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New York State Department of Environment Conservation's Asset Management Pilot

New England Water Environment Association Annual Conference

January 23, 2023

Agenda

- Pilot Program Background
- Introduction to Asset Management
- Pilot Program Tasks
- Lessons Learned from our Case Studies
- Current Activities of Asset Management Program

Introductions

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NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

NEW YORK STATE OF OPPORTUNITY. | Environmental Facilities Corporation

Barton & Loguidice

Hazen

Savin Engineers, P.C.

Ryan Biggs Clark Davis Engineering & Surveying

Patriot Design & Consulting — Still Serving

New York State Water Resources Institute

Town of Carmel, New York

Village of Honeoye Falls — come for the charm, stay for the experience

Westfield, New York

Village of Vernon — Incorporated 1827

Washington County Sewer District #II

Town of Bethlehem, NY

The Village of Dolgeville

Onondaga County Seal

Village of Greenport — Est. 1838

Corporation of the City of Yonkers

Agenda

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Why Asset Management?

Protect ecosystems and public health

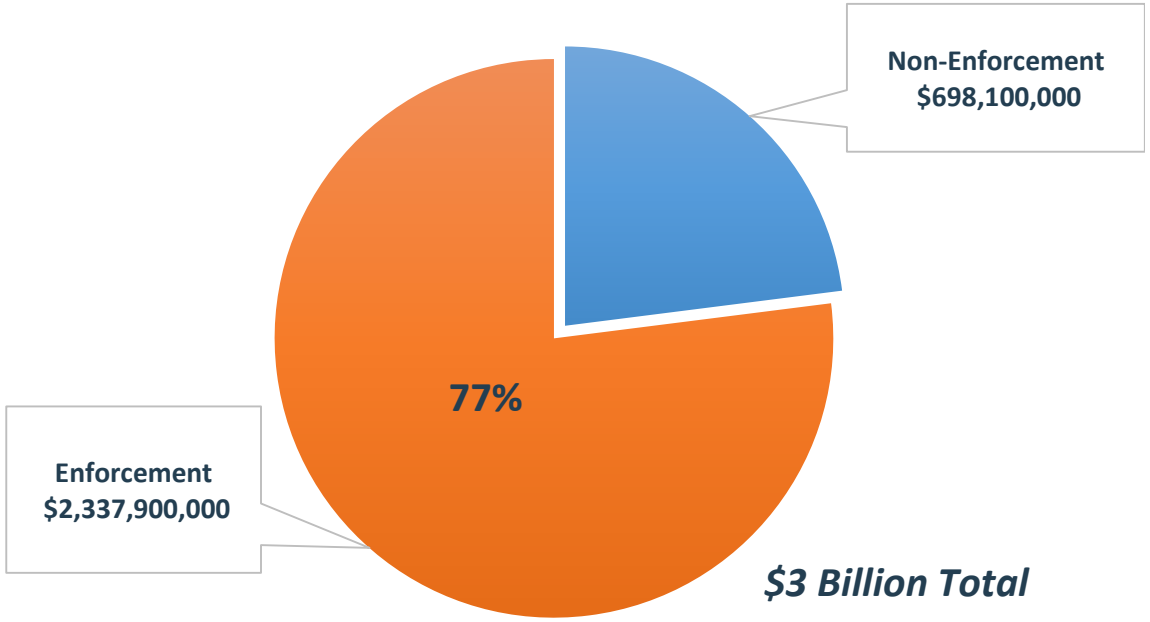
Avoid enforcements and penalties

Minimize long-term ownership costs

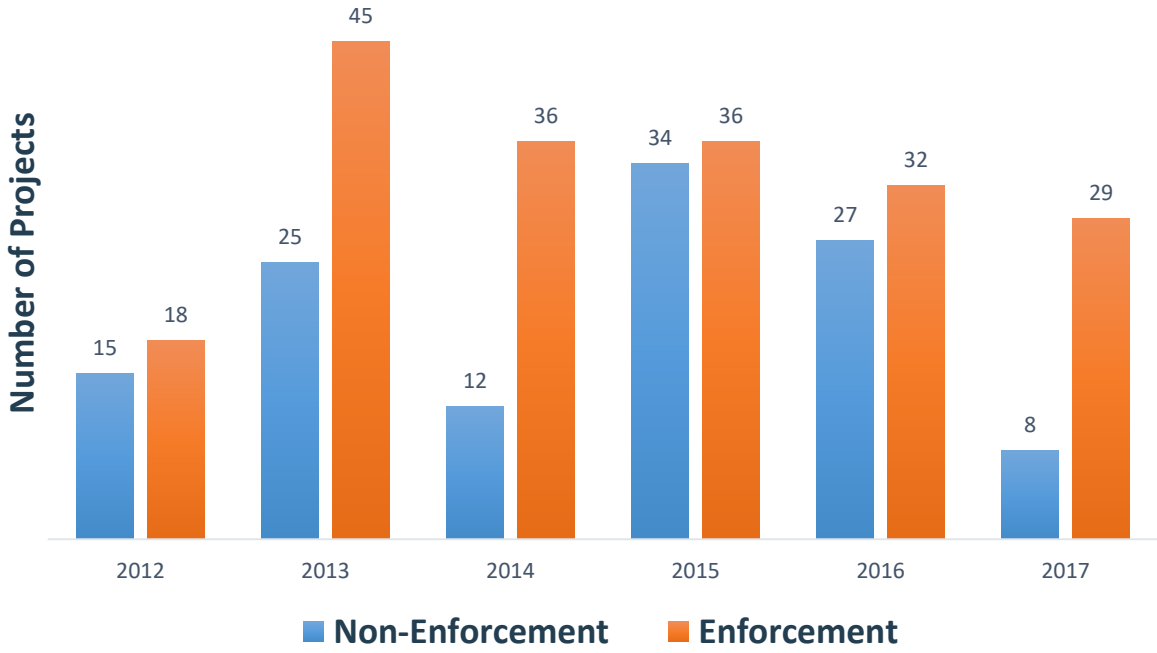
Maintain economic advantage

Why a Pilot Program?

CWSRF Financing (Fiscal Year 2012-2017)

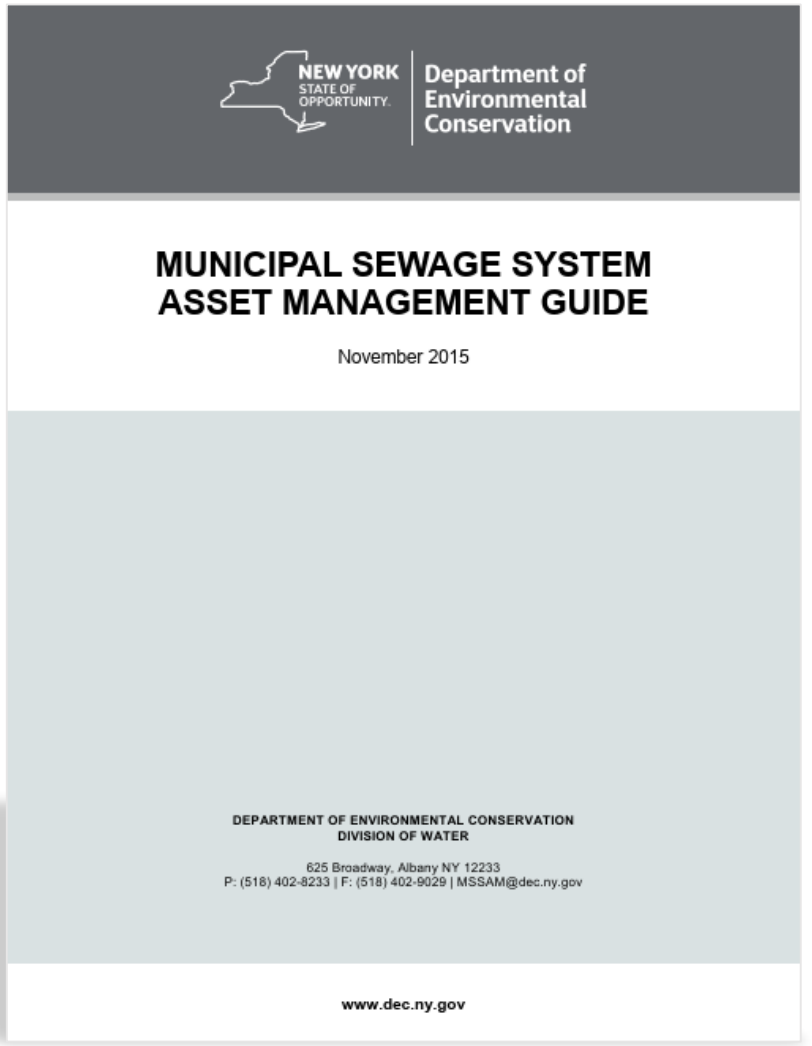


CWSRF Projects (Fiscal Year 2012-2017)

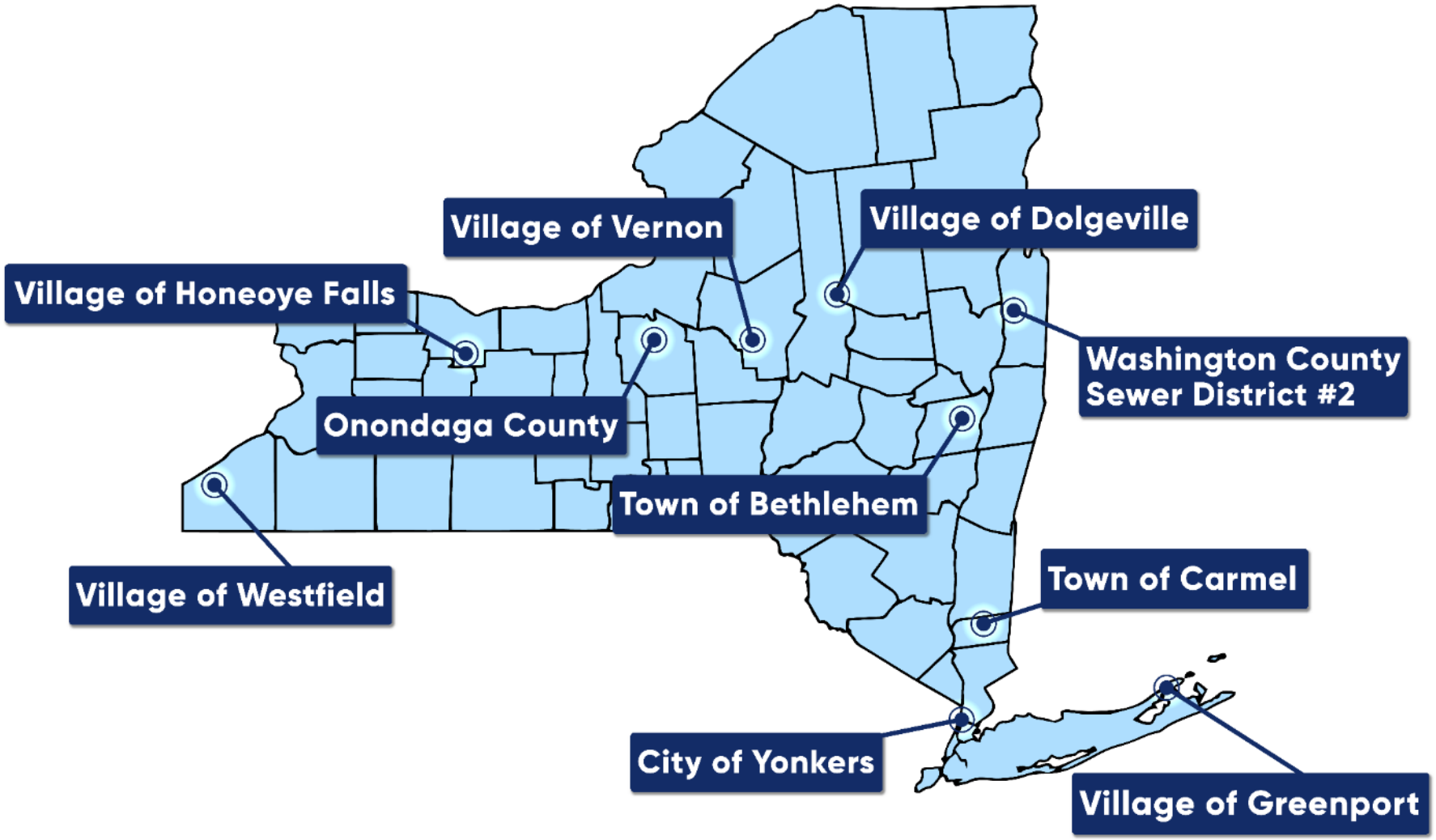


Purpose of the Pilot

- Learn how asset management works in different places around the state
- Develop guidance materials and templates that can be used by municipalities in the future
- The ultimate purpose: to test and improve the Guide



How the Pilot Started



Agenda

- Pilot Program Background
- Introduction to Asset Management
- Pilot Program Tasks
- Lessons Learned from our Case Studies
- Current Activities of Asset Management Program

What is Asset Management?

- In the context of **municipal wastewater systems**, **asset management** is managing assets in a way that **protects the public health and the environment**. It minimizes **the life-cycle cost** of the assets while continuing to deliver the expected **levels of service**.

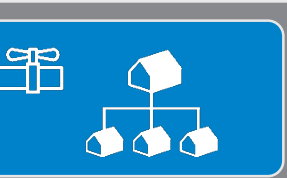
Benefits

- Supports effective information transfer and knowledge retention
- Improves communication between staff, regulators, and the community
- Improves public confidence through transparency and education
- Identifies risk management techniques and strategies
- Creates rigorous and defensible decision-making tools
- Lowers costs through more efficient asset ownership

EPA's Five Core Questions

1. What is the current status of my assets?

2. What is the required sustainable level of service?



3. Which assets are critical to providing those services?

4. What are the best O&M and CIP strategies?

5. What is the best long term funding strategy?

Agenda

- Pilot Program Background
- Introduction to Asset Management
- **Pilot Program Tasks**
- Lessons Learned from our Case Studies
- Current Activities of Asset Management Program

Tasks of the Pilot Program

#	Description	#	Description
1	Kick-Off Meetings	10	O&M Expenditure Program
2	Inventory of Critical Assets	11	Capital Improvement Plan
3	Condition Scores for Critical Assets	12	Sewer Rate Study
4	Remaining Useful Life	13	Long Range Funding Strategy
5	Replacement Cost	14	Develop Asset Management Program
6	Levels of Service	15	Project Management
7	Consequence of Failure Scores	16	Implementation of Asset Management Program
8	Likelihood of Failure Scores	17	Outreach, Education and Training
9	Risk Scores	18	Final Asset Management Program Templates

Agenda

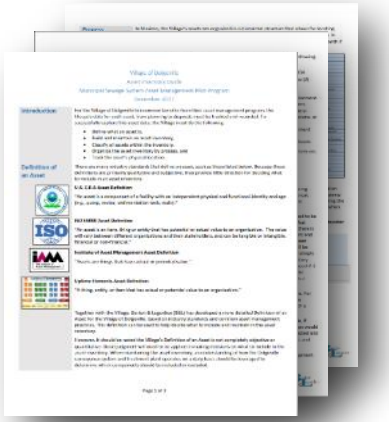
- Pilot Program Background
- Introduction to Asset Management
- Pilot Program Tasks
- Lessons Learned from our Case Studies
- Future of Asset Management

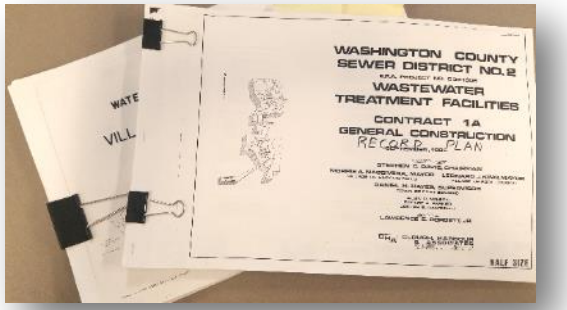
Task 1: Kick-Off Meetings

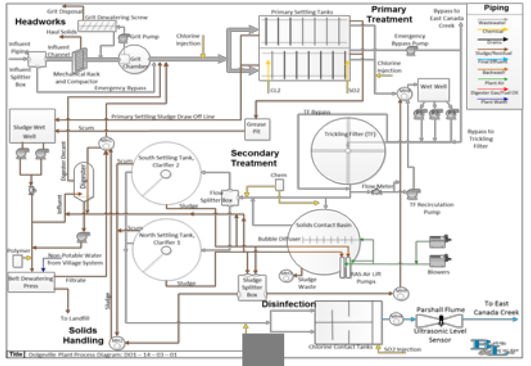
- What was done?
  - Overall meeting with all project participants
  - Separate in-person meetings with each municipality
- Why was it important?
  - Set the stage for the Pilot
  - Involve all facets of the municipal government structure
  - Identify the asset management champion
  - Initiate a shift in culture

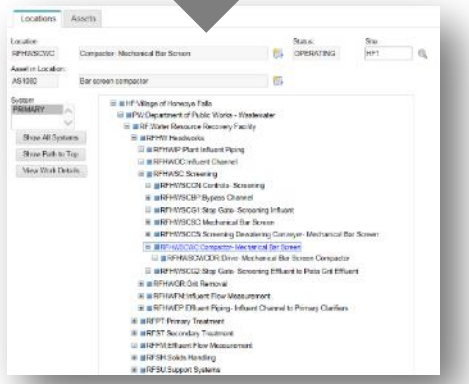
Task 2: Inventory of Critical Assets

To build asset inventories, we relied on available resources and developed tools to streamline the process

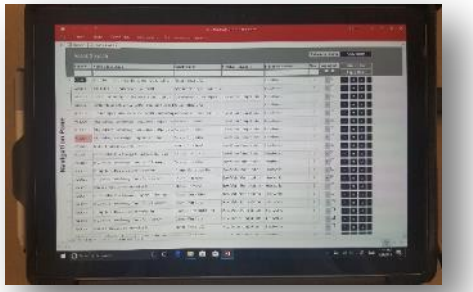






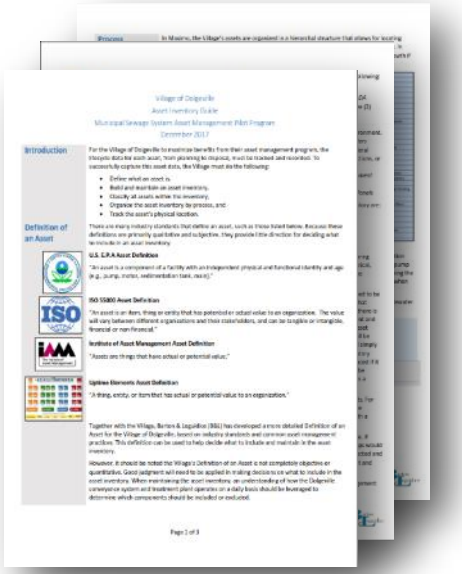


Feature Class Name	Feature Type	Description
ssGravityMain	Polyline	Separated and combined sewer gravity mains. This layer should include all main, trunk, and interceptor sewers. Siphons are also mapped in this layer. Pipes should be drawn in the direction of flow so arrows can be used to indicate flow direction.
ssManhole	Point	Manhole features connect two or more pipes and control the flow of water in the network through pipe elevations.
ssNetworkStructure	Point	Sewer network structures such as treatment plants and pump stations.
ssPressurizedMain	Polyline	Separated and combined sewer pressure mains (Force mains).
ssSystemValve	Point	Separated and combined sewer system valves, typically found on pressurized mains.
ssDischargePoint	Point	Wastewater discharge points (CSOs).



Task 2: Inventory of Critical Assets

Asset Inventory Guide provides specific guidance for building and maintaining asset inventories



The Village of Dolgeville's Definition of an Asset

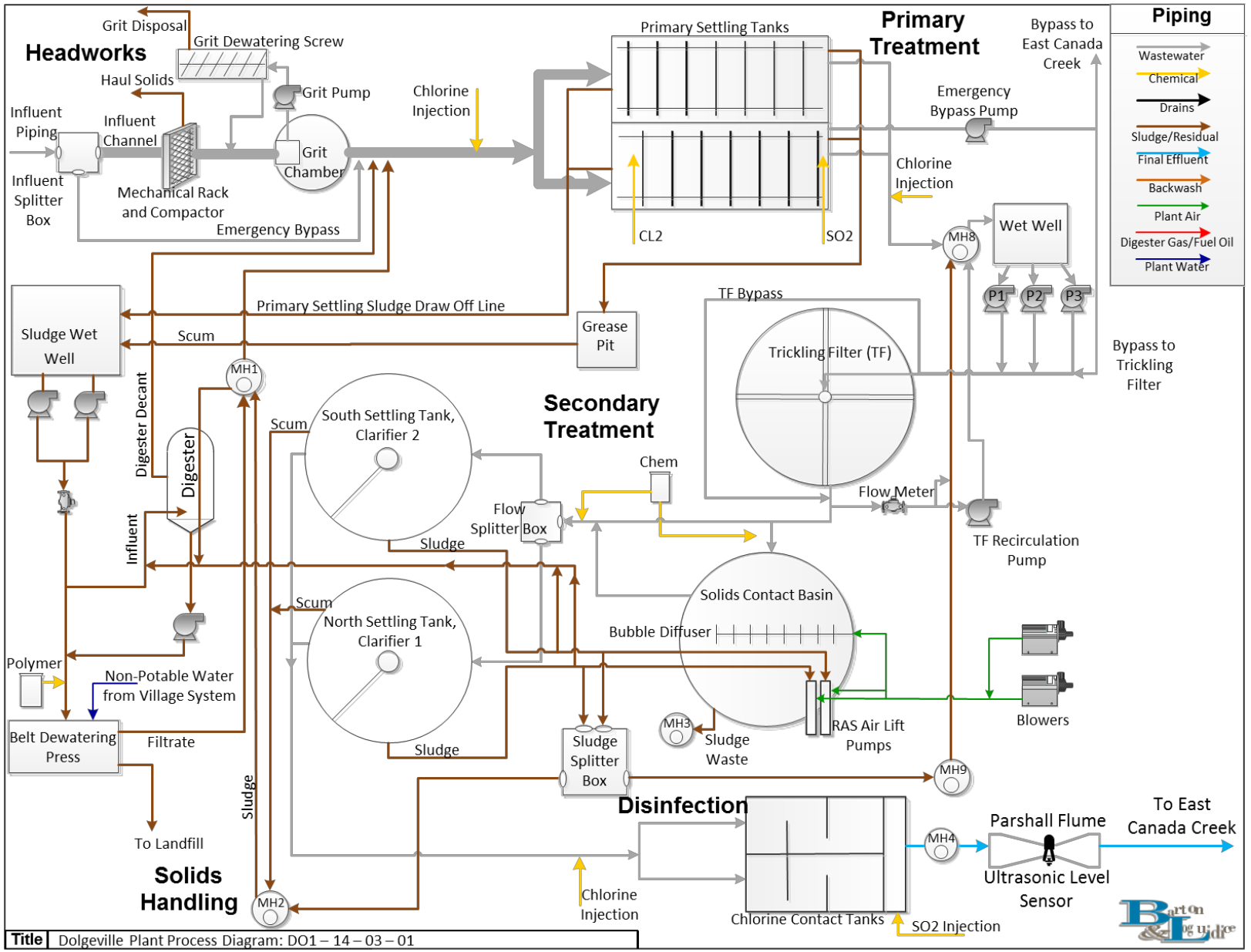
To be cataloged as an asset, the equipment/component must satisfy one or more of the following:

- Any necessary component in the conveyance or treatment of wastewater.
  Examples: Valves, Piping, Tanks, Pumps, Blowers, Aeration Diffusers, Controls, SCADA
- Any piece of equipment with an estimated useful life equal to or greater than three (3) years.
- Any piece of equipment with an estimated value greater than $3,000.
- Any component or piece of equipment that provides a safe and healthy work environment.
  Examples: Exhaust Fans, Gas Detectors, Eyewash Stations, Odor Control, Unit Heaters
- Any component or piece of equipment required to comply with local, state, or federal regulatory standards, or equipment that requires documented calibrations, inspections, or other activities.
  Examples: Fire Extinguishers, Flow Meters, Sampling Equipment, Chemical Containment
- Any necessary component or piece of equipment in the supply of electricity.
  Examples: Motors, Circuit Breakers, Transfer Switches, Generators, Switch Gears, Panels

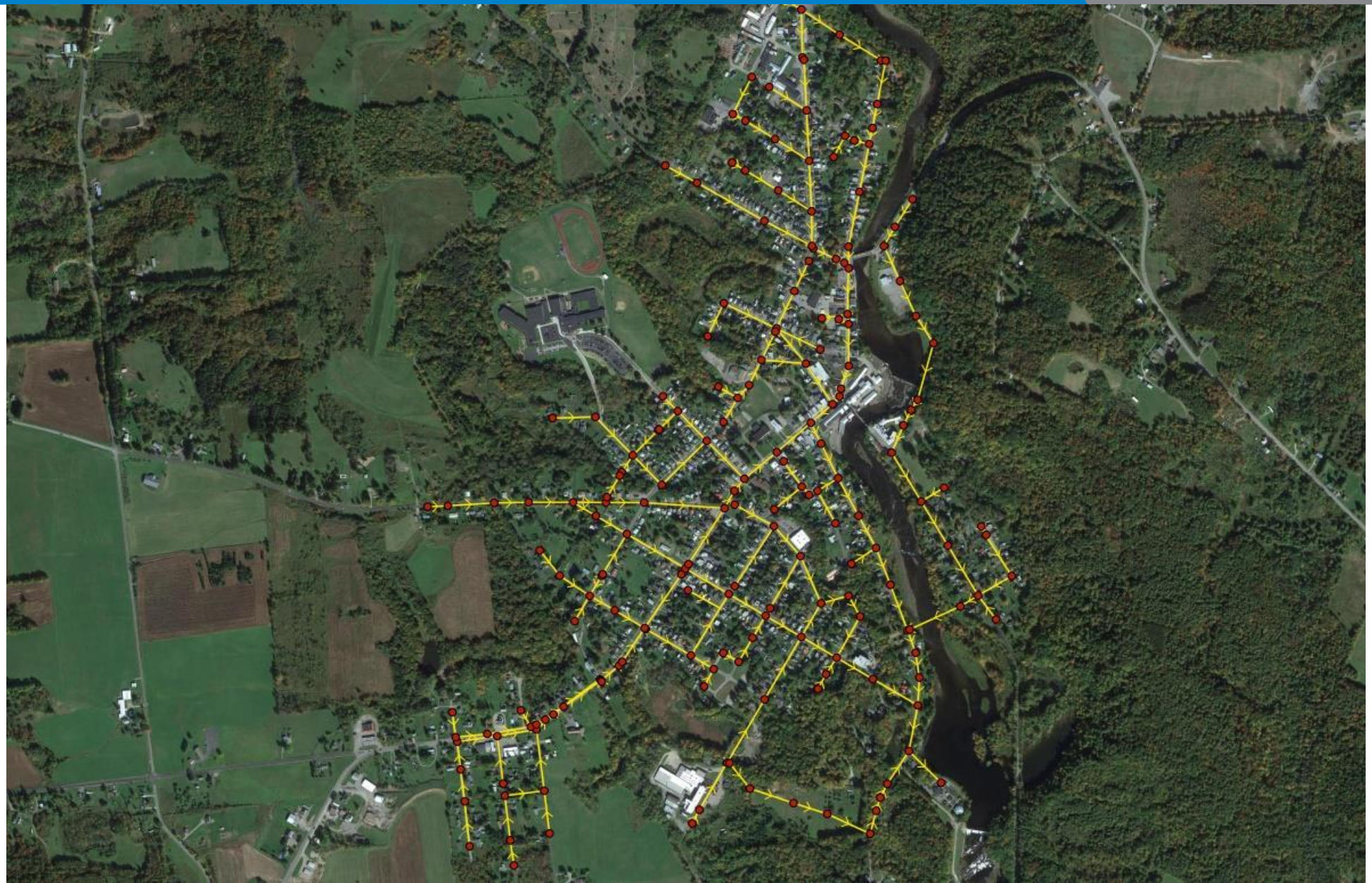
Other questions to condsider when deciding whether to include an item in the asset inventory are:

- Is the asset repairable or replaceable?
- Does it require maintenance?
- Is it inspected?
- Does it require individual tracking for reliability or performance purposes?

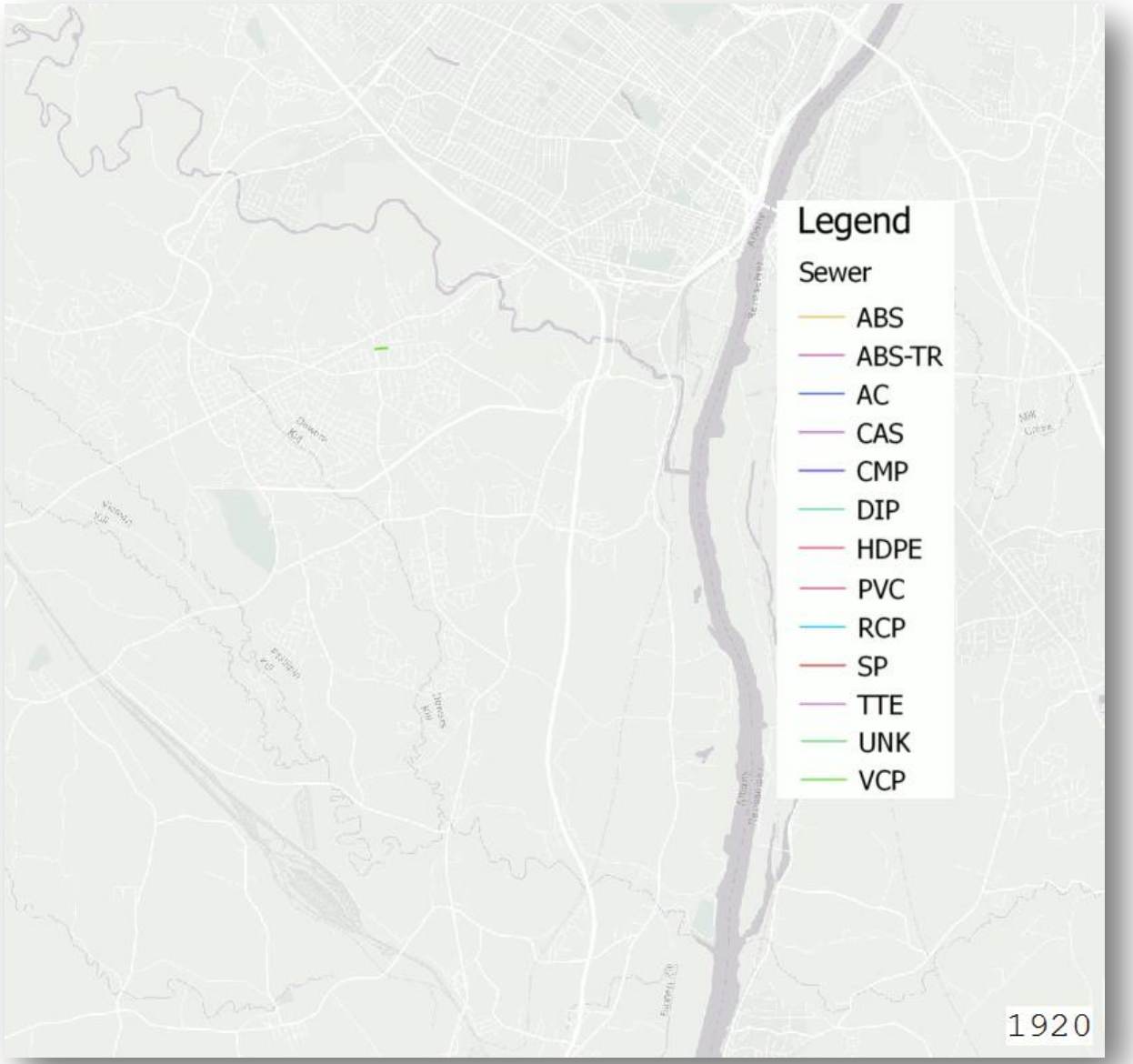
Task 2: Inventory of Critical Assets



Task 2: Inventory of Critical Assets

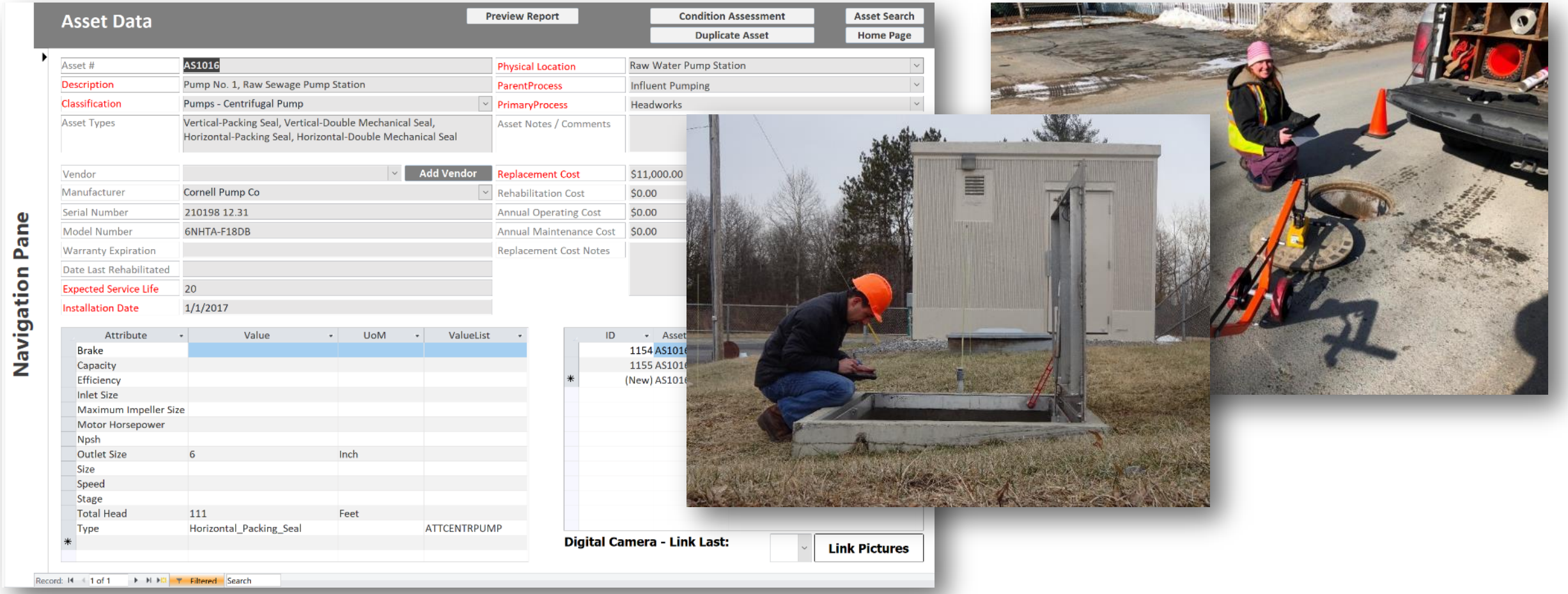


Task 2: Inventory of Critical Assets



Task 2: Inventory of Critical Assets

Tablets were used in the field to streamline data collection for the asset inventories



Task 3: Condition Scores for Critical Assets

Condition assessments are driven by the asset classification.

List View | Work Order | Details | Log/Notes | Plans | Assignments | Related Records | Actuals | Safety Plan | Failure

Work Order: WO1076 — Condition Assessment- AS1002
Site: DO1
Status: WAPPR
Attachments
Location: RFHWOC — Influent Channel
Average Condition Score: 2.57
Asset: AS1002 — Influent Channel
Classification: STRUCTURESWO
Class Description: Structures

Details — Filter — 1 - 7 of 7

Attribute	Description	Data Type	Alphanumeric Value
STRUCT_FO	Structural & Foundation systems - exposed systems only	NUMERIC	
EXENCL	Exterior enclosure – masonry, curtain wall, EFIS, exterior paint / siding, etc.	NUMERIC	3
INTSYS	Interior systems – walls, partitions, doors, finishes, interior paint, etc.	NUMERIC	1
PLUMBSYS	Plumbing systems	NUMERIC	1
ELECLIGHTS	Electrical / lighting systems – existing	NUMERIC	1
MECHSYS	Mechanical systems – boilers, HVAC, etc.	NUMERIC	1
BLDFIRECO	Building and fire code issues, accessibility compliance updates	NUMERIC	1

Manhole Inspection Report

Inspection Summary				Cover Details			
Inspection ID	6	Maximo WO #	WO1019	Cover Material	Cast Iron	Cover Location	Flush
MH #	9	Maximo Asset #	AS1301	Cover Condition	Sound	Amount Offset	0
Inspector	Killeen	Weather	Damp	Opening Size	24	# PickHoles	0
Date	10/31/2017	Time	8:52 AM	Cover Depth	1.5	Pick Hole Diameter	0
StreetLocation	Stewart St	Surcharged	☐	Frame Details			
Invert Depth (in)	87	MH Cleanliness	Adequate	Matial	Cast Iron	Opening Size	24
Surface Type	Asphalt	MH Diameter	60	Condition	Sound	Frame Depth	18
		Overall Condition Score	6	Insert	No	Frame Offset	No
Notes						Amount Frame Offset from Manhole	0
Corbel Details				Wall Details			
Material	Brick	Condition 1		Material	Brick	Condition 1	Water Mark
Condition 2		Condition 3		Condition 2		Condition 3	
Bench Details				Invert and Channel			
Material	Concrete	Condition 1		Material	PVC	Flow Characteristic	Steady
Bench Dep. Depth	0	Condition 2		Channel Dep. Depth	0	Condition 1	
Steps Details				Flow Depth	1/4 Full	Condition 2	
Material	Metal	Condition	Missing	Count of Steps	3		

Source Location	Estimated Flow	Deficiency	Deficiency Rating	Comments
Wall	0	Evidence of Infiltration		

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Task 4: Remaining Useful Life

- Remaining useful life was estimated for each asset in the inventory
- Key for capital planning, setting reserve budgets, and establishing sewer rates
- **EUL – Estimated Useful Life** (Design Life)
- **RUL – Remaining Useful Life** (Straight Subtraction, Adjusted, Manual)
- Why differentiate?

References:

- WERF Remaining Effective Life Tool
- NYSOGS Financial Administration Useful Life Table
- Engineering Judgement
- Operator Experience

Task 4: Remaining Useful Life

RUL Comparison

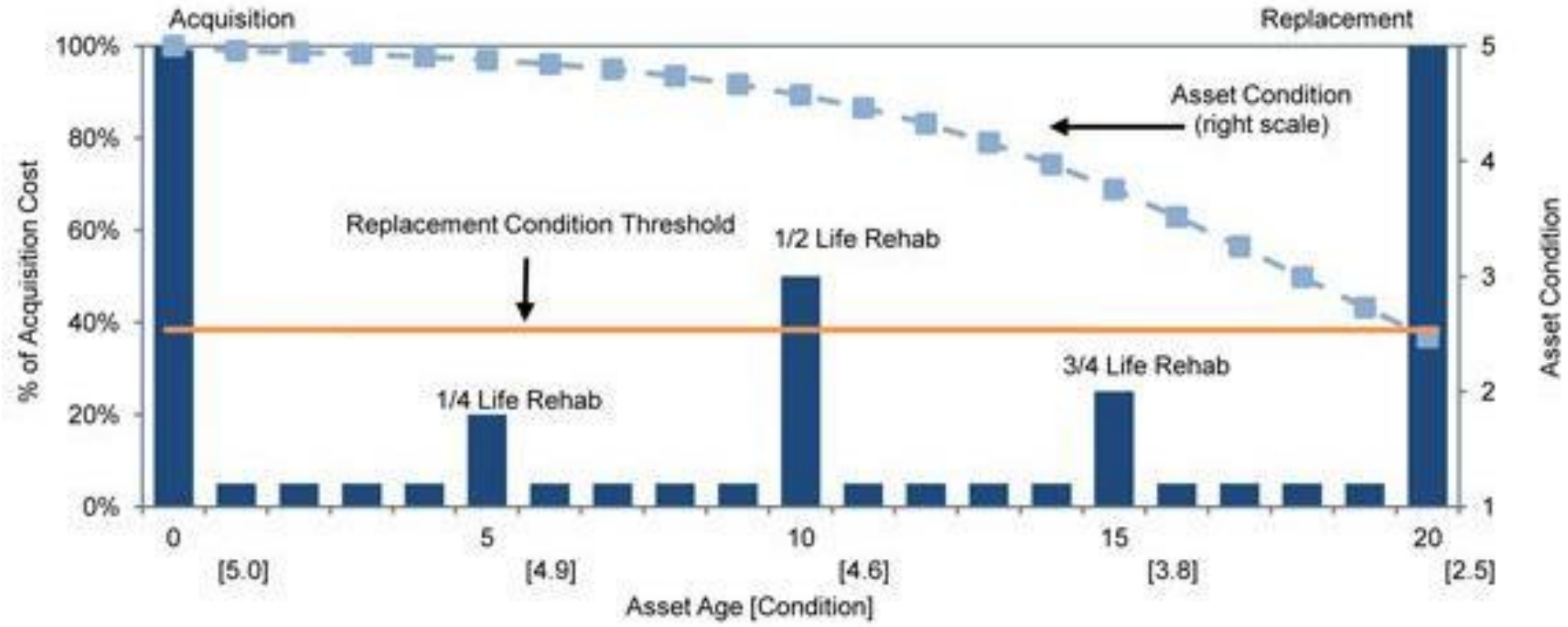
Knowing the condition of your assets helps make more informed decisions

Install Date = 2009
EUL = 20 years
RUL (Straight Subtraction) = 10 years
Condition Score (out of 10) = 7
RUL (Adjusted) = 7.5 years

Install Date = 2009
EUL = 20 years
RUL (Straight Subtraction) = 10 years
Condition Score (out of 10) = 3
RUL (Adjusted) = 17.5 years

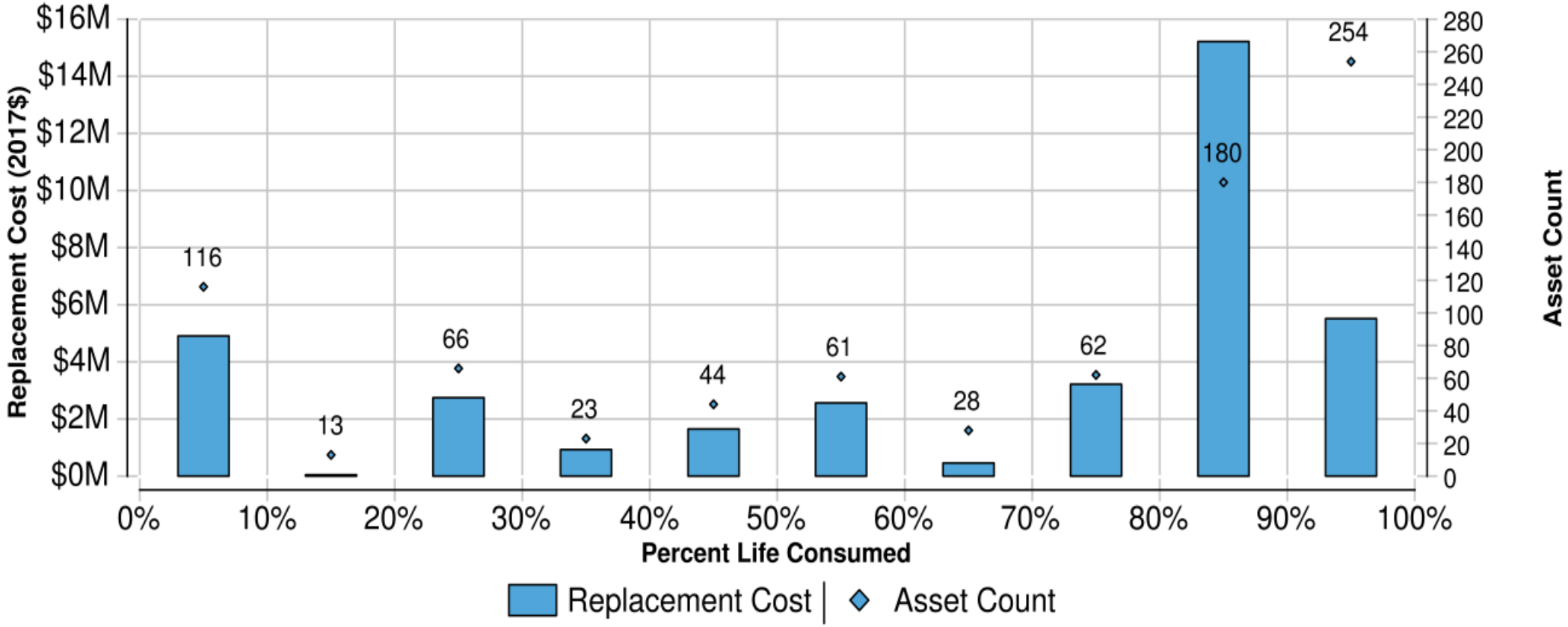
Task 5: Asset Replacement Costs

Replacement cost is a term referring to the amount of money a municipality must currently spend to replace an essential asset



Task 5: Replacement Cost

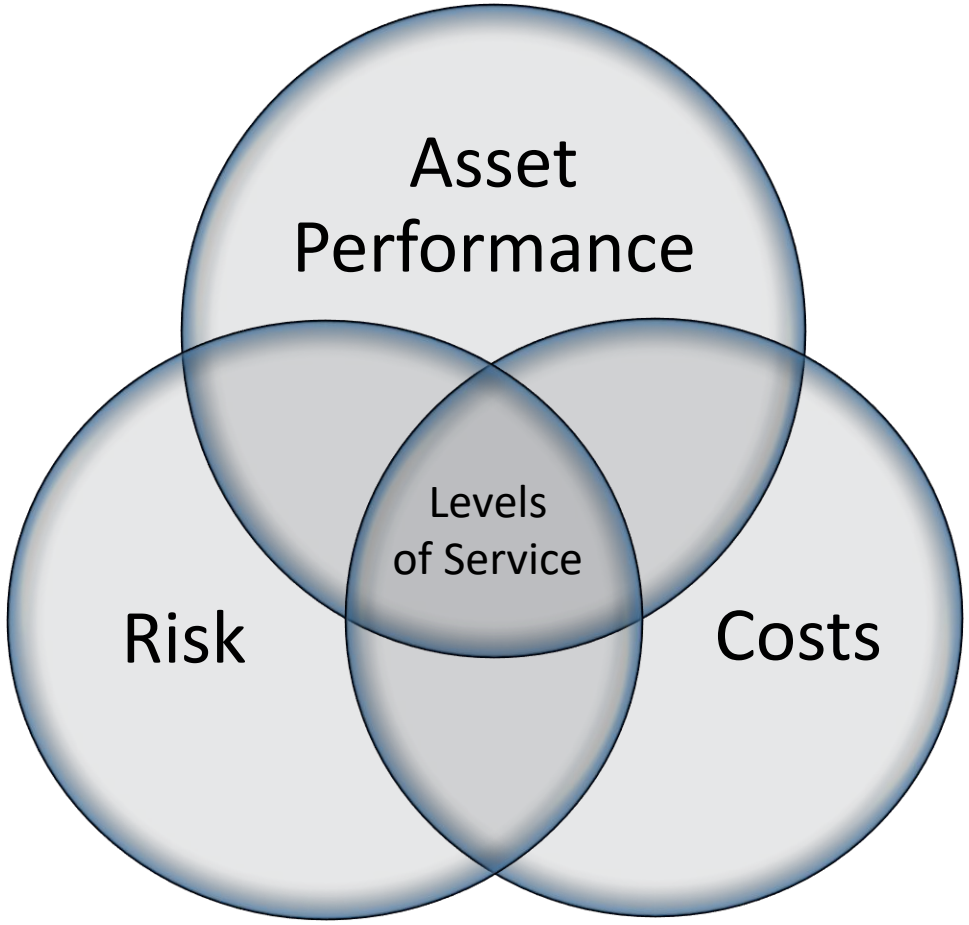
Percent of Life Consumed



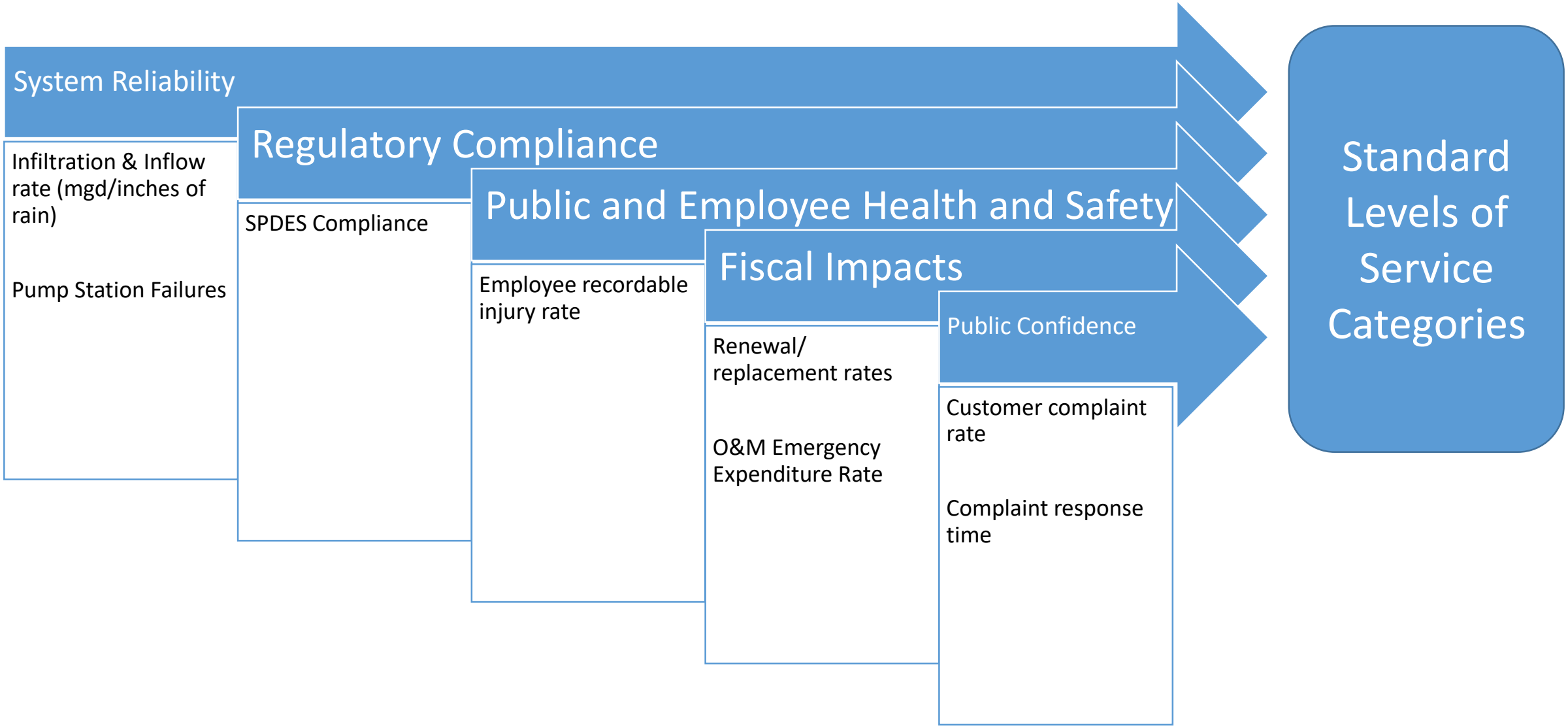
- Percent life consumed by replacement cost and asset count

Task 6: Levels of Service

- Are the driving force for the asset management program
- Provide a link between an organization's strategic goals and operational objectives
- Illustrates the service commitment to the municipalities stakeholders
- Standard Categories:
  - System Reliability
  - Regulatory Compliance
  - Public and Employee Health and Safety
  - Fiscal Impacts
  - Public Confidence



Task 6: Levels of Service



Risk Management

Identify Risks	Evaluate Risks	Manage Risks
• Determine risk categories (align with the levels of service) • Identify critical assets (inventoried assets)	• Consequence of Failure Scoring • Likelihood of Failure Scoring • Overall Risk Scoring	• Identify risk reduction strategies • Develop action plan

Task 7: Consequence of Failure Scores

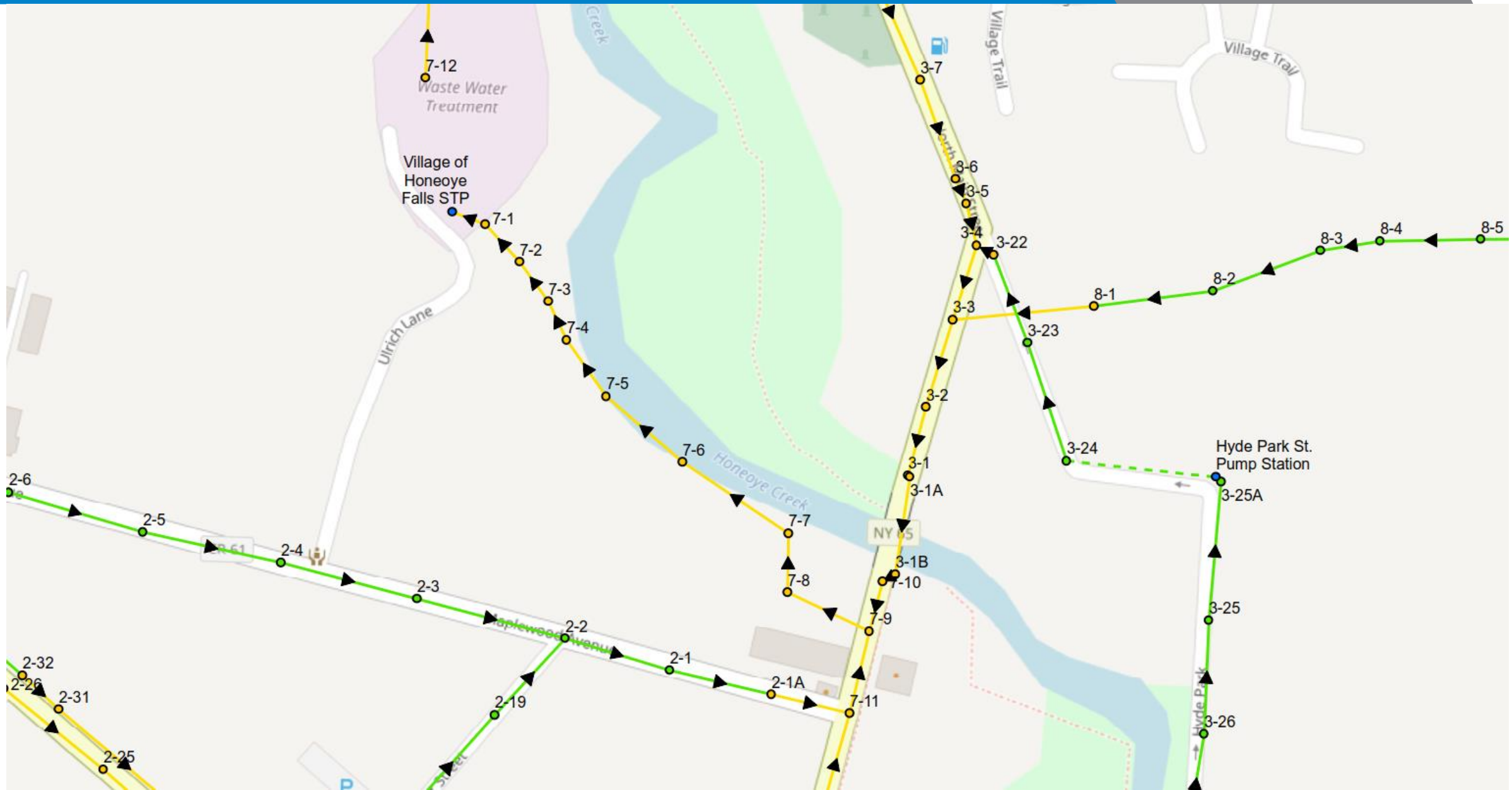
Simple Definition: It's the consequences on maintaining the levels of service when an asset fails.

- How is the community affected?
- How is the environment affected?
- Is it difficult to repair?
- Is its failure likely to cause permit violations?
- Can the repair be covered in the existing budget?

Consequence of Failure Determination – Gravity Sewers

Gravity Systems Consequence Category	Negligible = 0	Low = 0.5	Moderate = 1.0	Severe = 1.5	Weighting	Score	Weighted Score
Pipe Shape	Round	Rectangle / Square	Flat Bottom Round	Oval / Egg	0%	1.5	0.0
Size	≤6"	6" - 9.99"	10" - 14.99"	≥15"	10%	1.5	1.0
Material	PVC	Clay Tile / Concrete	Asbestos Cement	Brick / Web Tile	5%	1.5	0.5
Depth	<5'	5-9.99'	10'-19.99'	>=20'	15%	1.5	1.5
Critical Facilities Being Served	Residential	Residential/ Light Commercial	Commercial	Hospital/Industrial/ Schools	20%	1.5	2.0
Proximity to Structures (Roads/Buildings/ Lakes/Creeks)	Off Road; No Nearby Structures	Non DOT Roads w/in 25 feet	DOT Roads w/in 50 feet; Under Buildings	Within 25 feet of Creek or Lake; Interstate; or Railway Crossings	25%	1.5	2.5
Exposed/Above Ground	No	No	No	Yes	5%	1.5	0.5
Proximity to CSOs/SSOs	No CSOs/SSOs	CSOs in WRRF Service Area	CSOs <4,000 feet away	SSOs in WRRF Service Area/CSOs <1,000 feet away	0%	1.5	0.0
Accessibility to Repair /Traffic	< 500 cars per day (no data)	> 500 and <= 2,500 cars per day	> 2,500 and < 5,000 cars per day	>5,000 cars per day	20%	1.5	2.0
				TOTAL Weighted Score = (Score/1.5) * % * 10	100%	13.5	10.0

Task 7: Consequence of Failure Scores



Task 7: Consequence of Failure Scores

- System Reliability

Negligible = 1

- Can be without asset or system for 1-month or more

Bypass Bar Rack

Low = 4

- Cannot be without asset or system for 1-week

Septage Receiving Station

Moderate = 7

- Cannot be without asset or system for 1-day

Belt Filter Press

Severe = 10

- Cannot be without asset or system for 1-hour

Influent Pump

Task 8: Likelihood of Failure Scores

Simple Definition: The likelihood of failure (LoF) illustrates how likely it is that the asset will fail.

- For the Pilot Program, the score is based on the Estimated Useful Life and Remaining Useful Life
- Accounts for the condition of the asset through the adjusted RUL

$$LoF = \frac{EUL - Adjusted\ RUL}{EUL} * 10$$

- Other methodologies exist; as your asset management processes become more advanced, the LoF calculation can advance as well

Task 9: Risk Scores

Identify Risks	Evaluate Risks	Manage Risks
• Determine risk categories (align with the levels of service) • Identify critical assets (inventoried assets)	• Consequence of Failure Scoring • Likelihood of Failure Scoring • Overall Risk Scoring	• Identify risk reduction strategies • Develop action plan

Task 9: Risk Scores

Risk Analysis

Asset Risk Matrix:
Total Asset Value and Asset Count

Likelihood of Failure	1 2 3	4 5 6 7	8 9 10
10 9 8	$5,656,845 145 assets	$14,938,034 282 assets	$134,000 7 assets
7 6 5 4	$3,113,626 71 assets	$4,742,977 120 assets	$32,710 4 assets
3 2 1	$4,671,951 131 assets	$3,943,278 84 assets	$14,400 3 assets

Consequence of Failure

Number of Assets: 847

Value: $37 million

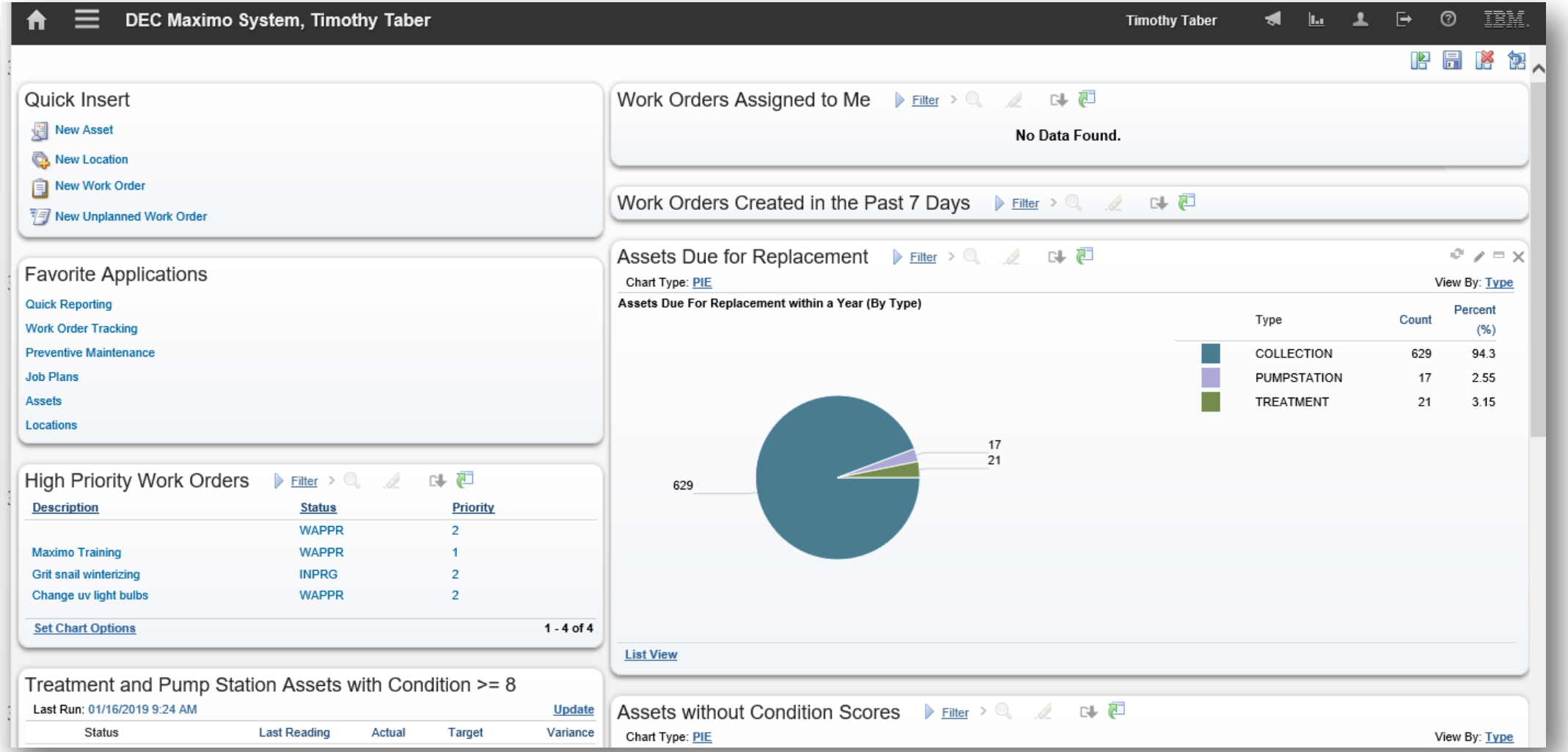
High Risk Asset in Secondary Treatment: AS1150 Effluent Box for the Trickle Filter with a risk score of 79.

Task 10: O&M Expenditure Program

- Review existing O&M documentation and practices
- Use generic strategies if nothing exists
- Enter into job plan module in Maximo
- Identify preventive maintenance practices
- Set up preventive maintenance strategies based on classification, remaining useful life and consequence of failure

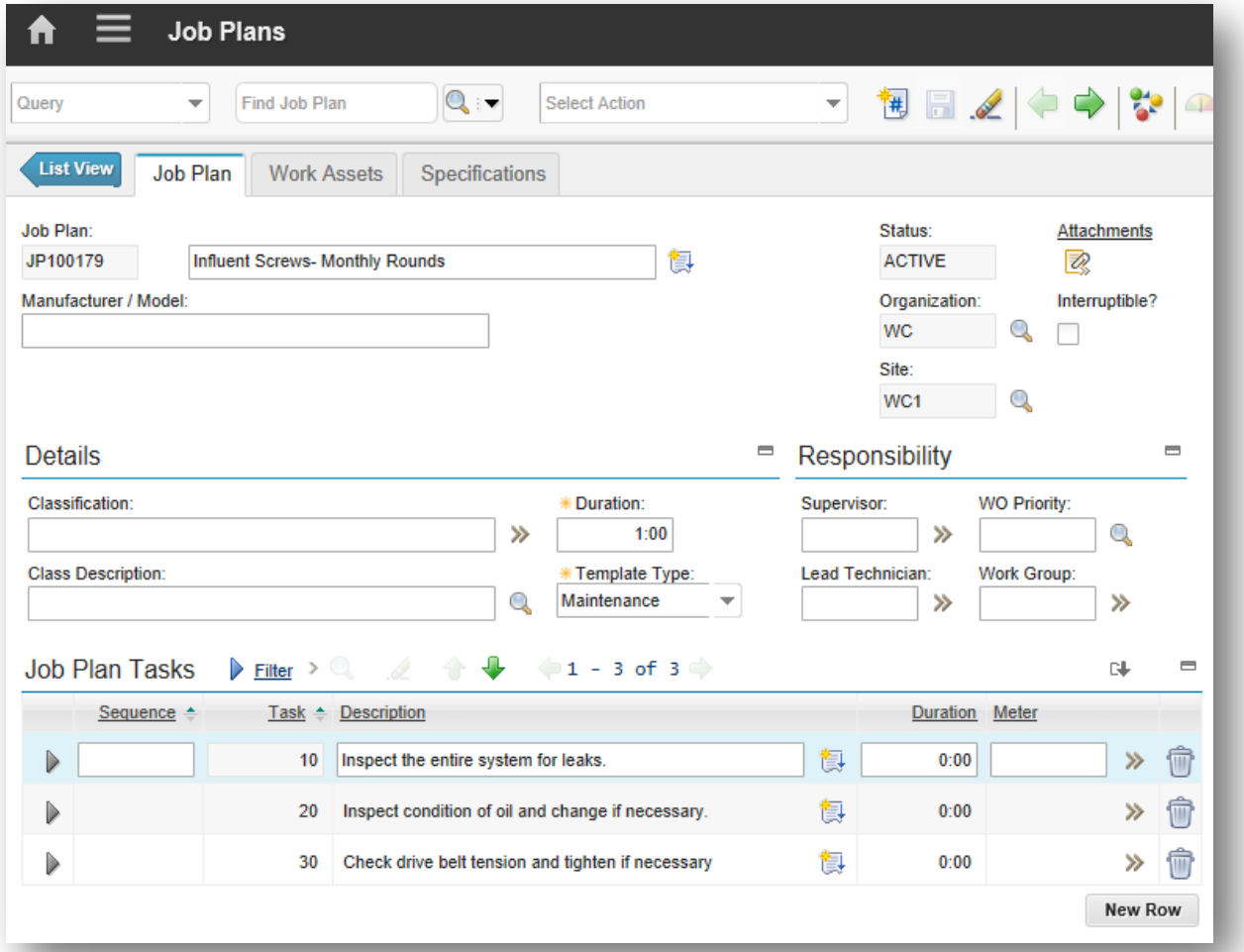
Task 10: O&M Expenditure Program

- Enterprise AM Software – IBM Maximo



Task 10: O&M Expenditure Program

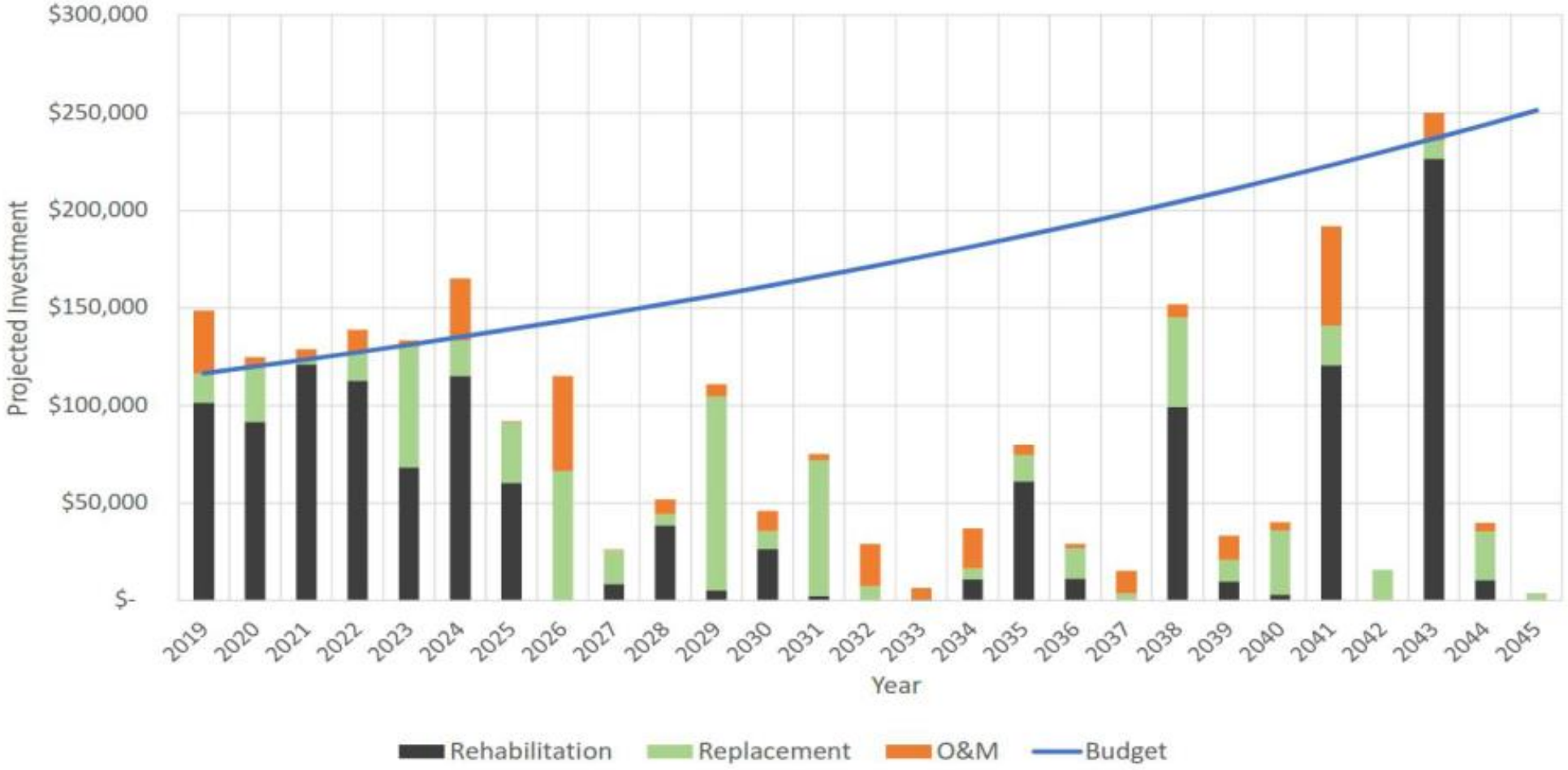
Job Plans



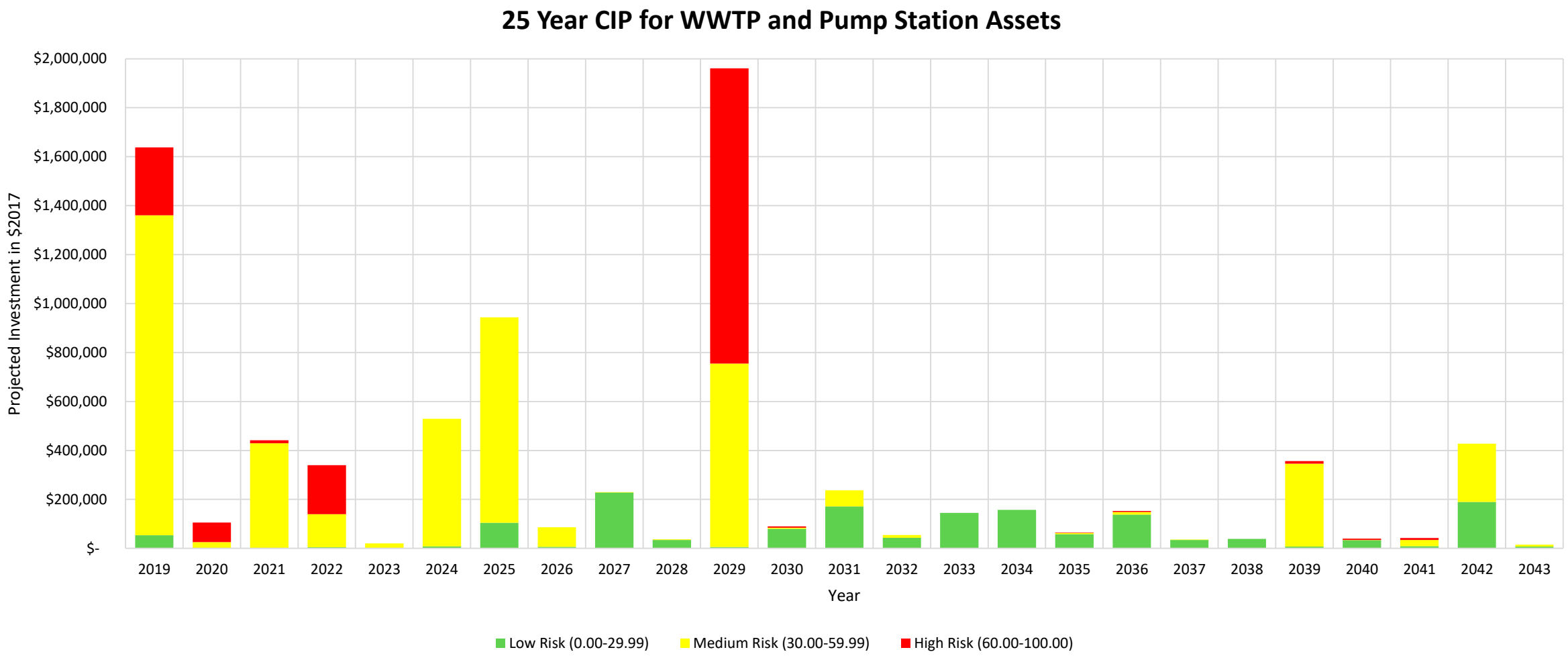
- Apply standard sequence of tasks to preventive maintenance or work order
- Estimate time for each task
- Associate labor type (mechanic, operator, etc.) to the job plan
- Attach O&M manuals or photographs, and specify tools/equipment required

Task 11: Capital Improvement Plan

Projected Investment at the WWTP



Task 11: Capital Improvement Plan

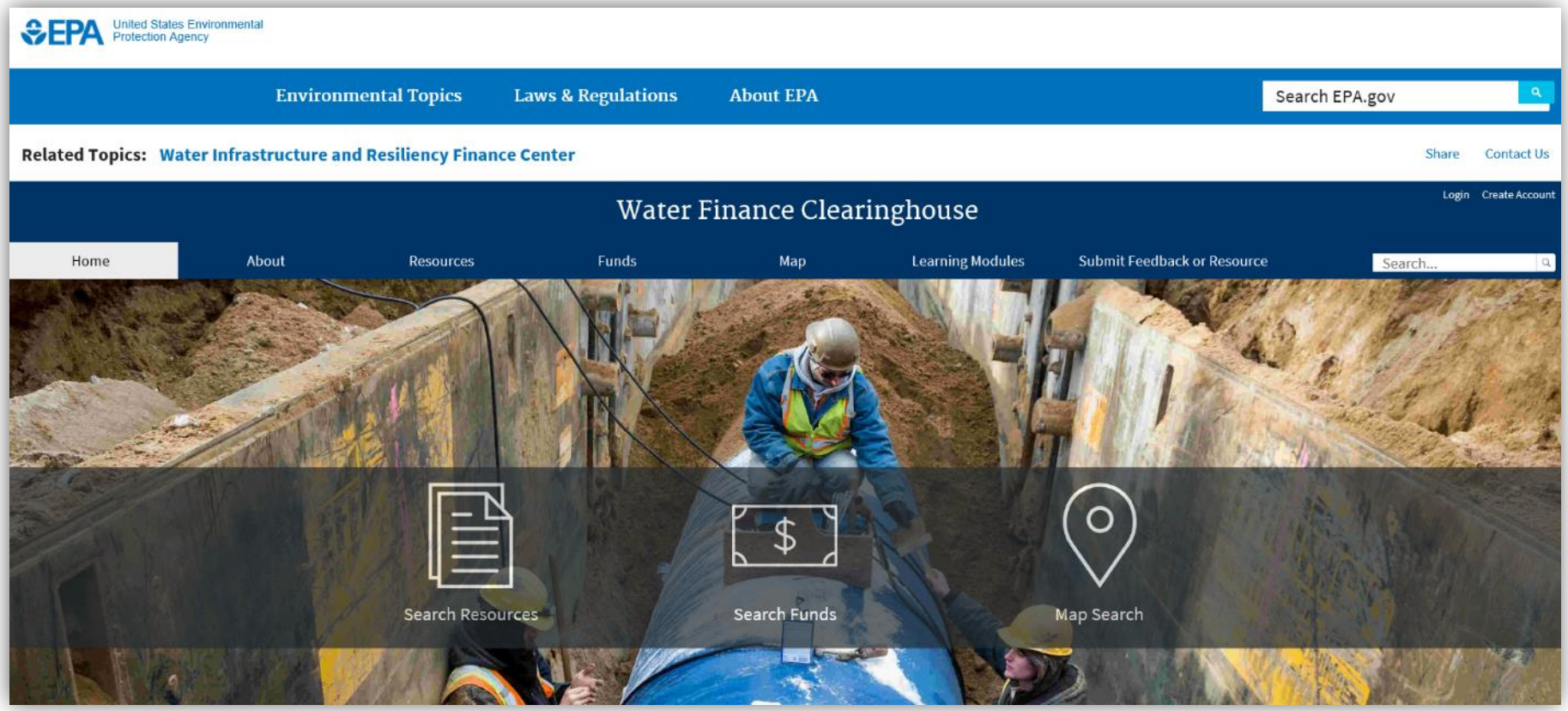


Task 12: Sewer Rate Study

- Review current financial liabilities, expenditures, revenues
- Review current rate structure
- Bring in existing capital projects and new CIP model budget
- Set target reserve and identify any rate increases
- Consider affordability

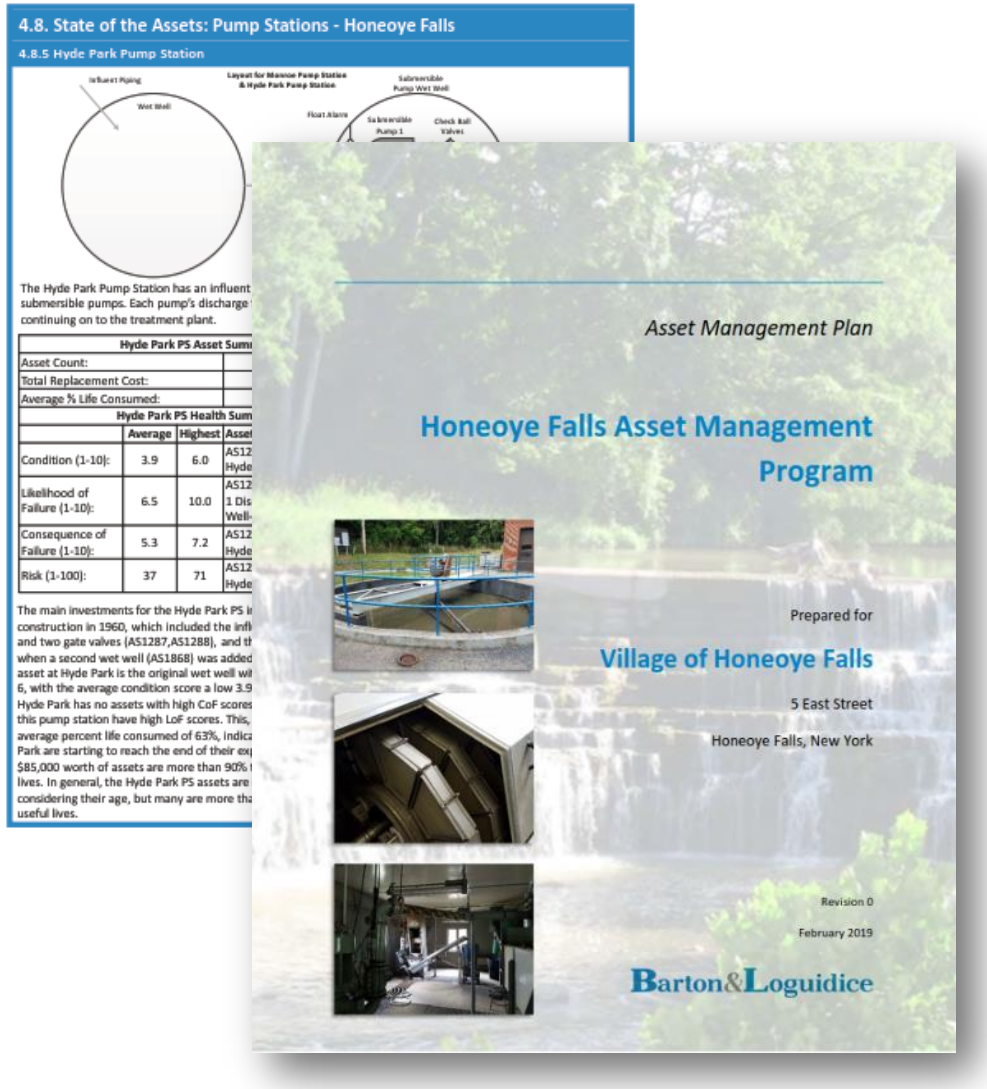
Task 13: Long Range Funding Strategy

- Determine eligibility for funding opportunities
- Identify strategies based on planned and potential projects



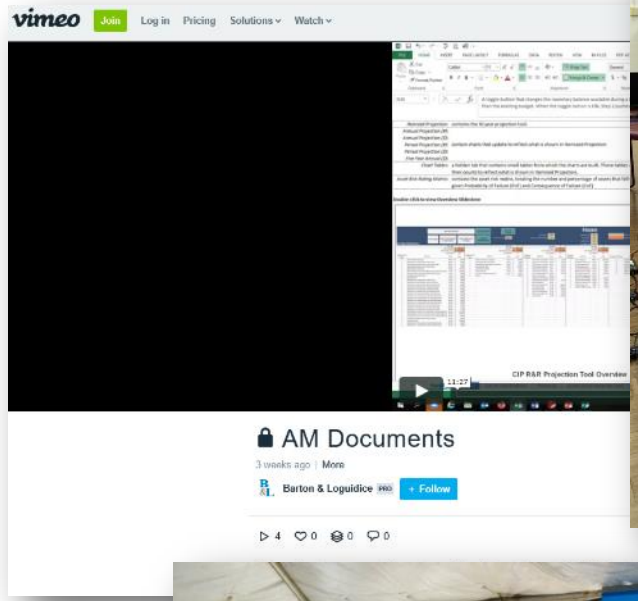
Task 14: Develop Asset Management Program

- The asset management plan is a snapshot of the ongoing asset management program
- Program for continuous improvement:
  - Review assets and/or update asset inventory weekly
  - Update CIP annually
  - Review rates 2-3 years
- Bringing all the building blocks together
- Communication – educate the community!
  - How to get the community on board and embrace asset management
  - Asset management is a cultural shift
- Next steps
  - Sharing of guidance



Task 17: Outreach, Education & Training

- Two Maximo trainings were held with each municipality
- Outreach meetings
  - Board meetings
  - Special committee meetings
  - Public Outreach Meeting
- Ongoing training through videos
- Working on setting up the Educational Program



Task 18: Final AM Program Templates

- Revised Asset Management Plan Guidance
- Tools and Resources Published

Asset Management Resources

The Asset Management Guide (PDF) provides the reader with an understanding of the minimum requirements and best practices of asset management as they relate to sustainably operating, maintaining, and funding POTW infrastructure.

Additionally, DEC has developed and assembled resources that municipalities can use to start their own asset management programs.

Each Chapter includes resources to facilitate the development of the asset management program. These resources are documented in the guidance and reflect the minimum elements of a successful asset management program. Access the resource files listed below.

Chapter 1 - Introduction to Asset Management

- Toolbox #1 (Excel)
- Asset Management IQ (PDF)

Chapter 2 - The Asset Management Team, Staffing, Succession

- Toolbox #2 (Excel)
- Blank Knowledge Retention/Staffing Plan (Word)

Chapter 3 - Current State of the Assets

- Toolbox #3 (Excel)
- Example Geodatabase Specifications (PDF)
- Toolbox #4 (Excel)

Chapter 4 - Level of Service

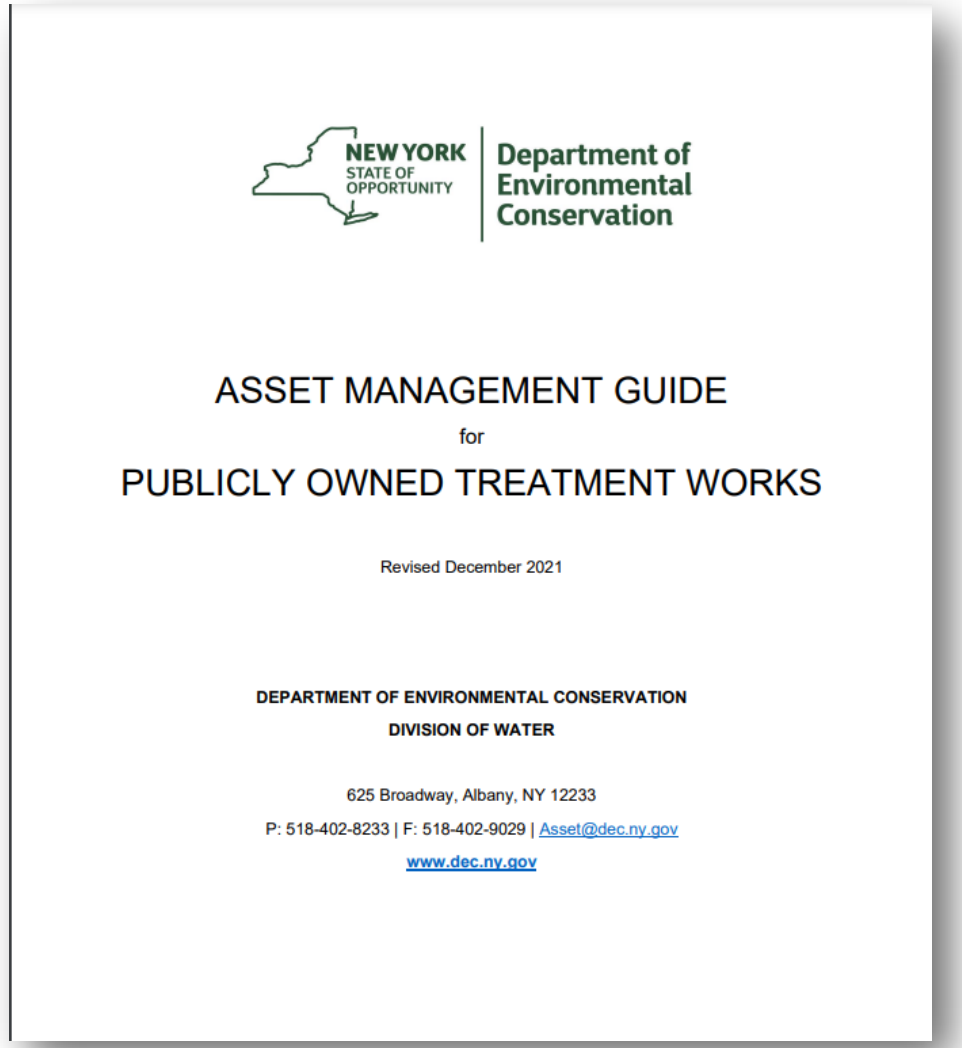
- Toolbox #5 (Excel)
- Level of Service Workshop (PowerPoint)

Chapter 5 - Assessing Asset Risk

- Toolbox #6 (Excel)

Chapter 6 - Planning, Managing, Funding

- Toolbox #7 (Excel)
- Example Capital Improvement Plan (Excel)
- Toolbox #8 (Excel)
- Example Simple Rate Analysis (Excel)
- Example Advanced Rate Analysis (Excel)



NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

ASSET MANAGEMENT GUIDE

for

PUBLICLY OWNED TREATMENT WORKS

Revised December 2021

DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DIVISION OF WATER

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Agenda

- Pilot Program Background
- Introduction to Asset Management
- Pilot Program Tasks
- Lessons Learned from our Case Studies
- **Current Activities of Asset Management Program**

Current Activities of Asset Management Program

Phase II of NYSDEC / NYSEFC Asset Management Program Goals

- Further improve the Guide to identify minimum and consistent standards for AMPs for all POTWs.
- Train and build capacity among the engineering community to ensure consistency in developing AMPs.
- Provide municipalities with tools to develop a comprehensive capital improvement plan to allow for proactive, cost-effective management of wastewater infrastructure.
- Support municipal decision-making through a clear and reproducible AMP.
- Improve resiliency of wastewater infrastructure assets to storm events.
- Assist the wastewater treatment plant operators' ability to more effectively operate their systems and transfer knowledge within their staff.

Participants in $10M Phase II

27 Municipalities

Capital Region:
- Albany County Water Purification District North Plant
- Village of Athens Wastewater Treatment Plant (WWTP)
- Brick Row WWTP
- Town of East Greenbush WWTP
- City of Glens Falls WWTP

Central New York
- City of Auburn Sewage Treatment Plant (STP)
- Village of Marcellus STP
- Village of Skaneateles WWTP

Finger Lakes
- Village of Arcade STP
- Village of Le Roy STP
- Village of Lima WWTP
- Lakeville WWTP

Long Island
- Village of Hempstead Publicly Owned Sewer System
- Port Jefferson STP
- Kings Park STP
- Selden STP

Mid-Hudson
- Village of Rhinebeck WWTP
- Town of Ulster WWTP
- Ulster Whittier Sewer District STP
- City of Newburgh WWTP

Mohawk Valley
- Gloversville Johnstown Joint Wastewater Treatment Facility
- City of Little Falls WWTP

New York City
- Port Richmond Wastewater Resource Recovery Facility (WRRF)

North Country
- Keeseville Wastewater Treatment Plant
- Village of Philadelphia WWTP
- Village of Sackets Harbor WWTP

Southern Tier
- Village of Bath WWTP
- Village of Endicott Water Pollution Control Plant

Western New York
- Erie County Lackawanna WRRF
- Village of Sherman WWTP

10 Engineering Firms

- Kimley-Horn
- STV Incorporated
- GHD
- CDM Smith
- Barton & Loguidice
- C2AE
- CHA
- Jacobs Civil Consultants
- Walden Environmental
- Woodard & Curran

Questions?

Thank you!

Tim Taber, P.E., BCEE – Vice President, Barton & Loguidice, DPC

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The experience to

listen

The power to

solve℠

BartonandLoguidice.com