

# Transportation Infrastructure Vulnerability to Sea Level Rise in Broward County

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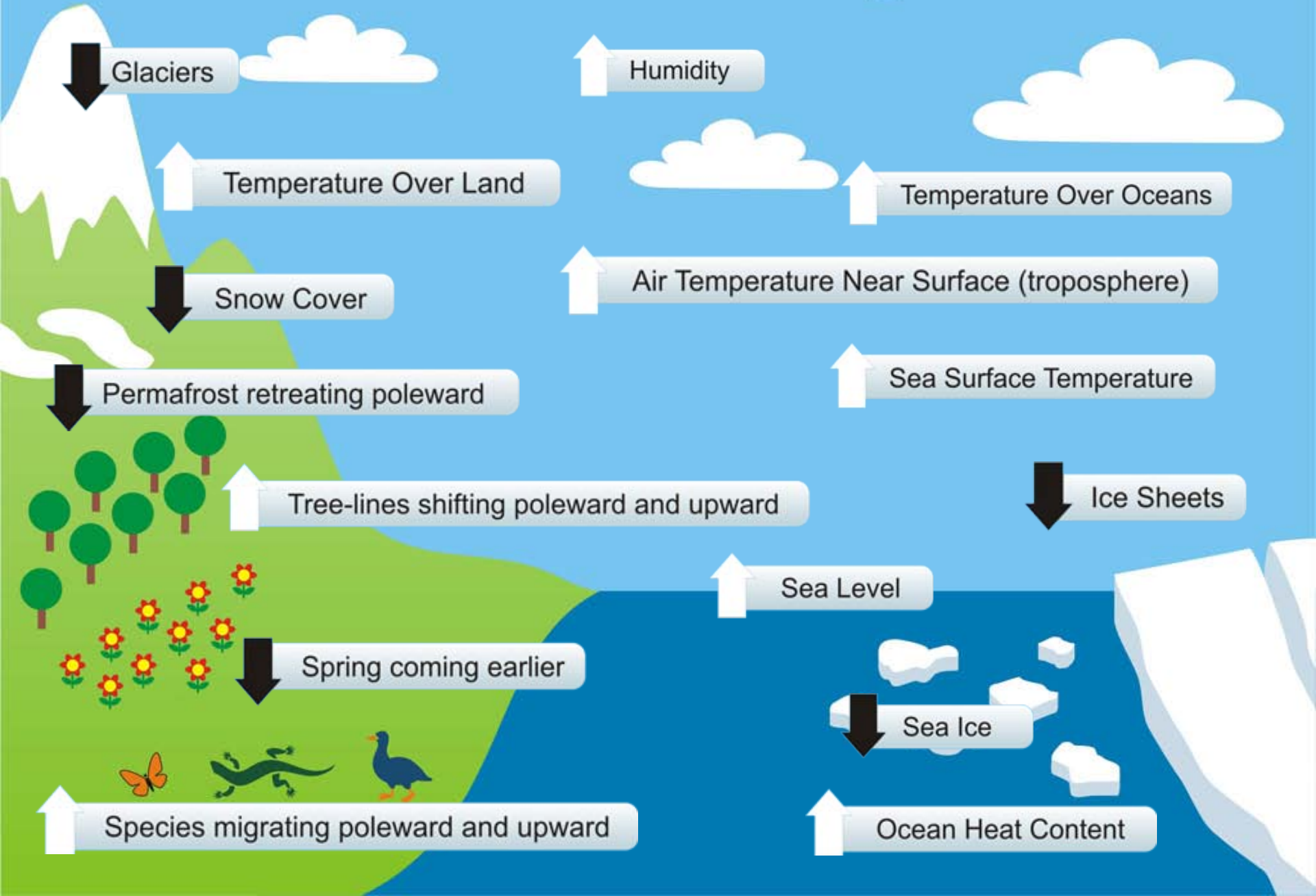
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**Broward County**

**Environmental Protection and Growth Management Department**

# Indicators of a Warming World

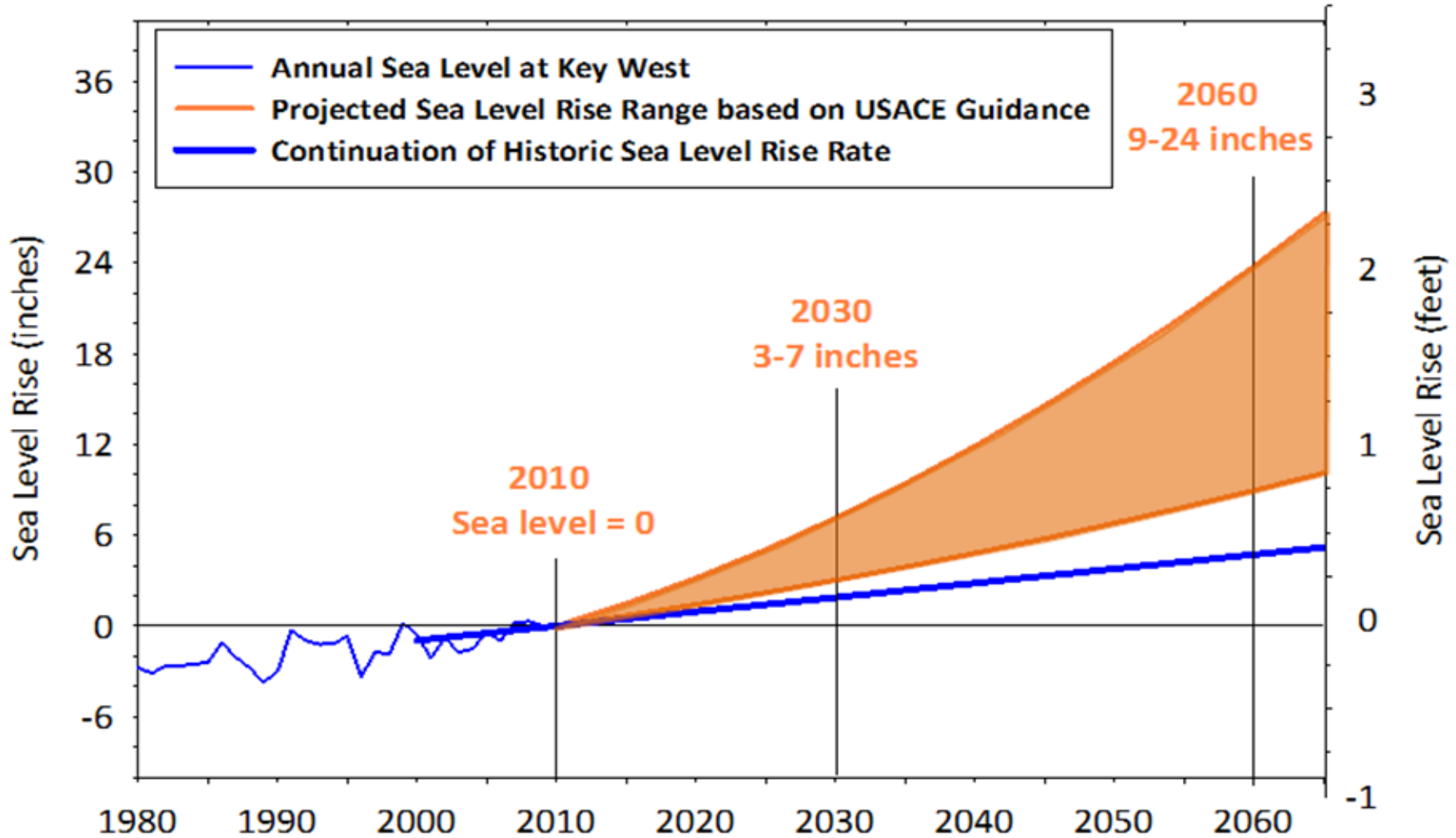


# Climate Change Impacts in SE FL

- Increasing Temp (2 to 10°F) by 2100
- Increasing occurrence of extreme weather
  - hotter summers
  - drier droughts
  - wetter rainy seasons
- Change in the growing season
- Sea level rise (2-5 feet) by 2100
- Potential change in the frequency and intensity of tropical storms



# Unified SLR Rise Projection



## Timeline of Sea Level Rise

1 foot = 2040 – 2070

2 foot = 2060 – 2115

3 foot = 2075-2150

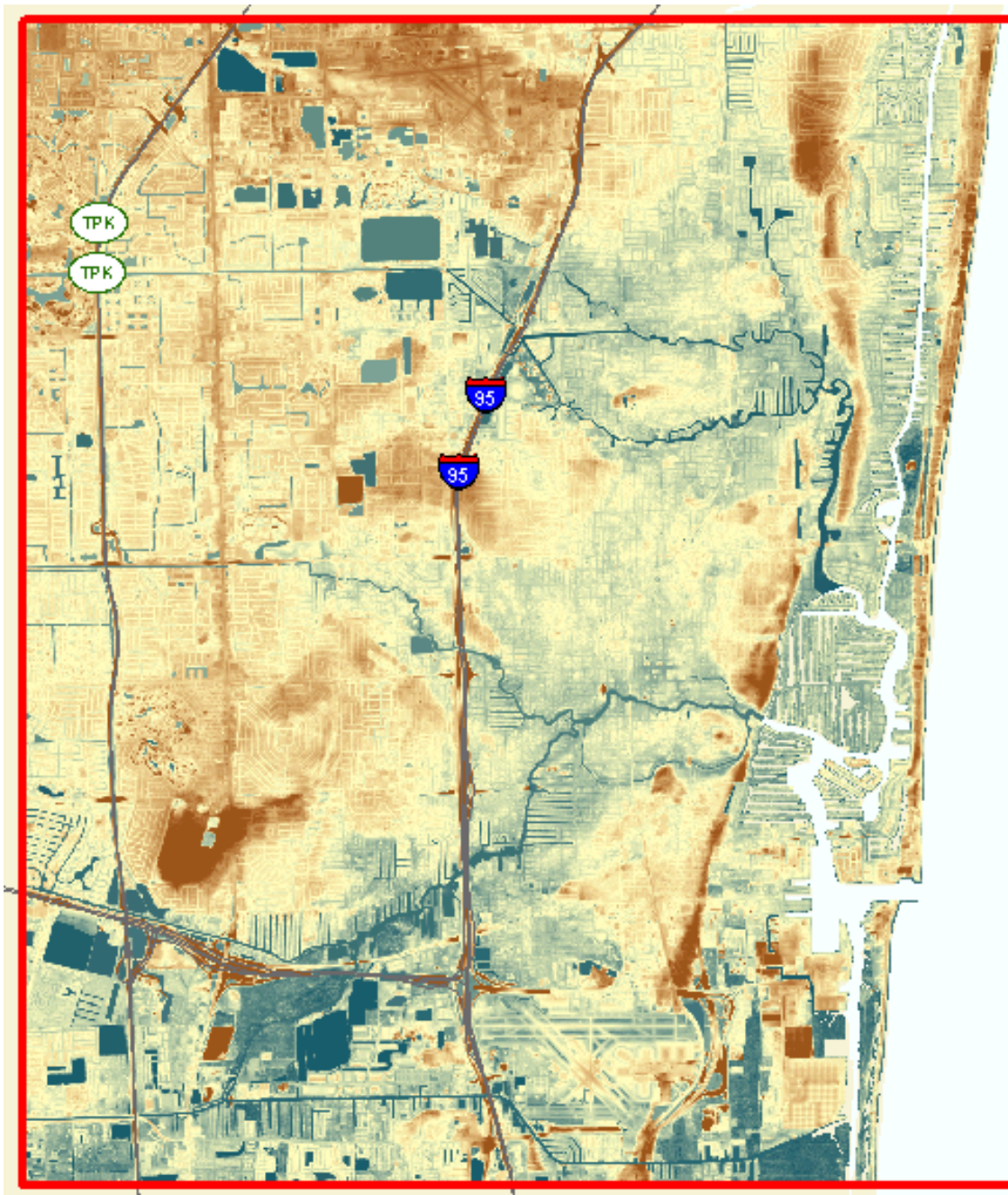


# Method -Inundation Mapping and Vulnerability Analysis

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- Used 2007 FDEM LiDAR elevation data to create digital elevation models for 1-, 2-, and 3-foot sea level rise above MHHW
- Analyzing impacts of 1-, 2-, and 3-foot sea level rise scenarios
- Existing water features removed from inundation.
- Data collected and analyzed.
- This analysis is merely an intersection of data layers with inundation grids.
- **Subject matter experts needed for more detailed evaluation.**



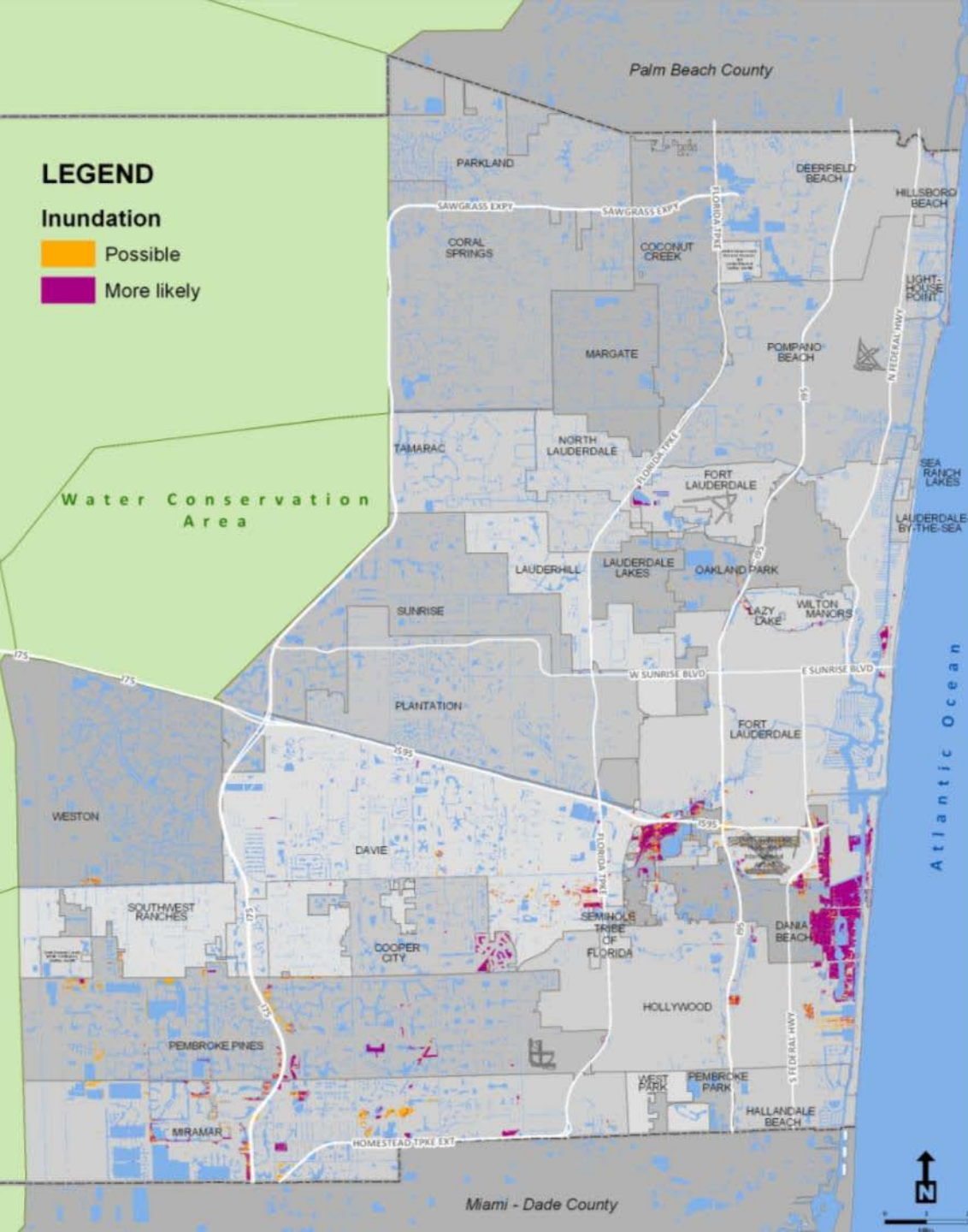


## Broward Test 25-ft Digital Elevation Model (DEM)

*(using Florida Dept. of  
Emergency Management 2007  
LiDAR Data)*



# 1-Foot



## LEGEND



### Inundation

-  Possible
-  More likely

- Identifies area with elevations below Mean High High Water (MHHW)

## LEGEND

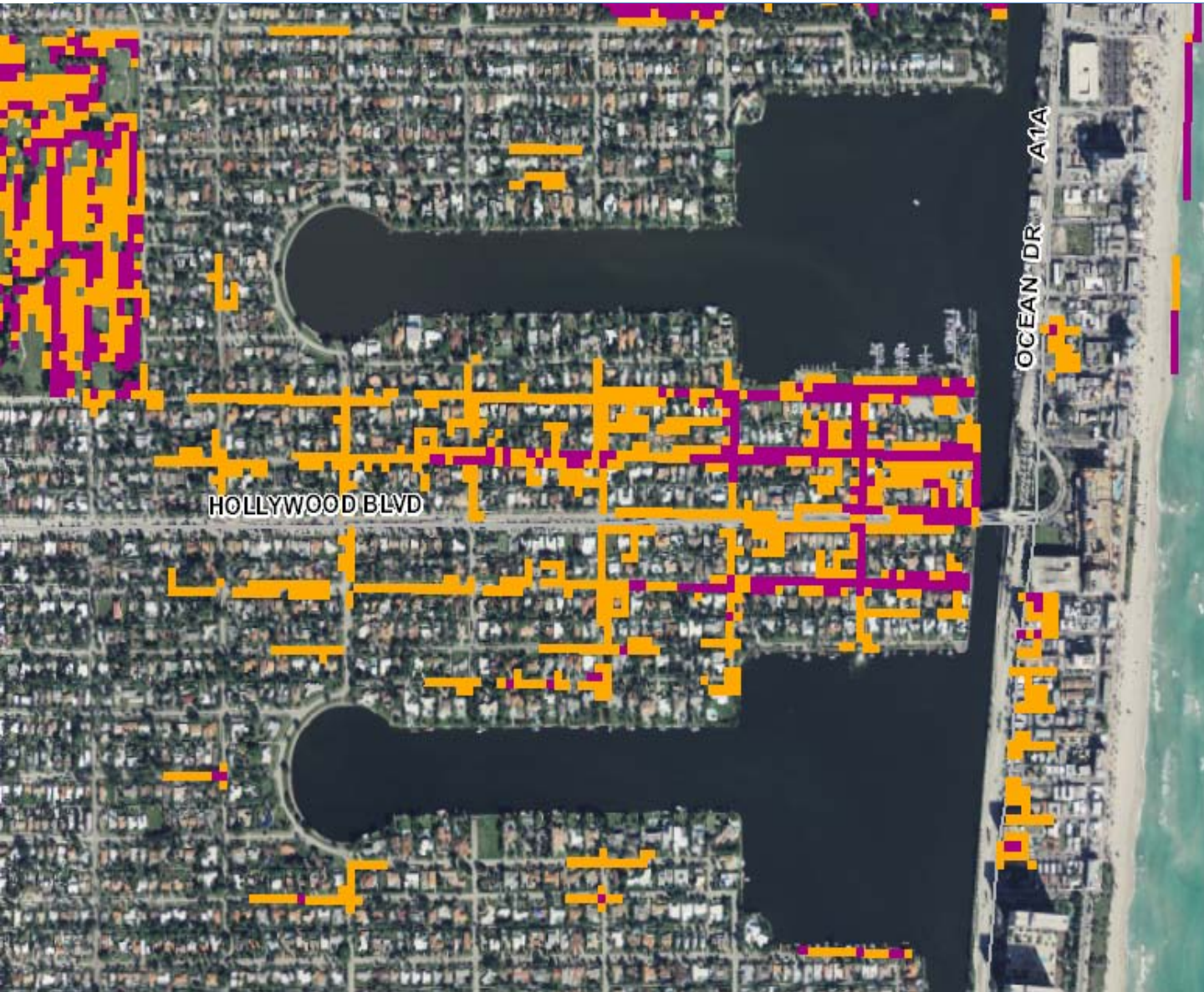
### Inundation

-  Possible
-  More likely



# 1-Foot

Twin Lakes  
area of  
Hollywood



**LEGEND**

**Inundation**

-  Possible
-  More likely





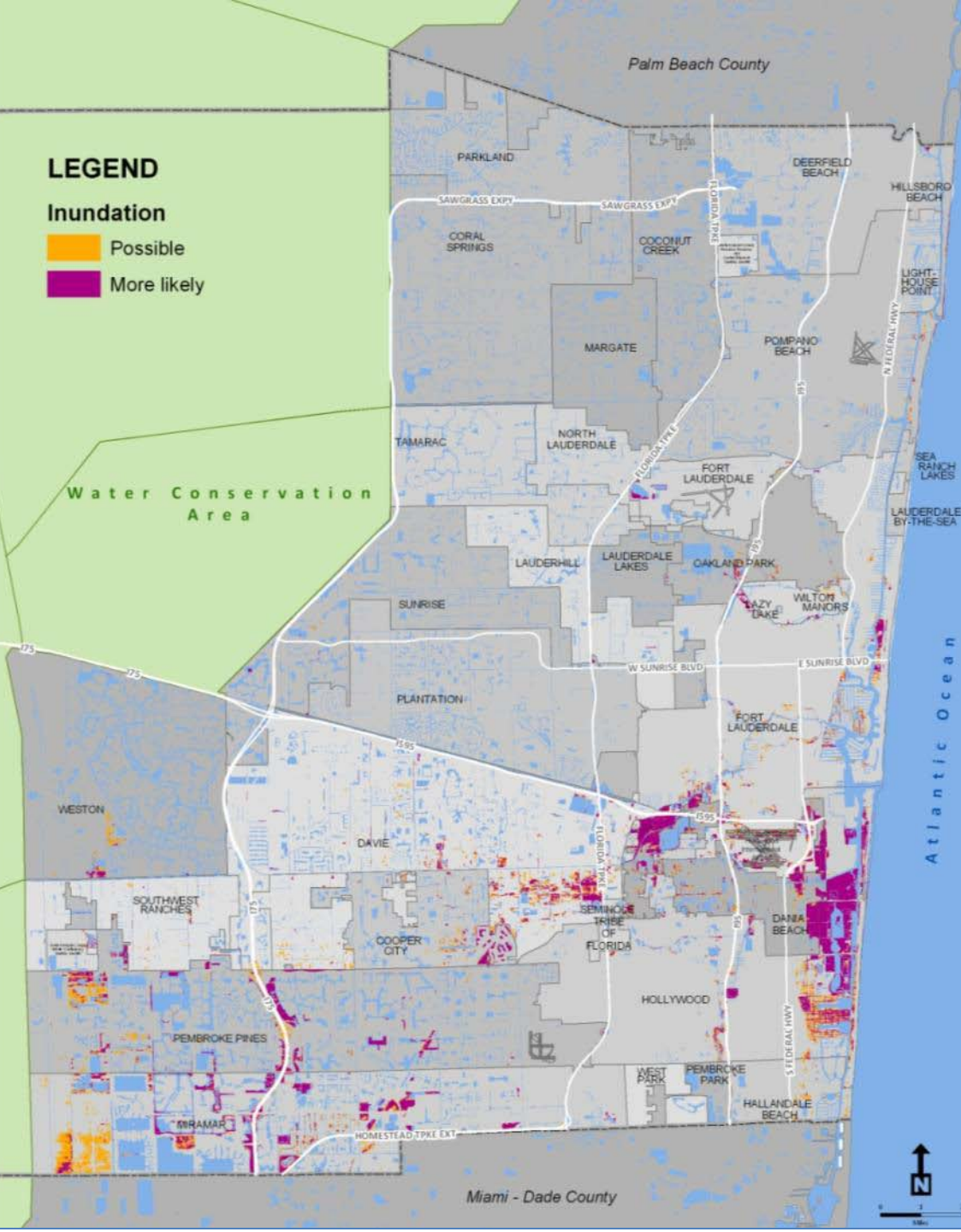
# 2-Foot

## LEGEND

### Inundation



-  Possible
-  More likely

Water Conservation Area



## LEGEND

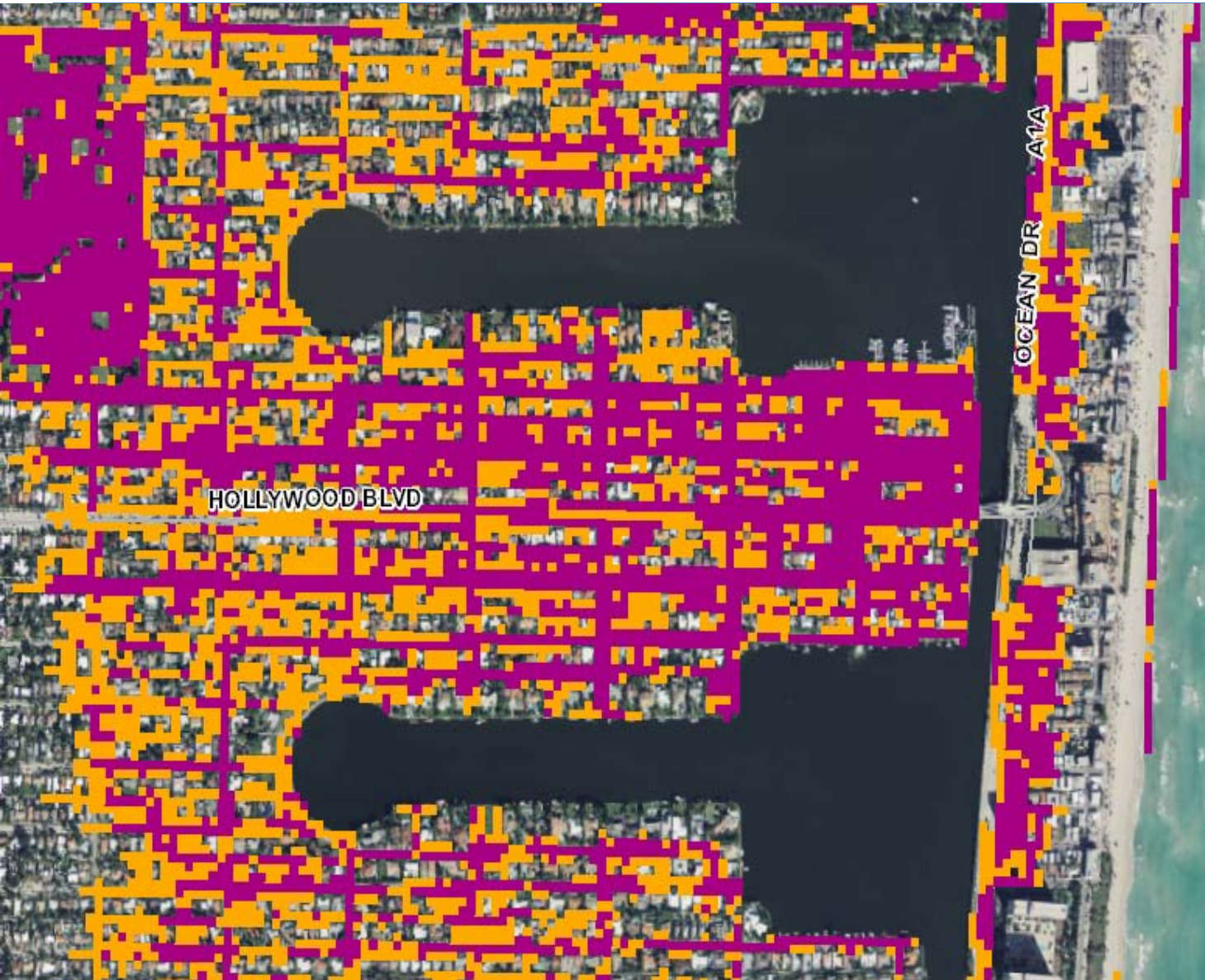
### Inundation

-  Possible
-  More likely



# 2-Foot

Twin Lakes  
area of  
Hollywood



**LEGEND**

**Inundation**

-  Possible
-  More likely





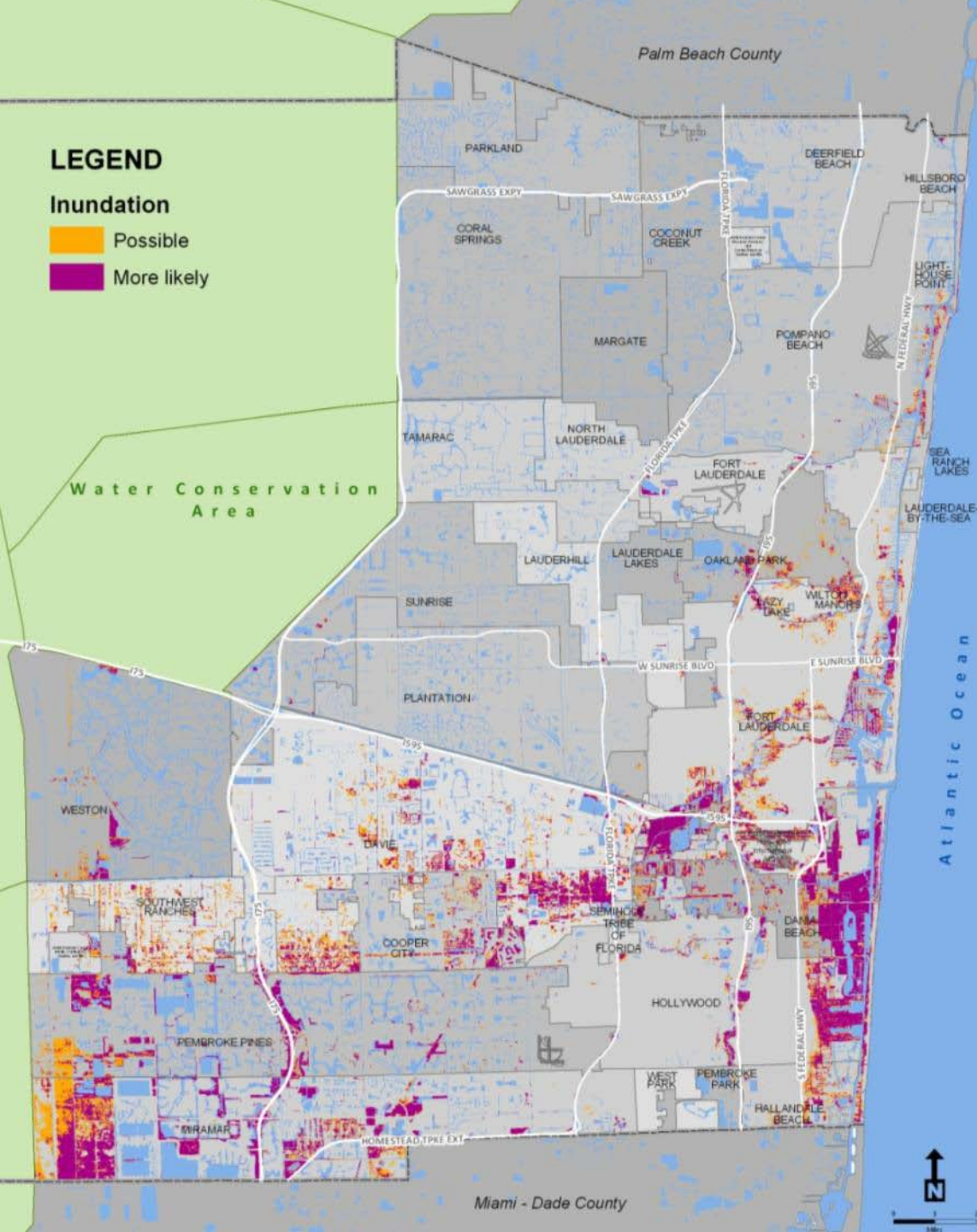
# 3-Foot

## LEGEND

### Inundation



-  Possible
-  More likely

Water Conservation Area



## LEGEND

### Inundation

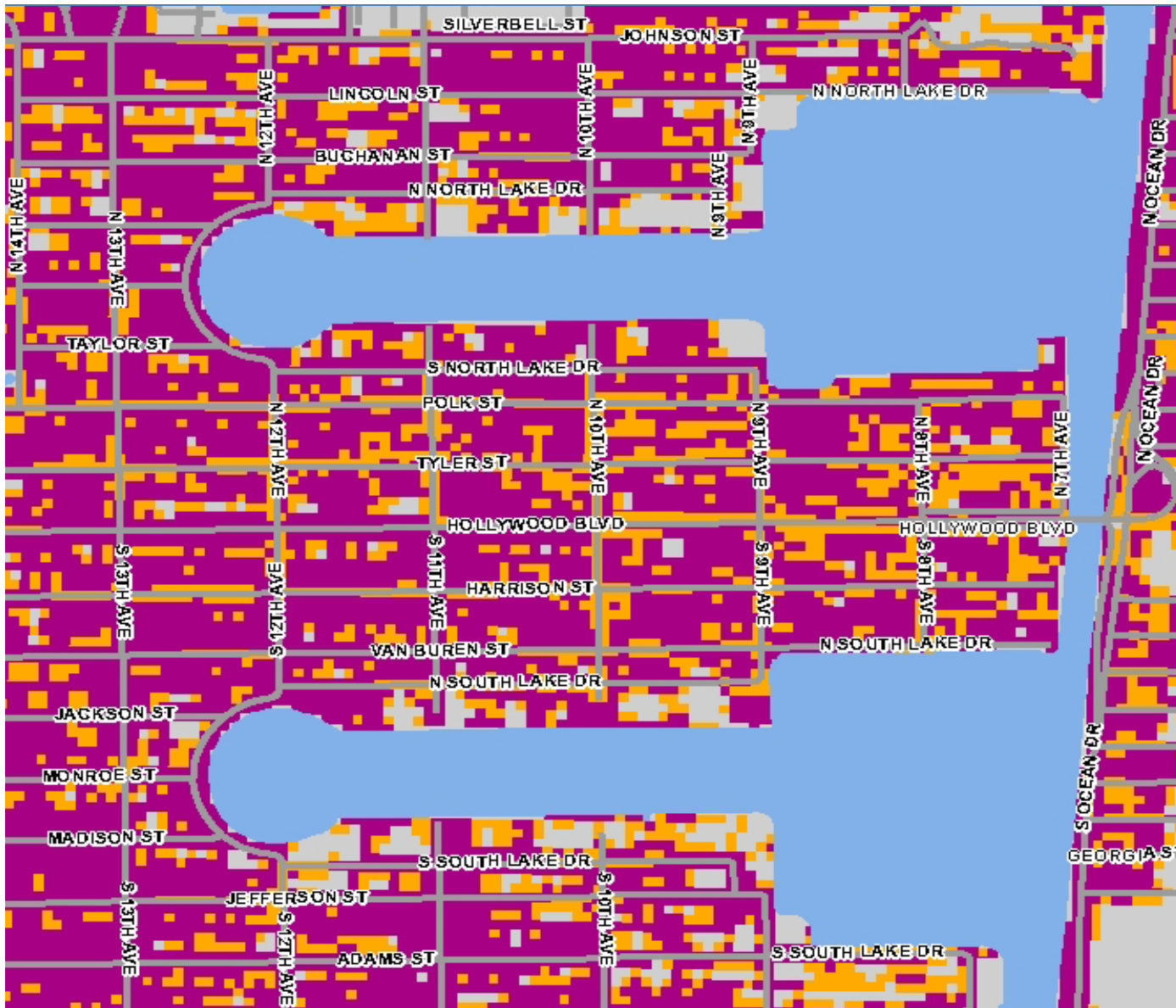
-  Possible
-  More likely



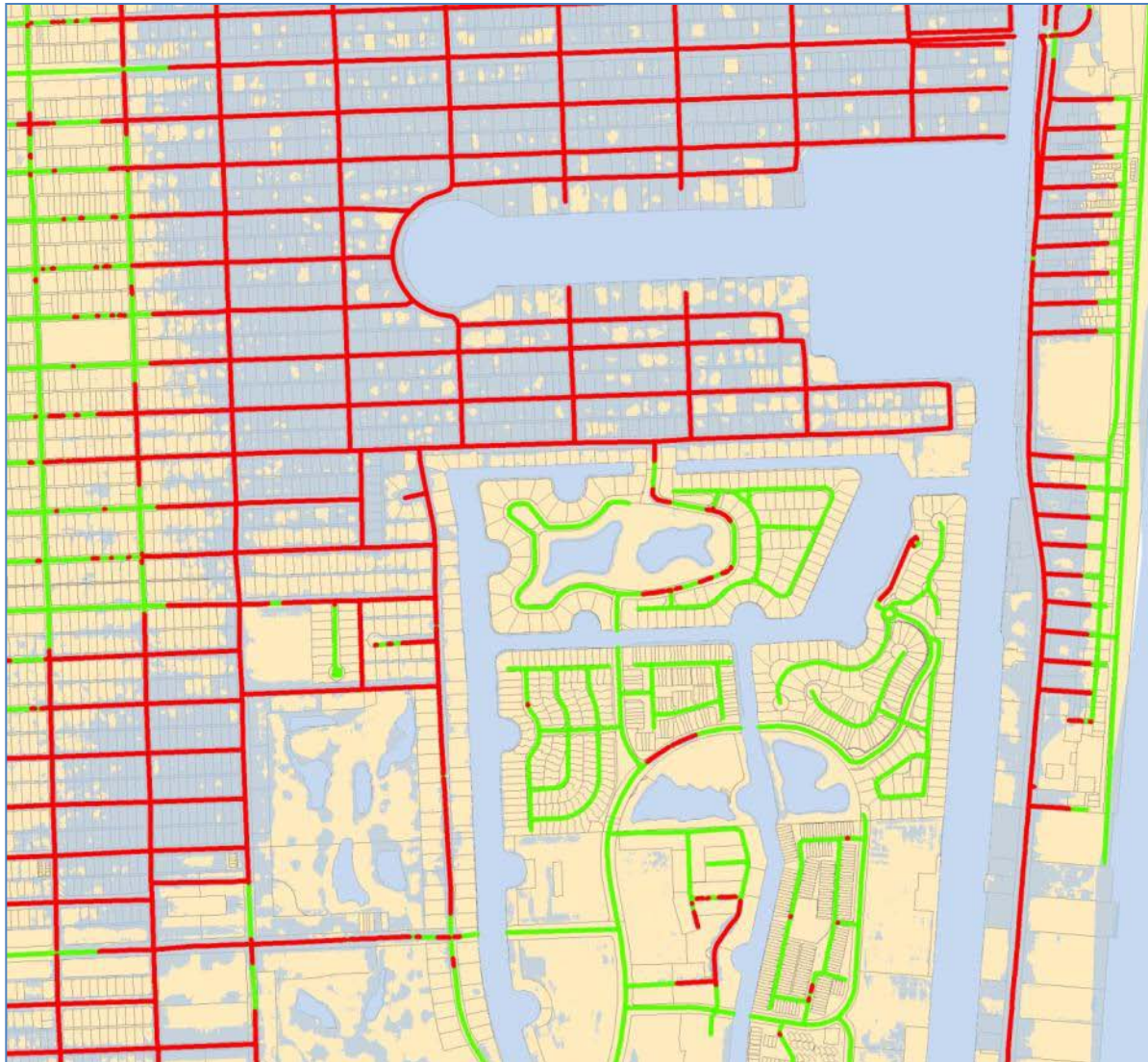


# 3-Foot

## Twin Lakes area of Hollywood



# Methodology



**Southern Hollywood /  
Northern Hallandale  
Beach**

**Streets with 3 foot sea  
level rise overlay**

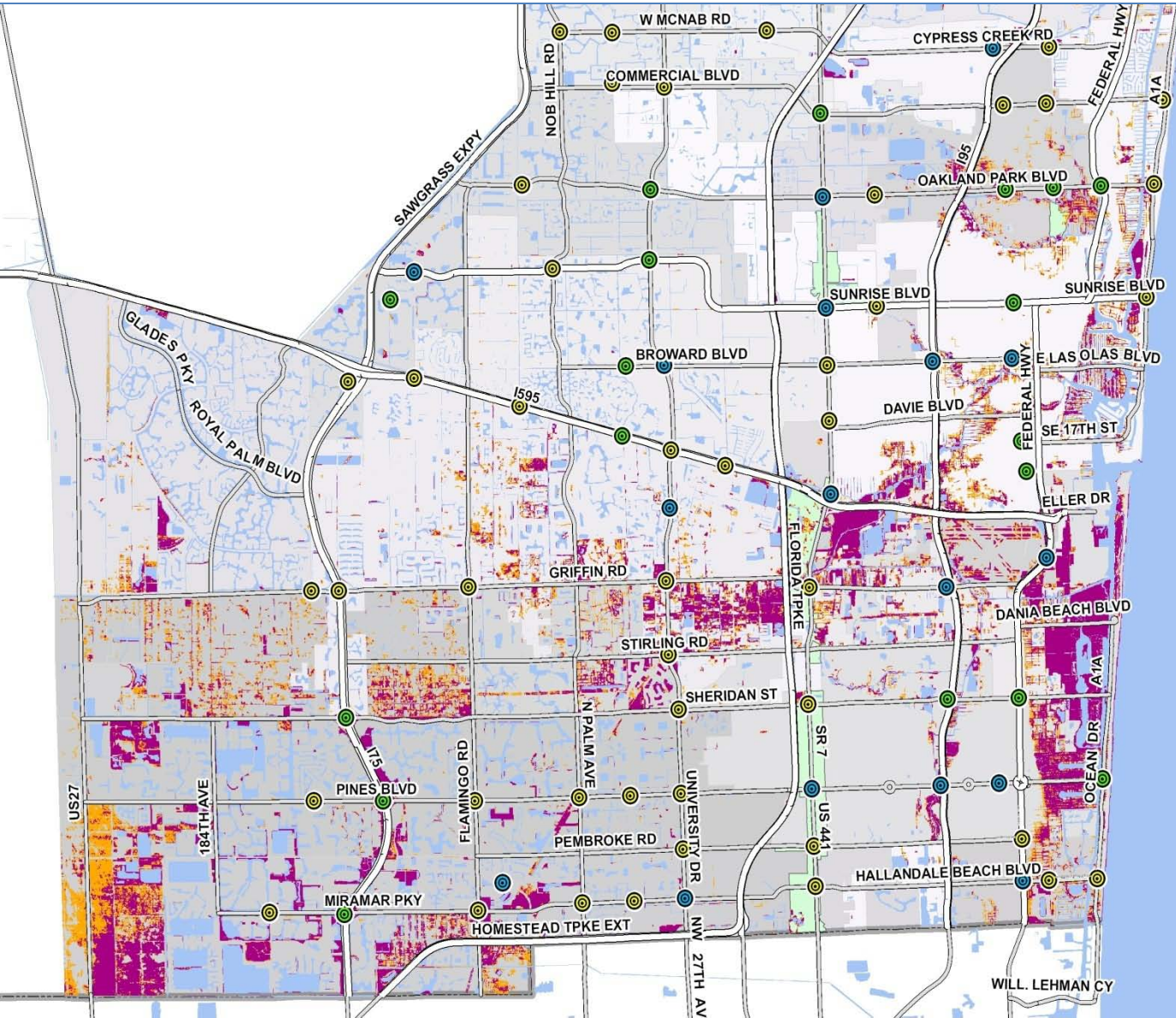
**Red: Streets affected  
Green: Streets not  
affected**

**Bridges not included,  
not calculated in total  
miles affected**





# 3-Foot



- Highlight current TODs

- Highlight Transit hub locations

 Anchor Hub

 Community Hub

 Gateway Hub

 Transit Oriented Corridor





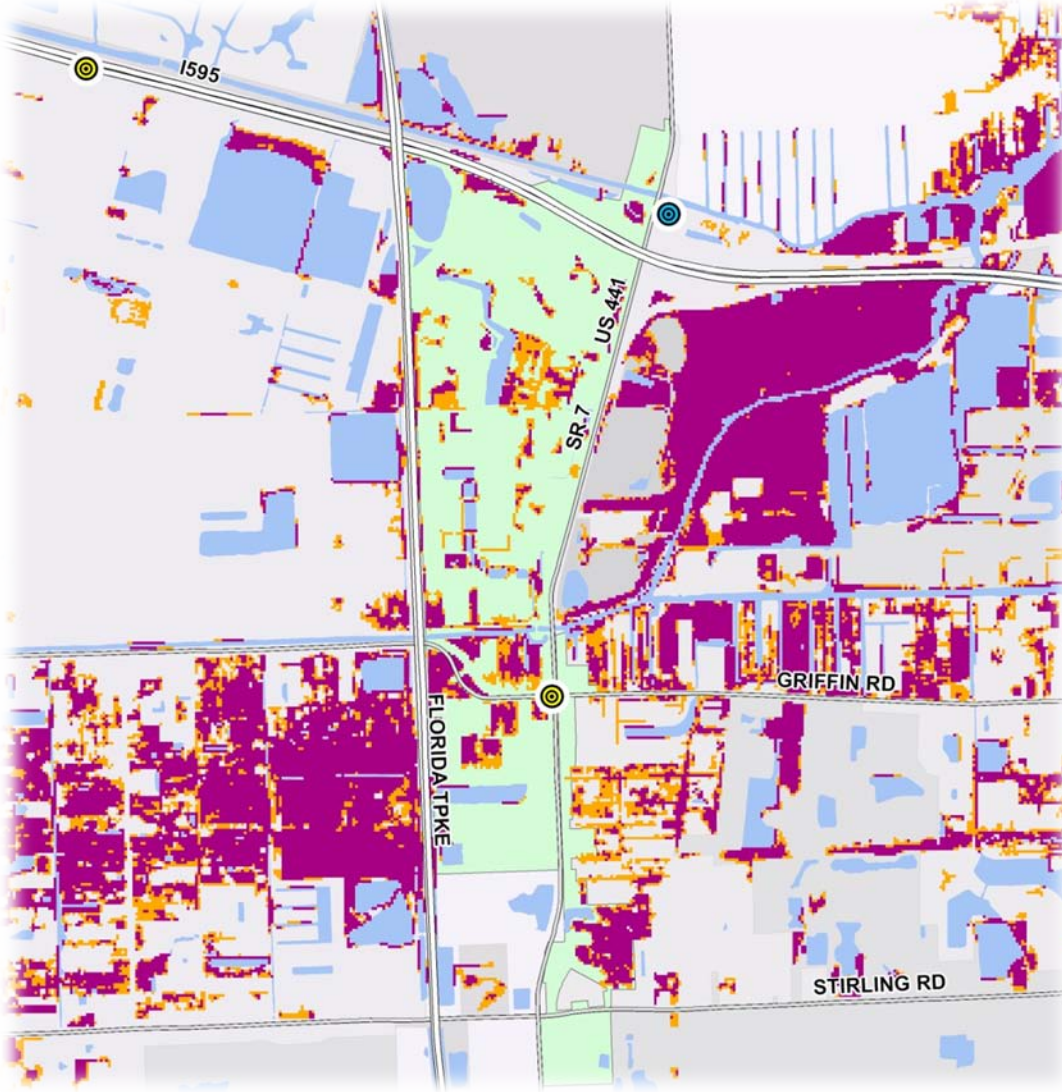
# DISTRICT 4

## 2035 LRTP Improvements

- Premium Transit
  - US-441
  - US-1
  - Hallandale Bch Blvd
  - Hollywood Blvd
- Mobility Hubs
  - 6 Gateway Hubs
  - 4 Anchor Hubs
  - 6 Community Hubs
- New Local Service
  - Griffin Rd

## Other Planned/Current Efforts

- Coordination on additional studies (I-95 Managed Lanes, SFECC)
- Connections to Downtown Miami and Golden Glades



3 foot

# Miles of Road by FDOT Category

- Results (in miles) at 1-ft Sea Level Rise

Functional Class (One foot SLR)	Total Inundation	Total Coverage
1 – high volume, maximum speed	0.73	127.70
2 – high speed, channels traffic to FC1	0.00	251.28
3 – high speed, lower mobility, connects to FC2	0.28	464.39
4 – moderate speed, through neighborhoods	0.72	820.83
5 – low volume, i.e. access roads, parking lanes	7.74	5,414.99
<b>Total</b>	<b>9.47</b>	<b>7,080.19</b>



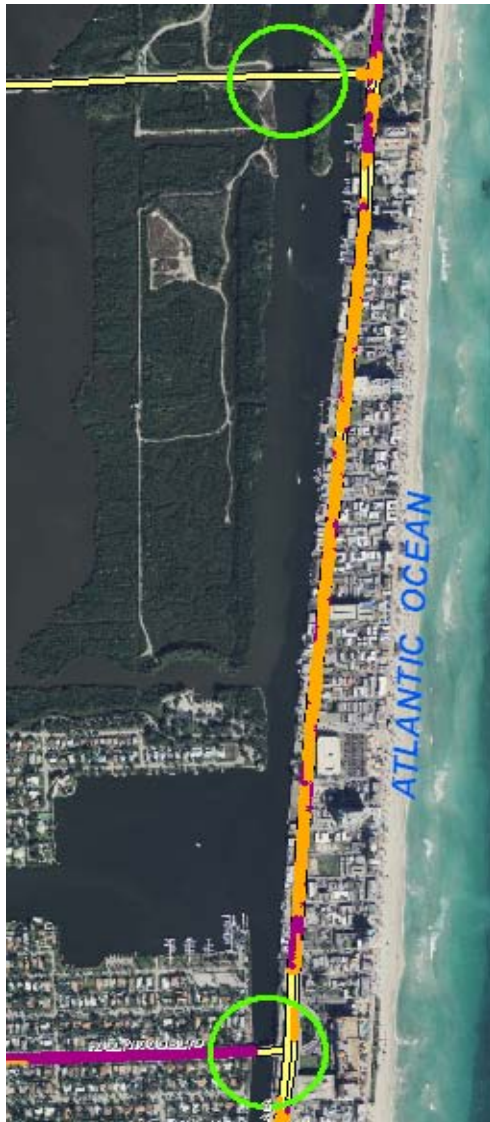
# Major Roads Impacted

One Foot	Two Foot	Three Foot
Hollywood Blvd Ocean Dr / A1A Dania Beach Blvd Sheridan St	Hollywood Blvd Ocean Dr / A1A Dania Beach Blvd Sheridan St Las Olas Blvd	Hollywood Blvd Ocean Dr / A1A Dania Beach Blvd Sheridan St Las Olas Blvd Griffin Rd Riverland Rd Davie Blvd Bayview Dr Hallandale Beach Blvd Broward Blvd

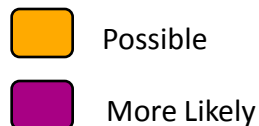




# Evacuation Routes



- Barrier islands vulnerable due to bridges being inaccessible from local roadway flooding
- 2-foot SLR shown, bridges circled in green



# Items for Further Study

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- Vulnerability analysis provides guidance on where to look first for impacts.
- Low lying road segments should be reviewed especially for evacuation routes.
- Inundation of roads and impacts to road beds need to be considered.
- Impacts to future transit hubs and TOD needs to be reviewed.



A1A just South of Hillsboro Inlet inundated during a November 2010 high tide



# Norfolk, VA raises road due to avert flooding at high tide.

Leslie Kaufman , The New York Times, 11/26/2010



Matthew Eich for The NY Times