



City of Mercer Island Water Supply Reliability Action Plan

October 17, 2023



Brief Review of Events that Led Us Here

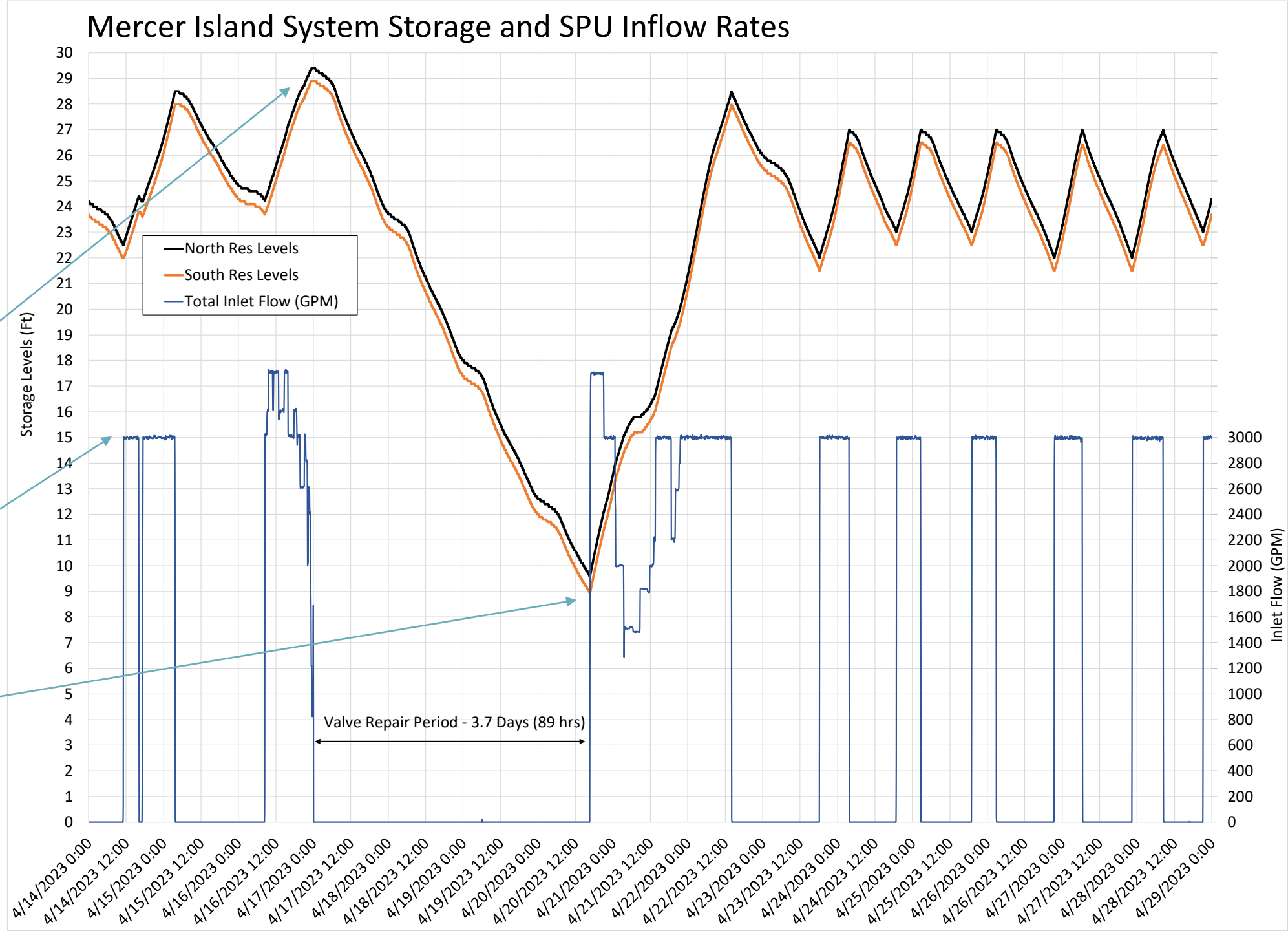
Mercer Island Pipelines Subregional System - Valve Issues



The Event in Data

Key Observations:

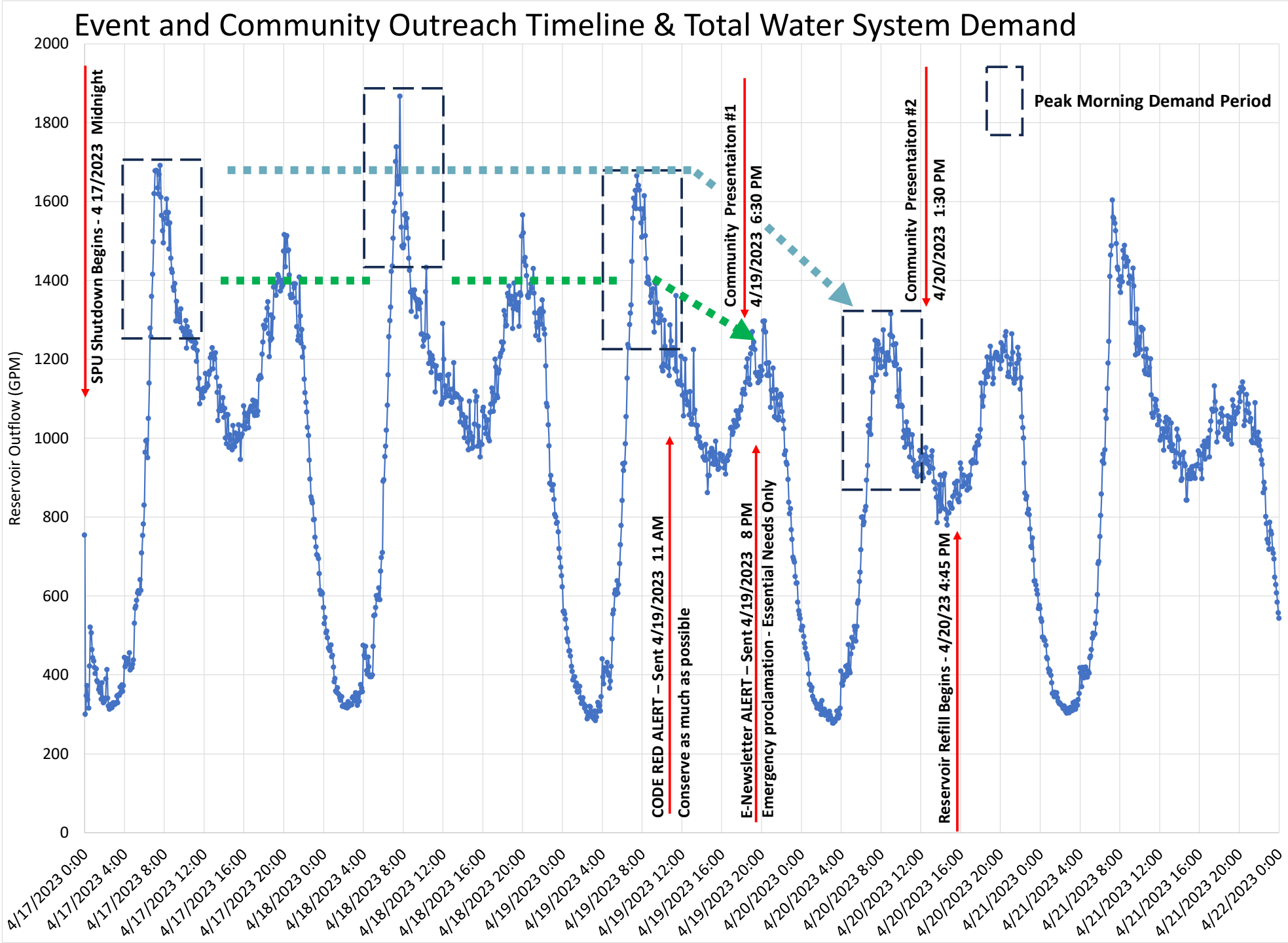
- Mercer Island made the wise decision to maximize storage in advance of the shutdown
- SPU supply operates on/off
- Restart of the SPU supply had some challenges in the first 24 hours



The Event in Data

Key Observations:

- In non-peak season, total system demands range from 300 gpm - 1800 gpm
- ~15% reduction in the evening peak on 4/19/23
- 20% reduction in morning peak demands between 4/19 and 4/20/2023 with less than one day public notice



Project Objectives

To evaluate and develop near- and long-term opportunities to improve system reliability and reduce risk of future water supply emergencies

Overview of Project Approach

- ✓ Data/information request and review
- ✓ Conduct interviews
 - City leadership
 - Public Works management and staff
 - Fire Department leadership
- ✓ Conduct brief review of resiliency activities by others/industry
- ✓ Develop list of potential *Actions Items* to improve resiliency
- ✓ Develop *Evaluation Criteria* to assess capabilities, benefits, barriers, trade-offs for each *Action Item*
- ✓ Begin collaboration with Utility Board
- *Apply Evaluation Criteria to Action Items*
- *Refine, prioritize, and develop draft Action Plan*
- Present draft Action Plan to Utility Board
- Present Action Plan to City Council

Action List Categories



INFRASTRUCTURE

Additional Pipeline
Additional Storage
Secondary Supply



PROGRAMMATIC

Enhanced Planning
O&M Evaluations
Community Engagement



PERSONNEL

Staffing
Training

Examples:

Action Items Under Consideration

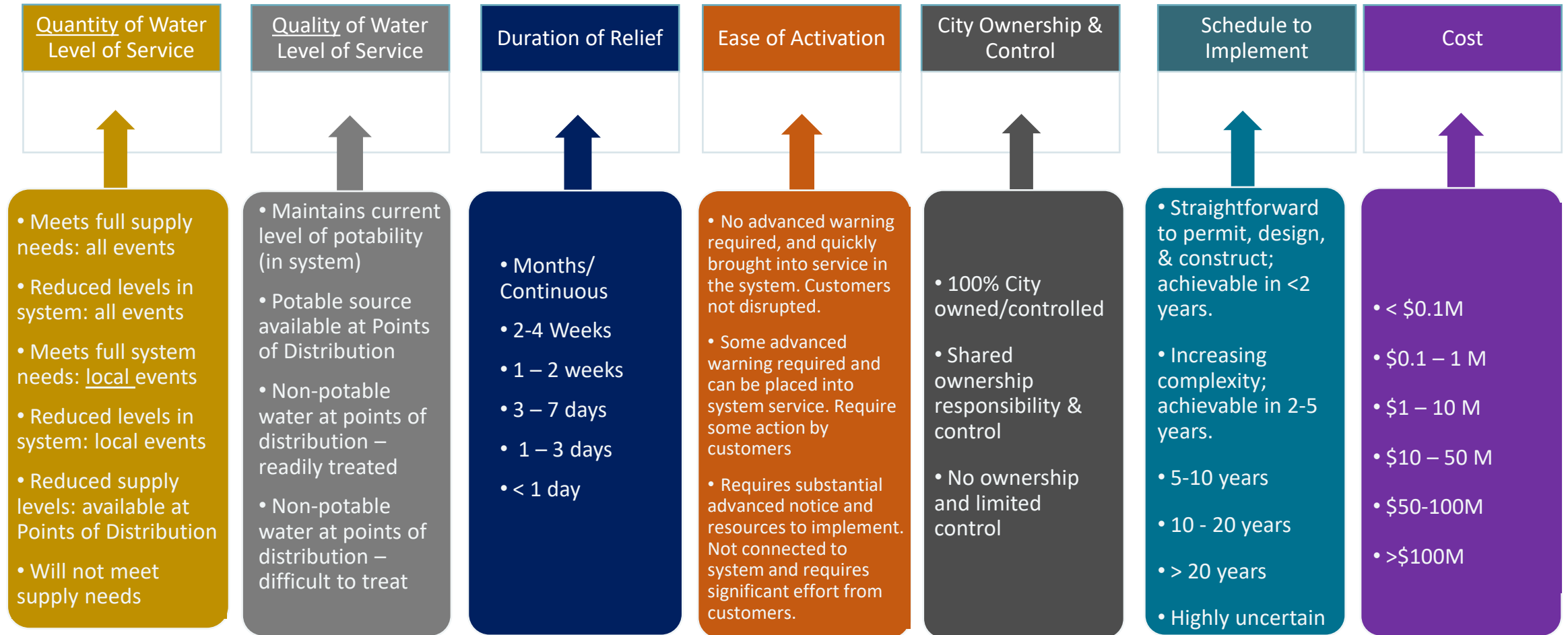
Infrastructure	SPU Supply Infrastructure	Second/parallel SPU supply line from east
		Second/new SPU supply line from west
		Comprehensive SPU valve renewal with robust bypass capabilities
		Selective SPU supply line renewal/ hardening
		New storage (Shorewood)
	Storage Management	New storage (south end)
		Expand existing storage (if feasible)
		Capability to fill existing storage from tanker trucks
		Seismic valve strategy (both tanks/one tank only)
		In-line emergency water storage tanks
		Portable / field deployable water storage tanks - to support fire response
		Portable / field deployable water storage tanks - to be used for defined points of distribution
	Develop/ Enhance Secondary Supplies	Emergency tenders
		Expand emergency well capacity – Non-potable
		Current and/or expand emergency well - Potable
		Lake non-potable (includes improved access for firefighting water supply)
	Incremental System Hardening - Seismic Events	Lake potable (treatment plant, operational capabilities)
		Replace most seismically vulnerable Pipe (AC and Cast Iron) with ductile iron;
		Use strategic placement of Earthquake Resistant Ductile Iron Pipe (ERDIP)
	Energy Management/ Resilience	Shake-Alert System control to critical rotating (pumping) equipment
Evaluate in-conduit hydroelectric generation (SPU fill into storage)		
Optimize Reservoir Pump Station with smaller capacity duty pumps		

Action Items Under Consideration

Programmatic	Enhance Planning	Develop Post-Event Level of Service (LOS) goals (staff and policymakers)
		Review 2004 Seismic Vulnerability Analysis for currency
		Standby power: - Refueling Evaluation & Plan (New 500 KW Genset; First Hill Genset) - Establish priority restoration of service (with PSE)
		Evaluation of regional power loss on Island, impacts to sewer lift stations, and lake water quality implications
	Supply Curtailment	Voluntary curtailment (all system)
		Mandatory curtailment (all system)
		Pre-planned geographic isolation (e.g. serve Town Center only)
	O&M Evaluations	Operational flexibility (Loss of storage, loss of pump stations, ability to bypass with SPU)
		Surge control - operation of hydrants and pumps, communications with fire department
		Assess water loss metrics
		Contingency plans for taking reservoirs/pump stations out of service
		Optimize infrastructure reliability (valve, hydrant exercise /condition assessment)
	Community Engagement/ Communications Strategy	Personal preparedness
		Scaled response (pre-defined triggers, conditions, and steps)
		Prepare "offline" webpages with information, explanations, and messaging

Personnel	Staffing	Emergency planning & community outreach
		Volunteer staffing (Emergency Well(s))
	Training	Internal cross-training
		Joint/SPU/Regional cross-training

Evaluation Criteria Categories



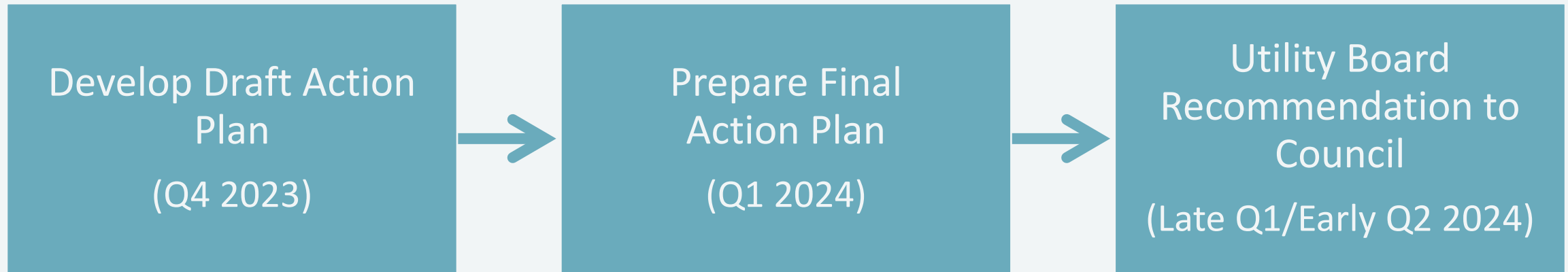
Working with Mercer Island Steering Team to develop *weighting factors* for these criteria

Will Use Phased
Approach for
Action Plan

Potential Early Action Items

- Enhanced Secondary Groundwater Supply
 - Conduct Feasibility Study for permanently connecting emergency well to system
 - Engage critical agencies (WDOE & WDOH)
- Enhanced Storage
- Enhanced Planning
 - Coordination with SPU re: system improvements
 - Review/update 2004 Seismic Vulnerability Analysis
 - Continue to build preparedness plans

Next Steps



THANK YOU

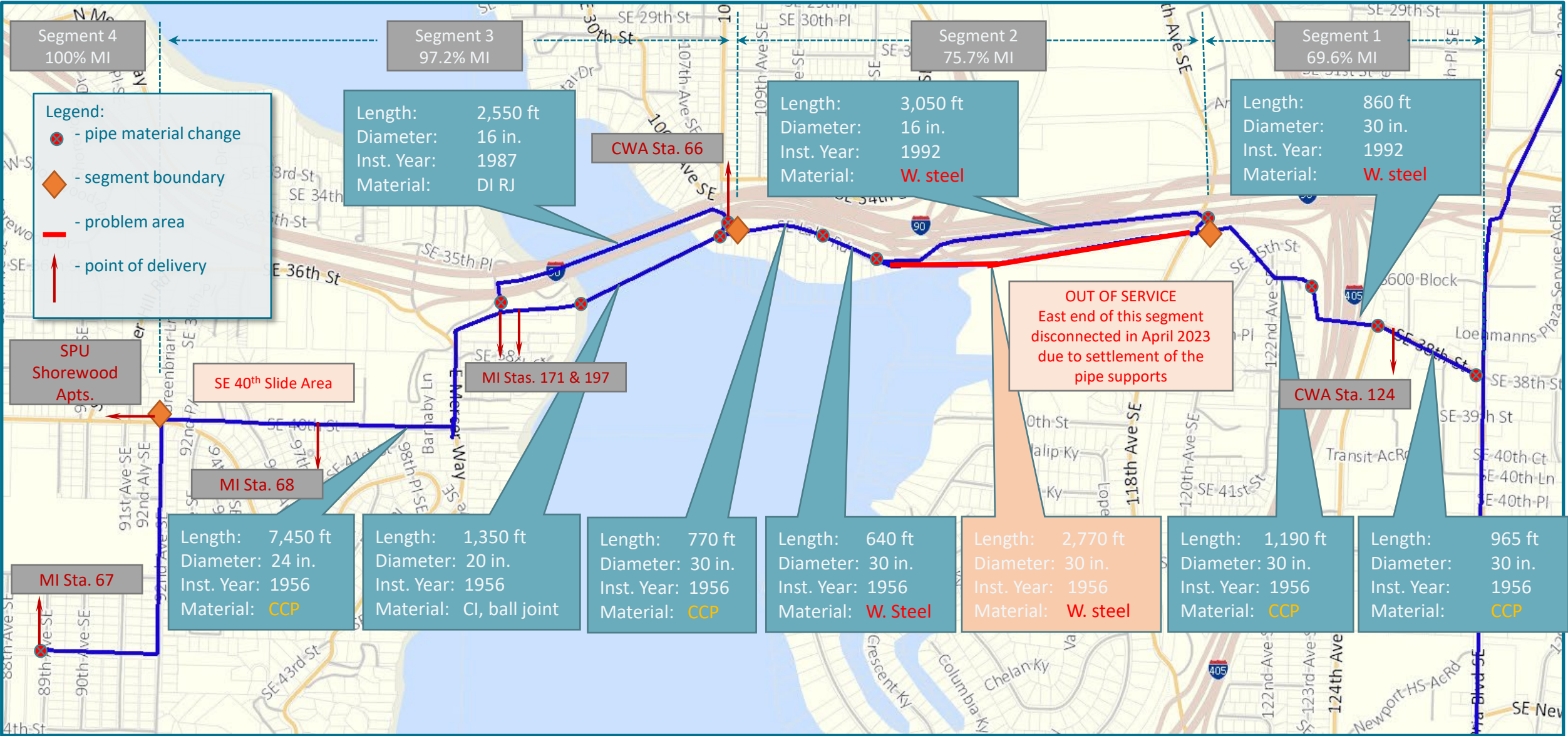


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Extra slides

Mercer Island Subregional System at a Glance



Evaluation Criteria Categories

Quantity of Water Level of Service

Quality of Water Level of Service

Duration of Relief

Ease of Activation

City Ownership & Control

Schedule to Implement

Cost

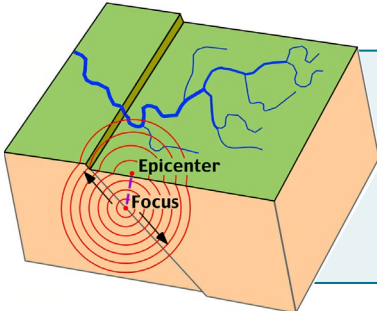
Ranking Strategy

Rank	Scale	Duration of Relief	City Ownership & Control	Cost
5	Major opportunity	Months/ Continuous	100% City owned/ controlled	< 0.1 M
4	Moderate-Major opportunity	2-4 weeks		> 0.1 M – 1 M
3	Moderate opportunity	1 – 2 weeks	Shared ownership responsibility & control	> 1 – 10 M
2	Minor-Moderate opportunity	3 – 7 days		> 10 – 50 M
1	Minor opportunity	1 – 3 days	No ownership and limited control	> 50 – 100 M
0	No opportunity	< 1 day		> 100 M

Working with Mercer Island Steering Team to develop *weighting factors* for these criteria

Reference Materials that Support the Action List

- Interviews
- Regional plans and goals
- Literature review ideas/goals



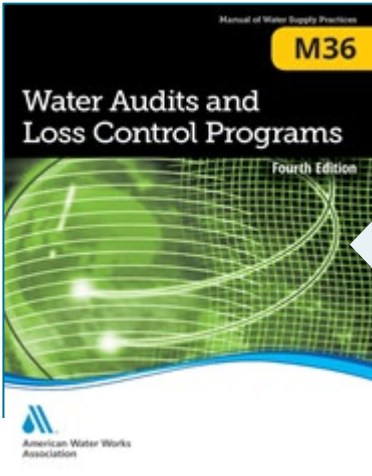
Christchurch, NZ and Kobe, Japan Earthquakes

AWWA Free Water Audit Software

$$ILI = \frac{\text{Current Annual Real Losses (CARL)}}{\text{Unavoidable Annual Real Losses (UARL)}}$$

Recent Earthquakes: Implications for U.S. Water Utilities

Web Report #4408



AWWA M36 Key Performance Indicators
AWWA supports the use of the *Normalized Water Losses* indicator, a new KPI expressed in volume/service connection/day.

WATER SUPPLY FORUM
 Serving Snohomish, King & Pierce Counties
Water Supply Forum Post-Event LOS Goals for a CSZ Earthquake Scenario



Partnership for Safe Water
 Working Together to Protect Public Health by Optimizing Water System Operations

Distribution System Optimization Program – Getting Started

Calling all Distribution System program subscribers! Have you submitted annual disinfectant residual data for your utility more recently? Are you considering beginning the process of performing a distribution system self-assessment? Or has your utility more recently joined the Partnership's newest program and you are wondering about the next steps? The Distribution System Optimization Program has continued to develop and grow since 2013, providing even more resources to guide subscribers through the Partnership process.

If your utility has not yet submitted baseline data and is interested in taking the next steps to get started, Partnership staff has the following suggestions for you.

1. Make sure you are able to log into the Partnership Web tool. To access the tool, visit: partnership.awwa.org. You will then need to log in using your awwa.org credentials. If you need help obtaining your existing login or if you need help registering/creating a login, please contact Customer Service at 800.926.7337. Once in the tool follow the Partnership web tool 'Getting Started user Guide' within the resource tab for help navigating, downloading the latest software, and uploading data into the web tool.
2. Collect your data. For baseline data submissions, only disinfectant residual data is required (no chlorine or