



**Bull Run**  
TREATMENT  
PROJECTS

*Our water: Safe and abundant  
for generations to come*

PORTLAND WATER BUREAU

## Bull Run Treatment Projects

# Bull Run Filtration Facility: 60% Design Update

April 28, 2022



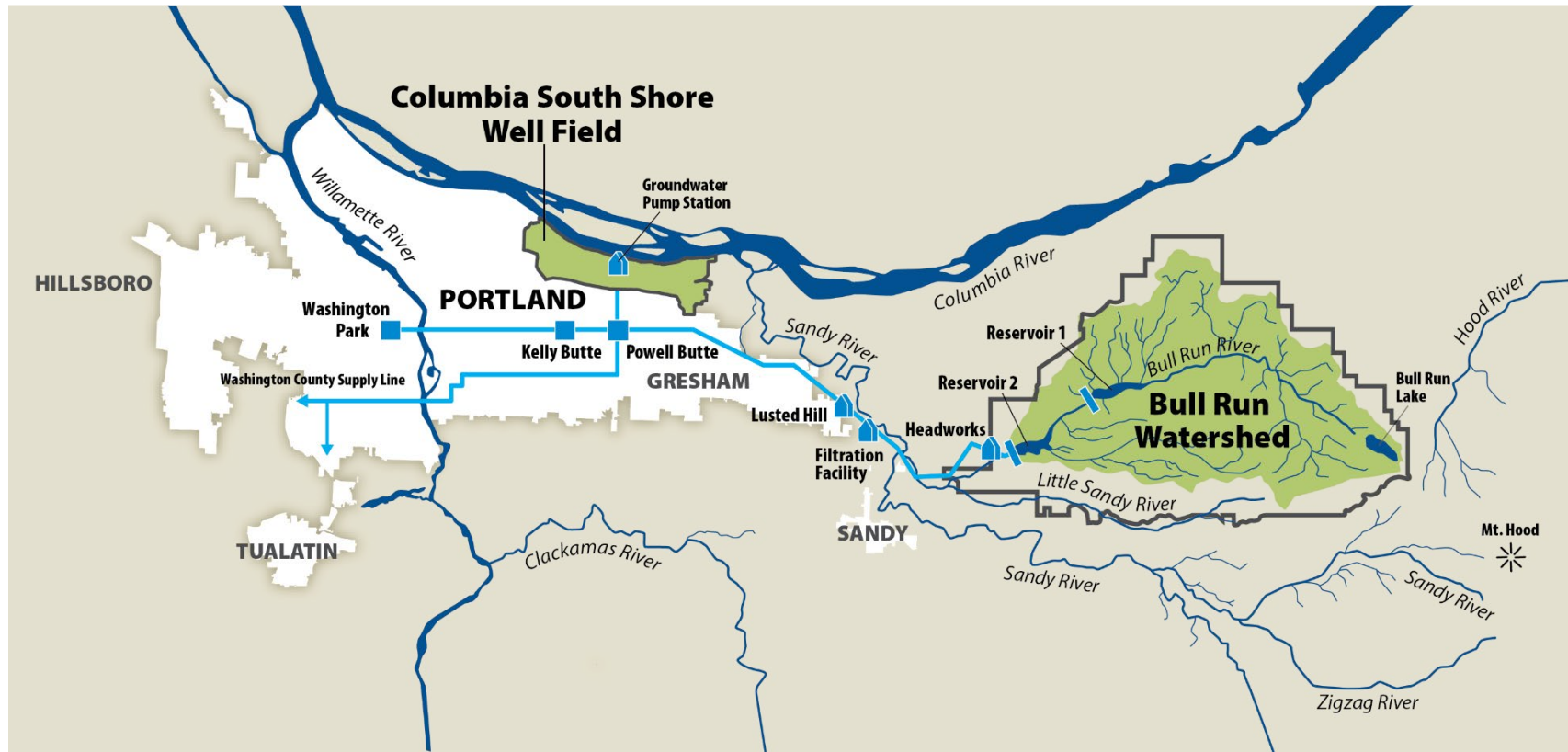
PNWS-AWWA  
**Water 2022**  
Tacoma, WA • April 27-29

# Agenda

1. Welcome
2. Filtration Facility Design
3. Construction Timeline
4. Key Permitting Activities



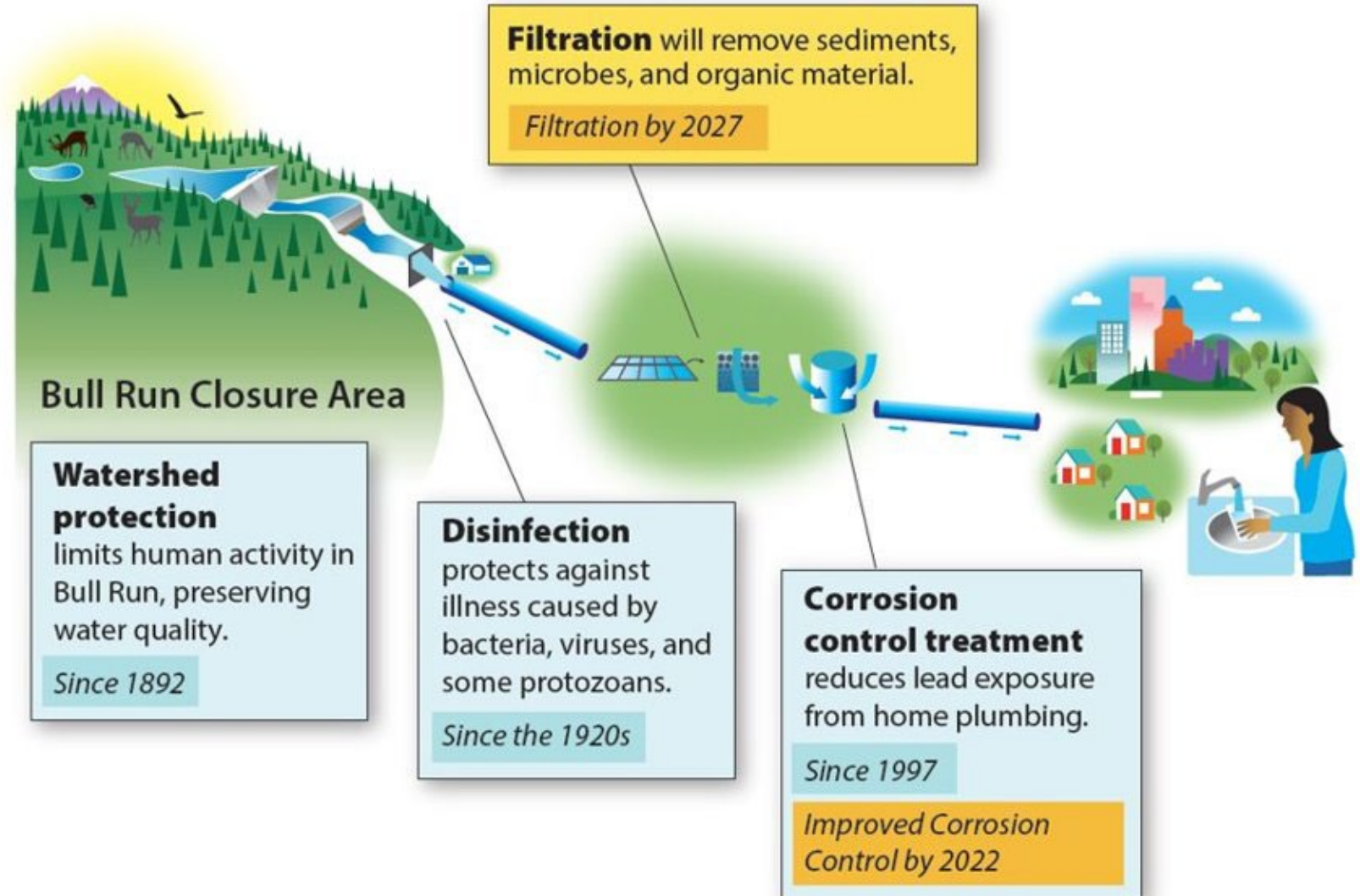
# Thanks to thoughtful planning, Bull Run has been a source of **excellent water since 1895**



- Serves almost 1 million people
- Serves the City of Portland and 19 wholesale customers
- Uses 100 million gallons of water on an average day



Improvements to our system are needed to meet national drinking water standards



# On-track to deliver filtered Bull Run water to customers beginning September 2027



**Planning  
Completed  
2018-2020**



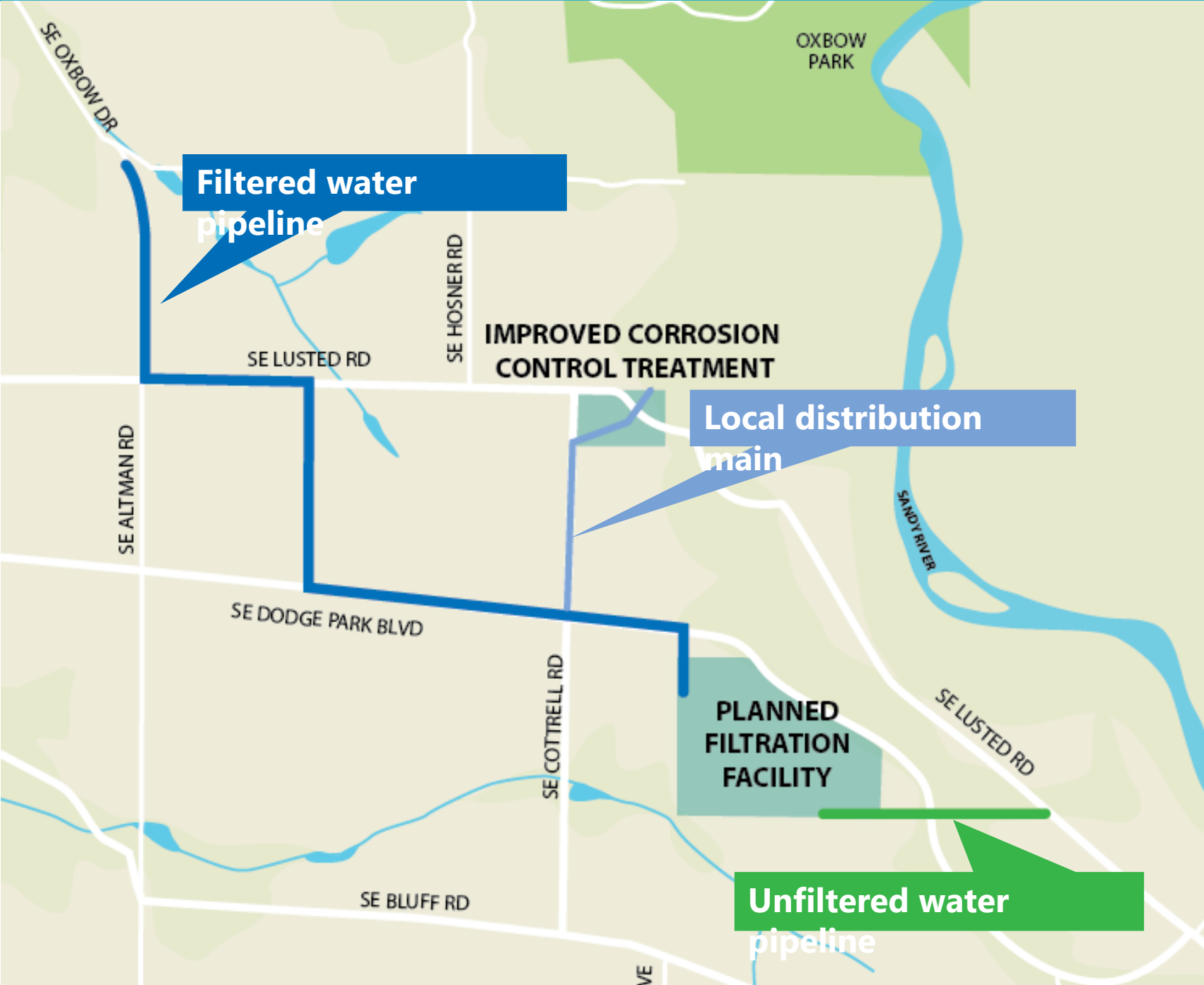
**Design  
Underway  
2020-2022**



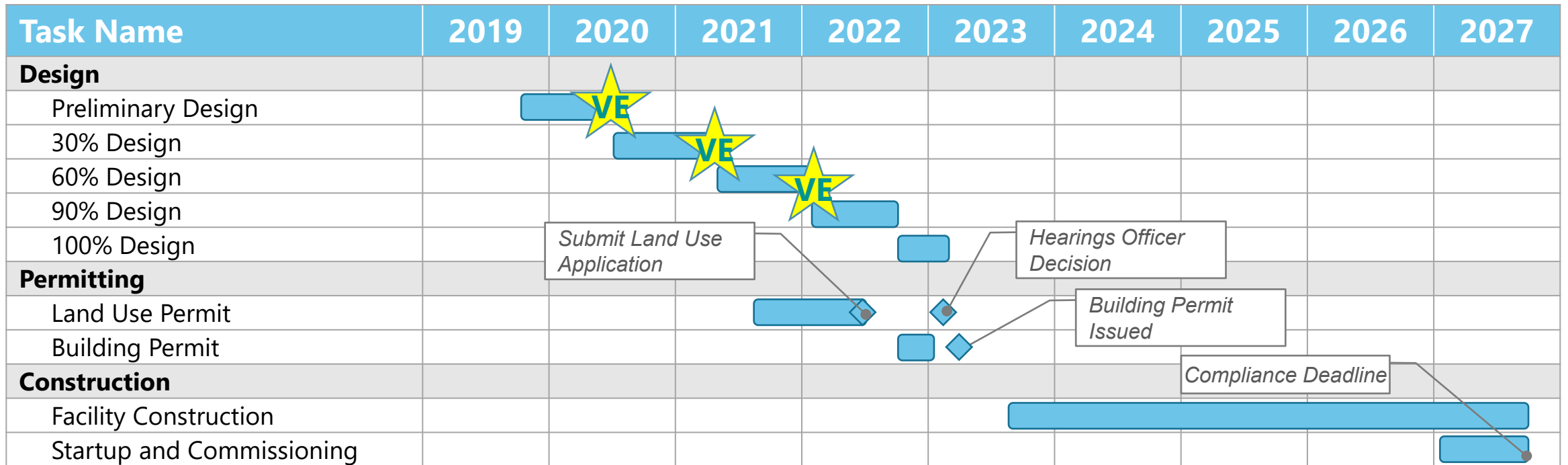
**Construction  
Expected  
2023-2027**



New pipelines will tie the water filtration facility into the existing system

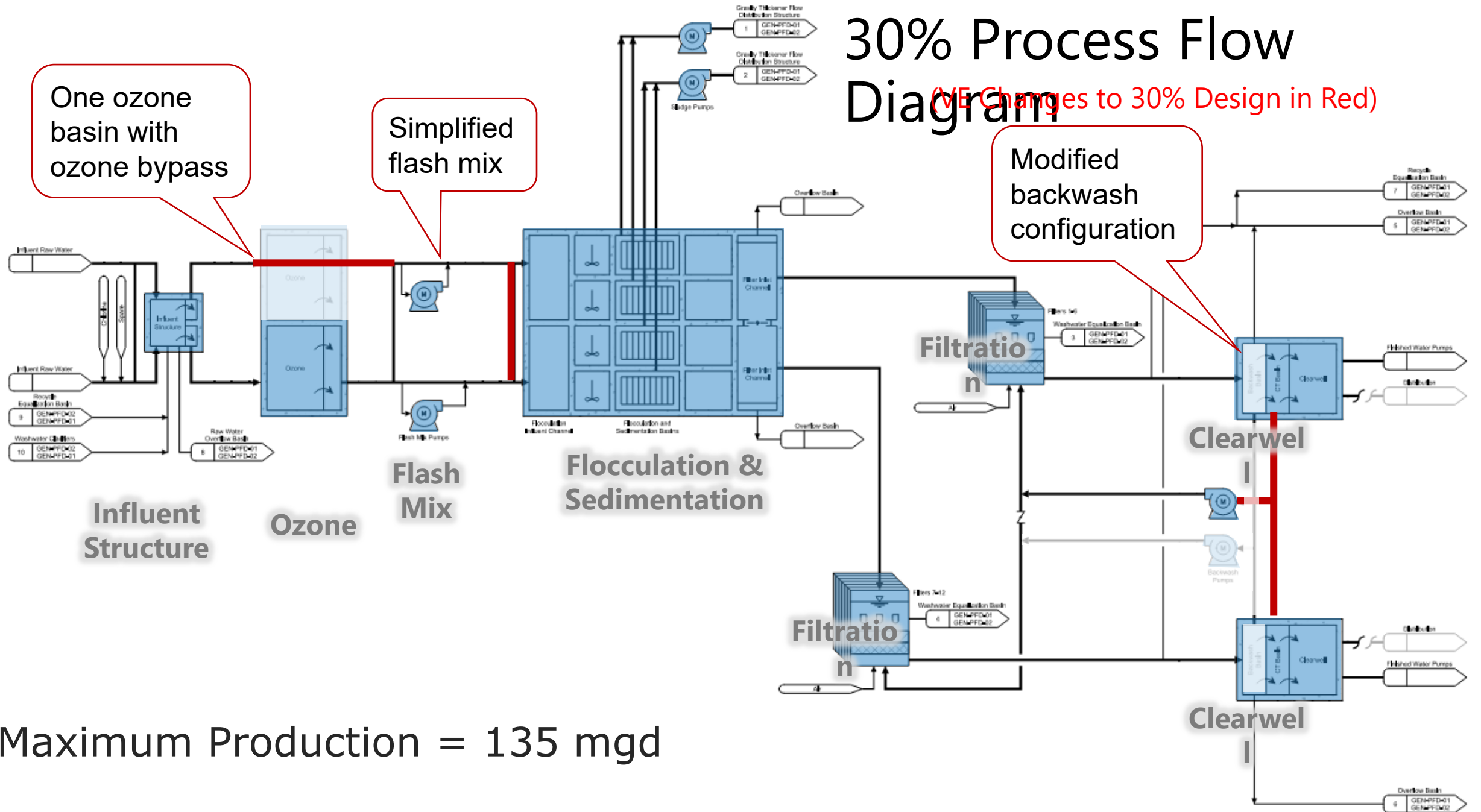


# Filtration Facility Design Schedule



# 30% Process Flow Diagram

(VE Changes to 30% Design in Red)



One ozone basin with ozone bypass

Simplified flash mix

Modified backwash configuration

Influent Structure

Ozone

Flash Mix

Filtration & Sedimentation

Filtratio n

Clearwel

Clearwel

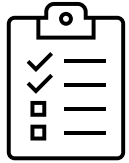
Maximum Production = 135 mgd



# 60% Design Development

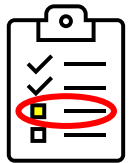
- Objective of 60% Design is to obtain approval for the major elements and institute a design freeze
- Information in this submittal will be incorporated into the application for land use permits
- Studies and Reports produced during 60% Design
  - HAZOP
  - Noise Study
  - Vulnerability Analysis
  - Light Study

# Collaboration with Program Staff and Program SMEs



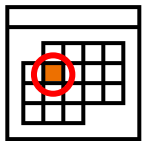
## Bi-Weekly Discipline Meetings

- Address items on Discipline Issue/Decision Checklist
- Design Team and Discipline Leaders Attend



## “Enhanced” Bi-Weekly Meetings

- Address cross-discipline issues
- Invite additional stakeholders to specific meeting



## Focus Meetings

- Address significant issues from Decision Log
- Invite specific stakeholders

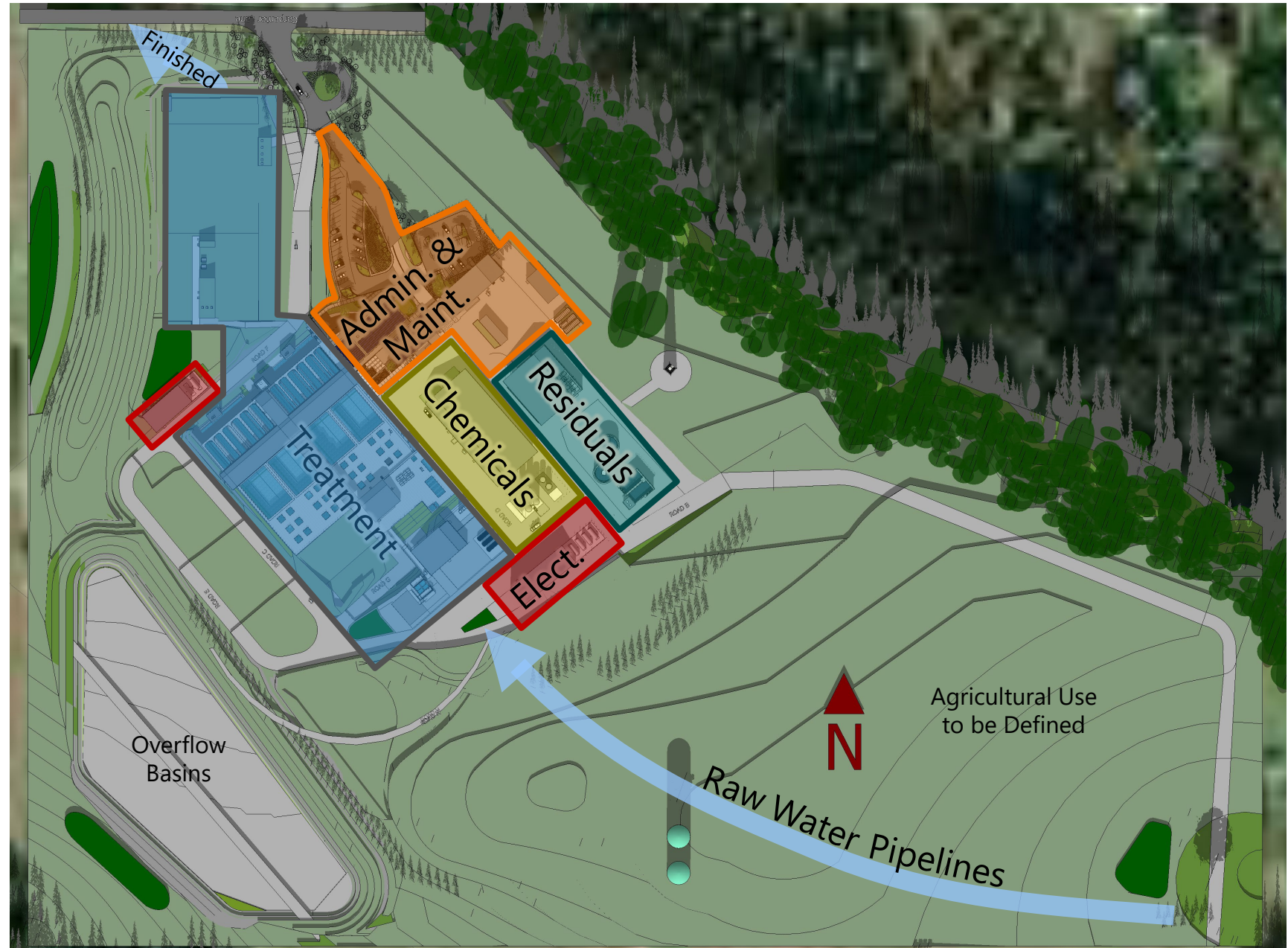


## PWB Management Approval

- Address critical issues from Decision Log
- Reviewed by PWB Program Leadership and Core Decision Team and/or Executive Committee

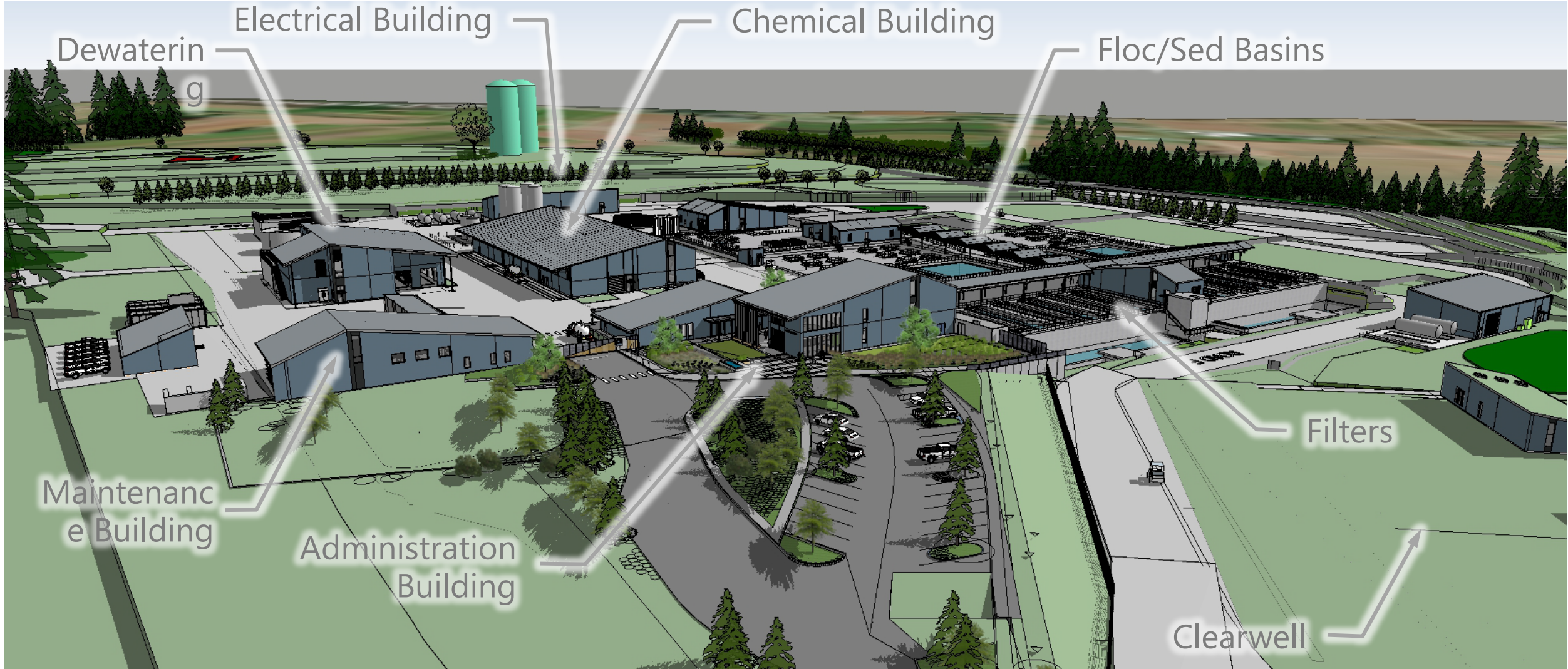
# 60% Overview

- Compact Site
- Functional Zones
  - Treatment
  - Chemicals
  - Residuals
  - Administration & Maintenance
  - Electrical



# Facility Concept

Aerial View from Northeast



# Administration Building



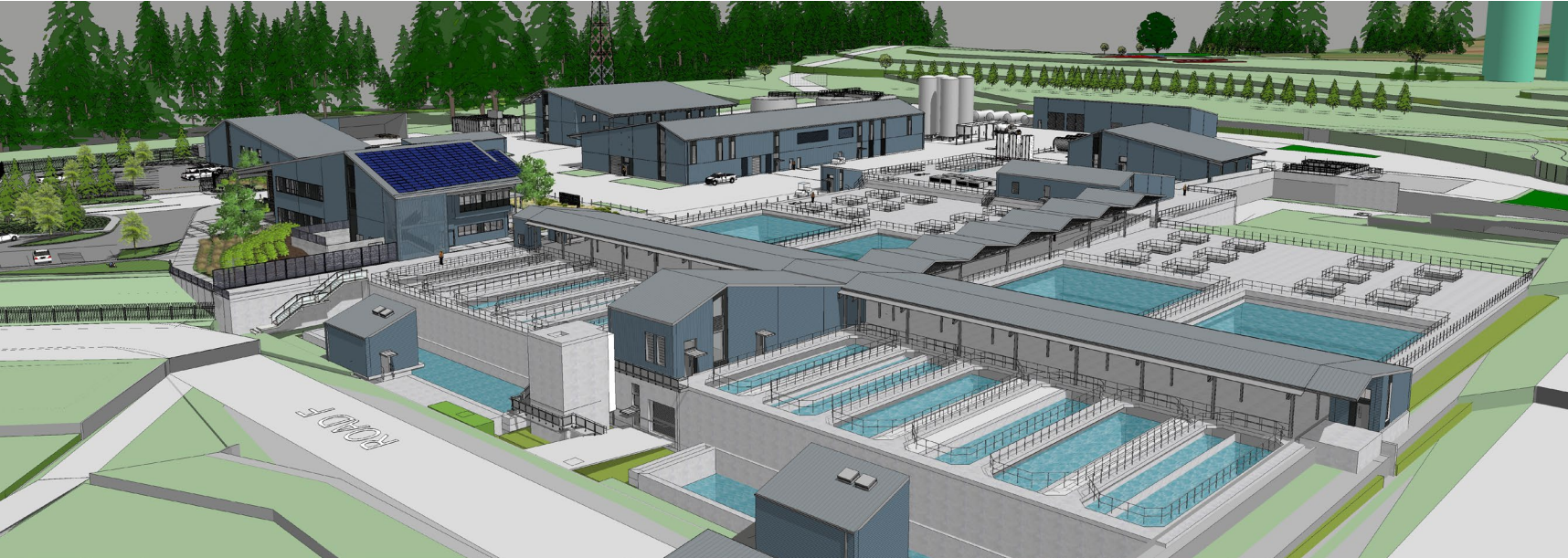
Overview looking south

# Administration Building

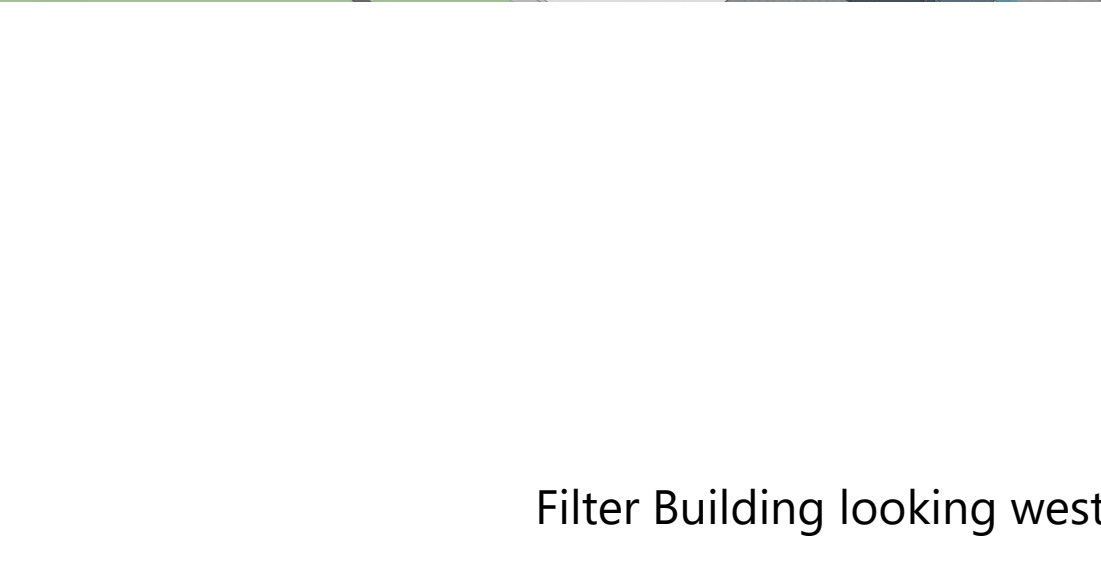


Overview looking east

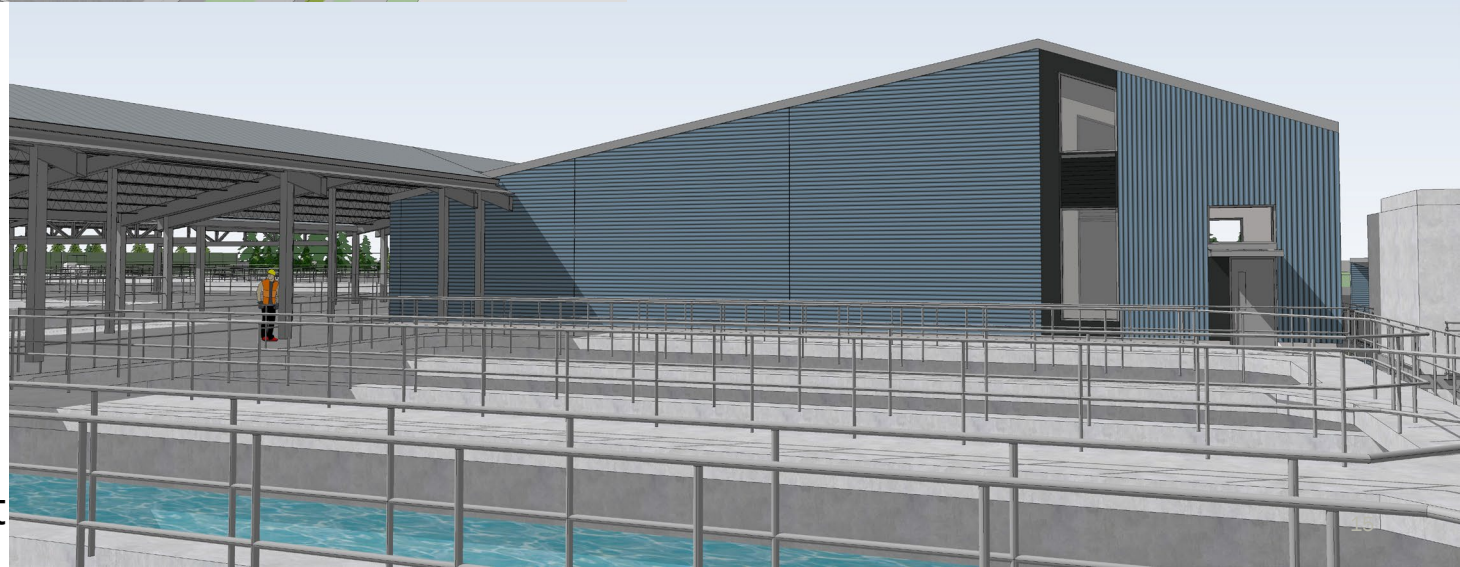
# Filter Building and Canopies



Overview looking southeast



Filter Building looking west



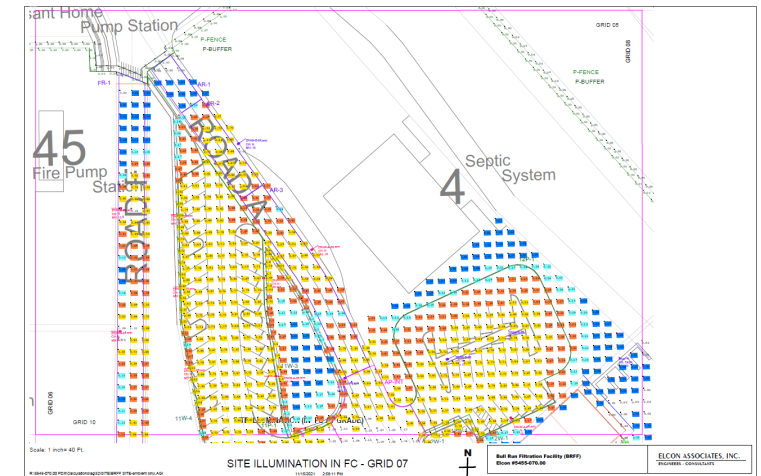
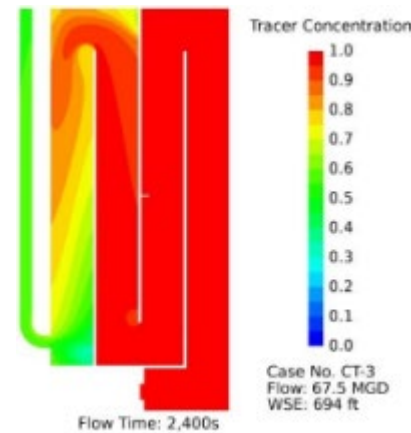
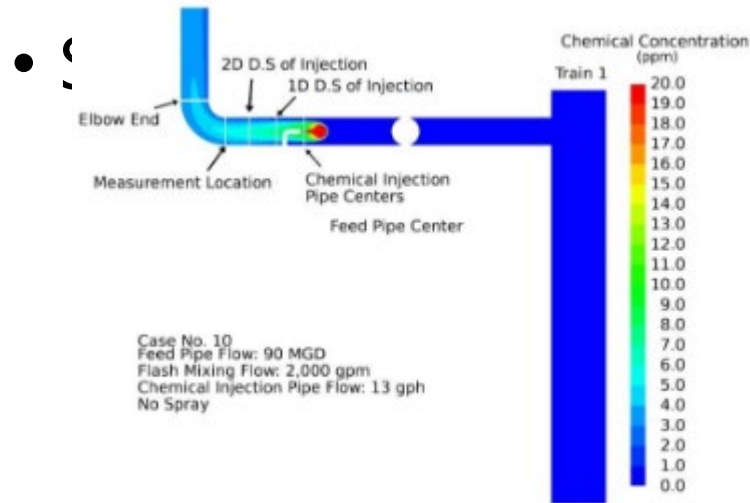
# Design Refinement w/ Modeling

- CFD Modeling
  - Confirmed effectiveness of flash mix
  - Confirmed CT basin detention time

- Lighting Model



**Noise Contours**

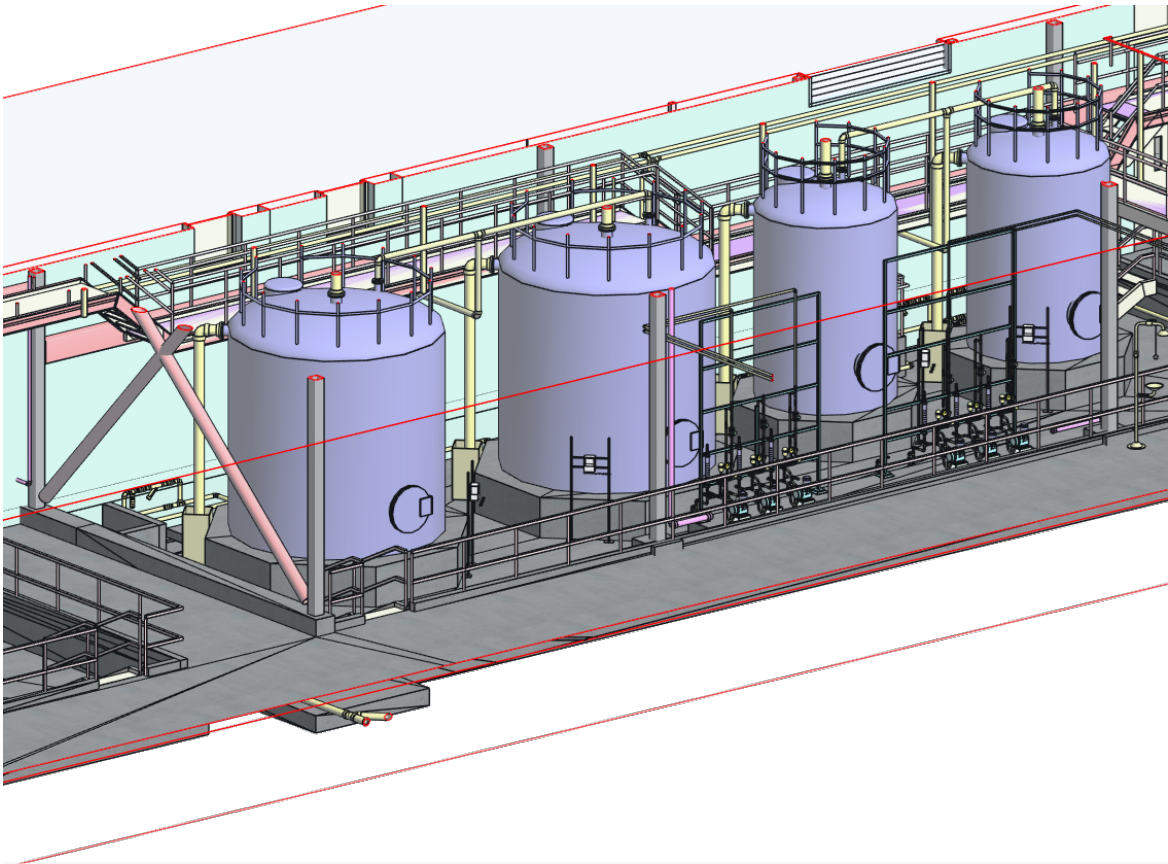


**Flash Mixing Chemical Concentration CT Basin Tracer Concentration**

**Exterior Illumination Levels**

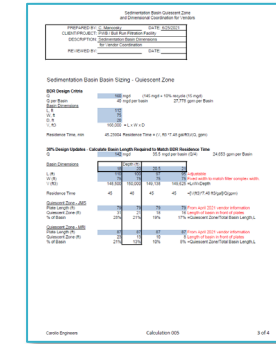
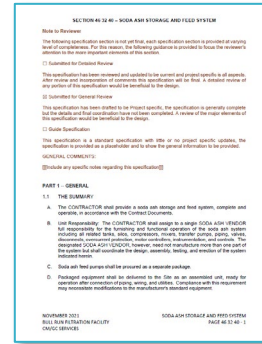
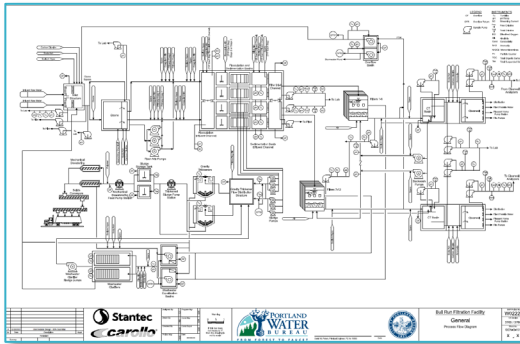


# Changed Ammoniation Chemical



- Changed from Aqueous Ammonia (AA) to Liquid Ammonium Sulfate (LAS)
- Advantages
  - Inherently safer
  - More environmentally friendly
  - Simplified O&M
  - Lower capital cost
  - Potential lead control benefits
- Disadvantages
  - Higher chemical cost

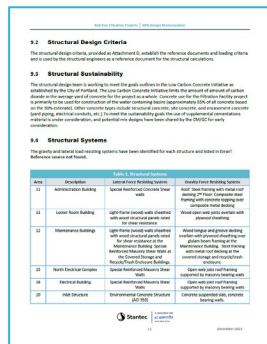
# 60% Milestone Deliverable Content



1,700 Drawings

4,591 pages of Specifications

350 pages of Calculations

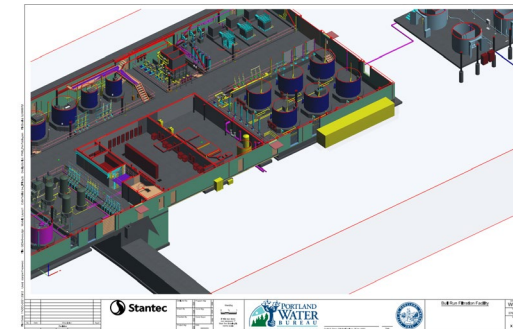


354 page Design Summary TM



Area 20 31 33 Inlet and Pre Treatment.mp4

83 minutes of Videos



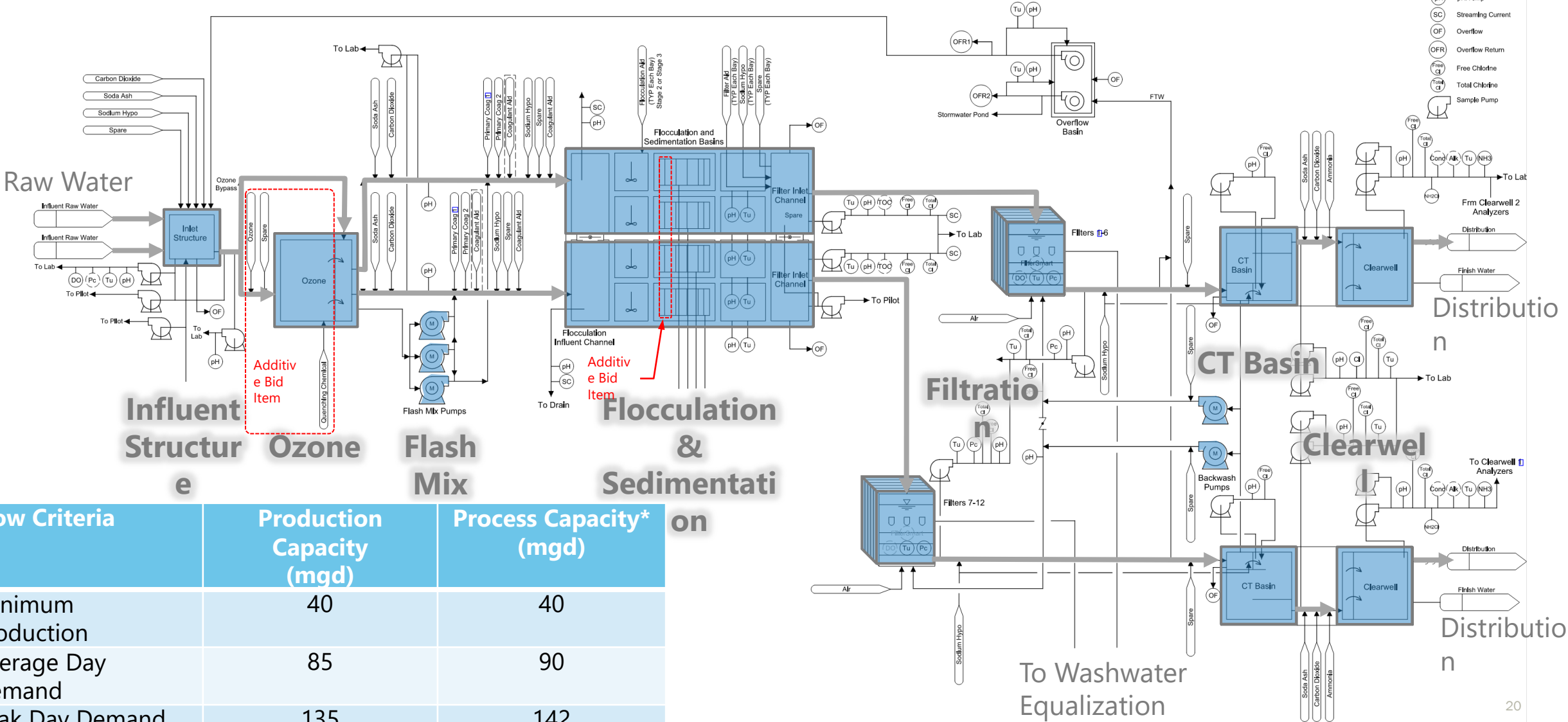
14 3D Models

# VE Design Refinements Since 60% Design Submittal

- Optimized hydraulic grade line and site grading
- Downsized administration building
- Simplified dewatering process and facilities
- Eliminated second power feed
- Reduced size of clearwell and CT basin
- ***Made ozone an additive bid item***
- ***Made a portion of the plate settlers an additive bid item***

(VE Changes to 60% Design in Red)

# Main Process Flow Diagram

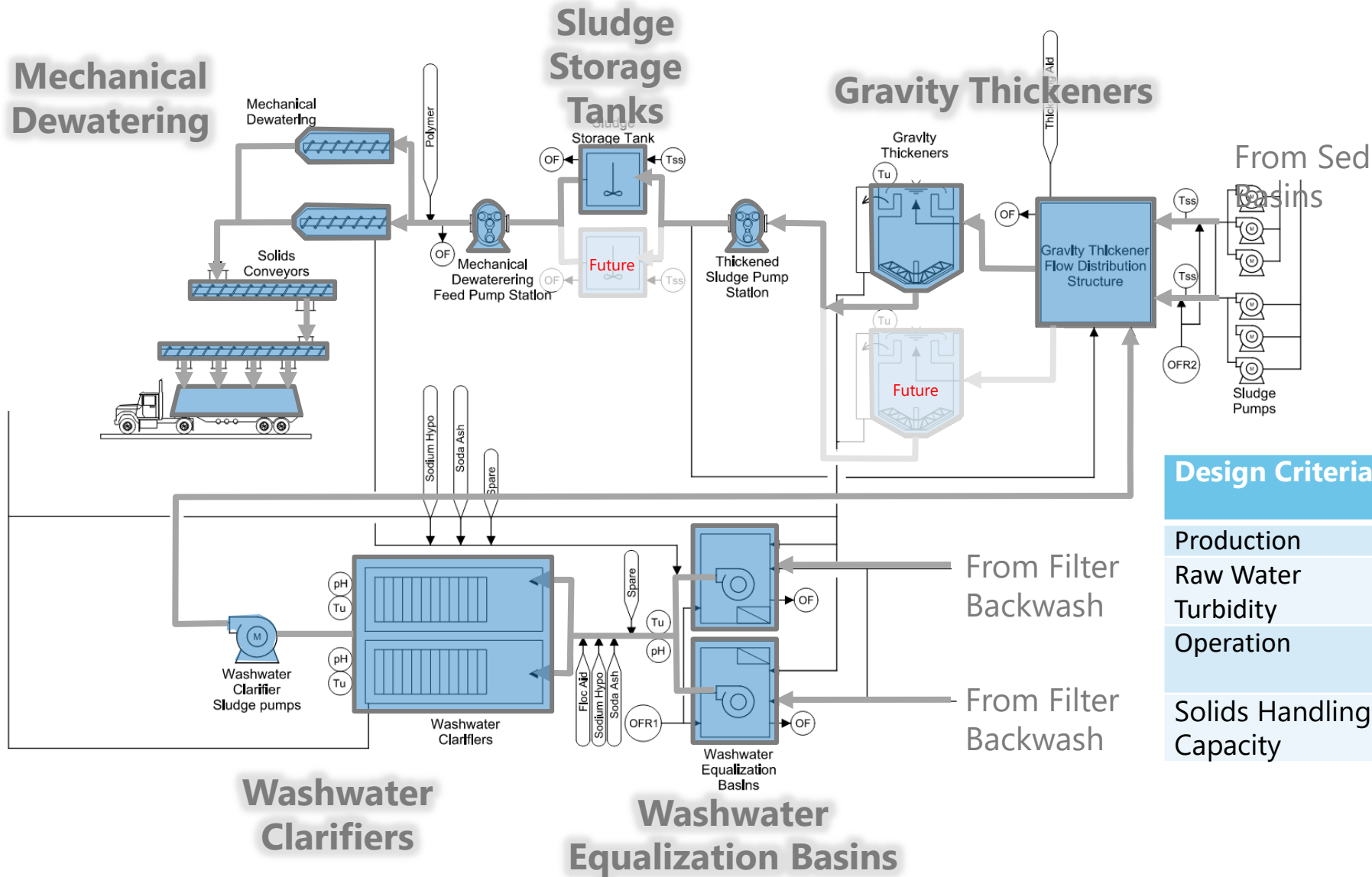


- LEGEND
- Tu Turbidity
  - pH pH/Temp
  - SC Streaming Current
  - OF Overflow
  - OFR Overflow Return
  - Free Cl Free Chlorine
  - Total Cl Total Chlorine
  - Sample Pump

Flow Criteria	Production Capacity (mgd)	Process Capacity* (mgd)
Minimum Production	40	40
Average Day Demand	85	90
Peak Day Demand	135	142

# Residuals Process Flow Diagram

(VE Changes to 60% Design in Rec)

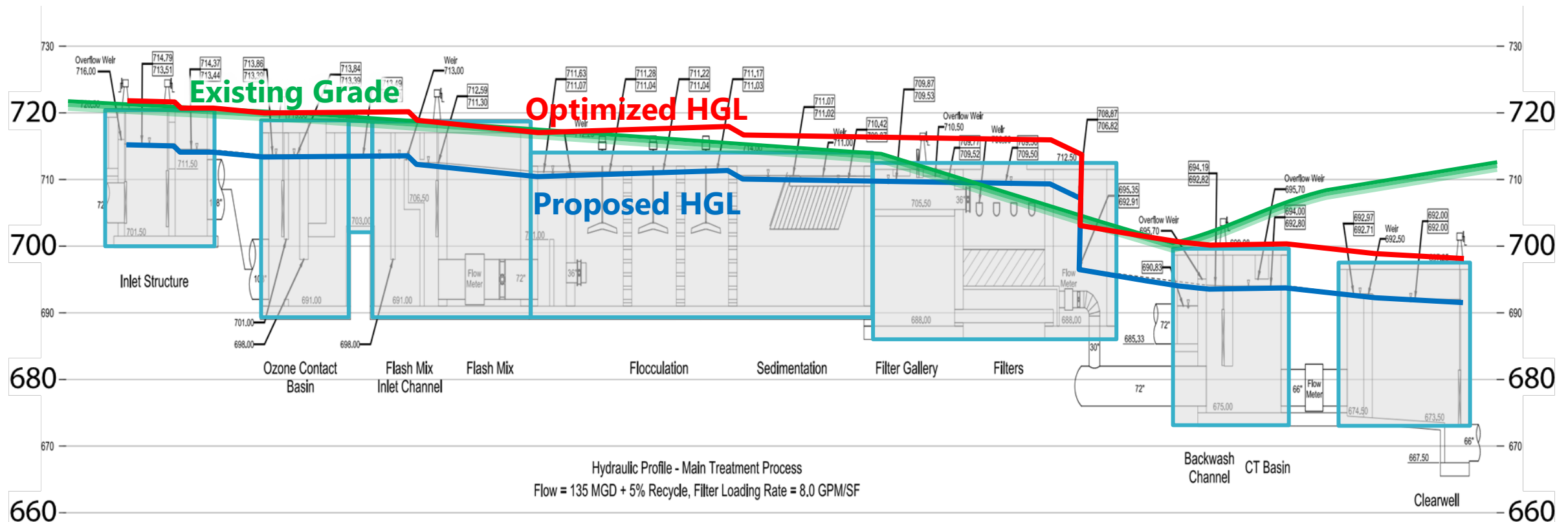


Design Criteria	Normal Operation	Extended Operation
Production	135 MGD	85 MGD
Raw Water Turbidity	1.5 NTU	24 NTU
Operation	7 hrs/day 5 days/week	24 hrs/day 7 days/week
Solids Handling Capacity	7,700 lbs/day	23,500 lbs/day

# HGL and Existing Grade

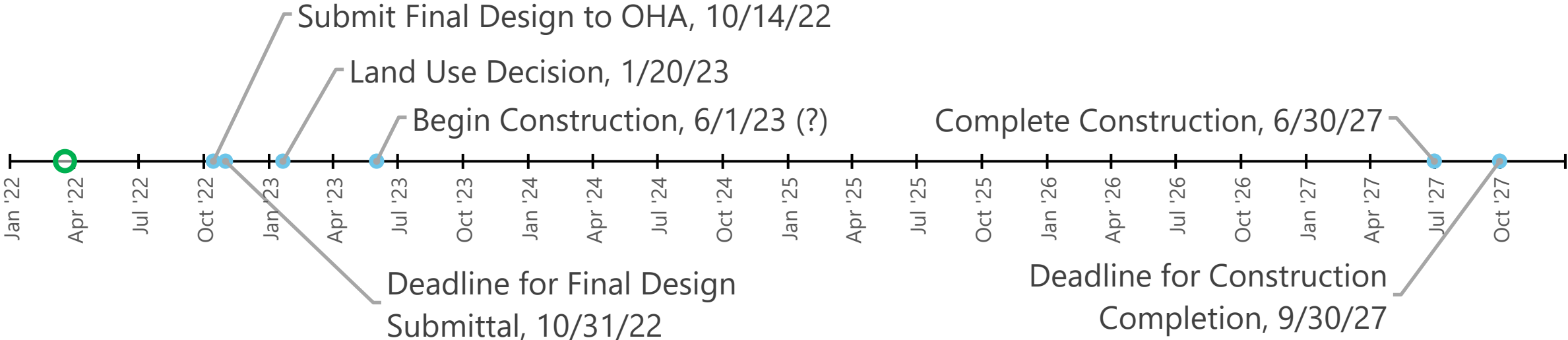
(VE Changes to 60% Design in Red)

- Process basin elevations set to allow gravity flow
- Elevation of non-process structures set to minimize excavation and imported fill
- Approx. **26'** excavation required for process basins
- **After additional hydraulic modeling, HGL was raised by 4' to reduce excavation**



# Construction Timeline

- Current Construction Schedule
  - Under development by CM/GC
  - Construction start dependent on Land Use Approval by Multnomah County

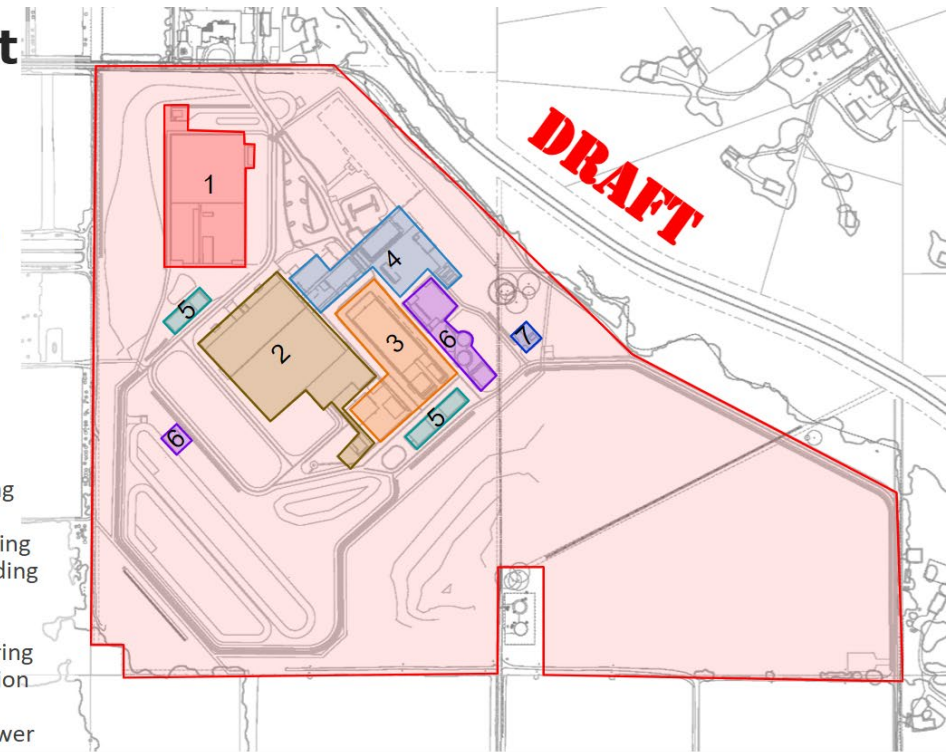


# Key Permitting Activities

- Land Use Permitting
- Building Permits
- Other Agency Reviews in Progress
  - Fire
  - Septic
  - Street Access
  - Construction Stormwater

## Building Permit Submittals

- **Package #1**
  - Site Grading
  - Yard Piping
  - Area 40 – CT Basin & Clearwell
- **Package #2**
  - Area 20 – Inlet Structure
  - Area 30 – Process Basin
- **Package #3**
  - Area 70 – Chemical Building
  - Area 80 – Ozone Building
- **Package #4**
  - Area 11 – Admin Building
  - Area 12 – Maintenance Building
- **Package #5**
  - Area 15 – Main Electrical Building
  - Area 16 – North Electrical Building
- **Package #6**
  - Area 50 – Residuals
  - Area 60 – Mechanical Dewatering
  - Area 90 – Overflow Pump Station
- **Package #7**
  - Area 18 – Communications Tower







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Thank you!

Learn More [portland.gov/bullrunprojects](http://portland.gov/bullrunprojects)