Minutes
Town of Lake Park, Florida
Commission Workshop Minutes
Wednesday, February 17, 2021 6:00 PM
Town Hall Commission Chamber
535 Park Avenue, Lake Park, Florida 33403

The Town Commission met for the purpose of a Commission Workshop on Wednesday, February 17, 2021 at 6:00 p.m. Present were Mayor O'Rourke, Vice-Mayor Kimberly Glas-Castro, Commissioners Erin Flaherty, John Linden, Roger Michaud, Town Manager John D'Agostino, Assistant Town Manager/Human Resources Director Bambi McKibbon-Turner, Attorney Thomas Baird, and Town Clerk Vivian Mendez.

Town Clerk Mendez performed the roll call and Mayor O'Rourke led the pledge of allegiance.

SPECIAL PRESENTATION/REPORT:
*** Virtual Legislative Update by Senator Bobby Powell.**

Senator Bobby Powell provided a Virtual Legislative Update (see Exhibit "A"). Vice-Mayor Glas-Castro expressed the need of assistance in establishing a COVID-19 "Pop-Up Vaccination Distribution Site" for residents of the Town of Lake Park who are unable to travel to the South Florida Fairgrounds. Senator Powell explained there are plans to establish a local permanent Vaccination Distribution Site. He explained the nearest Vaccination Distribution Sites might be Wells Recreation Center in Riviera Beach, Florida and Gaines Park in West Palm Beach, Florida. The Commission thanked Senator Powell for his presentation.

1. Seawall Condition Report by the Water Resource Management Association (WRMA).

Raul Mercado of WRMA, presented to the Commission (see Exhibit "B"). Vice-Mayor Glas-Castro questioned if all Seawall repairs needed to be addressed by the Town of Lake Park and Private Property Owners. Mr. Mercado answered, "Yes," and explained that a collaborative solution was required. Vice-Mayor Glas-Castro questioned if the Seawall Reports has been shared with Waterfront Property Owners. Mr. Mercado explained that the reports would be made available via the Town of Lake Park website. Commissioner Flaherty questioned if neighboring municipalities would need to increase elevations. Mr. Mercado explained neighboring municipalities would also need to increase their elevations, and suggested the survey be inclusive of South Lake. The Commission thanked Mr. Mercado for his presentation.

PUBLIC COMMENT:
None

TOWN ATTORNEY, TOWN MANAGER, COMMISSIONER COMMENTS:

Town Attorney Baird had no comments.

Town Manager D'Agostino had no comments.

Commissioner Linden had no comments.

Commissioner Michaud had no comments.

Commissioner Flaherty had no comments.

Vice-Mayor Glas-Castro had no comments.

Mayor O'Rourke had no comments.

ADJOURNMENT

There being no further business to come before the Commission and after a motion to adjourn by Vice-Mayor Glas-Castro and seconded by Commissioner Linden, and by unanimous vote, the meeting adjourned at 7:08 p.m.

Mayor Michael O'Rourke

Town Clerk, Vivian Mendez, MMC

Deputy Town Clerk, Shaquita Edwards, MPA, MMC

TOWN OF LAKE PARK
Town Seal
SEAL
FLORIDA

Approved on this 3 of March, 2021

Exhibit "A"

Legislative Update

Presented by:

Senator Bobby Powell, Jr.

The Florida Legislature

HOUSE OF REPRESENTATIVES

- 120 State Representatives
- Term Limit: 8 years (4 terms)
- 7 Bills per session + Senate Sponsor
- Appropriations

FLORIDA SENATE

- 40 Senators
- Term Limit: 8-10 years (2 terms)
- Unlimited Bills per session + HOR Sponsor
- Appropriations

LEGISLATIVE SESSION

- 60 Days, a special session may also be called
  - Special sessions usually occur when a special pressing issue(s) will affect the state and state budget
- Odd Year? – 1st Tuesday in March
- Even Year? – 1st Tuesday in January
- The <u>ONLY</u> bill that has to be passed during the legislative session is the State Budget

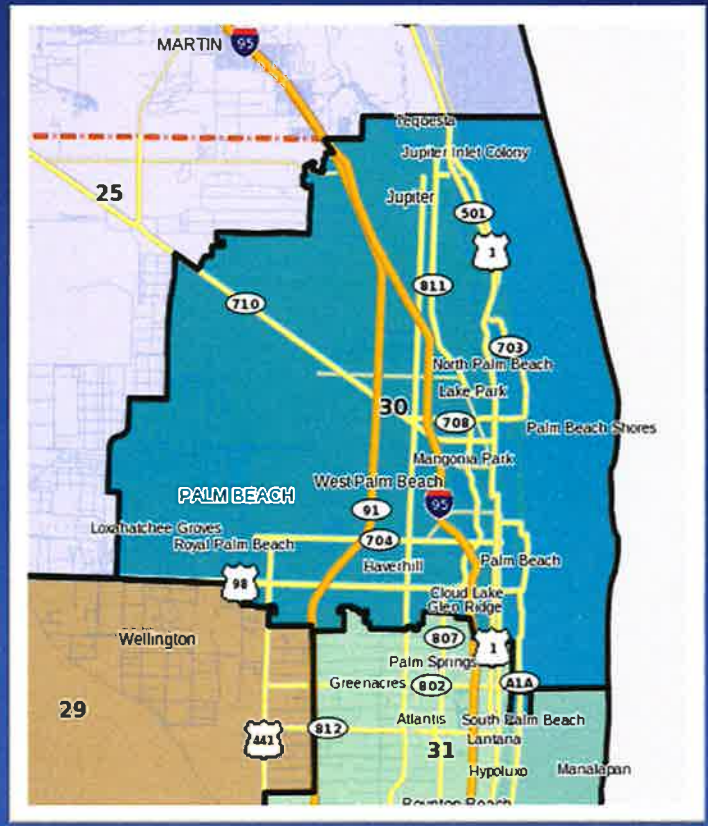
PBC Legislative Delegation

9 State Representatives

4 State Senators

Map of Senate District 30

- Cloud Lake
- Glen Ridge
- Haverhill
- Jupiter Inlet Colony
- Jupiter
- Juno Beach
- **Lake Park**
- Loxahatchee Groves
- Mangonia Park
- North Palm Beach
- Palm Beach
- Palm Beach Gardens
- Palm Beach Shores
- **Riviera Beach**
- Royal Palm Beach
- Tequesta
- West Palm Beach
- West Lake

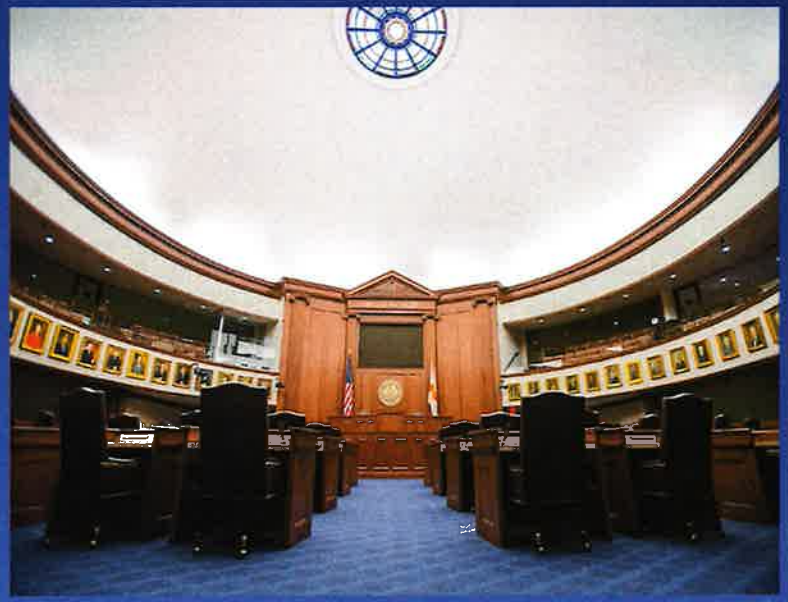


2020-2022 Committees

- Appropriations
- Commerce and Tourism
- Community Affairs
- Criminal Justice
- Joint Committee on Public Counsel Oversight, *Alternating Chair*
- Rules

2021 Bills Introduced

- SB 592 – Reemployment Assistance
- SB 638 - Direct Filing of an Information
- SB 824 Florida Bright Futures Scholarship Program
- SB 992 – Minimum Qualifications for Law Enforcement or Correctional Officers
- SB 1192 – Mental Health Training for Law Enforcement Officers



2020 Appropriations in Budget

Riviera Beach Early Learning to Kindergarten Pilot (LFIR: 1622)	$150,000
FAU Max Planck Florida Scientific Fellows Program (LFIR: 1016)	$889,101
Riviera Beach Youth Empowerment (LFIR: 1792)	$150,000
Place of Hope, Inc.- Child Welfare, Foster Care, Human Trafficking Prevention, Education (LFIR: 1047)	$650,000
Scripps Research Molecular Imaging Center (LFIR: 1629)	$500,000
Loxahatchee River Preservation Initiative (PBC) (LFIR: 1138)	$800,000
Riviera Beach Intracoastal Critical Water Main Replacement (LFIR: 1713)	$200,000
Loggerhead Marinelife Center Improving Water Quality and Coastline Cleanliness (LFIR: 1140)	$250,000
West Palm Beach SCADA Cybersecurity Technology Upgrades (LFIR: 1710)	$250,000
Mangonia Park Addie L. Green Town Park Improvements (LFIR: 1623)	$250,000
Riviera Beach Firefighter Cancer Reduction Plan (LFIR: 1708)	$250,000
Mult-Purpose Exhibition Building at the South Florida Fairgrounds (LFIR: 1625)	$250,000
Royal Palm Beach Commons Park All-Access Playground (LFIR: 2090)	$250,000
Loxahatchee Groves Canal System Rehabilitation (LFIR: 2249)	$150,000
Palm Beach County Bunker Gear Contamination Project (LFIR: 2375)	$400,000
Palm Beach County Firefighter Cancer Emission Reduction Project (LFIR: 2376)	$400,000
African American History Museum and Library (LFIR: 1620)	$200,000

2021 Major Session Issues

- Anti-Protest
- Police Reform
- Unemployment
- Education
- Mental Health
- COVID-19

Vaccine Update

As of Feb 12 per the PBC EOC:

The DoH will accept vaccination requests for their locations utilizing the www.myvaccine.fl.gov registration site, or by phone at **866-201-6754**. The public should sign up for only ONE county request. That site is currently open for signups, but all will remain in queue until the current wait list on PBC is exhausted.

Staff of Senate District 30

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Kristofer Stubbs

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West Palm Beach, FL 33407

561-650-6880

Questions?

Senator Bobby Powell, Jr.

Exhibit "B"

TOWN OF LAKE PARK

VULNERABILITY, RISK AND ADAPTATION ASSESSMENT TO CLIMATE CHANGE-BASED SEA LEVEL RISE

SEAWALL/BULKHEAD STRUCTURAL ASSESSMENT

INUNDATION MAPPING

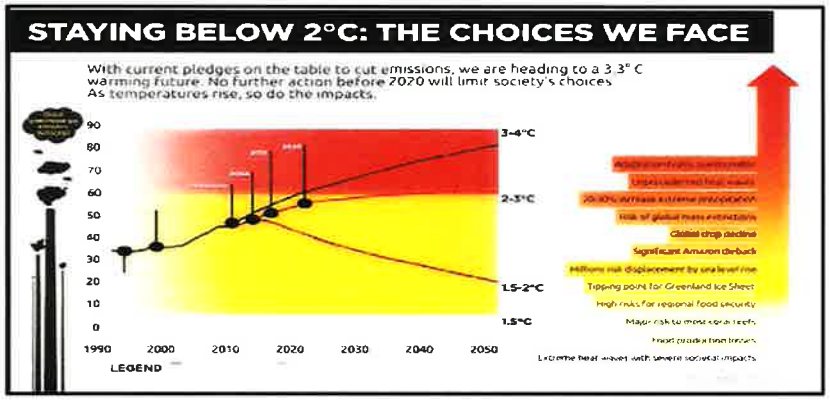
RAUL MERCADO, PE, CFM

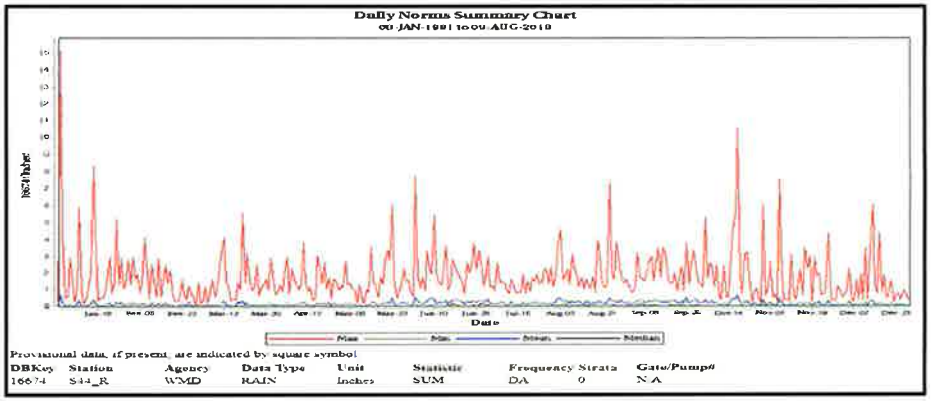
February 17, 2021

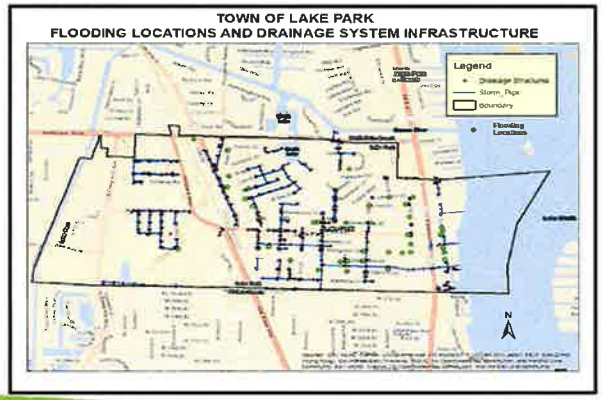
WRMA

CLIMATE CHANGE STRESSORS/EARTH WARMING

Higher Temperatures, Higher Rainfall Intensities, More Frequent Flooding







4th & Evergreen Drive

Ilex Street

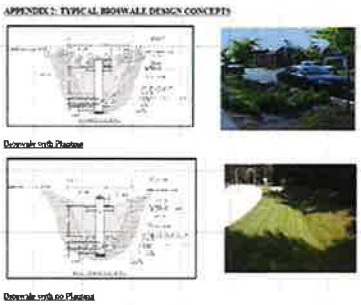
WRMA

STORMWATER MASTERPLAN UPDATE – GREEN INFRASTRUCTURE

Current Green Infrastructure-Based Projects

CLIMATE CHANGE

Higher Intensity Rainfall Is Causing More Frequent Nuisance Flooding Along 2nd Street Corridor



TOWN MUNICIPAL COMPLEX

Nuisance Flooding Hazard Adaptation

Typical Learning Display Plaque & Observation Area

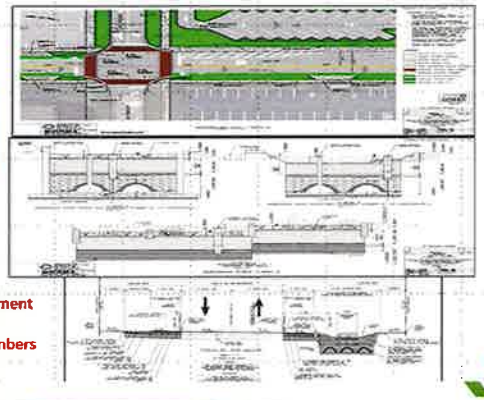
SOUTHERN OUTFALL PHASE 2

Upstream Peak Discharge Diversion, Attenuation And Water Quality Treatment Using GI/LID-based Underground Chamber Filtration @ Bert Bostrom Park

CLIMATE CHANGE ADAPTATION

SWMP – 10TH Street Green Infrastructure Pilot Project

10th Street
Right-Of-Way Corridor
Green Infrastructure-Based
Drainage Implementation



Treatment Train
- Bioswales
- Pervious Pavement
- Underground Filtration Chambers

The SWMP Goal is to convert 10% of impervious areas to GI in the next 20 years to Offset Warming Trends

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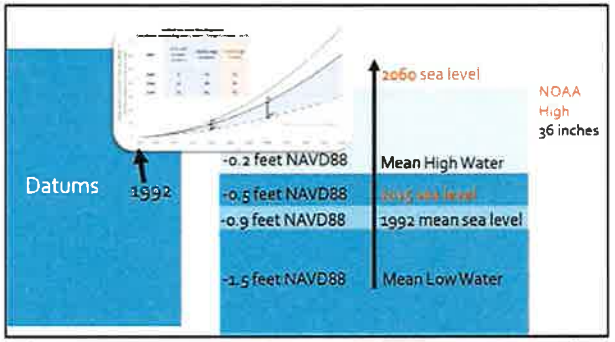
CLIMATE CHANGE STRESSORS – SEA LEVEL RISE (SLR)



NOAA has predicted a 36-40" Sea Level Rise by 2070.

"Sunny day" flooding is already experienced during king tides along lake shore drive.

THE TOWN OF LAKE PARK IS ALSO CONDUCTING A SEAWALL STRUCTURAL ASSESSMENT AND SLR INUNDATION MAPPING (FDEP COASTAL RESILIENCY GRANT)

WRMA

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
$75,000 COASTAL RESILIENCY GRANT

Seawall/Bulkhead Structural Assessment

1. Topographic Survey
   Javier Bidot Associates

2. Structural Condition Assessment
   Coastal Systems International

3. Repair/Replacement Cost
   Coastal Systems International

Inundation Mapping

1. Coastal Surge
   (FEMA 100-year Flooding)
   WRMA

2. Sea Level Rise
   (2020 through 2070)
   WRMA

Note: Three (3) Technical Reports Available for Download at the Town's Website

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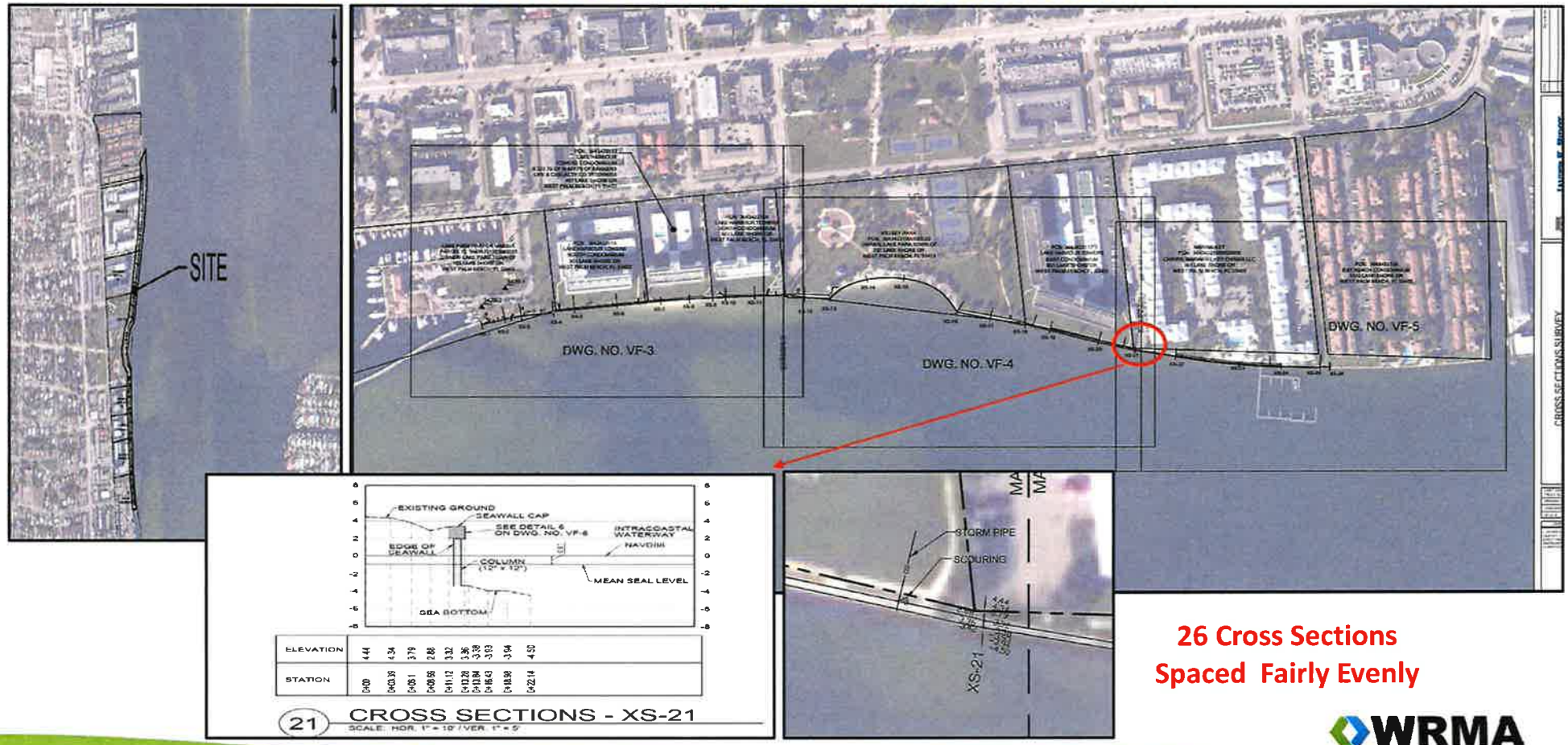
SEAWALL TOPOGRAPHIC SURVEYING



26 Cross Sections
Spaced Fairly Evenly

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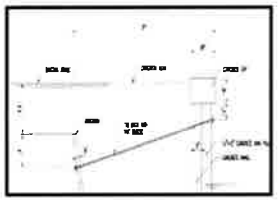
STRUCTURAL CONDITION ASSESSMENT – FIELD INVESTIGATION

Exhibit 1 – Lake Park Marina
Exhibit 2 – Lake Harbour Towers
Exhibit 3 – Kelsey Park
Exhibit 4 – Lake Harbour Towers East
Exhibit 5 – Marina Key
Exhibit 6 – Bay Reach

Structural Assessment
A team of two engineers used snorkel equipment and completed the above and below water inspection.

Exploratory Excavation
Four (4) locations were selected to perform exploratory excavations. The purpose of the exploratory excavations were to assess the seawall components that were not exposed during the visual inspection and to reveal the condition of the tie back systems, depth of the seawall and/or source of upland material loss.



Probing, Coring, Testing
Ten (10) concrete core samples were obtained from the concrete cap and concrete panel of the existing seawall and sent to a laboratory for compressive strength and chloride content testing. The 4" diameter cores were advanced to a depth sufficient for compressive strength testing and the core holes were patched with hand-mixed concrete mix upon completion.

WRMA

FIELD INVESTIGATION LOCATIONS

Tie-Back Excavation Locations

Concrete Coring Locations

WRMA

FIELD INVESTIGATION – TYPICAL OBSERVATIONS

Underwater, Below Deck Assessment Documentation & Tie Back Excavation

Pile Number	Condition	Photo Number
37	Cracks, corrosion stains, spalling	D-47
37-A	Cracks, corrosion stains	D-48
38	Cracks, corrosion stains	D-49
38-A	Cracks, corrosion stains	D-49
39	Cracks, corrosion stains	D-50
39-A	Cracks, corrosion stains	D-50
40	Cracks, corrosion stains	D-51
40-A	Cracks, corrosion stains	D-51
41	Spalling, cracks, corrosion stains	D-52
41-A	Cracks, corrosion stains	D-53
42-A	Breakage (soldier piles)	D-54

Core No.	Core Location	Sample Area	Compressive Strength (psi)	Chloride Content (wt % of cement)
C-1	Exhibit 1- Section 1- Pier 6	Top face of slab	5980	0.54
C-2	Exhibit 1- Section 2- Bulkhead	Waterward face of cap	5650	0.35
C-3	Exhibit 2- 401 Lake Shore Drive	Waterward face of cap	-	3.73
C-4	Exhibit 2- 401 Lake Shore Drive	Panel	5890	2.47
C-5	Exhibit 3- Kelsey Park (South Section)	Top face of cap	6080	0.19
C-6	Exhibit 3- Kelsey Park (Middle Section)	Waterward face of cap	4190	0.11
C-7	Exhibit 3- Kelsey Park (North Section)	Top face of cap	5890	0.08
C-8	Exhibit 4- Lake Harbour Towers East	Top face of cap	5430	0.89
C-9	Exhibit 5- Marina Key	Top face of cap	4760	0.28
C-10	Exhibit 5- Marina Key	Panel	6650	2.15

Photo A-39: Delamination on the bottom of the concrete slab at bent 13-a.

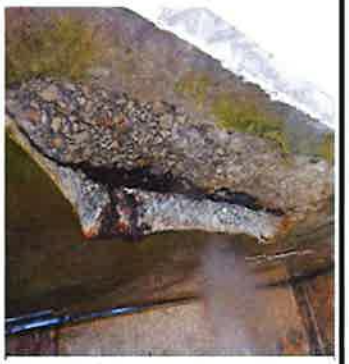


Photo A-40: Delamination at the bottom of the concrete slab between bent 14 and bent 14-a

Photo E-55: Deterioration on soldier piles at the easement bulkhead.

Photo E-56: Deterioration on soldier piles at the easement bulkhead.

Photo A-69: Excavation Location 1 at Exhibit 1, Section 2, station 1+35.

Photo A-70: An old bulkhead was revealed behind the existing bulkhead. A neback was revealed at station 1+34.

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CONDITION ASSESSMENT RATINGS, REMAINING USEFUL LIFE, & RECOMMENDATIONS

Location	*Rating	Initial Repair/Replacement Urgency	Remaining Useful Life after Performing the Repairs
Exhibit 1 – Section 1 (Pier 7)	Fair	Repair within 6 months	20 years w/periodic maintenance
Exhibit 1 – Section 1 (Pier 6)	Fair	Repair within 6 months	20 years w/periodic maintenance
Exhibit I – Section 2 (Bulkhead)	Satisfactory	-	30 years w/periodic maintenance
Exhibit 2	Serious	Replacement within 6 months	Design life ended
Exhibit 3	**Serious	Repair within 6 months	25 years w/periodic maintenance
Exhibit 4	Fair	Repair within 6 months	15 years w/periodic maintenance
Exhibit 5 – Section 1	Fair	Repair of piles and replacement of cap within 5 years	15 years w/periodic maintenance
Exhibit 5 – Section 2 (Easement)	Serious	Replacement within 6 months	Design life ended
Exhibit 6	Good	-	40 years w/periodic maintenance – recently replaced

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SEAWALL RESTORATION FINANCIAL ASSESSMENT

INITIAL REPAIR/REPLACEMENT COST

The initial repair/replacement costs as recommended for the full length of the bulkhead is approximately $5M. This value does not account for the periodic maintenance that is needed for the remaining useful life of the structures.

SEA LEVEL RISE ADJUSTMENT COST

After the initial repair/replacement, raising bulkhead caps and installing tiebacks is recommended to account for sea level rise. The estimated cost for the bulkheads not replaced in the initial phase is estimated to be approximately $2M.

INITIAL REPAIR/REPLACEMENT COST

Description	Quantity	Unit	Unit Cost	Extended Cost
Exhibit 1				
Pier 7 – Crack Repairs	135	LF	$ 360.00	$ 48,600
Pier 6 – Crack Repairs	523	LF	$ 360.00	$ 18,280
Exhibit 2				
Complete Bulkhead Replacement	775	LF	$ 3,500.00	$ 2,712,500
Exhibit 3				
Cap – Crack Repair	866	LF	$ 120.00	$ 103,920
Piles and Panels – Gap Repair	16	EA	$ 1,500.00	$ 24,000
Exhibit 4				
Batter Piles – Major Repair	41	EA	$ 1,200.00	$ 49,200
King Piles - Repair	9	EA	$ 800.00	$ 7,200
Cap – Crack Repair	370	LF	$ 120.00	$ 44,400
Exhibit 5				
Batter Piles – Repair	25	EA	$ 800.00	$ 20,000
King Piles – Repair	8	EA	$ 800.00	$ 6,400
Cap – Replacement	624	LF	$ 50.00	$ 156,000
Exhibit 6 – Easement				
Complete Bulkhead Replacement	32	LF	$ 3,500.00	$ 112,000
Sub-Total				$ 3,472,500
General Conditions (10%)				$ 374,250
Mobilization (5%)				$ 173,625
Bond and Insurance (5%)				$ 173,625
Contractor Overhead and Profit (10%)				$ 347,250
Contingency (10%				$ 347,250
Total Probable Construction Cost				**$ 4,861,500**

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SEA LEVEL RISE ADJUSTMENT COST

Description	Quantity	Unit	Unit Cost	Extended Cost
Exhibit 1				
Raising the Bulkhead Cap	242	LF	$ 250.00	$ 60,500
Additional Tieback Anchors	40	EA	$ 3,000.00	$ 120,000
Exhibit 3				
Raising the Bulkhead Cap	866	LF	$ 250.00	$ 216,500
Additional Tieback Anchors	110	EA	$ 3,000.00	$ 330,000
Exhibit 4				
Raising the Bulkhead Cap	370	LF	$ 250.00	$ 92,500
Additional Tieback Anchors	50	EA	$ 3,000.00	$ 150,000
Exhibit 5				
Raising the Bulkhead Cap	624	LF	$ 250.00	$ 156,000
Additional Tieback Anchors	80	EA	$ 3,000.00	$ 240,000
Sub-Total				$1,365,500
General Conditions (10%)				$ 136,550
Mobilization (5%)				$ 68,275
Bond and Insurance (5%)				$ 68,275
Contractor Overhead and Profit (10%)				$ 136,550
Contingency (10%				$ 136,550
Total Probable Construction Cost				**$1,911,700**

WRMA

REPLACEMENT OPTIONS – STRUCTURAL

Steel Sheet Piles Bulkhead

Concrete Pile and Panel

Concrete Sheet Pile Bulkhead

Truline Bulkhead

WRMA

REPLACEMENT OPTIONS – SUSTAINABLE

Living Shoreline (Currie Park)

Gabion Bulkhead

Bio-enhanced Concrete Forms

Combination Gabion Bulkhead & Living Shoreline

Prefer Town Option for Kelsey Park Seawall Replacement

WRMA

STRUCTURAL & SUSTAINABLE REPLACEMENT OPTIONS COST

Structural Replacement Cost (Per Lineal Foot)

Description	Unit	Unit Cost
Replacement Cost per Linear Feet of Bulkhead		
Concrete King Pile and Panels Bulkhead	LF	$ 1,500.00
ECO Seawall	LF	$ 2,000.00
Steel Sheet Pile Bulkhead	LF	$ 2,500.00
Concrete Sheet Pile Bulkhead with GFRP/CFRP	LF	$ 5,500.00

Sustainable Construction Cost (Unit Cost)

Description	Quantity	Unit	Unit Cost	Extended Cost
Living Shoreline (for 100 Linear Feet of shoreline)				
Riprap Breakwater	185	CY	$ 120.00	$ 22,200
Soil Mix for Planter	370	CY	$ 30.00	$ 11,100
Mangrove	2500	SF	$ 0.40	$ 1,000
Total (for 100 Linear Feet of shoreline)				**$ 34,300**

Eco-Concrete Unit Costs	Unit	Unit Cost
ECO Seawall Panels	SF	$ 70.00
ECO Mat (8 ft by 15 ft)	EA	$ 1,500.00
Tide Pool Armor (4 ft by 4 ft by 4ft block)	EA	$ 900.00

WRMA

TIDAL INUNDATION MAPPING - SEA LEVEL RISE

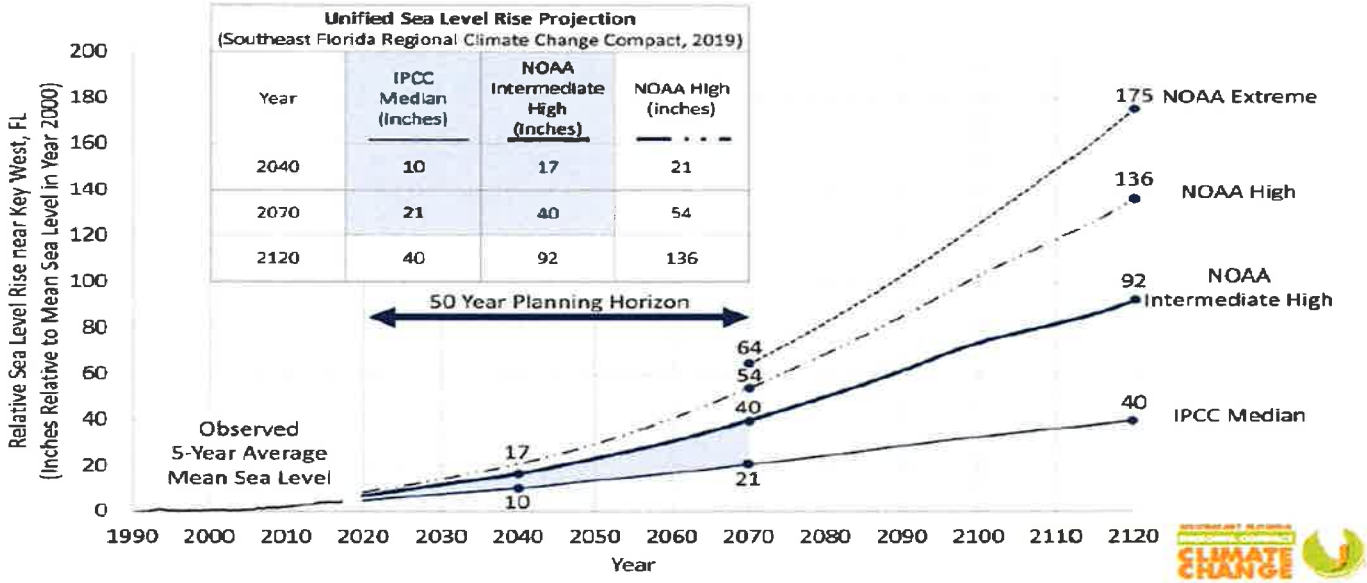


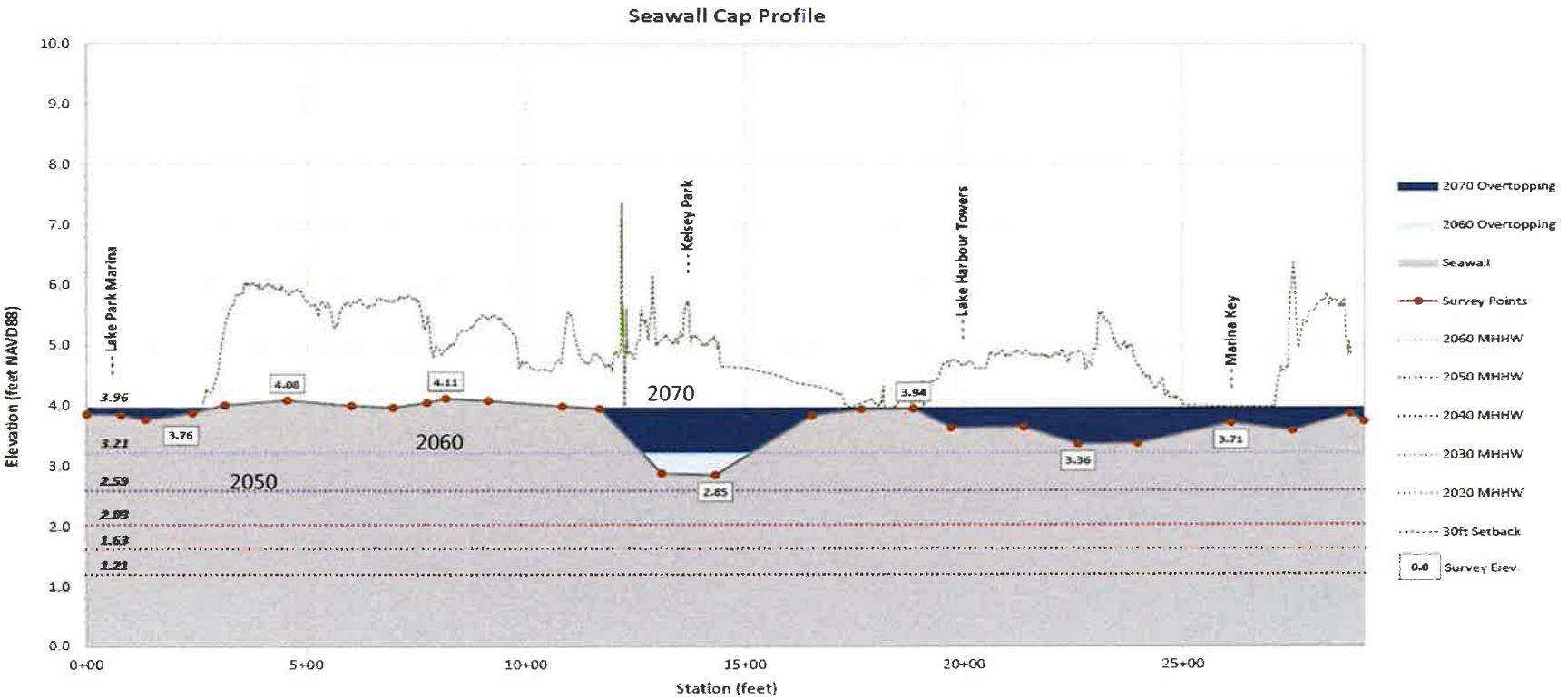
Figure 1 – Unified Sea Level Rise Projection

The Unified Sea Level Rise Projection, seen in **Figure 1**, consists of three planning horizons:

1. **short term**: by 2040, sea level is projected to rise 10 to 17 inches above 2000 mean sea level.
2. **medium term**: by 2070, sea level is projected to rise 21 to 54 inches above 2000 mean sea level.
3. **long term**: by 2120, sea level is projected to rise 40 to 136 inches above 2000 mean sea level.

WRMA

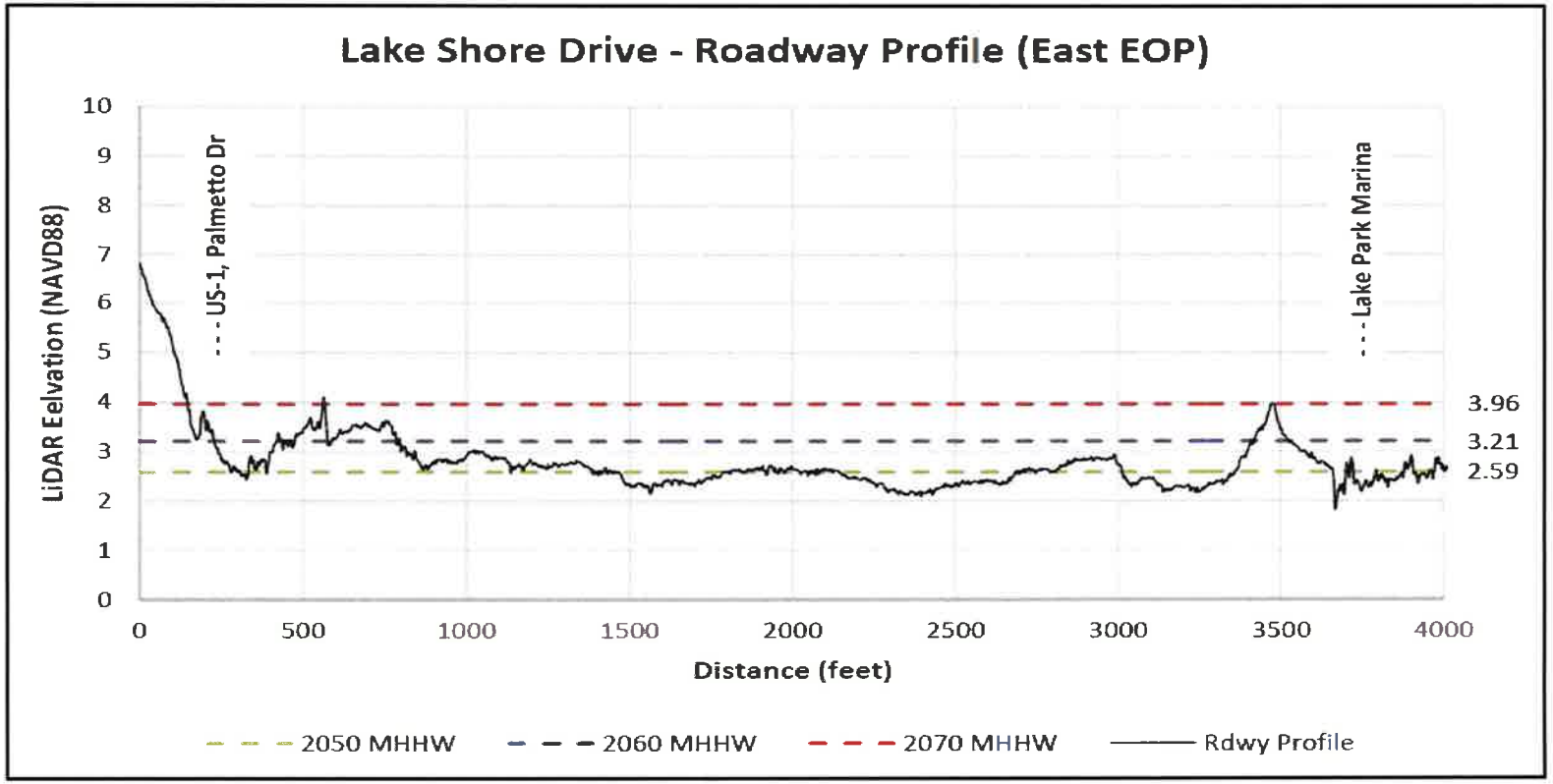
TIDAL INUNDATION BY DECADES



(Gray fill) – profile of the seawall cap
(Small-dotted lines and blue fill) – elevations of the decadal MHHW
(Green dashed line) – ground elevation profile set back 30 feet westward from the seawall face

WRMA

LAKE SHORE DRIVE INUNDATION



WRMA

SEA LEVEL RISE INUNDATION MAPPING (2050)

2020 to 2040 King Tide Drainage Impacts Only (Sunny Day Flooding)

WRMA

SEA LEVEL RISE INUNDATION MAPPING (2060)

WRMA

SEA LEVEL RISE INUNDATION MAPPING (2060 ENHANCED)

WRMA

SEA LEVEL RISE INUNDATION MAPPING (2070)

WRMA

SEA LEVEL RISE INUNDATION MAPPING (2070 ENHANCED)

WRMA

MONETARY COST ESTIMATION FOR SEA LEVEL RISE INUNDATION – METHODOLOGY

- Evaluating flood risk reduction interventions is balancing the costs of intervention versus avoided damages (benefits). This is known as Benefit-Cost Analysis (BCA). WRMA estimated monetary damages incurred in each decadal SLR scenario, for both tidal inundation and coastal floods separately.

- Tidal inundation will occur on a daily basis (potentially twice per day). Because of this, damages due to projected tidal inundation are associated with a Permanent Loss of Function (PLOF).

- PLOF is taken to be the result of the irrecoverable physical loss of structures by repetitive tidewater damage, and/or the blocking of property access by tidewaters to the point where they are functionally uninhabitable. Given the aforementioned, PLOF damages were assumed to be a total loss at market value.

- To determine the PLOF for each inundated parcel, WRMA applied 2019 real property tax assessment data from the Palm Beach County Property Appraiser's office. The PLOF was calculated as the sum total market value of each building within an inundated parcel.

TIDAL INUNDATION DAMAGES & RISK ASSESSMENT

Scenario Year	Buildings Inundated	Buildings Blocked	Parcel Units (PLOF)	PLOF Costs	Risks	Overall Risk Assessment
2020	0	0	0	-	-	Low
2030	0	0	0	-	King Tides	Low
2040	0	0	0	-	King Tides	Low
2050	0	0	0	-	Drainage + King Tides	Moderate
2060	3	31	433	$105,362,000	Drainage + King Tides	High
2070	15	107	692	$154,675,000	Drainage + Overtopping	Severe

WRMA

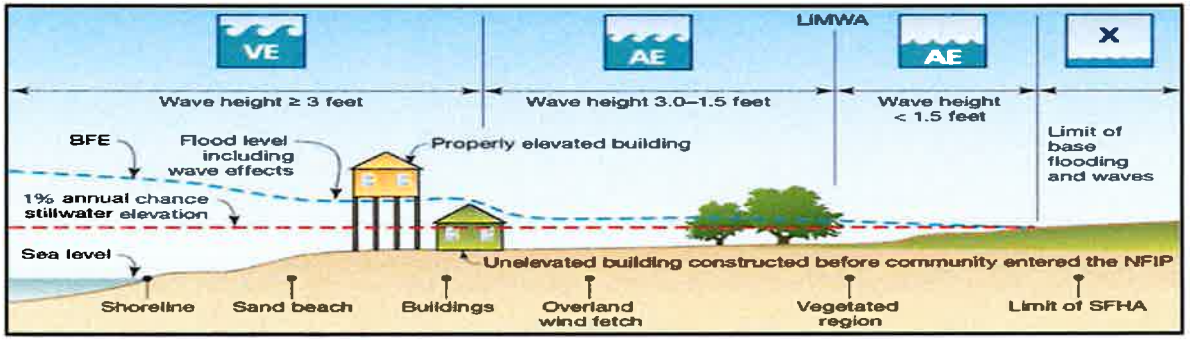
COASTAL INUNDATION MAPPING

EFFECTIVE 2017 FEMA 100-YEAR (1%) FLOODING (2019 DFIRM'S UNDER FINAL REVIEW)

Blue: 100-yr Flood Boundaries / Yellow: 500-yr Flood Boundaries

WRMA

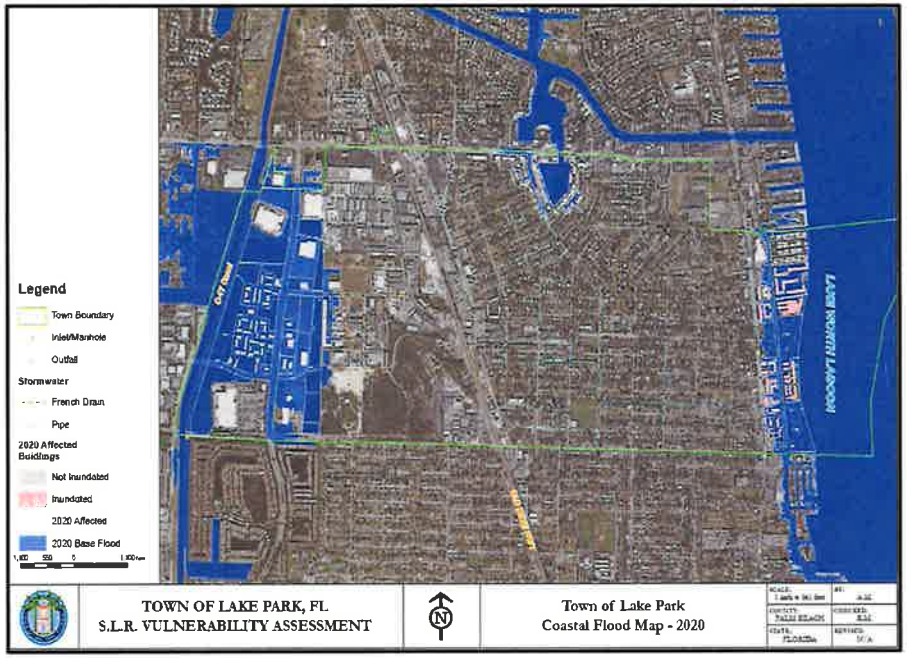
COASTAL INUNDATION MAPPING METHODOLOGY



- Due to the limited scope of this study, WRMA did not fully model the future base flood in the same manner as FEMA, but instead used an approximate method which is practically representative of FEMA's end product.
- In review of FEMA's effective FIRMs for the Town of Lake Park, it was determined that the inland extent of coastal flooding in Lake Park closely matches the 1% annual chance stillwater elevation (SWEL), not including wave setup, of the Lake Worth Lagoon. This means that wave runup has little to no effect on the inland extent of the current base flood in the Town, due to the extensive fetch of urban obstructions such buildings and roads.
- Given that riverine flooding is relevant for the Town, WRMA included those riverine areas which are flooded in the current FEMA base floodplain map for the C-17 Canal along the Western boundary.
- The inland extent of the projected base flood was approximated by the current 1% SWEL + SLR and current riverine flooding. The depth of flooding was approximated by the current BFE + SLR.

WRMA

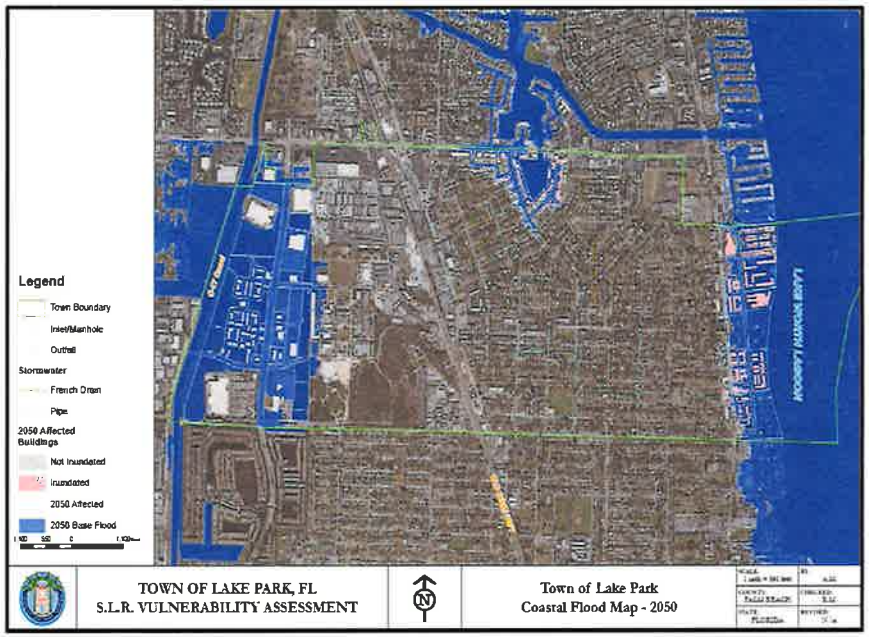
COASTAL INUNDATION MAPPING (2020 & 2030)



Unchanged Flooding Boundaries

WRMA

COASTAL INUNDATION MAPPING (2040 & 2050)



More flooding occurs in 2050 around South Lake and at the northern end of Lake Shore Drive.

WRMA

COASTAL INUNDATION MAPPING (2060)

Flooding in 2060 extends around South Lake and west of US Highway 1 between Date Palm Drive and Foresteria Drive.

WRMA

COASTAL INUNDATION MAPPING (2070)

More substantial flooding occurs in 2070 around South Lake and west of US Highway 1 between Date Palm Drive and Foresteria Drive.

WRMA

MONETARY COST ESTIMATION FOR COASTAL INUNDATION – METHODOLOGY

To determinate monetary damages incurred in each decadal coastal flood scenario, three types of costs were estimated for every flooded building using the FEMA/US Army Corps of Engineers Methodology:

Structural damage – includes physical damage to the building structure for a given flood depth, as a percentage of the building's replacement value;

Contents damage – includes damage to items within the structure that are not permanently installed and below a given flood depth, as a percentage of the estimated contents value;

Temporary Loss of Function (TLOF) – includes the costs associated with not being able to inhabit the structure until physical damages are restored.

- **To calculate these three costs, WRMA employed accepted "Depth-Damage Functions" (DDFs). As the moniker implies, this calculates damage as a function of flood depth – the future BFE, in the case of this study.**
- **The structural and contents DDFs were sourced from a 2006 report published by the U.S. Army Corps of Engineers (USACE), New Orleans District.**
- **The TLOF DDF was developed by WRMA, using research published in the FEMA Baseline Standard Economic Value Methodology Report (2016).**

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COASTAL FLOOD DAMAGES (2020-2070)

Scenario Year	Buildings Inundated[4]	Structure Damages	Contents Damages	TLOF Damages	Total Est. Damages
2020	64	$18,211,000	$15,909,000	$4,208,000	$38.3M
2030	76	$22,787,000	$25,178,000	$5,198,000	$53.2M
2040	95	$29,656,000	$40,269,000	$6,600,000	$76.5M
2050	141	$43,871,000	$72,039,000	$8,766,000	$124.7M
2060	162	$54,662,000	$86,951,000	$9,686,000	$151.3M
2070	219	$70,017,000	$111,440,000	$12,236,000	$193.7M

Scenario Year	Residential	Office	Commercial	Industrial	Public/Rec.
2020	69%	5%	17%	2%	7%
2030	69%	5%	17%	2%	7%
2040	71%	4%	16%	2%	6%
2050	75%	4%	15%	2%	5%
2060	75%	4%	14%	1%	5%
2070	78%	3%	14%	1%	4%

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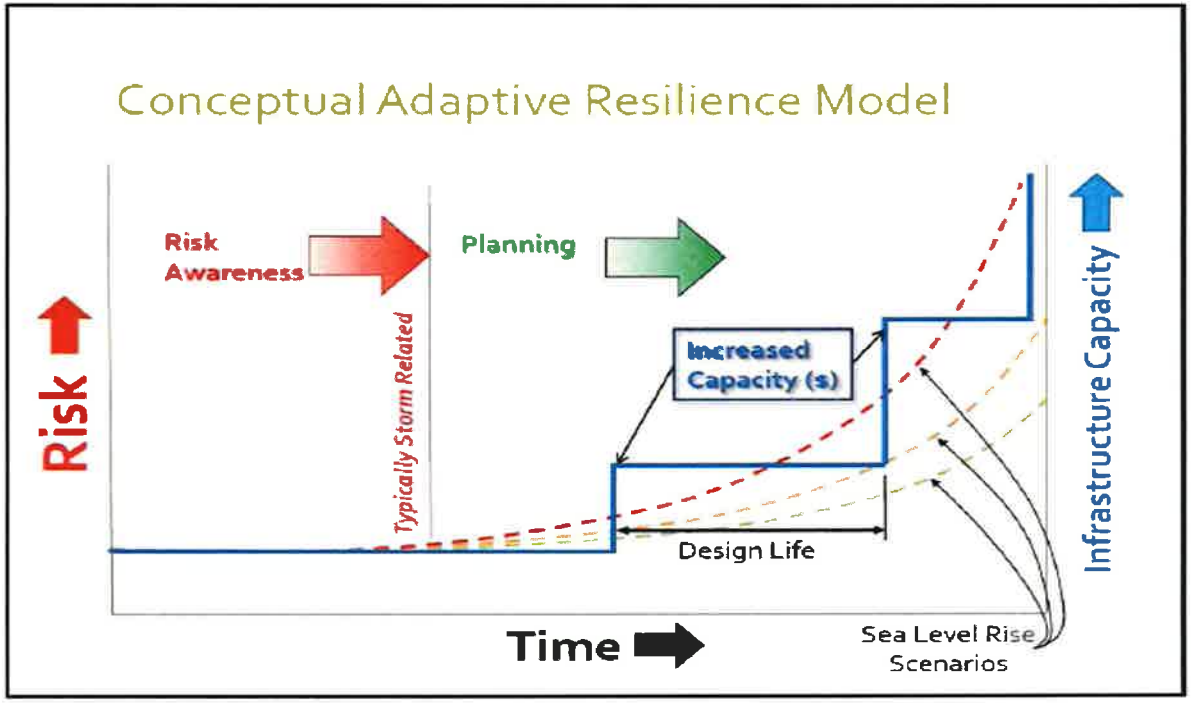
ADAPTATION PATHWAYS & OPTIONS



THE TOWN HAS 20-30 YEARS OF ADAPTATION PLANNING TIME AVAILABLE BUT MUST START AT ONCE

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ADAPTATION PATHWAYS & OPTIONS

DRY FLOOD-PROOFING

- ✓ If ceiling heights permit, raising the first-floor elevation may be practical for facilities near the fringe of the floodplain.
- ✓ Floodwalls (permanent or deployable) at an appropriate future BFE
- ✓ A quick estimation for the future BFE is to take the current FEMA BFE and add an amount of sea level appropriate for the expected useful life of the facility.

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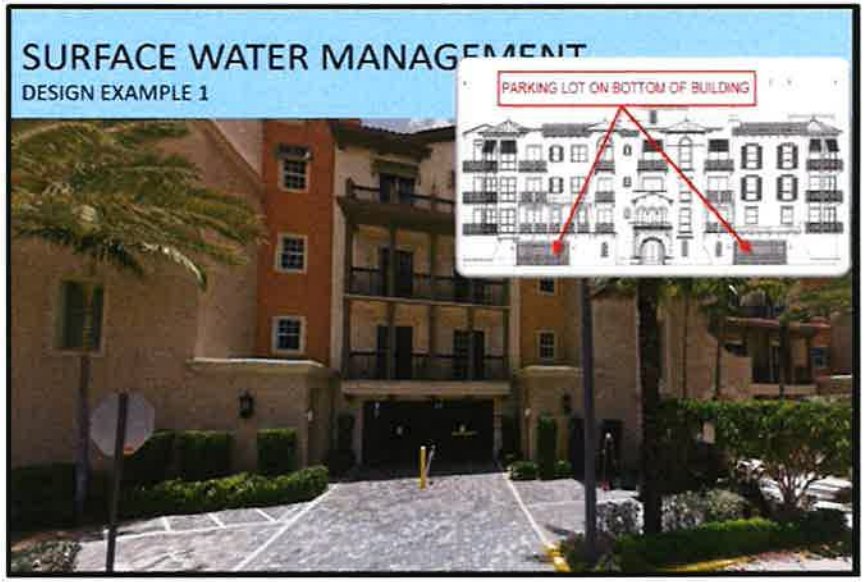
ADAPTATION PATHWAYS & OPTIONS

WET FLOOD-PROOFING

- ✓ **Not occupying the first floor (still usable for storage and access purposes)**
- ✓ **Raising vulnerable utilities and infrastructure within the first floor above the future BFE**



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ADAPTATION PATHWAYS & OPTIONS

RAISING ROADS

- ✓ **Build road base to accommodate additional wearing surface layers later.**
- ✓ **Elevate culverts or provide in-line valves.**

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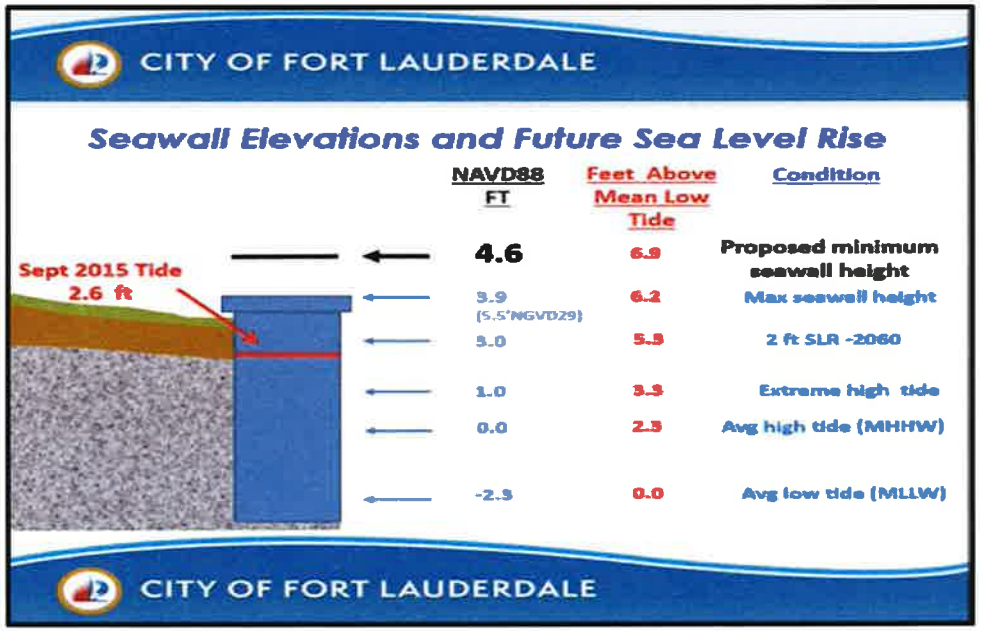
ADAPTATION PATHWAYS & OPTIONS

RAISING SEAWALLS (CAPS)

- ✓ Place caps on existing seawalls (if structurally adequate)
- ✓ Regulate new seawalls height by Ordinance



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ADAPTATION PATHWAYS & OPTIONS

TOWN OF LAKE PARK COASTAL ADAPTATION ALONG LAKE SHORE DRIVE

- ✓ **Consolidation of outfalls to Lake Worth Lagoon and Valve Placement**
- ✓ **Installation of Sea Level Rise Pump Stations to offset high tides**

- ➢ **Transitional (2020-2050) SLR Impact Efforts**
- ➢ **Will address local drainage deficiency for tide-impacted outfalls**
- ➢ **Will address 'Sunny Day" flooding from King Tides**

THESE PROJECTS WILL HOLD OFF SEA LEVEL RISE IMPACTS FOR THE NEXT 30 YEARS ONLY – BEGINNING IN 2050 SEWALLS WILL BE OVERTOPPED AND PUMP STATION EFFEICIENCY WILL DECREASE SUBSTANTIALLY

LAKE SHORE DRIVE DRAINAGE IMPROVEMENT PROJECT

SOUTHERN OUTFALL PRIORITY RETROFIT PROJECT

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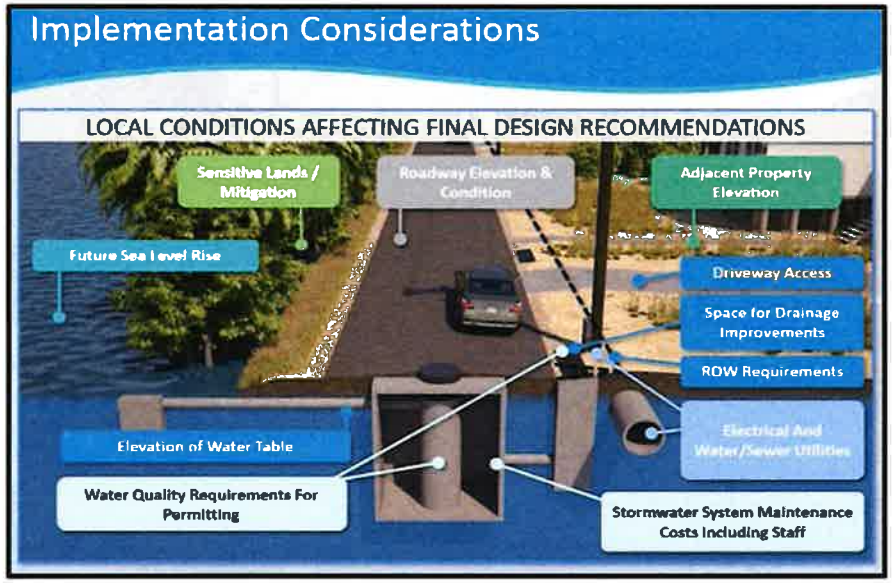
ADAPTATION PATHWAYS & OPTIONS

IMPLEMENTATION CONSIDERATIONS AND COST FOR 2050-2070

✓ **Utilities, Property/Building Elevation, Driveways, Environmental Factors**



Initial Results – Conceptual Cost Estimates for Design Scenarios

	Twin Lakes – Key Largo		Sands Community – Big Pine	
Elevation	Length of Roadway Elevated	Total Roadway and Drainage Cost	Length of Roadway Elevated	Total Roadway and Drainage Cost
12"	0.7 miles	$4 million	0.35 miles	$2.63 million
18"	0.8 miles	$5.8 million	1.3 miles	$8.9 million
28"	0.9 miles	$7.3 million	1.5 miles	$10.5 million

Costs factored in: Maintenance of traffic, mobilization, design, construction, 15% of costs for construction engineering and inspection, 25% contingency and stormwater features.

Costs not factored in: right-of-way (~12" is threshold), driveway improvements

MORE WILL HAVE TO BE DONE BEFORE 2050 BY THE TOWN OF LAKE PARK

WRMA

Thank You

WRMA