CITY OF Hollywood FLORIDA

Stormwater Master Plan Results Presentation

Project No. 20-11053 **April 19, 2023**

PRESENTATION

CDM Smith

SWMP Presentation Agenda

1. SWMP Program Overview
2. LOS Goals
3. SWMP Results and Citywide CIP to Meet LOS
4. Next Steps for the City
5. Questions and Discussion

Hollywood, FL
News Flash • Hollywood, FL • CivicEngage

[PHOTO CREDIT WSVN]

WSVN
King tides flood streets in Hollywood ...

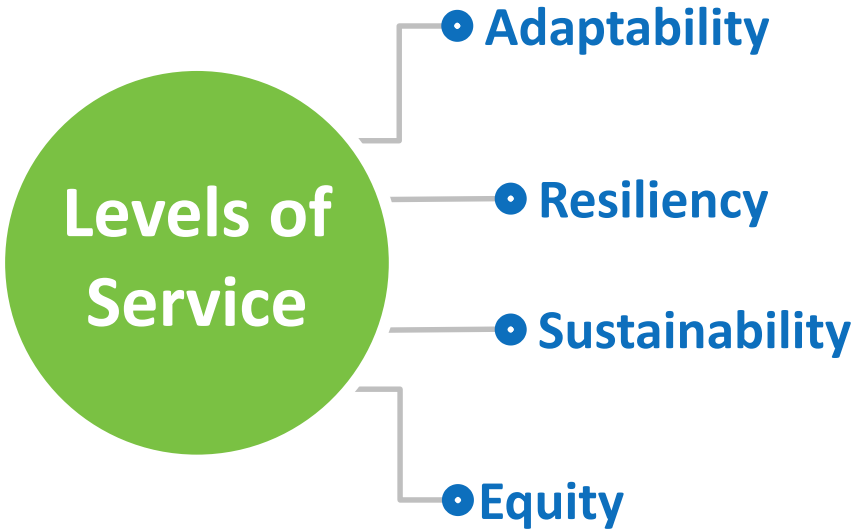
Hollywood, FL
Your Stormwater Utility

[PHOTO CREDIT WPLG]

WPLG Local 10
flooded water in Hollywood Beach

SWMP Goals Are Consistent with SFWMD ERP Requirements and Establish the Metrics for Success

- ✓ Flood Control
- ✓ Water Quality Protection
- ✓ Aquifer Recharge and Water Supply
- ✓ Conservation and Reuse
- ✓ Operation and Maintenance
- ✓ Stormwater Utility Sufficiency
- ✓ Long Term Financing
- ✓ Community Acceptance



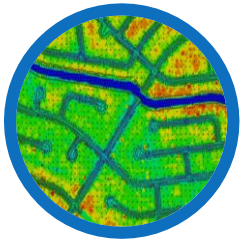
What Did the Citywide SWMP Accomplish?

1. Established comprehensive program goals
2. Created an updated stormwater asset database and problem area database from community workshops
3. Developed dynamic stormwater models and determined existing level of service (LOS) and the root causes of flooding
4. Evaluated two alternatives, budget costs, benefit/cost ratio, and sea level rise effects
5. Developed a citywide CIP for the desired LOS
6. Provide guidance with future policies
7. Provided information to updated stormwater design standards, building code, vulnerability

YEAR 1 ACTIVITIES

Identify Opportunities and Constraints

Data Collection and Evaluation Community Workshops



Modeling Phase Existing Conditions LOS

YEAR 2 ACTIVITIES

Alternatives Analysis, SLR, and Master Plan

Capital Improvement Program

Prioritization Public Input Funding Support

Hollywood Stormwater Issues and Constraints

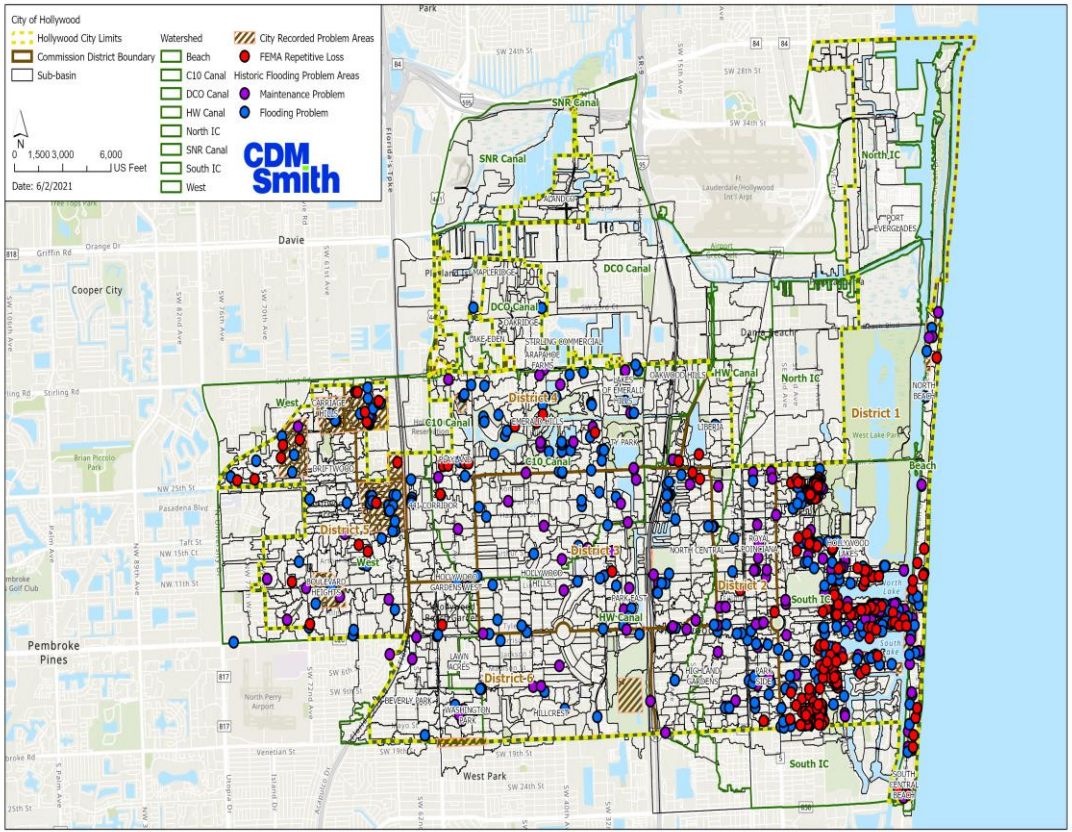
- Low, flat terrain with natural ridges trapping stormwater
- High groundwater table
- Near build-out with high impervious area
- Aging stormwater system and increased maintenance requirements
- Runoff into the City from other areas
- Older homes built in natural historic low-lying areas
- Saltwater intrusion and aquifer protection classification
- Regulations to maintain historic flows and stages in canals
- Increasing high tides, rising sea levels and tidal surge, tidal flooding

- Discharge limits to west
- Water quality regulations
- Little available area for new dedicated stormwater management
- Recharge wells limited to:
  - East of 10,000 TDS line
- Exfiltration and wells limited to areas of:
  - Higher elevation (> 6 ft-NAVD)
  - No known contamination
  - No potable wellfield cones

Stormwater Problem Areas Identification

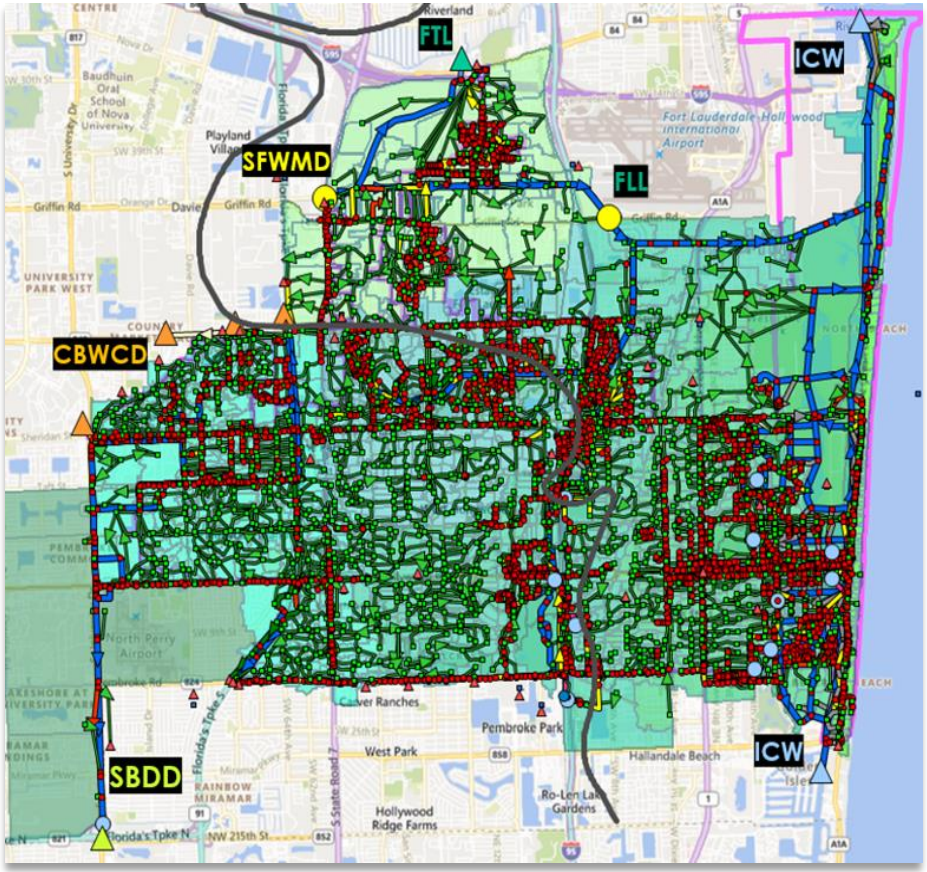
Flood Complaint Data Sources:

- Resident Flooding Problem Area Workshops
- Commission Flooding Problem Area Workshops
- Department of Public Utilities
- O&M Workshops Roadway Closures Map
- FEMA Floodplains and Repetitive Loss Data
- City Flood Complaint Database and County Complaint Data
- First Responder / Media Coverage



SWMM Model Build of Existing System

- Total Study Area 45 sq mi
- Four major basins
- Offsite basin system contributions considered
  - SFWMD
  - FDOT
  - Broward County
  - CBWCD
  - SBDD
  - FLL, FTL, Dania, Hallandale
  - ICW/Tides
- Neighborhood level of detail
- Considers both groundwater and tidal effects for present and future conditions and seawalls

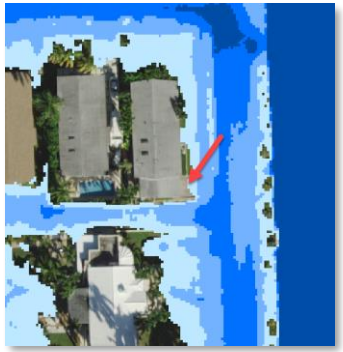


Existing Conditions Model Validation

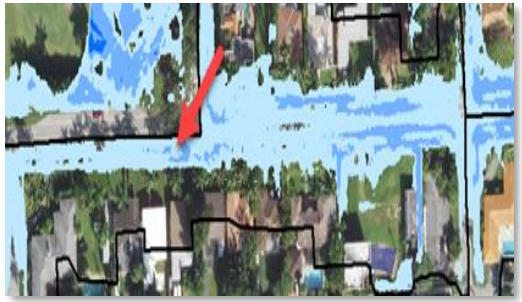
Comparison of Model Predictions to Actual Conditions

- ✓ **Accuracy** of results is **High** - model results verified to match recorded conditions of two large past storms around the City

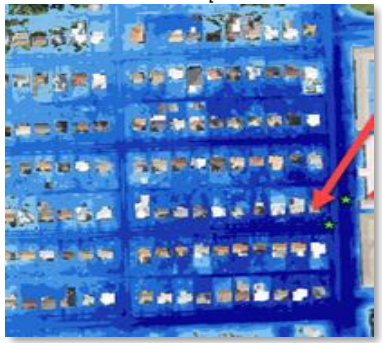
[Photo credit Sun Sentinel]



S 7th Ave & Tyler St Dec 2019



Polk & N 14th Ave TS Eta



14th Ave & Fletcher Dec 2019

Established City Desired Level of Service Goals

Two LOS goals for CIP provides wider range of implementation affordability

1. Alternative 1 – (*Primary LOS Goal)*
   - Flooding up to **3-inches over road crowns in the 10-year**, 24-hour recurrence interval design storm for **major roadways and identified evacuation routes**
   - Flooding up to **3-inches above road crown** for secondary and arterial **residential streets for a 5-year 24-hour storm**
   - Flooding maintained below building finished-floor elevations in the 100-year recurrence interval design storm wherever practicable

2. Alternative 2 – (*Secondary LOS Goal)*
   - Short duration, up to **6-inches of flooding allowable the over road crowns in the 10-year**, 24-hour recurrence interval design storm for major evacuation routes
   - Short duration, up to **6-inches of flooding above residential streets for a 5 year**, 24-hour storm event
   - Flooding maintained below building finished-floor elevations in the 100-year recurrence interval design storm wherever practicable

[Photo credit Sun Sentinel]

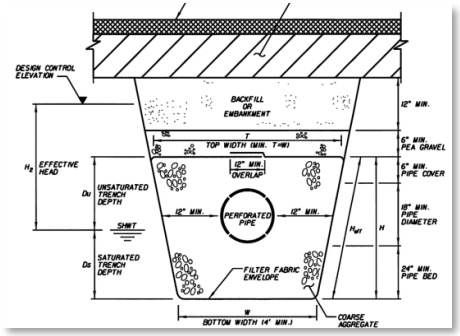
Not Meeting LOS

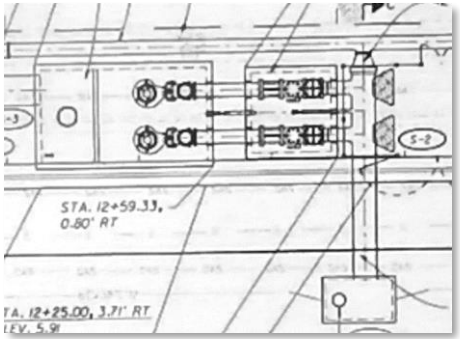
Allowable for Short Duration

Citywide Capital Improvements to Meet LOS

Stormwater Infrastructure CIP Types:

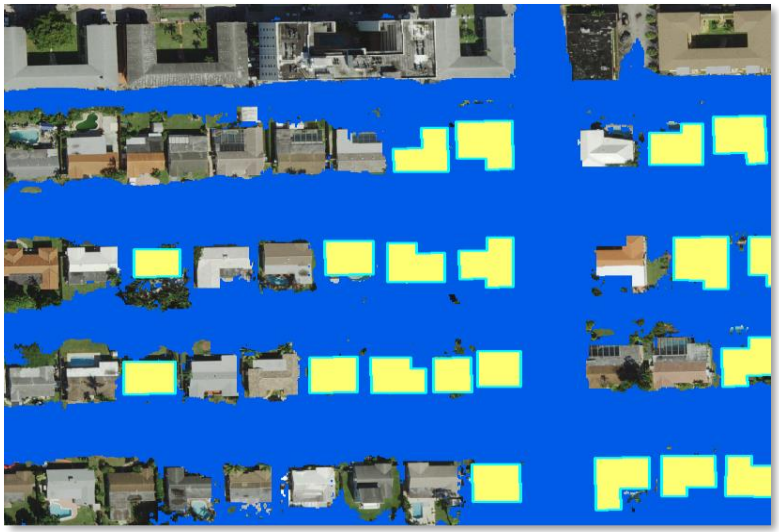
- Exfiltration Systems
- Gravity Pipe Collection Systems and Inlets
- Stormwater Pump Stations
- Outfalls
- Stormwater Gravity and Injection Wells
- Storage and Detention
- Swales
- Backflow Prevention Devices
- Raise Seawalls / Shoreline Armoring
- Road Raising in conjunction with new collection systems



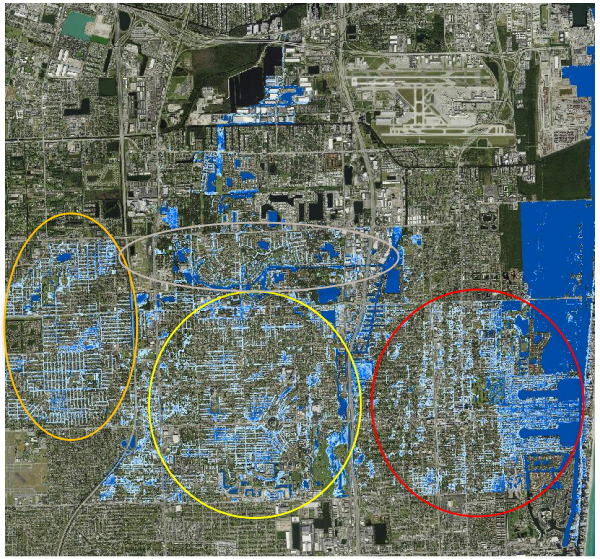


Pre-Post CIP Flooded Structures Reduction Citywide

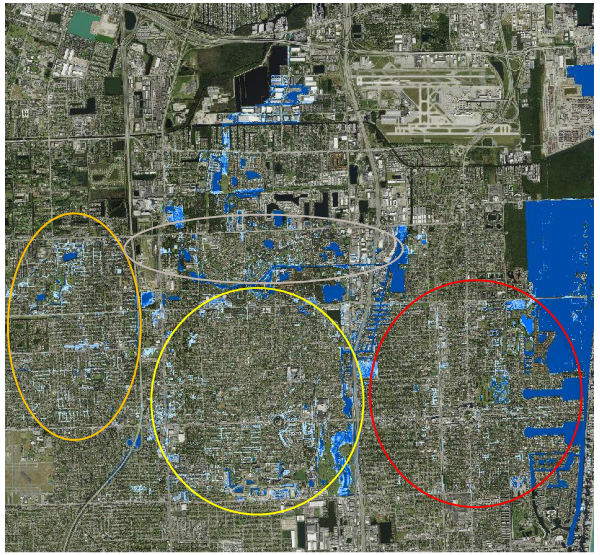
- 100-yr Storm Structures Inundation Analysis
  - LiDAR perimeter average plus 1-ft
  - FFEL sample for ground survey for truth check
  - Used for future NFIP-CRS score FEMA FIRM Flood Insurance Discount
    - Currently Approx 1,600 structures estimated inundated Citywide
    - ALT 1 reduction of Approx 83%
    - ALT 2 reduction of Approx 52%



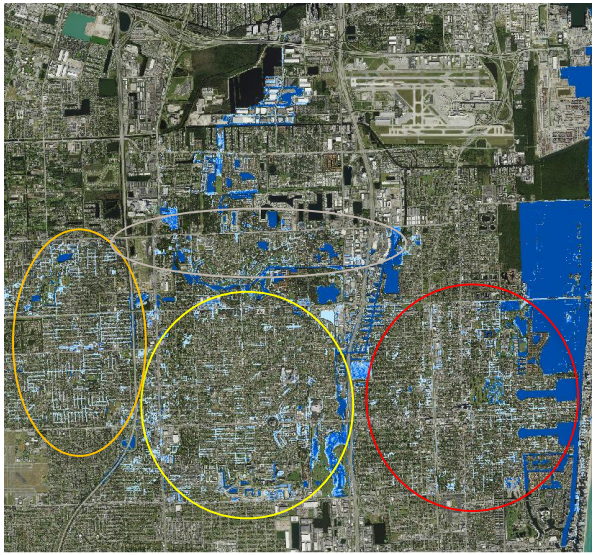
Pre-Post CIP Citywide Flood Inundation Maps



EXISTING CONDITIONS



ALT 1 CIP



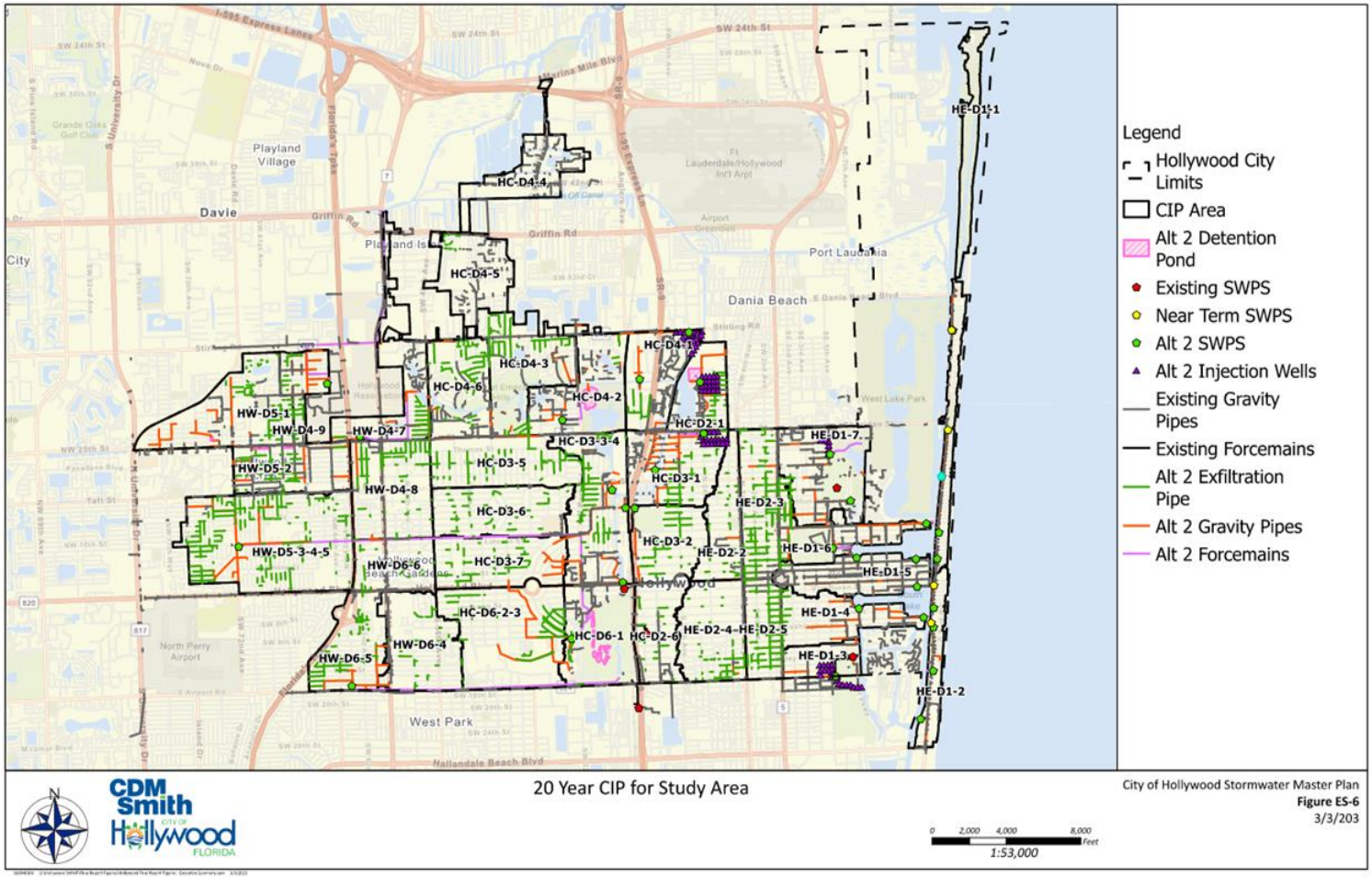
ALT 2 CIP

CIP Program Alternatives Comparison

ALTERNATIVE	PROPOSED CIP ELEMENT								
	EXFILTRATION (MI)	GRAVITY RECHARGE WELLS	STORMWATER GRAVITY COLLECTION PIPE (MI)	NEW STORMWATER PUMP STATIONS	FORCEMAIN (MI)	NEW OUTFALLS	AQUIFER RECHARGE / INJECTION WELLS	NEW DETENTION AREA (AC-FT)	BACKFLOW PREVENTERS
1	112	109	63	37	27	45	135	51.5	26
2	61	55	46	32	19	43	56	18.7	27

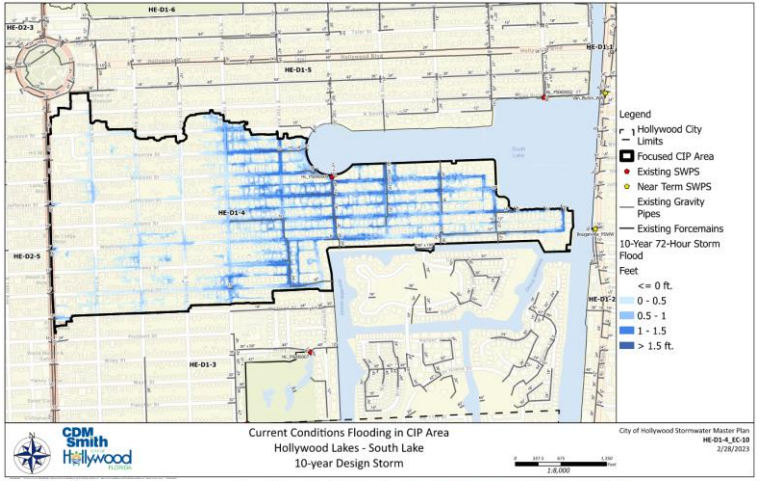
Citywide Stormwater Capital Improvement Areas

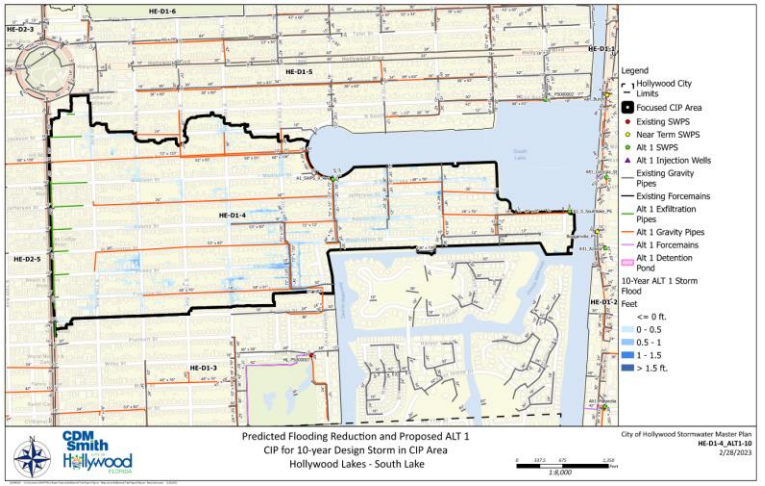
- 40 delineated CIP Areas
- Each represents an area of contiguous flooding
- Proposed CIP was developed to meet the LOS for each Alternative



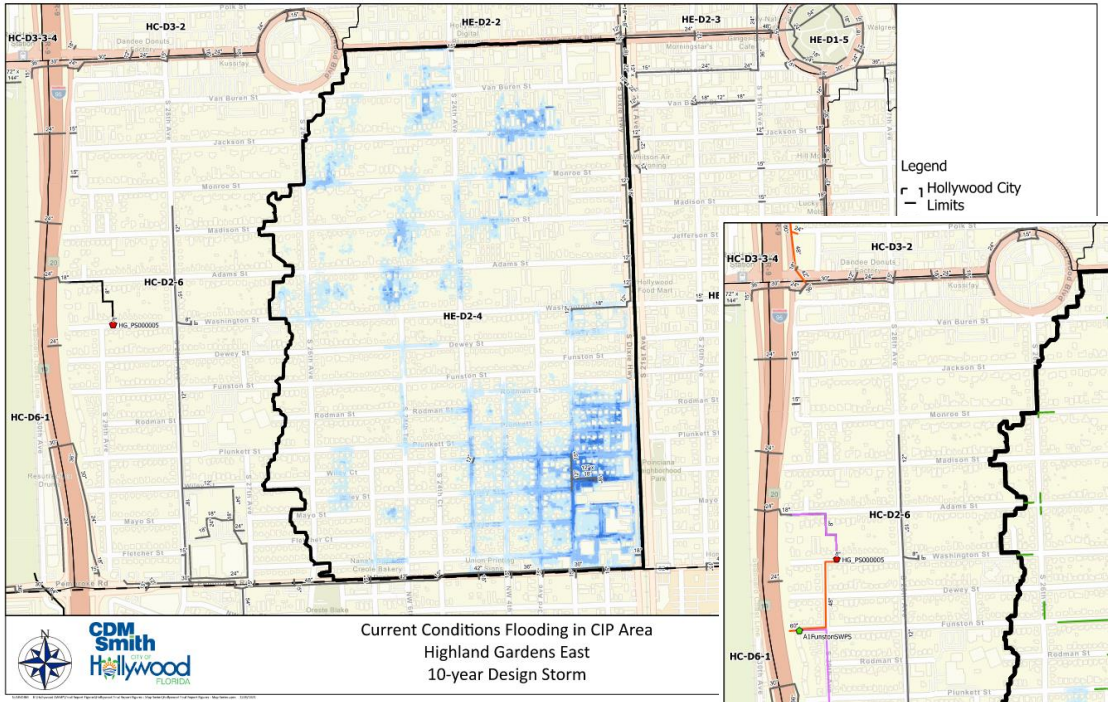
Example CIP Areas and Post-CIP Flood Reduction

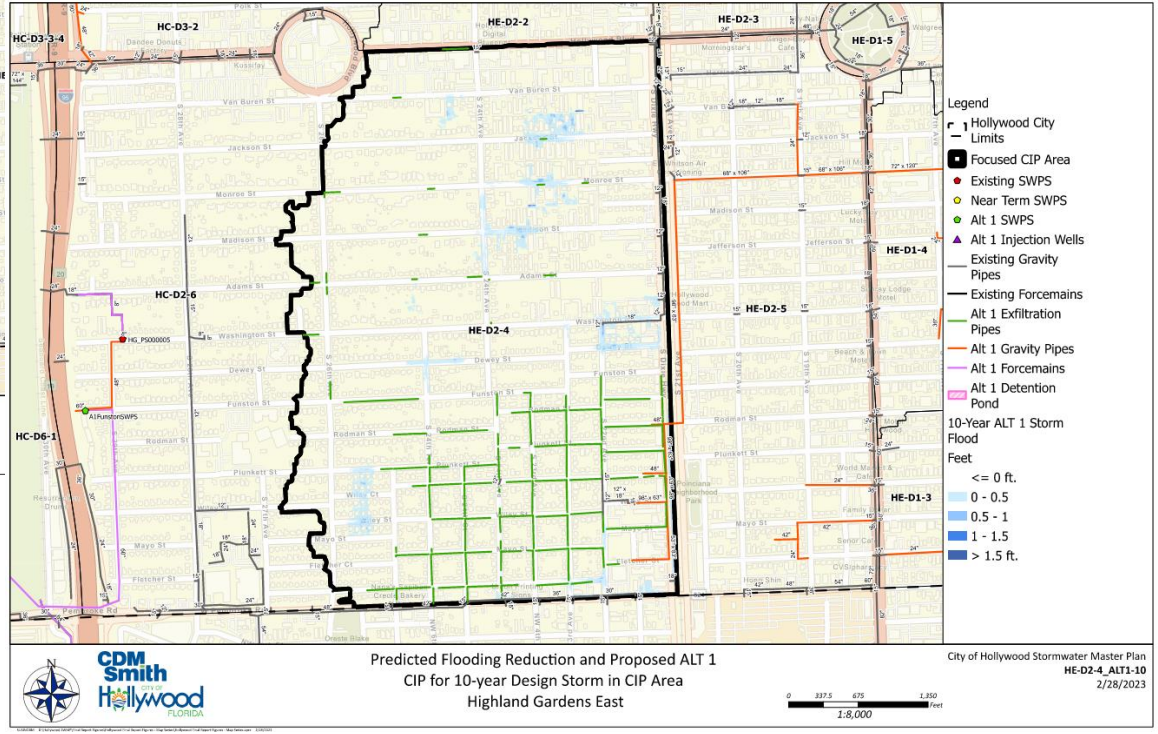
- Preliminary design concepts developed for each CIP Area
- Used by designers as a guide for the stormwater infrastructure improvements
- Can be further phased into smaller projects as funding allows
  - Exfiltration systems where hydraulically feasible to “capture water uphill”
  - Gravity collection systems and inlets in the roadways
  - Recharge wells (gravity and pumped) east of salinity line and avoiding contamination areas and well fields
  - Swales and detention areas
  - Stormwater pump stations
  - Raised seawalls and tidal outfall backflow preventers





Example CIP Area and Post-CIP Flood Reduction

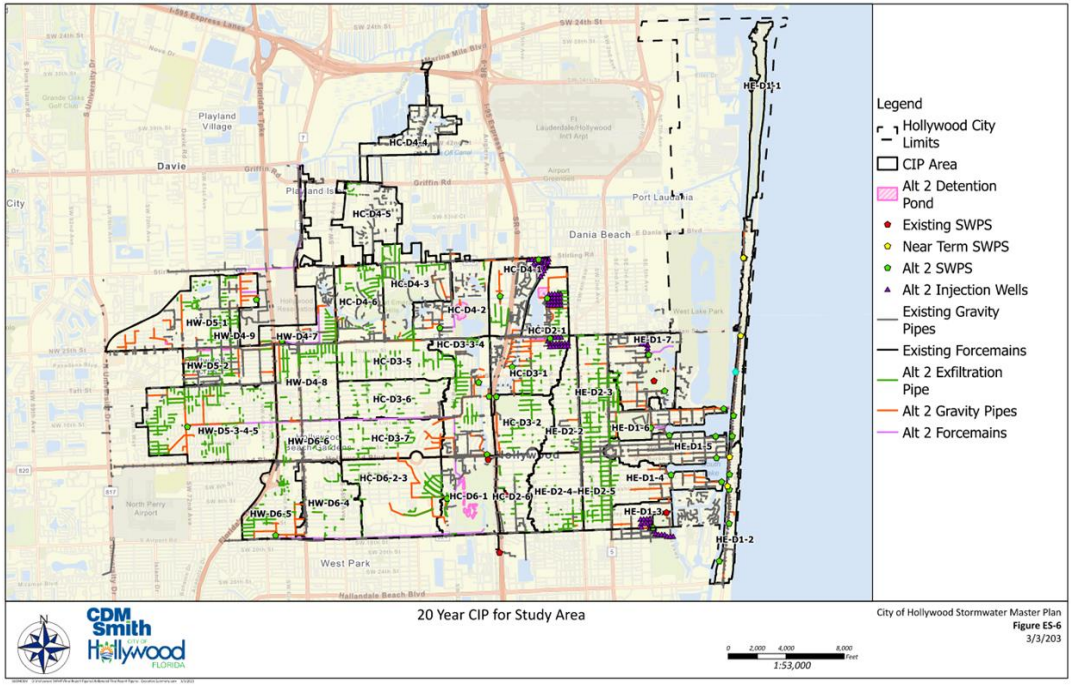




CIP Program Budgetary Planning Estimates by District

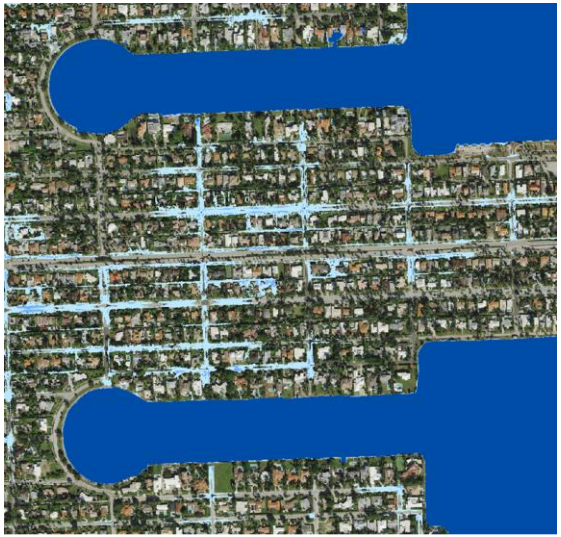
DISTRICT	CIP AREA NAME	NEIGHBORHOOD	ALT 1 PLANNING-LEVEL COST ($M)	ALT 2 PLANNING-LEVEL COST ($M)
1	HE-D1-1	North Beach and South Central Beach	$35.88	$26.87
1	HE-D1-2	South Central Beach	$38.06	$25.29
1	HE-D1-3	Hollywood Lakes South	$48.80	$16.89
1	HE-D1-4	Hollywood Lakes - South Lake	$64.30	$31.06
1	HE-D1-5	Hollywood Lakes - Central	$65.35	$30.43
1	HE-D1-6	Hollywood Lakes - North Lake	$68.53	$38.33
1	HE-D1-7	Hollywood Lakes North	$50.13	$26.84
		Subtotal D1	***$371.04***	***$195.72***
2	HC-D2-6	Highland Gardens	$30.00	$3.69
2	HC-D2-1	Liberia	$42.04	$27.05
2	HE-D2-2	North Central - East	$11.61	$4.31
2	HE-D2-3	Royal Poinciana	$80.27	$34.98
2	HE-D2-4	Highland Gardens East	$41.81	$9.35
2	HE-D2-5	Parkside	$35.75	$18.32
		Subtotal D2	***$241.48***	***$97.71***
3	HC-D3-5	Hollywood Hills North	$92.77	$19.89
3	HC-D3-6	Hollywood Hills North Central	$49.31	$7.35
3	HC-D3-7	Hollywood Hills South Central	$33.27	$15.65
3	HC-D3-3, 4	Parkeast North	$73.75	$48.96
3	HC-D3-2	North Cental South	$46.28	$18.36
3	HC-D3-1	North Cental North / Parkeast	$79.52	$42.35
		Subtotal D3	***$374.90***	***$152.55***
4	HW-D4-9	Driftwood	$100.50	$58.63
4	HW-D4-8	441 Cooridor Central / Hollywood Gardens West	$43.89	$28.54
4	HW-D4-7	Playland / 441 Corridor North	$19.62	$12.73
4	HC-D4-4	Alandco	$0.00	$0.00
4	HC-D4-5	Oakridge / Mapleridge	$1.76	$1.33
4	HC-D4-6	Emerald Hills / Playland / 441 Corridor Central / Hollywood Hills	$30.17	$18.41
4	HC-D4-3	Emerald Hills / Stirling Commercial District	$33.58	$18.98
4	HC-D4-2	Emerald Hills / TY Park	$25.11	$15.56
4	HC-D4-1	Oakwood Hills	$45.02	$32.92
		Subtotal D4	***$299.66***	***$187.11***
5	HW-D5-1	Driftwood / Carriage Hills	$41.94	$20.85
5	HW-D5-2	Driftwood	$53.40	$16.82
5	HW-D5-3, 4, 5	Boulevard Heights	$257.97	$111.25
		Subtotal D5	***$353.32***	***$148.92***
6	HW-D6-6	Hollywood Gardens West / 441 Cooridor South	$8.13	$3.22
6	HW-D6-5	Beverly Park	$157.03	$48.83
6	HW-D6-4	Lawn Acres / Washington Park	$12.51	$5.72
6	HC-D6-2, 3	Hillcrest / Hollywood Hills South	$65.66	$44.67
6	HC-D6-1	Parkeast South	$16.02	$4.16
		Subtotal D6	***$259.35***	***$106.60***
			ALT 1	***ALT 2***
		CIP TOTAL CITYWIDE	**$1,899.76**	**$888.62**

LOS	PROGRAM CIP COST	PROGRAM YRS - ANNUAL EXPENDITURE		
		20	25	30
ALT 1	$1,900,000,000	$95,000,000	$76,000,000	$63,333,333
ALT 2	$890,000,000	$44,500,000	$35,600,000	$29,666,667



Importance of Seawall Improvements in Coastal Neighborhoods

EXISTING CONDITIONS FLOODING*
(TIDE AT EL ~2.5 NAVD)



SWMP CIP*
WITH CITY SHORELINE MITIGATION PROJECT PH 1-3
AND PRIVATE SEAWALL IMPROVEMENTS
(FUTURE TIDES UP TO EL 5 NAVD)

SWMP CIP*
WITHOUT ANY SEAWALL IMPROVEMENTS
(TIDE AT EL ~2.5 NAVD)

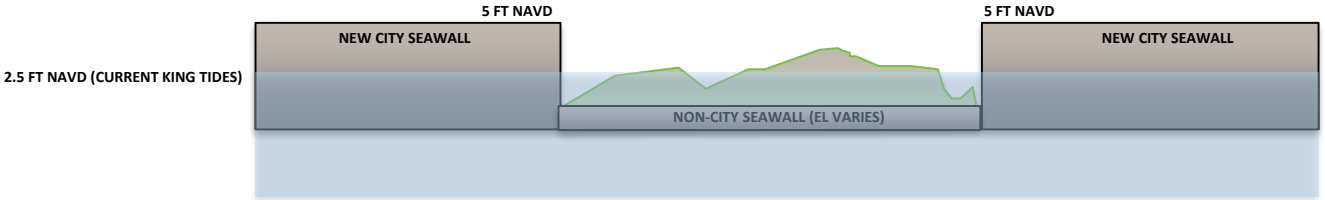
*10 yr storm, ALT 2 example shown

SWMP is Coordinated with Phases 1-3 City Shoreline Mitigation Project

Analysis shows:

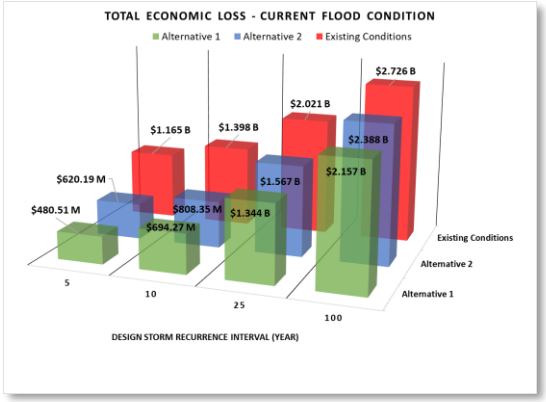
1. Proposed stormwater CIP cannot pump out the ocean
2. Tidal flooding mitigation requires contiguous shoreline barrier:
   - Identify leaks in existing seawalls to be repaired
   - Maintain backflow preventers at outfalls so tides do not come up through the stormwater inlets into the streets
   - Potential lining of leaking pipes required (infiltration)
   - Verify shoreline for potential remaining low-lying non-City seawall areas to ensure a continuous barrier

N Southlake Dr

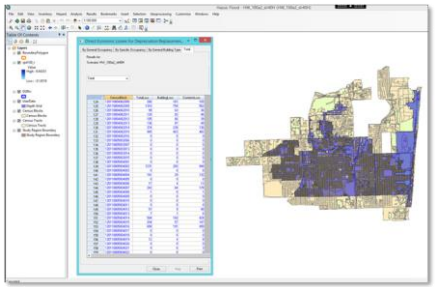


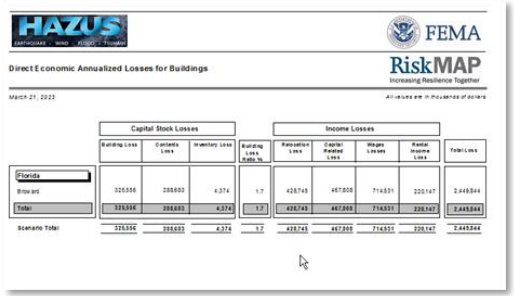
FEMA HAZUS Results – Citywide Analysis – Flood Damage Avoidance

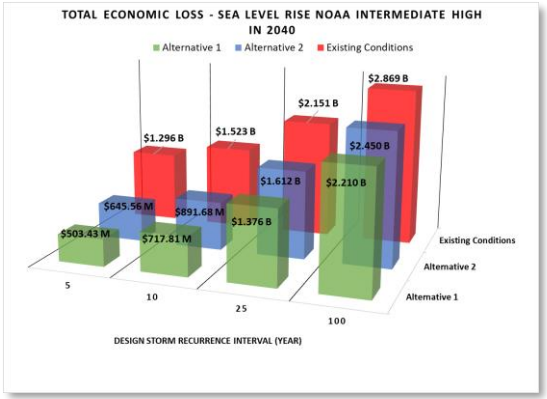
- **ALT 1 BCA = 1.7**
- **ALT 2 BCA = 2.5**



- ✓ Includes Citywide cost of seawalls in CIP (Public/Private)
- ✓ FEMA HAZUS Considers flood damages and basic economic loss
- ✓ Compare flood damages to the CIP costs and calculates a benefit- to-cost ratio (BCR)
- ✓ The benefit-cost ratio is used to determine the viability of cash flows from an asset or project. The higher the ratio, the more attractive the project's risk-return profile
- ✓ If a project has a BCR greater than 1.0, the project is expected to deliver a positive net present value to the owner or its investors.







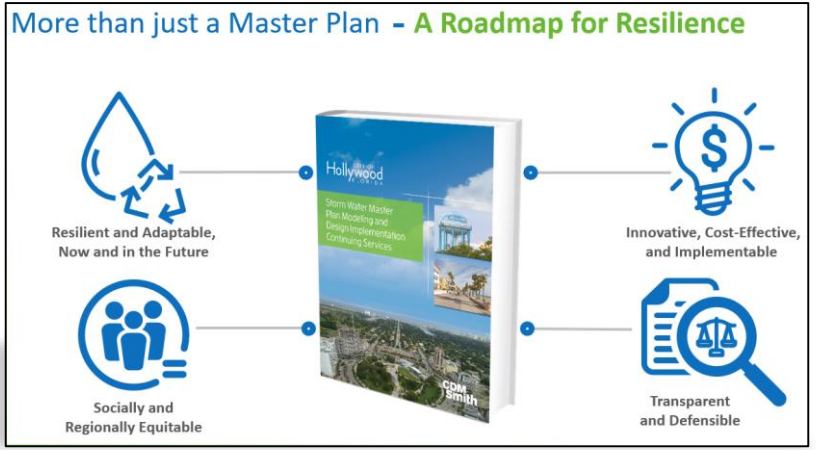
Future Project Sequencing

Factors in the sequencing of future projects:

- Funding
- Grant and Loan Availability
- Coordination with Other Utility, Drainage Districts, and Roadway Work
- Public-Private-Partnerships (PPP) and Re-development
- New Seawall Areas
- Long lead-time projects (permitting, involvement of other entities)
- Impacts to City and major storm conditions

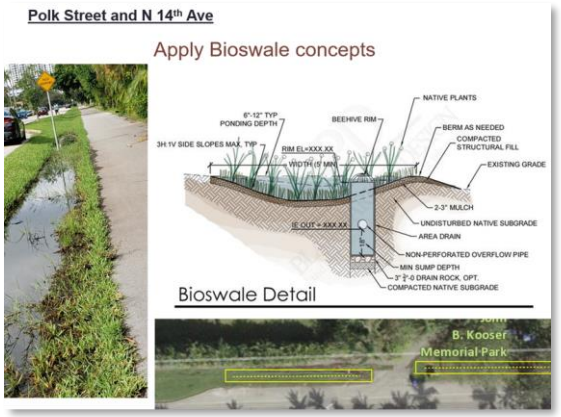
What are the Next Steps for the City?

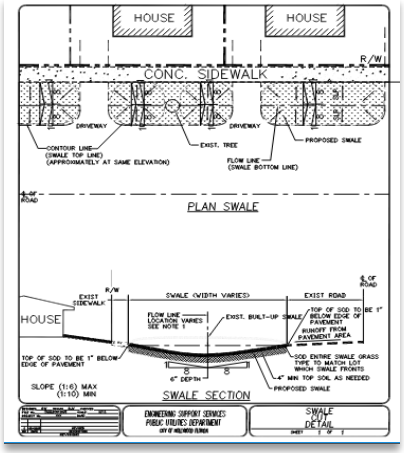
- Determine the near-term budget and select initial program projects within the budget
- Determine the City's long-term financing plan
- Continue grant and loan identification in parallel
- Continue to identify Joint Project Agreements with other entities (FDOT, WC Districts, P3, Neighboring Municipalities, BC)
- Select next rounds of projects to determine future budget
- Review NFIP CRS for potential additional credits
- Update design and development standards
- Remain flexible in project execution
- Update the model as CIP is installed for current snapshot of Citywide progress, important for permitting, use for review and conformance with SWMP
- Plan for future O&M budget reserve



SWMP - Recapture the Swale Grant Program

- ✓ City wide existing swales have been identified and digitized into a GIS layer
- ✓ Location, depth, area, linear feet, and volume estimates
- ✓ Modeled the water quality storm pre-post
- ✓ First 5 of 15 swale projects has completed

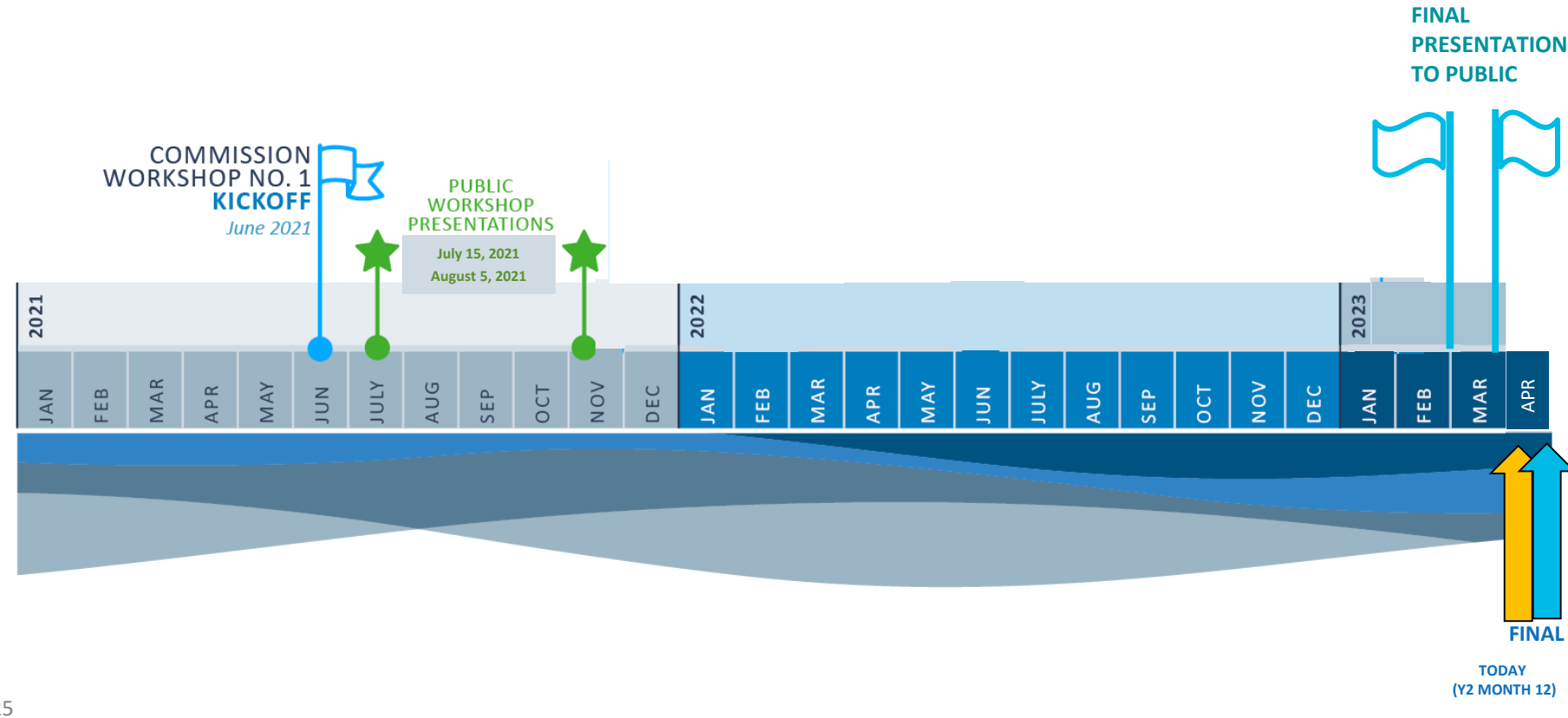




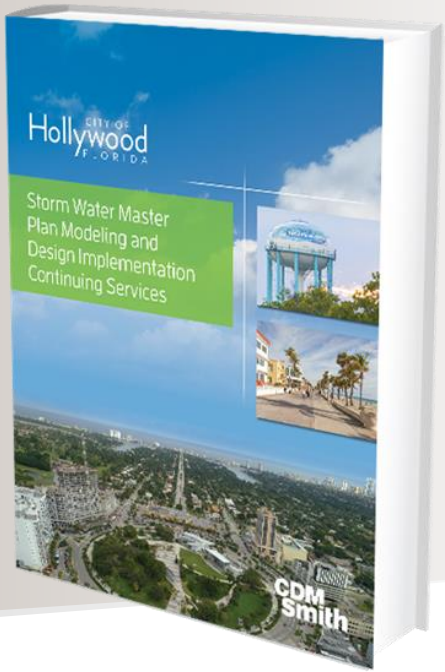
SWMP Rollout and Presentation

1. Commission Presentation
2. Westside and Eastside Resident Presentations
3. Educational Materials
4. Adopt the SWMP and Funding Plan

Schedule Update



Open Questions and Discussion



CITY OF Hollywood FLORIDA