

WTUA SAW GRANT Capital Improvements and Asset Management Plan

2017 Infrastructure Funding Seminar

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**We build lasting
relationships with
clients and their
communities**

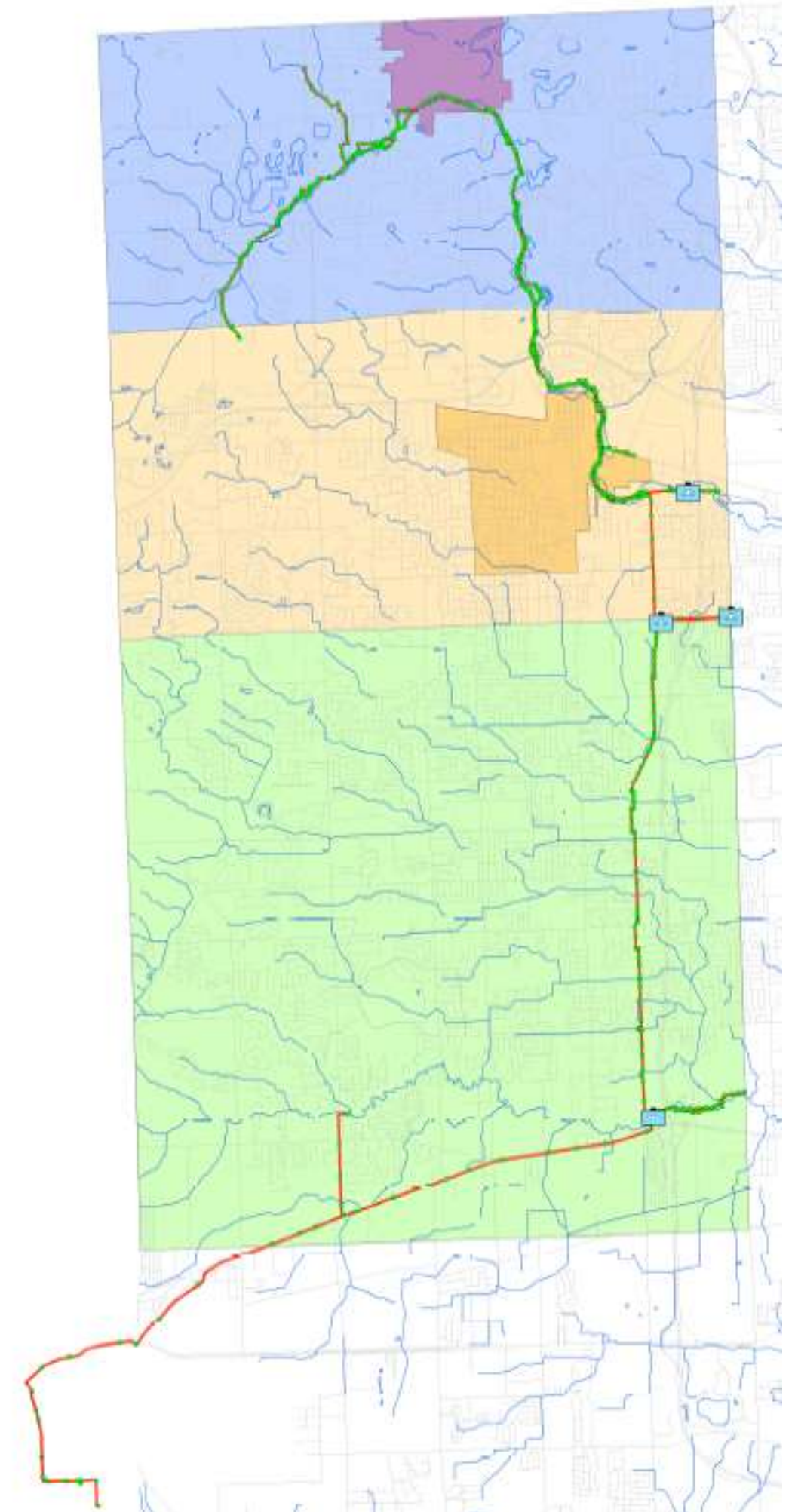
Agenda

- Introduction
- SAW Grant Scope
- Condition Assessment
- Criticality Analysis
- CIP Development
- Asset Management Plan Summary

Introduction

WTUA System Summary

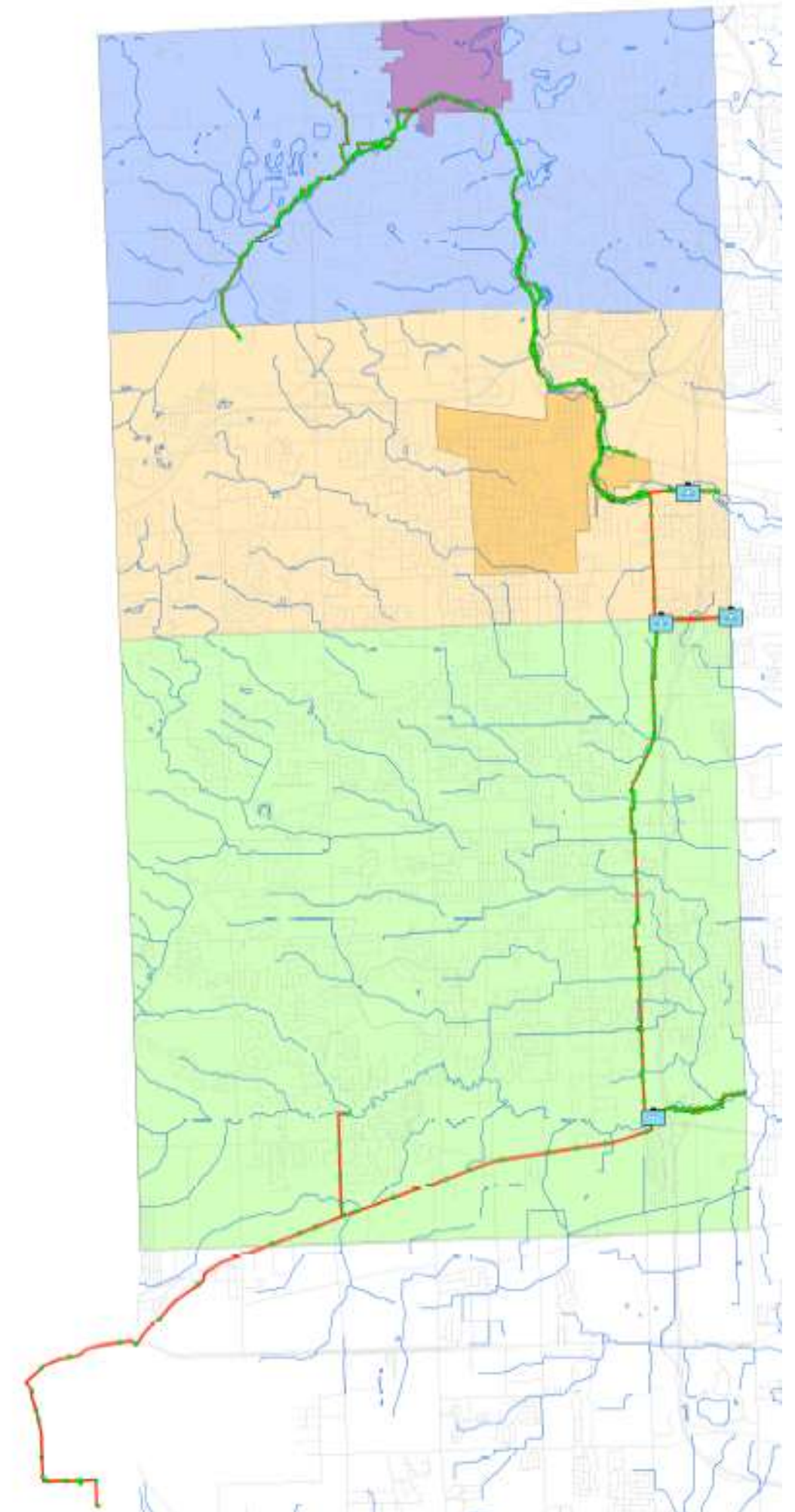
- Regional Collection and Transport
 - Northville Charter Township
 - Plymouth Charter Township
 - Canton Charter Township
- Two Regional Treatment Providers
 - YCUA
 - GLWA/DWSD



Introduction

WTUA System Summary

- Gravity Interceptors
 - 26 Miles; 12"-60"
 - > 500 manholes
 - Inverted siphons
- Force Mains
 - 8 miles; 10"-36"



Introduction

WTUA System Summary

- 2 Local Pump Stations
 - Hines PS – 2.16 MGD (1,500 gpm)
 - Eckles PS – 3.31 MGD (2,300 gpm)
- 2 Large Pump Stations
 - Middle Rouge – 72 MGD
 - 8 MG EQ Storage
 - Lower Rouge –
 - 110 MGD (fill);
 - 35 MGD (force main)
 - 11 MG EQ Storage



Introduction

WTUA Existing Asset Management/CIP

- MACP/PACP five year rotations
- Operator Opinion/Feedback
- Management Company Feedback



Introduction

WTUA Needs & Goals

- Expand from tracking assets to forecasting
 - Complete existing asset inventory (GIS, Lucity)
 - Inspect and analyze pump station facilities
 - Inspect and analyze interceptor system
 - Provide for ongoing future system evaluations
- Capital Improvement Plan

User Friendly

Streamlined

Adaptable

Customizable

SOLUTIONS

SAW Grant Scope/Approach

- 1. What Do You Have?**
- 2. Condition and Expected Service Life?**
- 3. Critical Assets & Acceptable Risk?**
- 4. Level of Service Expectations?**
- 5. When Do You Need to Do It?**
- 6. How Much Will It Cost?**
- 7. How Will You Pay For It?**



Level of Service

Level of Service (LOS) – *A qualitative measure of the internal and external requirements placed on a system.*

High – Maintain all assets at peak condition

Medium – Maintain critical and non-critical assets to provide enhanced performance and reliability

Low – Maintain the most critical assets only.



Capital Improvement Plan



- Short term Improvement Projects (0-5 years)
- Medium Term (5-10 years)
- Long term (10-20 years)



Asset Inventory

- GIS efforts
 - Attribute Population
 - Hyperlink Plans
 - Connection with AM Software
- ESRI's Collector App (pump stations)
 - Loaded with existing inventory
 - Component & attribute population
 - Photos



To make best use of your Asset Management program you need to be aware of not only how much your assets cost to repair and/or replace but also, what are they and where are they located.

Condition Assessment

Pump Stations

- Collector App
- System/Subsystem/
Component

Process	Wet Well	Forcemain Piping
		Pumps
		Pump Motors
		Inlet Gravity Sewer
		Pump Supports
	Control Chamber/Vault	Gravity Outlet from EQ
		Isolation Valves
		Flow Control Valves
	EQ Basin	Control Gates
		Flushing Devices
		Exhaust/Circulation Fans
	Pipe Gallery	Discharge Piping
	Odor Control	Tanks
		Pumps
Blowers/Fans		
Analyser		

Condition Assessment

Pump Stations

- Ratings from 1 – 5
- Apparent Condition based on:
 - Visible Condition (observed)
 - Operating Condition (WTUA feedback)



Condition Assessment

Interceptors

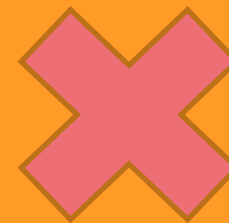
- PACP/MACP inspections
- 5-year Cycle
- Following NASSCO standards
 - Pipe Condition ratings from 1 – 5
 - Level 2 MACP Inspections



RISK



PROBABILITY OF FAILURE



CONSEQUENCE OF FAILURE

Criticality Analysis

3 Levels

- Pump Station Facility
- Pump Station Subsystems/Components
- Interceptor

Criticality Analysis

Risk Categories

- Customizable Criteria
- Examples include:
 - Disruption to Customers
 - Risk to Public Health
 - Major Traffic Disruption
 - Cost of Repair
 - Redundancy



Criticality Analysis

Risk Categories

Category Weighting



Component Redundancy	Impact on Health & Safety	0.23	Risk to Public Health	0.3	Environmental Impact	0.22	Repairability	0.13	Cost of Repair	0.12
Yes	N/A	0	N/A	0	N/A	0	Simple	2	< \$1k	0
No	Remote	3	Remote	3	Minor	3	Difficult	5	\$1 - \$5k	3
n/a	Single Injury	7	Moderate	7	Moderate	7	Complex	10	\$5 - \$25k	7
	Multiple Injury	10	Extreme	10	Extreme	10			>\$25k	10

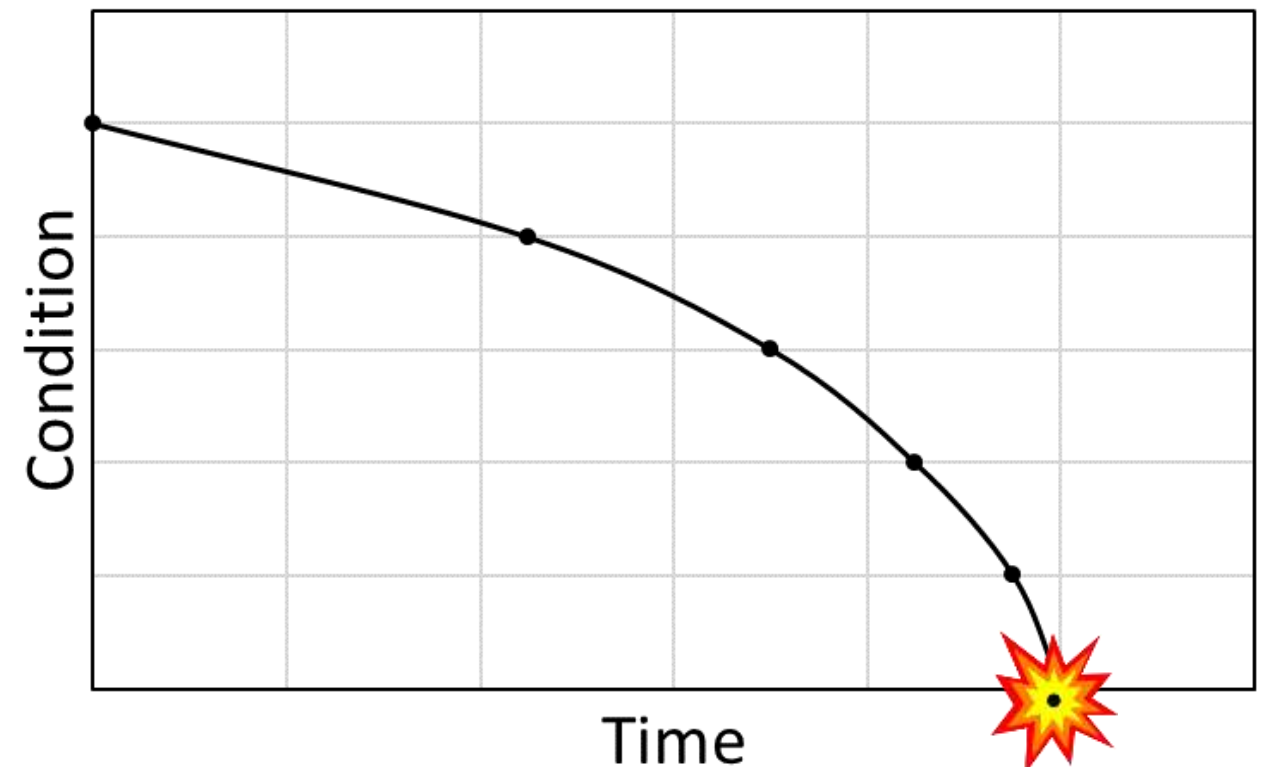
Consequence of Failure

Pair-wise Comparison



Capital Improvement Plan

- Condition/Criticality/Risk
- Life Cycle Analysis
 - Service Life – SRF Guidance Document
 - Deterioration Curve
 - Remaining Life
 - Rehabilitation date



Capital Improvement Plan

- Rehabilitation Costs
 - Recently tendered works, quotes and industry experience
 - Estimated as % of replacement cost



Capital Improvement Plan

Pump Station Facility	System	Subsystem	Component	Lucity Equipment ID	Apparent Condition ¹	Component Life Expectancy (yrs) ³	Inspection/ Replaced Year	Anticipated Year of Upgrade (yr) (from inspection date)			Subsystem Criticality ⁶	Risk ⁷	Component Rehabilitation Cost ⁸	Budgetary Consideration ⁹	LOS
Eckles PS	Electrical	Power	Distribution Panel	ECKLES-MDP	1	30	2015	23.3	2038	2068	6.74	160	\$5,000	O&M	3
Eckles PS	Electrical	Power	Transformer	ECKLES-TRANSFORMER	1	30	2015	23.3	2038	2068	6.74	160	\$10,000	O&M	3
Eckles PS	Electrical	Generator	Transfer Switch	ECKLES-SWITCHGEAR	1	30	2015	23.3	2038	2068	6.74	160	\$5,000	O&M	3
Eckles PS	Instrumentation & Control	Communication/Control	MCC	ECKLES-MCC	1	20	2015	15.5	2031	2051	6.74	160	\$6,250	O&M	3
Eckles PS	Instrumentation & Control	SCADA	PLC	ECKLES-SCADA-PLC	3	15	2015	3.4	2018	2033	5.78	450	\$5,000	O&M	3
Eckles PS	Electrical	Generator	Engine	ECKLES-BACK-UP-GEN	1	30	2015	23.3	2038	2068	5.43	120	\$50,000	CIP	3
Eckles PS	Electrical	Generator	Fuel System	ECKLES-GAS-TANK	1	30	2015	23.3	2038	2068	5.43	120	\$2,500	O&M	3
Eckles PS	Instrumentation & Control	SCADA	AI Card	ECKLES-SCADA-AI	3	15	2015	3.4	2018	2033	5.13	400	\$1,000	O&M	3
Eckles PS	Instrumentation & Control	SCADA	DI Card	ECKLES-SCADA-DI	3	15	2015	3.4	2018	2033	5.13	400	\$2,500	O&M	3
Eckles PS	Instrumentation & Control	SCADA	DO Card	ECKLES-SCADA-DO	3	15	2015	3.4	2018	2033	5.13	400	\$1,000	O&M	3
Eckles PS	Instrumentation & Control	Instrumentation	Flow Meters	Eckles-Flow-Meter	1	15	2015	11.6	2027	2042	5.13	120	\$1,250	O&M	3
Eckles PS	Instrumentation & Control	Instrumentation	Flow Meters	FE-21	1	15	2015	11.6	2027	2042	5.13	120	\$1,250	O&M	3
Eckles PS	Instrumentation & Control	Instrumentation	Level Sensors	ECKLES-FM-MRVI	1	15	2015	11.6	2027	2042	5.13	120	\$1,250	O&M	3
Eckles PS	Process	Wet Well	Forcemain Piping	ECKLES-LINKSEAL	4	30	2015	3.0	2018	2048	2.91	260	\$2,500	O&M	3
Eckles PS	Process	Wet Well	Forcemain Piping	ECKLES-FM-WETWELL	3	30	2015	6.8	2022	2052	2.91	230	\$25,000	CIP	3
Eckles PS	Process	Control Chamber	Check Valves	ECKLES-CHECKV-1-2	2	20	2015	8.5	2024	2044	2.72	160	\$25,000	CIP	3
Eckles PS	Process	Control Chamber	Forcemain Piping	ECKLES-BYPASS	2	30	2015	12.8	2028	2058	2.72	160	\$5,000	O&M	2
Eckles PS	Process	Control Chamber	Forcemain Piping	ECKLES-FM-VAULT	2	30	2015	12.8	2028	2058	2.72	160	\$25,000	CIP	3
Eckles PS	Process	Control Chamber	Isolation Valves	ECKLES-PLUGV-1-2	2	20	2015	8.5	2024	2044	2.72	160	\$25,000	CIP	3
Eckles PS	Process	Control Chamber	Isolation Valves	ECKLES-PLUGV-3	2	20	2015	8.5	2024	2044	2.72	160	\$10,000	O&M	3
Eckles PS	Structural	Wet Well	Guide Rails	ECKLES-SLIDERAILS	2	30	2015	12.8	2028	2058	2.23	130	\$1,000	O&M	2
Eckles PS	Structural	Wet Well	Lifts	ECKLES-LIFTING-CHAIN	1	30	2015	23.3	2038	2068	2.23	50	\$1,000	O&M	2
Eckles PS	Process	Wet Well	Sewer Isolation Valves	ECKLES-GRAV-VALVE	4	20	2015	2.0	2017	2037	1.79	160	\$10,000	O&M	1
Eckles PS	Mechanical	Plumbing	Sump Pumps	ECKLES-SUMP-PUMP	1	15	2015	11.6	2027	2042	1.28	30	\$1,000	O&M	1
Eckles PS	Architectural	Building	Exterior Walls	ECKLES-00-EXT-WALL	1	40	2015	31.0	2046	2086	1.10	30	\$2,500	O&M	1
Eckles PS	Architectural	Building	Floor	ECKLES-00-FLOOR	1	50	2015	38.8	2054	2104	1.10	30	\$1,250	O&M	1
Eckles PS	Architectural	Building	Interior Walls	ECKLES-00-INT-WALL	1	50	2015	38.8	2054	2104	1.10	30	\$1,250	O&M	1
Eckles PS	Architectural	Building	Roof	ECKLES-00-ROOF	2	30	2015	12.8	2028	2058	0.62	40	\$2,500	O&M	1
Eckles PS	Architectural	Building	Ceiling	ECKLES-00-CEILING	1	40	2015	31.0	2046	2086	0.62	10	\$625	O&M	1
Eckles PS	Mechanical	HVAC	Actuators	ECKLES-ACT-1	1	10	2015	7.8	2023	2033	0.48	10	\$500	O&M	2
Eckles PS	Mechanical	HVAC	Actuators	ECKLES-ACT-2	1	10	2015	7.8	2023	2033	0.48	10	\$500	O&M	2
Eckles PS	Architectural	Building	Doors	ECKLES-00-DOOR	2	30	2015	12.8	2028	2058	0.26	20	\$125	O&M	1

Capital Improvement Plan

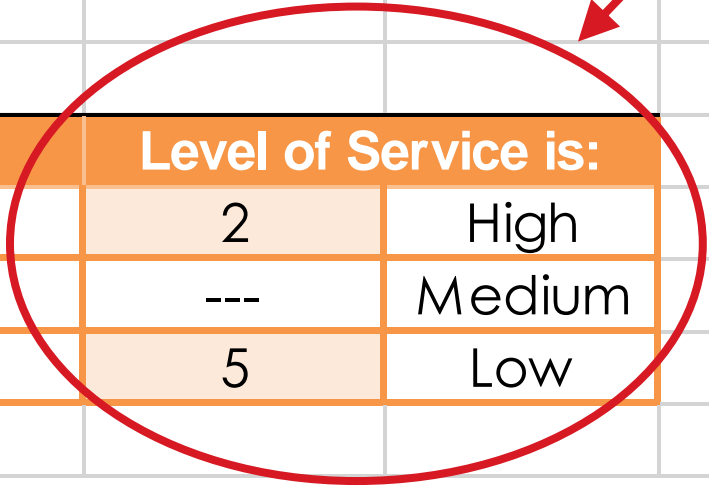
WTUA Asset Management & Capital Improvement Plan			
WTUA Needs and Costs Analysis - Summary			
Analysis Tools			
Budget Category	CIP		
Level of Service	Medium		
Beginning Year of 20-yr Planning Period	2018		
Interceptor Analysis Tools			
Condition Rating Type	Structural		
Risk Threshold	200		
Level of Service Criteria			
If criticality is:	Level of Service is:		
less than (0 min.)	2	High	
in between these limits	---	Medium	
greater than (10 max.)	5	Low	
			Estimated 20-year Financial Outlay
			Lower Rouge PS
			\$7,800,000
			Middle Rouge PS
			\$3,737,500
			Hines PS
			\$212,500
			Eckles PS
			\$287,500
			Interceptors
			\$1,461,200
			Total
			\$13,498,700

Budget Filter

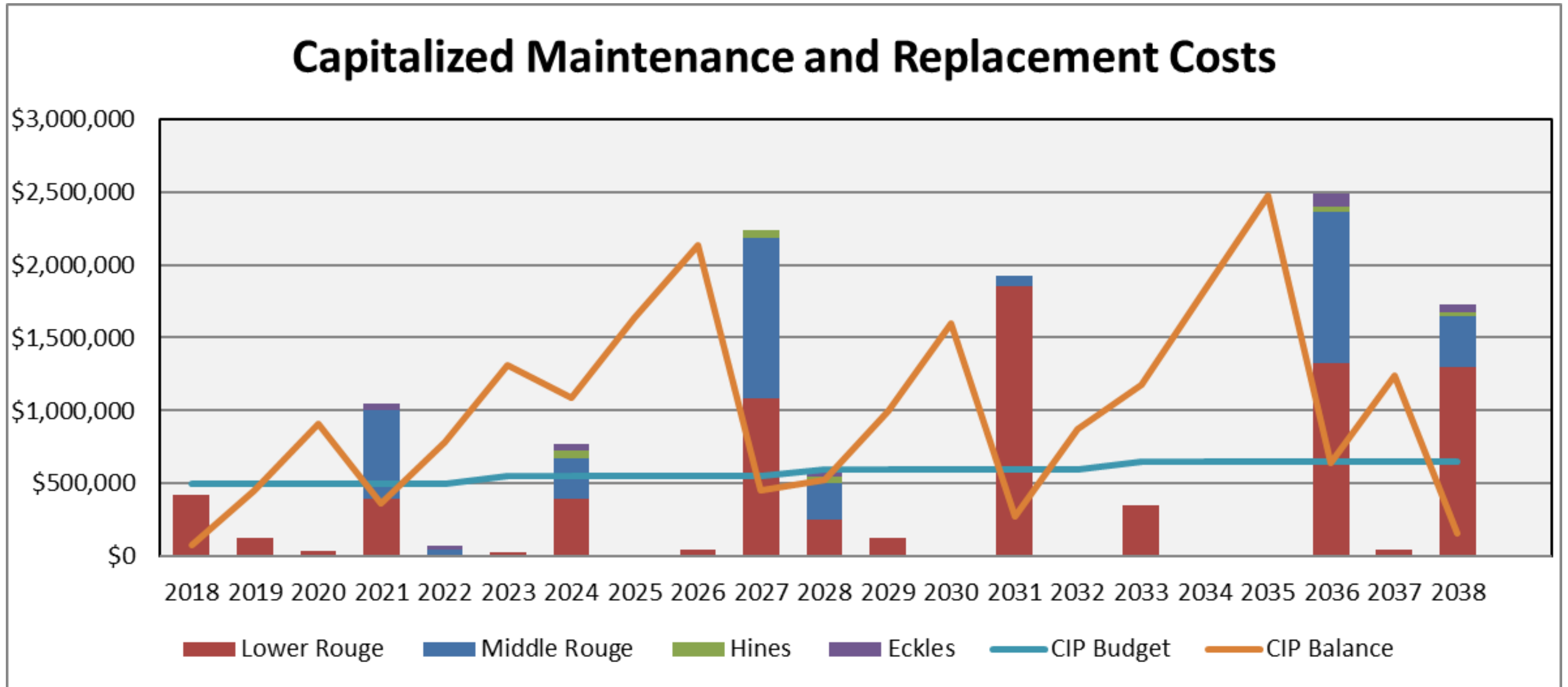
Toggle LOS

Risk Threshold

Criticality → LOS relationship



Capital Improvement Plan



Asset Management Summary

- Framework for future analysis
 - Update periodically
 - Annually for facilities
 - Every five years for Interceptors
- Adaptable to client preferences
 - Level of Service
 - Risk Tolerance
 - Customizable Criticality Criteria
 - Budget Targets



