



# Unlocking the Flow: SCADA-Powered Knowledge Retention for Efficient Flow Management

Thursday, May 2, 2024

# Agenda

- Team Introductions
- System Layout
- The Challenge and Solution
- Control Strategy Walk-through
- Results
- Next Steps
- Question and Answer

# Team Introductions



**Jamie Davis**

Water Distribution Coordinator

**Sophia Hobet**

Water Operations Manager / PM

**Alex Zabarenko**

IS Systems Analyst



**Jeff Hesse**

Project Manager / Technical Lead

**Dan Groves**

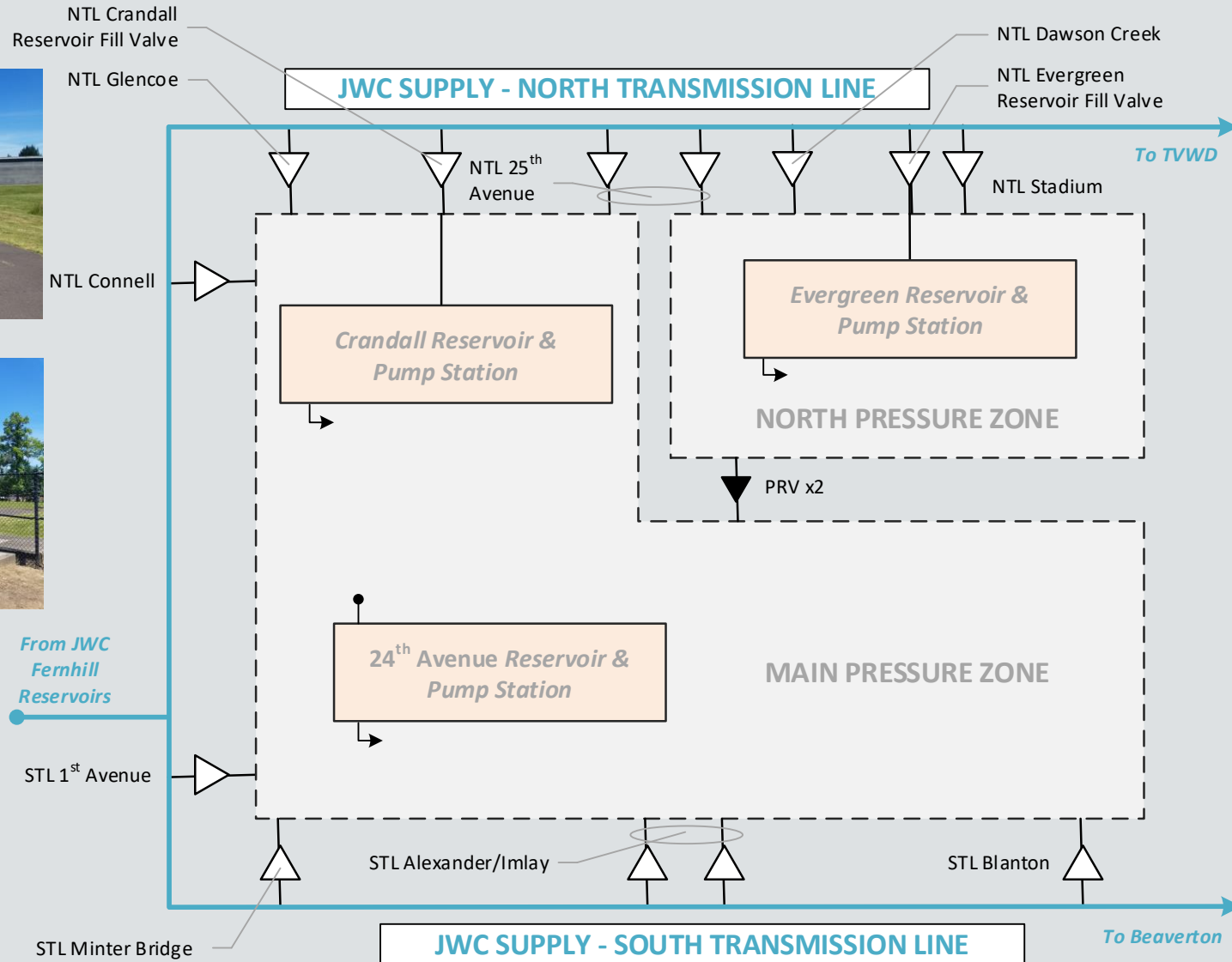
Technical Advisor / QA/QC

# System Layout

City of Hillsboro - Water Supply and Distribution System



# Hillsboro Water Supply and Distribution System



**LEGEND**

- Turnout
- JWC – Joint Water Commission
- NTL – North Transmission Line
- STL – South Transmission Line
- TVWD – Tualatin Valley Water District



# Operational Challenge

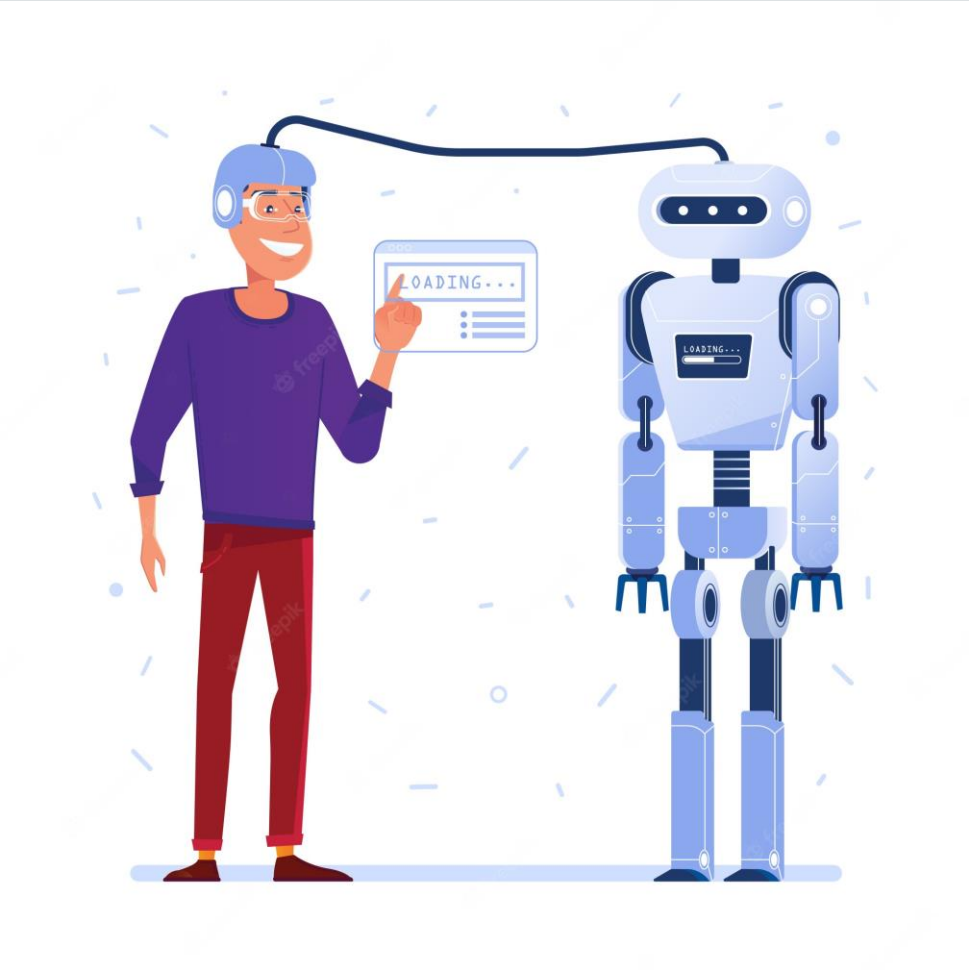
- Hillsboro aims to be a good partner of Joint Water Commission (JWC).
- JWC desires all partners to draw water consistently throughout 24-hour period from JWC system.
- Hillsboro distribution system is not designed for a consistent flatline flow rate from the transmission mains.

# Objective

- Draw water consistently throughout 24-hour period from JWC system and create a “Flatline” system.
- Maintain water quality (i.e., water age/chlorine residual).
- Avoid excessive strain on equipment (i.e., pump starts and stops).



# The Solution







# Control Strategy Walk-through

More detail on the control approach.

# Overview



# System Controls

**Flow Control Objective:** Achieve Flatline flow by maintaining Total PRV (TO) Flow to the Flatline Setpoint.

HPZ PRV Flow (GPM)	
HPZ Total PRV Flow	9227 gpm
Dawson Creek	2640 gpm
Stadium	4953 gpm
25th (10")	1632 gpm

MPZ PRV Flows (GPM)	
MPZ Total PRV Flow	1281 gpm
Valley View	214 gpm
Connell	0 gpm
Glencoe	76 gpm
25th (6")	0 gpm
1st Street	78 gpm
Minter Bridge	14 gpm
Alexander	961 gpm
Imlay	44 gpm
Blanton	401 gpm

# System Controls

## Flatline “Target” Setpoint

- The GPM setpoint for the system to deliver the daily water order over 24 hours.
- This value is compared to the Total PRV (TO) Flow to determine what action flow control should be doing.

FLOW CONTROL STATUS	
FC ACTIVE	
Flatline Target Flow	12500 gpm
COH Total Flow	10387 gpm
Flatline Delta	-2113 gpm
Available Volume	6.0 MG
Available Volume	20.0 %
Current Volume	24.2 MG



# System Controls

FC Overview

**Summer Mode**  
Enable/Disable

**Winter Mode**  
Enable/Disable

**Today's Operational Values**

Above Flatline	Discharge Flow	Flatline SP	MPZ PRV Flow
946 gpm	0 gpm	13889 gpm	3815 gpm
Below Flatline	Fill Flow	Flatline SP	HPZ Flow
0 gpm	1974 gpm	20.0 MGD	9216 gpm
MPZ/HPZ Demand			14835 gpm

Discharging

**Tomorrow's Flatline Values**

Water Order Source: **Manual**

On/Off  Auto Demand

Manual Water Order (Flatline SP)\*\* 20.0 MGD 13889 gpm

On/Off  Tomorrow Man Order adj. (Takes effect 12:10am)

Butternut Yesterday 0.09 Mga

LaCoop Yesterday 0.00 Mga

Cornelius Yesterday 1.23 Mga

US\_Elm Yesterday 0.48 Mga

Total 1.80 Mga

Predictive Usage Today (MG) 21.22

Usage Yesterday (MG) 18.70

ADD THIS TOTAL TO DAILY JWC WATER ORDER BUT NOT TO FLOW CONTROL

Limits/Peak Shaving

Shutdown Config

Setpoints

**Booster Pump Operatic**

Lead/Lag	Site Active	Start Flow	Stop Flow	Start Time Delay	Stop Time Delay	Flow Setpoint	Peak Shaving
Crandall Lead	<input type="checkbox"/>	650 gpm	0 gpm	10 min	15 min	800 gpm	<input type="checkbox"/>
24th Lag	<input type="checkbox"/>	650 gpm	0 gpm	25 min	30 min	800 gpm	<input type="checkbox"/>
Evergreen	<input type="checkbox"/>	650 gpm	0 gpm	20 min	25 min	800 gpm	<input type="checkbox"/>
Above flatline		946 gpm					

**Fill Valve Operator**

Lead/Lag	Open Flow	Close Flow	Time Delay Open	Time Delay Close	Flow Setpoint	Peak Filling
Crandall Lag	600 gpm	0 gpm	25 min	30 min	800 gpm	<input type="checkbox"/>
24th Lead	600 gpm	0 gpm	20 min	20 min	600 gpm	<input type="checkbox"/>
Evergreen	600 gpm	0 gpm	20 min	25 min	800 gpm	<input type="checkbox"/>
Below Flatline		0 gpm				

**Evergreen Pump Order**

Selection	Status	Time
Constant Pmp 1 Lag2	Lag 2	442 Hrs
Constant Pmp 2 Lag3	Lag 3	1195 Hrs
VFD Pump 3 Lead	Lead	3870 Hrs
VFD Pump 4 Lag1	Lag 1	2566 Hrs

**Evergreen Pump Flow Ranges**

Flow setpoint at which pumps start

Flow Range 1	500 gpm
Flow Range 2	1500 gpm
Flow Range 3	3000 gpm
Flow Range 4	5200 gpm

**STL 24th Pump Order**

Auto Rotate  Pmp 3 Lead 2272 Hrs

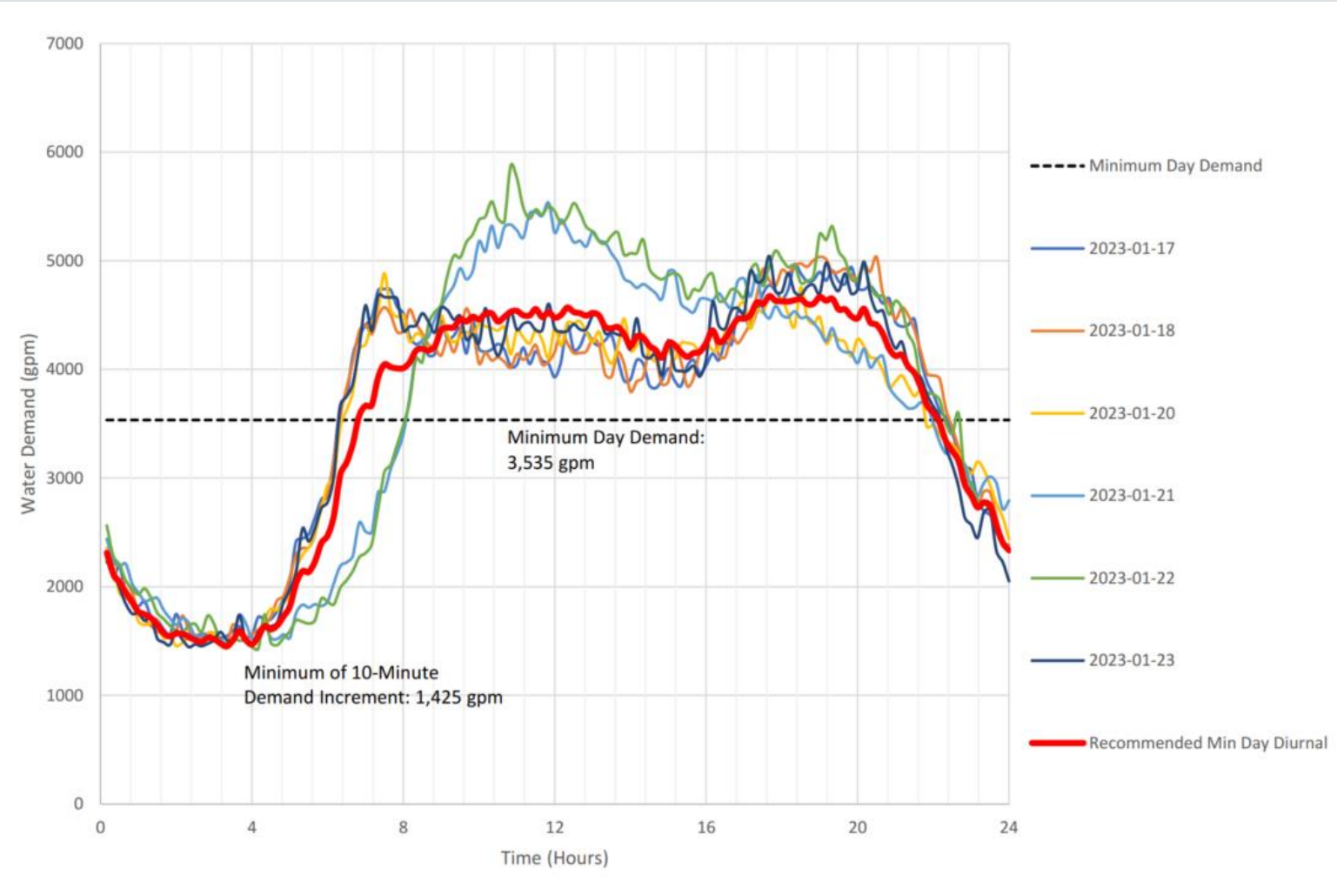
Manual Rotate  Pmp 4 Lead 993 Hrs

Rotate Pumps

# Results

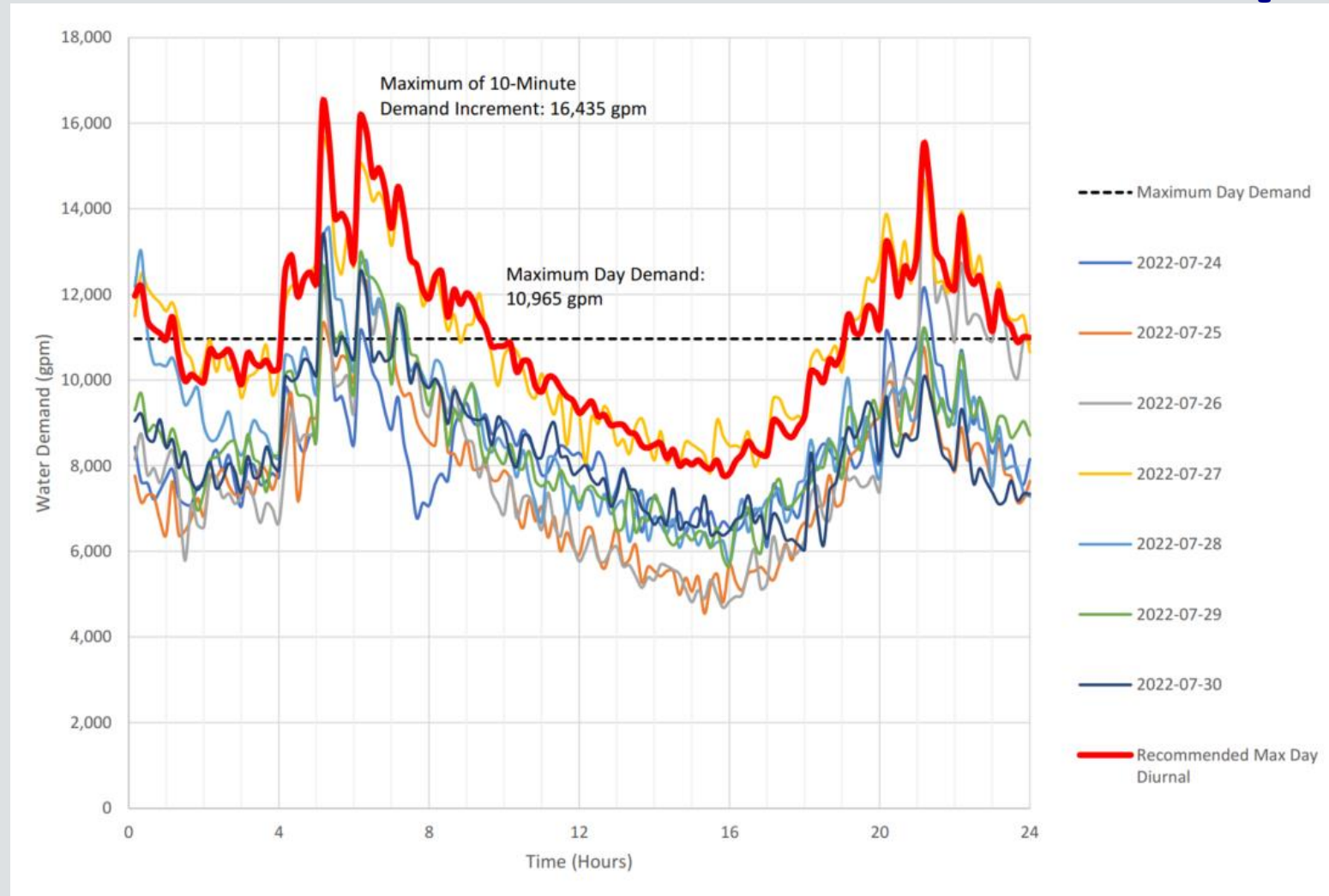
Diurnal curve meets the Flatline control.

# Diurnal Curve – Winter MPZ Sample Set



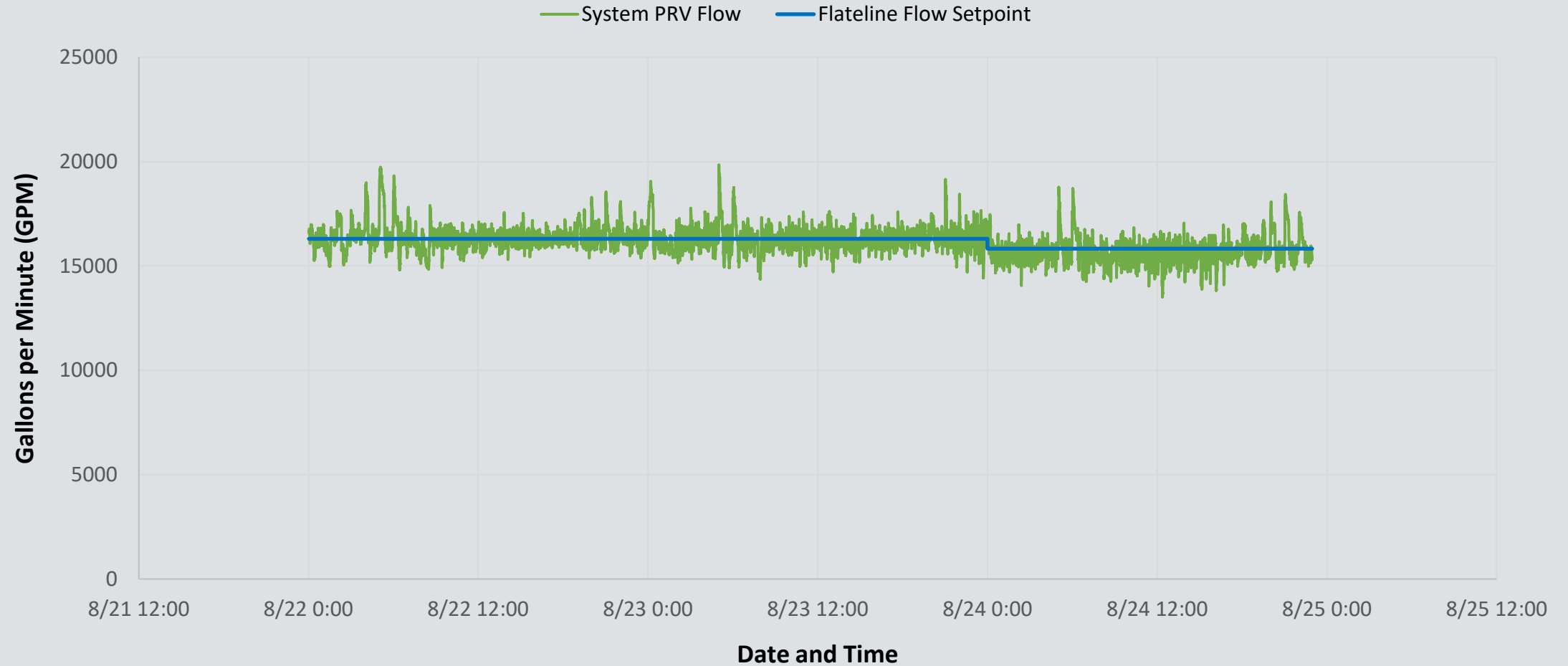


# Diurnal Curve – Summer MPZ Sample Set



# Results

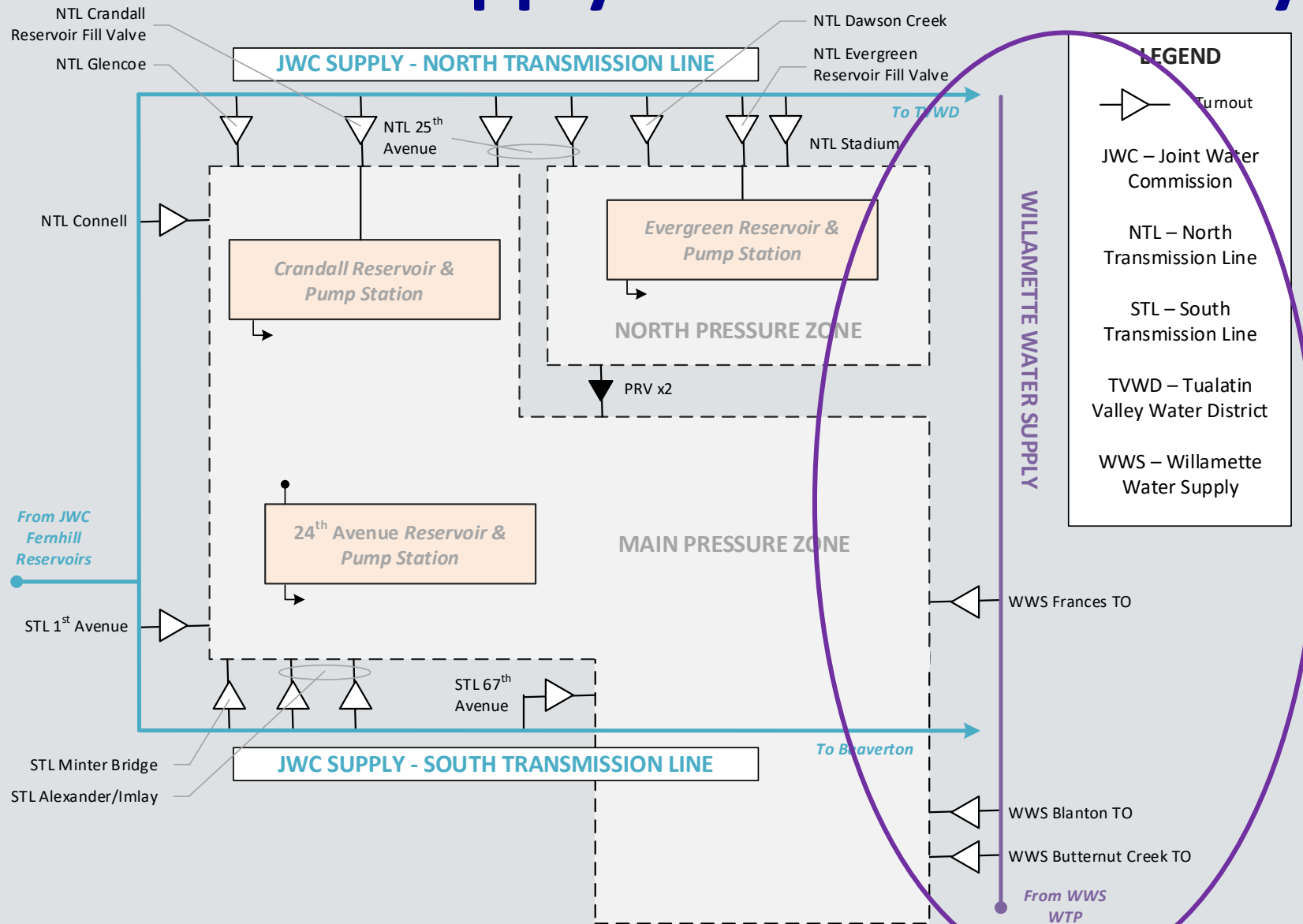
## Flow Control Results: 8/22 - 8/25



# Next Steps

- Evaluation of alternatives to address increase energy costs including Distributed Energy Resources (DER).
- Enhancements to automation of water quality operations for winter season (e.g. Turnout lead/lag function, reservoir turnover prioritization).
- Expand flow control to include flatling flow from the future Willamette Water Supply (on-going).

# Hillsboro Water Supply and Distribution System



# Question and Answer



THANK YOU

