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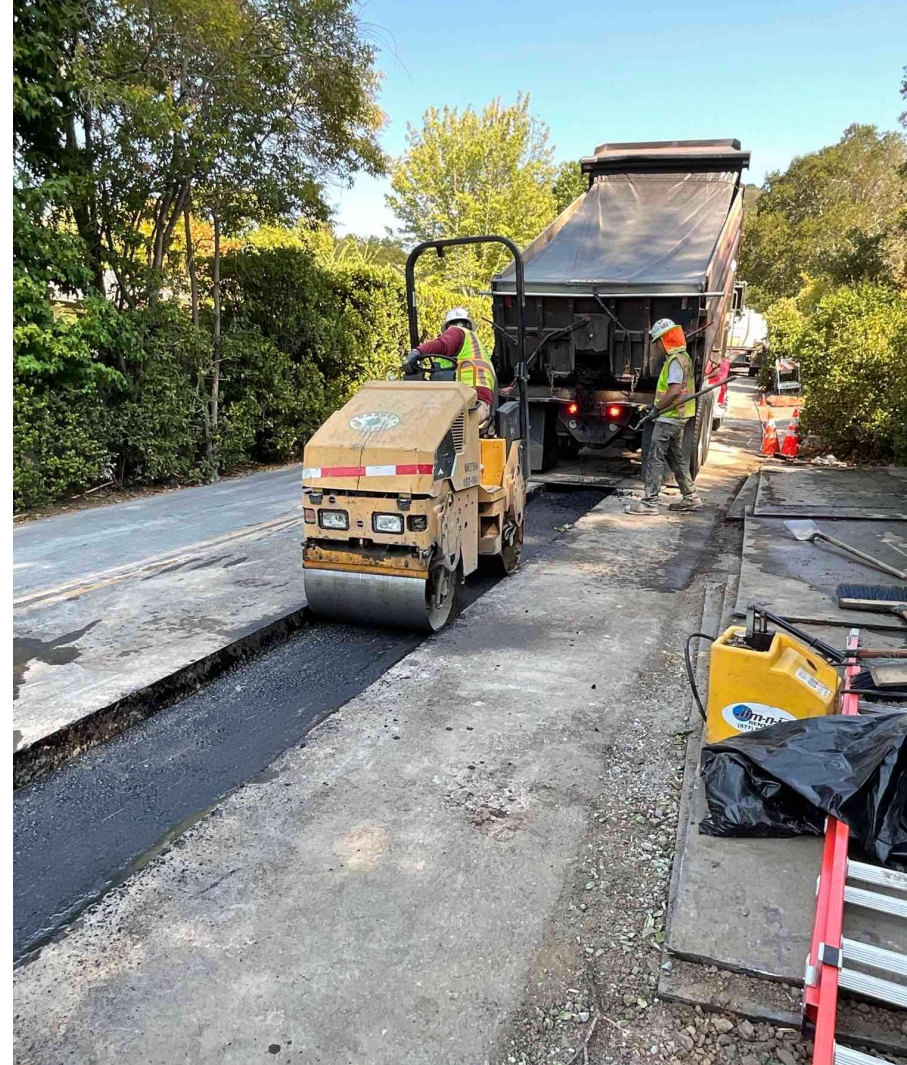


Risk, Renewal, and Reduced Regulation:
Transforming Ross Valley Sanitary District's Regulatory-
Driven O&M and Capital Programs
Allan Scott and Steve Moore



Agenda

- Ross Valley Sanitary District Overview
- IAMP Characteristics
- Highlights:
 - Sewer Main Degradation Study
- Current Status – Program Effectiveness





Learning Objectives

- Understand the **key elements of a data-driven asset management-** based capital improvement plan
- Learn how a **sewer degradation study** can provide insight on how your system breaks down over time
- Discuss an approach to **leveraging asset risk and condition data** to develop a prioritized **capital improvement** plan
- Learn how this **process is currently used** to respond to Ross Valley Sanitary District's needs



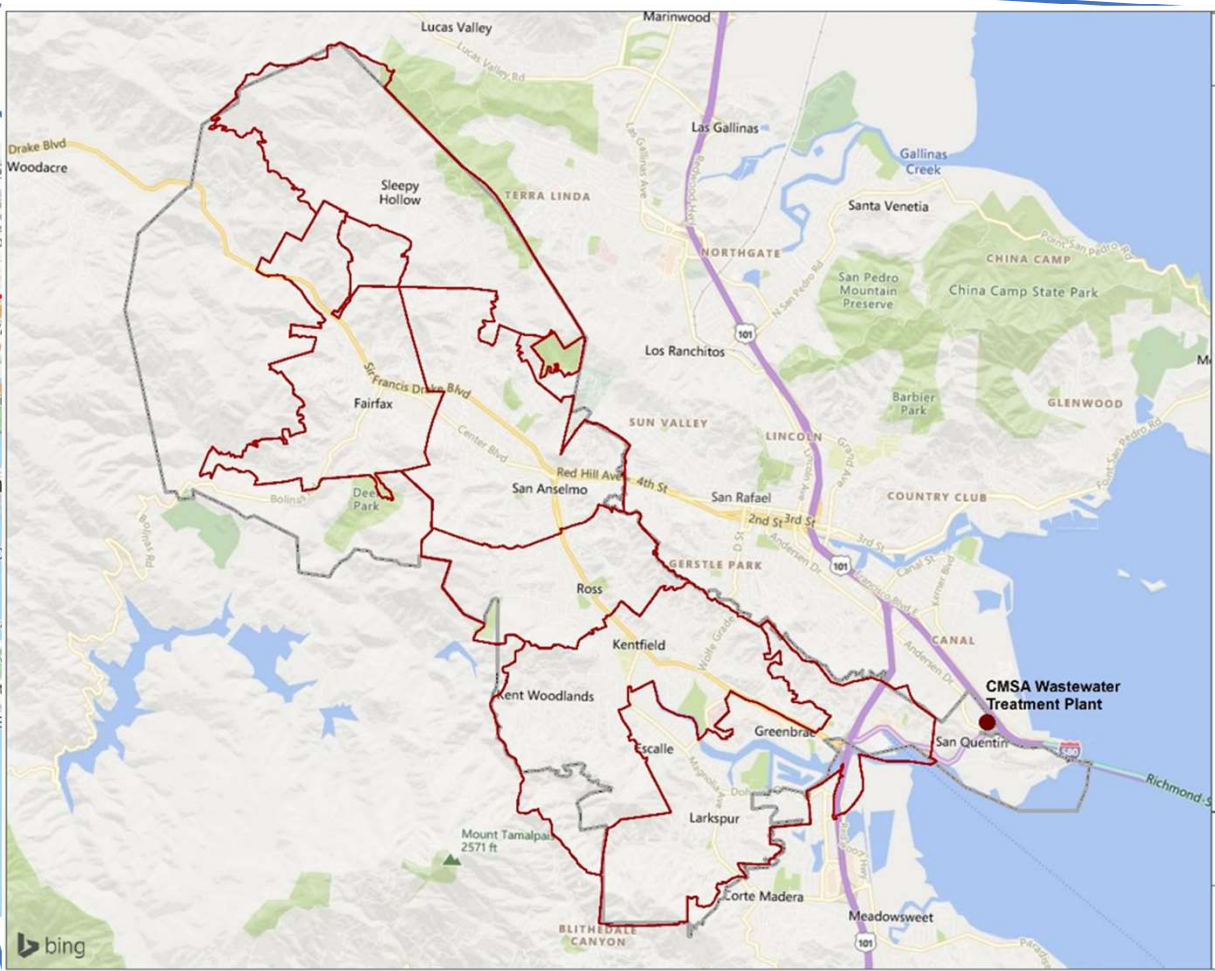


Ross Valley Sanitary District Facts

3.6/70
Average annual dry/peak wet weather flow (MGD)

10 - 18
Wet weather peaking factor (WWPF) range

49 / 14
(MGD/WWPF in 2023)



15,900
customers

194
Miles of gravity main

19
Pump stations

8.4
Miles of force main

60%
Installed before 1955



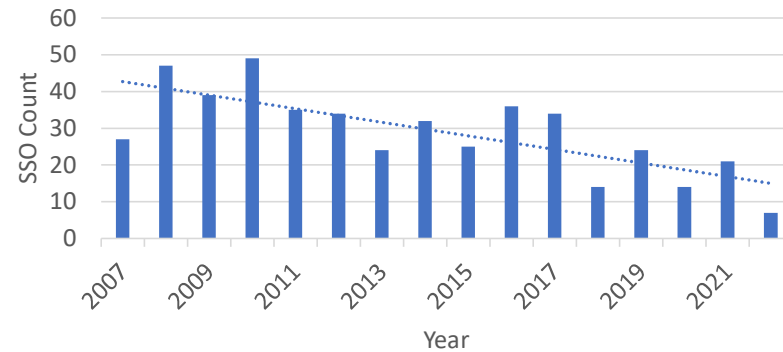
Collection System History

Aging infrastructure – significant SSOs 2000 – 2010

2013 Cease and Desist Order

- **List of prescriptive actions** based on available information at the time
 - 2007 Sewer System Replacement Master Plan
 - 2006 SHECAP (system hydraulic evaluation and capacity assurance plan)
 - 2012 Condition Assessment Data (Rehab all Grade 5's)

RVSD Sewer Spill History
2007 - 2022



**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION**

CEASE AND DESIST ORDER NO. R2-2013-0020
REQUIRING THE

SANITARY DISTRICT NO. 1 OF MARIN COUNTY
(ALSO KNOWN AS "ROSS VALLEY SANITARY DISTRICT")
SANITARY SEWER COLLECTION SYSTEM
IN MARIN COUNTY

TO CEASE AND DESIST DISCHARGING WASTE
IN VIOLATION OF REQUIREMENTS IN

STATE WATER BOARD ORDER NO. 2006-0003-DWQ,
STATE WATER BOARD ORDER NO. 2008-0002-EXEC,
SECTION 301 OF THE CLEAN WATER ACT, AND
CALIFORNIA WATER CODE SECTION 13376



District Response

- 2013 Infrastructure Asset Management Plan (IAMP)
 - Provided plan to **meet key requirements** of CDO
- Additional data and analysis enabled District to **re-evaluate priorities**
- **Original prescriptive list too rigid** – didn't incorporate new information and needs based on new condition assessment or flow monitoring information



Sanitary District No. 1 of Marin County
Infrastructure Asset Management Plan

October 1, 2013

RWQCB Order No. R2-2013-0020



Prepared by  V.W. HOUSEEN
& ASSOCIATES

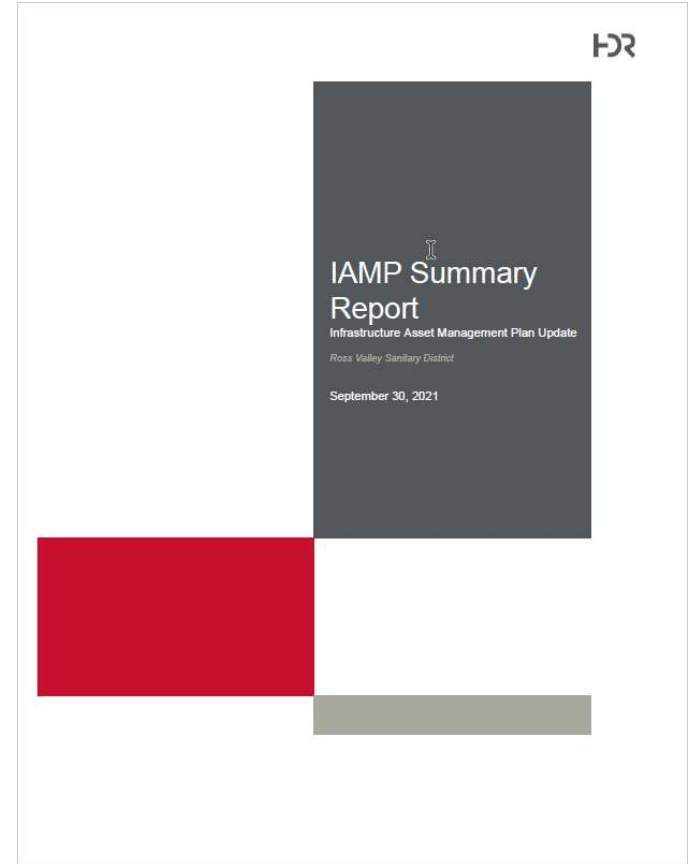
in association with
Schaaf & Wheeler
JDH Corrosion
Humphrey Consulting



2021 IAMP Update

- 2021 IAMP
 - **Risk-based, data-driven, forward-looking**
 - Shift from pre-determined projects/repairs
 - Established an **off-ramp** from the prescriptive requirements
 - Balances **rehabilitation** with **I&I** based on **risk**
 - **Flexibility** to identify and **prioritize** projects based on changing needs

Prescriptive → Targeted Data-Driven Needs





Key components



- **Gravity main deterioration analysis** and repair plan
- **Manhole risk assessment** and repair plan
 - **Hydraulic model update** and **flow monitoring** study
 - **Force main condition assessment** and risk analysis
 - **Creek crossing assessment** and action plan
 - **Lift station condition assessment** and risk analysis
 - **10-year prioritized capital improvement plan**





Multi-tiered Risk Approach

- Provides comprehensive scoring for capital project prioritization

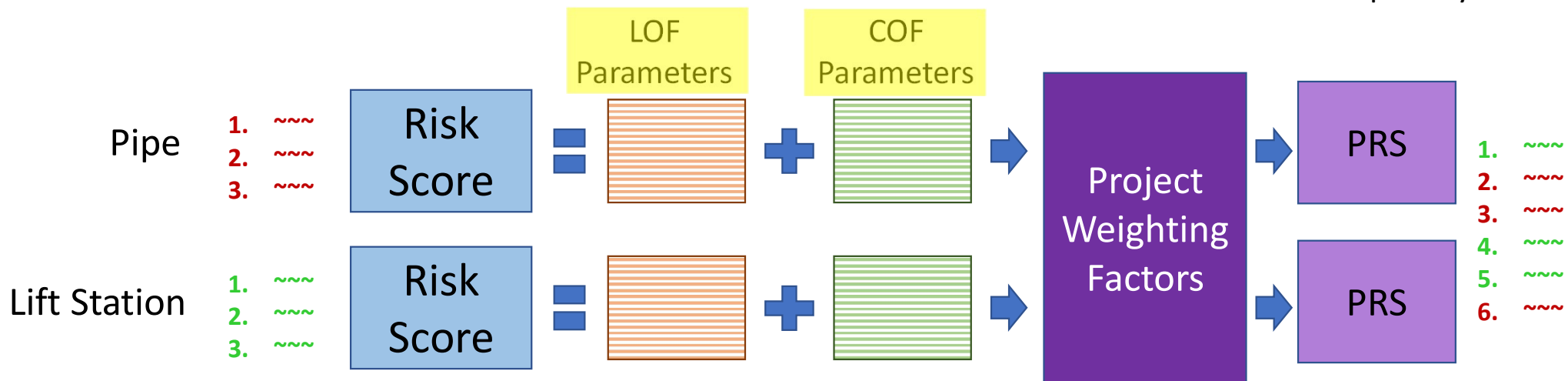
Determines improvement priorities in **asset class**

Likelihood of Failure

Consequence of Failure

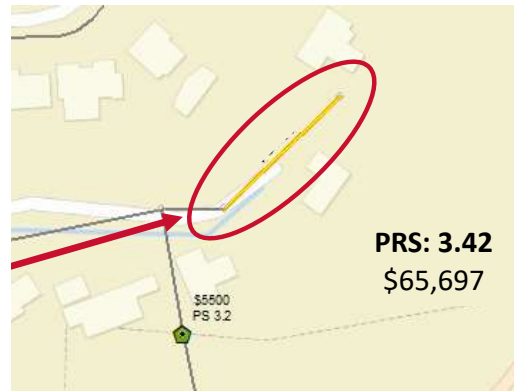
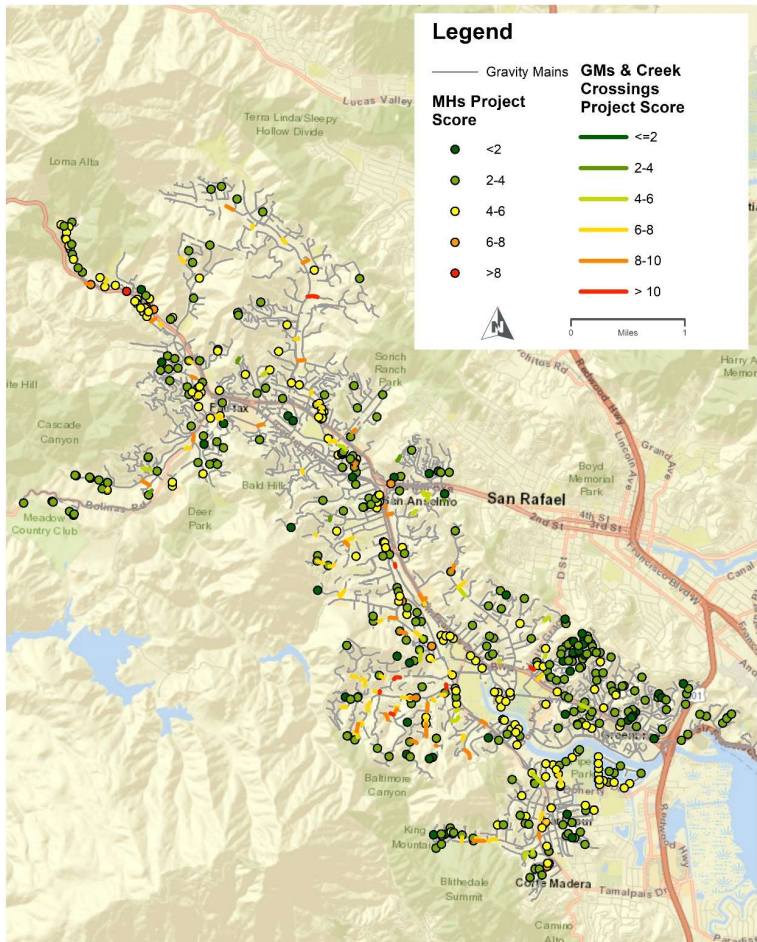


Project Risk Score – Determines overall priority

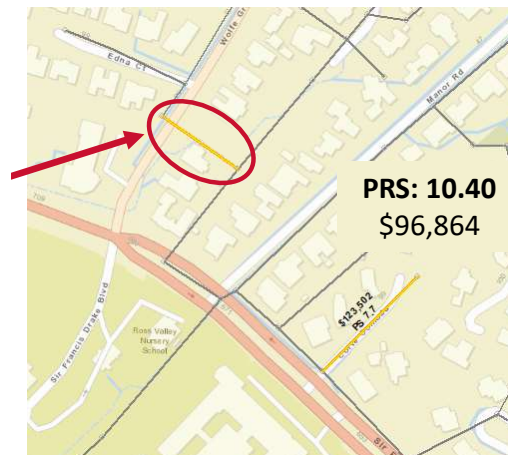




Project Risk Score Prioritizes Improvements



Category	COF Score	Weight	Category Score
Environmental	1	19%	0.2
Stakeholder/Customer Service	1	20%	0.2
Location/Critical Facility Impact	1	18%	0.2
Regulatory Compliance	2	21%	0.4
Health and Safety	1	11%	0.1
Ability to Restore to Design LOS	1	13%	0.1
Financial Impacts (No Criteria)	NA	12%	1.2
Risk			1.0
Project Prioritization Score			3.4

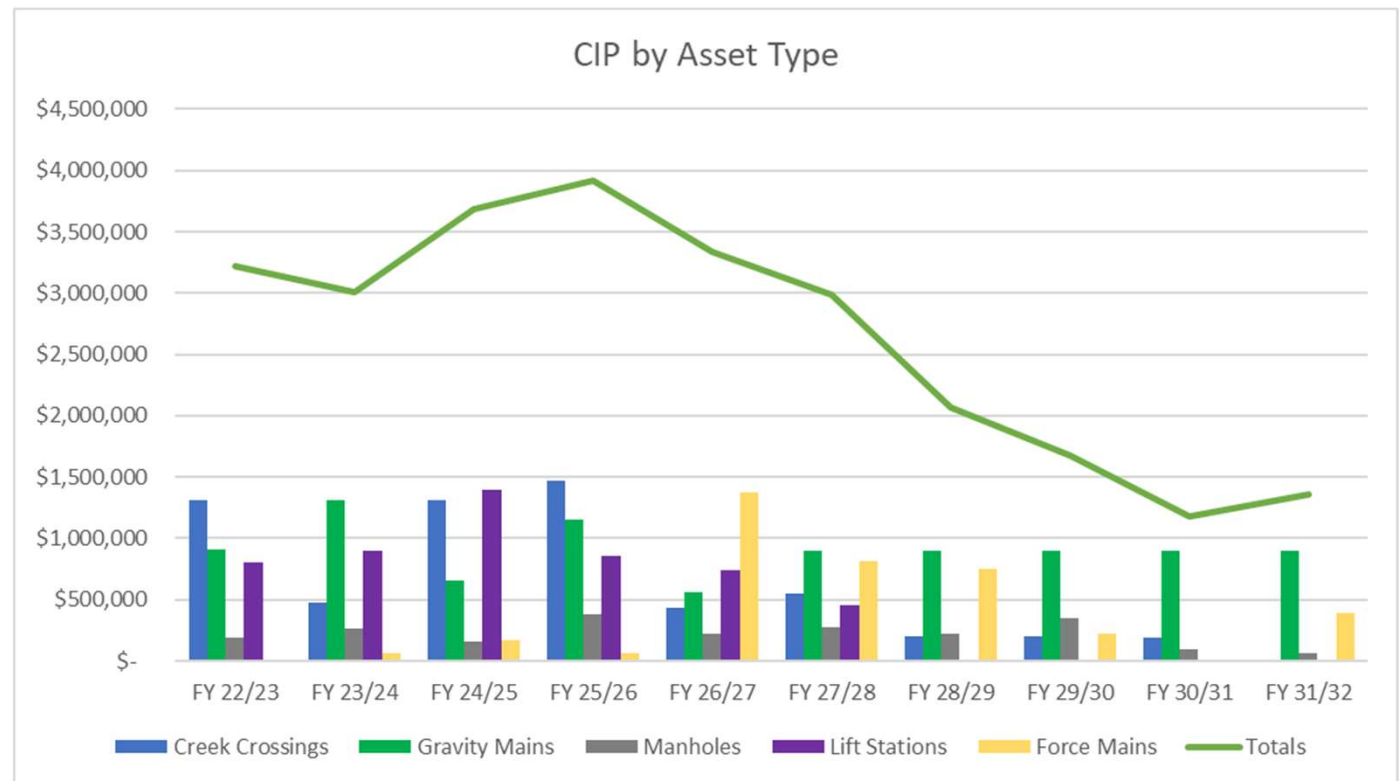


Category	COF Score	Weight	Category Score
Environmental	10	19%	1.9
Stakeholder/Customer Service	10	20%	2.0
Location/Critical Facility Impact	10	18%	1.8
Regulatory Compliance	6	21%	1.3
Health and Safety	1	11%	0.1
Ability to Restore to Design LOS	10	13%	1.3
Financial Impacts (No Criteria)	NA	12%	1.2
Risk			1.0
Project Prioritization Score			10.4



10-year prioritized capital improvement plan

- Project Risk Score **normalizes criticality scores across all asset types**





Key findings and results

Gravity main deterioration	<ul style="list-style-type: none"> • Most defects studied did not deteriorate (95%) • Reprioritized reinspection and repair • Significantly reduce rehabilitation costs and inspection requirements
Manhole risk assessment and repair plan	<ul style="list-style-type: none"> • Manholes in relatively good shape and are low risk • Most rehabilitation work could be performed in-house over next 10-15 years
Hydraulic model update and flow monitoring study	<ul style="list-style-type: none"> • Model demonstrated that capital improvements have made steady progress to reduce flow and I&I • Helped validate hydraulic strategies in different parts of system
Force main condition assessment and risk analysis	<ul style="list-style-type: none"> • Highest risk pipes appear to be in good shape based on assessment results • Established low-cost condition monitoring approach with Pica Recon+
Creek crossing assessment and action plan	<ul style="list-style-type: none"> • Risks are relatively low; creek crossings are in reasonably good shape • No urgent repairs, mostly maintenance and inspection
Lift station condition assessment and risk analysis	<ul style="list-style-type: none"> • Defined plan to bring all lift stations to good or excellent condition over next 5 years
10-year prioritized capital improvement plan	<ul style="list-style-type: none"> • Developed project prioritization scores based on weighted consequence of failure risk factors from the risk analysis of each asset type



Gravity main deterioration analysis and repair plan

- Evaluate deterioration rates of PACP Grade 4 and Grade 5 defects
- Evaluated **203 matched defect pairs** ranging from 3 to 8 years apart
- Established **reinspection** and **repair guidelines**
- Developed repair plan and reinspection **plan alternatives**
- Select the **best options** for implementation

Large Defect
Example





IAMP Highlights – Gravity Main Deterioration

- Deterioration analysis results:
 - Less than **5% of defects deteriorated**
 - Strong correlation between **defect size** and **deterioration**
 - 2 or more clock positions
 - **No PACP structural grade 4 defects deteriorated** to a grade 5
 - **Most PACP structural grade 5 defects will remain stable over a 4 year period**

From/At	12	01	03	09	08
To	-	02	09	03	04
Clock Position Change	0	1	6	6	8

Description	Defect Match Pairs	PACP Grade 5 Match Pairs	PACP Grade 4 Match Pairs	PACP Grade 3 Match Pairs
Defects with Match Pair Identified	203	140	61	2
Defect Deterioration Identified	10	9	1	0
Percent with Deterioration	4.9%	6.4%	1.6%	0%



IAMP Highlights – Gravity Main Deterioration

- Repair and reinspection plan options and implementation
 - Leveraged **Innovyze InfoAsset Planner** to develop guidelines, recommendations, and costs for each gravity main
 - Identified **5 repair plan alternatives**
 - Identified **2 reinspection plan alternatives**
 - **Alternative B** extends inspection periods based on observed conditions – reduces inspection length by 5 miles annually

Primary Defects Addressed	Alternative No.	Remediation Strategy	Length (Miles)	Localized Liner Repairs	Capital Project Cost (\$M)	Localized Liner Repair Cost (\$M)	Total Cost (\$M)
PACP Structural Grade 5s with 2 or more Clock Position Changes, Collapses, Significant Deformation	1	Most Spot Repairs	8.5	147	\$8.7	\$0.8	\$9.5
	2	More Spot Repairs	8.5	126	\$11.0	\$0.6	\$11.6
	3	More Manhole to Manhole Remediation	8.5	96	\$14.4	\$0.3	\$14.7
	4	Most Manhole to Manhole Remediation	8.5	60	\$18.2	\$0.1	\$18.3
PACP Structural Grade 5s	5	More Spot Repairs	12.9	190	\$15.8	\$0.8	\$16.6



IAMP Highlights – Gravity Main Deterioration

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Alternative	Reinspection Alternative Description	Reinspection Plan Actions	Reinspection Frequency (years)	Small Diameter Gravity Sewer Length (miles)	Inspection Length per Year (miles)	Total (M)
A	Similar to Current Inspection Program	CCTV (See Note 1)	10	76	7.6	1.6
		Monitor – 10 Years – PACP Structural Grade 1, 2, 3	10	87	8.7	4.7
		Monitor – 5 years – PACP Structural Grade 4	4	17	4.1	3.3
		Monitor – 3 years – PACP Structural Grade 5	3	3	1.0	3.6
		Alternative A Total			182	21.4
B	Updated Inspection Frequencies Based on Deterioration Analysis	CCTV (See Note 1)	12	76	6.3	
		Monitor – 12 Years – PACP Structural Grade 1, 2, 3	12	87	7.2	
		Monitor – 8 years – PACP Structural Grade 4	8	17	2.1	
		Monitor – 4 years – PACP Structural Grade 5	4	3	0.7	
		Alternative B Total			182	16.3



Current Status and Program Effectiveness

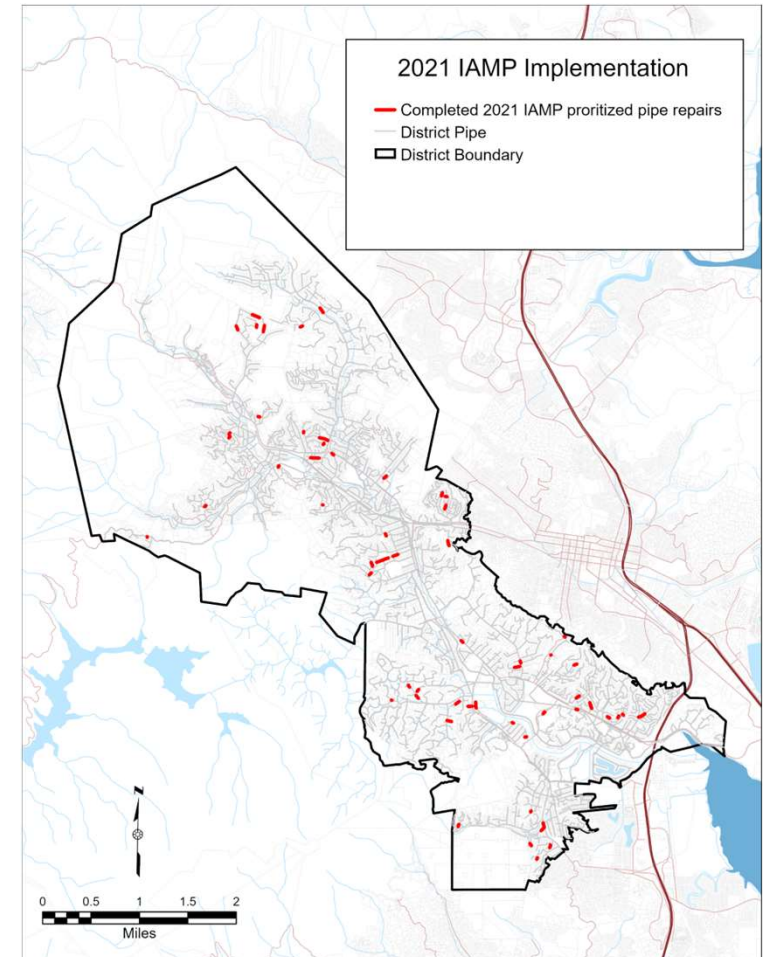
- Original 2013 IAMP/CDO requirements
 - Completed **all 605 grade 5** gravity pipe **defects**
 - Completed **all the gravity sewer capital commitments**
 - Finishing up the **Pump Station projects**





Current Status and Program Effectiveness

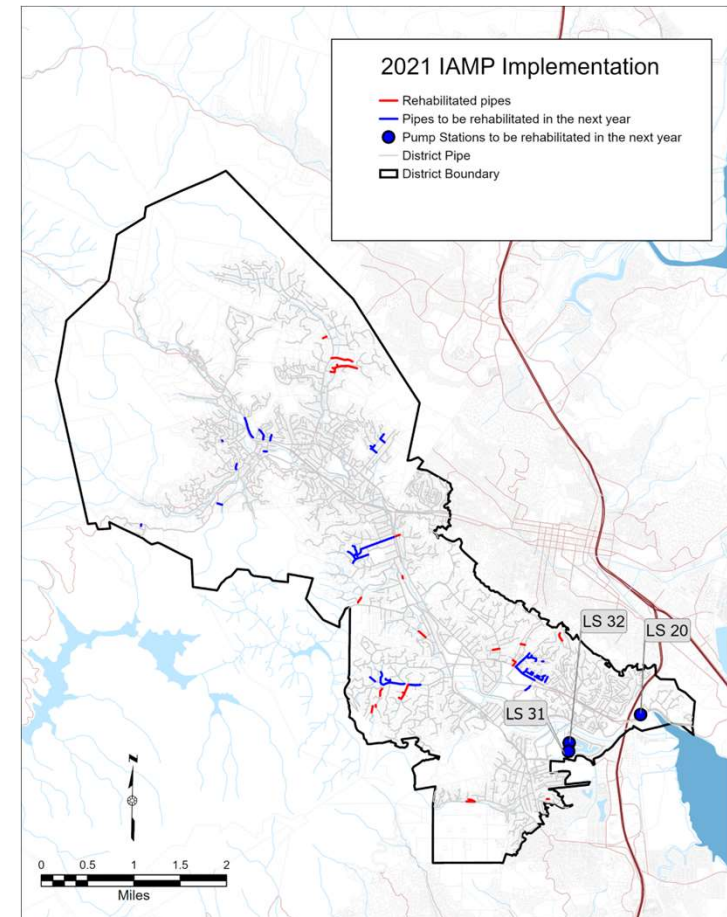
- 2021 IAMP completed pipe repairs





Current Status and Program Effectiveness

- 2022-2023 Gravity Sewer Projects (red)
 - **\$2.7 M project** just wrapping up
 - Based on the 2021 IAMP risk analysis
- 2023-2024 Projects (blue)
 - Includes several IAMP **high priority creek crossings**
 - **Three lift stations** going out to bid in April.

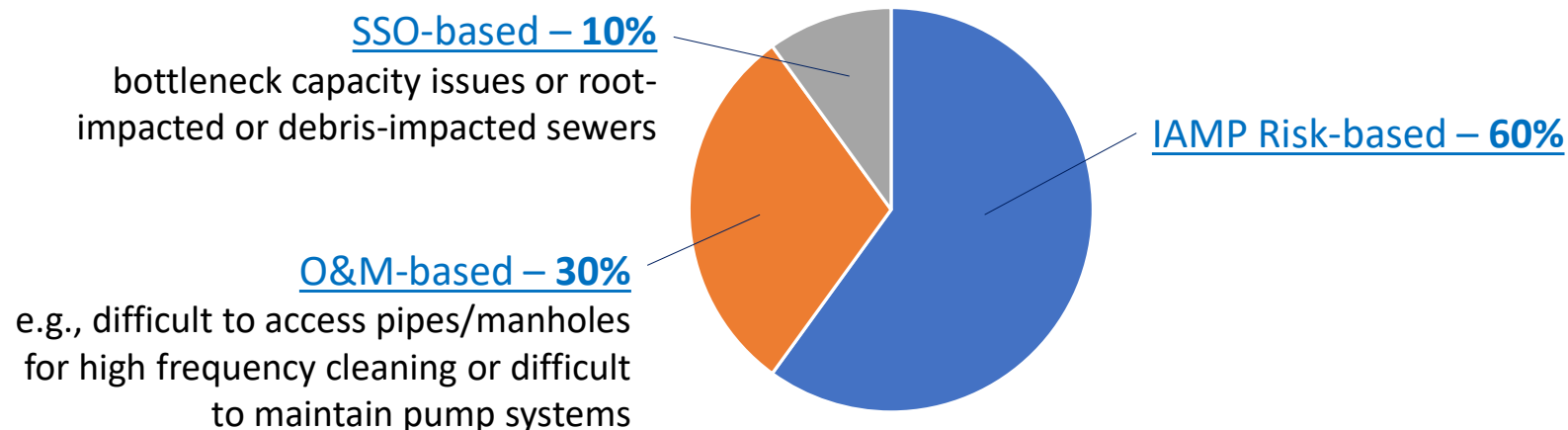




Current capital planning strategy

- 2021 IAMP risk-based analysis - **\$3 to \$5 M** / year program
 - Current revenues can support more per year
- Enables District to **add maintenance-based, SSO-based, or capacity-based** capital project elements

Capital Planning Strategy





Data-driven IAMP Providing Exit Plan for CDO Requirements

- Regional Water Board:

"The revised IAMP is comprehensive and lays out the District's strategy to fix its collection system moving forward. ...we might be close to rescinding the CDO. "



RVSD's Data-Driven Risk-Based Approach

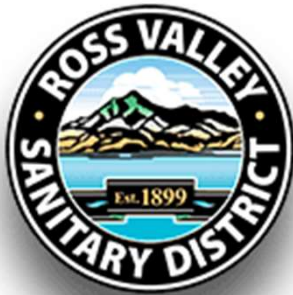
- Demonstrates **multiple ways to apply risk** to support capital improvement
 - Flexible, efficient, **consistent CIP**
 - **Responsive** to changing priorities
 - Provides **pathway out** of consent decree
- Sewer degradation study
 - Leverage available **historical CCTV data**
 - Practical evidence to support **extending rehabilitation and reinspection** periods





For more information

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Thank You!

