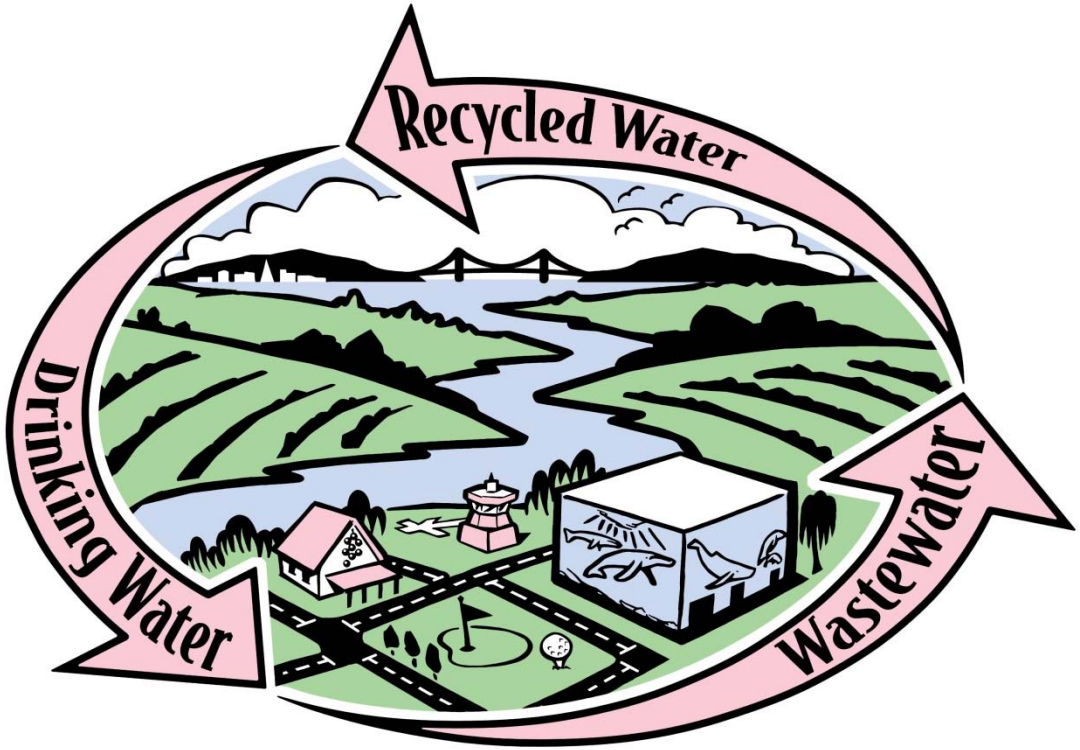
Welcome to the City of Livermore
Water Resources Division



2017 CAMP, WRD Presentation
Maintenance Services Center, Sept 18, 2017

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How We are Organized

- Administration
- Water/Recycled Systems
- Source Control
- Collection Systems
- Wastewater Operations
- Maintenance
- Laboratory

101 West Jack London Blvd

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City of Livermore Municipal Water Utility

- **Potable Water System**
- **Recycled Water System**

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The Livermore Water System

- Potable and Recycled water supplies
- Potable system supplies approximately 1/3 of the City
- Recycled system supplies the Western portion of the City

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The Livermore Potable Water System

- Established in 1963 as part of the Water Resources Division
- Initially supplied 20 million gallons of potable water to 372 customers through 3 miles of pipe and a single reservoir
- In 2016 the potable system supplied nearly 1.5 billion gallons of water to 28,782 customers through 155 miles of pipe

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Pump Stations and Reservoirs

- Livermore receives treated water from Zone 7 Water Agency
- The water is delivered to five pump stations
- The pump stations move the water to four reservoirs
- These reservoirs provide billions of gallons of water for domestic, irrigation and fire protection use annually.

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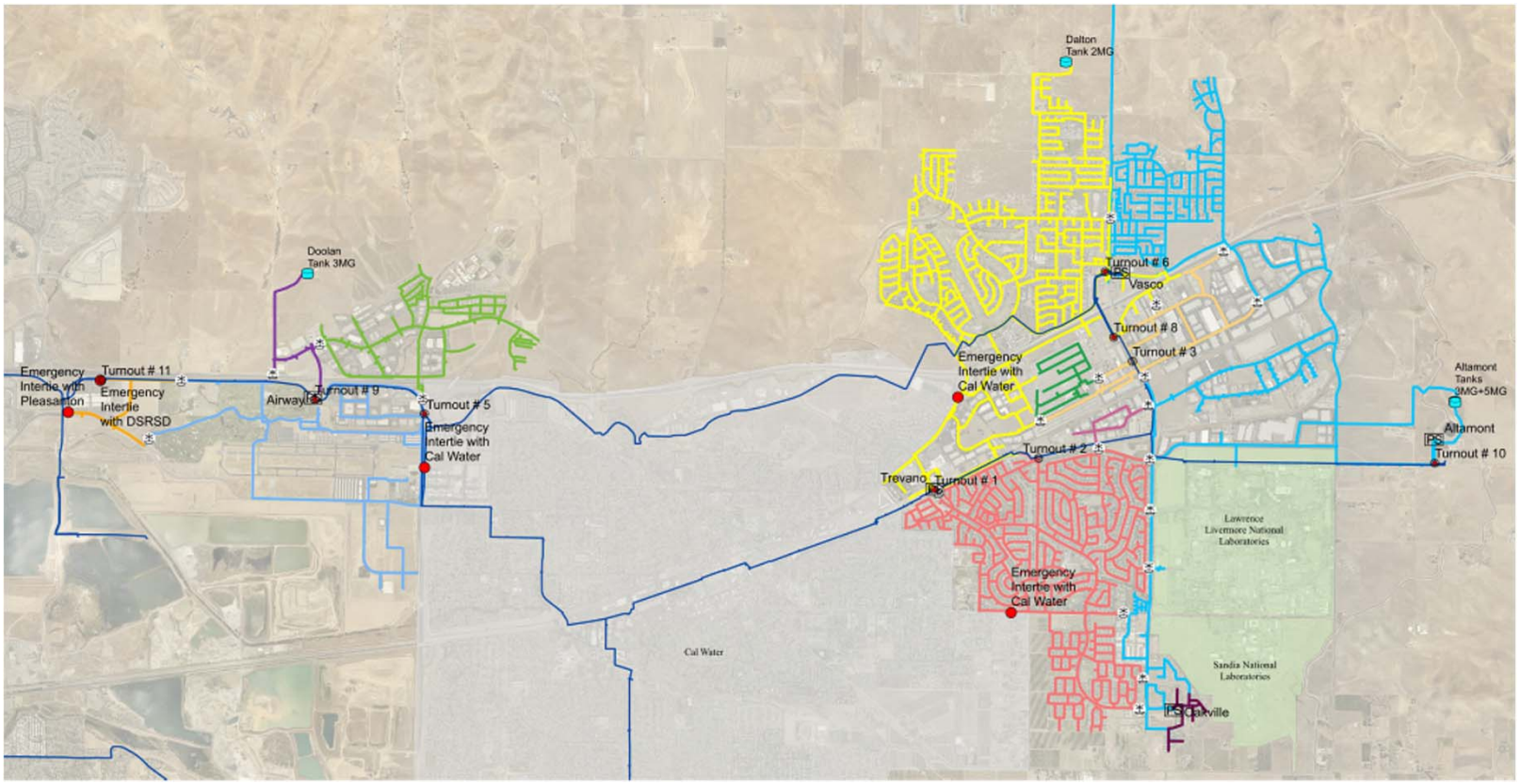
Water System Pressure Zones



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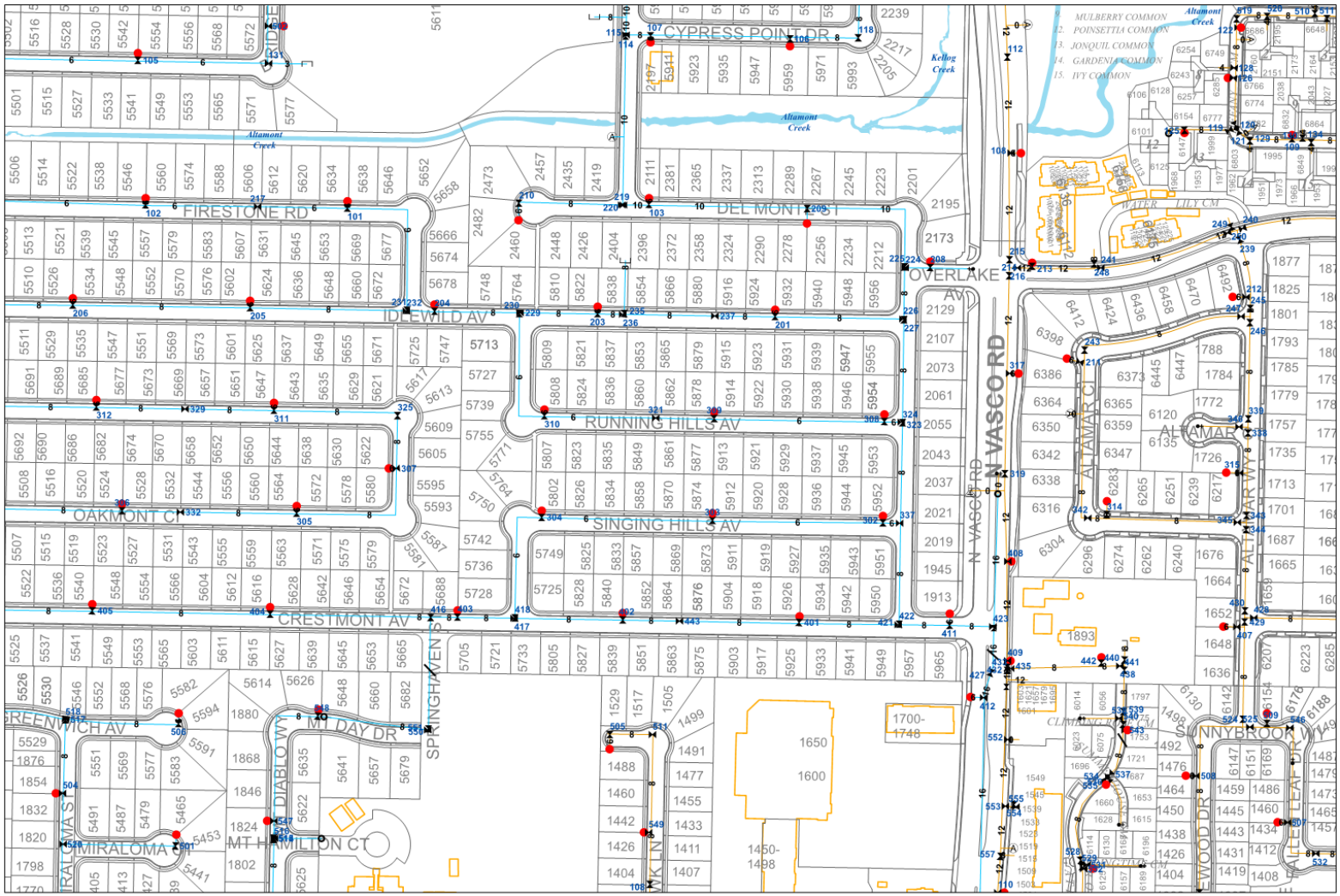
A Neighborhood Map



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The Recycled Water System

- The Recycled water system was established in early 1960's to irrigate fields surrounding the Livermore Municipal Airport
- In 2016 Water Resources delivered nearly 300 million gallons of recycled water to Livermore customers for irrigation and fire protection purposes

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The Recycled Water System

- Livermore receives recycled water from the Livermore Water Reclamation Plant
- Recycled water is pumped from the plant to two reservoirs on Doolan Road
- These reservoirs provide water for irrigation and fire protection

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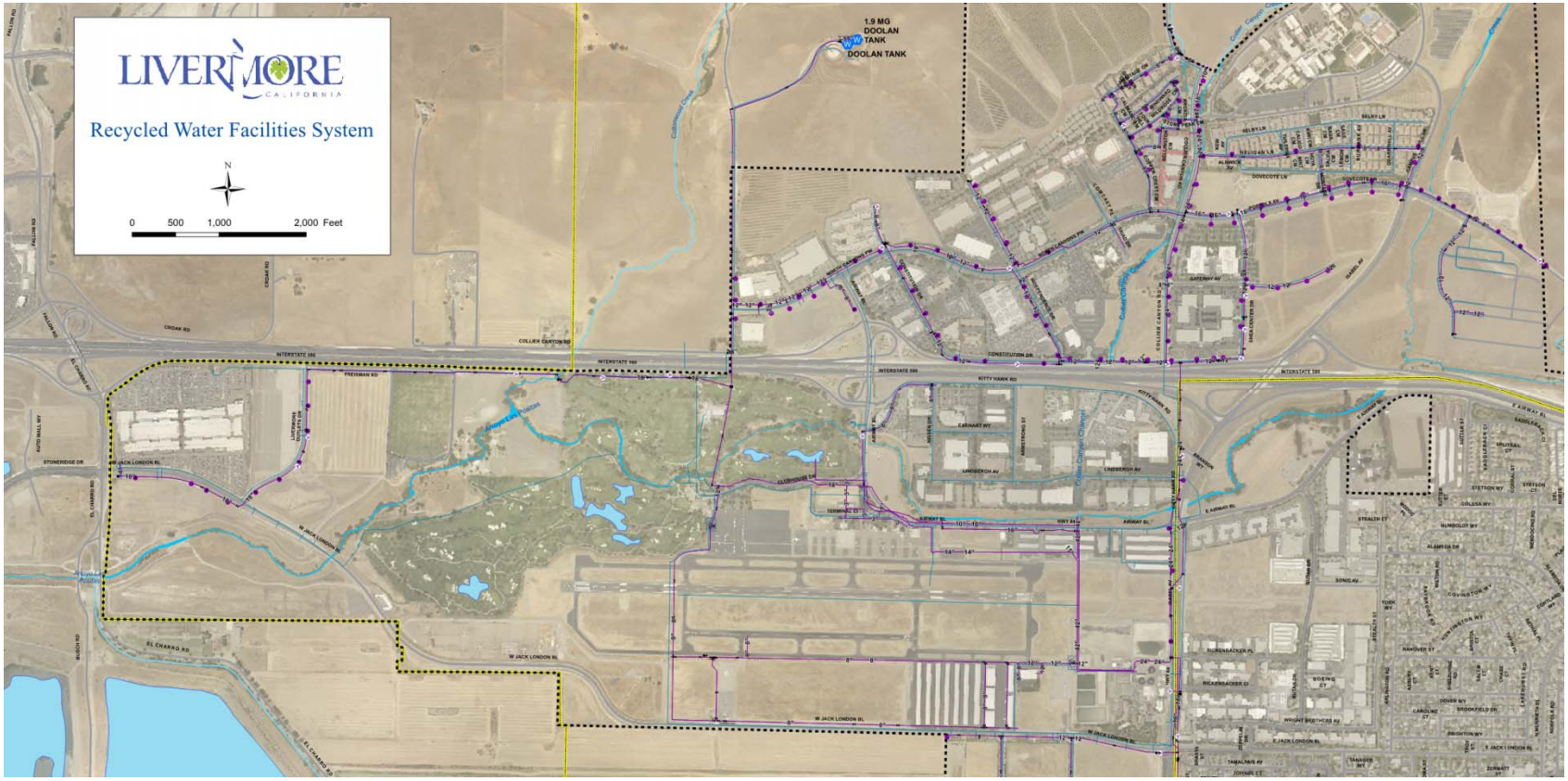
The Recycled Water System



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Water Resources Division
Source Control

- Pretreatment Program
- Stormwater Program

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Pretreatment Program

The **Industrial Pretreatment Program** is mandated under the Clean Water Act, specifically under the General Pretreatment Regulations (40 CFR 403). These regulations establish the responsibilities of federal, state and local governments, industry and the public in controlling the pollutants in wastewater

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Pretreatment Program Objectives:

- Protect Livermore Water Reclamation Plant
- Protect Sanitary Sewer System
- Protect Operators and Collection System Workers
- Protect Public Health and Safety
- Prevent Harmful Discharges to the SF Bay

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Stormwater Program

Stormwater runoff contains many types of pollutants from the urban landscape – including oil, pesticides, sediment and trash. In most cases stormwater runoff doesn't receive treatment – it discharges directly to storm drains, which lead to the creeks and eventually to the Bay.

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Stormwater Program

The City of Livermore is covered under a Municipal Regional Permit (MRP) which requires the City to implement a Stormwater Management Plan to control NON-Stormwater Discharges.

MRP Requirements/Objectives

- Commercial and Industrial Facility Inspection Program
- Illegal Discharge Response and Abatement
- Public Outreach and Education
- New Development and Green Infrastructure Plan
- Trash/Litter Reduction

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HOW are these objectives met:

- Regulate 102 Industrial Dischargers with Wastewater Discharge Permits
- Conduct Facility Inspections- Permitted and Unpermitted Dischargers
- Monitor effluent from Industrial Discharges for compliance with pollutant limits
- Require Best Management Practices (BMPs) to reduce or eliminate introduction of pollutants

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City of Livermore Collection Systems

- **Sanitary Sewer System**
- **Storm Drainage System**

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Livermore's Sanitary Sewer system

- 297 miles of pipe
- 4 sewer lift stations
- 6,148 maintenance holes
- 29,800 service connections

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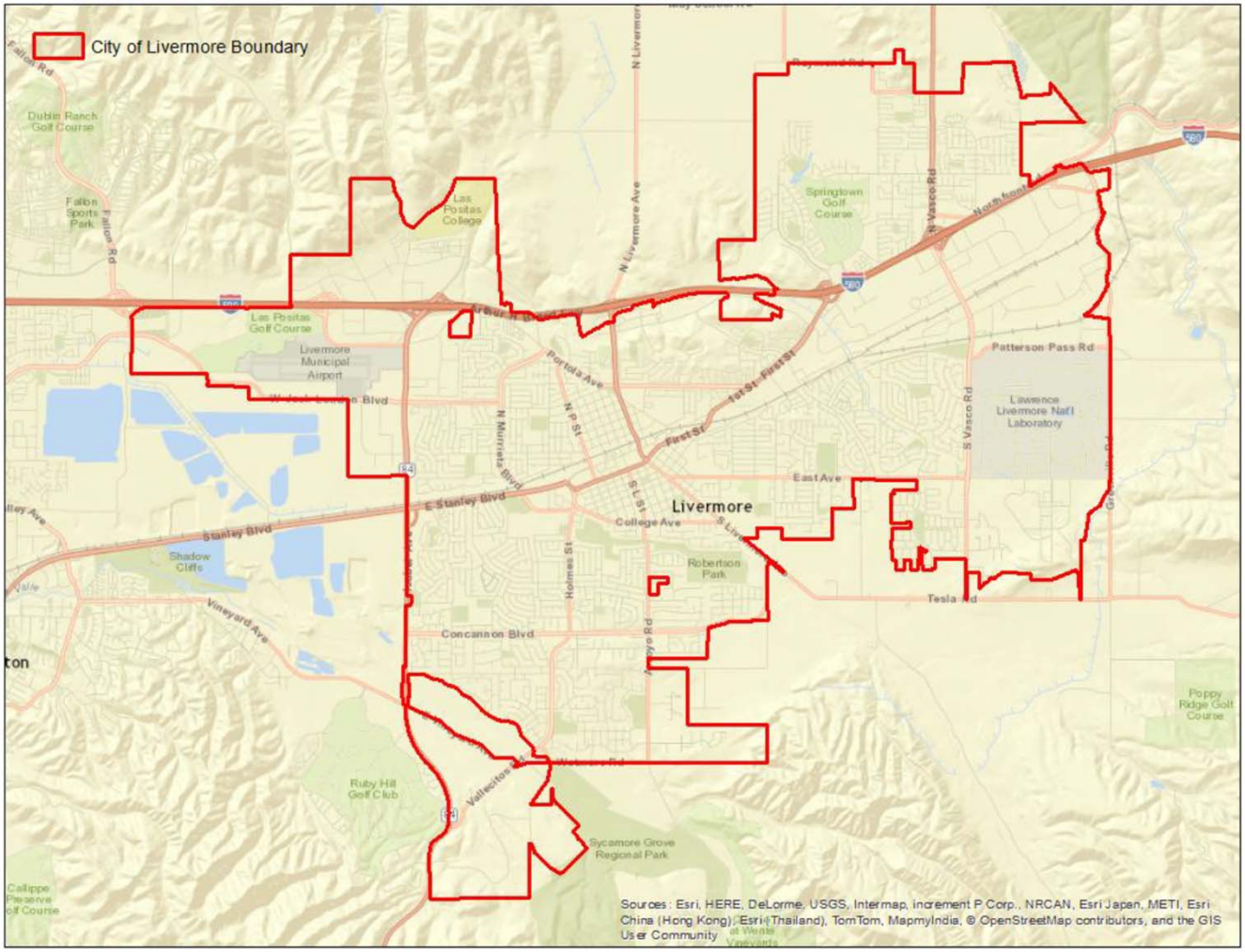
Collections system



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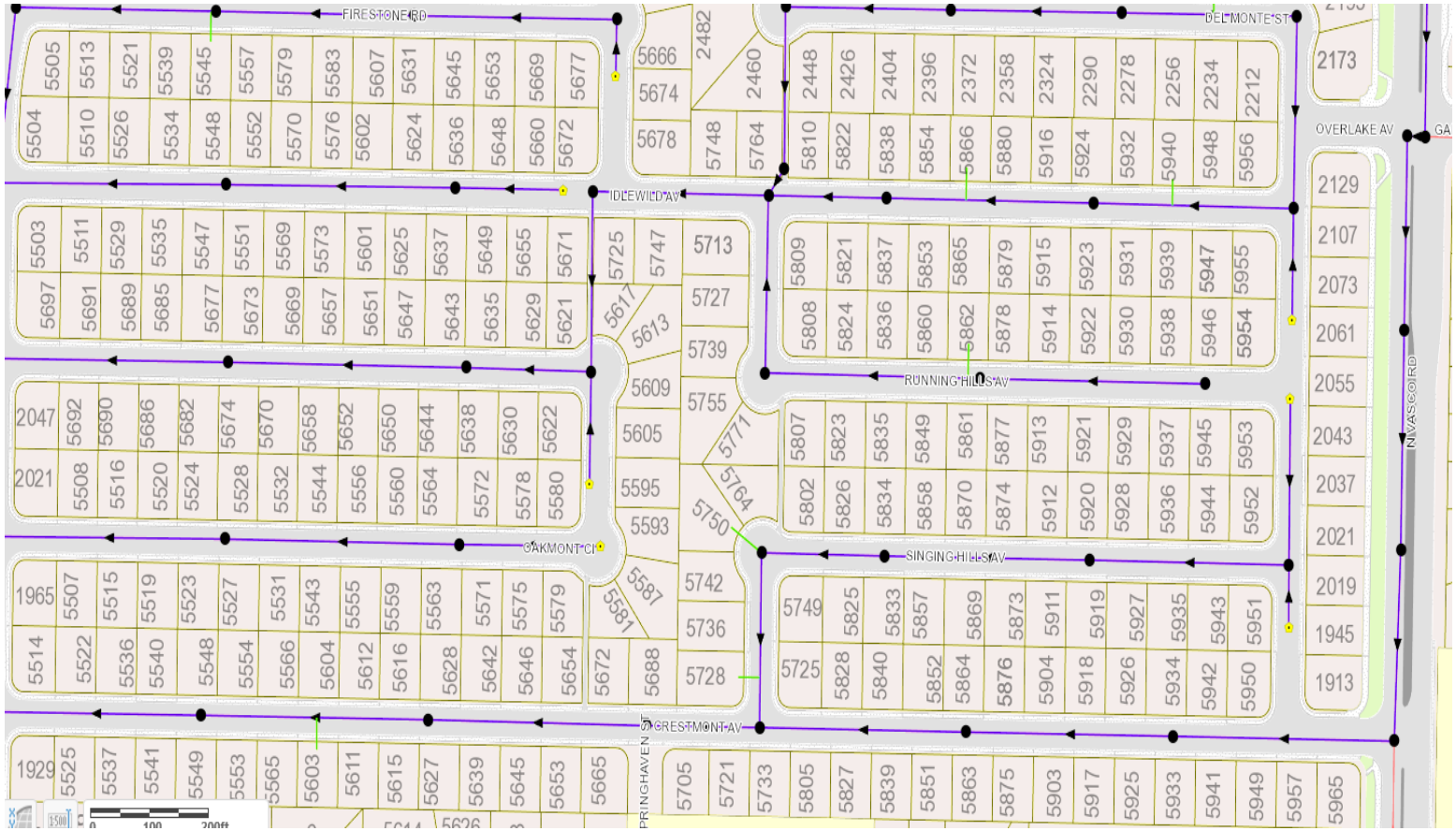
Street View



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Livermore's Storm system

- 241 Miles
- 3 Pump Stations
- 4,451 catch basins
- 181 outfall(< 12")
- 186 TCD's (Trash Capture Devices)
- SMP (Stream Maintenance Permit)
- Trash reduction plan

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City of Livermore Water Reclamation Plant

- **Wastewater Treatment Overview**

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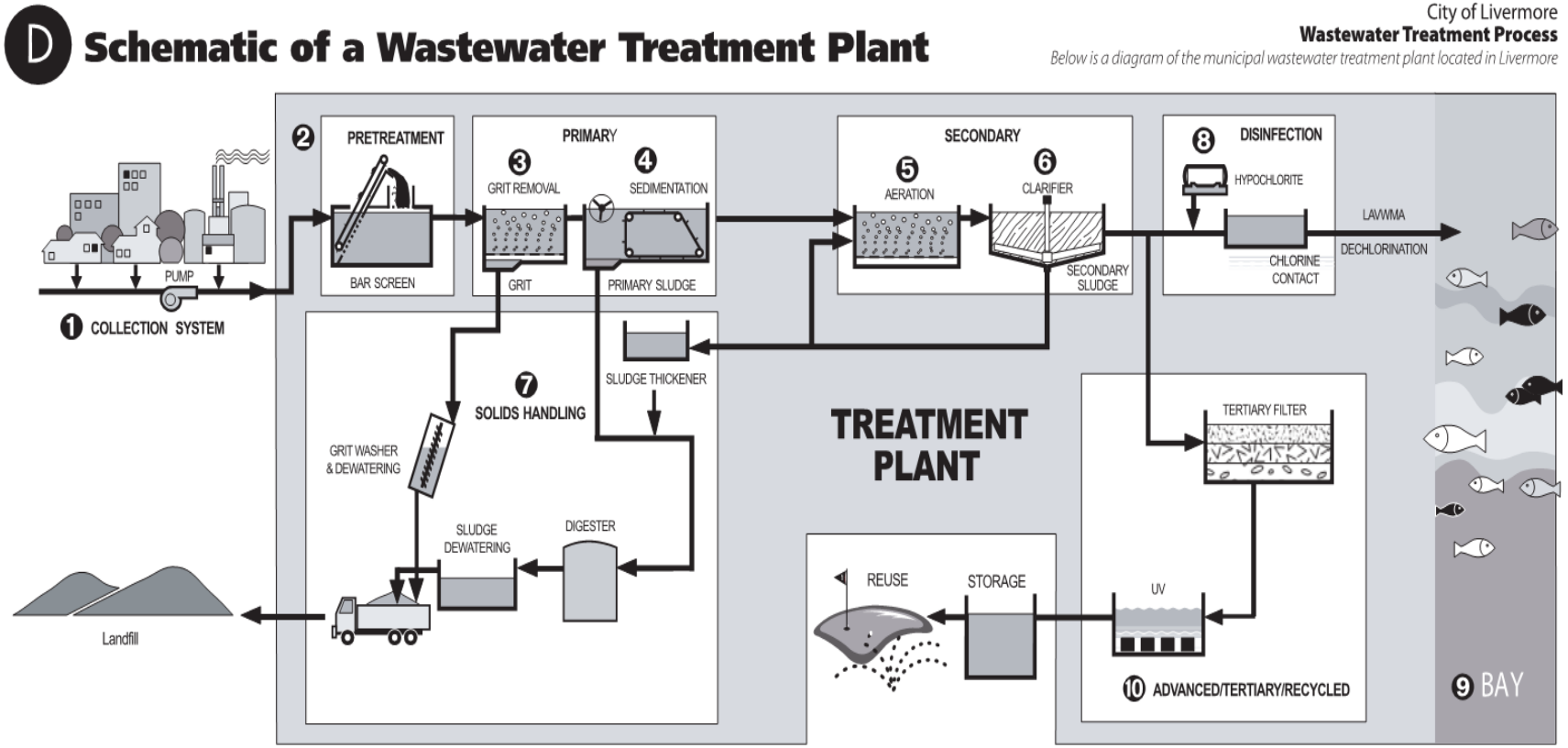
Treatment Process Overview



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Treatment Process Overview

- The majority of the wastewater flows by gravity into the plant.
- For low lying areas, 4 pump stations boost the flow into the plant.
- In 2016 the Livermore Water Reclamation Plant processed nearly 6 million gallons of wastewater per day.

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Treatment Process Overview

Recycled Water System

- WRD recycles up to 2.5 million gallons per day.
- Two Doolan reservoirs have a capacity of 1.9 million gallons each.

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City of Livermore Water Resources Division

- **Asset Management Program**

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Asset Management

Making the right decision at the right time at the right costs for the right reasons

- A collection of strategies for managing infrastructure assets efficiently
- Risk reduction while maintaining Level of Service

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Asset Management

What is an Infrastructure Asset?

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Asset Management

Data collection

- WRD tracks nearly 80,000 assets
- Install date, Material, Length, Condition

Asset_ID	Class	InstallYear	Material	Length	Diameter	Condition
ACS5C4P6303	Force Mains	2003	PVC	33.20604	8	1
ACS5C1P7516	Force Mains	2012	PVC	109.8423	8	1
ACS5C1P0101	Force Mains	2003	PVC	161.355	8	2
ACS5C1P0105	Force Mains	2003	PVC	57.8778	8	1
ACS5C1P2748	Force Mains	2003	PVC	61.4052	8	3
ACS5C4P6302	Force Mains	2003	PVC	301.193	10	1
JLS5C2FP7538	Force Mains	2012	PVC	36.81386	12	1

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Asset Management

Mapping Probability of Failure

- Structural Failure

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Asset Management

Calculating Probability of Failure

Theoretical Vs Condition Assessment

Theoretical

- Age Based
- Age/Useful Life = PoF
- Used as a baseline
- Inaccessible assets (water pipes)

Condition Assessment

- Asset class related scoring matrices
- PoF is calculated from the condition score using a decay curve
- Remaining useful life (PoF) can increase or decrease

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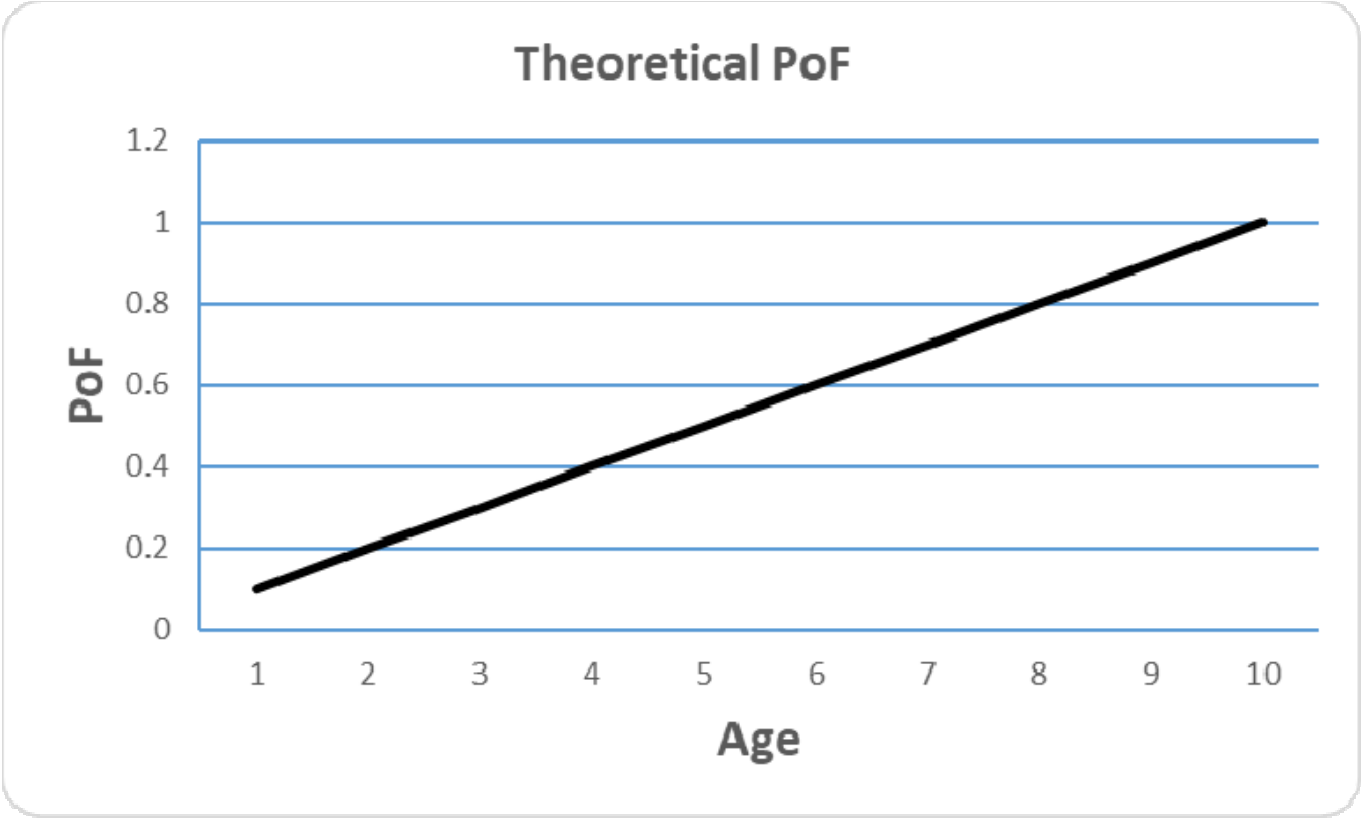
Asset Management

Calculating Probability of Failure



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Asset Management

Condition Matrix

Pump	1	2	3	4	5
Leakage	None	Visible wear at seals, but no signs of leakage	Moisture at seals/joints	Water dripping or pooling on floor	Water squirting / Running
Corrosion / Deterioration	Like new	Some minor corrosion	Moderate corrosion, minor shaft wear	Significant corrosion / deterioration affecting integrity	Extreme corrosion, extreme casing deterioration, significant shaft wear
Vibration	None detectable	Minor vibration to touch, not visible	Visible Vibration	Vibration transferred to connecting equipment	Vibration damage, extreme rattling
Noise	No unusual noise	Slight whine/rumble	Noticeable noise, audible from a yard away	Moderate whine/rattle	Loud, rattling due to vibration
Temperature	Cool or room temp	Warm, normal	Heat detected by hand	Uncomfortable to touch	Too hot to touch

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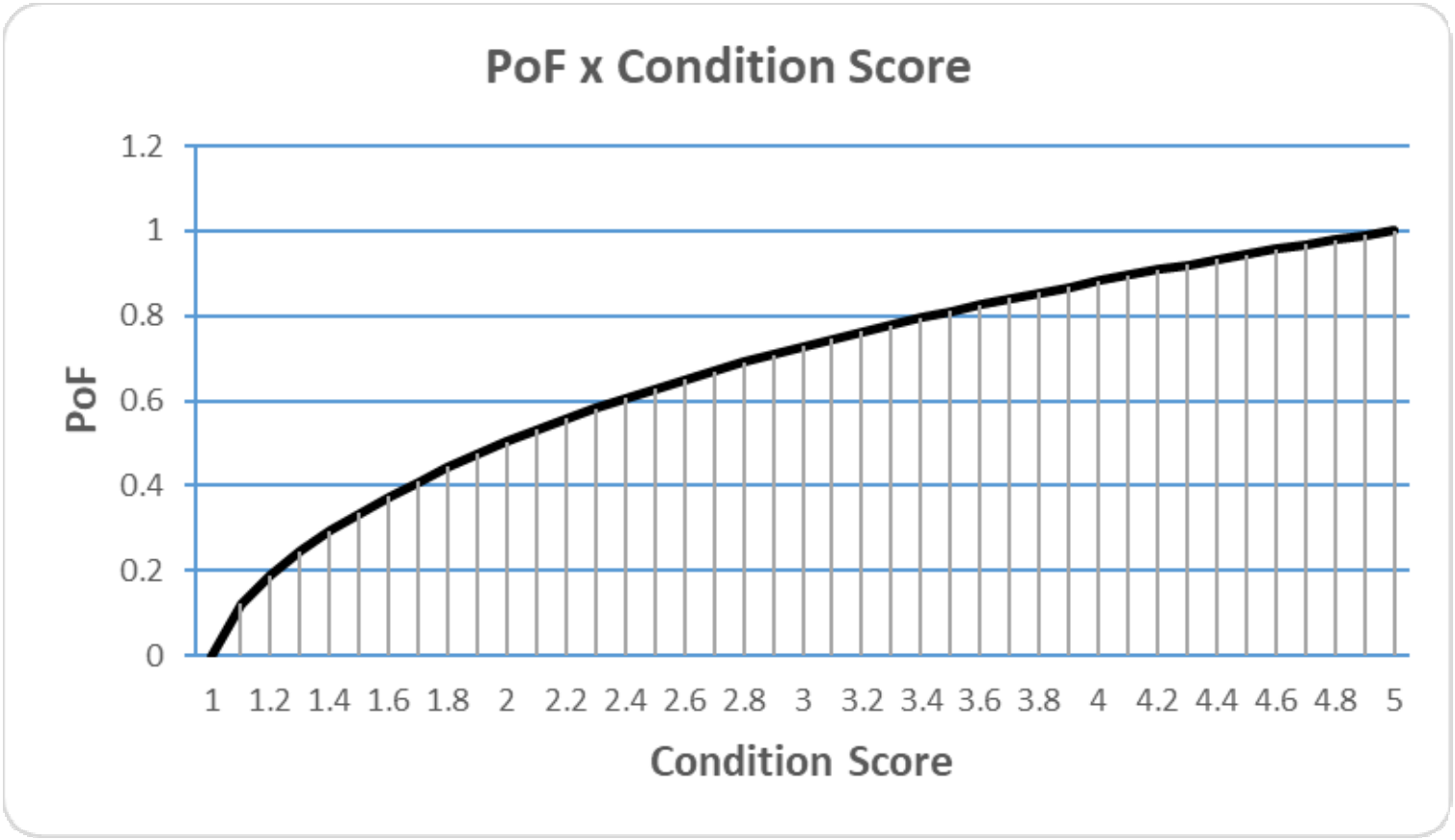
Asset Management



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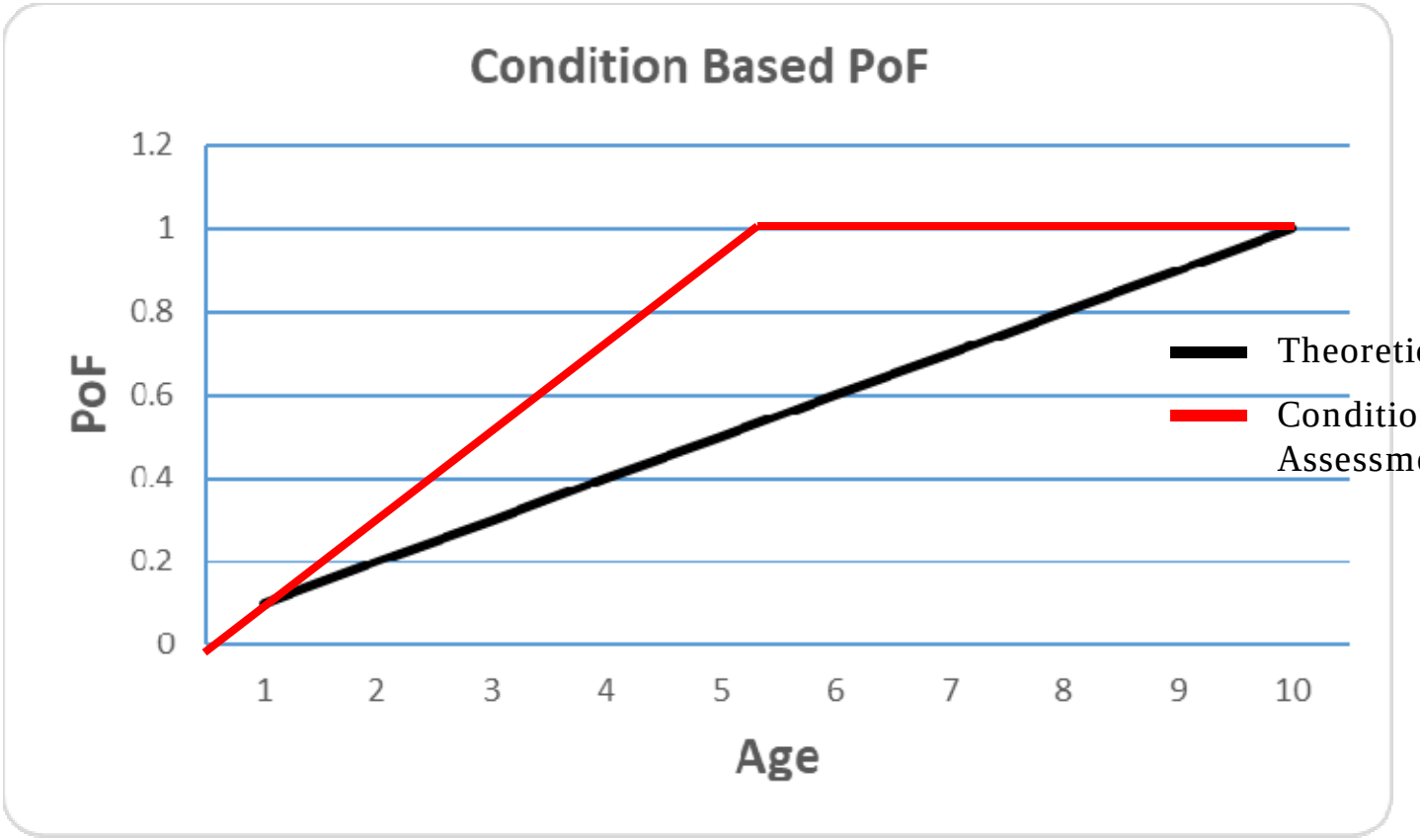
Asset Management



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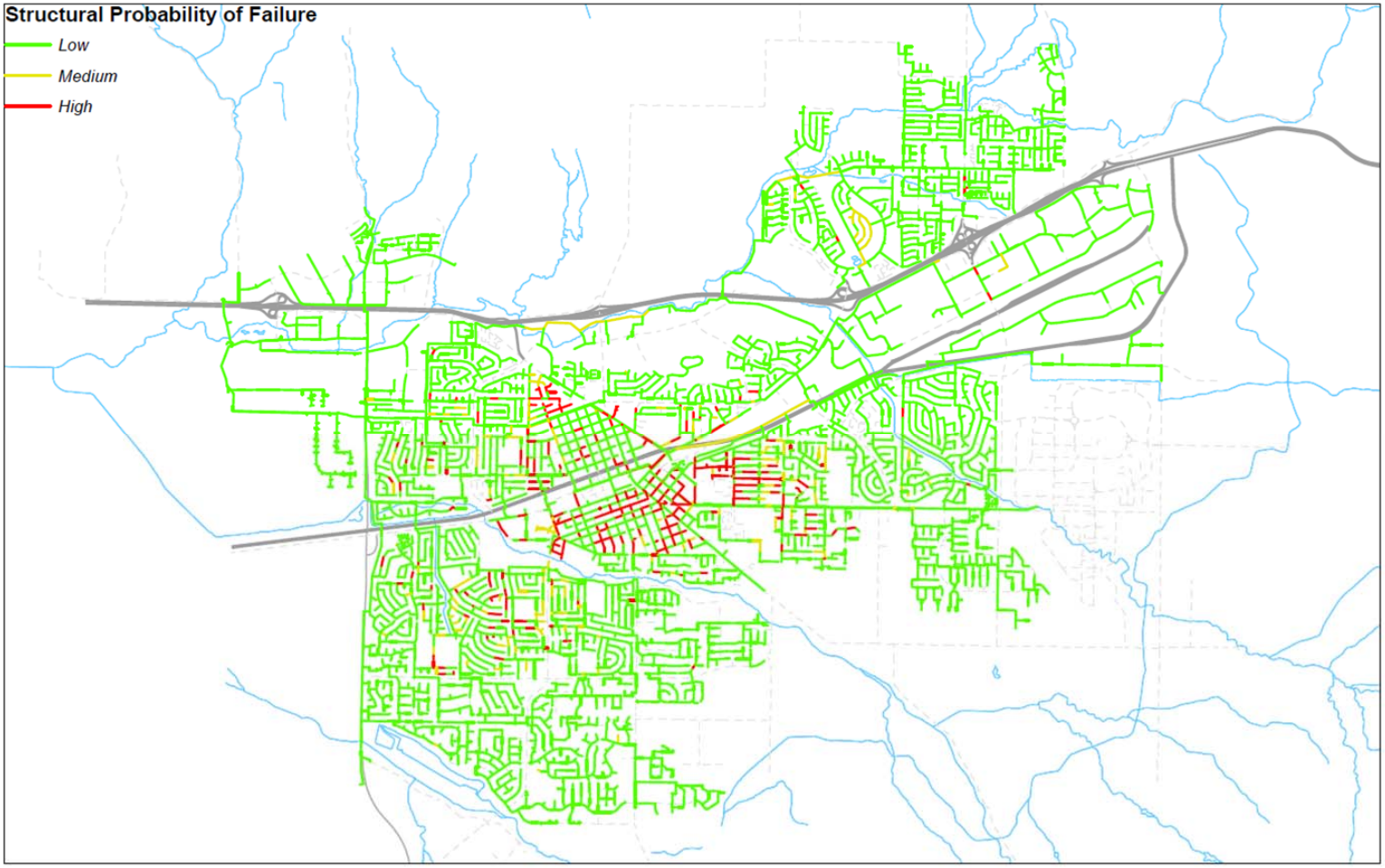
Asset Management

Structural Probability of Failure



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Asset Management

Calculating Consequence of Failure

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Asset Management

Calculating Consequence of Failure

Triple Bottom Line

- Economic
- Environmental
- Social

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Asset Management

Calculating Consequence of Failure

Scoring and weighting of sewer pipes

- Zoning – 20%
- Street Type – 20%
- Proximity to water (creek) – 20%
- Pipe size – 40%

Each asset receives 1 – 5 score

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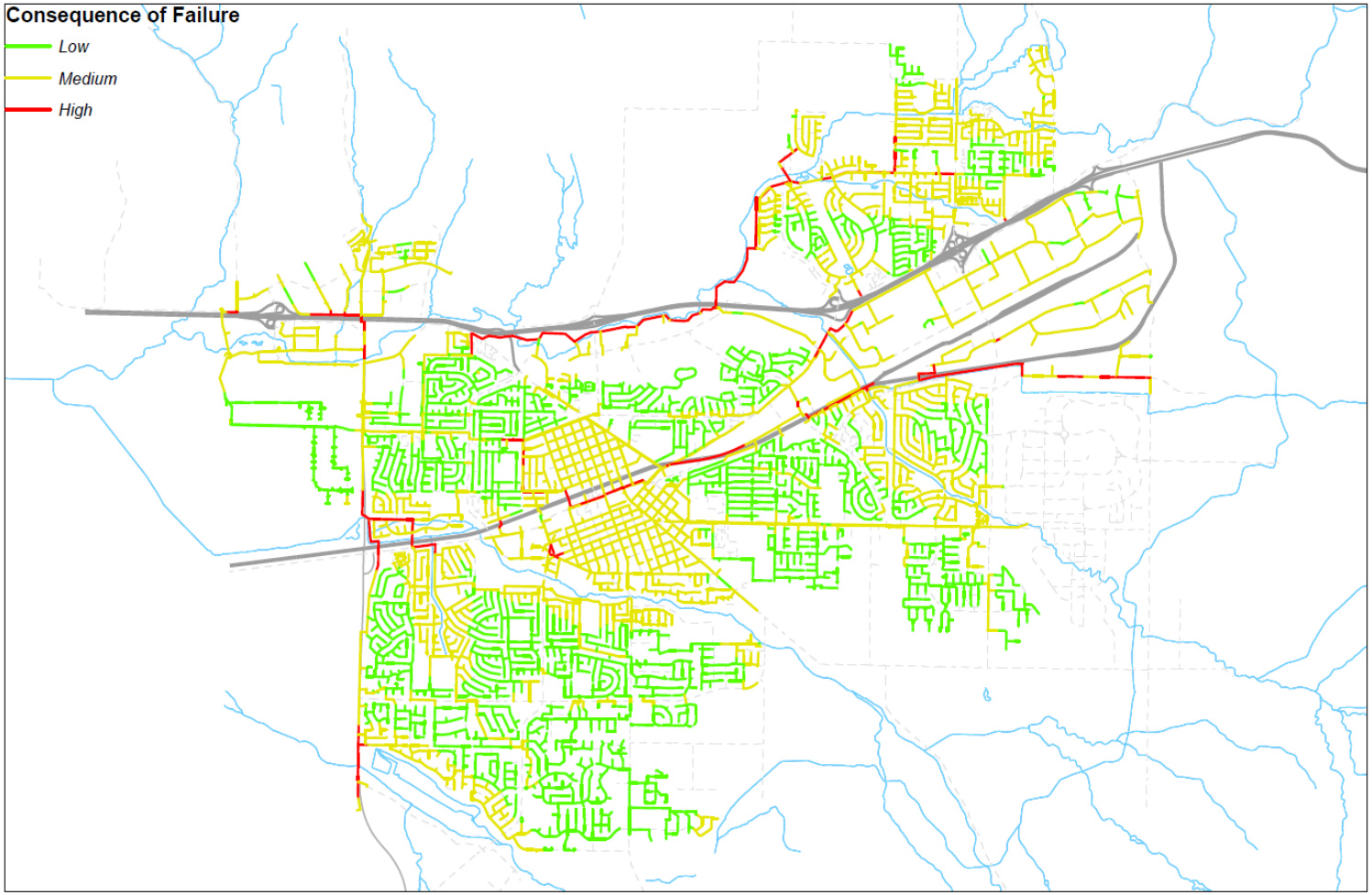
Asset Management

Consequence of Failure



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Calculating Risk

- (PoF X CoF)

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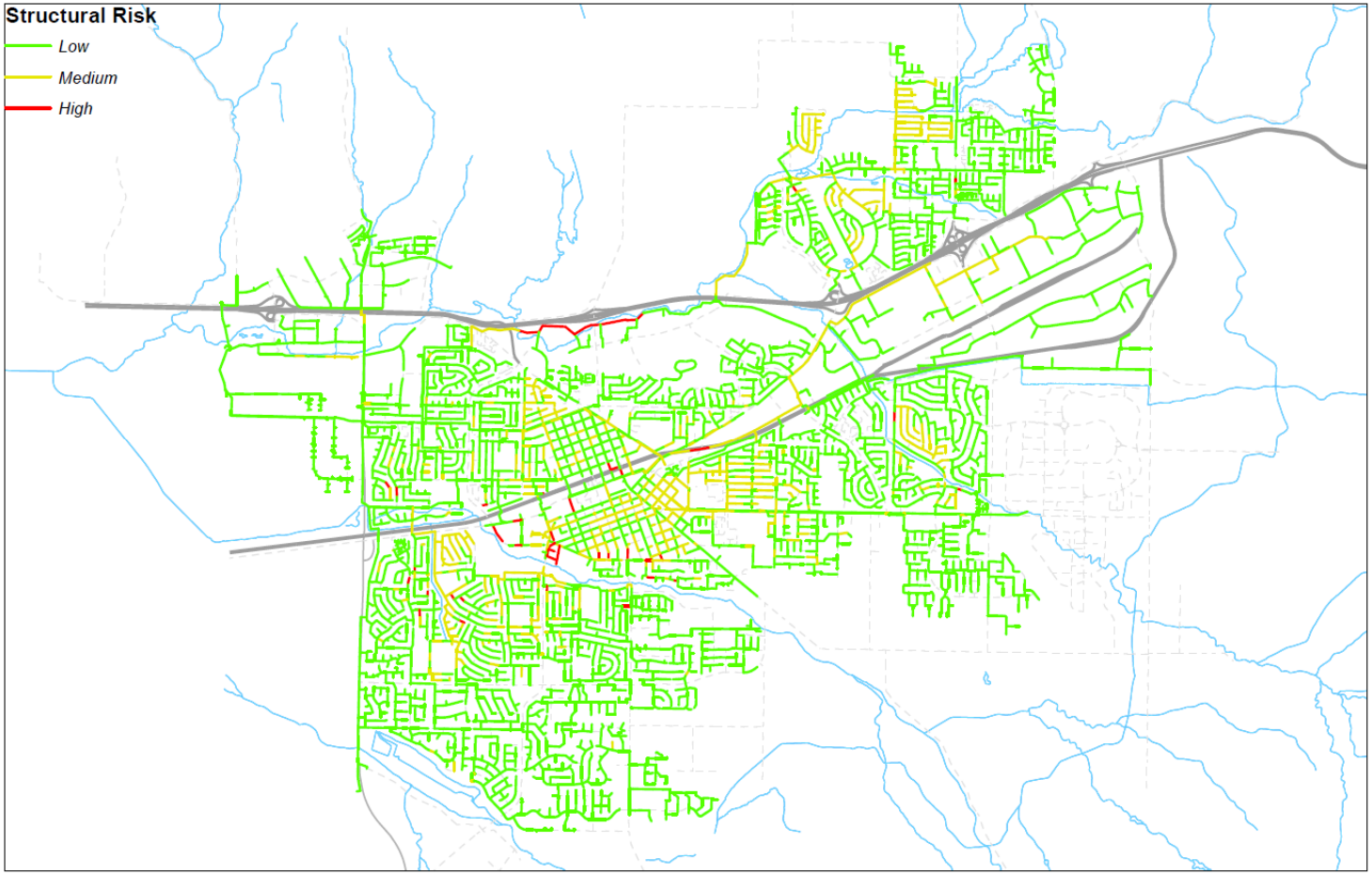
Structural Risk



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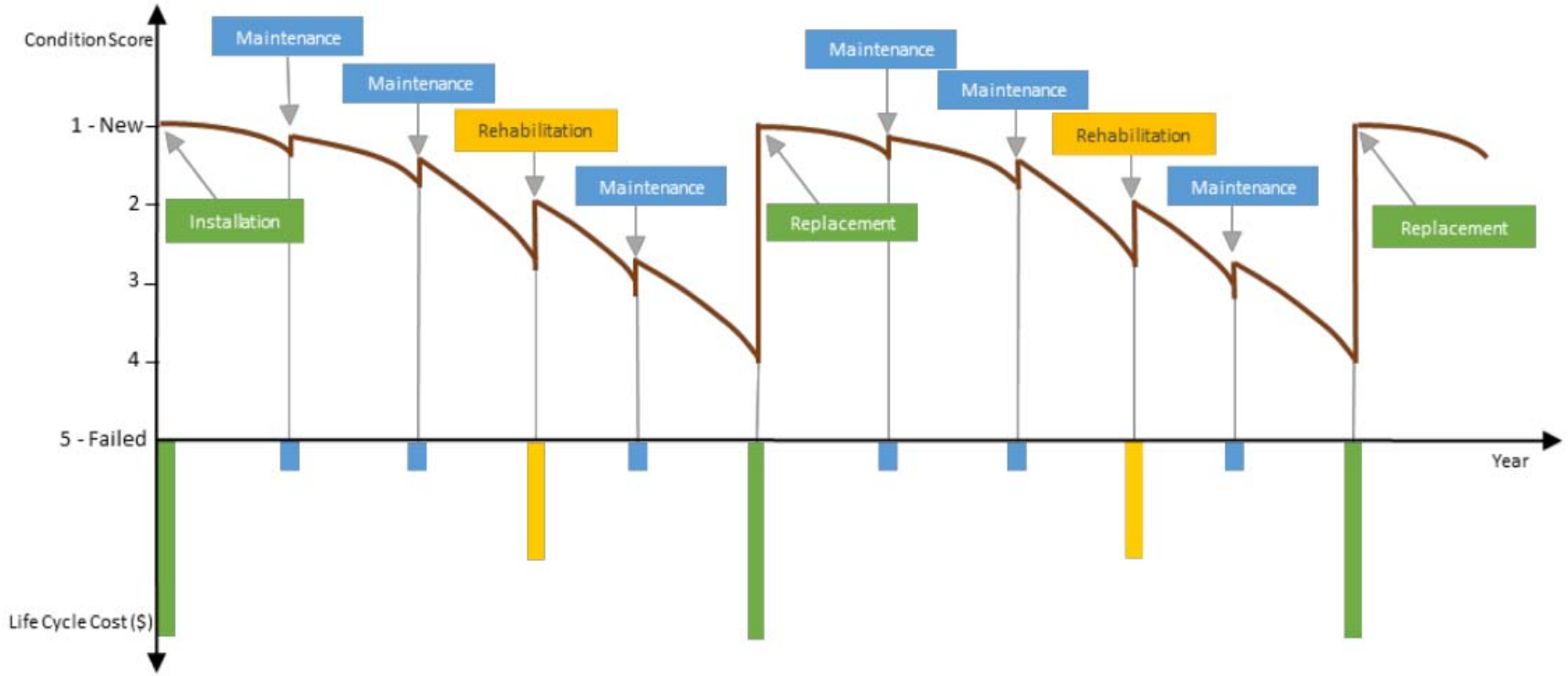
Asset Management

Asset Level Maintenance Strategy



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Asset Management

Condition Analysis

- CCTV examination

- Condition Score

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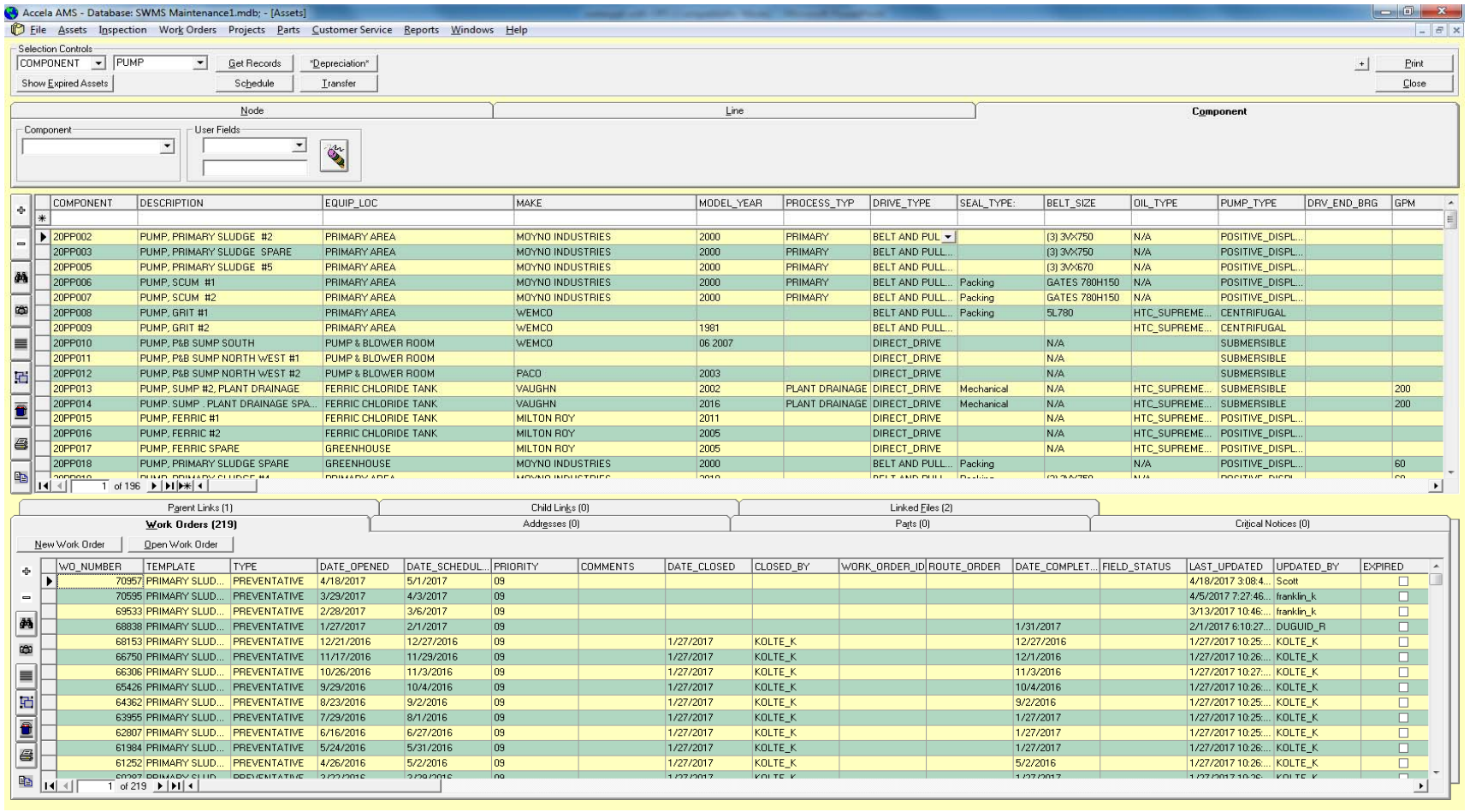
Asset Management

CMMS Data



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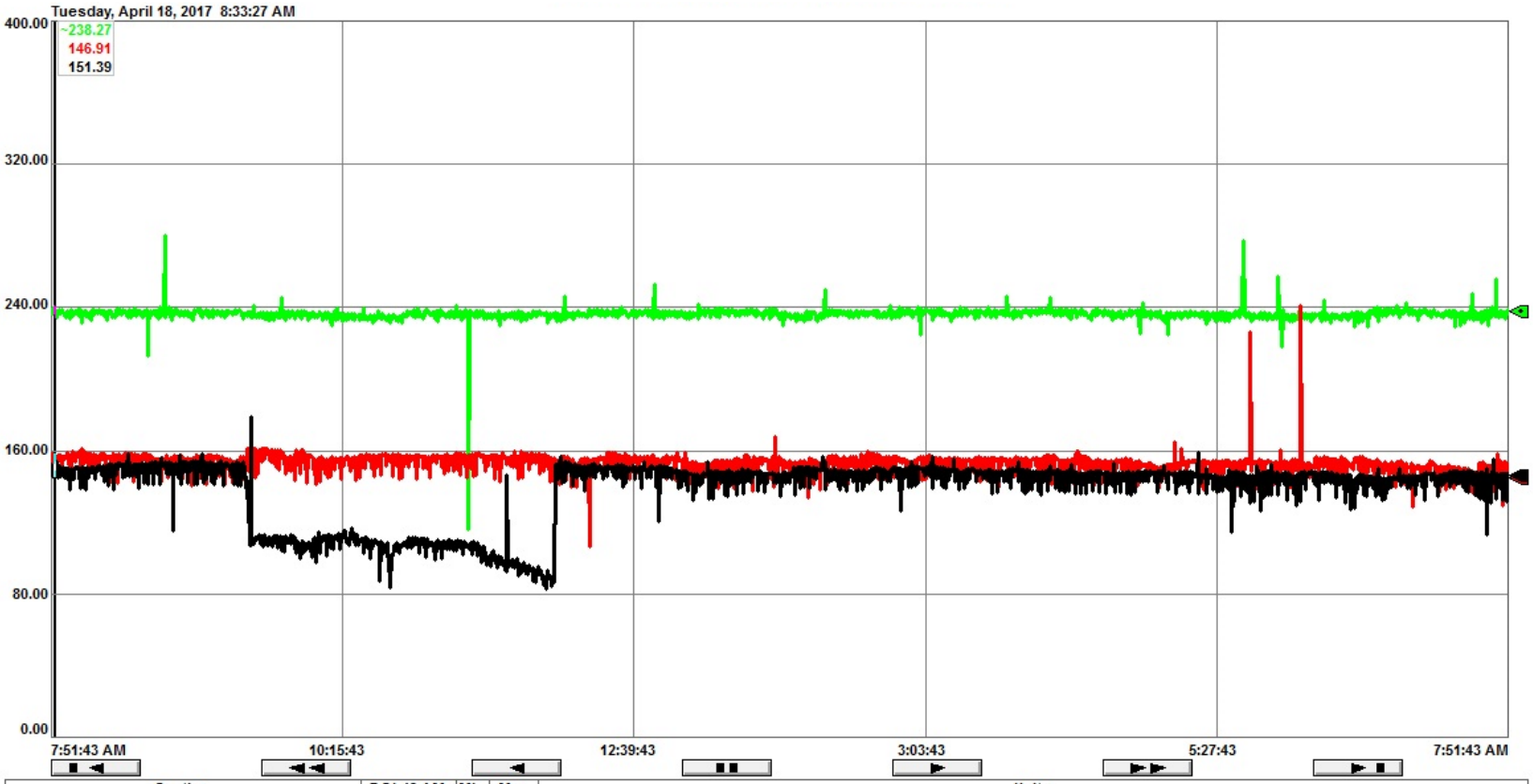
Asset Management

SCADA Data



Caption	7:51:43 AM	Min	Max	Units
DIGESTER RECIRCULATION FLOWMETER #3	238.52	0.00	400.00	MGD
DIGESTER RECIRCULATION FLOWMETER #2	145.62	0.00	400.00	GPM
DIGESTER RECIRCULATION FLOWMETER #1	146.65	0.00	400.00	

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Asset Management

Rehabilitate

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Asset Management

Replace

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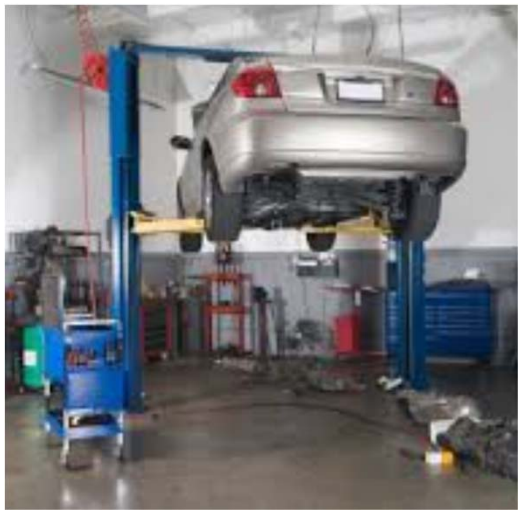
Asset Management

Asset level VS Project level decision making



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Asset Management

Asset level VS Project level decision making

Problem: Over the next 10 years 10,000 assets will reach their the end of useful life

- How do we develop a strategy to replace groups of assets
- In-house Maintenance VS Capital Project

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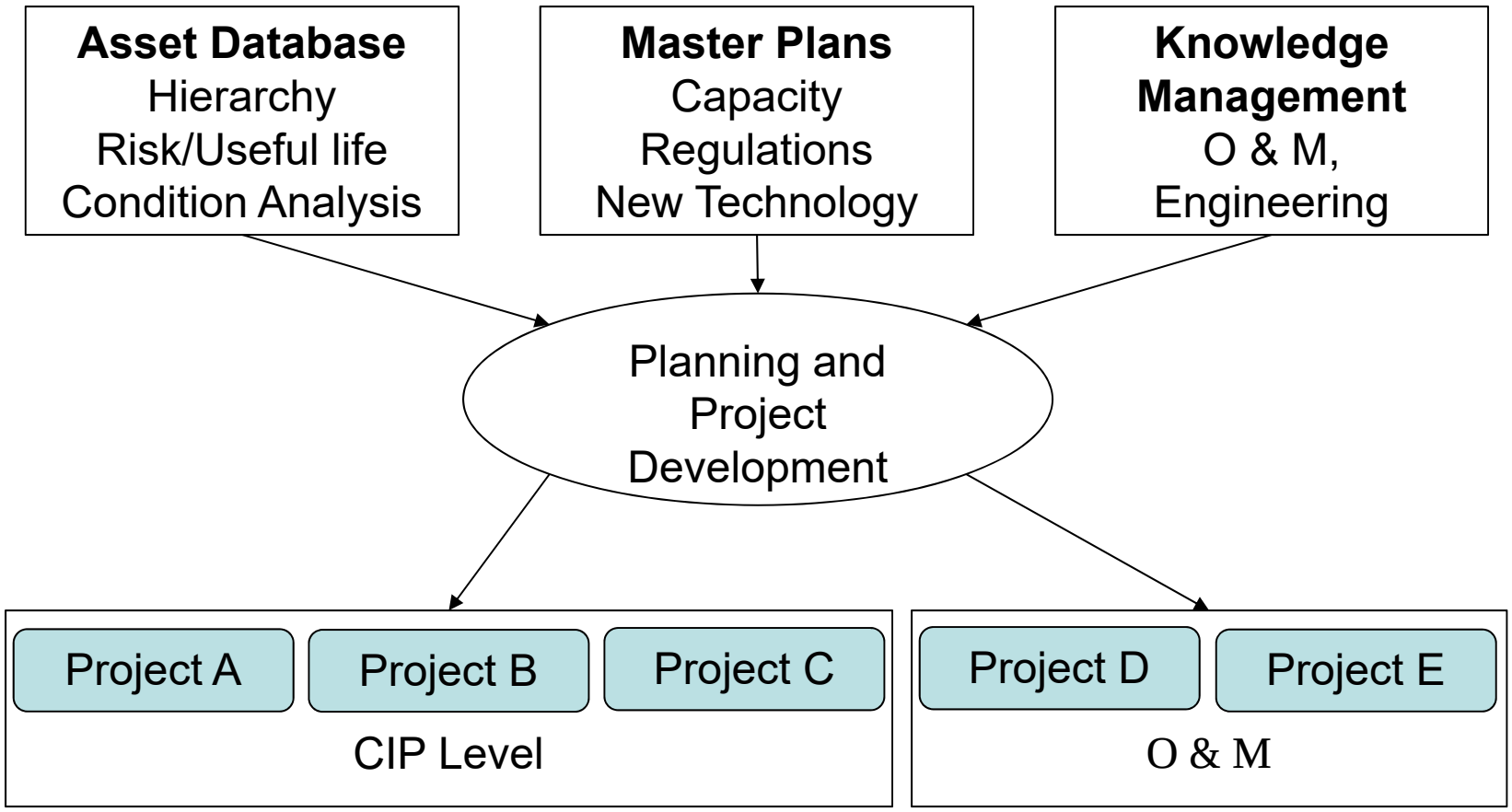
Project Development



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Asset Management

Current Status

- Improve data collection (missing assets and attributes)
- Improve cost estimates (replacement and rehabilitation values)
- Migrating to new CMMS which includes an AM module
- Developing reports to analyze historic data to improve O&M efficiencies

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Asset Management

Making the right decision at the right time at the right costs for the right reasons

- Reduce cost of ownership to an acceptable level of risk while maintaining established levels of service

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QUESTIONS?

City of Livermore
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