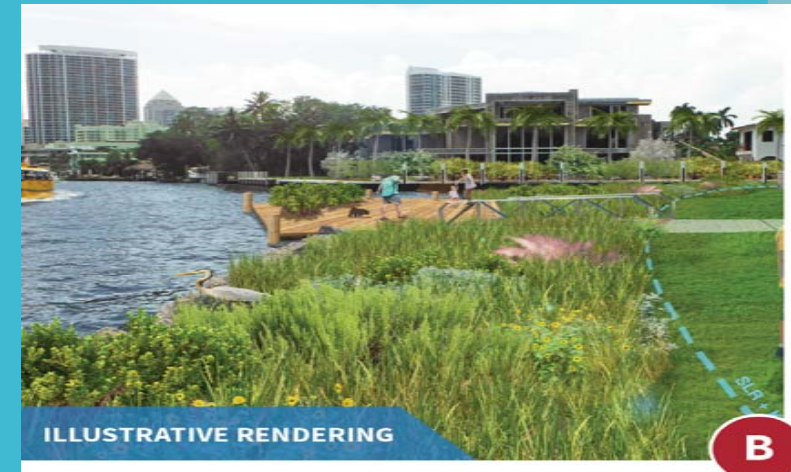
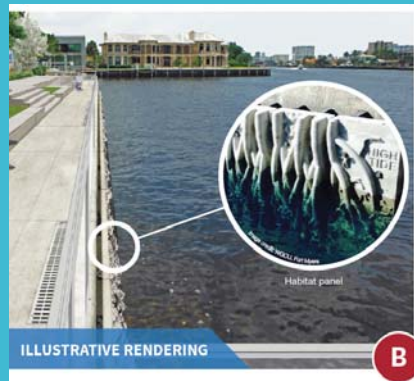
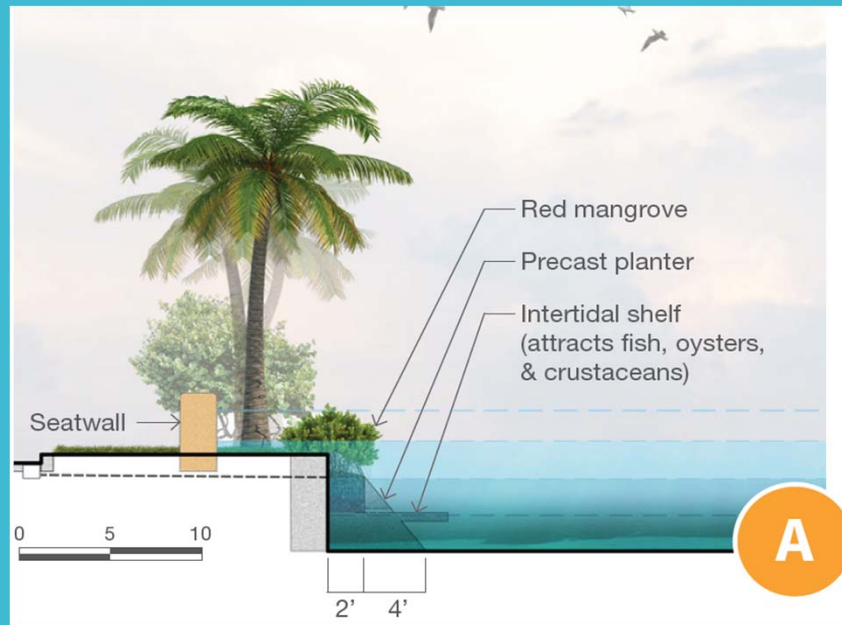
Improve local water quality, fishing and environment



Pick the best option based on space, depth and waves

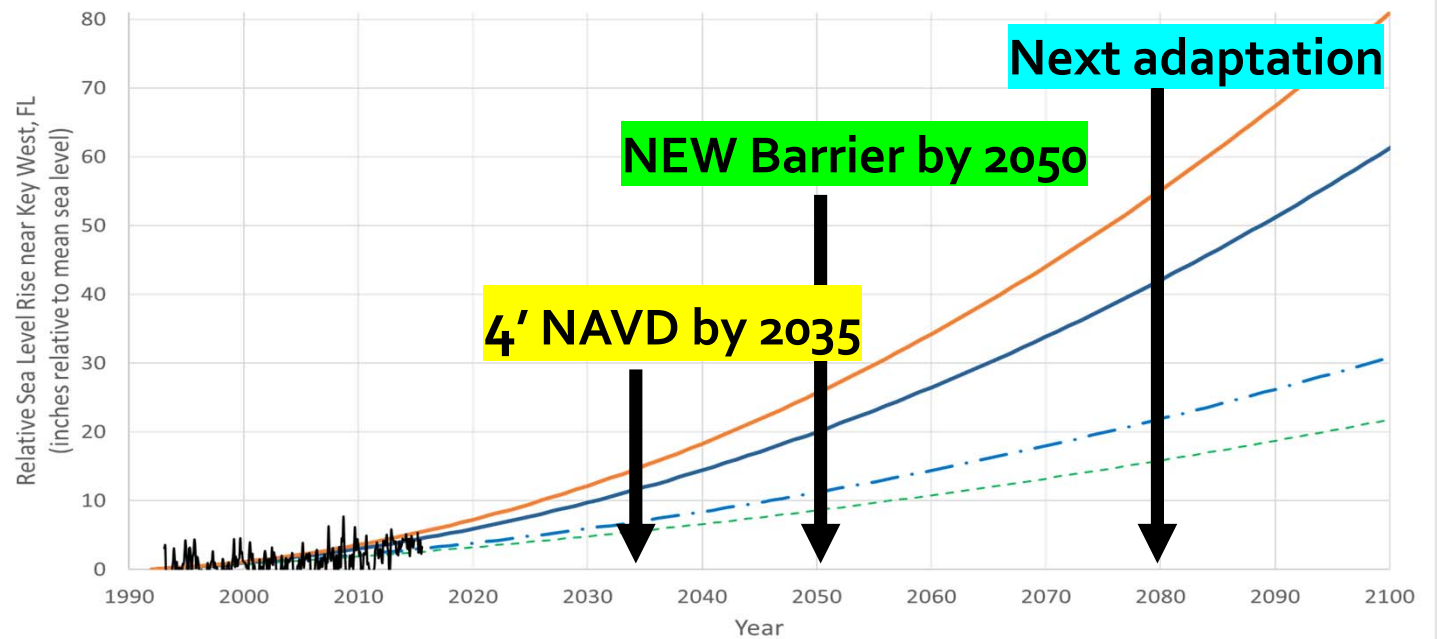


Enhance an existing seawall, if in good condition



Sea level rise after 2060

*Reminder: further adaptation will be needed



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Public Outreach and Process

- Public comment period – May 31, 2019
 - Planning Council Hearing – August 22, 2019
 - County Commission Agenda Item to Set Hearing – Sept. 10
 - County Commission Public Hearing – Sept. 24
 - Planning Council Second Hearing – Sept. 26
 - Transmittal to DEO for review – Oct. 15
 - Present to WAB for recommendation – Nov. 8
 - BOCC Public Hearing – Jan 7
 - Effective Date – January 2020
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- FDOT LIDAR Deliverable and Shoreline Elevation Mapping – Spring 2020
 - Real Estate Industry Communications – Spring 2020
 - Municipal ordinance adoption - Jan 2022

Additional Presentations

November 9, 2016	USACE Study Initial Stakeholder Meeting: Ft Lauderdale (52 participants); Hollywood (25)
September 4, 2018	Climate Change Task Force Briefing
September 10, 2018	USACE Study Final Stakeholder Meeting (16 participants and available on Broward Video Central)
October 12, 2018	Feature Article in EPCRD's Climate Resilience Newsletter
November 9, 2018	Water Advisory Board Briefing
November 9, 2018	Broward Commercial Realtors Midyear Conference
November 11, 2018	Presentation Materials for Pompano Beach Marine Advisory Group
November 16, 2018	Municipal Workshop
November 27, 2018	Feature Article in EPCRD's Climate Resilience Newsletter
December 3, 2018	Local Mitigation Strategy Quarterly Meeting with Municipalities
January 11, 2019	Water Advisory Board Discussion
February 5, 2019	CREW Fort Lauderdale Chapter (Commercial Real Estate)
February 12, 2019	Tower Club Real Estate Luncheon
February 28, 2019	Hollywood Community Meeting
March 3, 2019	Draft Policy Email to Municipal Resilience Contacts and Industry with Survey
March 21, 2019	Industry Workshop
March 29, 2019	Water Advisory Board Presentation
April 2, 2019	Opening of 60-Day Draft Policy Public Comment Period on Broward.org/climate
April 5, 2019	Twitter and Facebook Posts
April 25, 2019	Twitter and Facebook Posts
May 30, 2019	Twitter and Facebook Posts
September 13, 2019	Water Advisory Board Update