

Making the Most of your WTP: Increasing Capacity at the MWC Duff WTP

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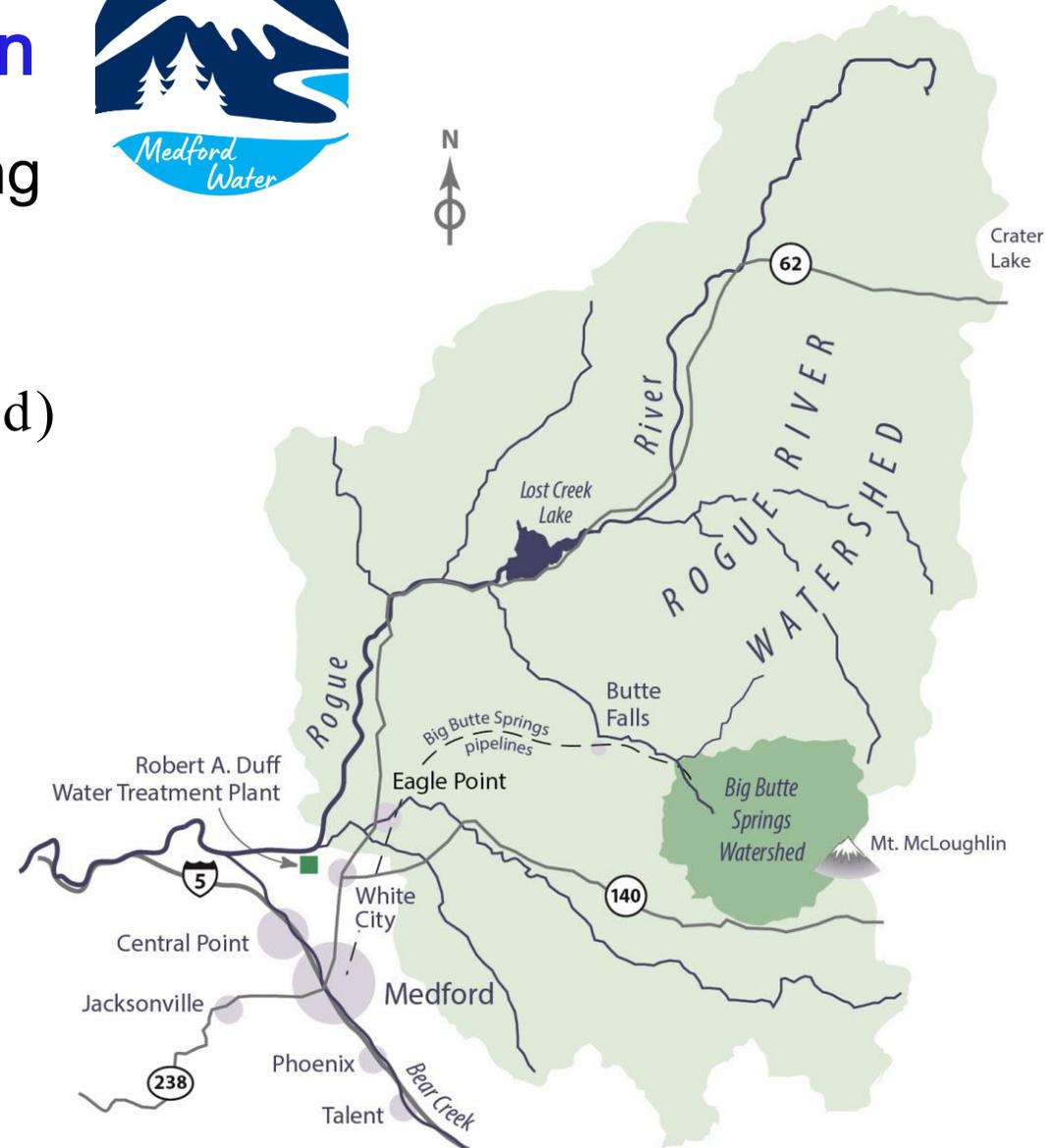
Agenda

- Project overview
- Problem statement
- Facility planning and prioritization
- Implementation and results
- The future of the Duff WTP

Project Overview

Background - Medford Water Commission

- 140,000 customers in Medford and surrounding communities
- Two sources:
 - Duff Water Treatment Plant, Rogue River (45 mgd)
 - Big Butte Springs (26.4 mgd)
- Capacity: 71.4 mgd nominal

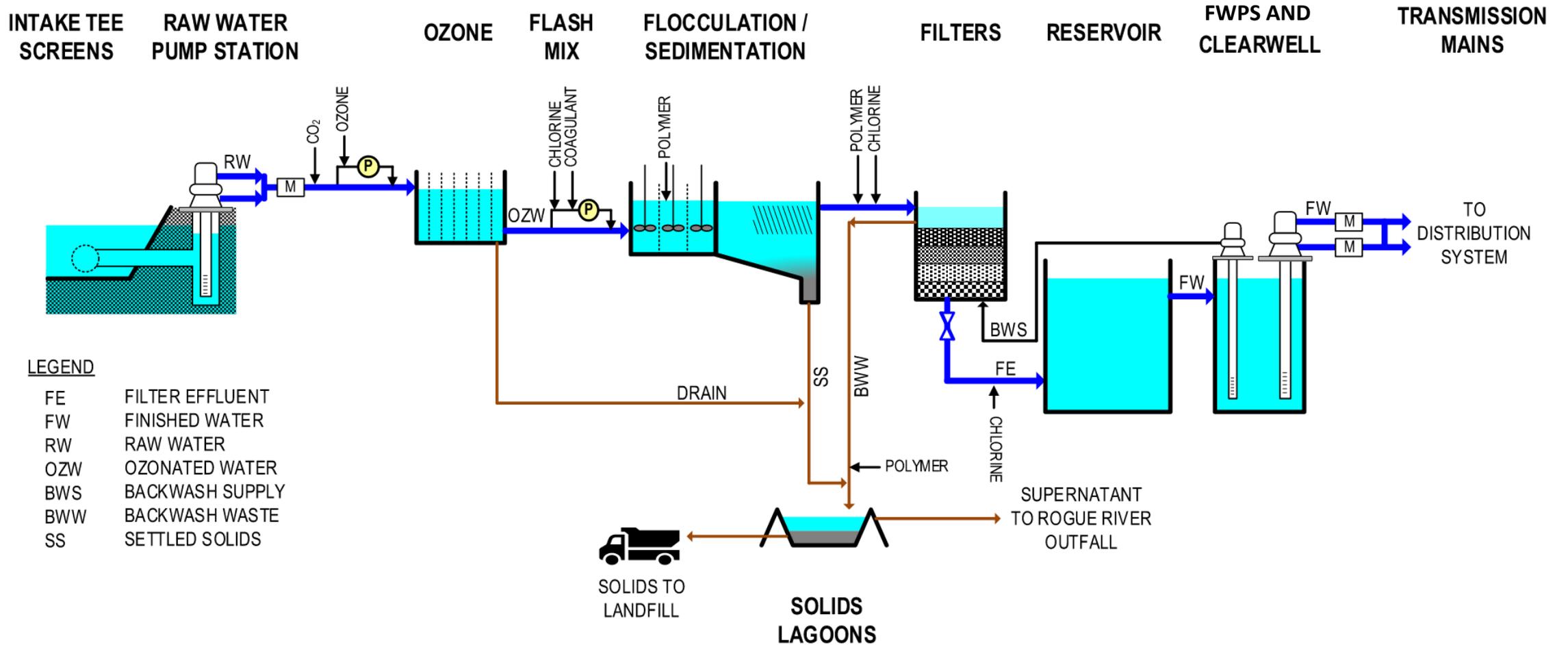


Background - Duff Water Treatment

- History and capacity:
 - Originally constructed in 1968 for 15 mgd
 - Expanded to 30 mgd in 1964
 - Expanded to 45 mgd in 1999
 - Expansion to 65 mgd began in 2017



Background - Duff Water Treatment



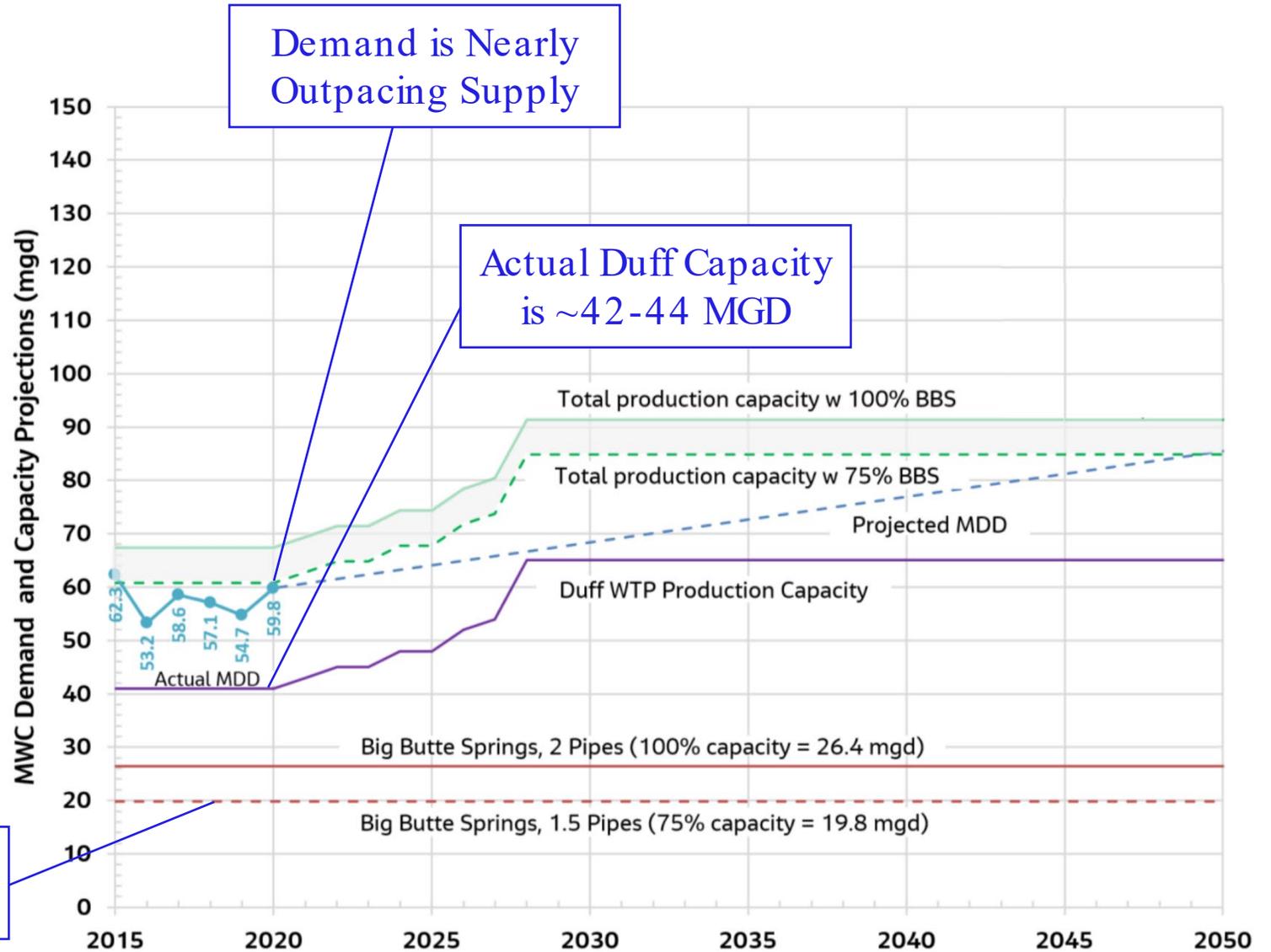
Problem Statement

Problem Statement

- Demand outpacing supply
- Limited equalization storage at WTP

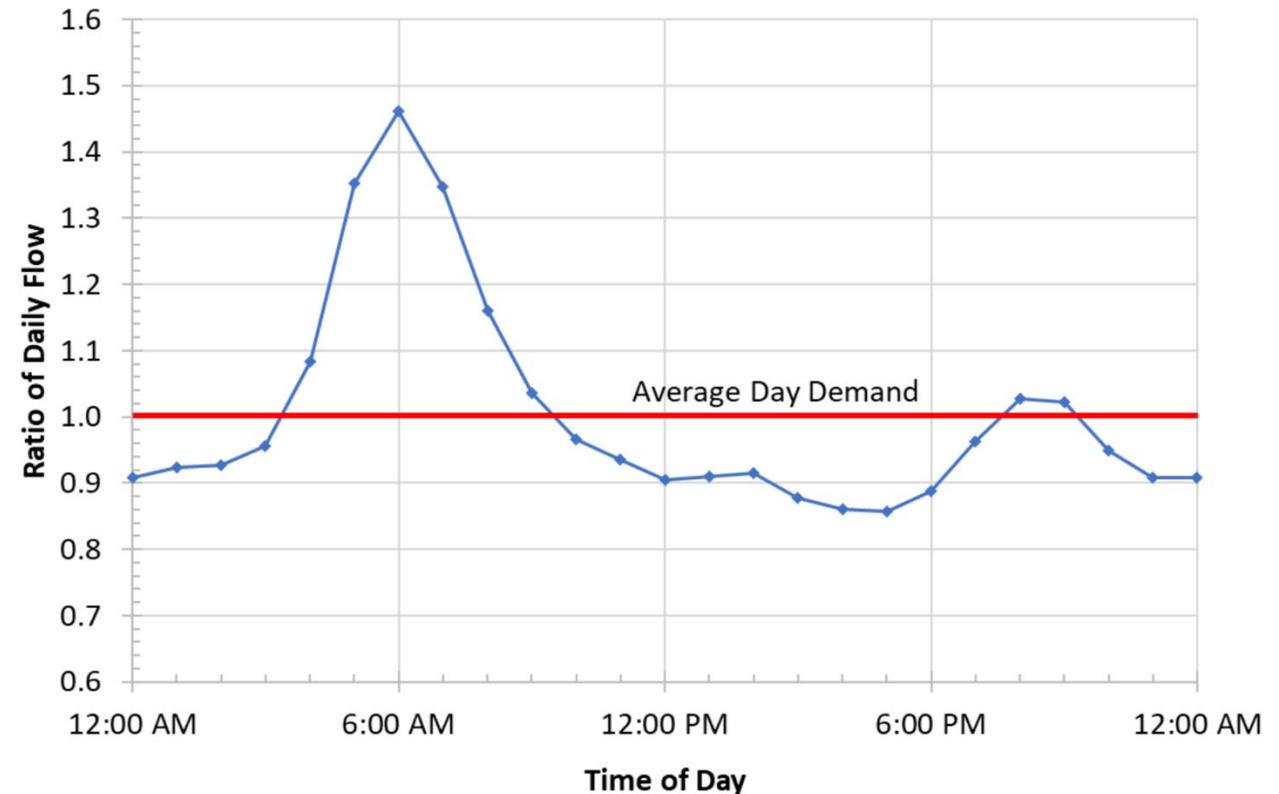
Problem Statement

- Demand outpacing supply
 - Big Butte Springs capacity is below 26.4 mgd due to drought
 - Duff WTP capacity is limited to less than nominal 45 mgd (for various reasons)



Problem Statement

- Limited equalization storage at WTP
 - Finished water reservoir has limited baffling ($T_{10}/T = 0.29$)
 - Previous tracer study limits operations to between 12-14 ft
 - WTP flow must vary throughout the day to meet peak flow periods



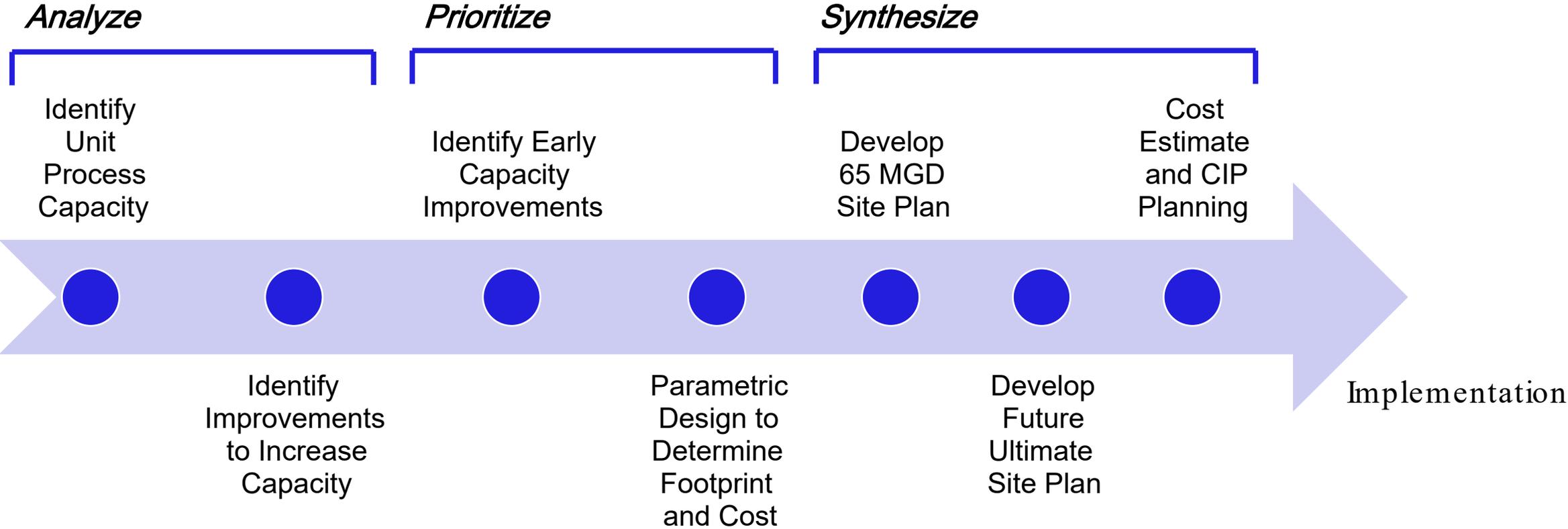
Objectives

- Define capacity of each unit process, determine which is limiting the WTP capacity
- Identify projects to increase production in short and long term (65 mgd)

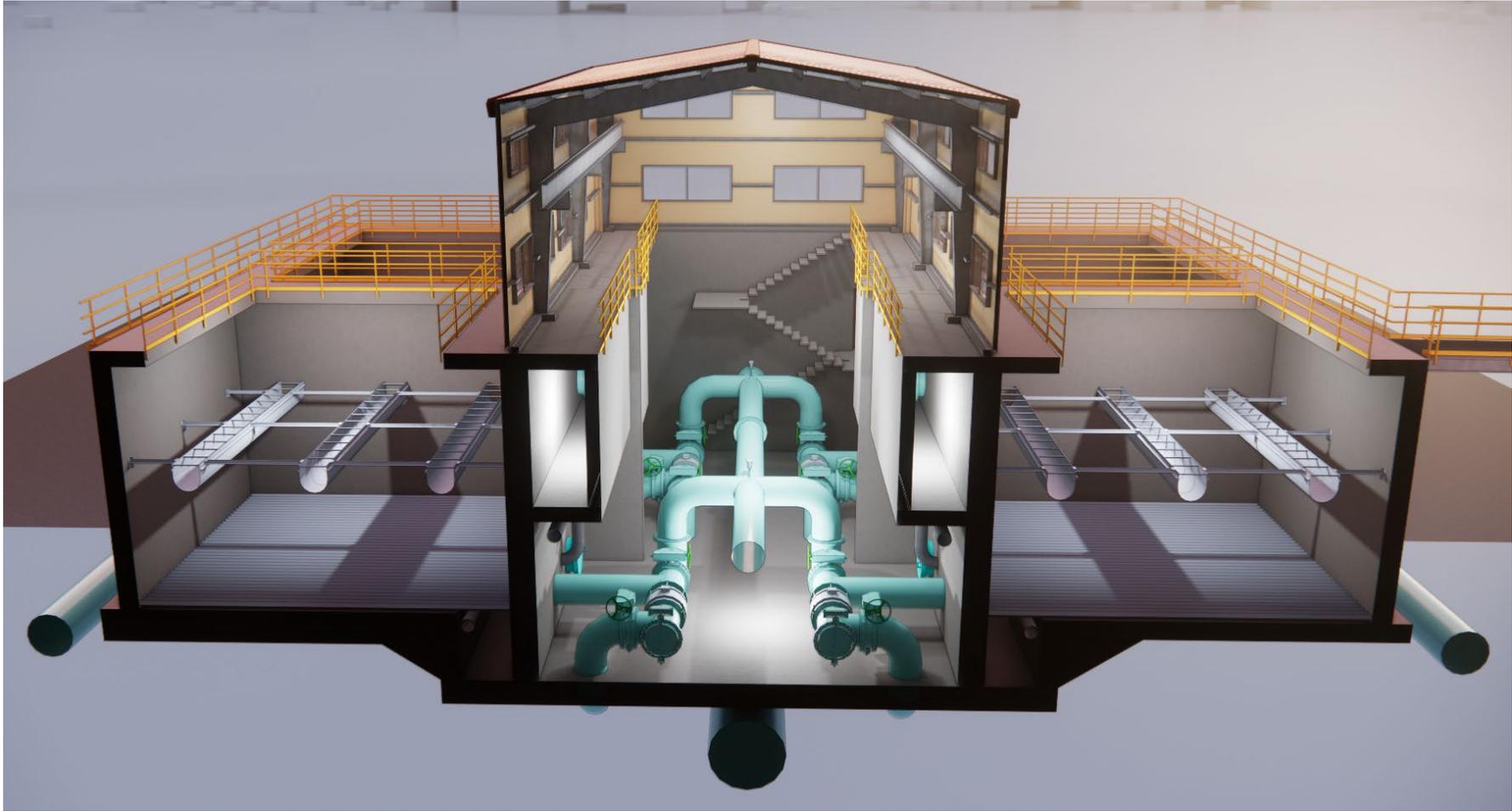


Facility Planning

Overview



Rapid Prototyping for Early Decision Making

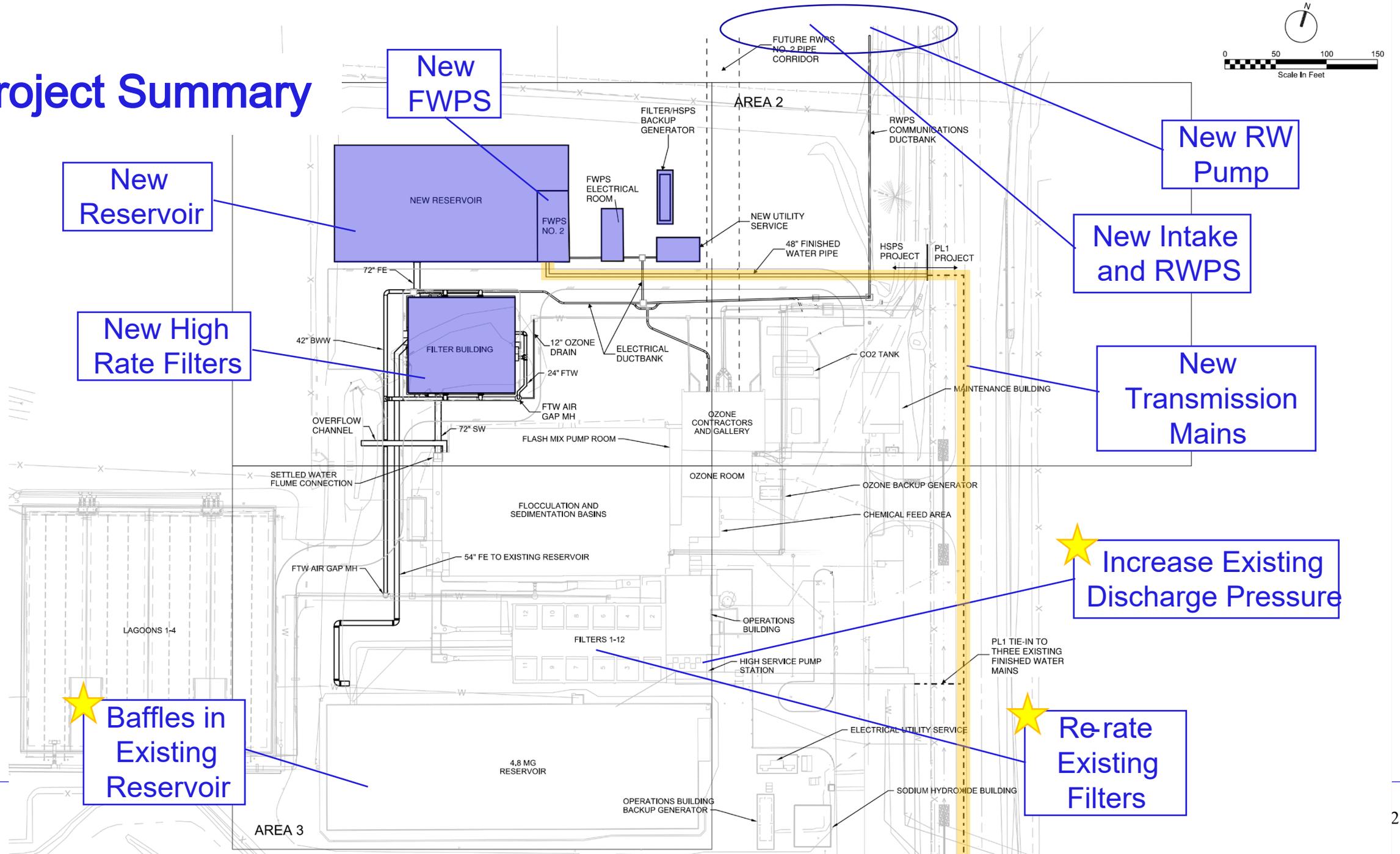
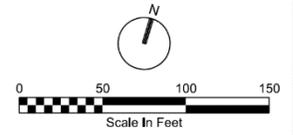


Replica
Parametric
Design^{1/4}

Identify Unit Process Capacity

Unit Process	Current Capacity in MGD (2019)	
	Peak	Firm
Raw water pumps	77	54
Ozone	67	67
Flocculation	72	67
Sedimentation	81	67
Filtration	44	42 ★
Reservoirs	45	45 ★
High service pumps	55	45
Transmission and storage	48	43 ★
Chemical systems	67	67
Solids dewatering	67	67

Project Summary



New FWPS

New Reservoir

New High Rate Filters

Baffles in Existing Reservoir

AREA 2

New RW Pump

New Intake and RWPS

New Transmission Mains

Increase Existing Discharge Pressure

Re-rate Existing Filters

Project Prioritization

- Short Term Projects (by 2021)
 - Existing reservoir baffles
 - Re-rate existing filters
 - Increase discharge pressure
- Medium Term Projects (by 2025)
 - Upsize pump in RWPS
 - Install new filters
 - Install new reservoir
 - Install new FWPS
 - Install new transmission mains
- Long Term Projects (timing TBD)
 - Install second intake and pump station

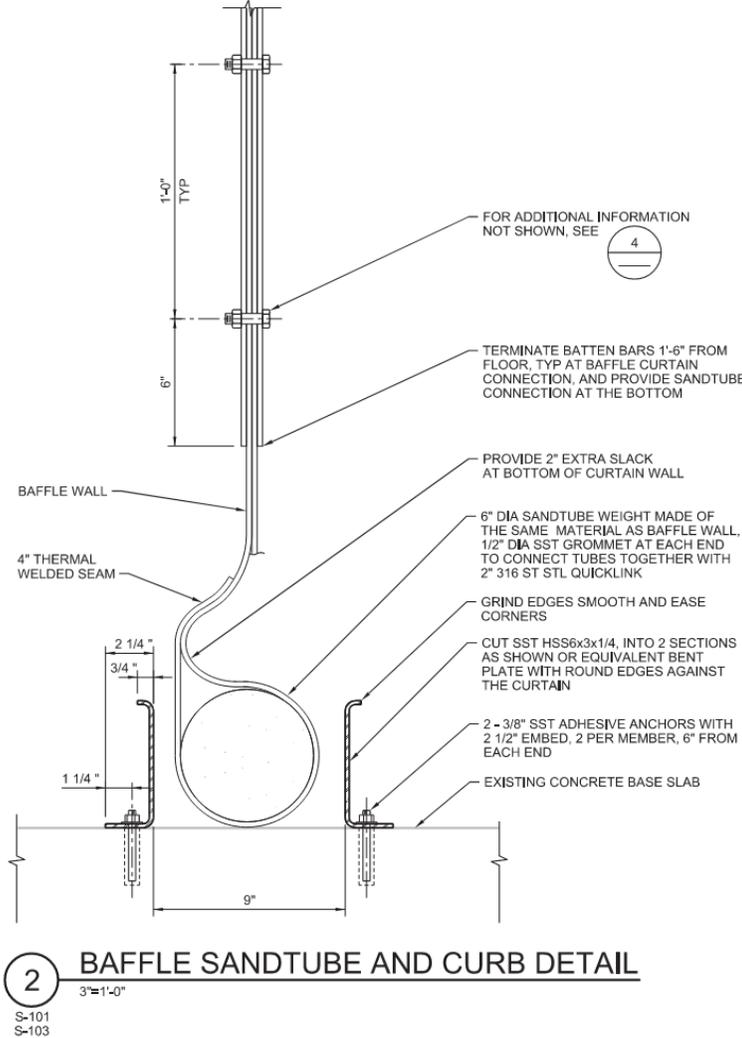
Implementation and Results

Reservoir Baffles

- Polyester baffles
- Limit stress on existing old reservoir
- Target >0.5 baffling factor
- Conduct tracer test following installation



Reservoir Baffles



Reservoir Baffles – Tracer Study

- Baffling Factor = 0.6
- Maximum Flow = 49.5 mgd
- Operating Level = 7.9-15 ft

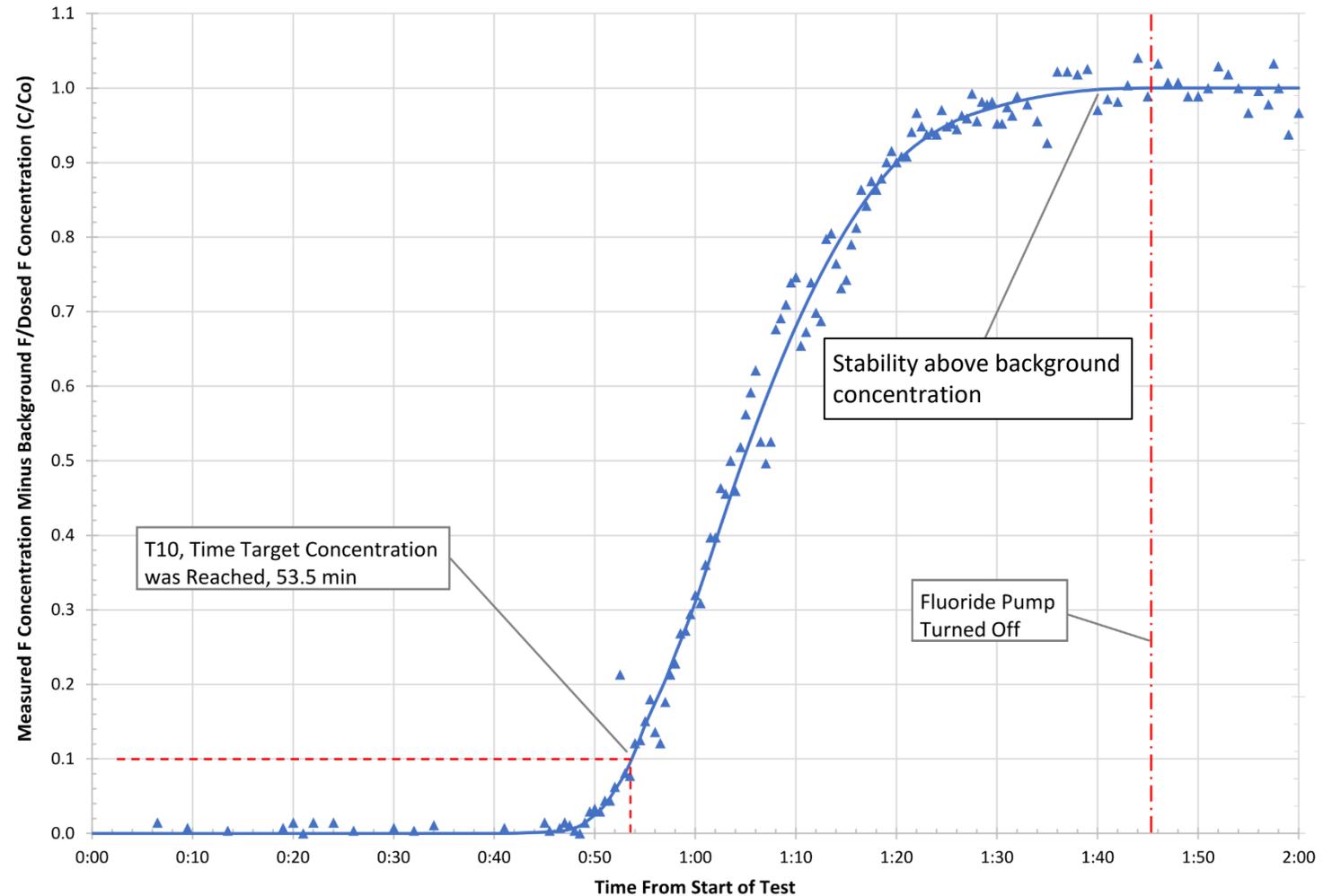


Figure 3: Tracer Test Results Showing Time Target Concentration was Reached (T10)

Re-Rate Existing Filters

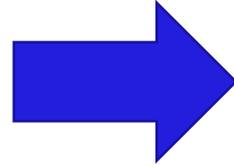
- Perform pilot test to prove performance
- Up-rate from 5.4 gpm/sf to 6.5 gpm/sf
- Existing filter media:
 - 18” 1.0-mm anthracite
 - 9” 0.5-mm sand
 - 3” 0.3-mm garnet



Re-Rate Existing Filters – Pilot Results

- Increase loading rate via pilot testing

5.4 gpm/sf



6.5 gpm/sf

Re-Rate Existing Filters – Pilot Results

- Treatment performance not impacted by increased loading rate
- Filter efficiency (UFRV) impacted, meaning more frequent backwashes
- Net filtration capacity increased from 42 -44 MGD to 47-50 MGD

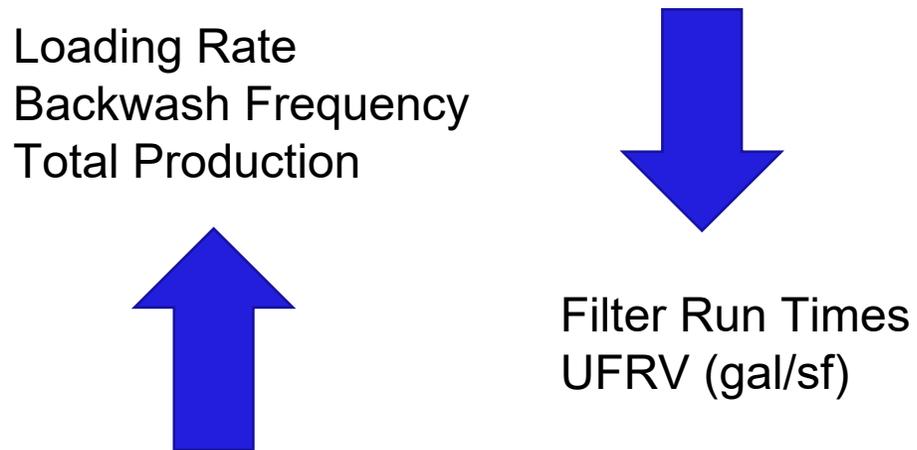
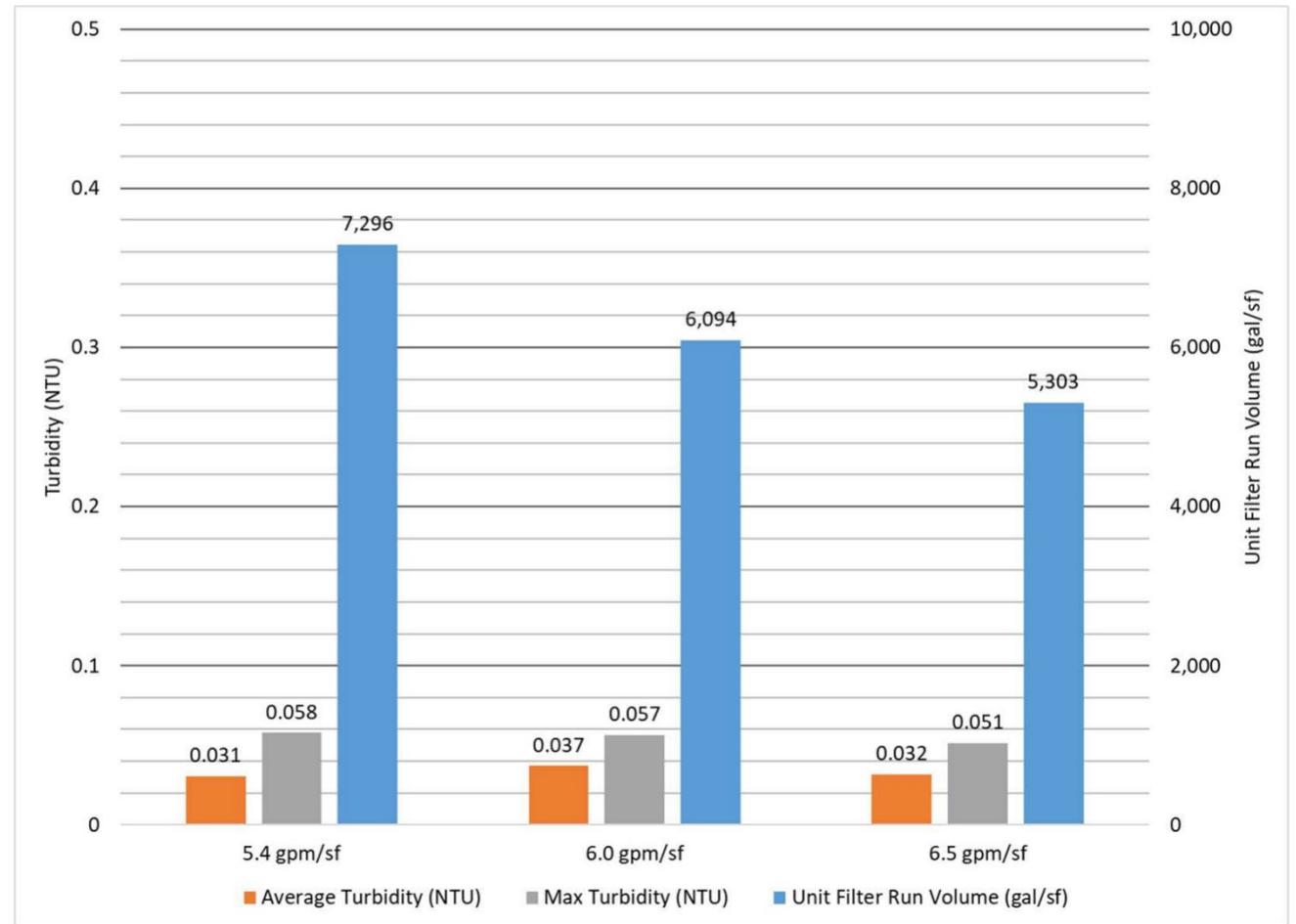


Figure 4: Pilot Study Filter Loading Rate Comparison



The Future of the Duff WTP

Future Work

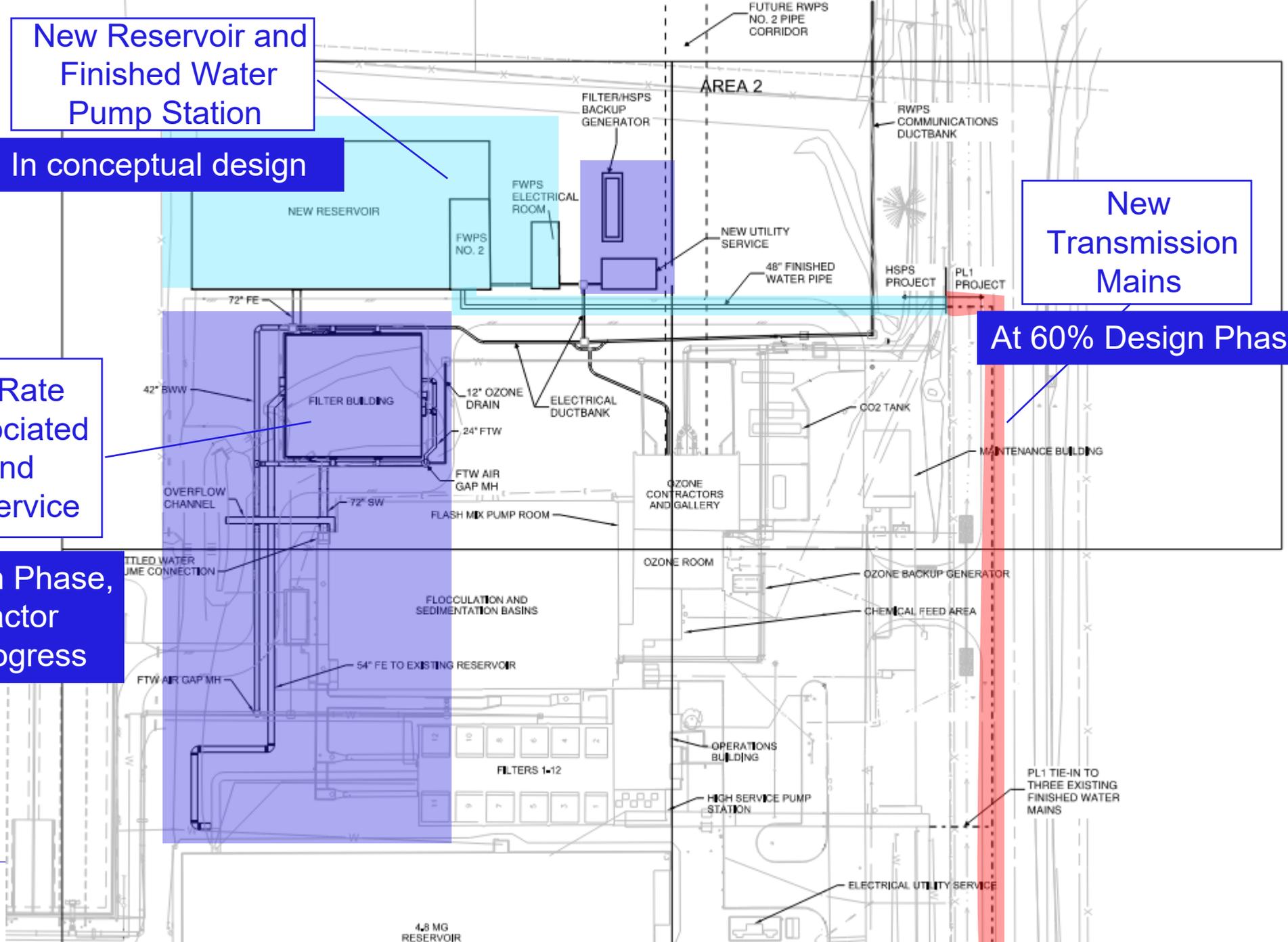
- 65 MGD Capacity by 2026

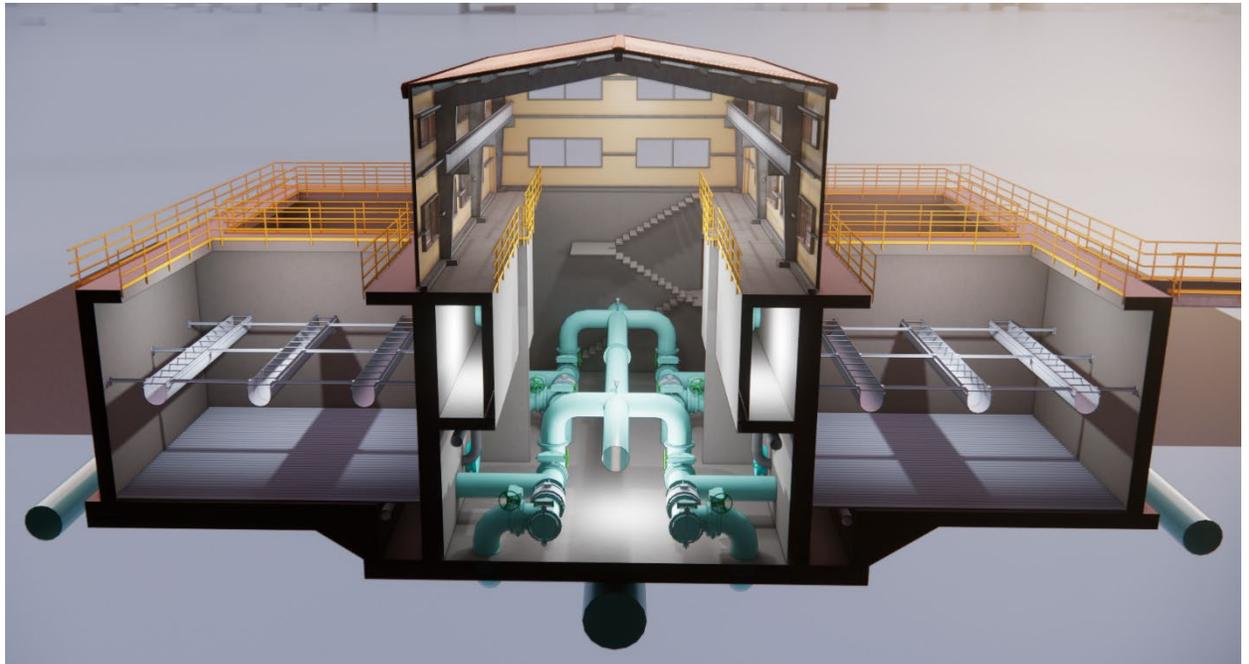
New Reservoir and Finished Water Pump Station
In conceptual design

New High Rate Filters, Associated Piping, and Electrical Service

At 60% Design Phase, CM/GC Contractor selection in progress

New Transmission Mains
At 60% Design Phase





Thank You