People, Process, and Performance: A Tailored Approach to Integrated Water Resources Planning in Portland

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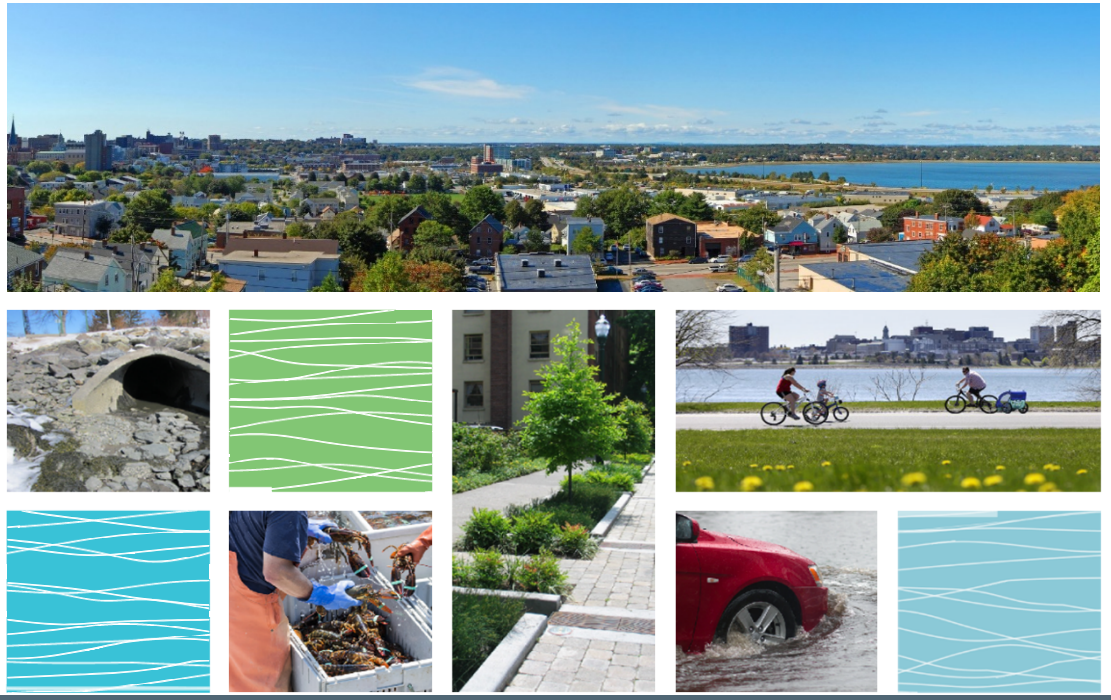

NEWEA Annual Conference
February 2, 2021

AGENDA

1. Portland Background

2. Portland's Integrated Plan
   - ✓ People
   - ✓ Process
   - ✓ Performance

3. Next Steps

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Background

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Background and Regulatory Context

1870
Sewers constructed - mostly combined

1979
EEWWTF and Interceptors Constructed

1991
Consent Decree to address CSO's- MeDEP

1993
CSO Abatement Master Plan Submitted

1997
5yr CSO Update - 45 Tier I Sewer Separation Projects - $45M

1997
EEWWTF Wet Weather Capacity Maximized - ISPS and NEPS - 80mgd

2003
5yr CSO Update - 75 Tier II Sewer Separation Projects

2007
CSO Tier II Implementation Plan - $60M

2008
Maine MS4 General Permit

2009
EPA Issues Maine Statewide Bacteria TMDLs

2012
- CMOM - EPA Admin. Order
- EPA Issues Integrated Planning Framework
- EPA Issues Maine Statewide Impervious Cover TMDLs

2013
- **CSO Tier III LTCP- $175M-15 years**
- **Maine MS4 General Permit(Revised)**

2014
Portland CSO Permit Issued

2016
City establishes Stormwater Service Charge

2017
- WWTF MePDES/WDL Permit
- EEWWTF Aeration Upgrade - $12M
- Citywide I/I Program
- City conducts Bayside Adapts Study

2018
Integrated Plan

Program Focus:

WWTF CSO CMOM MS4

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Portland Water District
Portland, ME

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Types of Action
Capital Project
Capital Program
Watershed Initiative
O&M
Policy
Further Study

Targeted System
Source Controls
Collection System
Stormwater Treatment
Wastewater Treatment
Ecosystem

Drivers for Action
MS4
CSO
CMOM
WWTF (CWA)

Water Body
Casco Bay
Back Cove
Portland Harbor
Fore River
Presumpscot River
Capisic Brook

Integrated Plan: People

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STAKEHOLDER STEERING COMMITTEE

SOCIAL

- Portland Health and Human Services Department
- Portland Department of Planning and Urban Development
- Portland Parks, Recreation and Facilities
- Portland Trails
- SailMaine

ECONOMIC

- Maine Real Estate and Development Association
- New England Environmental Finance Center
- Portland City Manager's Office
- Portland Economic Development Department/ Waterfront Economic Development
- Portland Office of Economic Opportunity
- Portland Regional Chamber of Commerce
- The Waterfront Alliance

ENVIRONMENTAL

- Casco Bay Estuary Partnership
- Conservation Law Foundation
- Cumberland County Soil and Water Conservation District
- Friends of Casco Bay/ Casco BayKeeper
- Maine Department of Environmental Protection
- Maine Department of Marine Resources
- Portland Land Bank Commission
- Portland Department of Public Works/Water Resources Division
- Portland Water District
- United States Environmental Protection Agency

Stakeholder Engagement

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Advisory Group

- Josh Schimmel
  Executive Director, Springfield Water and Sewer Commission
- Tom Balestero
  University of New Hampshire
- Roger Janzen
  EPA (Retired)
- Megan Moir
  Director of Water Resources, Burlington Vermont

Integrated Plan: Process

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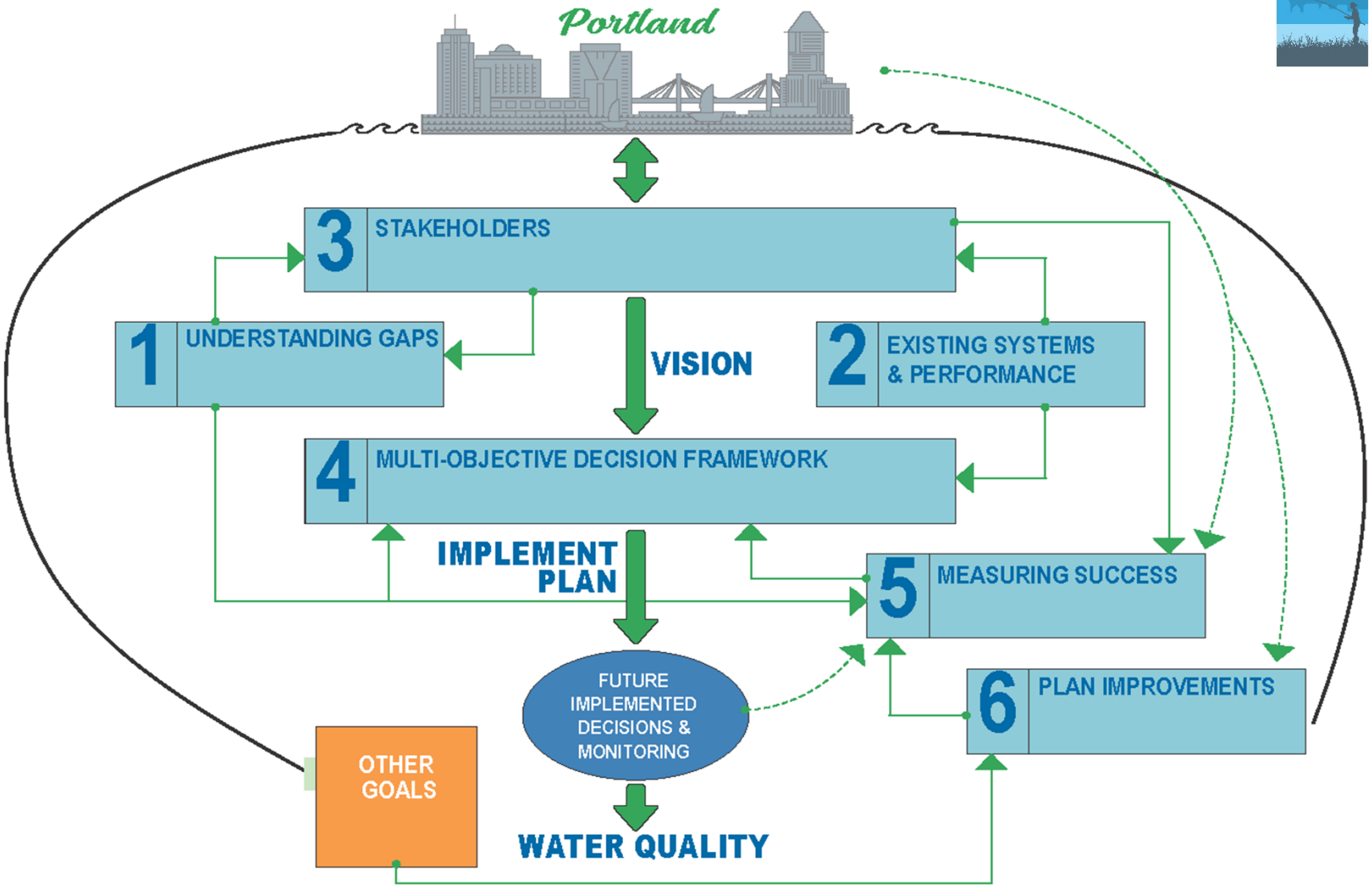
Portland
3 STAKEHOLDERS
1 UNDERSTANDING GAPS
VISION
2 EXISTING SYSTEMS & PERFORMANCE
4 MULTI-OBJECTIVE DECISION FRAMEWORK
IMPLEMENT PLAN
5 MEASURING SUCCESS
FUTURE IMPLEMENTED DECISIONS & MONITORING
6 PLAN IMPROVEMENTS
OTHER GOALS
WATER QUALITY

PROCESS: OBJECTIVES

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Obj-1: Preserve/Enhance Sustainable Ecosystems

Obj-2: Improve Water Quality

Obj-3: Support Portland's Working Waterfront

Obj-4: Support Sustainable Economic Growth

Obj-5: Encourage An Active and Informed Citizenry:

Obj-6: Enhance Community Character and Assets:

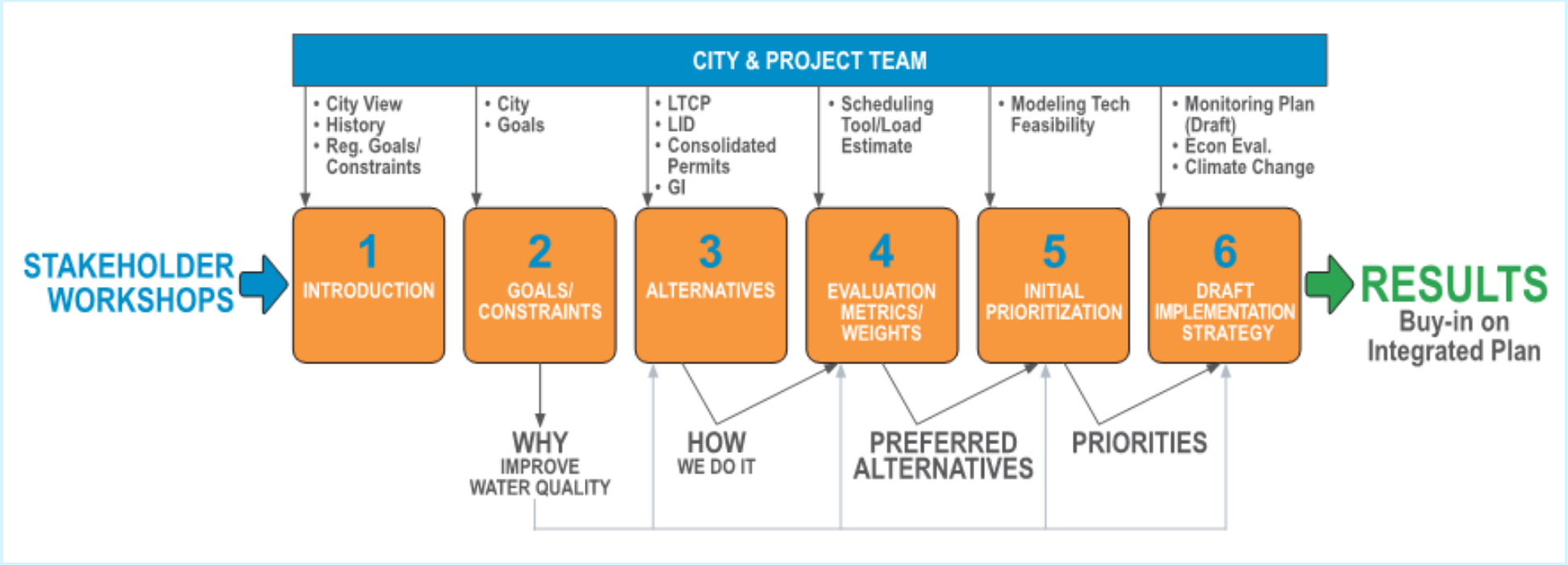
Obj-7: Promote Equity

Obj-8: Protect Public Health and Safety

Obj-9: Strengthen Institutional Capacity

Obj-10: Improve System Performance/Resilience

PROCESS: STAKEHOLDER WORKSHOPS



Process: Alternatives Development

Program Objectives
Water Quality
Ecosystem
Regional Economy
Equity
Community Character
Education
Etc.…

Targeted System
Source Controls
Collection System
Stormwater Treatment
Wastewater Treatment
Ecosystem

Types of Action
Capital Project
Capital Program
Watershed Initiative
O&M
Policy
Further Study

Water Body
Casco Bay
Back Cove
Portland Harbor
Fore River
Presumpscot River
Capisic Brook

Drivers for Action
MS4
CSO
CMOM
WWTF (CWA)

Alternative Evaluation: Weights / Scores / Ranks

Metrics – Ways of measuring progress toward objectives

Weights for screening metrics: Relative importance

		Quantitative Scores		Qualitative Scores		
	METRICS:	Flood Reduction	Water Quality Improvemen	Support Local Economy	Public Health & Safety	Regulatory Compliance
	Weight	0.15	0.25	0.3	0.2	0.1
Alternatives						
1	CSO 1	10	15	5	5	4
2	CSO 2	12	18	4	4	5
3	CSO 3	0	25	5	1	5
4	CSO 4	5	18	4	2	3
5	CSO 5	8	22	2	4	5
6	Stormwater 1	15	15	5	4	5
7	Stormwater 2	25	12	5	3	1
8	Stormwater 3	45	8	1	3	3
9	Stormwater 4	38	28	1	4	3
10	Stormwater 5	40	16	1	3	1
11	WWTP 1	4	35	5	4	2
12	WWTP 2	5	20	5	5	3
13	WWTP 3	2	25	3	2	2
14	WWTP 4	3	15	5	5	2
15	WWTP 5	7	20	2		1

EXAMPLE INFORMATION ONLY

Alternative	Equal Weights	Watershed Association	Business Community
CSO 1	3	3	1
CSO 2	1	2	3
CSO 3	14	8	9
CSO 4	5	6	7
CSO 5	12	10	11
Stormwater 1	2	1	2
Stormwater 2	10	14	6
Stormwater 3	13	13	15
Stormwater 4	4	5	10
Stormwater 5	15	15	14
WWTP 1	7	4	8
WWTP 2	6	7	4
WWTP 3	11	9	13
WWTP 4	8	11	5
WWTP 5	9	12	12

EXAMPLE INFORMATION ONLY

Quantitative Scores from models, GIS, Risk Assessment, etc.

Qualitative Scores "Poor-Fair-Good-Better-Best"

RANKS
Relative composite value of weights and scores

Ranking Results - "Heat Map"

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Alternative Number	Alternative Name	Average Weights	Equal Weights by Metric	Ranks by Stakeholder Weights													
				A	B	C	D	E	F	G	H	I	J	K	L		
F04	Green Infrastructure Program (F04)	1	1	1	1	1	7	1	3	1	1	1	2	1	1		
B09*	3.5 MG Storage - Back Cove South (B09)	2	2	2	2	4	3	4	2	2	6	2	3	2	2		
A20	Sewer Separation Strategy (A20)	3	3	5	12	14	8	8	4	4	3	11	1	3	5		
C02	Street and Sidewalk Sweeping (C02)	4	7	3	11	2	2	2	9	3	8	10	7	6	6		
A03*	Inflow and Infiltration Program (A03)	5	6	6	19	16	11	3	10	7	4	20	4	7	3	7	7
B10*	2.25 MG Storage - Back Cove West (B10)	6	10	7	6	6	12	10	6	8	7	4	9	13	11	10	5
F01	Public Education and Involvement Program (F01)	7	4	9	3	12	25	21	15	5	17	3	22	5	4	3	6
A06	CSO Outfall Treatment Facilities (A06)	8	9	29	27	13	6	12	1	15	14	26	5	29	13	20	16
C06	Pet Waste Management (C06)	9	5	27	4	9	22	24	11	10	19	5	33	15	7	6	4
D11	Wetland Protection Ordinance (D11)	10	8	4	10	29	19	5	30	6	29	19	15	17	8	8	19
D05	More Stringent Stormwater Management Requirements for Redevelopment Projects (D05)	11	13	8	9	22	20	22	20	9	15	7	13	16	18	11	14
B16	Commercial Street CSO Storage Conduit (B16)	12	31	17	25	3	10	13	5	26	13	17	12	27	23	19	11
B14	Fore River CSO Storage Tank (B14)	13	24	22	22	5	14	16	7	24	16	12	17	25	22	16	8
A13	Prevent Erosion Around Back Cove (A13)	14	11	18	5	19	16	17	26	11	35	6	26	11	12	9	17
E18	Open Space Study (E18)	15	12	16	7	21	25	15	27	12	42	8	27	19	20	12	20
C05	Winter Roadway Maintenance (C05)	16	18	11	26	15	5	6	21	16	30	28	16	20	9	18	29
A19*	Illicit Discharge Detection and Elimination - Targeted Program (A19)	17	20	13	31	27	34	26	12	21	2	27	6	9	15	25	18
C14	Enhanced Pipeline Cleaning and Inspection Program (C14)	18	17	15	28	18	15	9	19	19	9	31	20	14	17	22	15
C04	Catch Basin Cleaning (C04)	19	28	12	32	11	1	7	23	17	23	32	8	18	25	28	34
D06	Develop City-Wide Fertilizer Policy (D06)	20	16	31	8	10	30	34	29	22	44	13	43	24	10	14	21
C11	Yard Waste Collection (C11)	21	23	14	14	31	23	33	32	14	24	9	10	8	31	15	28
E17	Stream Restoration Study (E17)	22	21	24	16	23	25	11	34	25	40	16	32	28	19	23	26
D09	Update and Optimize Stormwater Utility for More Water Quality Treatment (D09)	23	22	10	21	30	21	23	28	13	20	29	11	12	28	26	36
C03	Fertilizer Management on City Properties(C03)	24	19	21	18	24	18	28	24	18	26	30	21	10	21	21	30
C07	Waterfowl Waste Management (C07)	25	15	25	13	32	43	29	33	20	33	15	39	33	35	17	12
C13	Fats, Oils, and Grease Program (C13)	26	14	38	15	20	31	37	31	27	10	21	35	4	14	13	10
A04	Sewer System Renewal/Improvements (A04)	27	25	43	41	17	4	14	16	33	12	42	14	21	24	36	31
B17	Regulator Modifications and Tide Flex Valve Installations (B17)	28	29	26	39	25	23	18	18	30	21	33	34	45	26	29	23
D12	Enforce Proper Discharge of Wastewater from Boats (D12)	29	30	44	24	8	17	41	17	34	32	18	37	31	16	24	24
B18	Deep Tunnel Conveyance and Storage (B18)	30	40	46	42	7	9	27	8	39	37	25	36	39	45	40	13
B25	Franklin Street Storm Drain (B25)	31	33	30	38	37	33	19	13	37	18	36	25	44	29	33	22
E16	Watershed Management Plans (E16)	32	27	19	17	39	44	36	47	23	38	14	29	26	33	27	27
D14	Enhance Stream Corridor and Shoreland Protection Zoning Requirements (D14)	33	32	28	23	28	32	31	40	29	27	22	28	23	30	30	32
E20	Estuary Restoration Study (E20)	34	35	34	29	26	25	20	34	35	43	24	29	32	32	31	38
A15	Stormwater Infrastructure Improvements (A15)	35	26	39	35	40	50	46	25	38	11	38	31	34	27	34	25
E14	Evaluate Regional Roles for Water Quality Improvements (E14)	36	34	36	20	34	45	49	37	32	50	23	47	36	38	32	33
B37	Repair Storm Drains and Remove Cross Connections on Peaks Island (B37)	37	36	37	33	35	41	44	22	36	36	34	45	47	36	35	35
D07	Improve City Inter-Departmental Collaboration to Optimize Stormwater Treatment (D07)	38	38	23	34	41	37	30	41	31	25	37	23	22	34	37	37
D13	Optimize Operations of Water Resource Management (D13)	39	39	20	36	43	37	38	38	28	34	35	24	30	42	38	40
B32	Wet Weather Treatment (B32)	40	41	59	54	42	13	51	14	47	31	54	19	37	47	53	46
C12*	East End Wastewater Treatment Facility (EEWWTF) Rehabilitation and Replacement (R&R) (C12)	41	44	32	48	47	49	42	43	41	5	43	18	35	40	42	42
D01	Enhance Water Quality Projects Through Public - Private Partnerships (D01)	42	37	42	30	48	52	47	49	40	48	39	52	38	39	39	39
A12	Detention Basin Retrofits (A12)	43	42	40	45	44	36	32	46	44	22	45	38	40	41	43	41
E19	Technical Support for On-Going Coordination Efforts between the City and PWD (E19)	44	43	41	40	46	45	49	39	42	47	41	44	41	43	41	45
A05	Pump Stations Rehabilitation (A05)	45	45	45	47	36	42	25	45	51	39	52	46	43	37	45	53
E15	Develop Hydrodynamic Model for Casco Bay (E15)	46	54	33	56	33	29	35	36	43	52	49	42	51	53	49	49
E12	Stroudwater River Dam Removal Study (E12)	47	53	35	50	50	37	40	44	48	51	51	40	53	50	51	52
E01	Improve and Expand Stormwater Management Model (SWMM) (E01)	48	50	47	49	38	37	43	48	49	49	48	54	48	48	47	43
D08	Optimize Stormwater Compensation Utilization Fund (D08)	49	47	50	43	54	51	54	50	46	45	50	41	42	46	44	54
E13	Critical Asset Inventory (E13)	50	46	48	46	53	52	47	55	50	46	46	53	46	44	46	44
B02	Manhole Rehabilitation Along Presumpscot North Interceptor (B02)	51	49	53	44	49	56	45	42	54	41	56	51	52	51	52	50
B48*	Improve Odor Control at East End Wastewater Treatment Facility (EEWWTF) (B48)	52	48	49	37	56	48	52	53	45	56	47	58	56	54	48	51
A02	Improve Access to Interceptors (A02)	53	52	55	52	45	35	39	52	52	59	53	59	55	49	50	47
C01	Smart Covers, Rain Gauges, and Groundwater Gauges Deployment Program (C01)	54	51	54	55	57	55	56	54	53	28	55	49	49	55	54	48
B03*	Baxter Blvd. Pump Station Construction (B03)	55	55	51	53	52	45	53	51	55	53	57	48	50	52	55	56
B39	Install Anaerobic Digesters at the East End Wastewater Treatment Facility (EEWWTF) (B39)	56	58	58	51	51	61	57	57	58	61	40	60	57	57	56	55
B04*	Complete Stroudwater Pump Station Upgrades (B04)	57	59	52	58	58	54	55	56	57	54	60	50	59	56	57	60
E09	Study Hydrobrakes (E09)	58	56	56	59	60	58	58	59	56	57	58	57	60	59	58	58
E10	Develop Hydraulic Model for Fall Brook (E10)	59	57	56	57	61	58	58	58	59	58	59	56	58	58	59	57
D10	Develop and Charge Stormwater Impact Fee for Waterbody Abutters (D10)	60	60	60	60	55	58	61	60	60	55	44	55	54	60	60	59
B33	Canco Road Storm Drain (B33)	61	61	61	61	59	56	60	61	61	60	61	61	61	61	61	61

Development of Integrated Plan

Alternatives

Weights

Ranked Alternatives

Alternative	Equal Weights	Watershed Association	Business Community
CSO 1	3	3	1
CSO 2	1	2	3
CSO 3	14	8	9
CSO 4	5	6	7
CSO 5	12	10	11
Stormwater 1	2	1	2
Stormwater 2	10	14	6
Stormwater 3	13	13	15
Stormwater 4	4	5	10
Stormwater 5	15	15	14
WWTP 1	7	4	8
WWTP 2	6	7	4
WWTP 3	11	9	13
WWTP 4	8	11	5
WWTP 5	9	12	12

Themes

Low Cost Program

Low Risk Program

High Resilience Program

High Water Quality

Integrated Plan (HYBRID)

Institutional Knowledge

Regulations

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Integrated Plan: Performance

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CITY SYSTEM PERFORMANCE
PORTLAND, MAINE

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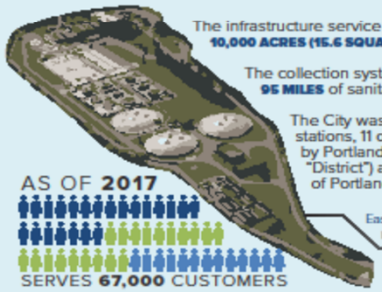
Wastewater Collection System



The infrastructure service area covers approximately **10,000 ACRES (15.6 SQUARE MILES)**

The collection system consists of approximately **95 MILES** of sanitary mains

The City wastewater system includes 23 pump stations, 11 of which are owned and operated by Portland Water District (PWD or the "District") and 12 that are owned by the City of Portland.

East End Wastewater Treatment Facility (WWTF) in Portland, which is operated by PWD.

AS OF **2017**

SERVES **67,000** CUSTOMERS

Stormwater Infrastructure

8K DRAINAGE STRUCTURES

136 MILES COMBINED SEWER PIPE

140 MILES STORMWATER DRAINAGE PIPE

130 MS4 OUTFALLS

Sewer Separation Projects

Major sewer separation projects resulted in the removal of over **295 ACRES** of surface drainage area and **279 CATCH BASINS** from the combined system.

2013 → 2018

43 CSO STRUCTURES. **12** CLOSED between 1998 - 2016

CSO Volume Per Inch of Rainfall

Dry Weather Overflows

CSO Storage Projects

GOAL
Capture first inch of rainfall runoff

1"

Back Cove North (Baxter Blvd) 2MG **COMPLETED**

Back Cove South 3.5 MG Planned

Back Cove West 3.5 MG Planned

Stormwater Management

The City has historically taken a proactive approach toward stormwater management and the past program established a solid foundation for the current program, which includes:

Prioritization of Portland's four Urban Impaired Stream watersheds for stormwater improvements, including Capisic Brook, Nasons Brook, Fall Brook, and Dole Brook. Capisic Brook watershed is the highest priority, with over **1,500 ACRES** within the City.

Development of an Illicit Discharge Detection and Elimination (IDDE) Program Manual in 2016. Implementation of the IDDE Program is ongoing, including water quality monitoring at stormwater outfalls.

Establishment of a stormwater service charge to adequately fund Portland's stormwater program. The user charge is based on impervious area, which is a surrogate measurement for the amount of stormwater runoff produced. Over **200 BMPS** have been implemented as a result of this service charge and improvements to local design requirements for development and redevelopment.

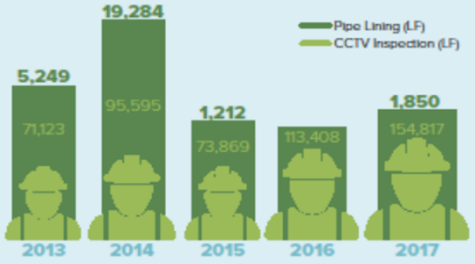
Implementation of a City-wide good housekeeping and pollution prevention program for municipal facilities and activities that could contribute stormwater pollution to the drainage system, which includes employee training.

Operations and Maintenance Activities

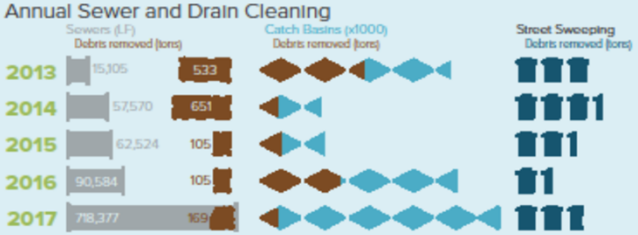
12 SmartCovers Monitoring Systems installed

FATS OILS & GREASE Over 800 inspections have been completed.

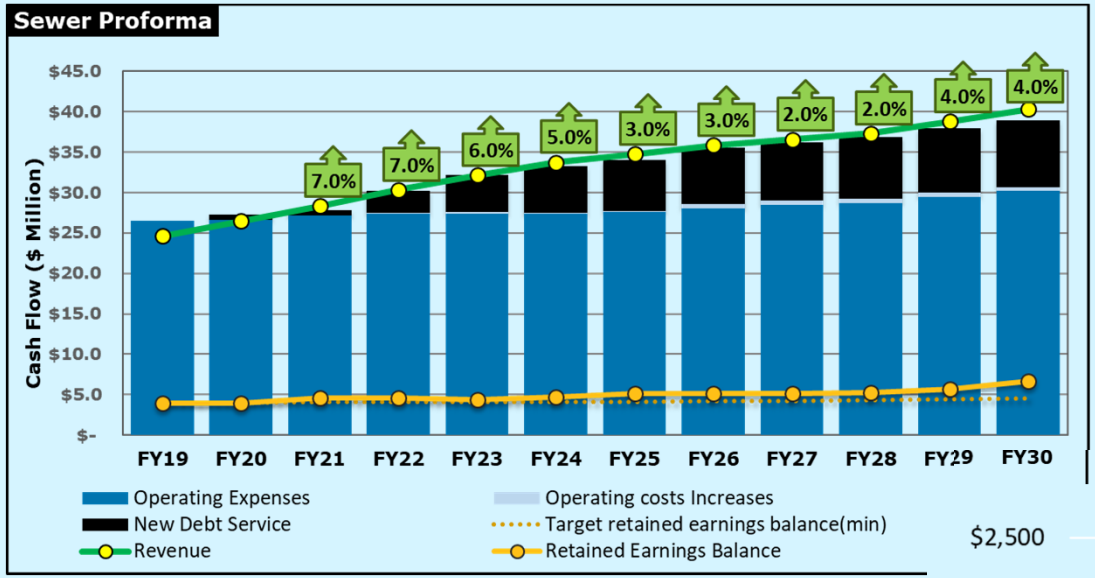
In May 2017 a **$1,800,000** multi-year I/I Program was awarded.



Annual Sewer and Drain Cleaning



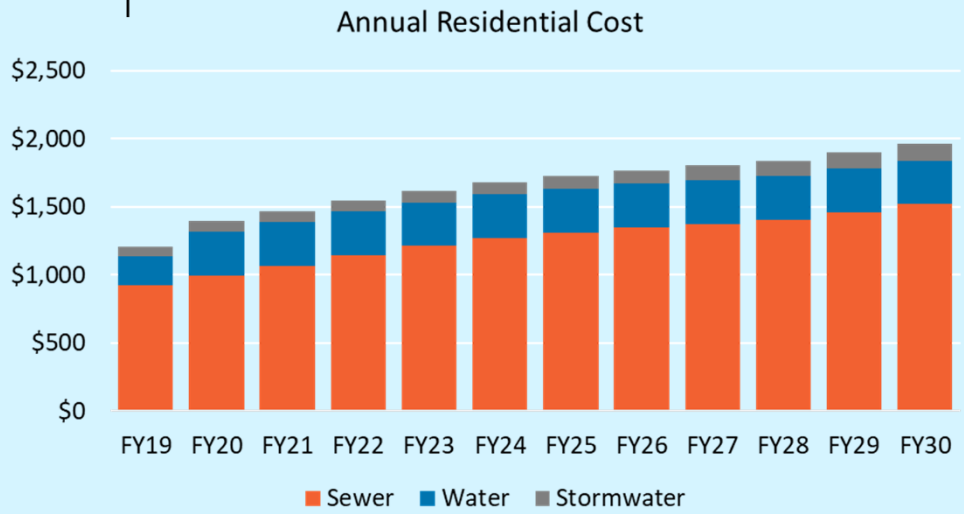
Financial Analysis



1. Develop proforma by projecting future expenses.
2. Estimate future rate increases needed to fund program
3. Calculate annual costs for typical residential user
4. Determine affordability using industry indicators

Typical Residential Customer

4 person household
200 gallons per day
1,200 SF Impervious Area
$18,404 Income (LQI)



Financial Analysis

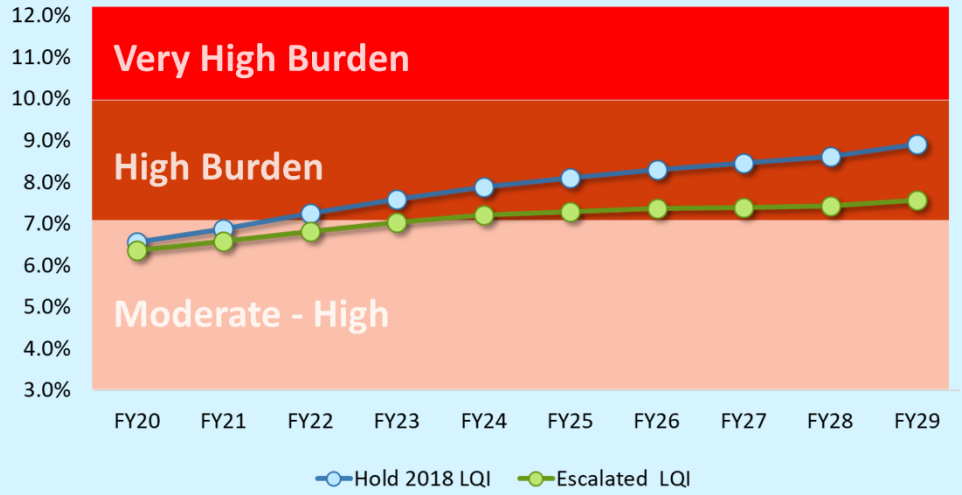
HBI – Water Costs as a percent of income at LQI	PPI Percent of Households below 200% of FPL		
	>=35%	20% to 35%	< 20%
>= 10%	Very High Burden	High Burden	Moderate - High Burden
7% to 10%	High Burden	Moderate - High Burden	Moderate - Low Burden
< 7%	Moderate - High Burden	Moderate - Low Burden	Low Burden

The Household Burden Indicator (2019). Uses two components to estimate burden.

1. Lowest Quintile Income (LQI) which is more representative of household financial status than Median Household Income. *LQI =$18,404 (2018)*

2. Poverty Prevalence Indicator (PPI) percentage of incomes below 200% of the Federal Poverty Level. *PPI = 36% (2018)*

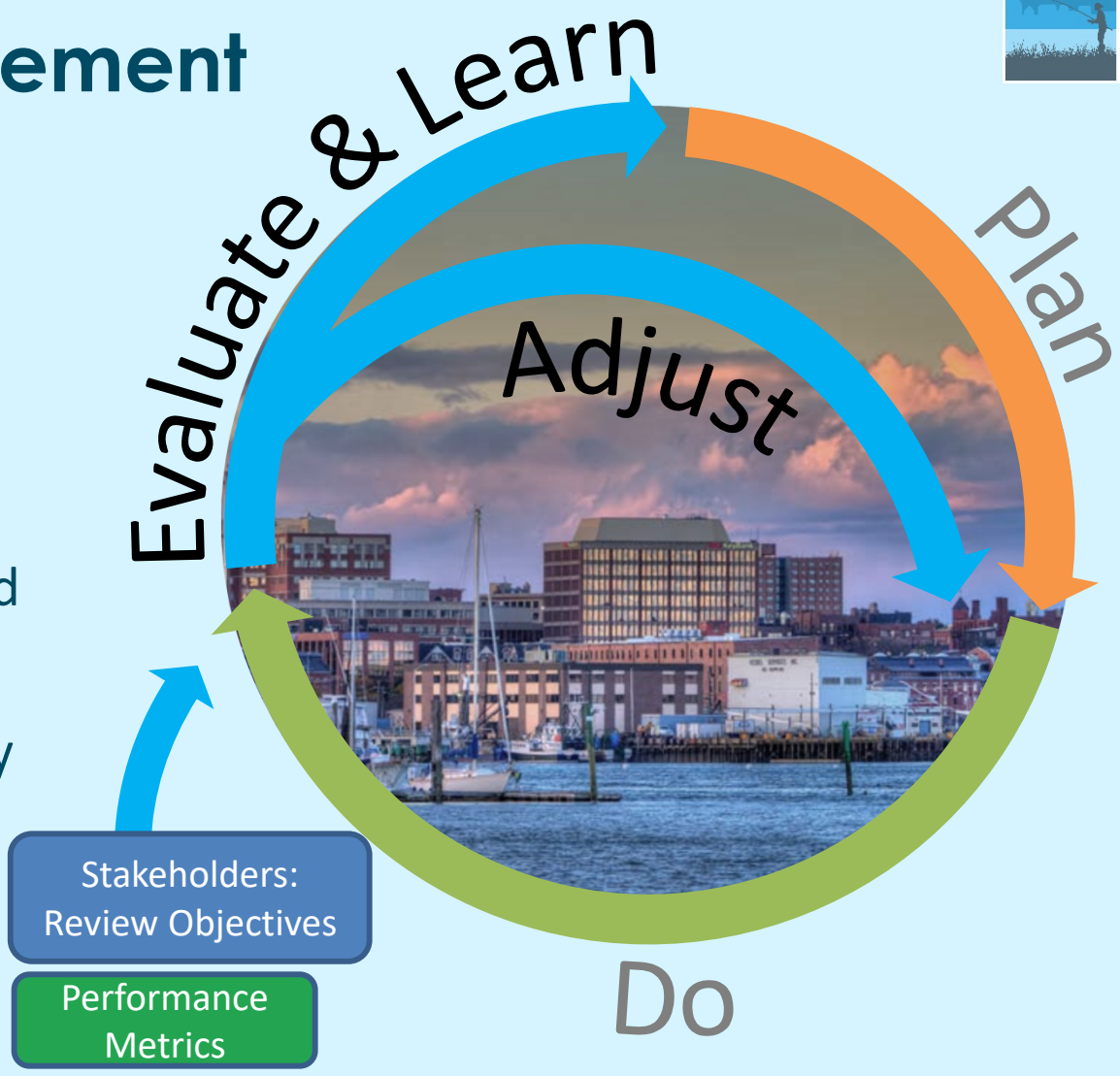
The economic burden associated with the program has more to do with the overall economic conditions in the City than the cost of the program.



Adaptive Management Framework

Evaluate & Learn

- **5 Years:** Compare trends in Performance Metrics to 10-Year Vision
- Work with Regulators and Stakeholders to Make Significant Program Adjustments, if necessary



Performance Metrics: 10 Year Vision

- Set Measurable Goals and Milestones
  - Themes for the Performance Metrics
- Alignment with the 10 Objectives
- Work Performed and Results Achieved

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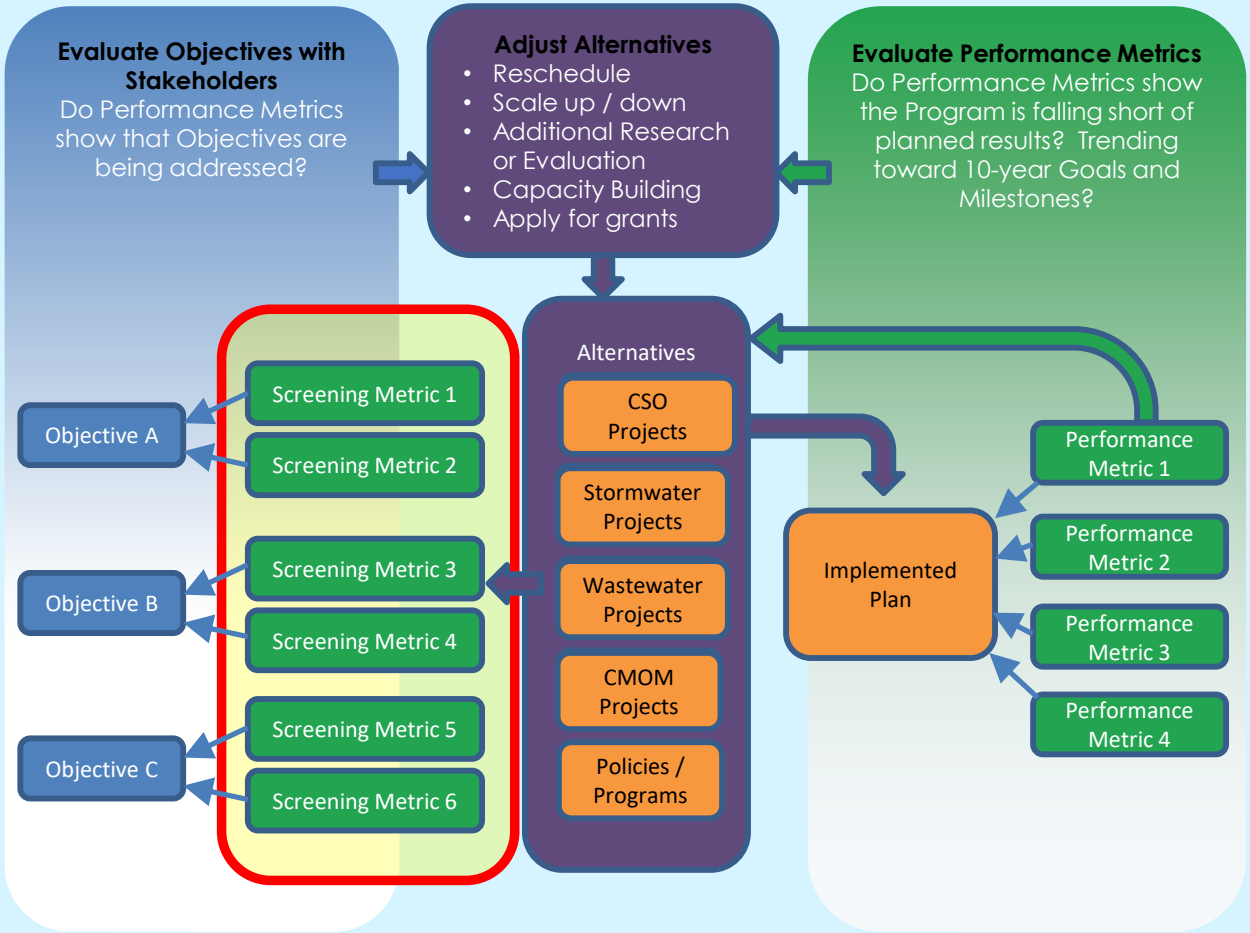
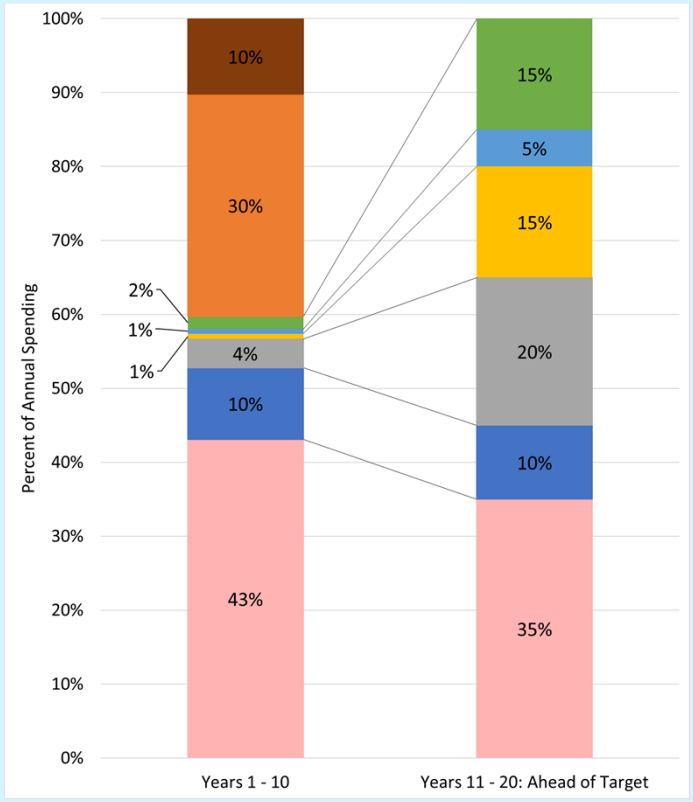
Strategy for Program Adjustments

- Program Flexibility to respond to evolving City needs
- Modifications to Program Implementation
  - Modify Alternative Prioritization, Schedule, Scale
  - Maintain Affordability
- Use Alternative Ranking and Scores to rebalance costs and benefits

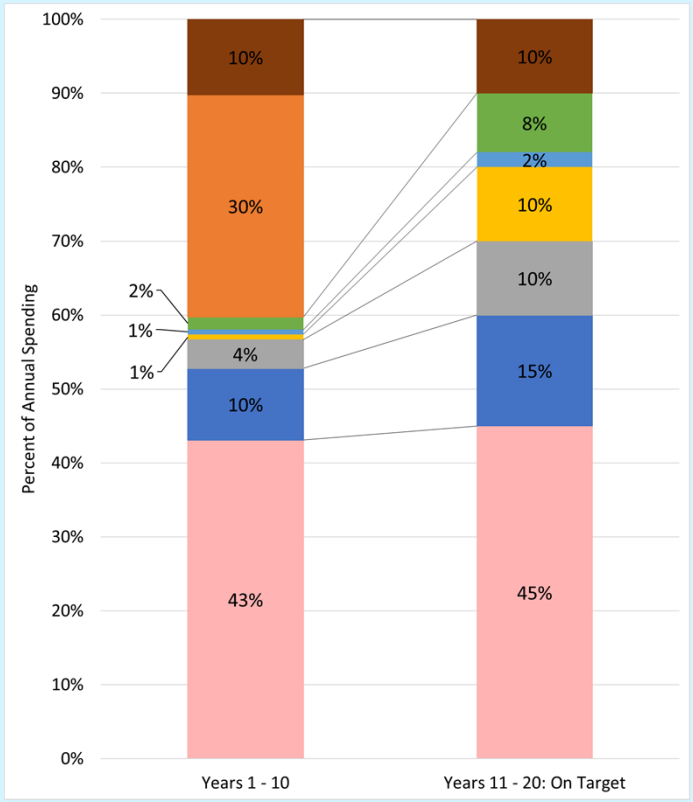


Example of Program Adjustments for Phase 2

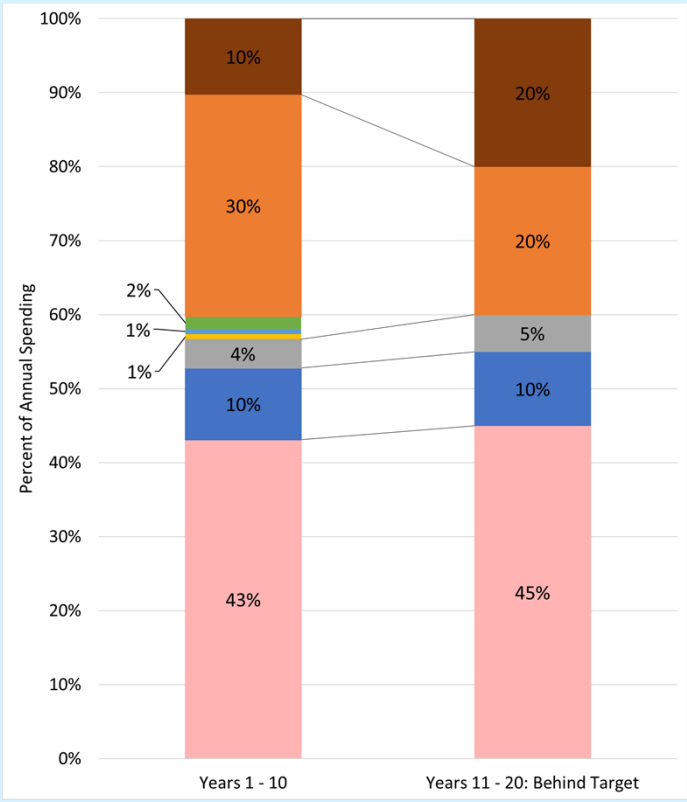
Ahead of Target



On Target



Behind Target



System Maintenance, Renewal, and Reinvestment | Non-Point Source Management | Green Infrastructure | Management/Policy | Study/Model | Waterfront Protection | CSO Storage/Treatment | Sewer Separation

Next Steps:

- Water Quality Stakeholder Group
- Integrated Permit
- Capital Improvement Plan
- Staffing, Training
- Monitoring Ongoing Projects

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Acknowledgements

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