City of Fort Lauderdale
Watershed Asset Management Program (WAMP)
2020 FSA Annual Conference – July 2020

Speakers:

Elkin Diaz, MBA, PE, PMP, IAM (City)

Marie Pierce, LEED AP BD+C (City)

Ryan Nagel, PE, ENV SP (Hazen)

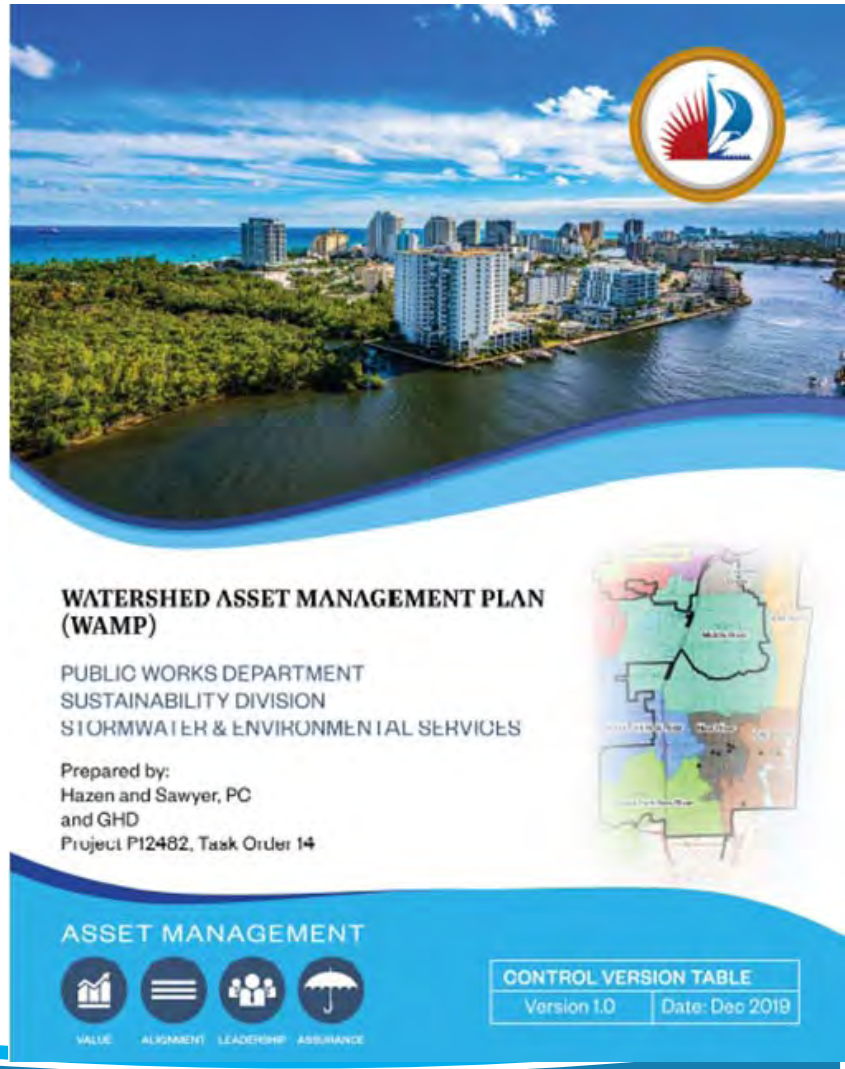
Jose Morales (GHD)

Hazen

GHD

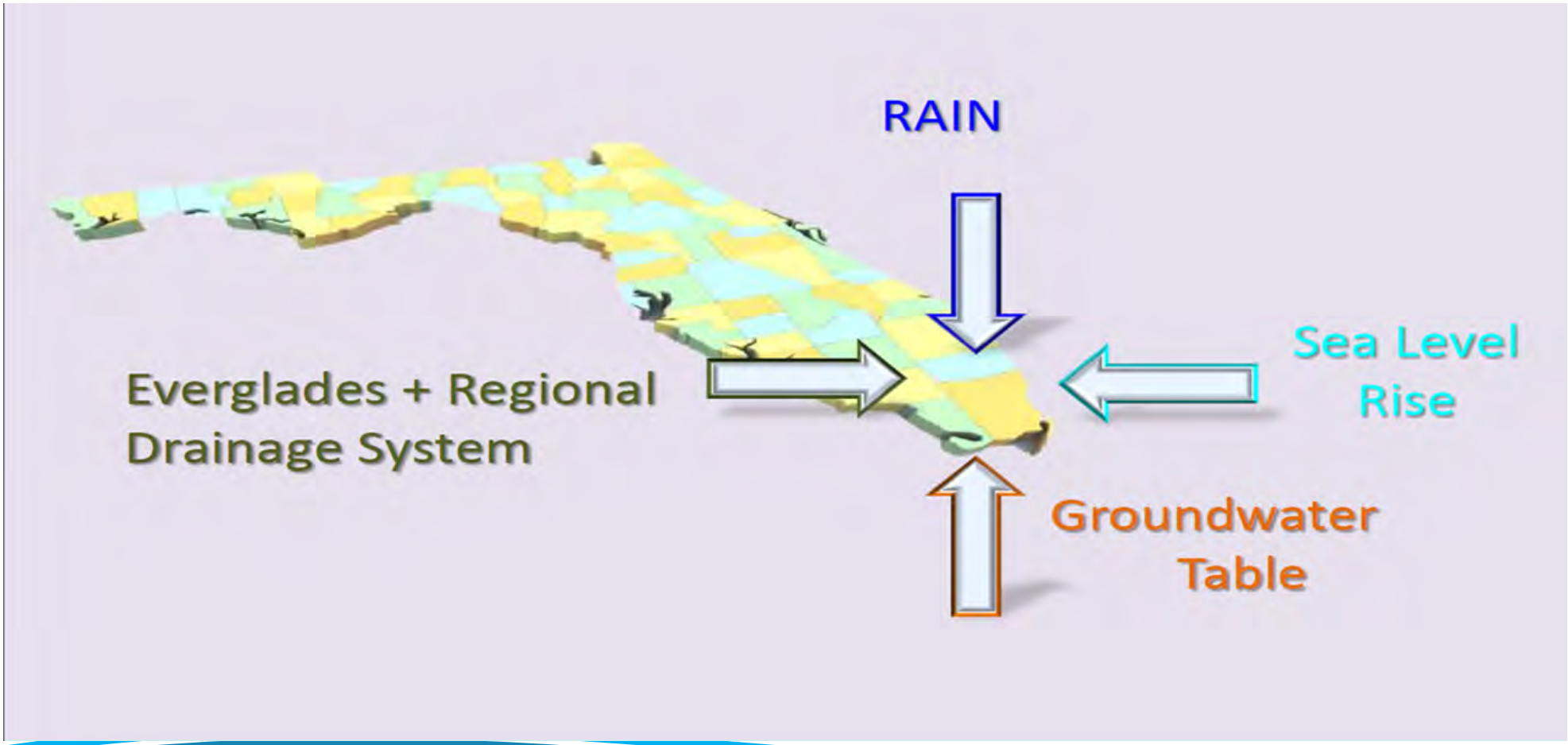
Presentation Agenda

1. **Why** – Reasons to create the WAMP
2. **How** – Funding mechanism, Strategy
3. **What** – Major Components, Roadmap
   i. Maturity & Gap Assessment
   ii. Level of Services
   iii. Condition Assessment
4. **Who** – Roles, responsibilities & recommendations
5. **Q/A Session**

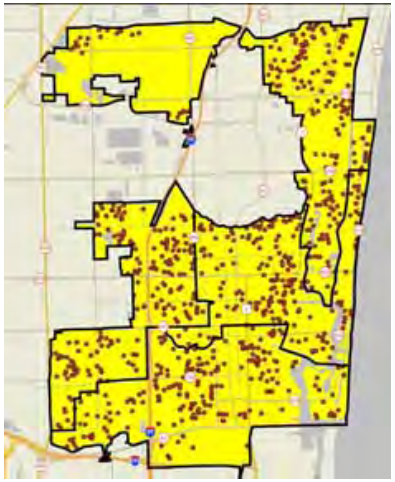


1. Reasons for creating the WAMP

Multiple Challenges & Geographic limitations



CITY'S STORMWATER HARD ASSETS - HIGHLIGHTS



Over 9,000 Unverified Assets

CITY'S STORMWATER NATURAL & SOFT ASSETS - HIGHLIGHTS

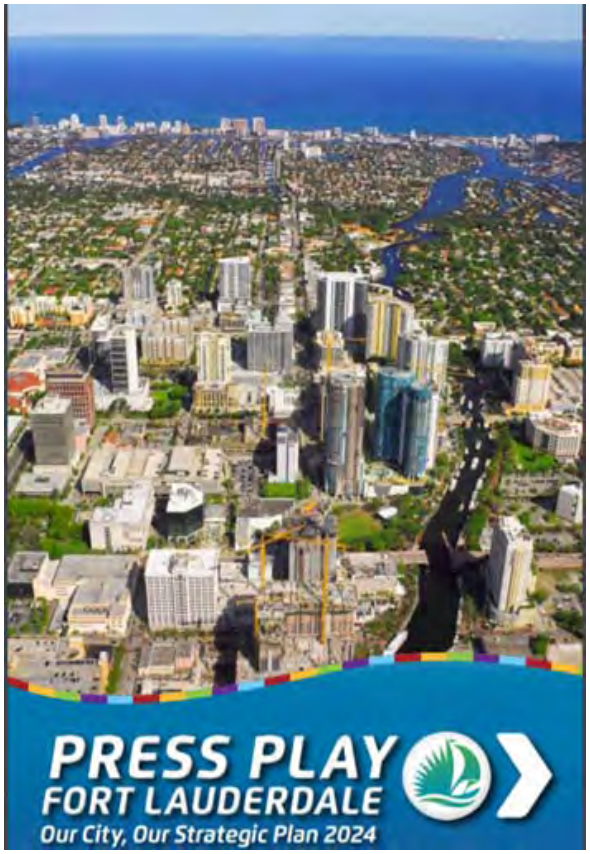
NATURAL ASSETS

- RIVERS, CREEKS, CANALS
- LAKES
- OCEAN
- TREES
- MANGROVES
- CITY PARCELS

SOFT ASSETS

- HUMAN RESOURCES
- POLICIES
- PROCEDURES
- REGULATIONS
- CITY ORDINANCES
- STAFF TRAINING
- STAKEHOLDER OUTREACH
- GIS INVENTORY

REASON # 1 – WAMP serves meeting City Press Play Strategic 2024 Plan



Infrastructure Focus Area

GOAL 1: Build a Sustainable & Resilient Community

Objectives:

- Proactively maintain our water, wastewater, stormwater, road and bridge infrastructure
- Reduce Flooding and Adapt to Sea Level Rise

The Internal Support Focus Area

GOAL 8: Build a Sustainable & Resilient Community

Objectives:

- Provide safe, well-maintained, and efficient facilities and capital assets
- Integrate sustainability and resiliency into daily operation

REASON # 2

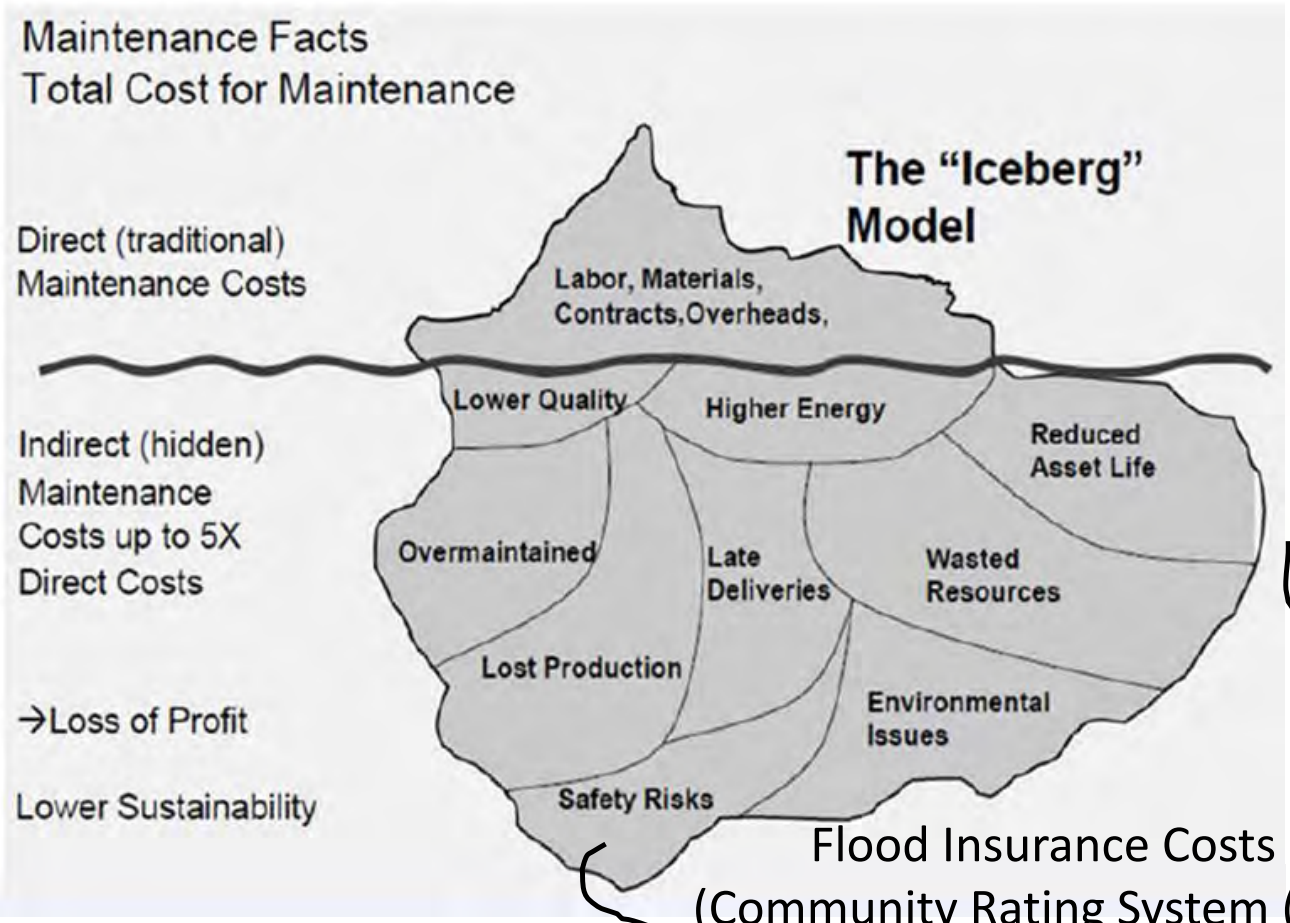
WAMP serves reaching the Division's Flood Resilience & Environmental Vision, Mission, and Goals

REASON # 3 – WAMP helps building up the City's resilience

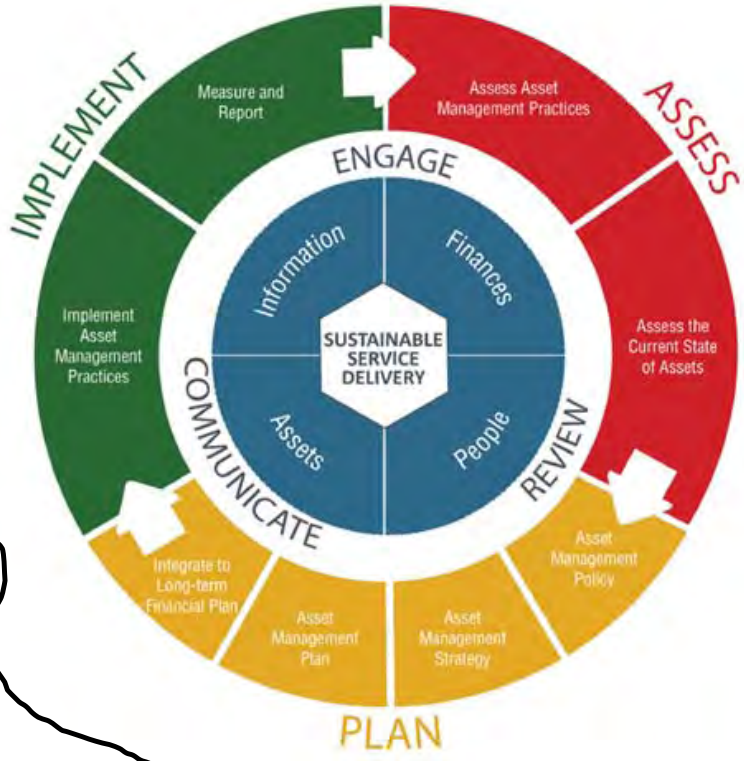
WAMP & Asset Management (AM)

- Asset Inventory
- Probability of Failure
- Consequence of Failure
- Redundancy
- Risk Quantification
- Management & Operations Strategies
- GIS & Spatial Visualization
- People & Knowledge Management

Resilience

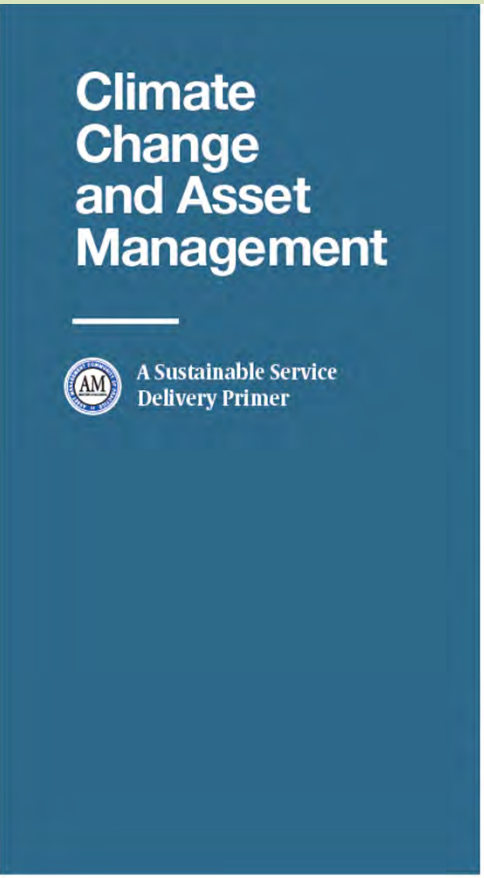


Integrating climate change response with the BC Asset Management Framework



Flood Insurance Costs
(Community Rating System (CRS)

REASON # 4 – WAMP helps combat climate change



1. The purpose of Asset Management (AM) is sustainable service delivery, and Climate Change (CC) is a threat to sustainable service delivery

2. AM practices can increase a community's resilience to the impacts of CC and improve response to natural disasters.

3. AM decisions will impact CC.

4. AM helps local governments make decisions about CC response in the broader context of local government service delivery and other priorities.
5. Integrating CC response into AM is a practical approach to managing liability risks.

REASON # 5 – WAMP serves Prioritizing Work

Figure 2.1: Stormwater Hard Assets (2019 Stormwater Geodatabase)

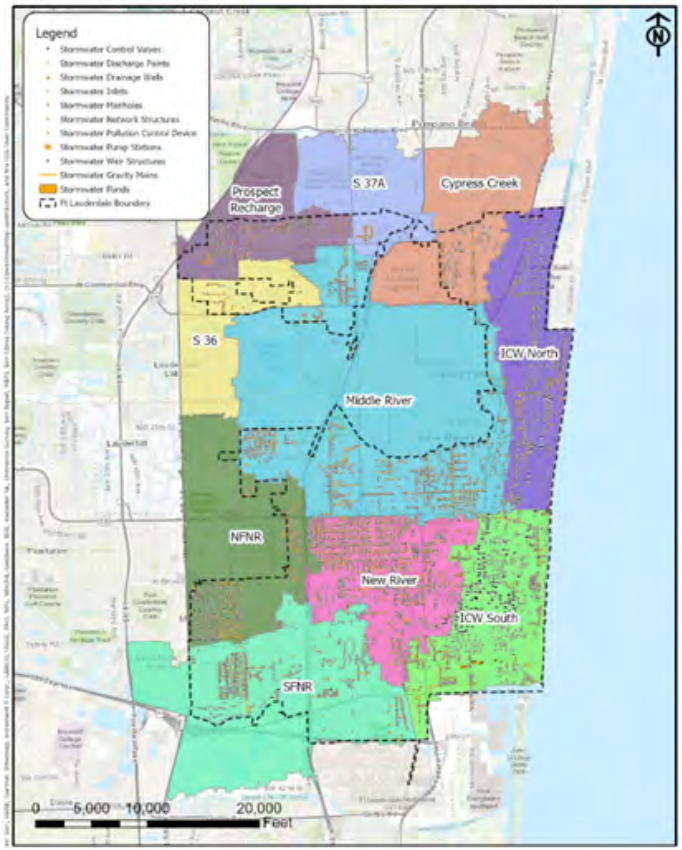
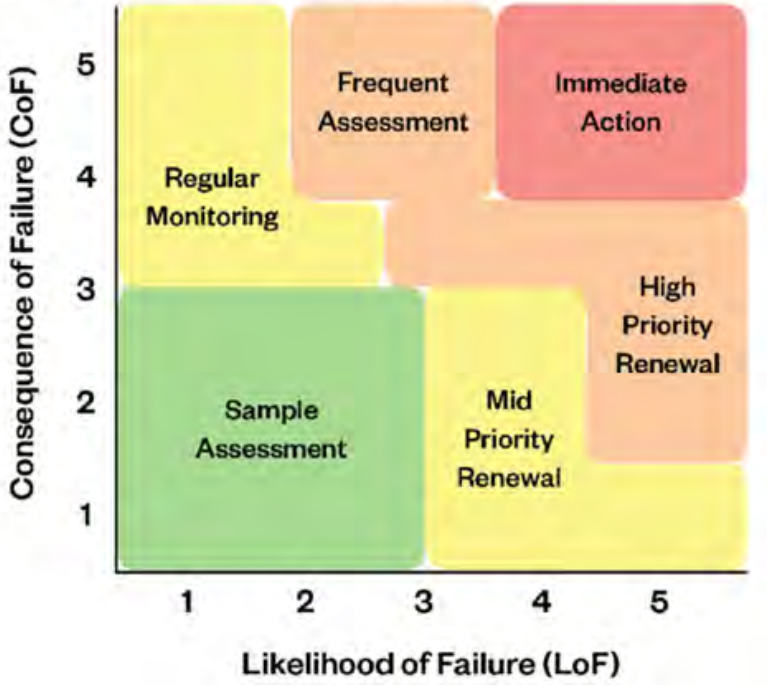
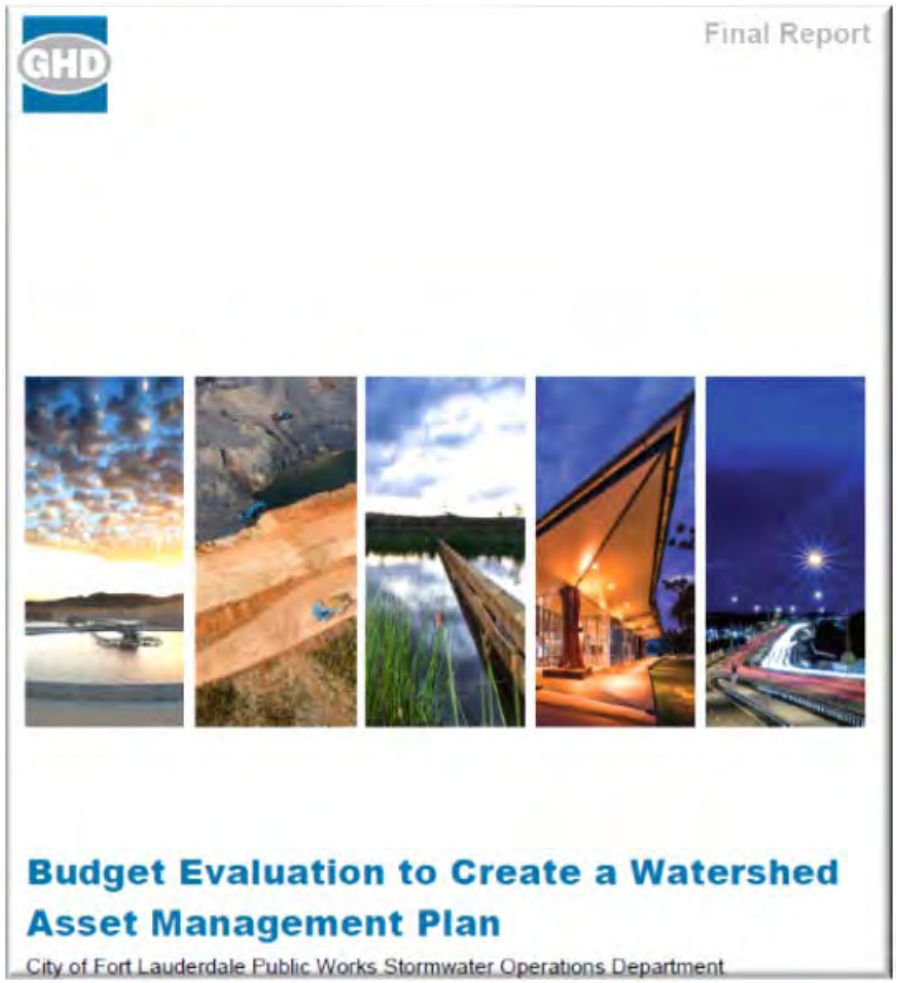


Figure ES.5: Typical Risk Matrix and Associated Management Approaches



BRE = LoF X CoF

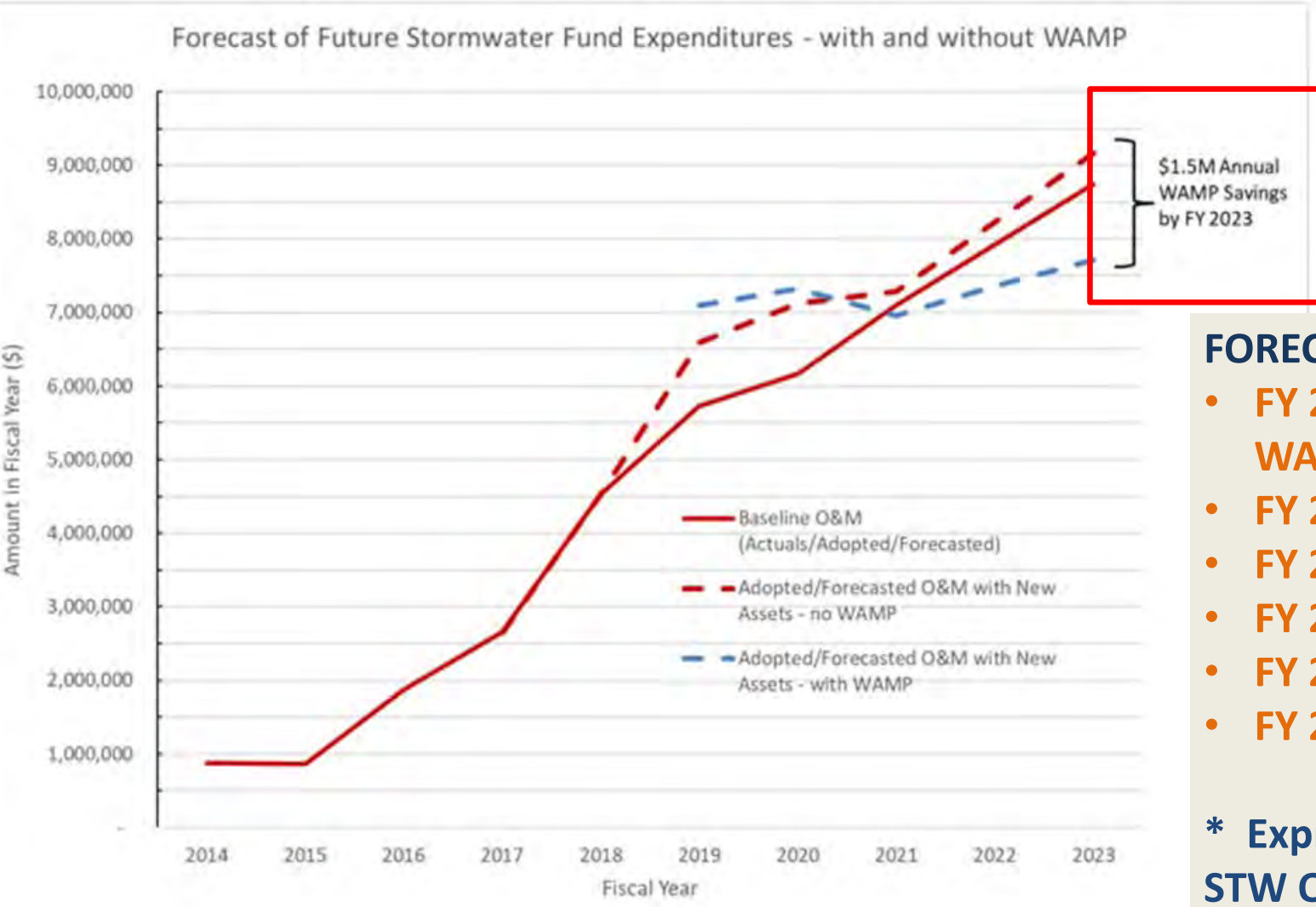
2. How – WAMP Funding Strategy



Feb 2018 – Public Works asked GHD for a budget study to create the WAMP and evaluate potential savings from implementation

April 2018 – GHD completed the budget study

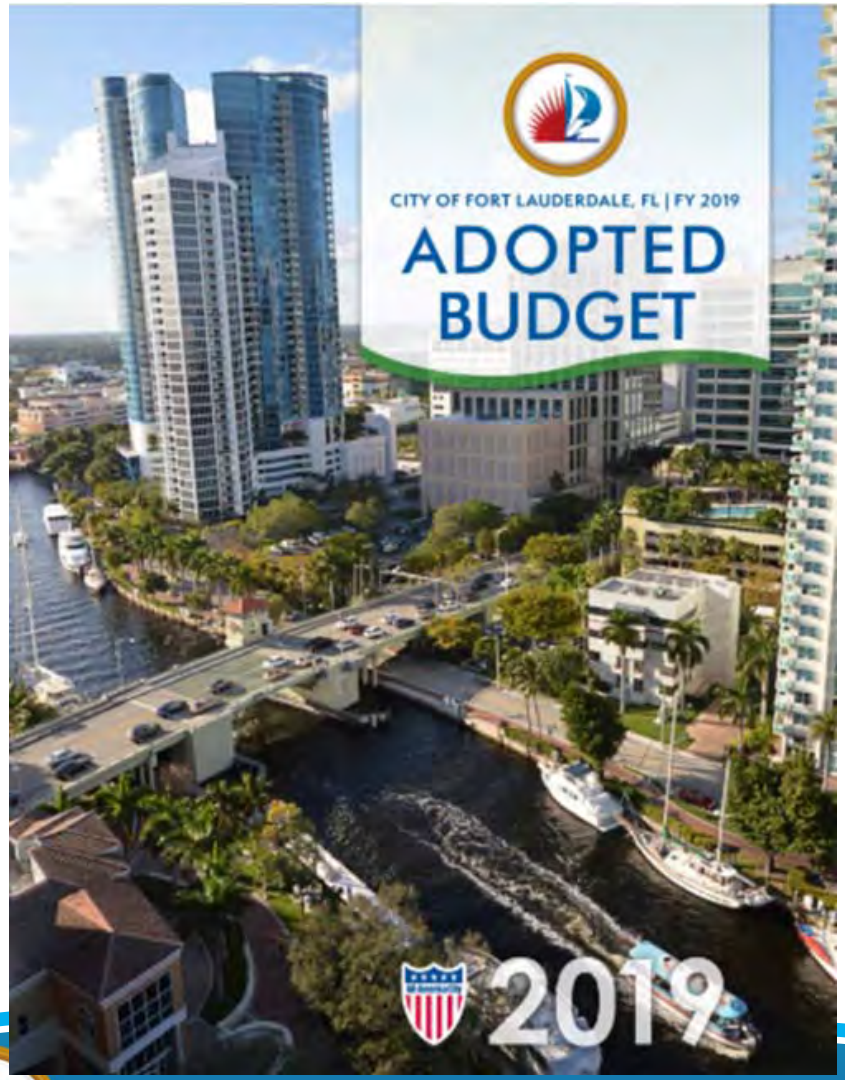
Forecasted $1.5M Annual WAMP Savings by FY 2023



FORECASTED WAMP SAVINGS*

- **FY 2018: GHD WAMP Budget Study**
- **FY 2019: 0% annual savings**
- **FY 2020: 5%**
- **FY 2021: 14%**
- **FY 2022: 22%**
- **FY 2023: 28%**

*** Expressed as a % savings of STW OPS budget**



Last Update: 06/21/2018 Total Request: 1,405,000.00

FY 2019 BUDGET MODIFICATION FORM

Public Works - 470 Stormwater Operations

APPROVED

Priority No: 5

Title of Request: Establish Watershed Asset Management Plan (WAMP)

Request Type: Program - New

New Position(s) Requested:	Position(s) Eliminated:	Change in Part-Time:	Total Change in FTEs:
0.00	0.00	0.00	0.00

Basis of justification: Improvement, revenue generating, mandated, cost reduction, workload change. Please state what will be the consequence if this request is not funded?

This for adding $1,405,000 annually to the Stormwater Operations (STW OPS) Budget for a program to develop a Watershed Asset Management Program (WAMP) to compliment and expand an existing City effort to compile existing stormwater (STW) infrastructure data into the Cityworks Asset Management Software.

• The City of Fort Lauderdale's STW system was built mostly during the mid-20th century and not designed to address the challenges posed by climate change, sea level rise and growing impervious surface faced by the coastal City it is today. As a

June 2018 – Budget Office approves $1.4M Annual funding for WAMP

STW O&M needs and minimize the O&M impact of the STW capital expenditures planned by the SWMP.

• By funding and establishing a WAMP, the PWD will be able to achieve these goals through the STW and environmental groups:

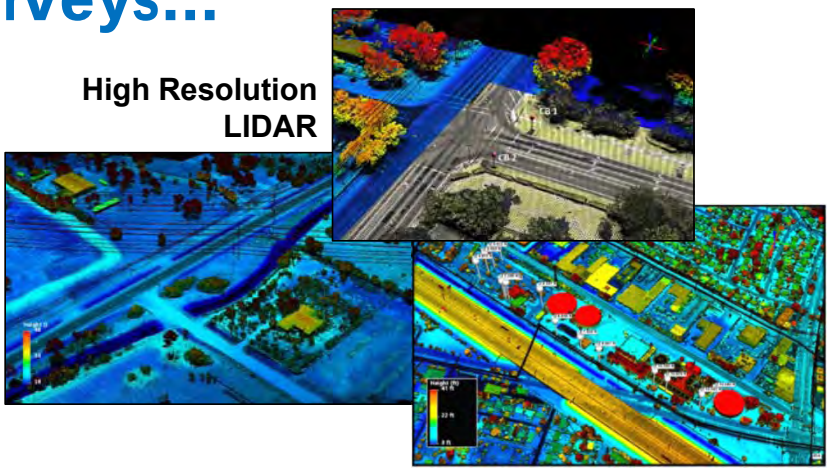
- Save the City about $2 Million in avoided costs from years 1 through 5 and about 28% annual savings of STW O&M costs for years 5 through 10
- Establish a sustainable financial framework for STW management, including risk-based decision making process and data-driven budgeting justifications
- Implement asset management and business process improvements to help the City's STW OPS and environmental programs be better prepared for extreme weather events and sea level rise
- Establish asset management objectives including those for lifecycle costs; management of risks; organizational improvement, including knowledge management; business operations; maintenance and reliability; use of technology; and service level enhancement
- Establish a state-of-the-art maintenance and reliability program enhanced by Cityworks™ asset management software implementation

3. What is the WAMP? – Components & Roadmap

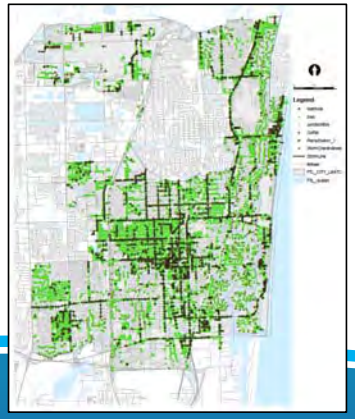
The City Has Performed Extensive Work Related to Stormwater System Mapping and Asset Attribute Surveys…

Extensive System of Survey Control

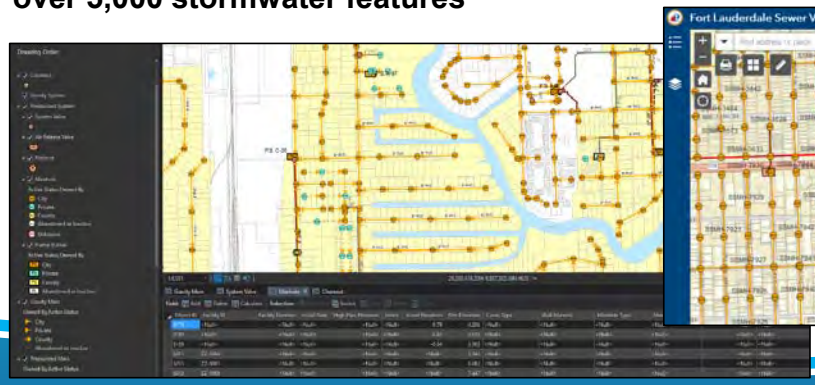
High Resolution LIDAR



Fiveash WTP



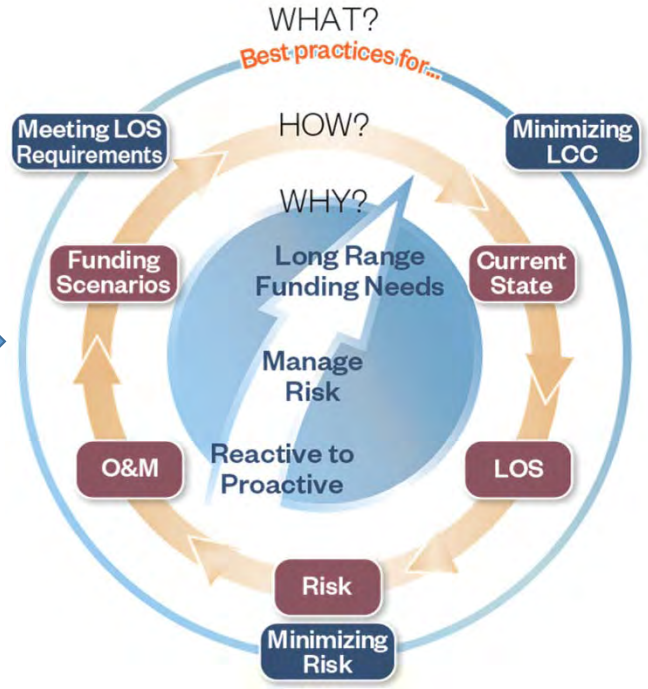
Attributes field surveyed for over 5,000 stormwater features



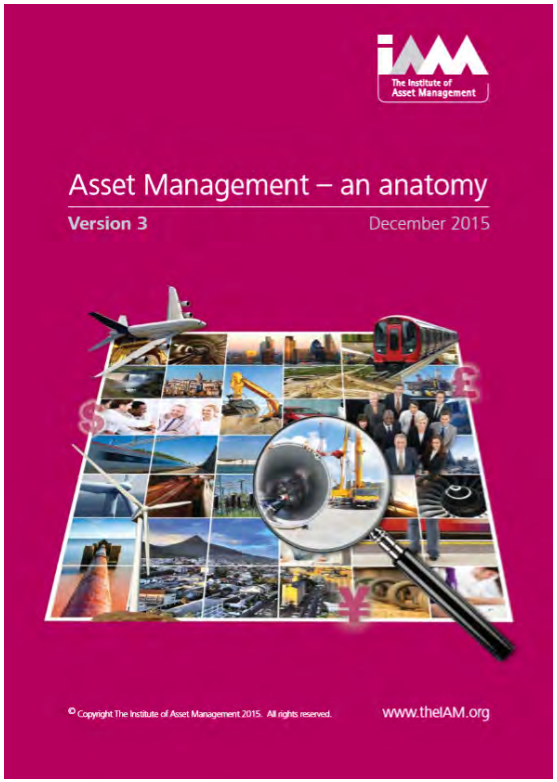
…and was Ready to Formalize its Asset Management Practices and Procedures in Alignment with Industry Standards

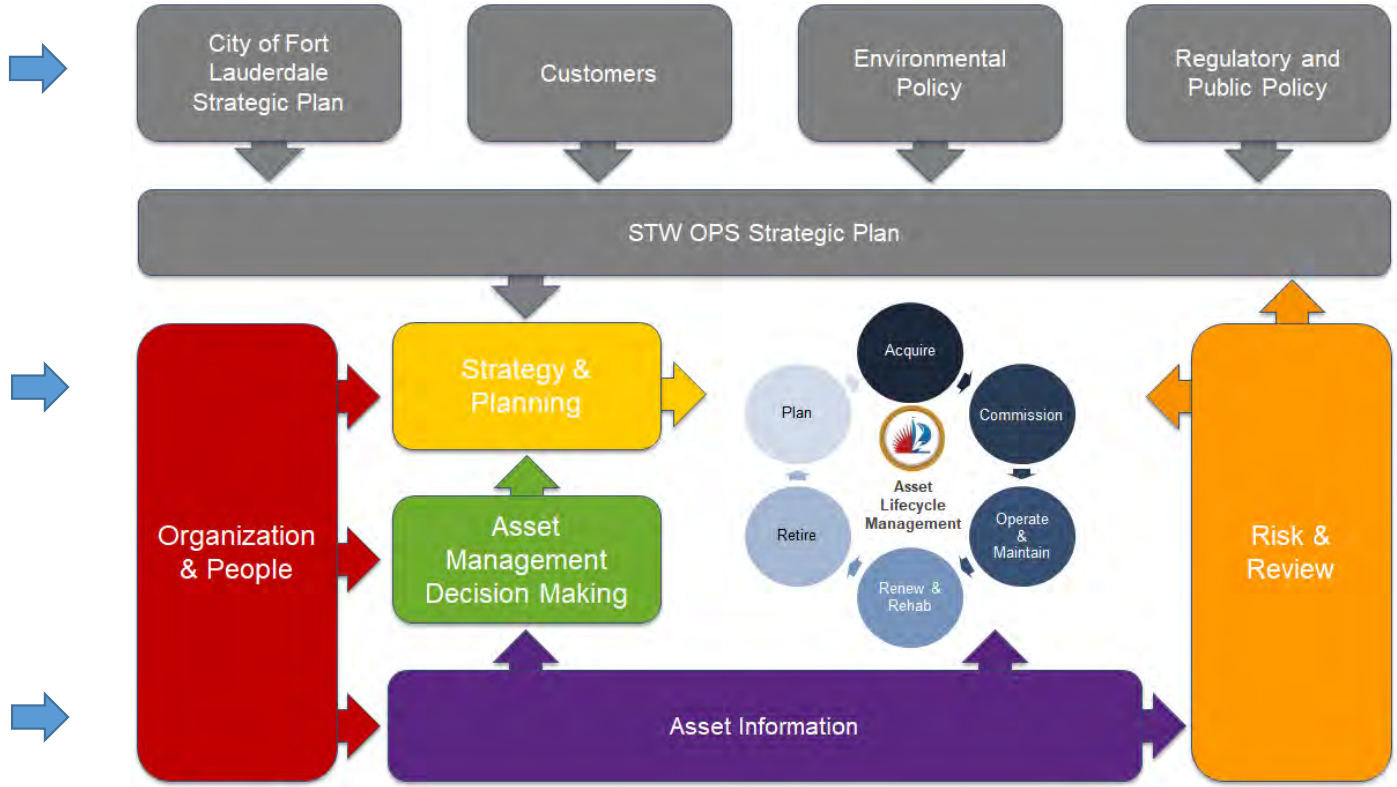
All Industry Asset Management Frameworks Focus on:

- **Minimizing total costs** of acquiring, operating, maintaining, and renewing assets
- **Continuously delivering the levels of service** your customers desire and regulators require
- **Minimizing** the overall risk to the organization



The IAM Conceptual Model (Anatomy) was Selected as a Best-Fit Framework for the City's Watershed Asset Management Program





WAMP Fig. ES.1, Page ES-2

A Maturity Assessment Was Conducted to Compare the City's Existing AM Practices to the IAM Anatomy Requirements

Maturity Scores across 39 IAM Elements

Maturity Level Scoring Framework

Innocent → Aware → Developing → Competent → Mature → Industry Leader

Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4	Maturity Level 5
The City has not recognized the need for this requirement and/or there is no evidence of commitment to put it in place	The City has identified the need for this requirement and there is evidence of intent to progress it	The City has identified the means of systematically and consistently achieving the requirements, and can demonstrate that these are being progressed with credible and resourced plans in place	The City can demonstrate that it systematically and consistently achieves relevant requirements set out in the IAM Anatomy	The City can demonstrate that it is systematically and consistently optimizing its asset management practice, in line with the City's objectives and operating context	The City can demonstrate that it employs the leading practices and achieves maximum value from the management of its assets, in line with the City's objectives and operating context

IAM Conceptual Model Elements

Group 1 - Strategy & Planning

1. Asset Management Policy
2. Asset Management Strategy & Objectives
3. Demand Analysis
4. Strategic Planning
5. Asset Management Planning

Group 2 - Asset Management Decision-Making

6. Capital Investment Decision-Making
7. Operations & Maintenance Decision-Making
8. Lifecycle Value Realisation
9. Resourcing Strategy
10. Shutdowns & Outage Strategy

Group 3 - Life Cycle Delivery

11. Technical Standards & Legislation
12. Asset Creation & Acquisition
13. Systems Engineering
14. Configuration Management
15. Maintenance Delivery
16. Reliability Engineering
17. Asset Operations
18. Resource Management
19. Shutdown & Outage Management
20. Fault & Incident Response
21. Asset Decommissioning & Disposal

Group 4 - Asset Information

22. Asset Information Strategy
23. Asset Information Standards
24. Asset Information Systems
25. Data & Information Management

Group 5 - Organisation & People

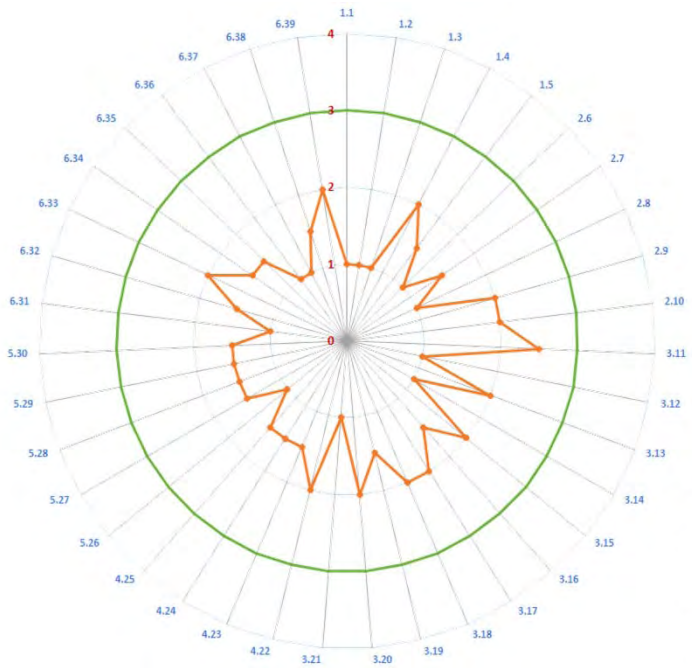
26. Procurement & Supply Chain Management
27. Asset Management Leadership
28. Organisational Structure
29. Organisational Culture
30. Competence Management

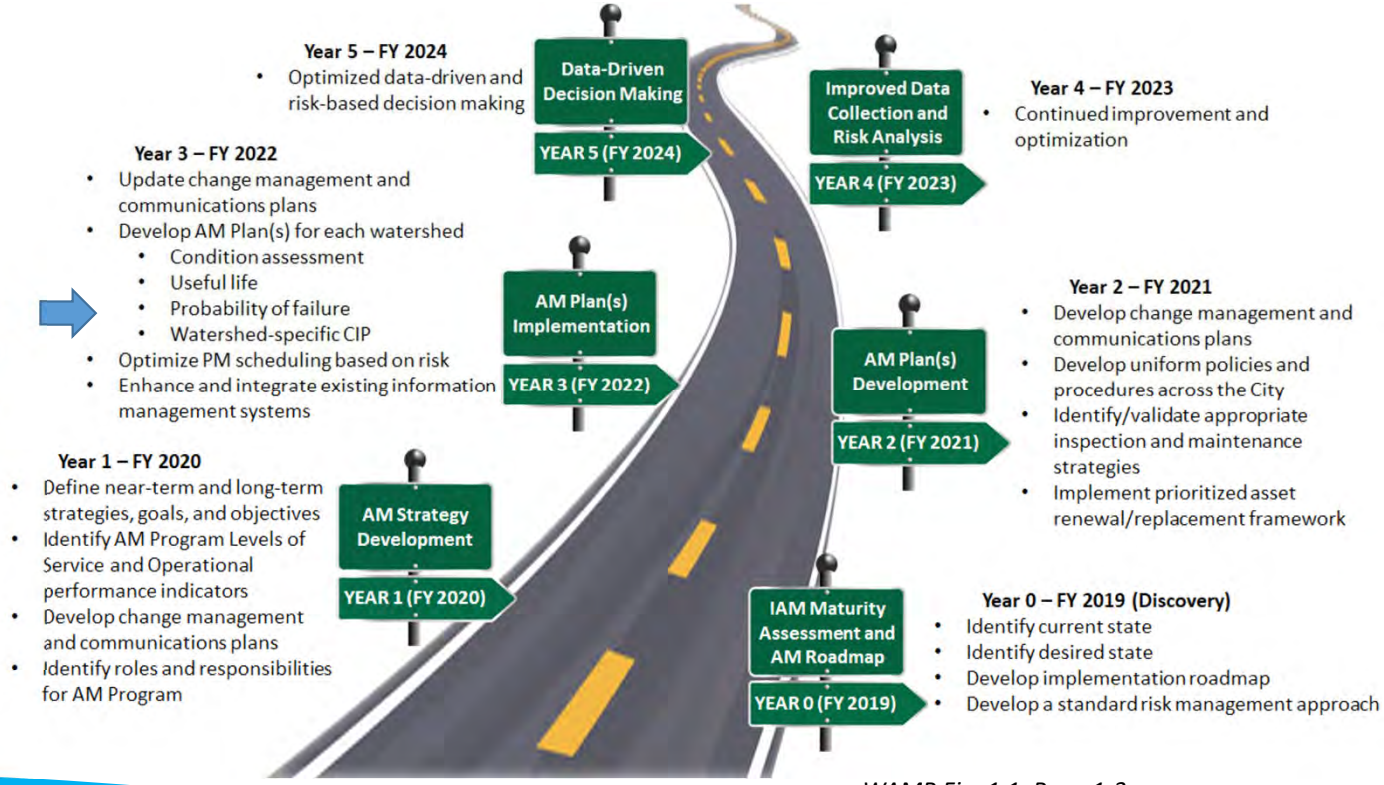
Group 6 - Risk & Review

31. Risk Assessment & Management
32. Contingency Planning & Resilience Analysis
33. Sustainable Development
34. Management of Change
35. Asset Performance & Health Monitoring
36. Asset Management System Monitoring
37. Management Review, Audit & Assurance
38. Asset Costing & Valuation
39. Stakeholder Engagement

The City's existing asset management policies, practices, and procedures were compared to the IAM requirements in each of the 39 elements and scored for maturity.

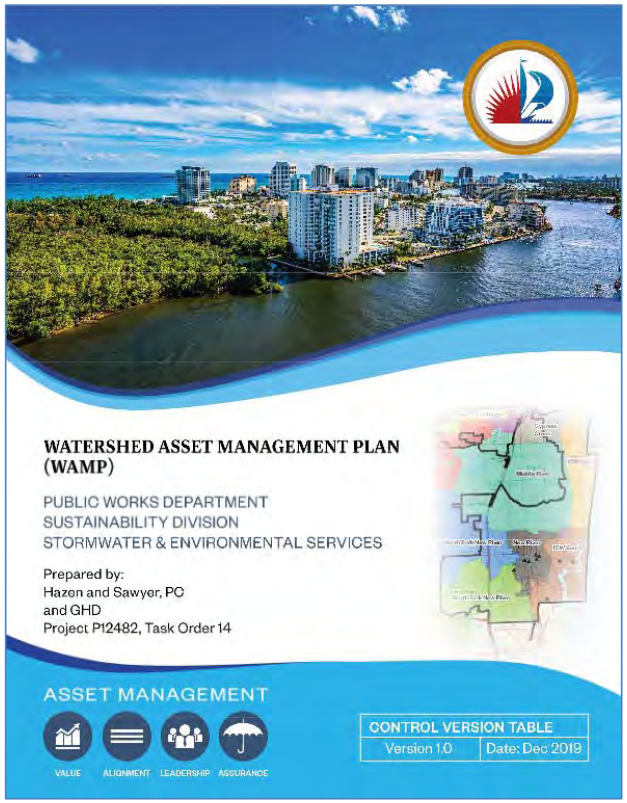
Maturity Assessment Results Drove Development of the City's Watershed Asset Management Program Roadmap…





WAMP Fig. 1.1, Page 1-3

…and Culminated with the Watershed Asset Management Plan Ver. 1.0



- **Purpose:** to document the current state of the City's stormwater assets and to project the short- and long-range asset renewal and replacement needs aligned with ongoing and future operations and maintenance requirements

- **Intention:** The WAMP is intended to be a planning document used to provide a rational framework for:
  - **Understanding** the existing risk and stewardship requirements of the City's stormwater asset portfolio;
  - **Planning** for the appropriate standard of care necessary to provide an acceptable level of service; and
  - **Decision-making** to provide a justifiable basis to support long-range organization, operations, and asset management decisions.

The IAM Conceptual Model Maturity Assessment and the WAMP Ver. 1.0 are Supported by the USEPA Model for Implementation

1. **What is the current state of my assets?**
   - What do I own?
   - Where is it?
   - What condition is it in?
   - What is its performance?
   - What is its remaining useful life?
   - What is its remaining economic value?

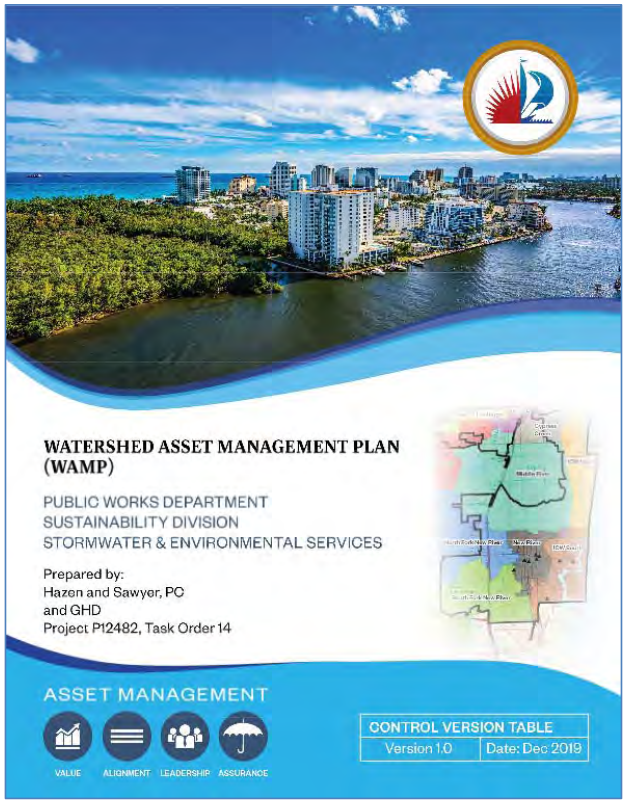
2. **What is my required level of service (LoS)?**
   - What is the demand for my services by my stakeholders?
   - What do regulators require?
   - What is my actual performance?

3. **Which assets are critical to sustained performance?**
   - How does it fail? How can it fail?
   - What is the likelihood of failure?
   - What does it cost to repair?
   - What are the consequences of failure?

4. **What are my best O&M and CIP investment strategies?**
   - What alternative management options exist?
   - Which are the most feasible for my organization?

5. **What is my best long-term funding strategy?**

The WAMP Ver. 1.0 Contents Mirrors the USEPA Model Elements



EXECUTIVE SUMMARY

SECTION 1 – INTRODUCTION

SECTION 2 – OVERALL STORMWATER SYSTEM

SECTION 3 – CITY FLOOD PROTECTION AND COMMUNITY INVESTMENT PLAN

SECTION 4 – STANDARD OF CARE, LEVEL OF SERVICE, AND KEY PERFORMANCE INDICATORS

SECTION 5 – ASSET INVENTORY UPDATING PROCEDURES

SECTION 6 – HOW MUCH WILL THE WAMP COST?

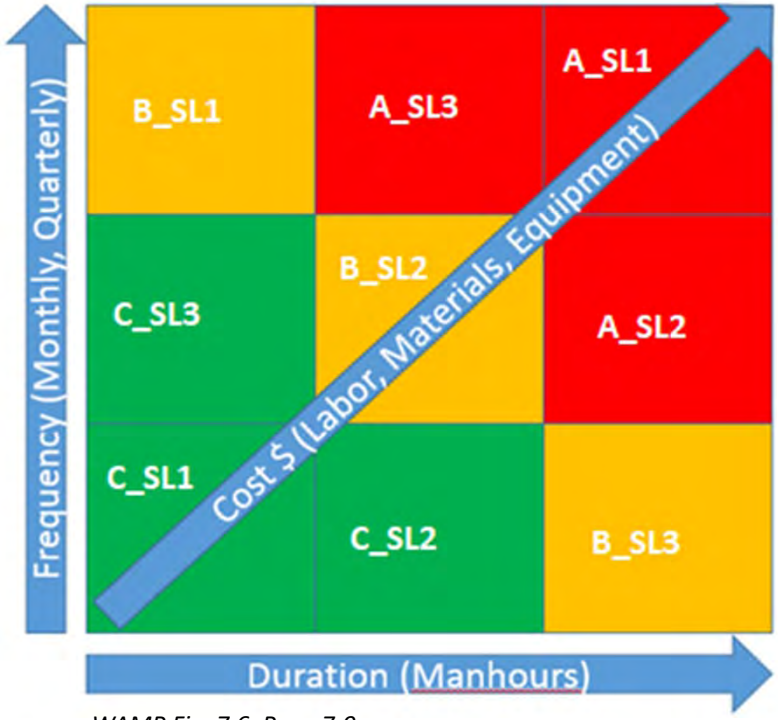
SECTION 7 – HOW CAN THE CITY PAY FOR IT?

SECTION 8 – WATERSHEDS

SECTION 9 – REFERENCES

3. What – Levels of Service

Levels of Service (LoS) Help to Identify the Right Response at the Right Time within Each Watershed



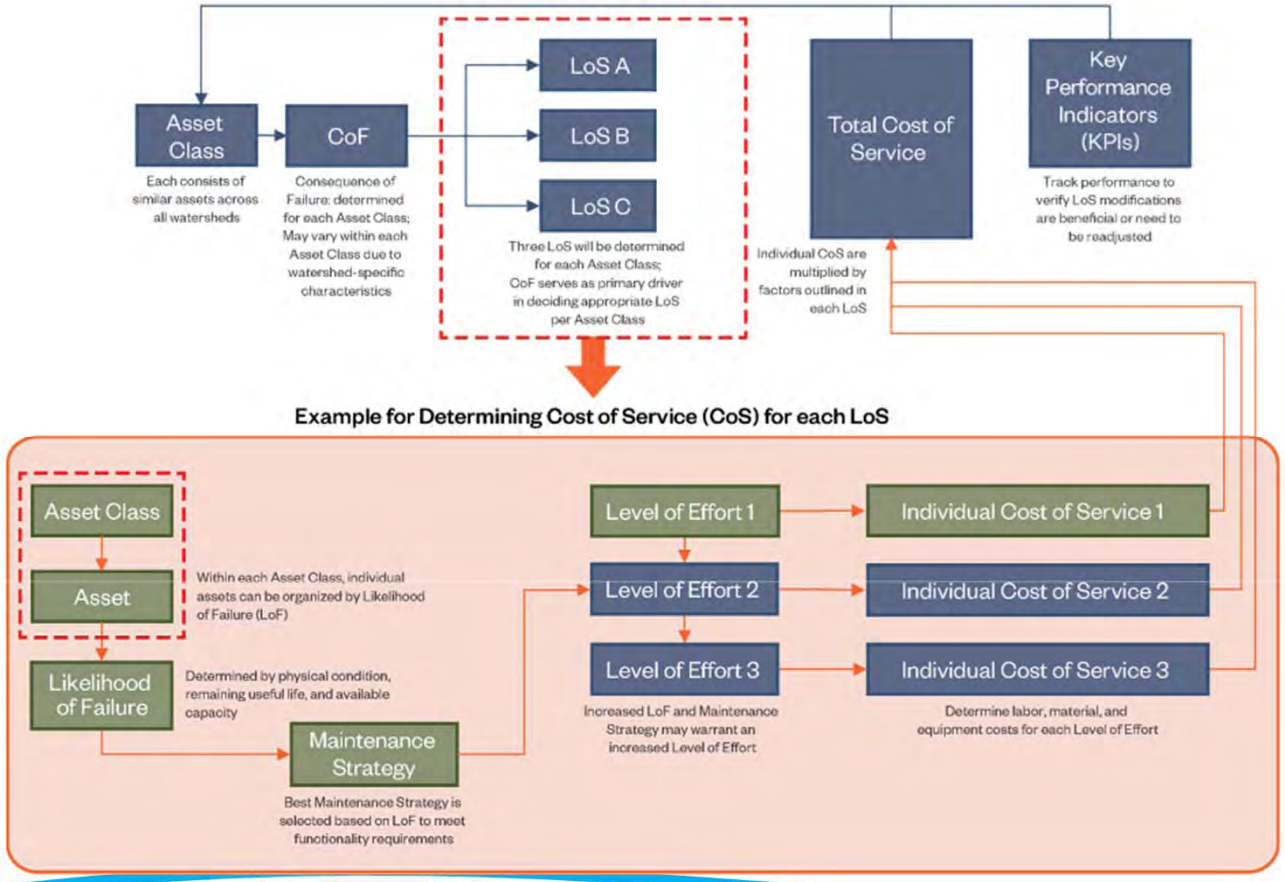
WAMP Fig. 7.6, Page 7-9

Lower Cost of Operating & Maintaining Assets through:

- Most Efficient to Respond to or Maintain Assets within each Watershed
- Most Effective use of Resources to Meet Citizen Expectations
- Optimal Level of Service Performance and Standard of Care (Efficient *and* Effective) for each Watershed
- Tolerable Risk of Function Failures

Research was conducted on how other communities across the country identify and monitor stormwater LoS

Levels of Service (LoS) are an Essential Element of the WAMP Ver. 1.0



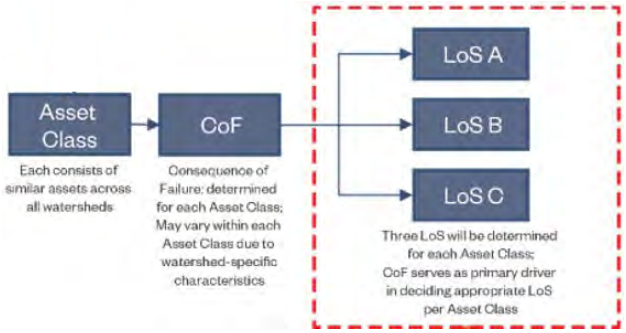
What is the demand for services by my stakeholders within each watershed?

What do regulators require?

What is the actual performance?

WAMP Fig. 4.1, Page 4-2

Reactive Level of Service (LoS): Right Level of Response, Right Time

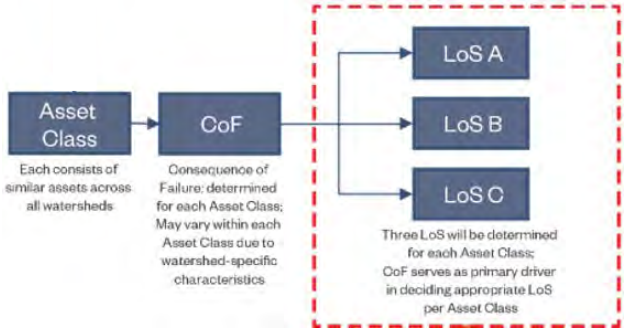


- ✓ **Correctly sets citizen expectations**
- ✓ **Establishes the appropriate level and type of response to satisfy citizen requirements**

Watershed goals can be met by focusing on the most critical stormwater infrastructure and high priority areas, while addressing environmental compliance	Watershed goals require an improved level of inspection and preventive and corrective maintenance	Watershed goals require maximum level of inspection and preventive and corrective maintenance.

Asset	LoS C	LoS B	LoS A
Control Valve	Within 24 hours	Within 8 hours	Within 2 hours
Inlet	Within 7 business days	Within 3 business days	Within 24 hours
Manhole	Within 72 hours	Within 48 hours	Within 24 hours
Gravity Main	Within 7 business Days	Within 72 hours	Within 24 hours
Pollution Control Structure	Within 72 hours	Within 48 hours	Within 24 hours
Pump Station	Within 24 hours	Within 8 hours	Within 2 hours

Proactive Level of Service (LoS): Maintain Right Asset, Right Time



- ✓ **Establishes the appropriate level and type of resources to satisfy LoS requirements**
- ✓ **Establishes most efficient utilization of resources through effective planning & scheduling**

	Watershed goals can be met by focusing on the most critical stormwater infrastructure and high priority areas, while addressing environmental compliance	Watershed goals require an improved level of inspection and preventive and corrective maintenance	Watershed goals require maximum level of inspection and preventive and corrective maintenance.
Asset	**LoS C**	**LoS B**	**LoS A**
Control Valve	Inspect & test once annually	Inspect & test twice annually	Inspect & test quarterly
Inlet	Clean annually	Clean quarterly	Clean monthly
Manhole	Clean annually	Clean quarterly	Clean monthly
Gravity Main	WS 1,2,3,4,6,7,8, & 10 annual	WS 5 Semi-annual	WS 9 Quarterly
Pollution Control Structure	Inspect annually	Inspect quarterly	Inspect monthly
Pump Station	PS #3 quarterly	PS #4&5 monthly	PS #1&2 semi-weekly

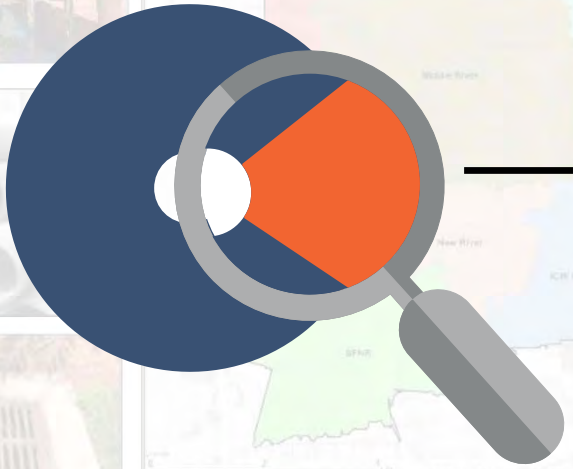
Watershed-Based Levels of Service (LoS) for each Asset Class Help to Identify the Level of Effort (and Resources) Required - *Example*

	LoS C	LoS B	LoS A
Risk Tolerance	High	Medium	Low
Percentage of Total Assets	50	30	20
Asset Class	Pollution Control Device	Manhole	Tidal Control
# Assets in Class	76	1,192	150
Proactive Inspection Frequency	Annual	Quarterly	Monthly
Duration/Inspection	0.5 Hours	1 Hour	2 Hours
Inspections/Year	1	4	12
Cost/Inspection (assuming avg. labor rate/hour = $30)	$15	$30	$60
Total Cost per Year	**$15**	**$120**	**$720**

3. What – Risk-Based Condition Assessment

Focusing on the most critical assets will solve major problems first

Overall City Assets



Focus on Critical Assets First

Prioritized Capital and Maintenance Activities to Maximize Return on Investment

Consequence of Failure (CoF) Determines an Asset's Failure Impacts and is Used to Prioritize Capital and O&M Planning

CR	FAILURE IMPACT	DESCRIPTION	INSPECTION FREQ.
1	FAILURE LEAST DISRUPTIVE	DRAINAGE TO PARKS AND OPEN SPACES	AS NEEDED
2	LOW DISRUPTION	LOCAL ROADS, SMALL PIPES	15-20 YRS
3	MODERATE DISRUPTION	MEDIUM SIZE PIPES, COLLECTOR ROADS	10-15 YRS
4	SIGNIFICANT DISRUPTION	LARGE PIPES, ARTERIAL ROADS, COMMERCIAL PROP.	5-10 YRS
5	FAILURE MOST DISRUPTIVE	LARGEST PIPES, MAJOR CORRIDORS & PUMP STATION	1-5 YRS

WAMP Table 2.8, Page 2-5

Likelihood of Failure (LoF) Determines an Asset's Existing Condition and Remaining Useful Life (RUL)

GRADE	CONDITION	RESPONSE	RUL
0	NOT RATED	ABANDONED	N/A
1	VERY GOOD	NO IMMEDIATE	60-100%
2	GOOD	CLEANING	35-60%
3	FAIR	ADDRESS DEFECTS	20-35%
4	POOR	REHAB OR RENEWAL	10-20%
5	VERY POOR	RENEWAL / REPLACE	0-10%

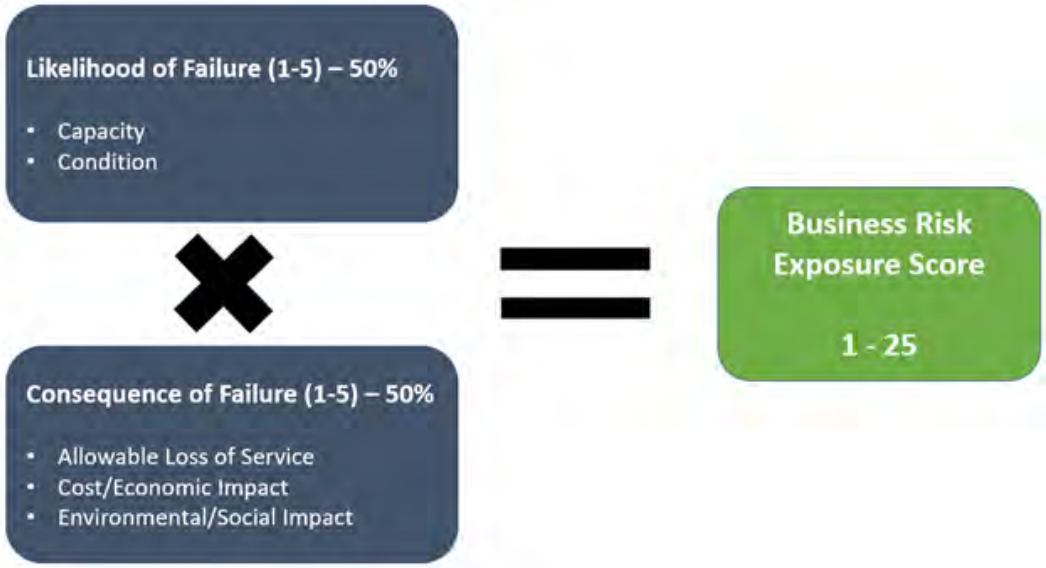
WAMP Table 2.5, Page 2-1

NASSCO
NATIONAL ASSOCIATION OF SEWER SERVICE COMPANIES

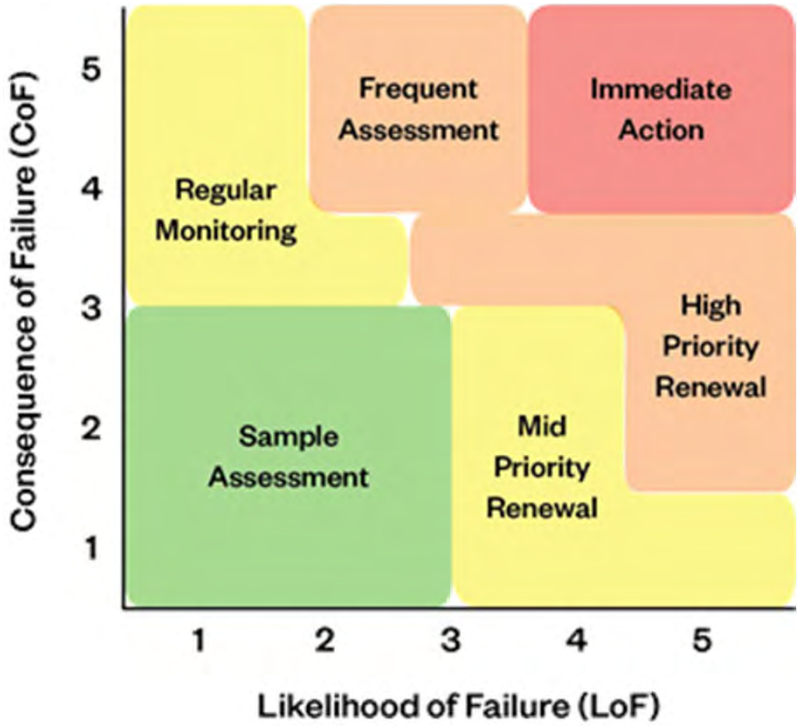
NASSCO · PIPELINE ASSESSMENT CERTIFICATION PROGRAM · PACP

Risk Assessment Drives Work Prioritization and Planning Efforts

BRE = LoF x CoF



WAMP Fig. 2.6, Page 2-16

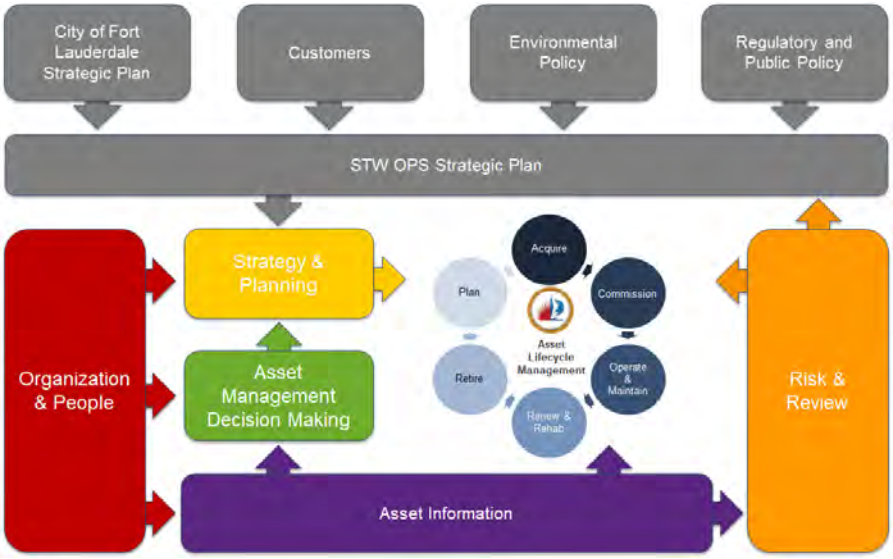


WAMP Fig. 2.5, Page 2-15

4. Who – Roles, Responsibilities, Recommendations

The IAM Conceptual Model Maturity Assessment Identified Several Immediate-Term Recommendations/Responsibilities

WAMP Fig. ES.1, Page ES-2



No.	Key Immediate Term Recommendations	Responsibility
1	Develop organization-wide Asset Management Policy statement	Executive Leadership, Asset Management
2	Establish capital prioritization and formalized business case evaluation methodology	Financial Services and Stormwater Adaptation & Design
3	Implement "Identify-Plan-Schedule-Execute-Close-Analyze" (IPSECA) Process for O&M	Stormwater Operations
4	Implement problem, cause, remedy codes into Cityworks	IT/GIS and Stormwater Operations
5	Track equipment use and associated costs by Work Order	Stormwater Operations
6	Develop and implement an asset onboarding workflow	Asset Management, IT/GIS
7	Formalize process and workflow for requirements analysis, design and evaluation of asset systems and components	Stormwater Adaptation and Design
8	Determine and implement schedule for attribute update, including using Cityworks/GIS to edit attributes	IT/GIS
9	Formalize procedures for engineering principles throughout life cycle to ensure asset performance	Stormwater Adaptation and Design, Stormwater Operations
10	Standardize asset and equipment inspection forms with drop-down menus identifying required information prior to closing out work orders	Asset Management, Stormwater Operations
11	Leverage Cityworks in field (tablet mode) for data collection	IT/GIS, Stormwater Operations, Asse Management
12	Develop, align and assign roles and responsibilities to fully support a formalized asset management program	Executive Leadership, Asset Management
12	Implement triple bottom line (TBL) elements (financial, social, and environmental) into formalized Business Risk Exposure tool	Financial Services and Stormwater Adaptation & Design
13	Establish AM Program Levels of Service	Executive Leadership, Asset Management, Stormwater Operations
14	Identify Effective Useful Life for all asset classes	Asset Management, Stormwater Adaptation & Design, Stormwater Operations

Each Operating Group within Public Works Has a Role to Ensure the Successful Implementation of the WAMP

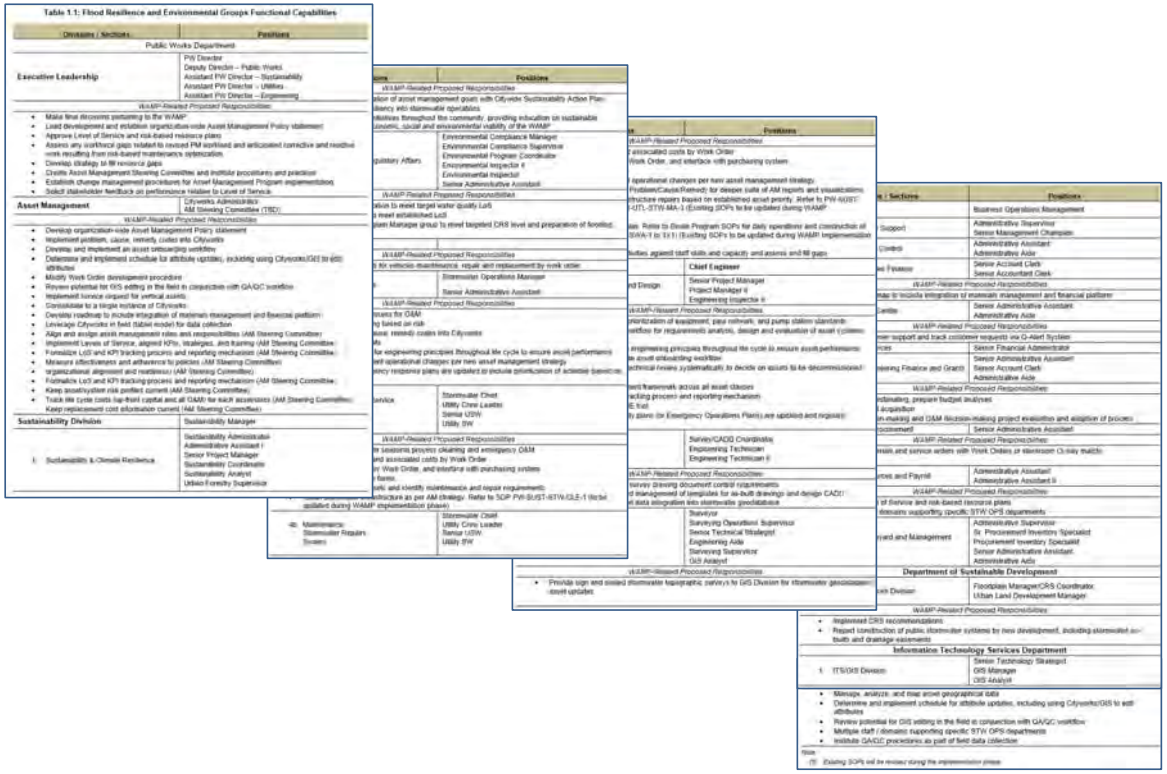
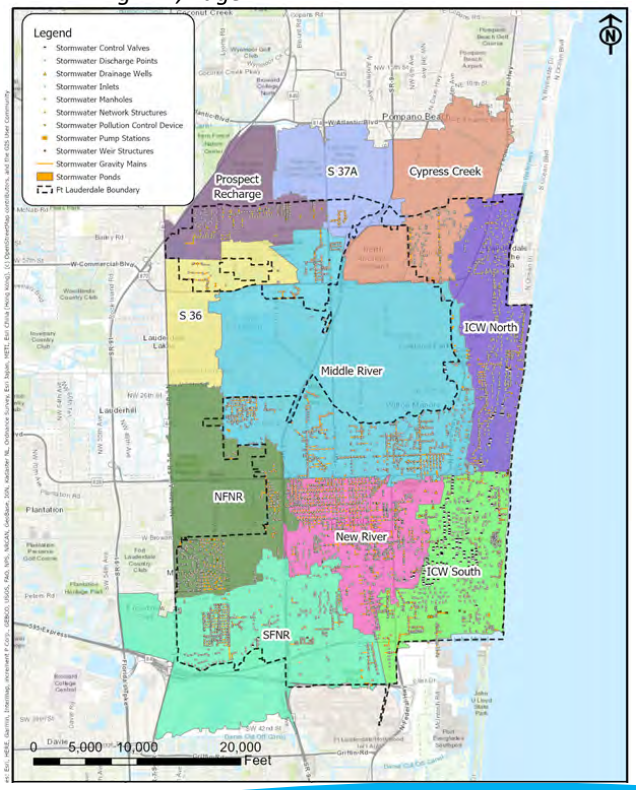


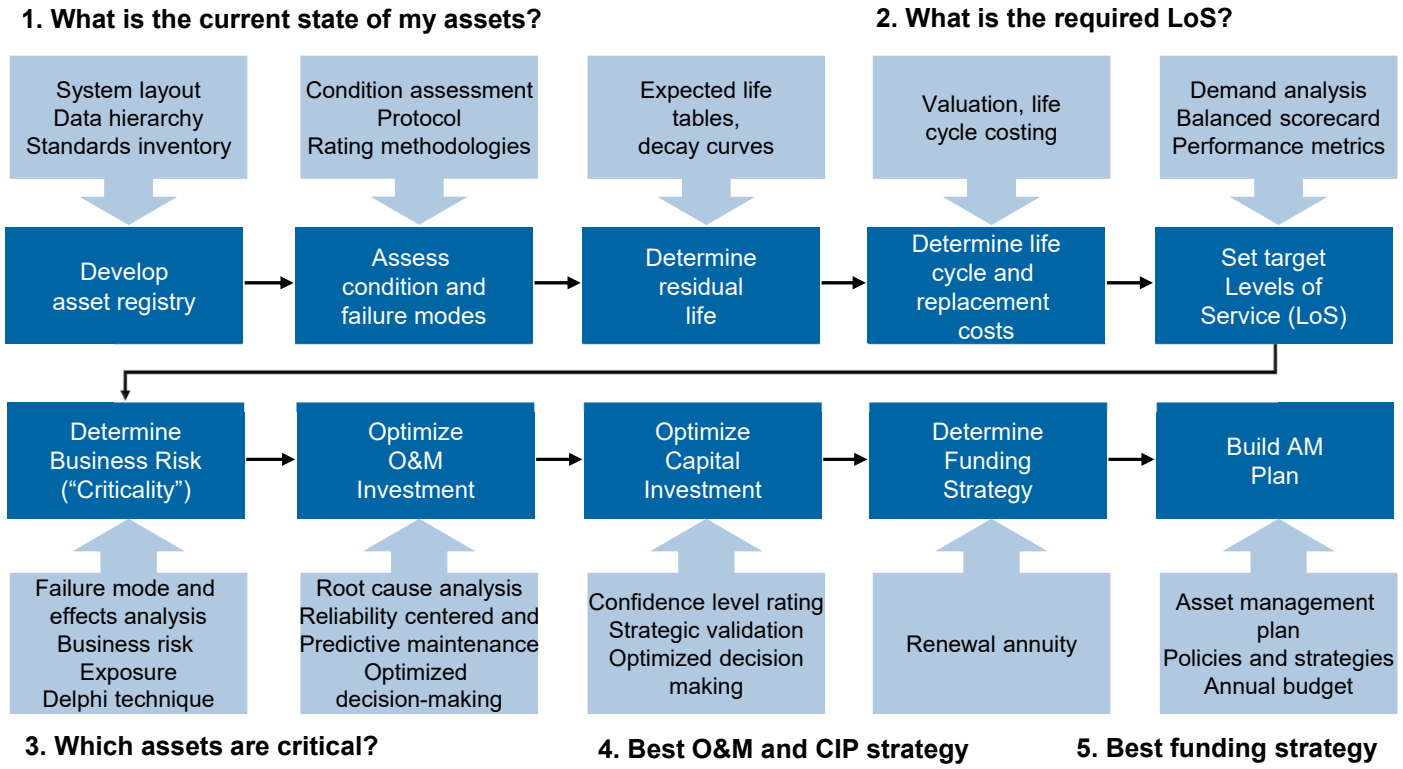
Table 1.1: Flood Resilience and Environmental Groups Functional Capabilities

WAMP Pages 1-6 through 1-10

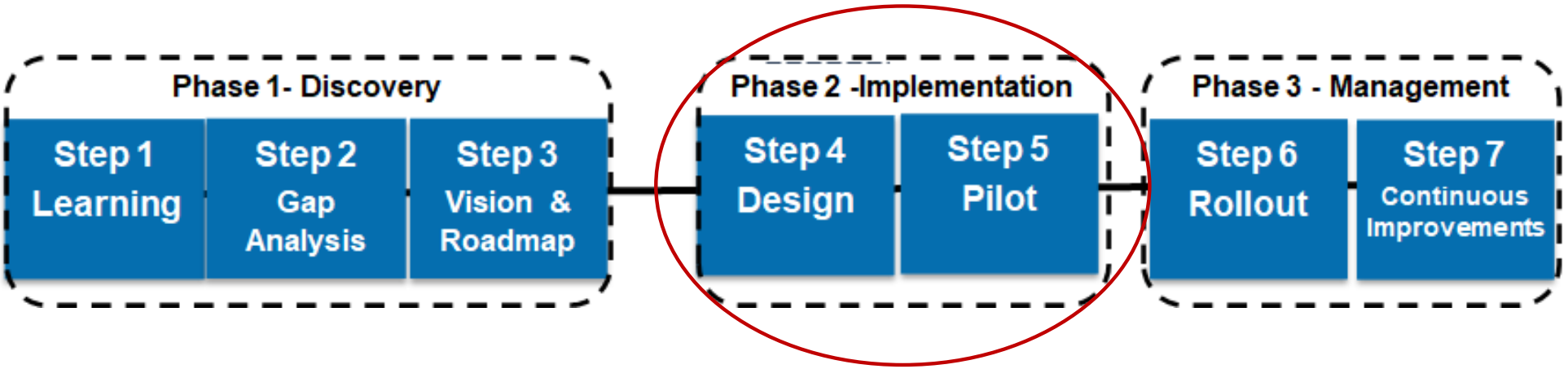
The IAM Conceptual Model Maturity Assessment and the WAMP Ver. 1.0 are Supported by the USEPA Model for Implementation

WAMP Fig. 2.1, Page 2-4





With the Completion of the Vision, Implementation Roadmap, and WAMP Ver. 1.0, the City is Prepared for Phase 2 - Implementation



- ✓ WAMP helps the City to meet its Press Play Strategic 2024 Plan Goals
- ✓ WAMP serves to achieve the Division's Flood Resilience & Environmental Vision, Mission, and Goals
- ✓ WAMP helps to build up the City's resilience
- ✓ WAMP helps to combat climate change
- ✓ WAMP serves to prioritize stormwater work

WAMP Presentation Recap

- Presented the WAMP basics (AM Framework & AM Standards)
- Presented how the WAMP was funded through a STW OPS budget modification
- Presented the WAMP Levels of Service & Asset Risk Assessment
- Previewed a suggested WAMP Roadmap for Implementation

Questions?

Thank You!