



Water resources planning for Broward county in response to climate change

Broward County Environmental Planning &
Community Resilience

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South Florida Hydrologic Society

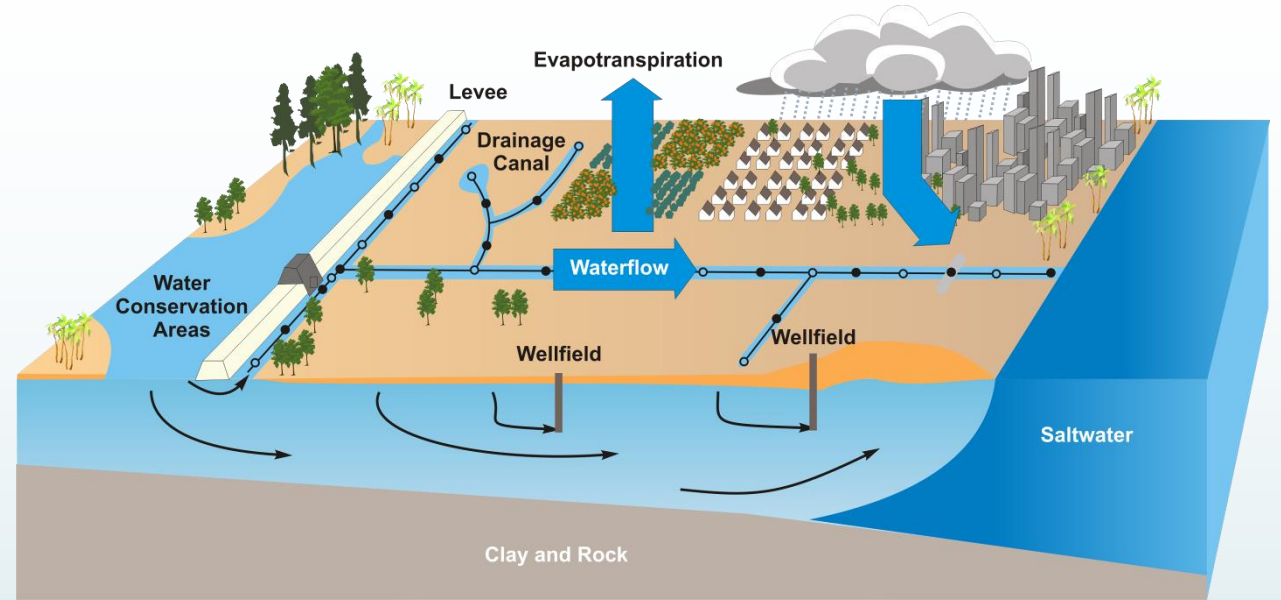
ANTICIPATED IMPACTS

- Climate change and sea level rise
- More extreme weather
- Increased flooding
- More intense wind damage and storm surge
- More severe beach erosion
- Impacts to water supplies
- Degradation of natural resources



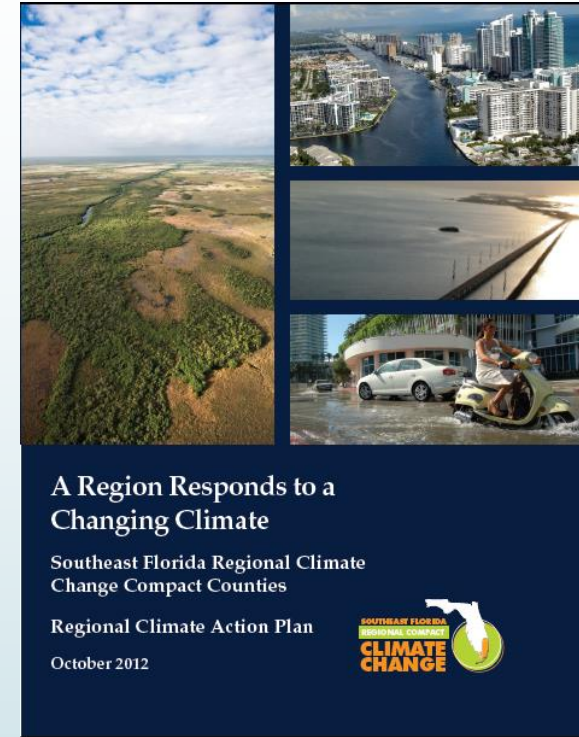
VULNERABILITIES

- \$ Billions in public and private infrastructure
- Water supply and water management systems
- Critical habitat and natural systems
- Recreational and commercial fisheries
- Communities and economies



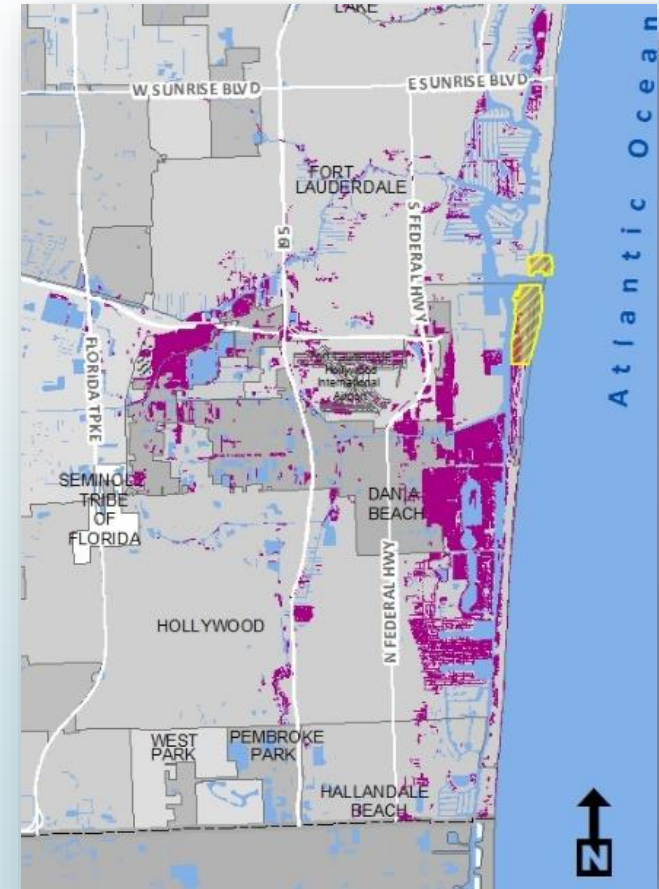
POLICY & PLANNING INITIATIVES

- 4- County Southeast Florida Regional Compact
- Regional, County Climate Action Plan
- Commission Goals

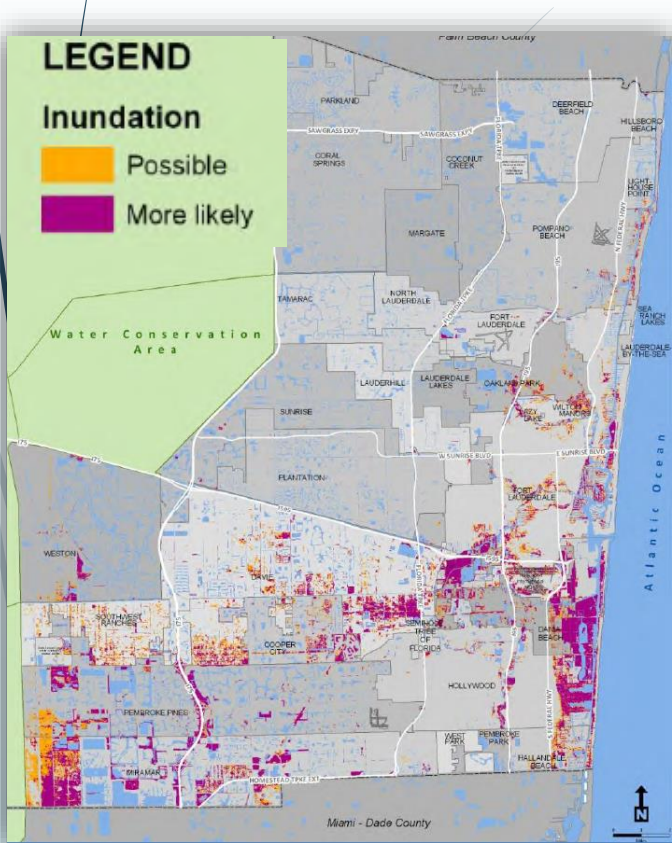


WATER RESOURCE PLANNING

- ▶ County Comprehensive Plan
 - ▶ Elements
 - ▶ Land Use Plan
 - ▶ Priority Planning Areas: Unified SLR Projection
 - ▶ Adaptation Action Areas
 - ▶ Pursue infrastructure improvements
- ▶ Integrated Water Management Plans
- ▶ C-51 Reservoir Project
- ▶ Support Everglades Restoration



RISK ASSESSMENT



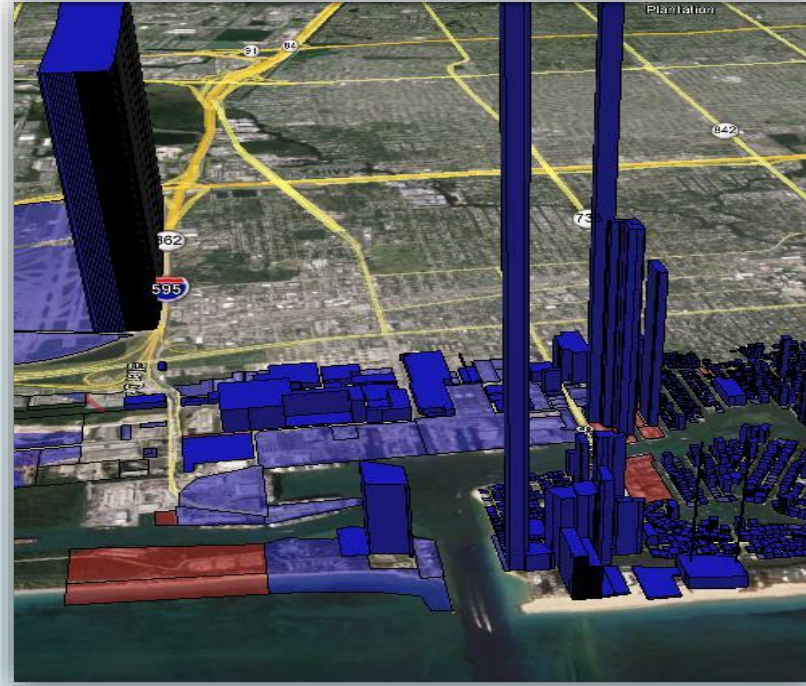
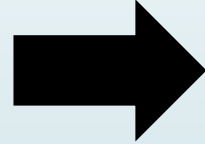
**Sea Level Rise
Inundation and
Vulnerability
Assessment**



**Vulnerable Critical
Infrastructure**



**Replacement
Costs of
Transportation**

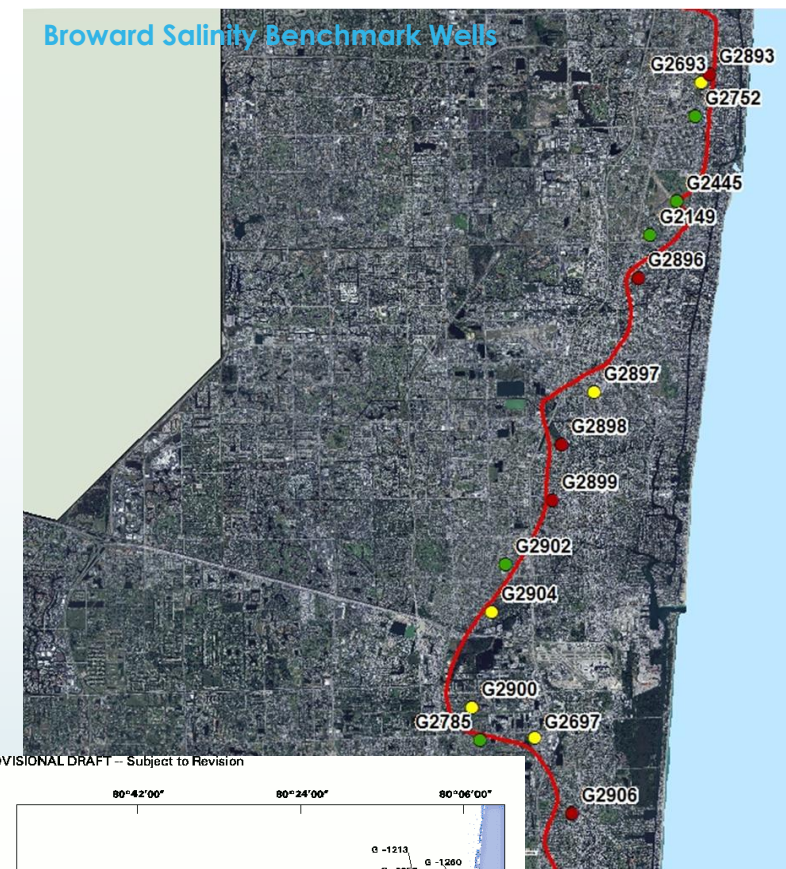


**SLR + Surge
Cumulative Impact
Socio-Economic
Modeling & Survey**

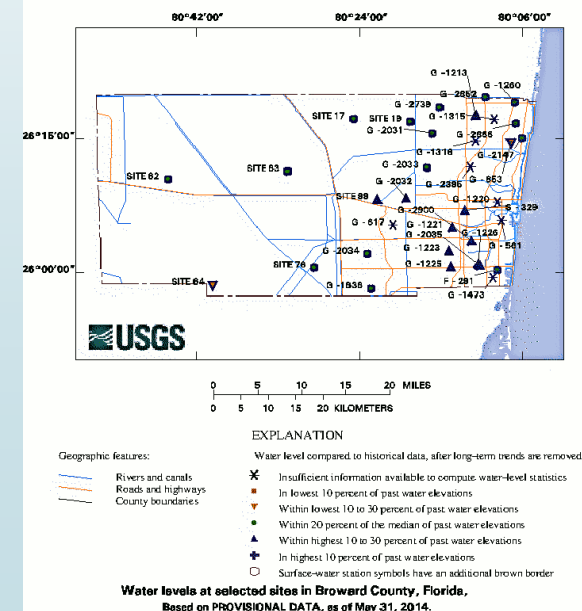
MONITORING

- Broward:
 - 3 chloride sites from BC Lab
 - Cooperative agreement with USGS for
 - 5 discrete GW level measurements
 - 17 continuous GW measurements
 - 5 quarterly chloride measurements
 - 4 Electromagnetic induction logs
 - Additional GW, SW, and Chloride wells funded by USGS/SFWMD/local municipalities
 - Flood complaints kept on file with BC Environmental Licensing and Building Permitting Division

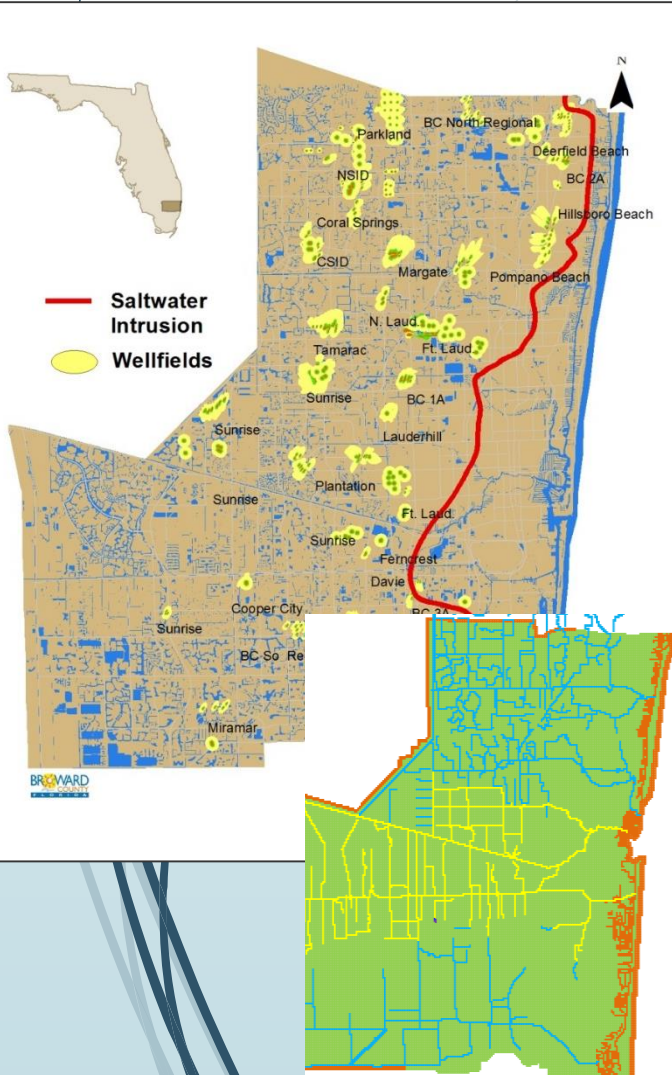
Broward Salinity Benchmark Wells



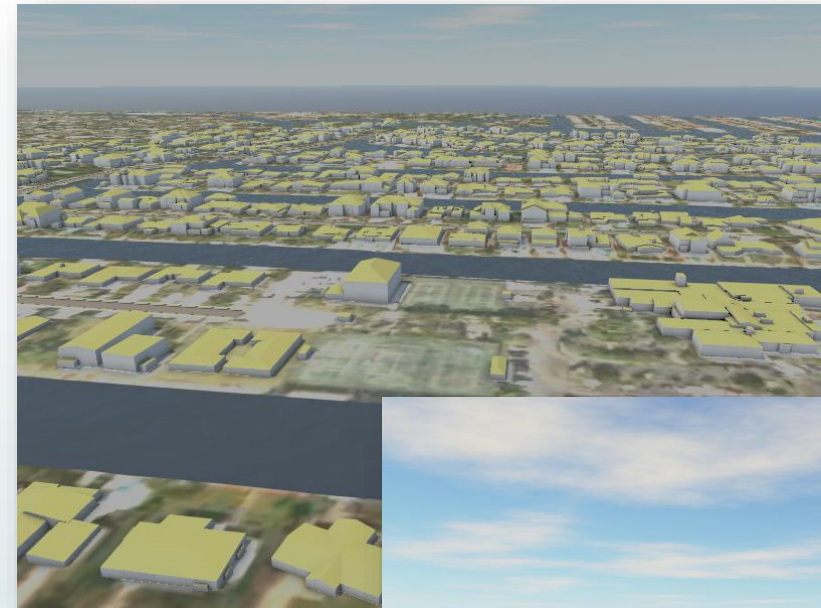
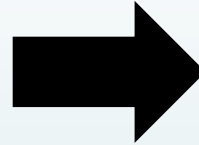
PROVISIONAL DRAFT – Subject to Revision



RISK MODELING



**Climate
Vulnerability
Groundwater
Modeling/
Surface Water
Inundation
Modeling (USGS)**



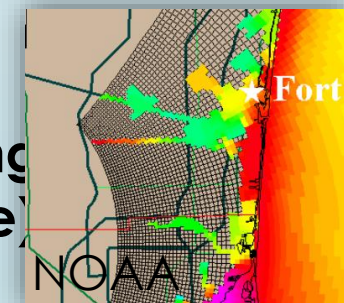
**3D Flood
Visualization
(NEMAC
UNC)**



Coming Soon

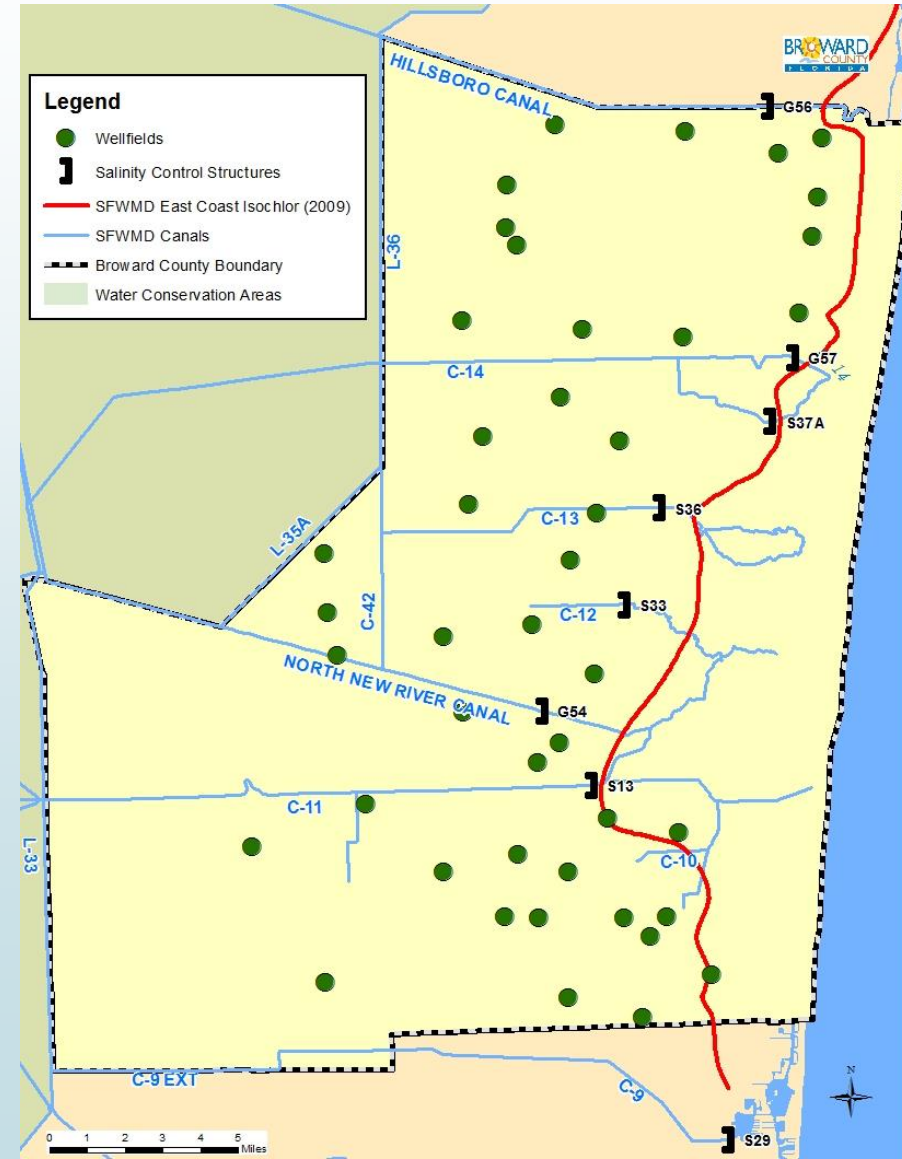


**Coastal Flood Modeling
(Surge + Sea Level Rise)**



SURFACE WATER CONTROLS

- Request SFWMD to analyze operational capacity at District salinity control structures with SLR projections
- County exploring expanding/movement of structures through modeling
 - Salinity control structures
 - Pump stations



TIDAL FLOOD MANAGEMENT

- Document king tide flooding
- Environmental Licensing and Building Permitting Division track flood complaints
- Modeling to access future high risk areas & effective adaptation strategies
- Expanding economic risk assessment & cost/benefit analysis



Regional Reuse Master Plan

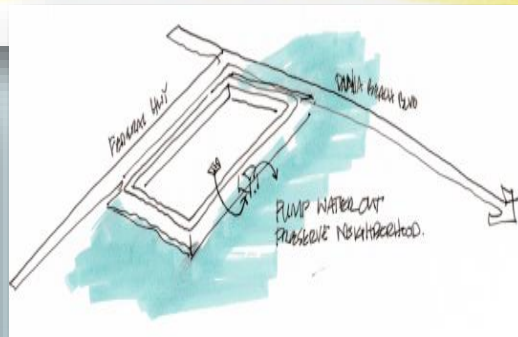
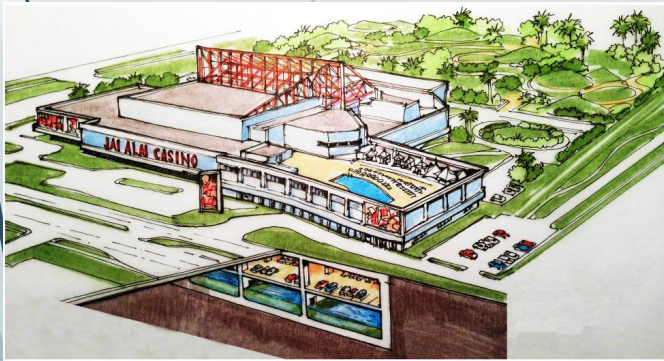


- Integrate existing efforts into regional plan
- Collaborate on ocean outfall compliance
- Coordinate with wastewater/water supply providers, municipalities, and regional planning agencies
- SFWMD, FDEP, FDOT, BDOH, MPO
- Investigate the use of right-of-ways, canals, and other corridors



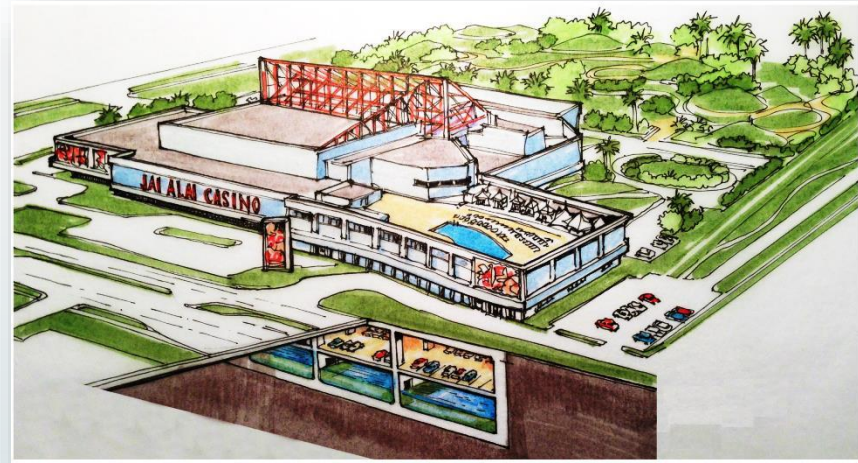
MODELS OF RESILIENCE

South Florida Resilient Redesign

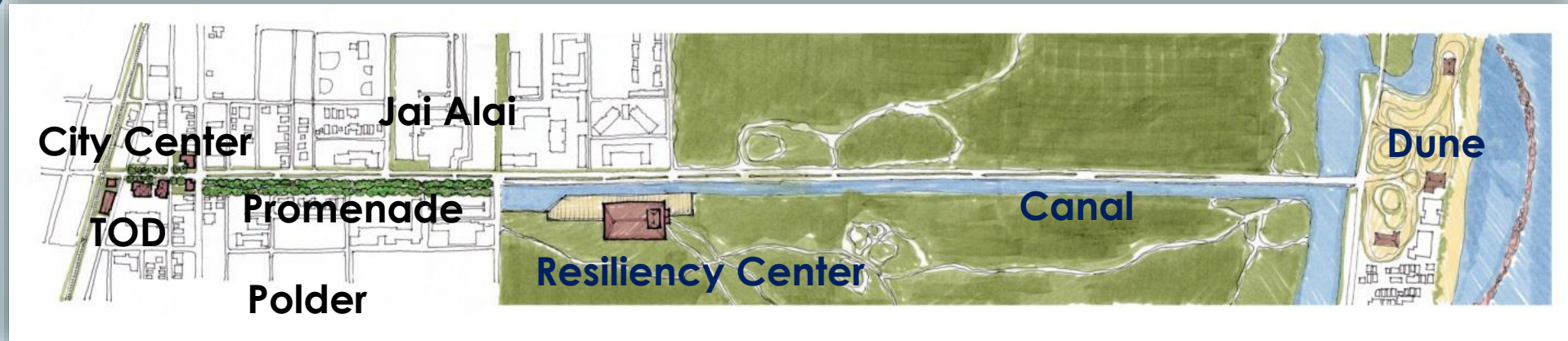


MIAMI CENTER FOR ARCHITECTURE & DESIGN

URBAN COMMUNITY: DANIA BEACH



Interconnectivity



MULTI-PURPOSE NATURAL INFRASTRUCTURE

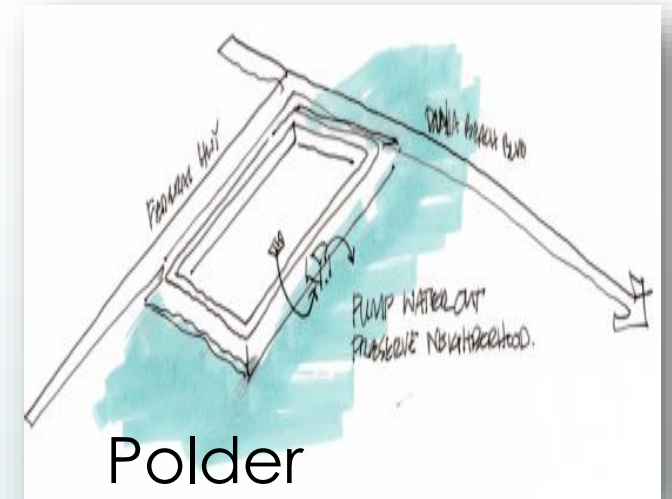


- Enhance dune
- Underground parking
- Reef enhancement

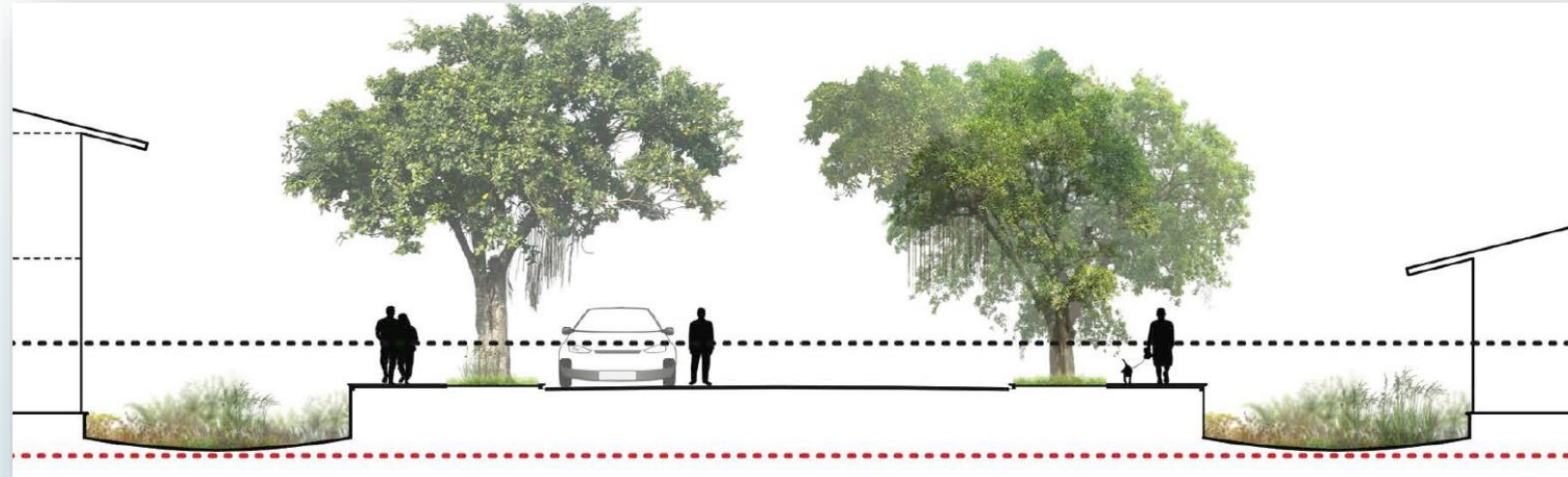
ACTIVE FLOOD CONTROL

► Polder

- Isolating areas that require active control
- Raise perimeter roads to act as levees
- Add pump system
- Incorporate canals



DENSE URBAN COMMUNITY: SOUTH BEACH



- Raise streets
- Garden city
- Increase Water Storage
- Integrate Transit

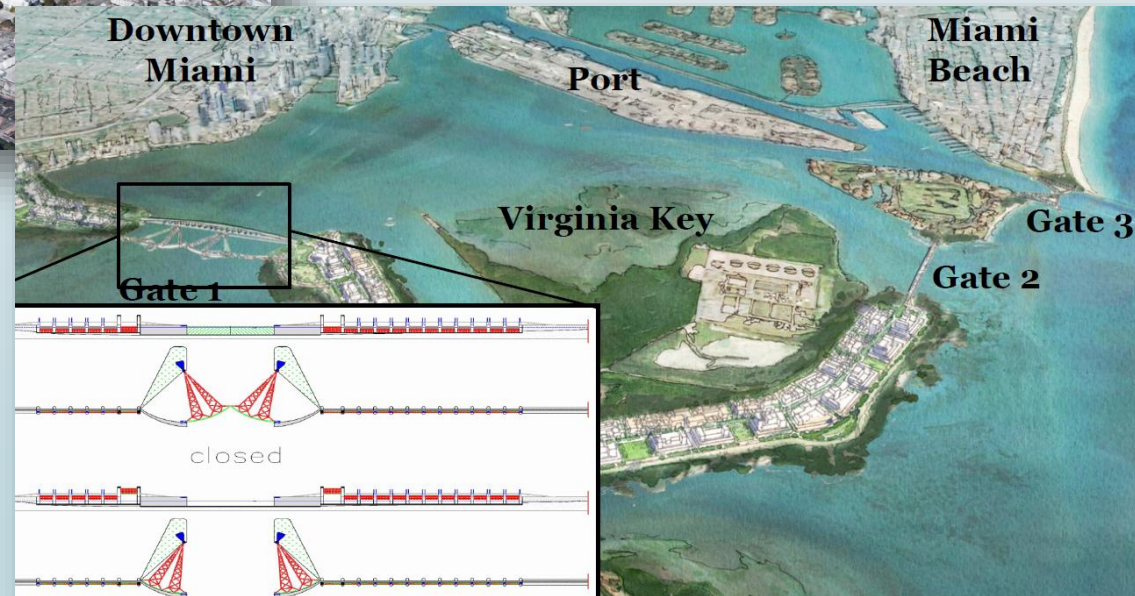


DESIGN CONCEPTS



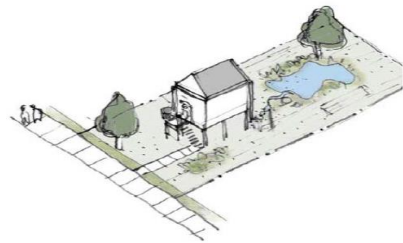
- Elevate
- Densify Buildings

- Flood Gates
- Protective Promenade

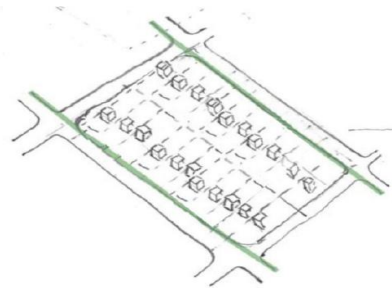


SUBURBAN COMMUNITY: W. MIAMI-DADE

- ▶ Engineering Approach
 - ▶ Widen Tamiami Canal and build walls
 - ▶ Increase pump capacity
 - ▶ Increased costs, no real fix
- ▶ Incremental Approach



Lot – Incentive planning



Streets – Green infrastructure



Neighborhood –
Blue/green Network

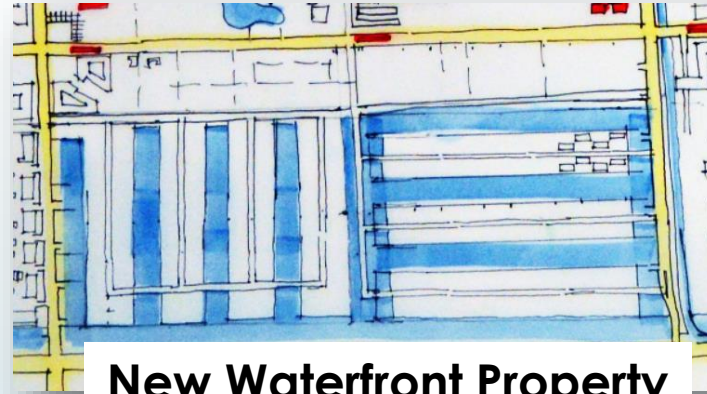
RESILIENT REDESIGN APPROACH



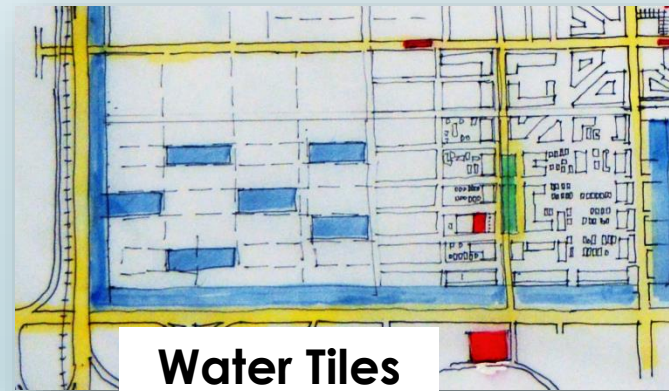
DESIGN CONCEPTS



Floating Trailer Park



**New Waterfront Property
Finger Canals**



Water Tiles

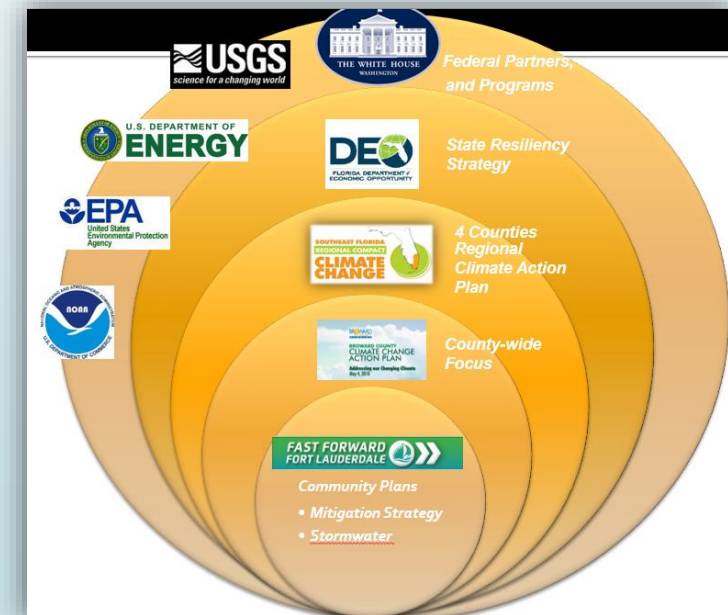
DESIGN CONCEPT SUMMARY

- Interconnect resources.
- Densify in naturally resilient areas.
- Enhance and use natural infrastructure for multiple purposes.
- Active flood control using polders.
- Incremental adaptation.
- Living with water. Increase water storage.
- Elevate infrastructure.



LESSONS LEARNED

- Build a solid foundation through policy, planning and assessment to gain administrative and stakeholder support for implementation
- Develop tools that aid in communication and decision making
- Align your agency's goals with state and federal efforts
- Leverage funds through community collaborations and partnerships





Opportunities to get involved

- Climate Change Action Plan Update
 - Built Environment: March 18th
 - Natural Systems: March 23rd
- Next Resilient Redesign in July 2015

www.broward.org/naturalresources