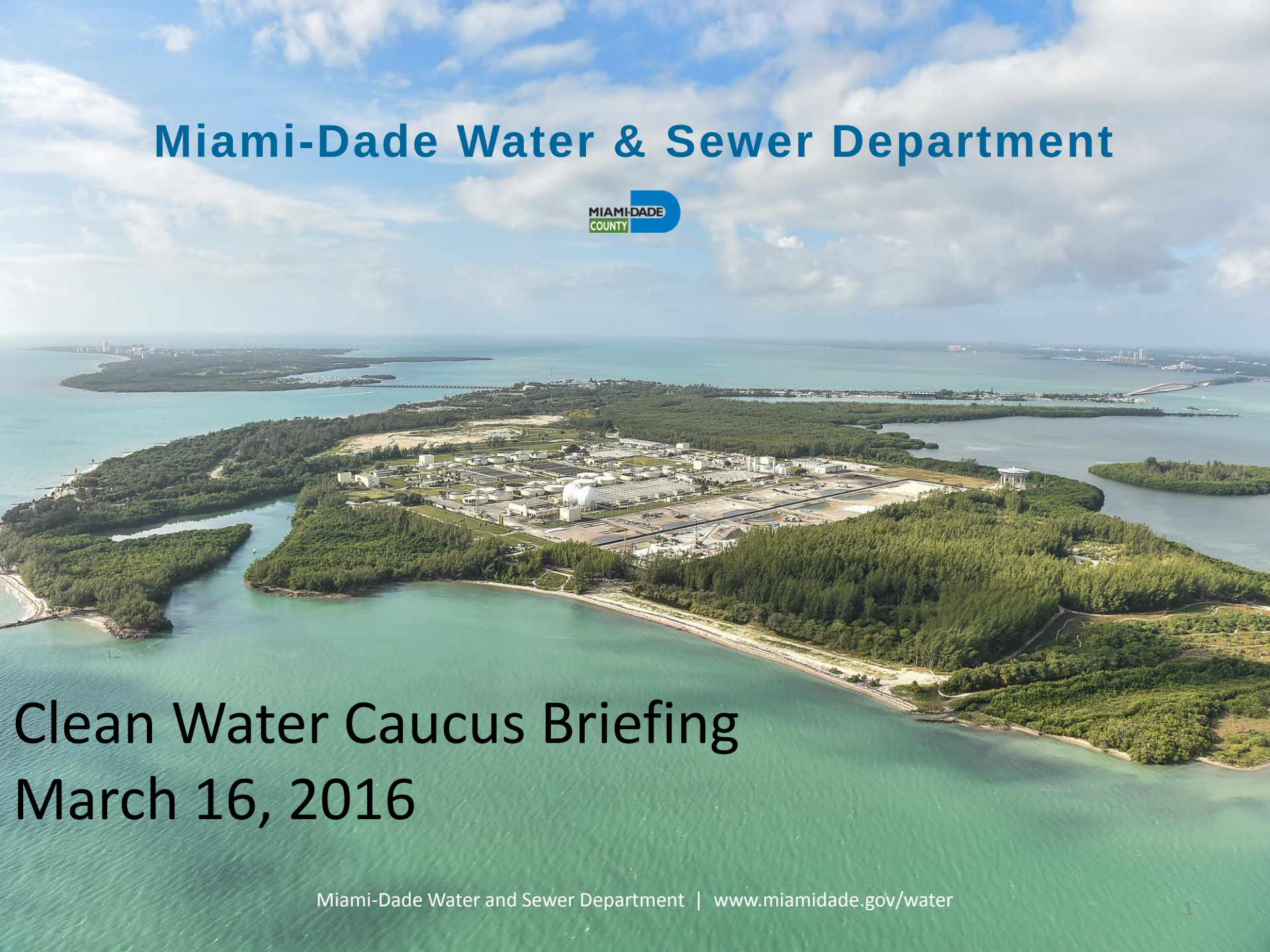
Miami-Dade Water & Sewer Department



Clean Water Caucus Briefing
March 16, 2016

Miami-Dade Water and Sewer Department (WASD)

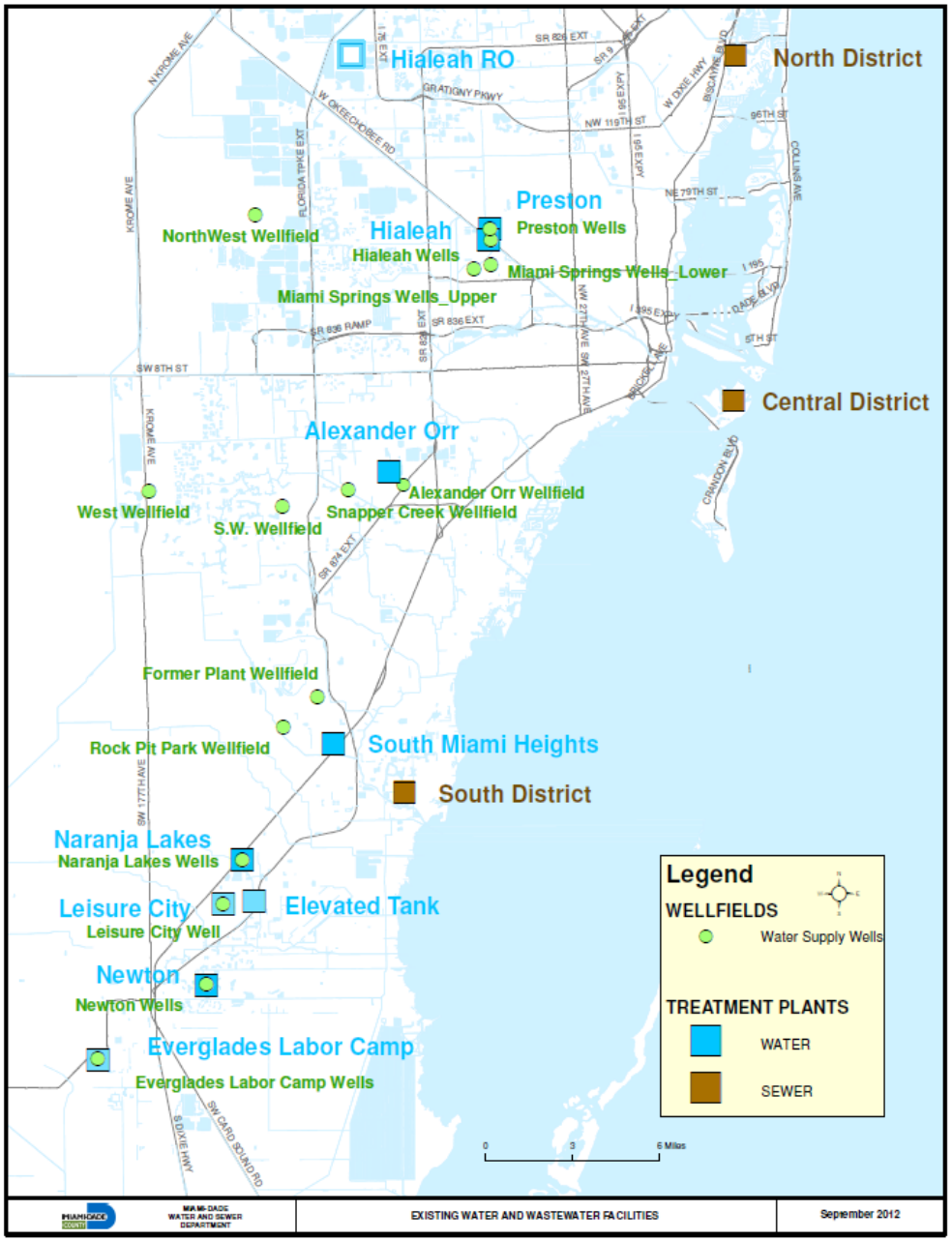
- Largest Water & Sewer Utility in the Southeastern United States
- Serving more than 2.3 million residents
- FY2015-2016 Budget:
  - Projected Revenues $732 Million
  - $13.5 Billion Multi-Year Capital Plan (FY16-21)
  - 2626 Total Budgeted Positions

Water System

- 3 large regional and 5 small water treatment plants (WTP), plus new Hialeah Reverse Osmosis WTP
- Supplying an average of 314 million gallons per day (MGD)
- Per capita water use 137 gpcd
- 15 wholesale customers
- 432,000 retail customers
  - 100 water supply wells
  - 8,206 miles of pipes
  - 38,381 fire hydrants
  - 126,306 valves

Wastewater System

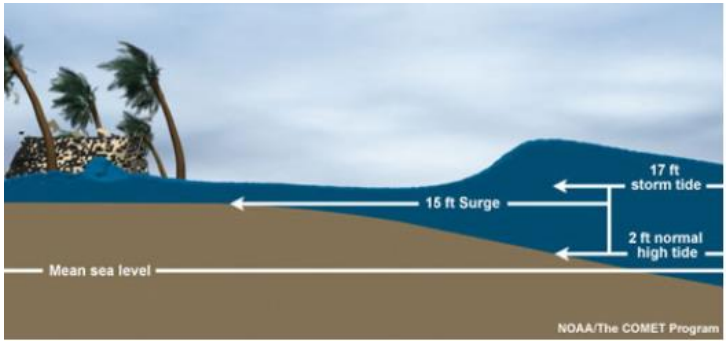
- 3 wastewater treatment plants
- 2 ocean outfalls and 21 deep injection wells
- Collecting, treating, and disposing 308 MGD
- 350,000 retail customers
- 13 wholesale customers
- 6,309 miles of mains and laterals
- 1,047 sewer pumps stations
- Reusing 13 MGD



Water & Wastewater Treatment Facilities

Climate Impacts of Concern

- Drought conditions
- Sea Level Rise (SLR)
  - Saltwater intrusion in water supply wellfields
- Increased flooding and infiltration and inflow
- Impacts from storm surges on coastal facilities



Water Supply Resiliency

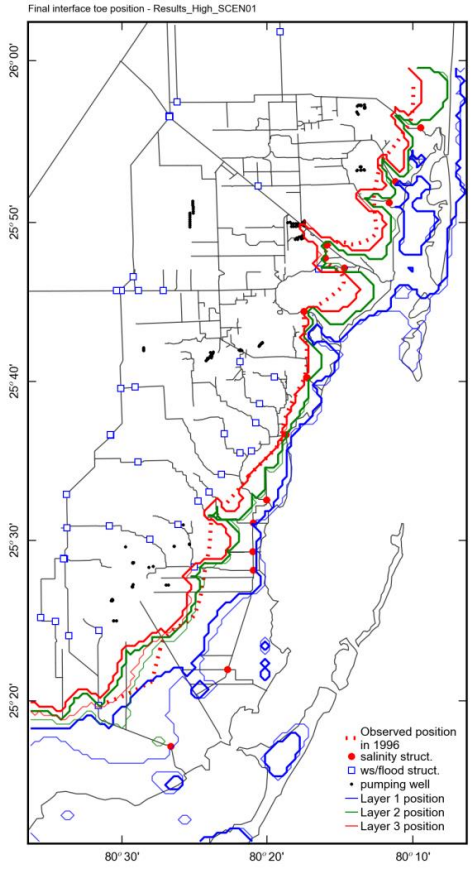
- 20-Year Water Use Efficiency Program:
  - Implementation of Water Conservation Incentives
  - Water Loss Reduction Program
  - Legislative Initiatives
  - Public Outreach
- Alternative Water Supplies:
  - Floridan Aquifer (deeper)

Results = demands today 32 million gallons per day less than in 2006

SLR/Salt Water Intrusion Assessment, with USGS Integrated Model

- High sea-level rise rate (NRC III rate - 1.23 ft increase over 30 years)
- Actual Virginia Key tidal stage
- Increased well field withdrawals based on 20-year projections

Results = No projected salt water intrusion by 2040



State Ocean Outfall Legislation Compliance Program Assessment

- Rainfall and Sea Level Rise Projections
- Preliminary wastewater flow projections, based on population growth, increased groundwater levels (SLR) and rainfall
- Storm surge modeling
- Inundation Mapping
- Extreme Wind Speed and SLR Pressure Change Analysis
- Risk Based Cost-Benefit Analysis of Facility Hardening Design Flood Elevations for Pump Stations and Wastewater Treatment Plants

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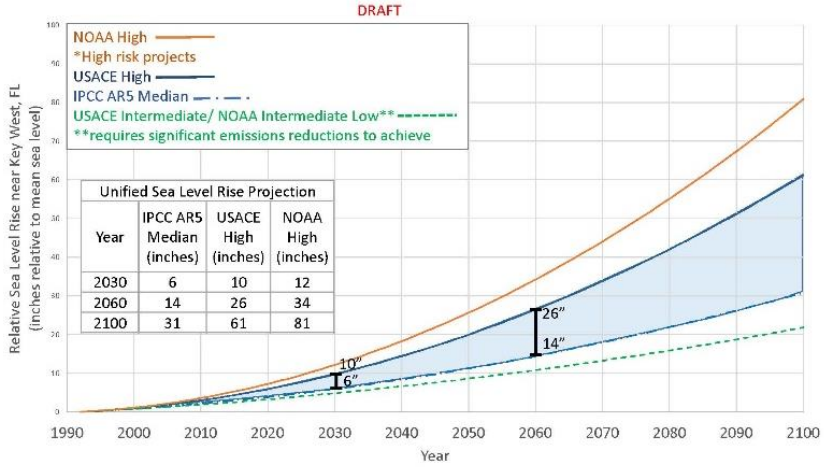
Guidance on Key Climate Variables for Scenario Analysis

- **Planning Horizon:**
  - 2075 for Critical Long-Term Facilities (e.g. WWTPs)
  - 2040 selected for pump station flows
- **Climate scenarios:**
  - Greenhouse Gas Scenario: RCP – 8.5
  - GCM ensemble upper bound
    - 90% non-exceedance
- **Design storms:**
  - 2-year 24-hr
  - 10-year 24-hr
  - 100-year 24-hr
- **Sea Level Rise Unified Projection**:
  - NOAA (High) projection for critical facilities
  - USACE (high) projection for others



Unified Sea level Rise Projection
Southeast Florida Regional Compact

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2-year 24-hour Precipitation Projections for Peak Wastewater Flow

Horizon	RCP, % non-exceedance	2-Year 24-hr Rainfall (inches)	% Change in Rainfall	Peak Flow Rate (mgd)	% Change in flow
	"Current"	4.5	0%	151	0%
2040	RCP6.0/8.5, 50%	4.8	7%	155	3%
2040	RCP8.5, 90%	5.42	20%	167	11%
2075	RCP6.0, 90%	5.58	24%	171	13%
2075	RCP8.5, 90%	6.05	34%	180	19%

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Design Elevations for Existing and New Facilities (WWTPs)

Table 1
WWTP Summary of Design Criteria for Hardening against Flooding from Surge, Sea Level Rise and Extreme Storm Events.

	Existing WWTP Facility Assets		New WWTP Facility Assets	
	ft NGVD29	Basis	ft NGVD29	Basis
CDWWTP	16.0	FEMA BFE + 3ft SLR from SEFLCC(2011) +FB +SF	20.3	2075 Surge+1.23m(48")SLR + FB +SF+21"(100-yr, 72-hr rainfall)
SDWWTP	16.0	FEMA BFE + 3ft SLR from SEFLCC(2011) +FB +SF	19.0	2075 Surge+1.23m(48")SLR + FB +SF+21"(100-yr, 72-hr rainfall)
NDWWTP	16.0	Same as CDWWTP and SDWWTP	17.1	2075 Surge+1.23m(48")SLR + FB +SF+21"(100-yr, 72-hr rainfall)

FB= Freeboard = 2.0 ft per ASCE Standard 24-05/2010 FBC Category IV

SF= Safety Factor = 1.0 ft per 2014 MWH study at CDWWTP

SLR = 1.23m = 48" per NOAA High projection for 2075 (USACE High projection is 0.93m)

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Hardening Cost Wastewater Treatment Plants

	Scenario 1 (Design Elevation 16.0 ft)			Scenario 2 (2075 SLR + FB + SF)		
	CD	OOL (Existing Facilities)	Total	CD	OOL (Existing Facilities)	Total
CDWWTP	$ 4,576,200		$ 4,576,200	$ 39,947,600		$ 39,947,600
SDWWTP	$ 1,533,000	$ 3,980,000	$ 5,513,000	$ 16,053,000	$ 7,650,000	$ 23,703,000
NDWWTP	$ 9,213,000		$ 9,213,000	$ 14,578,000		$ 14,578,000
Note:			**$ 19,302,200**			**$ 78,228,600**
OOL Facility hardening was only estimated for retrofitting existing facilities.						
New OOL facilities would be hardened to same design criteria.						

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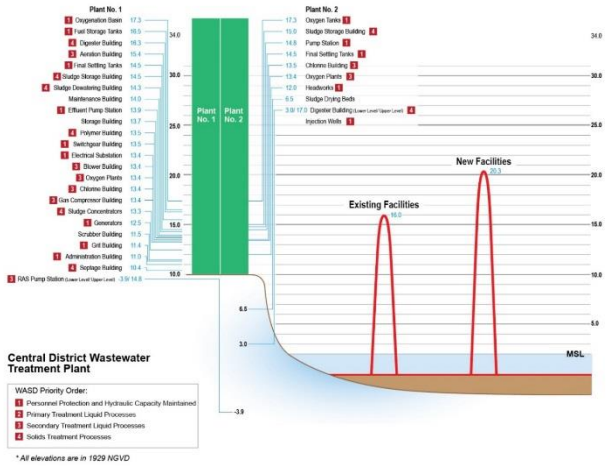
Level of Service Priorities for Facility Resilience during Extreme Events

1. Personnel protection and hydraulic capacity maintained.
2. Primary treatment liquid processes
3. Secondary treatment liquid processes
4. Solids treatment processes



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2006 High Level Disinfection Design at the South District Wastewater Treatment Plant

- Facility designed for 14.5 ft floor elevation
- Emergency power generators designed at same elevation and enclosed for flood and wind protection

Miami-Dade Water and Sewer Department:
http://www.miamidade.gov/water/

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