Transportation Infrastructure Vulnerability to Sea Level Rise in Broward County

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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

- 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)
- Identifies area with elevations below Mean High High Water (MHHW)
Broward County Inundation Mapping and Vulnerability Analysis

LEGEND

- Inundation
  - Orange: Possible
  - Purple: More likely

Twin Lakes area of Hollywood

1-Foot

OCEAN DR

HOLLYWOOD BLVD
LEGEND
Inundation
- Orange: Possible
- Purple: More likely
Twin Lakes area of Hollywood
3-Foot Twin Lakes area of Hollywood

Broward County Inundation Mapping and Vulnerability Analysis
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
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
## Miles of Road by FDOT Category

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

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

<table>
<thead>
<tr>
<th>One Foot</th>
<th>Two Foot</th>
<th>Three Foot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hollywood Blvd</td>
<td>Hollywood Blvd</td>
<td>Hollywood Blvd</td>
</tr>
<tr>
<td>Ocean Dr / A1A</td>
<td>Ocean Dr / A1A</td>
<td>Ocean Dr / A1A</td>
</tr>
<tr>
<td>Dania Beach Blvd</td>
<td>Dania Beach Blvd</td>
<td>Dania Beach Blvd</td>
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<tr>
<td>Sheridan St</td>
<td>Sheridan St</td>
<td>Sheridan St</td>
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<tr>
<td></td>
<td>Las Olas Blvd</td>
<td>Las Olas Blvd</td>
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<tr>
<td></td>
<td></td>
<td>Griffin Rd</td>
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<td></td>
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<td>Riverland Rd</td>
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<tr>
<td></td>
<td></td>
<td>Davie Blvd</td>
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<tr>
<td></td>
<td></td>
<td>Bayview Dr</td>
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<tr>
<td></td>
<td></td>
<td>Hallandale Beach Blvd</td>
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<tr>
<td></td>
<td></td>
<td>Broward Blvd</td>
</tr>
</tbody>
</table>
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

• 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.