Adaptation and Resilience at the City of Fort Lauderdale

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Overview

- Climate challenges and limitations
- Sea Level Rise Projections
- King Tide Events
- Adaptation Action Areas
- Seawall Ordinance Modifications
- Seawall Master Plan
- Stormwater Master Plan
Climate Challenges and Limitations

• High groundwater table
• Low-lying residential streets
• Sea level rise
• Extreme weather
• Low and deteriorating seawalls
• Aging infrastructure
• Absence of stormwater infrastructure
• Lack of green space

2015 Unified Sea Level Rise (SLR) Projection for SE FL

• 3” SLR since 1992
• 2030: 6-10” SLR
• 2060: 14-26”
• Orange line for long term projects with low risk tolerance (2060: 34”)
Tidal Flooding today, in 2030 and in 2045

SE Florida will advance from <10 events today to 240 events in 2045

SOURCE: Union of Concerned Scientists – Encroaching tide

King Tide in September 2015

2.615 ft NAVD88

Observed King Tide
Predicted King Tide
Normal High tide
Flood Impacts

- Two types of flooding occurring during high tides:
  - Tidal flooding
  - Storm flooding

King Tides in September 2015
**Land Elevation Map**

*Red represents areas below 5 feet elevation*

**Sea Level Impacts:**
- Drainage Issues
- Road
- Beach Erosion
- Drinking Water
- Economy

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**Towards Adaptation and Resiliency**

- Vision and Strategic Plan
- Adaptation Actions Areas
- Seawall Ordinance Modifications
- Seawall Master Plan
- Stormwater Master Plan
2035 Community Vision Statement

WE ARE CONNECTED.
We move seamlessly and easily through a safe transportation system where the pedestrian is first.

WE ARE READY.
We are a resilient and safe coastal community.

WE ARE COMMUNITY.
We are a neighborhood of neighborhoods.

WE ARE HERE.
We are an urban center and a vacationland in the heart of South Florida.

WE ARE PROSPEROUS.
We are a subtropical City, an urban laboratory for education and business.

WE ARE UNITED.
We are a strong and vibrant kaleidoscope of multi-generational cultures, ethnicities, and community partners.

We are Fort Lauderdale, a community of choice. We are the City you never want to leave.

http://www.fortlauderdale.gov/vision/
GOAL 2: Be a sustainable and resilient community.

Fort Lauderdale's roadways and bridges, water and wastewater systems, and drainage infrastructure will be more structurally sustainable to meet the needs of current and future generations. This will make our City increasingly resilient to inclement weather, high-tides, future water demands, and a growing population. Our community will utilize sustainable construction techniques and efficiencies to blend buildings with the natural environment, and increase recycling practices to minimize our environmental impact.

- Proactively maintain our water, wastewater, road and bridge infrastructure
- Reduce flooding and adapt to sea level rise
- Improve climate change resiliency by incorporating local, regional and mega-regional plans
- Reduce solid waste disposal and increase recycling
- Improve air and water quality and our natural environment
- Secure our community’s water supply

Neighbor Survey

Level of Agreement with Various Aspects of Sustainability - 2012 to 2015

<table>
<thead>
<tr>
<th>Aspect</th>
<th>2016</th>
<th>2014</th>
<th>2012</th>
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<tbody>
<tr>
<td>I have observed coastal water level increases</td>
<td>75%</td>
<td>55%</td>
<td>70%</td>
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<tr>
<td>I have observed increased flooding</td>
<td>72%</td>
<td>52%</td>
<td>68%</td>
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Identification of 16 Adaptation Action Areas (AAA) meeting minimum AAA criteria

Includes 38 Capital Projects in the Community Investment Plan (CIP) for funding
Key Modifications to the Seawall Ordinance

- Adds definitions for seawall, North American Vertical Datum and rip rap;
- Sets a minimum seawall elevation at 3.9 feet NAVD88 (previous allowable max);
- Recommends design of seawall for future height adjustment;
- Sets an allowable maximum height of the seawall based on a property’s base flood elevation;
- Requires seawall reconstruction to the minimum elevation if the substantial repair threshold is triggered;
- Requires maintaining seawalls in good repair and sets a timeline of 365 days for completion of repairs if cited;
- Requires owners to prevent tidal waters entering their property from impacting others and sets a timeline of 365 days for remedy if cited;
- Allows fixed docks to extend 10 inches above the adjacent seawall; and
- Allows for floating docks and requires them to be permitted and permanently attached.

Seawall Master Plan

- City owns approximately 4 miles of seawalls and 1.3 miles of natural banks
- Inspection of seawall & bank with recommendation for rehabilitation or replacement
- Address potential structural modifications to address challenges associated with sea level rise
Stormwater Master Plan

• Stormwater Master Plan developed in 2014
• Three phase approach:
  ✓ **Phase I**: design/construction of 38 projects and evaluation of stormwater rate options
  ✓ **Phase II**: Modeling, preliminary stormwater solutions, stormwater bond recommendations
  ✓ **Phase III**: Updated Master Plan, revised/updated standards, and construction Phase II projects
• Ten year plan (FY2014-2024)

Level of Service (LOS) Road Crown

• The primary purpose for choosing a LOS criteria is to protect public safety/property and enhance quality of life
• Roads need to be passable for emergency and evacuation traffic
• A higher LOS will result in increased public safety, enhanced quality of life, and decreased property damage and land erosion

![Diagram of Level of Service (LOS) Road Crown](image-url)
**Comprehensive Multi-Year Stormwater Master Plan**

**Improvement Features**

- **Bio Swales**
- **Recharge Drainage Well**
- **Exfiltration Trench**
- **Tidal Control Valves**
- **Pervious Pavers & Pavedrain**
- **Sea Wall Repairs & Upgrades**
- **Storm Drain Water Preserves**
- **Pumping Stations**

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**Tidal Control Valves**

- Backflow prevention devices for high tide control
- Installed inside the outfall structure prior to discharge into a canal or waterway
2011 Halloween Storm
Rainfall during an extreme high tide caused coastal flooding.

Stormwater cannot drain

Stormwater Pump Stations

LEGEND
- CITY STORMLINE - 172.22 miles of pipe
- COUNTY STORMLINE - 44.16 miles of pipe
- STATE STORMLINE - 47.79 miles of pipe
- PRIVATE STORMLINE - 44.48 miles of pipe
- CITY STORMINLET - 6942 inlets
- COUNTY STORMINLET - 617 inlets
- STATE STORMINLET - 1357 inlets
- PRIVATE STORMINLET - 2860 inlets
- STORM Bypass
- STORM OUTFALL
- STORM PUMP STATION
- STORM ENTRANCE

Sea Wall
Road
Yard
Storm drain
Pump
High Tide
Freshwater
Aligning Fort Lauderdale’s Plans

- **Fast Forward - 2035 Vision Plan**
  - Adaptation Aspirations Defined
- **Press Play - 5 year Strategic Plan**
  - Adaptation Initiatives Outlined
- **Community Investment Program (CIP)**
  - Adaptation Measures Implemented
- **Comprehensive Plan**
  - Adaptation Action Areas Policies
- **SE FL Regional Climate Action Plan**
  - Local alignment with regional plans
We are Ready
We are a resilient and safe coastal community.

Questions?