WATERSHED ASSET MANAGEMENT PLAN (WAMP)

PUBLIC WORKS DEPARTMENT
SUSTAINABILITY DIVISION
STORMWATER & ENVIRONMENTAL SERVICES

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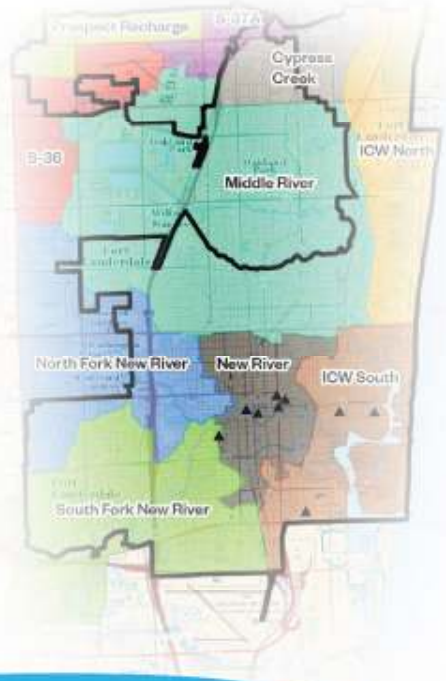

ASSET MANAGEMENT

VALUE ALIGNMENT LEADERSHIP ASSURANCE

CONTROL VERSION TABLE	
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Table of Contents

Glossary of Terms xx

Acknowledgements xxii

Executive Summary ES-1

ES-1 Overview ES-1
ES-2 City Overview, Watersheds and the Overall Stormwater System ES-3
ES-3 Risk Management ES-7
ES-4 Operations Maintenance and Replacement Strategies ES-8
ES-5 City Flood Protection and Community Investment Plan ES-8
ES-6 Standard of Care, Level of Service (LoS) and Key Performance Indicators (KPIs) ES-9
ES-7 How Much Will the WAMP Cost? ES-12
ES-8 How Can the City Pay for the WAMP? ES-14
ES-9 Recommendations for Continuous WAMP Improvements ES-15

SECTION 1 – INTRODUCTION 1-1

1.1 Purpose and Intent 1-1
1.2 Plan Development Approach 1-1
1.3 Asset Management Plan Implementation Process 1-2
1.4 Plan Relation with other City Strategic Master Plans 1-3
1.5 Suggested use of this Plan 1-5
1.6 Asset Management Plan Updates 1-5
1.7 City of Fort Lauderdale Organizational Capabilities and Responsibilities 1-5
1.7.1 City Flood Resilience and Environmental Vision, Mission and Goals 1-10
1.7.1.1 Community Rating System (CRS) 1-11
1.7.1.2 NPDES and Water Quality 1-13
1.7.2 Public Works Department 1-15
1.7.2.1 Engineering Division 1-15
1.7.2.2 Sustainability Division 1-15
1.7.2.3 Strategic Support 1-16
1.7.3 Department of Sustainable Development 1-17
1.7.3.1 Building Services Division - Floodplain Management and Community Rating System (CRS) 1-17

1.8 City Watersheds and Stormwater System 1-17
1.8.1 City's Stormwater System 1-17
1.8.2 City's Primary Watersheds 1-18
1.8.3 Watershed Impacts 1-21
1.8.3.1 Climate Change Impacts: Sea Level Rise and Extreme Rainfalls 1-21
1.8.3.2 High Tides Impacts 1-22
1.8.3.3 Development Projections and Impacts 1-22
1.8.4 Stormwater Master Plan Watershed Modeling 1-23

SECTION 2 – OVERALL STORMWATER SYSTEM 2-1
2.1 What Assets does the City Own/Manage? 2-1
2.1.1 Asset Summary 2-1
2.1.1.1 Hard Assets 2-1
2.1.1.2 Soft Assets 2-5
2.1.1.3 Natural Assets 2-8
2.1.2 Asset Ownership, Asset Inventory, and Data Source 2-9
2.2 What is the Condition and Performance of the Assets? 2-9
2.2.1 Condition Assessment Methodology 2-10
2.2.1.1 Useful Life 2-2
2.2.1.2 Replacement Cost 2-3
2.2.1.3 Proposed Condition Assessment Framework 2-3
2.3 What is the Criticality of the Assets? 2-4
2.3.1 Pipe Assets 2-6
2.3.1.1 Pipe Criticality 2-6
2.3.1.2 Pipe Asset Criticality Scoring 2-8
2.3.2 Non-Pipe Assets 2-9
2.3.2.1 Non-Pipe Criticality 2-9
2.3.2.2 Non-Pipe Asset Criticality Scoring 2-11
2.3.3 Soft Asset Criticality 2-12
2.4 What is the Overall Stormwater System Risk? 2-14
2.4.1 Risk-Based Asset Management 2-15
2.4.2 Operations, Maintenance and Replacement Strategies 2-17
2.4.3 Operation and Maintenance Strategies 2-18
2.4.4 Renewal Strategies 2-20
2.4.5 Disposal Strategies 2-31

2.4.6 Expansion Strategies 2-32
2.4.7 Non-Asset Solutions 2-33
2.4.8 Risks Associated with the Asset Strategies 2-33
2.4.9 Procurement Methods 2-33

SECTION 3 – CITY FLOOD PROTECTION AND COMMUNITY INVESTMENT PLAN 3-1
3.1 City Roadway Flood Protection Criteria 3-1
3.1.1 Roadway Asset Evaluation Criteria 3-2
3.1.2 Potential Roadway Capital Projects 3-3
3.1.3 Considerations for City Roadways Resiliency Planning 3-3
3.2 Stormwater Master Plan Modeling and Design Implementation Program 3-4
3.2.1 Phase I 3-4
3.2.2 Phase II – Seven Priority Neighborhoods 3-4
3.2.2.1 Dorsey Riverbend 3-6
3.2.2.2 Durrs 3-6
3.2.2.3 Edgewood 3-7
3.2.2.4 Progresso 3-7
3.2.2.5 River Oaks 3-7
3.2.2.6 Southeast Isles 3-8
3.2.2.7 Victoria Park 3-10
3.2.3 Phase III 3-10

SECTION 4 – STANDARD OF CARE, LEVEL OF SERVICE (LoS) AND KEY PERFORMANCE INDICATORS (KPIs) 4-1
4.1 Asset Classes 4-1
4.2 Level of Service Overview 4-1
4.2.1 Reactive **LoS** 4-2
4.2.2 Proactive **LoS** 4-2
4.3 LoS and KPIs 4-3
4.4 Proposed LoS and KPIs 4-4
4.5 Proposed LoS Framework 4-5
4.5.1 Asset-Imposed Risk 4-5
4.5.1.1 Consequence of Failure 4-5
4.5.1.2 Likelihood of Failure 4-5
4.5.2 Maintenance Strategies 4-6

4.5.2.1 Low CoF Maintenance Strategies 4-6
4.5.2.2 Moderate CoF Maintenance Strategies 4-6
4.5.2.3 High CoF Maintenane Strategies 4-7
4.5.3 Functional Requirements and Level of Effort 4-7
4.5.4 Reactive and Proactive LoS 4-8

SECTION 5 – ASSET INVENTORY UPDATING PROCEDURES 5-1
5.1 Asset Inventory Access 5-1
5.2 Existing Assets Updates 5-2
5.2.1 Updates to Existing Assets Included in the Existing Stormwater Geodatabase 5-2
5.2.1.1 PWD Signed and Sealed Surveys and As-built Drawings Workflow – In-house Work / Projects 5-3
5.2.1.2 PWD Signed and Sealed Surveys and As-built Drawings Workflow – Contracted Projects 5-5
5.2.2 Updates to Existing Assets not included in the Existing Stormwater Geodatabase and GIS Schema Development 5-7
5.3 New Assets Inventory 5-7
5.3.1 City Projects 5-7
5.3.2 Private Development Projects Transferred to the City 5-7
5.3.3 Public Assets Transferred Across Jurisdictions 5-7

SECTION 6 – HOW MUCH WILL THE WAMP COST? 6-1
6.1 Budgetary Forecast of WAMP Level of Effort and Savings Impact on Stormwater Operations Fund, Fiscal Years 2019 through 2023 6-1
6.2 Forecasted Operations and Maintenance Expenses 6-1
6.3 Forecasted Capital Renewal and Replacement Costs 6-3
6.4 Estimated Impact of SWMP Assets on Forecasted Operations and Maintenance Costs 6-4
6.4.1 New Assets 6-4
6.4.2 New Pipe and Exfiltration Trenches 6-4
6.4.3 New Pump Stations 6-4
6.5 Forecasted WAMP Investment Costs 6-5
6.5.1 Forecasted Consultant Costs 6-5
6.5.2 Forecasted STW OPS Internal Costs 6-5
6.6 Forecasted WAMP Savings 6-6

SECTION 7 – HOW CAN THE CITY PAY FOR IT? 7-1
7.1 Funding Strategies 7-1
7.2 Historical Funding Levels and Cycles 7-3

7.3 Potential Funding Sources 7-4
7.3.1 Grant Funding Plan 7-5
7.3.2 Grants Process Alignment to WAMP 7-7
7.4 Budget Scenarios 7-8
7.4.1 Proactive Versus Reactive O&M Costs 7-8
7.4.2 Five Year Operations Budget Estimate 7-9
7.4.3 Current Budget and Baseline Level of Service 7-10
7.4.4 Budget Example for LoS A, B, C 7-10
7.5 WAMP Financial Summary 7-11

SECTION 8 – WATERSHEDS 8-1
8.1 CYPRESS CREEK 8-1
8.1.1 Asset Summary 8-3
8.1.1.1 Hard Assets 8-3
8.1.1.2 Soft Assets 8-5
8.1.1.3 Natural Assets 8-7
8.1.2 Watershed Challenges 8-8
8.1.2.1 Identification and Prioritization of Challenges 8-8
8.1.3 Asset Ownership and Inventory 8-8
8.1.4 What is the Condition and Performance of the Assets? 8-9
8.1.4.1 Proposed Condition Assessment Plan 8-9
8.1.5 What is the Criticality of the Assets? 8-10
8.1.6 What is the Risk of the Assets? 8-12
8.1.7 Operations, Maintenance and Replacement Strategies 8-14
8.2 FORT LAUDERDALE EXECUTIVE AIRPORT (S 36) 8-16
8.2.1 Asset Summary 8-16
8.2.1.1 Hard Assets 8-18
8.2.1.2 Soft Assets 8-20
8.2.1.3 Natural Assets 8-22
8.2.2 Watershed Challenges 8-24
8.2.2.1 Identification and Prioritization of Challenges 8-24
8.2.3 Asset Ownership and Inventory 8-25
8.2.4 What is the Condition and Performance of the Assets? 8-25
8.2.4.1 Proposed Condition Assessment Plan 8-25
8.2.5 What is the Criticality of the Assets? 8-26

8.2.6 What is the Risk of the Assets? 8-28
8.2.7 Operations, Maintenance and Replacement Strategies 8-30
8.3 INTRACOASTAL WATERWAY (ICW) NORTH 8-30
8.3.1 Asset Summary 8-32
8.3.1.1 Hard Assets 8-32
8.3.1.2 Soft Assets 8-34
8.3.2 Watershed Challenges 8-38
8.3.2.1 Identification and Prioritization of Challenges 8-38
8.3.3 Asset Ownership and Inventory 8-39
8.3.4 What is the Condition and Performance of the Assets? 8-39
8.3.4.1 Proposed Condition Assessment Plan 8-39
8.3.5 What is the Criticality of the Assets? 8-40
8.3.6 What is the Risk of the Assets? 8-42
8.3.7 Operations, Maintenance and Replacement Strategies 8-44
8.4 INTRACOASTAL WATERWAY (ICW) SOUTH 8-46
8.4.1 Asset Summary 8-48
8.4.1.1 Hard Assets 8-48
8.4.1.2 Soft Assets 8-50
8.4.1.3 Natural Assets 8-52
8.4.2 Watershed Challenges 8-54
8.4.2.1 Identification and Prioritization of Challenges 8-58
8.4.3 Asset Ownership and Inventory 8-58
8.4.4 What is the Condition and Performance of the Assets? 8-58
8.4.4.1 Proposed Condition Assessment Plan 8-58
8.4.5 What is the Criticality of the Assets? 8-59
8.4.6 What is the Risk of the Assets? 8-61
8.4.7 Operations, Maintenance and Replacement Strategies 8-65
8.5 MIDDLE RIVER 8-64
8.5.1 Asset Summary 8-66
8.5.1.1 Hard Assets 8-66
8.5.1.2 Soft Assets 8-68
8.5.1.3 Natural Assets 8-70
8.5.2 Watershed Challenges 8-73
8.5.2.1 Identification and Prioritization of Challenges 8-73
8.5.3 Asset Ownership and Inventory 8-74

8.5.4 What is the Condition and Performance of the Assets? 8-74
8.5.4.1 Proposed Condition Assessment Plan 8-74
8.5.5 What is the Criticality of the Assets? 8-75
8.5.6 What is the Risk of the Assets? 8-77
8.5.7 Operations, Maintenance and Replacement Strategies 8-79
8.6 NEW RIVER 8-78
8.6.1 Asset Summary 8-81
8.6.1.1 Hard Assets 8-81
8.6.1.2 Soft Assets 8-83
8.6.1.3 Natural Assets 8-85
8.6.2 Watershed Challenges 8-87
8.6.2.1 Identification and Prioritization of Challenges 8-88
8.6.3 Asset Ownership and Inventory 8-88
8.6.4 What is the Condition and Performance of the Assets? 8-89
8.6.4.1 Proposed Condition Assessment Plan 8-89
8.6.5 What is the Criticality of the Assets? 8-89
8.6.6 What is the Risk of the Assets? 8-92
8.6.7 Operations, Maintenance and Replacement Strategies 8-95
8.7 NORTH FORK NEW RIVER (NFNR) 8-93
8.7.1 Asset Summary 8-95
8.7.1.1 Hard Assets 8-95
8.7.1.2 Soft Assets 8-97
8.7.1.3 Natural Assets 8-99
8.7.2 Watershed Challenges 8-101
8.7.3 Asset Ownership and Inventory 8-102
8.7.4 What is the Condition and Performance of the Assets? 8-102
8.7.4.1 Proposed Condition Assessment Plan 8-102
8.7.5 What is the Criticality of the Assets? 8-103
8.7.6 What is the Risk of the Assets? 8-105
8.7.7 Operations, Maintenance and Replacement Strategies 8-109
8.8 PROSPECT RECHARGE 8-111
8.8.1 Asset Summary 8-113
8.8.1.1 Hard Assets 8-113
8.8.1.2 Soft Assets 8-115
8.8.1.3 Natural Assets 8-117

8.8.2 Watershed Challenges 8-119
8.8.2.1 Identification and Prioritization of Challenges 8-119
8.8.3 Asset Ownership and Inventory 8-119
8.8.4 What is the Condition and Performance of the Assets? 8-120
8.8.4.1 Proposed Condition Assessment Plan 8-120
8.8.5 What is the Criticality of the Assets? 8-121
8.8.6 What is the Risk of the Assets? 8-123
8.8.7 Operations, Maintenance and Replacement Strategies 8-127
8.9 SOUTH FORK NEW RIVER (SFNR) 8-129
8.9.1 Asset Summary 8-131
8.9.1.1 Hard Assets 8-131
8.9.1.2 Soft Assets 8-133
8.9.1.3 Natural Assets 8-135
8.9.2 Watershed Challenges 8-137
8.9.3 Asset Ownership and Inventory 8-138
8.9.4 What is the Condition and Performance of the Assets? 8-138
8.9.4.1 Proposed Condition Assessment Plan 8-138
8.9.5 What is the Criticality of the Assets? 8-139
8.9.6 What is the Risk of the Assets? 8-141
8.9.7 Operations, Maintenance and Replacement Strategies 8-144
8.10 UPTOWN S 37A 8-145
8.10.1 Asset Summary 8-147
8.10.1.1 Hard Assets 8-147
8.10.1.2 Soft Assets 8-149
8.10.1.3 Natural Assets 8-151
8.10.2 Watershed Challenges 8-153
8.10.2.1 Identification and Prioritization of Challenges 8-153
8.10.3 Asset Ownership and Inventory 8-153
8.10.4 What is the Condition and Performance of the Assets? 8-154
8.10.4.1 Proposed Condition Assessment Plan 8-154
8.10.5 What is the Criticality of the Assets? 8-155
8.10.6 What is the Risk of the Assets? 8-157
8.10.7 Operations, Maintenance and Replacement Strategies 8-160

SECTION 9 – References 9-1

List of Tables

Table A.1: City of Fort Lauderdale Staff Members xxii
Table ES.1: Watershed Hard Asset Identification ES-5
Table ES.2: Priority Neighborhoods and Corresponding Watersheds ES-9
Table ES.3: City of Fort Lauderdale Baseline LoS P ES-9
Table ES.4: Discharge Point/Outfall LoS - Example ES-11
Table ES.5: Suggested WAMP and AMP Review Periods ES-16
Table 1.1: Flood Resilience and Environmental Groups Functional Capabilities 1-6
Table 1.2: Total Maximum Daily Loads (TMDL) – DEP Adopted (EPA Approved) and EPA Established 1-14
Table 1.3: Summary of Existing Feature Classes and Number of Features per Feature Class (2019 Stormwater Geodatabase) 1-18
Table 1.4: Watershed Hard Asset Identification 1-20
Table 1.5: Number of Associations and Adjacent Cities for Each Watershed 1-20
Table 2.1: Number of Hard Assets per Asset Class (2019) 2-2
Table 2.2: Soft Asset Example – City Health and Safety Policy (Tangible) 2-5
Table 2.3: Soft Assets 2-5
Table 2.4: Summary of Hard Asset Ownership (2019 Stormwater Geodatabase) 2-9
Table 2.5: Condition Assessment Scoring Guide 2-1
Table 2.6: Example Service Life Scores 2-3
Table 2.7: Capacity Condition Assessment Scoring Guide 2-4
Table 2.8: Summary IIMM Criticality Ratings 2-5
Table 2.9: Asset Classes and CoF Score (Example) 2-5
Table 2.10: CoF Score Criteria for Cost and Social Impacts – Pipes (Example) 2-6
Table 2.11: Social Factor Criteria Scores – Pipes (Example) 2-7
Table 2.12: Cost Factor Criteria Score Summary – Pipes (Example) 2-7
Table 2.13: Cost and Weights – Pipes (Example) 2-8
Table 2.14: Social Impact Criteria and Weights (Example) 2-8
Table 2.15: CoF Score Criteria for Cost and Social Impacts – Non-Pipe Assets (Example) 2-9
Table 2.16: CoF Score Criteria for Social Impacts – Non-Pipes (Example) 2-9
Table 2.17: CoF Score Criteria for Cost Impacts – Non-Pipe Assets (Example) 2-10
Table 2.18: Cost Criteria and Weights – Non-Pipe Assets (Example) 2-11
Table 2.19: Soft Asset Example – City Health and Safety Policy (Tangible) 2-12
Table 2.20: Soft Asset Scoring Consequence of Failure (CoF) Example 2-12
Table 2-21: Soft Assets Criticality 2-13

Table 2.22: Risk Color Scheme 2-16
Table 2.23: Example of an Approach to Determine Operations & Maintenance and Renewal Strategies (Linear Stormwater System) 2-27
Table 2.24: Example of an Approach to Determine Operations & Maintenance and Renewal Strategies (Stormwater Ponds) 2-27
Table 2.25: Stormwater Pond Component Inspection Rating Scale (Example) 2-31
Table 2.26: Population Forecasts and Population Growth Rate for City of Fort Lauderdale 2-32
Table 3.1: Priority Neighborhoods and Corresponding Watersheds 3-4
Table 3.2: Seawalls to be Raised within Southeast Isles 3-9
Table 3.3: Cordova Road and Isle of Palm Drive Seawalls 3-10
Table 4.1: City of Fort Lauderdale Example LoS 4-3
Table 4.2: Asset Classes of Low CoF (Example) 4-6
Table 4.3: Asset Classes of Moderate CoF (Example) 4-7
Table 4.4: Asset Classes of High CoF (Example) 4-7
Table 4.5: Discharge Point/Outfall LoS - Example 4-9
Table 6.1: LOE for WAMP, Forecasted WAMP Savings and Stormwater Operations Fund Budget Estimate Fiscal Years 2019 through 2023 6-2
Table 6.2: New (SWMP) Assets Impact on Future Operational and Maintenance Costs 6-4
Table 6.3: Estimated WAMP Savings as Percent of Forecasted Stormwater Operations Fund Budget, Fiscal Years 2019 through 2023 6-6
Table 7.1: Stormwater Fee Increase 7-2
Table 7.2: Project Scoring Worksheet 7-8
Table 7.3: LoS Comparative Analysis 7-11
Table 8.1: Summary of Hard Assets in Cypress Creek Watershed (2019 Stormwater Geodatabase) 8-3
Table 8.2: Cypress Creek Watershed Challenges and Solutions 8-8
Table 8.3: Asset Inventory and Ownership in Cypress Creek Watershed (2019 Stormwater Geodatabase) 8-9
Table 8.4: CoF Scores by Asset Class (Example) 8-10
Table 8.5: Cypress Creek Watershed COF (Example) 8-12
Table 8.6: Cypress Creek Assets Maintenance Strategy (Example) 8-15
Table 8.7: Summary of Hard Assets in S 36 South Watershed (2019 Stormwater Geodatabase) 8-18
Table 8.8: Middle River Watershed Challenges and Solutions 8-24
Table 8.9: Asset Inventory and Ownership in Fort Lauderdale Executive Airport (S 36) Watershed (2019 Stormwater Geodatabase) 8-25
Table 8.10: CoF Scores by Asset Class (Example) 8-26
Table 8.11: S 36 Watershed CoF (Example) 8-28

Table 8.12: S 36 Assets Maintenance Strategy....8-31
Table 8.13: Summary of Hard Assets in ICW North Watershed (2019 Stormwater Geodatabase)....8-32
Table 8.14: ICW North Watershed Challenges and Solutions....8-38
Table 8.15: Asset Inventory and Ownership in ICW North Watershed (2019 Stormwater Geodatabase)....8-39
Table 8.16: CoF Scores by Asset Class (Example)....8-40
Table 8.17: ICW North Watershed CoF (Example)....8-42
Table 8.18: ICW North Assets Maintenance Strategy....8-45
Table 8.19: Summary of Hard Assets in Intracoastal Waterway (ICW) South Watershed (2019 Stormwater Geodatabase)....8-48
Table 8.20: ICW South Watershed Challenges and Solutions....8-55
Table 8.21: Asset Inventory and Ownership in Intracoastal Waterway (ICW) South Watershed (2019 Stormwater Geodatabase)....8-58
Table 8.22: CoF Scores by Asset Class (Example)....8-59
Table 8.23: ICW South Watershed CoF (Example)....8-61
Table 8.24: ICW South Assets Maintenance Strategy....8-66
Table 8.25: Summary of Hard Assets in Middle River Watershed (2019 Stormwater Geodatabase)....8-66
Table 8.26: Middle River Watershed Challenges and Solutions....8-73
Table 8.27: Asset Inventory and Ownership in Middle River Watershed (2019 Stormwater Geodatabase)....8-74
Table 8.28: CoF Scores by Asset Class (Example)....8-75
Table 8.29: Middle River Watershed CoF (Example)....8-77
Table 8.30: Middle River Assets Maintenance Strategy....8-80
Table 8.31: Summary of Hard Assets in New River Watershed (2019 Stormwater Geodatabase)....8-81
Table 8.32: New River Watershed Challenges and Solutions....8-87
Table 8.33: Asset Inventory and Ownership in New River Watershed (2019 Stormwater Geodatabase)....8-88
Table 8.34: CoF Scores by Asset Class (Example)....8-89
Table 8.35: New River Watershed CoF (Example)....8-92
Table 8.36: New River Assets Maintenance Strategy....8-96
Table 8.37: Summary of Hard Assets in North Fork New River (NFNR) Watershed (2019 Stormwater Geodatabase)....8-95
Table 8.38: NFNR Watershed Challenges and Solutions....8-101
Table 8.39: Asset Inventory and Ownership in NFNR Watershed (2019 Stormwater Geodatabase)....8-102
Table 8.40: CoF Scores by Asset Class (Example)....8-103
Table 8.41 NFNR Watershed CoF (Example)....8-105

Table 8.42: NFNR Assets Maintenance Strategy 8-110
Table 8.43: Summary of Hard Assets in Prospect Recharge Watershed (2019 Stormwater Geodatabase) 8-113
Table 8.44: Prospect Recharge Watershed Challenges and Solutions 8-119
Table 8.45 Asset Inventory and Ownership in Prospect Recharge Watershed (2019 Stormwater Geodatabase) 8-120
Table 8.46: CoF Scores by Asset Class (Example) 8-121
Table 8.47: Prospect Ridge Watershed CoF (Example) 8-123
Table 8.48: Prospect Recharge Assets Maintenance Strategy 8-128
Table 8.49: Summary of Hard Assets in South Fork New River (SFNR) Watershed (2019 Stormwater Geodatabase) 8-131
Table 8.50: SFNR Watershed Challenges and Solutions 8-137
Table 8.51: Asset Inventory and Ownership in South Fork New River (SFNR) Watershed (2019 Stormwater Geodatabase) 8-138
Table 8.52: CoF Scores by Asset Class (Example) 8-139
Table 8.53: SFNR Watershed CoF (Example) 8-141
Table 8.54: SFNR Assets Maintenance Strategy 8-144
Table 8.55: Summary of Hard Assets in Uptown S 37A Watershed (2019 Stormwater Geodatabase) 8-147
Table 8.56: S 37A Watershed Challenges and Solutions 8-153
Table 8.57: Asset Inventory and Ownership in Uptown S 37A Watershed (2019 Stormwater Geodatabase) 8-154
Table 8.58: CoF Scores by Asset Class (Example) 8-155
Table 8.59 S 37A Watershed CoF (Example) 8-157
Table 8.60: S 37A Assets Maintenance Strategy 8-160

List of Figures

Figure ES.1: Institute of Asset Management's Conceptual Model ES-2
Figure ES.2: Public Works Stormwater and Environmental Groups Asset Management Implementation Roadmap ES-3
Figure ES.3: City Watersheds ES-4
Figure ES.4: Stormwater Hard Assets (2019 Stormwater Geodatabase) ES-6
Figure ES.5: Typical Risk Matrix and Associated Management Approaches ES-7
Figure ES.6: LOE for WAMP, Forecasted WAMP Savings and Stormwater Operations Fund Budget Estimate Fiscal Years 2019 through 2023 ..... ES-13
Figure ES.7: Stormwater Funding Projections ES-15

Figure 1.1: Public Works Stormwater and Environmental Groups Asset Management Implementation Roadmap 1-3
Figure 1.2: Mission, Vision, and Goals 1-10
Figure 1.3: CRS Progress to Date 1-11
Figure 1.4: City of Fort Lauderdale Remaining CRS Point Opportunities Benefit Matrix (Abbreviated) 1-13
Figure 1.5: New River TMDL Implementation Schedule 1-14
Figure 1.6: City Watersheds 1-19
Figure 1.7: Unified Sea Level Rise Projection (Southeast Florida Regional Climate Change Compact, 2015) 1-21
Figure 2.1: Stormwater Hard Assets (2019 Stormwater Geodatabase) 2-4
Figure 2.2: Initial Expected Useful Life 2-2
Figure 2.3: Calculation of Remaining Useful Life 2-2
Figure 2.4: Asset Management Risk-Cost Balance 2-14
Figure 2.5: Typical Risk Matrix and Associated Management Approaches 2-15
Figure 2.6: Business Risk Exposure Score Breakdown (Example) 2-16
Figure 2.7: Risk Matrix 2-17
Figure 2.8: Conceptual Lifecycle Cost Model 2-18
Figure 2.9: Optimized Maintenance: Optimal Mix of Proactive and Reactive Work 2-19
Figure 2.10: Typical Asset Decay Curve 2-20
Figure 2.11: Example CCTV Decision-Logic Chart 2-30
Figure 2.12: Fort Lauderdale Population Projections 2-32
Figure 3.1: King Tide Flood Areas 3-1
Figure 3.2: Stormwater Master Plan – Phase II, Seven Specific Neighborhoods 3-5
Figure 4.1: Proposed LoS Framework 4-2
Figure 5.1: Overview of ArcGIS Enterprise GIS Data Flows 5-1
Figure 5.2: PWD Signed and Sealed Surveys and As-built Drawings Workflow – In-house Work / Projects 5-4
Figure 5.3: Signed and Sealed Surveys and As-built Drawings Workflow – Contracted Projects 5-6
Figure 6.1: LOE for WAMP, Forecasted WAMP Savings and Stormwater Operations Fund Budget Overview 6-2
Figure 7.1: Stormwater Funding Projections 7-3
Figure 7.2: Historical Stormwater Operations Revenues and Expenditures Fiscal Years 2014 to 2017 7-3
Figure 7.3: Historical Stormwater Operations Budget Expenditures by WAMP Budget Category 7-4
Figure 7.4: Financing Methods 7-5
Figure 7.5: Review of Project Grant or Low-Interest Loan Funding 7-6

Figure 7.6: OPEX Planning Matrix 7-9
Figure 8.1: Cypress Creek Watershed Boundary 8-1
Figure 8.2: Cypress Creek Land Use Plan 8-2
Figure 8.3: Hard Assets in Cypress Creek (2019 Stormwater Geodatabase) 8-4
Figure 8.4: Cypress Creek Watershed Neighborhood Associations 8-6
Figure 8.5: Natural Assets in Cypress Creek Watershed 8-7
Figure 8.6: Cypress Creek Watershed Data Subset Used for CoF Analysis (Example) 8-11
Figure 8.7: Cypress Creek Watershed Business Risk Exposure by Asset (Example) 8-14
Figure 8.8: S 36 Watershed Boundary 8-16
Figure 8.9: S 36 Land Use Plan 8-17
Figure 8.10: Hard Assets in S 36 Watershed (2019 Stormwater Geodatabase) 8-19
Figure 8.11: S 36 Watershed Neighborhood Associations 8-21
Figure 8.12: Natural Assets in S 36 Watershed 8-23
Figure 8.13: S 36 Watershed Data Subset Used for CoF Analysis 8-27
Figure 8.14: S 36 Watershed Business Risk Exposure by Asset (Example) 8-30
Figure 8.15: ICW North Watershed Boundary 8-30
Figure 8.16: ICW North Land Use Plan 8-31
Figure 8.17: Hard Assets in ICW North (2019 Stormwater Geodatabase) 8-33
Figure 8.18: ICW North Neighborhood Associations 8-35
Figure 8.19: Natural Assets in ICW North Watershed 8-37
Figure 8.20: ICW North Watershed Data Subset Used for CoF Analysis 8-41
Figure 8.21: ICW North Watershed Business Risk Exposure by Asset (Example) 8-44
Figure 8.22: ICW South Watershed Boundary 8-46
Figure 8.23: ICW South Land Use Plan 8-47
Figure 8.24: Hard Assets in ICW South (2019 Stormwater Geodatabase) 8-49
Figure 8.25: ICW South Neighborhood Associations 8-51
Figure 8.26: Natural Assets in ICW South Watershed 8-53
Figure 8.27: Phasing Design Approach for Tidally Influenced Locations 8-54
Figure 8.28: Flooding Locations during King Tide Events (August and September 2019) 8-57
Figure 8.29: ICW South Watershed Data Subset Used for CoF Analysis 8-60
Figure 8.30: ICW South Watershed Identification of Critical Facilities and Assets Map 8-61
Figure 8.31: ICW South Watershed Business Risk Exposure by Asset (Example) 8-65
Figure 8.32: Middle River Watershed Boundary 8-64
Figure 8.33: Middle River Land Use Plan 8-65
Figure 8.34: Hard Assets in Middle River (2019 Stormwater Geodatabase) 8-67

Figure 8.35: Middle River Neighborhood Associations 8-69
Figure 8.36: Summary of Natural Assets in Middle River Watershed 8-72
Figure 8.37: Middle River Watershed Data Subset Used for CoF Analysis 8-76
Figure 8.38: Middle River Watershed Business Risk Exposure by Asset (Example) 8-79
Figure 8.39: New River Watershed Boundary 8-78
Figure 8.40: New River Land Use Plan 8-80
Figure 8.41: Hard Assets in New River Watershed (2019 Stormwater Geodatabase) 8-82
Figure 8.42: New River Neighborhood Associations 8-84
Figure 8.43: Natural Assets in New River Watershed 8-86
Figure 8.44: New River Watershed Data Subset Used for CoF Analysis 8-91
Figure 8.45: New River Watershed Business Risk Exposure by Asset (Example) 8-95
Figure 8.46: NFNR Watershed Boundary 8-93
Figure 8.47: NFNR Land Use Plan 8-94
Figure 8.48: Hard Assets in NFNR (2019 Stormwater Geodatabase) 8-96
Figure 8.49: NFNR Neighborhood Associations 8-98
Figure 8.50: Natural Assets in NFNR Watershed 8-100
Figure 8.51: NFNR Watershed Data Subset Used for CoF Analysis 8-104
Figure 8.52: NFNR Watershed Business Risk Exposure by Asset (Example) 8-109
Figure 8.53: Prospect Recharge Watershed Boundary 8-111
Figure 8.54: Prospect Recharge Land Use Plan 8-112
Figure 8.55: Hard Assets in Prospect Recharge Watershed 8-114
Figure 8.56: Prospect Recharge Neighborhood Associations 8-116
Figure 8.57: Summary of Natural Assets in Prospect Recharge Watershed 8-118
Figure 8.58: Prospect Recharge Watershed Data Subset Used for CoF Analysis 8-122
Figure 8.59: Prospect Recharge Watershed Business Risk Exposure by Asset (Example) 8-127
Figure 8.60: SFNR Watershed Boundary 8-129
Figure 8.61: SFNR Land Use Plan 8-130
Figure 8.62: Hard Assets in SFNR 8-132
Figure 8.63: SFNR Neighborhood Associations 8-134
Figure 8.64: Summary of Natural Assets in South Fork New River (SFNR)Watershed 8-136
Figure 8.65: SFNR Watershed Data Subset Used for CoF Analysis 8-140
Figure 8.66: SFNR Watershed Business Risk Exposure by Asset (Example) 8-143
Figure 8.67: S37A Watershed Boundary 8-145
Figure 8.68: S 37A Land Use Plan 8-146
Figure 8.69: Hard Assets in S 37A Watershed (2019 Stormwater Geodatabase) 8-148

Figure 8.70: S 37A Watershed Neighborhood Associations....8-150
Figure 8.71: Summary of Natural Assets in S 37A Watershed....8-152
Figure 8.72: S 37A Watershed Data Subset Used for CoF Analysis....8-156
Figure 8.73: S 37A Watershed Business Risk Exposure by Asset (Example) 8-159

List of Appendices

Appendix A: WAMP Initiative Implementation Roadmap and Schedule

Appendix B: Public Works Organizational Chart – January 1, 2019

Appendix C: City of Fort Lauderdale TMDL Prioritization Report – June 2017

Appendix D: City of Fort Lauderdale Neighborhood Associations per Watershed

Appendix E: City of Fort Lauderdale Trainings

Appendix F: Present Level of Service (LoS P) – Citywide

Appendix G: Proposed LoS Tiers and KPIs Template

Appendix H: Stormwater Data Dictionary

Appendix I: WAMP Grant Funding Sources

List of Acronyms and Abbreviations

Abbreviation	Definition
AAA	Adaptation Action Areas
AMP	Asset Management Plans
AWWA	American Water Works Association
BMP	Best Management Practice
BRE	Business Risk Exposure
CAPEX	Capital Expenditures
CB	Catch Basin
CBM	Condition-Based Maintenance
CCTV	Closed Circuit Television
CIP	Capital Improvement Planning
CM	Corrective Maintenance
CoF	Consequence of Failure/Criticality
CoS	Cost of Service
CRS	Community Rating System
D&CM	Design & Construction Manual
EAM	Enterprise Asset Management
EUL	Expected Useful Life
FDEM	Florida Department of Emergency Management
FDEP	Florida Department of Environmental Protection
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
HOA	Homeowners Association
I&T	Inspection and Testing
IAM	Institute of Asset Management
ICW	Intracoastal Waterway
IRR	Internal Rate of Return

Abbreviation	Definition
KPI	Key Performance Indicator
LID	Low Impact Development
LoE	Level of Effort
LoF	Likelihood of Failure
LoS	Level(s) of Service
LoS P	The City's current/present Level of Service
LoS A	The City's Level of Service Tier where watershed goals require the maximum feasible level of inspection and preventive and corrective maintenance.
LoS B	The City's Level of Service Tier where watershed goals require an improved level of inspection and preventive and corrective maintenance.
LoS C	The City's Level of Service Tier where watershed goals require focusing on the most critical stormwater infrastructure, high priority areas, and addressing environmental compliance.
MH	Manhole
MHPA	Multi-Habitat Planning Area
MS4	Municipal Separate Storm Sewer System
NAVD88	North American Vertical Datum of 1988
NFIP	National Flood Insurance Program
NFNR	North Fork New River
NPDES	National Pollutant Discharge Elimination System
NOAA	National Oceanic & Atmospheric Association
O&M	Operations & Maintenance
OPEX	Operational Expenditures
PdM	Predictive Maintenance
PM	Preventative Maintenance
PWD	Public Works Department
ROI	Return on Investment
RTF	Run to Failure
RUL	Remaining Useful Life
S36	Fort Lauderdale Executive Airport Watershed
SAP	Sustainability Action Plan

Abbreviation	Definition
SFHA	Special Flood Hazard Area
SFNR	South Fork New River
SFWMD	South Florida Water Management District
SLR	Sea Level Rise
SOPs	Standard Operating Procedures
STW OPS	Stormwater Operations
SWMP	Stormwater Master Plan
TAMP	Tactical Asset Management Plan
TBM	Time-Based Maintenance
TMDL	Total Maximum Daily Load
USACE	US Army Corp of Engineers
USEPA	United States Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGAO	United States Government Accountability Office
USFWC	US Fish and Wildlife Commission
WAMP	Watershed Asset Management Plan
WLA	Waste Load Allocation

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Glossary of Terms

1. **Asset** – Item, thing, or entity that has potential or actual value to an organization (International Standard, ISO 55000, 2014).
2. **Asset Management** – Coordinated activity of an organization to realize value from assets (International Standard, ISO 55000, 2014).
3. **Asset Management Plan** – Documented information that specifies the activities, resources, and timescales required for an individual asset, or a grouping of assets, to achieve the organization's asset management objectives (International Standard, ISO 55000, 2014).
4. **Asset Management Policy** – Intentions and direction of an organization as formally expressed by its top management (International Standard, ISO 55000, 2014).
5. **Asset Management Program -** A formalized, systematic set of practices to implement the Asset Management Plan within the organization, with a focus on developing Asset Management capabilities within the organization. The Program typically includes the cohesive development, implementation, and integration of people, processes and information systems (AWWA AM Definitions Guidebook, 2018).
6. **Asset Management System** – Management system for asset management whose function is to establish the asset management policy and asset management objectives (International Standard, ISO 55000, 2014).
7. **Asset Life** – Period from asset creation to asset end-of life (International Standard, ISO 55000, 2014).
8. **Asset Type** – Grouping of assets having common characteristics that distinguish those assets as a group or class (International Standard, ISO 55000, 2014).
9. **Critical Asset** – Asset having potential to significantly impact on the achievement of the organization's objectives (International Standard, ISO 55000, 2014).
10. **Criticality -** An asset prioritization measure often used to determine "what" assets to focus on. Criticality is normally based on potential Consequences of Failure, not Risk, and is used to determine higher priority assets for risk management activity (AWWA AM Definitions Guidebook, 2018).
11. **Community Rating System (CRS) -** A program developed by FEMA to provide incentives for those communities in the Regular Program that have gone beyond the minimum floodplain management requirements to develop extra measures to provide protection from flooding (FEMA, 2019).
12. **Condition Assessment -** A technical assessment of an asset followed by the interpretation of the resultant data to determine its current and/or future physical condition, performance, Likelihood of Failure, and/or Remaining Useful Life (IIMM, 2015) (SIMPLE)(modified). The assessment

can be based on a desktop analysis, physical observation/inspection, interviews, and/or through the use of instrumentation (AWWA AM Definitions Guidebook, 2018).

13. **Hard Asset** - An asset that is purchased and constructed, has a defined lifecycle and is replaced at the end of the useful life.
14. **Key Performance Indicator (KPI)** - A performance measure that is considered important to the organization (IIMM, 2015).
15. **Level of Service (LoS)** – Parameters, or combination of parameters, which reflect social, political, environmental and economic outcomes that the organization delivers ((International Standard, ISO 55000, 2014).
16. **Level of Service (LoS) A** - Level of Service Tier which would be required where watershed goals require the maximum feasible level of inspection and preventive and corrective maintenance.
17. **Level of Service (LoS) B** - Level of Service Tier which would be implemented in watersheds requiring an improved level of inspection and preventive and corrective maintenance in order to meet the established watershed goals.
18. **Level of Service (LoS) C** - Level of Service Tier which would allow the City to meet its watershed goals, focusing on the most critical stormwater infrastructure, high priority areas, and addressing environmental compliance.
19. **Management System –** Set of interrelated or interacting elements of an organization to establish policies and objectives and processes to achieve those objectives (International Standard, ISO 55000, 2014).
20. **Natural Asset** - An asset that is not human-made but must be managed by the City to comply with NPDES permit requirements, and to mitigate flood risk or water quality impacts, for example.
21. **National Flood Insurance Program (NFIP)** - The program of flood insurance coverage and floodplain management administered under the Act and applicable federal regulations promulgated in Title 44 of the Code of Federal Regulations, Subchapter B (FEMA, 2019).
22. **Soft Asset** - A human-determined asset managed by the division that is not constructed or purchased outright, does not have a defined lifespan but does have defined operation and maintenance costs. Soft assets can be tangible living documents such as policies, procedures and/or guidelines that influences intangible behavior(s) to produce measurable outcomes/results.
23. **Strategic Asset Management Plan** – Documented information that specifies how organizational objectives are to be converted into asset management objectives, the approach for developing asset management plans, and the role of the asset management system in supporting achievement of the asset management objectives (International Standard, ISO 55000, 2014).

Acknowledgements

The City of Fort Lauderdale Watershed inaugural Asset Management Plan (WAMP) was completed with the collaboration of many members of the City of Fort Lauderdale Public Works Department, Finance Department, Information Technology Department (IT), Geographical Information Systems (GIS), and the Hazen Team (Hazen and Sawyer, PC and GHD). Many members of the City contributed through their participation during the discovery interviews, workshops, meetings, and submittal reviews.

Table A.1: City of Fort Lauderdale Staff Members

Paul A. Berg	Director-Public Works	Veronica Wade	Revenue Collections Manager
Nancy Gassman	Assistant Public Works Director of Sustainability	Brandy Leighton	Senior Project Manager
Aneisha Daniel	Deputy Director- Public Works	Rares Petrica	Senior Project Manager
Glen Hadwen	Sustainability Manager	Kymberly Holcombe	Chief Financial Administrator
Elkin Diaz	City's Project Manager	Shannon Barrett	Senior Administrative Assistant
Sandra Marie Pierce	Stormwater Operations Manager	Reina Gonzalez	Administrative Supervisor
Todd Hiteshew	Environmental Compliance Manager	Kelly High	Administrative Supervisor
Richard Benton	Floodplain Manager	Elke Blanco	Senior Administrative Assistant
Larry Teich	Environmental Compliance Supervisor	Susan LeSage	Engineering Business Manager
Omar Castellon	Chief Engineer	Fernando Ayrosa	Senior Technical Analyst
Erin Saey	STW OPS Admin Assistant	Ian A Wint	GIS Manager
Jeron Coney	Chief of Maintenance	Lucia Hogan	GIS Analyst
Eric Rucker	Chief of Stormwater Repairs	Carlos Cruz	GIS Analyst
Todd Hiteshew	Environmental Compliance Manager	Dennis Girisgen	City Engineer/Urban Land Development Manager
Donna McMahon	Customer Service Supervisor	Craig Barret	CADD Coordinator
Nadine Blue	Senior Administrative Assistant	Claudelle Hazell	Administrative Assistant I
Ruby Cuellar-Summa	Administrative Assistant I	Richard Wentworth	Maintenance Supervisor
Jordan Wingate	Senior Administrative Assistant	Michael Donaldson	City Surveyor
Fred Harris	Cityworks Administrator		

Executive Summary

ES-1 Overview

The purpose of this Watershed Asset Management Plan (WAMP) is to document the current state of the City of Fort Lauderdale'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. 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 and planning for the appropriate standard of care necessary to provide an acceptable level of service to the City's stormwater stakeholders and customers. This WAMP consolidates the City's asset information into a structured framework and uses it to provide a justifiable basis to support long-term organization, operations, and asset management decisions.

The WAMP is the asset management plan for the City's stormwater assets and addresses the five (5) core questions of asset management in order to optimize the value of the assets based on the City's stormwater organizational objectives.

1. What is the current state of the stormwater assets?
2. What is the required level of service?
3. Which assets are critical to sustained performance?
4. What are the best operation and maintenance & capital improvement investment strategies?
5. What is the best long-term funding strategy?

The City's Flood Resilience and Environmental Groups commissioned Hazen and Sawyer, with support from GHD, to perform an assessment of its current related program activities against sound industry standard practice, as defined by the Institute of Asset Management (IAM), which incorporates six (6) major components, whose relationship is shown in **Figure ES.1.**

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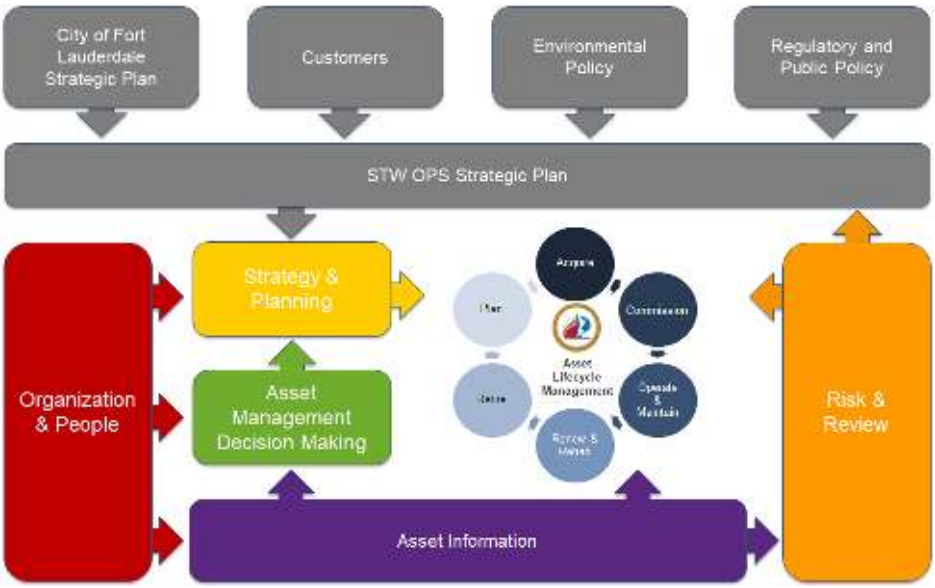
Figure ES.1: Institute of Asset Management's Conceptual Model



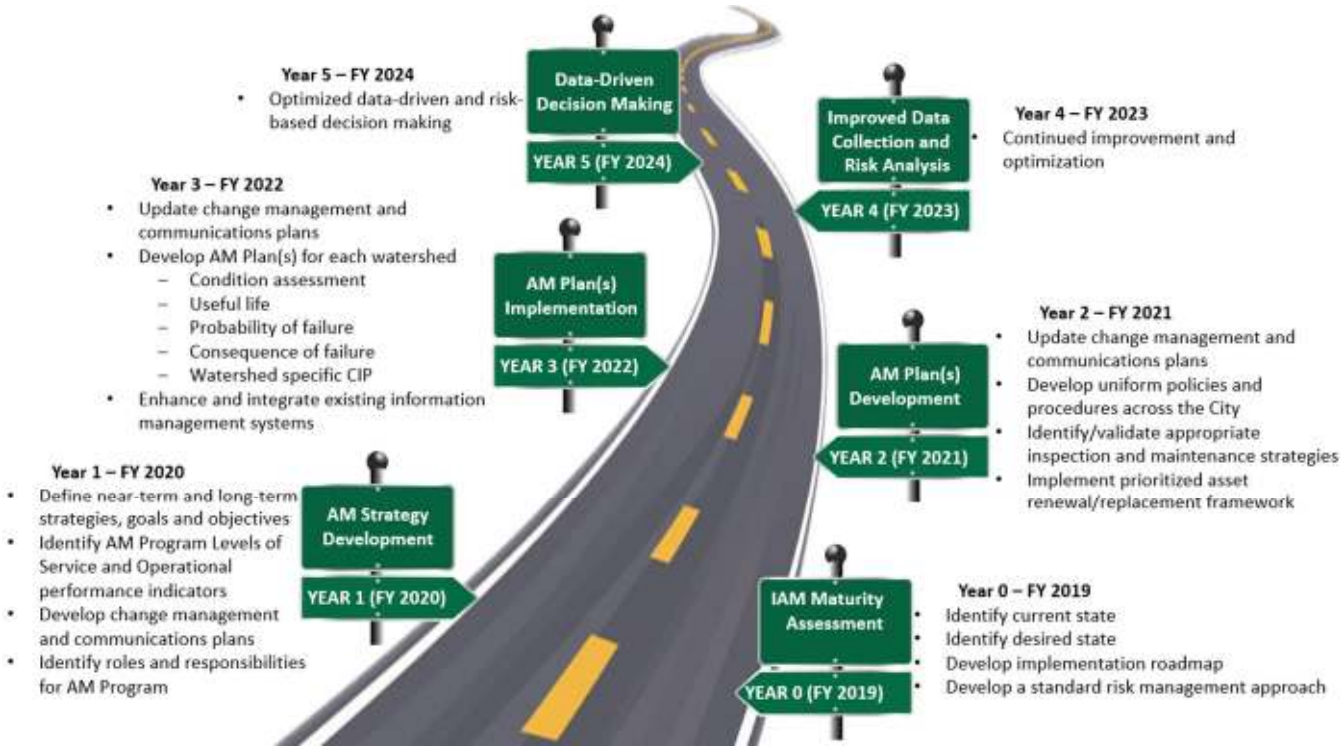
An effective asset management program will support data-driven and risk-based decision making. The desired end-result includes the following:

- **Asset Management Strategy:** A clear and concise plan is available that states the needs and approach to the Public Works Stormwater and Environmental Groups' Asset Management Program and is integrated into the culture.
- **Data Needs:** Data is collected, organized, easily available and useful to make decisions regarding the maintenance, rehabilitation and replacement of assets.
- **Risk Management:** A clear understanding of the Public Works Stormwater and Environmental Groups' risk tolerance is established and is integrated into the organizational culture. In addition, a guide to evaluate risks that incorporates consequences and likelihood of failure (LoF) is available.
- **Prioritize and Plan Investment:** Public Works Stormwater and Environmental Groups' asset systems have asset management plans detailing the appropriate maintenance and monitoring strategies for each asset class and watershed, and scheduled capital renewal/replacement of assets based on risk. Collectively, these asset management plans inform the Public Works Stormwater and Environmental Groups' overall asset investments.

The implementation roadmap describes each of the recommended initiatives, along with specific actions, the assigned Flood Resilience and Environmental Groups' lead, the Flood Resilience and Environmental Groups' teams responsible for supporting the initiative implementation, the anticipated timeframe for completion, the priority of the action, and the estimated cost for support from external resources.

The implementation roadmap action items and corresponding schedule are presented at a high level in **Figure ES.2**, with initiative detail provided in **Appendix A.**

Figure ES.2: Public Works Stormwater and Environmental Groups Asset Management Implementation Roadmap



Implementation requires a broad section of departments, divisions, and sections working together to achieve the overarching asset management goals. This includes participation from Public Works executive management, Cityworks administration, Sustainability Division, Engineering Division, and Strategic Support. In addition, the WAMP will support the City's Flood Resilience and Environmental Vision, Mission, and Goals (Figure 1.2); Community Rating System; and NPDES and Water Quality efforts.

ES-2 City Overview, Watersheds and the Overall Stormwater System

The City of Fort Lauderdale is situated in the east-central portion of Broward County, Florida and it encompasses approximately 36 square miles with an estimated population of 176,747. Fort Lauderdale is the largest of Broward County's 31 municipalities with more than 13 million visitors per year (as per 2013 data). The City is composed of ten (10) primary watersheds ranging in size from approximately 2,100 to 10,500 acres characterized by urban development, low-lying topography and intersected by numerous canals and rivers. **Figure ES.3** presents the 10 primary watersheds within the City. **Table ES.1** lists the 10 watersheds and the number of total assets within each watershed in accordance with the City's 2019 stormwater geodatabase.

Figure ES.3: City Watersheds

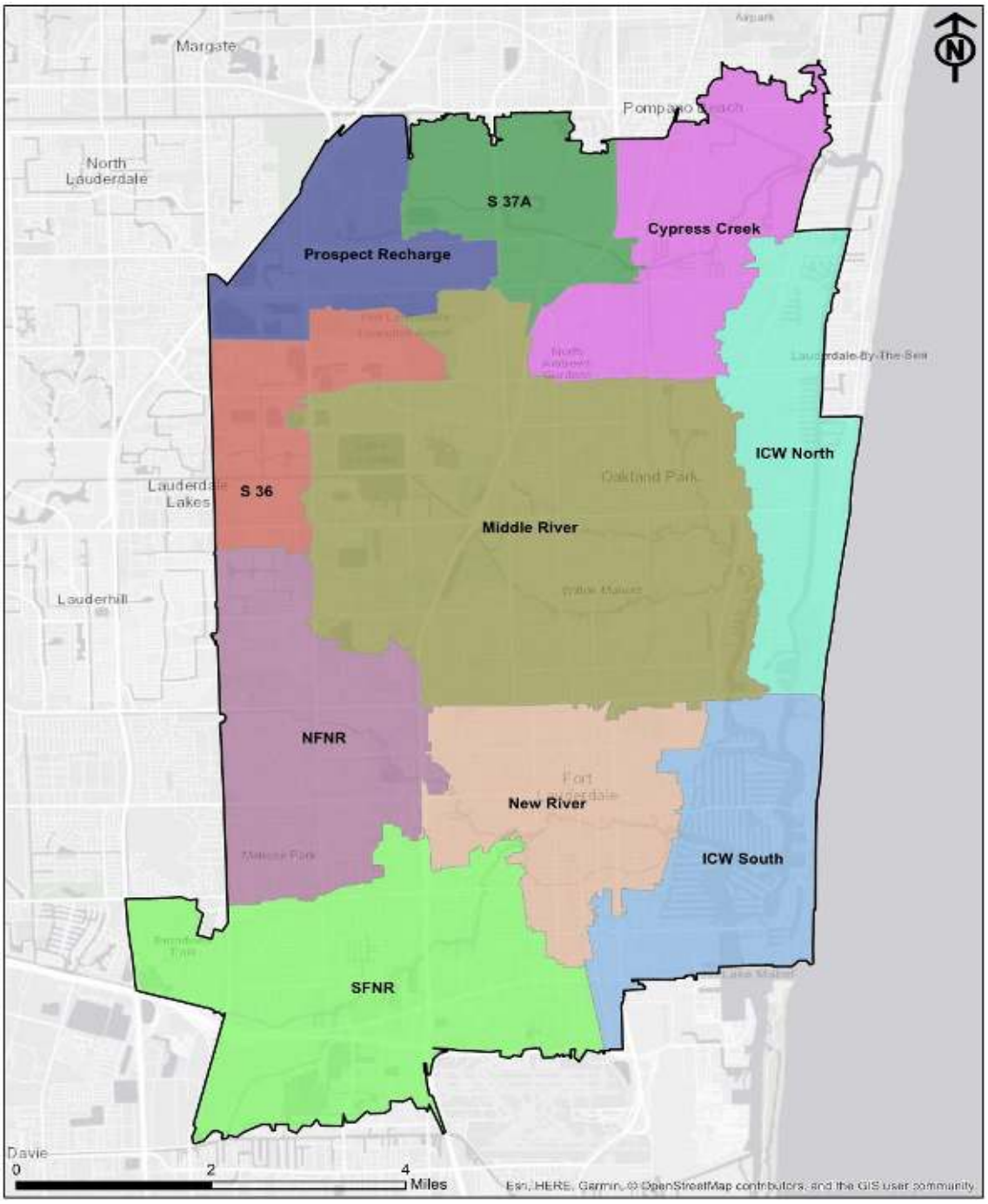


Table ES.1: Watershed Hard Asset Identification

Watersheds	Number of Hard Assets (Stormwater Geodatabase)	Total Watershed Size (Square Miles)	Watershed Area within City Boundary (Square Miles)
Cypress Creek	1,115	5.65	1.25
Intracoastal Waterway (ICW) North	5,337	4.88	4.78
Intracoastal Waterway (ICW) South	7,254	5.30	5.26
Middle River	8,363	16.34	7.30
New River	11,364	5.29	5.29
North Fork New River (NFNR)	2,949	6.40	2.56
South Fork New River (SFNR)	4,088	9.65	5.86
Prospect Recharge	1,755	3.71	1.97
Fort Lauderdale Executive Airport (S 36)	491	3.24	1.10
Uptown S37A	437	3.54	0.63

The City categorizes the assets that are managed by the STW OPS or that are related to the stormwater system in three different categories as follows:

- **Hard assets** - assets that are human-made, purchased and constructed, have a defined lifecycle and are replaced at the end of their useful life.
- **Soft assets** - human-determined assets managed by the division that are not constructed or purchased outright with an undefined lifespan. Soft assets can be tangible living documents such as policies, procedures and/or guidelines that influences intangible behavior(s) to produce measurable outcomes/results.
- **Natural assets** - not human made assets managed by the Division. These include rivers, creeks, trees, mangroves, beach, runoff and discharges.

Figure ES.4 presents the stormwater assets as provided in the 2019 stormwater geodatabase.

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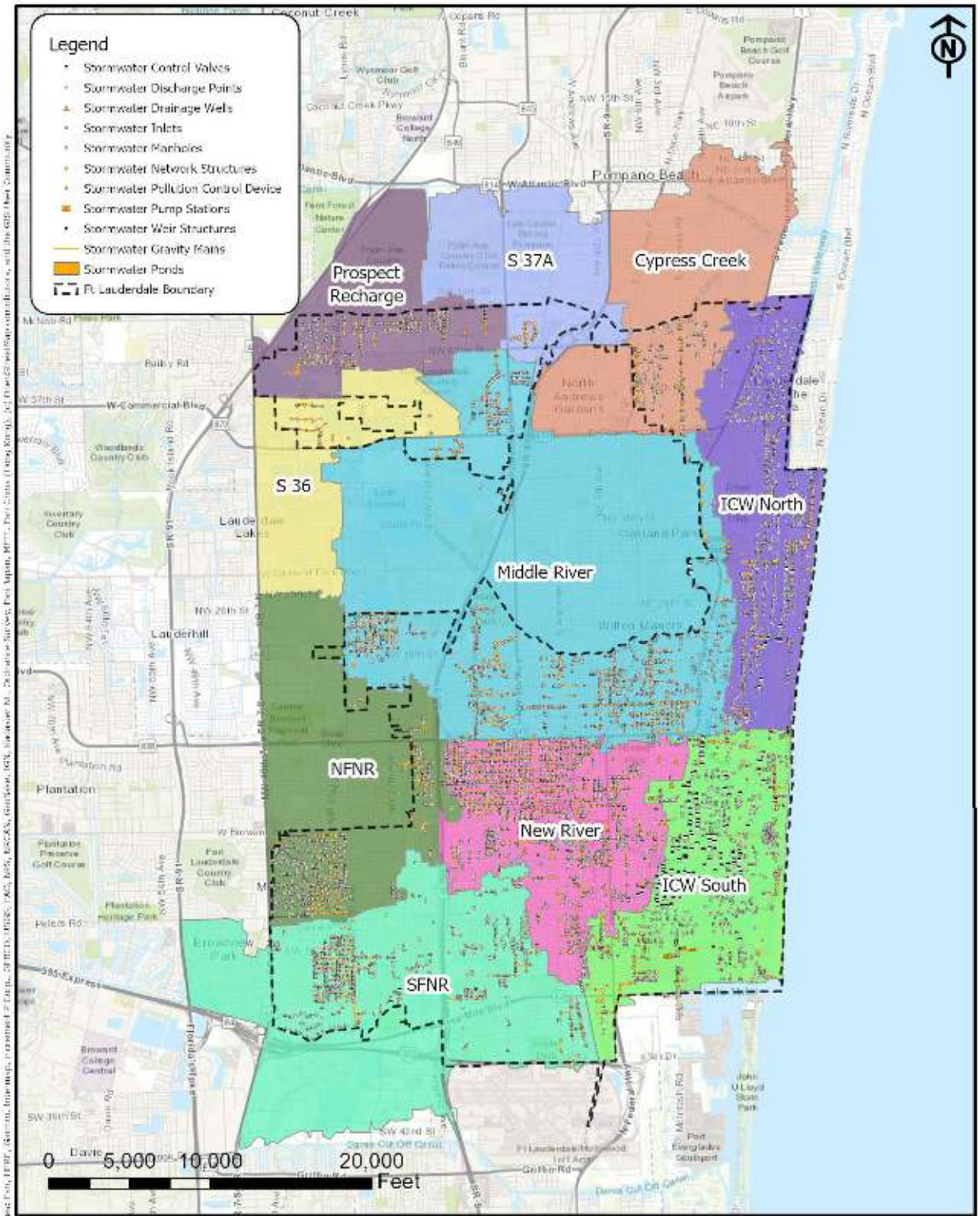
Figure ES.4: Stormwater Hard Assets (2019 Stormwater Geodatabase)



ES-3 Risk Management

Management of risk is critical in order to optimize level of service provided to the City's stormwater customers, minimize the lifecycle cost associated with asset ownership, operations and maintenance, and minimize the likelihood of catastrophic stormwater infrastructure failure with the City's service area. As such, the City intends to move to a more risk-based asset management decision making approach. This will help the City to prioritize its asset management investment in higher risk assets or projects. Knowing an asset's risk allows asset managers to make informed decisions about the best actions to take to optimize asset performance and achieve the City's asset management objectives.

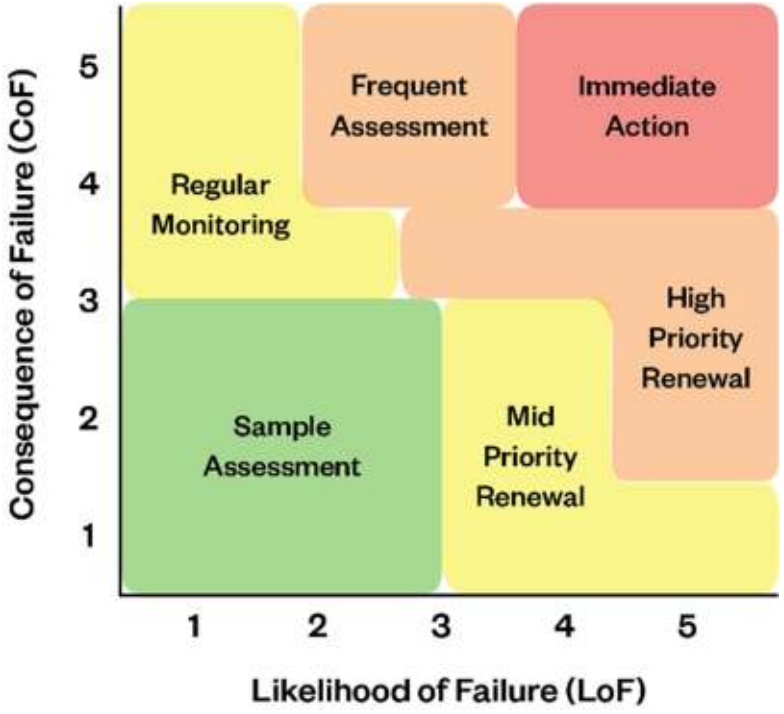
Overall asset risk is determined by quantifying an asset's likelihood (or probability) of failure (LoF) and consequence of failure (CoF). Knowing the LoF and CoF allows the City to calculate the business risk exposure (BRE), or risk using the following calculation:

BRE = LoF X CoF

Determining asset BRE allows asset managers to predict how their actions can impact the future performance of the stormwater assets and support City stormwater service level goals.

BRE scores can be used as visual representations of the asset risks, which allow for prioritization of the recommended actions (inspection, assessment, renewal, replacement, etc.) that is recommended for the asset portfolio. **Figure ES.5** presents the recommended action for assets based on their LoF and CoF scores.

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



Additional details on how to determine overall risk, including details on LoF and CoF determination, can be found in **Section 2.2** of this document.

ES-4 Operations Maintenance and Replacement Strategies

Asset lifecycle management strategies are planned actions that enable assets to provide the defined levels of service in a sustainable manner, while managing risk, at the lowest lifecycle cost. Asset lifecycle management strategies are typically organized into the following categories:

- **Operations & Maintenance activities –** including regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.
- **Renewal activities –** significant rehabilitation designed to extend the life of the asset and replacement activities that are expected to occur once an asset has reached the end of its useful life and rehabilitation is no longer an option.
- **Expansion activities –** planned activities required to extend services to previously unserviced/underserviced areas or expand services to meet growth demands. Also includes redevelopment activities.
- **Disposal activities –** the activities associated with the disposal of an asset once it has reached the end of its useful life or is otherwise no longer needed by the municipality.
- **Non-asset solutions –** actions or policies that can lower costs, lower demands, or extend asset life (e.g. better integrated infrastructure planning and land use planning, demand management, insurance, process optimization, education of public).

The City assesses the costs of potential lifecycle activities to determine the lowest lifecycle cost strategy to manage each asset type. The sum of all asset lifecycle management strategies informs the minimum cost to sustain each asset type. Failing to take care of assets can impact the total cost of ownership for that asset and can also have other impacts such as causing damage to other infrastructure or causing interruption to service delivery. Maintenance and renewal activities are timed to reduce the risk of service failure from deterioration in asset condition, and to minimize the total cost of ownership. Sufficient investment, of the right type, at the right time, is crucial.

Additional details regarding Operations, Maintenance and Replacement Strategies can be found in **Section 2.4.2**.

ES-5 City Flood Protection and Community Investment Plan

In recent decades, several of the City's coastal watersheds have experienced more routine flooding associated with both Spring and King Tides. The events are often referred to as "Sunny Day/Nuisance Flooding" resulting from higher than normal tides in association with Sea Level Rise (SLR). There are three (3) watersheds identified with flooding as a result of changes to the historic tidal patterns. As shown in Figure 3.1, these watersheds include the Intracoastal Waterway (ICW) North, Intracoastal Waterways (ICW) South and the New River basin areas. Most of the flooding has been associated with roadways, residential properties and common areas.

The Stormwater Master Plan Modeling and Design Implementation Program is a holistic and future-focused effort that involves several interconnected phases as described below.

- **Phase I:** included implementation of 37 small-scale stormwater Capital Improvement Planning (CIP) projects managed and completed by the City.
- **Phase II:** included development of a city-wide stormwater model and also addressed storm and tidally-driven flooding issues in seven priority neighborhoods. Those seven neighborhoods and the watersheds in which they are located are listed in **Table ES.2.** Projects will be constructed in a phased approach from 2020 to 2025.

Table ES.2: Priority Neighborhoods and Corresponding Watersheds

Neighborhood	Watershed(s)
Edgewood	South Fork New River
Victoria Park	New River, ICW South
Progresso Village	New River
Southeast Isles	ICW South, New River
Durrs	North Fork New River
Dorsey Riverbend	North Fork New River, New River
River Oaks	South Fork New River

- Phase III Stormwater Improvements: The City has selected the following neighborhoods for Phase III stormwater improvements: Melrose, Sailboat Bend, Riverland, Harbor Isles, Flagler Village, and Downtown. The design improvements for these neighborhoods shall be coordinated with the WAMP objectives, recommendations, and initiatives.

ES-6 Standard of Care, Level of Service (LoS) and Key Performance Indicators (KPIs)

The City's present watershed LoS delivered to its customers (LoS P) defines how the City currently responds to citizen requests to inspect, maintain, repair and/or replace assets in each of its ten watersheds. **Table ES.3**provides the LoS P associated with the City's stormwater management, engineering, and environmental programs.

Table ES.3: City of Fort Lauderdale Baseline LoS P

Exiting Hard Assets	Reactive Inspection (non-emergency)	Proactive / Routine Inspection	Proactive Routine / Preventive Maintenance	Reactive / Corrective Maintenance
Control Valve	As needed	Quarterly	NPDES Permit: Clean XX Annually	Respond to Reactive Maintenance Efforts
Pond	Undefined	Undefined	Undefined	Undefined
Discharge Point	As needed	Critical Only - Monthly	Respond to Critical Outfall	Respond to Reactive Maintenance Efforts
Drainage Well	As needed	Semi-Annual (Feb/Aug)	Respond to Maintenance Efforts	Respond to Maintenance Efforts

Exiting Hard Assets	Reactive Inspection (non-emergency)	Proactive / Routine Inspection	Proactive Routine / Preventive Maintenance	Reactive / Corrective Maintenance
			on a First Come First Serve Internal Referral Basis	on a First Come First Serve Internal Referral Basis from Reactive Inspections
Exfiltration Trench	Undefined	Undefined	Undefined	Undefined
Inlet	As needed	Semi-Annual	Clean XX Annually	Perform XX Reactive / Corrective Maintenance Annually
Manhole	Respond to Maintenance Efforts on a First Come First Serve Basis	Respond to Maintenance Efforts on a First Come First Serve Basis	Clean XX Annually	Perform XX Reactive / Corrective Maintenance Annually
Gravity Main	Respond to Maintenance Efforts on a First Come First Serve Basis	Respond to Maintenance Efforts on a First Come First Serve Basis	Clean XX Annually	Perform XX Reactive / Corrective Maintenance Annually
Network Structure	Undefined	Undefined	Undefined	Undefined
Pollution Control Structure	As needed	Quarterly (Feb/May/Aug/Nov)	Respond to Maintenance Efforts on a First Come First Serve Internal Referral Basis	Perform XX Reactive / Corrective Maintenance Annually
Pollution Control Device	As needed	Quarterly (Jan/Apr/Jul/Oct)	Respond to Maintenance Efforts on a First Come First Serve Internal Referral Basis	Perform XX Reactive / Corrective Maintenance Annually
Pump Station	As needed	PS No. 1&2 – Semi-Weekly PS No. 4&5 - Quarterly	Respond to Maintenance Efforts on a First Come First Serve Internal Referral Basis	Perform XX Reactive / Corrective Maintenance Annually
Weir Structure	As needed	Semi-Annual (Apr-Oct)	Respond to Maintenance Efforts on a First Come First Serve Internal Referral Basis	Respond to Maintenance Efforts on a First Come First Serve Internal Referral Basis from Reactive Inspections
Swales[(1)]	Undefined	Undefined	Undefined	Undefined
Culvert	Undefined	Weekly (Jan-Dec)	Undefined	Undefined
Ditch	Undefined	Melrose Ditch – Monthly (Jan-Dec)	Undefined	Undefined
Pressure Pipe	Undefined	Undefined	Undefined	Undefined
Right of Way	Undefined	Undefined	Undefined	Undefined

Exiting Hard Assets	Reactive Inspection (non-emergency)	Proactive / Routine Inspection	Proactive Routine / Preventive Maintenance	Reactive / Corrective Maintenance
Seawall	Undefined	Undefined	Undefined	Undefined
Rock and Grade(2)	Undefined	Undefined	Undefined	Undefined
KT Delineators	Undefined	Deployed Annually (Sept)	Undefined	Undefined
KT No Wake Signs	Undefined	Deployed Annually (Sept)	Undefined	Undefined
Riverland Delineators(3)	Undefined	Undefined	Undefined	Undefined
High Water Signs(3)	Undefined	Undefined	Undefined	Undefined

(1) New asset to be mapped during the WAMP implementation.
(2) New asset. Ownership to be determined.
(3) On hold.
(4) SWML (a soft asset) has a 5-year renewal cycle.

The three proposed alternatives to LoS are as follows:

- **LoS C** would allow the City to meet its watershed goals with a baseline level of service over and above LoS P, focusing on the most critical stormwater infrastructure, high priority areas, and addressing environmental compliance.
- **LoS B** would be implemented in watersheds requiring an improved level of inspection and preventive and corrective maintenance in order to meet the established watershed goals.
- **LoS A** would be required where watershed goals cannot be met without a much greater level of inspection and preventive and corrective maintenance.

Each LoS will outline the frequency (for proactive LoS) or efficiency and timeliness (for reactive LoS) at which work is to be completed, with values more stringent as the LoS increases. For example, the Discharge Point/Outfall asset class may have the following LoS:

Table ES.4: Discharge Point/Outfall LoS - Example

Levels	Levels of Service			
	Reactive Inspection (non-emergency)	Proactive/ Routine Inspection	Proactive/Routine Preventive Maintenance	Reactive/ Corrective Maintenance
LoS P	As needed	Critical Only	Respond to Critical Outfall	Respond to Reactive Maintenance Efforts
LoS C	Respond within 3 days	33% of assets inspected each fiscal year	33% of all assets restored to performance standards each fiscal year	100% of all asset repairs completed within 60 calendar days of notification
LoS B	Respond within 2 days	66% of assets inspected each fiscal year	66% of all assets restored to performance standards each fiscal year	100% of all asset repairs completed within 45 calendar days of notification

Levels	Levels of Service			
	Reactive Inspection (non-emergency)	**Proactive/ Routine Inspection**	**Proactive/Routine Preventive Maintenance**	**Reactive/ Corrective Maintenance**
LoS A	Respond within 1 day	100% of assets inspected each fiscal year	100% of all assets restored to performance standards each fiscal year	100% of all asset repairs completed within 30 calendar days of notification

ES-7 How Much Will the WAMP Cost?

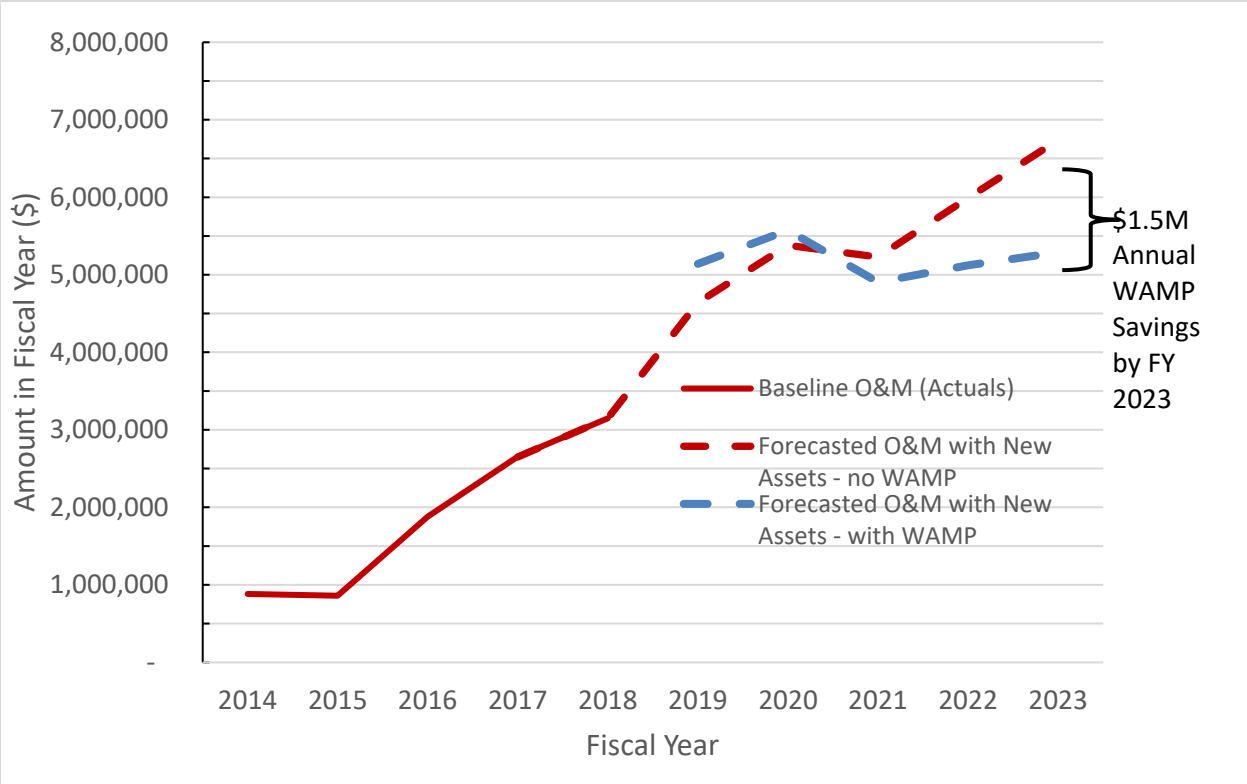
In order to determine the level of effort (LOE) and associated budget requirements for the City to develop and implement a multi-phase, multi-year WAMP that supports the City's sustainability and environmental programs for Fiscal Years 2019 through 2023, the City needs to assess the following four components for each of the 10 watersheds:

- Forecasted operations and maintenance expenses, which includes both in-house and contracted work.
- Forecasted capital renewal and replacement costs
- Estimated impact of SWMP assets on forecasted operations and maintenance expenses.
- Forecasted WAMP investment costs, both for external (i.e., consultant) support and within STW OPS.
- Forecasted WAMP savings achieved through improved efficiencies.

Each of these components is described in further detail in **Sections 6.2** through **6.5**. **Section 6.6** then presents graphical and tabular summaries of how all four of these components comprise the WAMP's forecasted LOE and associated Stormwater Operating Fund budget for Fiscal Years 2019 through 2023.

Based upon the current situation, the most realistic basis for forecasting future stormwater fund operations and maintenance expenditures for Fiscal Years 2019 through 2023 is a linear projection of historical budget data for Fiscal Years 2014 through 2017, for which complete annual budgetary data currently exist. **Figure ES.6** presents the O&M cost projections through FY 2023.

Figure ES.6: LOE for WAMP, Forecasted WAMP Savings and Stormwater Operations Fund Budget Estimate Fiscal Years 2019 through 2023



Capital Investment for the City of Fort Lauderdale for fiscal years 2020 through 2024 is identified through the Community Investment Plan (CIP), which provides a total investment required including stormwater infrastructure.

The Stormwater Management Program faces several infrastructure challenges in order to successfully achieve the City's stated goal: 'to be a sustainable and resilient community'. The key objective of this goal is to reduce flooding and adapt to sea level rise. The City has already developed a stormwater master plan and plans to invest $196 million into making hard assets more resilient to flooding and sea-level rise.

Stormwater capital investment planned for FY 2020 is $11.6 million, or 1.6% of the total budget. The City intends to issue a $200 million bond in FY 2021 in order to fund the critical infrastructure needed to reduce flooding in at least five of the ten watersheds and their respective seven neighborhoods, which make up half of the City's stormwater system of ten watersheds, recognizing that each watershed has its own unique requirements.

ES-8 How Can the City Pay for the WAMP?

Stormwater funding, as stated in the City's Revenue Manual (Page 104), is derived from stormwater fees assessed and approved by the City Council for services provided to the City to the community ratepayers. This rate is projected to increase by 5% annually through 2023.

The WAMP funding strategy outlines the suggested financial approach to adequately funding the required standard of care, LoS and KPIs needed to achieve the City's stormwater objectives outlined in Section 4. The financing strategy forecast was prepared in alignment with the City's 2018 Stormwater Management Financing Study, so that it can be used to measure ratepayer impacts relative to what was identified in that study, and includes:

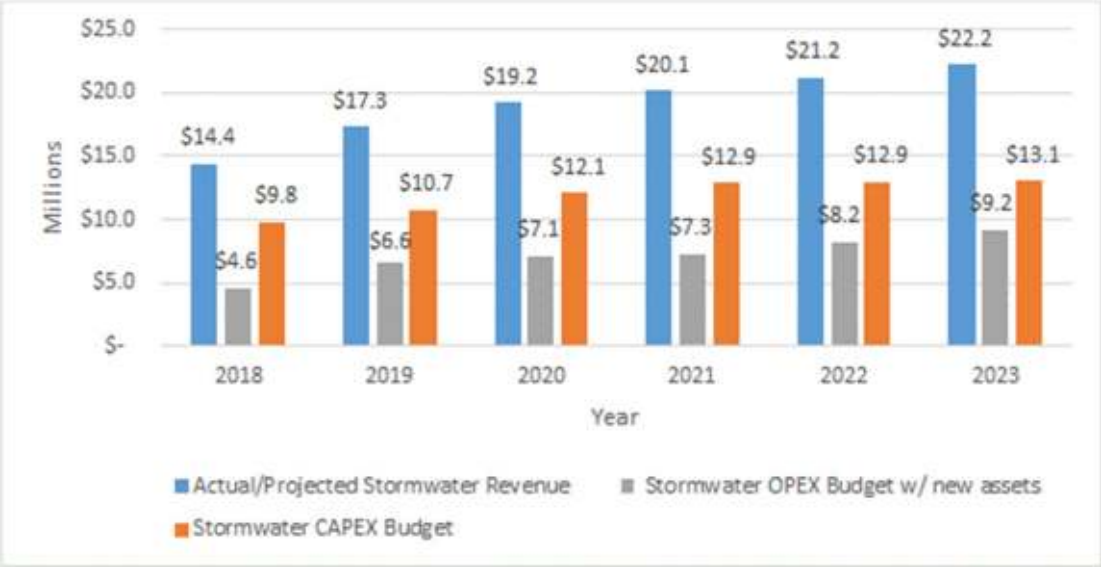
- Annual expenditure forecasts broken down by:
    - Capital renewal rehabilitation, and replacement activities
    - Significant operating costs
- A breakdown of annual funding/revenue by source
- Identification of any funding shortfalls, if applicable
- Documentation of all key assumptions

Funding strategies consider both Operational (OPEX) and Capital (CAPEX) expenditures and are based upon the Levels of Service STW OPS is striving to achieve today and how STW OPS expects demand for these services to change over the next five years and beyond. It also considers how reliable the City's stormwater infrastructure (and ancillary equipment such as fleet vehicles) is today with respect to meeting existing demand, and whether the infrastructure has the capacity to meet expected future demand. These considerations inform a financial plan that supports meeting service levels by providing:

- Recurrent Operational Expenditure Profile – What STW OPS needs for day-to-day management of the assets
- Investment Profile – Capital expenditures needed for both replacement of existing assets and for growth in the system
- Revenue Profile – What STW OPS is being paid for the services it provides
- The Revenue-Cost Gap (or surplus) – Including associated implications and recommendations

Figure ES.7 presents a projection of stormwater funding needs through fiscal year 2023. These funding needs include stormwater OPEX budget, including the addition of operations and maintenance for anticipated new stormwater assets, a projection of stormwater CAPEX needs, and the overall potential revenue requirements that will need to be funded through stormwater revenues.

Figure ES.7: Stormwater Funding Projections



ES-9 Recommendations for Continuous WAMP Improvements

The WAMP is the guiding strategic document providing the overarching strategic goals and objectives and the framework and methodologies governing the content of the asset management plans (AMPs) that will be created for each watershed. These individual AMPs will provide the LoF and CoF (and subsequent BRE) evaluation and update, along with the forecasted O&M and capital costs for the subsequent five fiscal years.

It is recommended that the WAMP's strategic goals and objectives be reviewed as frequently as is feasible given the City's current and future asset management staffing levels. Ideally, once asset management roles and responsibilities are defined and staffing levels are deemed adequate to fulfill these roles and responsibilities, it is recommended that the WAMP's strategic goals and objectives be reviewed annually to ensure alignment throughout all watershed AMPs. In addition, as each watershed's LoF, CoF, and BRE are defined based on updated condition assessment information, the watershed five-year forecasted O&M and capital expenditures projections should also be reviewed and updated annually.

A recommended guideline for reviewing and updating the WAMP, subsequent watershed AMPs, and the management and communications plan is shown in **Table ES-5**. Details of the recommended implementation timelines by IAM Section and Element is provided in **Appendix A**.

Table ES.5: Suggested WAMP and AMP Review Periods

Item	Suggested Minimum Review Time Period	Suggested Maximum Review Time Period	Comments
WAMP	Annually	Every Five Years	Perhaps more frequent at beginning to ensure actions are remaining on track and meeting the City's goals and objectives.
AMP (per watershed).	Semi-Annually	Annually	Once established, review each watershed's asset management progress and information to ensure changes to LoF/CoF are documented, resulting maintenance and capital plans are updated, and LoS are being met.
Change Management Plan	Semi-Annually	Annually	Ensure that requirements are in place to get employees trained on asset management principles, practices, and methodologies and the changes to individual jobs and responsibilities are identified and managed to effectively implement asset management.
Communications Plan	Semi-Annually	Annually	Once finalized, ensure Communications Plan is meeting stakeholder needs and familiarity with asset management principles and practices is increasing.

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