Lake Whatcom Water and Sewer District

Sudden Valley WTP Assessment Project

March 10, 2021, 6:30 PM

Project Team: Russ Porter, Keith Stewart, Myron Basden, Aaron Pease, Jason Newquist

Presentation Outline

- Project Description & Purpose
- Sudden Valley WTP
- Project Goals
- Project Approach
- Background Information
- Summary of Alternatives
- Next Steps

Project Description & Purpose

- South Shore Water System Assessment
  - Assess conditions at Sudden Valley WTP
  - Provide basis for decision making with regards to WTP modifications and/or continued use
    - Phase I (Previous)
      - Assess existing condition of structures and equipment
      - Compile findings and complete Assessment Report
    - Phase II (Current)
      - Prepare Technical Memoranda (a la carte)
      - Prepare final alternatives analysis (Capital Improvements Plan for the SVWTP)

Project Goals

- Phase II - Alternatives Analysis
  - G1 - Maintain exceptional WQ performance record
  - G2 - Accommodate immediate need for additional space and separation of chemicals/electrical equipment
  - G3 - Provide adequate equipment and process redundancy
  - G4 - Improve access and flexibility for equipment repair/rehabilitation and/or future expansion
  - G5 - Provide capacity for full buildout flow (1,400 gpm)
  - G6 - Provide treatment equipment for 30 or 50-year time period

Project Approach

Schedule

	Board Meeting Dates								
	Sep-09	Oct-14	Nov-11	Dec-09	Jan-13	Feb-10	Mar-10	Apr-14	May-12
Scope of Work Item	Sep-30	Oct-28	Nov-25	Dec-30	Jan-27	Feb-24	Mar-31	Apr-28	May-26
1 Project Management	c	c	c	c	c	a	a	a	t
2.1 Pump Performance Test	c								
2.2 Chemical Systems Analysis	c	c	c						
2.3 Disinfection Systems Analysis			c	c	c	c			
2.4 Backwash Systems Analysis			a	a	a	a	t		
2.5 Filtration System Analysis		c	c	c					
2.6 Tier 2/3 Seismic and Structural Analysis	c	c	c						
2.7 Structural/Arch Workspace Analysis					a	a	t		
2.8 NACE III Coating Inspection	c								
2.9 Risk Assessment and Project Prioritization						p	p	t	
2.10 Draft Alternatives Analysis Report						p	p	t	
2.11 Draft Alternatives Analysis Meeting							p	t	
2.12 Final Alternatives Analysis Report							p	p	t
2.13 Alternatives Analysis Board Presentation									t
2.14 Financial Analysis Board Meeting									
3 Quality Assurance/Quality Control	c	c	c	c	c	a	a	a	t

NOTATION LEGEND	
p	Planned (labor not started)
a	Active (labor underway)
c	Completed (no further labor needed)
t	Target Completion

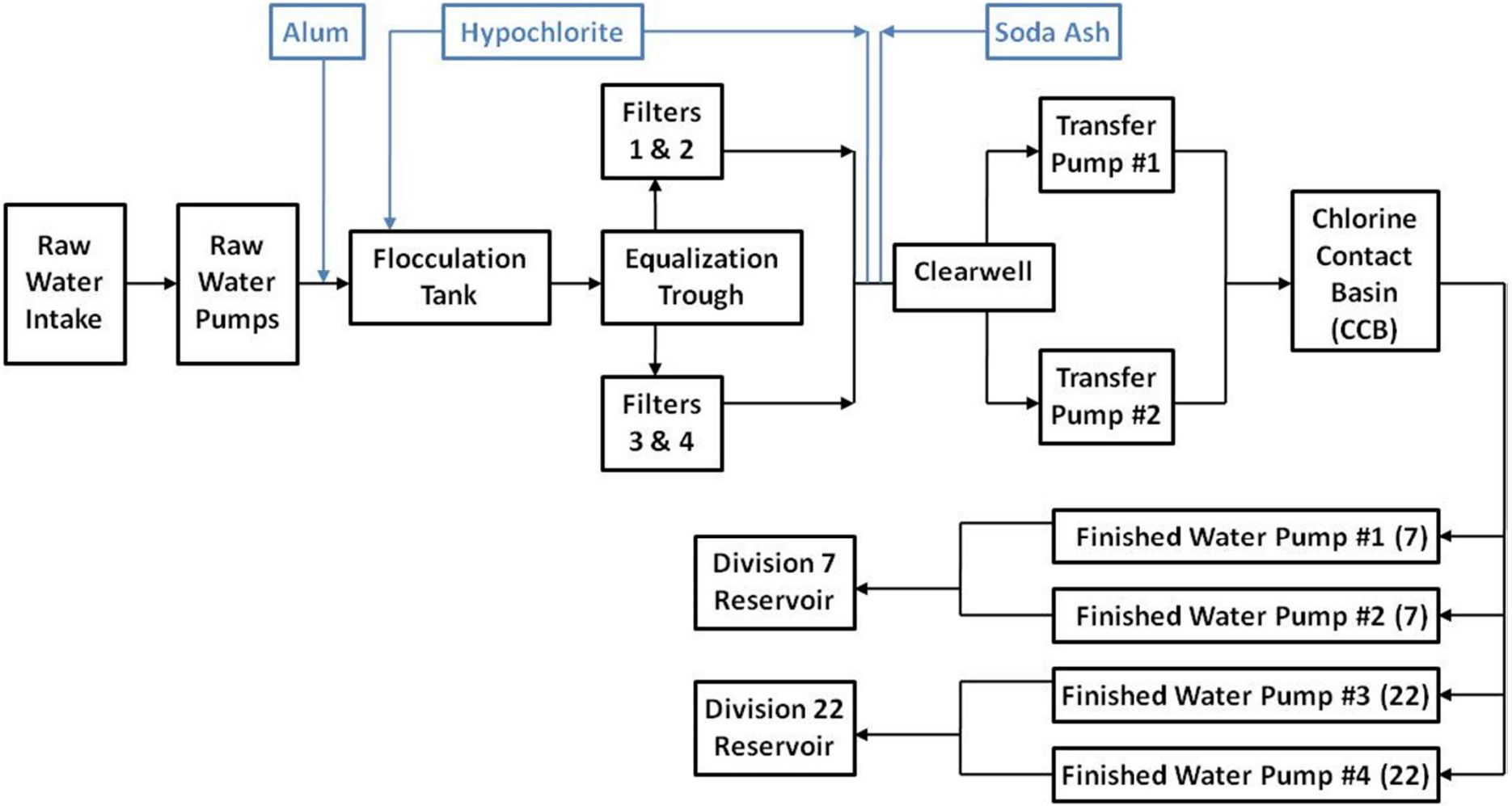
Project Approach

Schedule

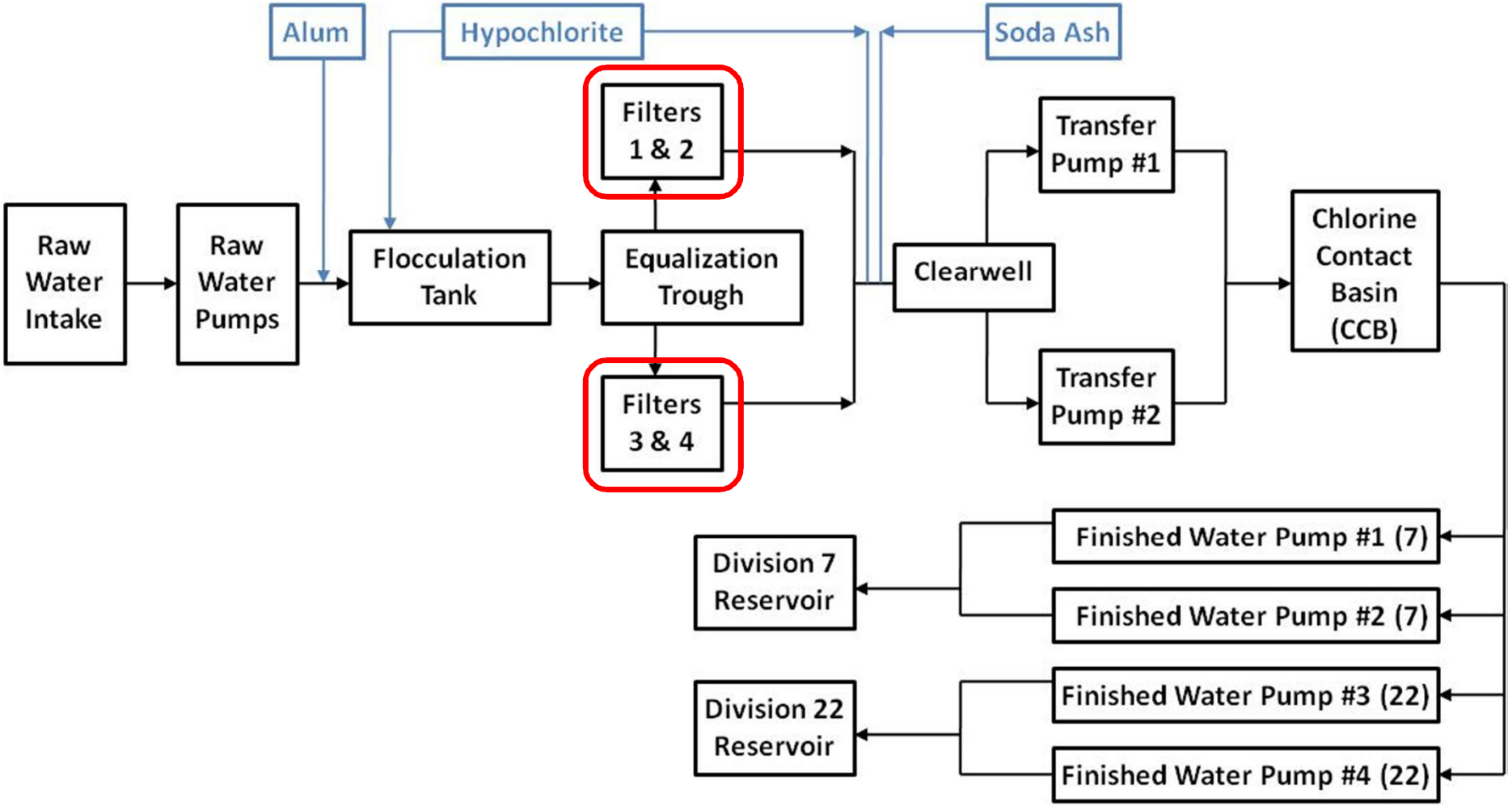
	Board Meeting Dates								
	Sep-09	Oct-14	Nov-11	Dec-09	Jan-13	Feb-10	Mar-10	Apr-14	May-12
Scope of Work Item	Sep-30	Oct-28	Nov-25	Dec-30	Jan-27	Feb-24	Mar-31	Apr-28	May-26
1 Project Management	c	c	c	c	c	a	a	a	t
2.1 Pump Performance Test	c								
2.2 Chemical Systems Analysis	c	c	c						
2.3 Disinfection Systems Analysis			c	c	c	c			
2.4 Backwash Systems Analysis			a	a	a	a	t		
2.5 Filtration System Analysis		c	c	c					
2.6 Tier 2/3 Seismic and Structural Analysis	c	c	c						
2.7 Structural/Arch Workspace Analysis					a	a	t		
2.8 NACE III Coating Inspection	c								
2.9 Risk Assessment and Project Prioritization						p	p	t	
2.10 Draft Alternatives Analysis Report						p	p	t	
2.11 Draft Alternatives Analysis Meeting							p	t	
2.12 Final Alternatives Analysis Report							p	p	t
2.13 Alternatives Analysis Board Presentation									t
2.14 Financial Analysis Board Meeting									
3 Quality Assurance/Quality Control	c	c	c	c	c	a	a	a	t

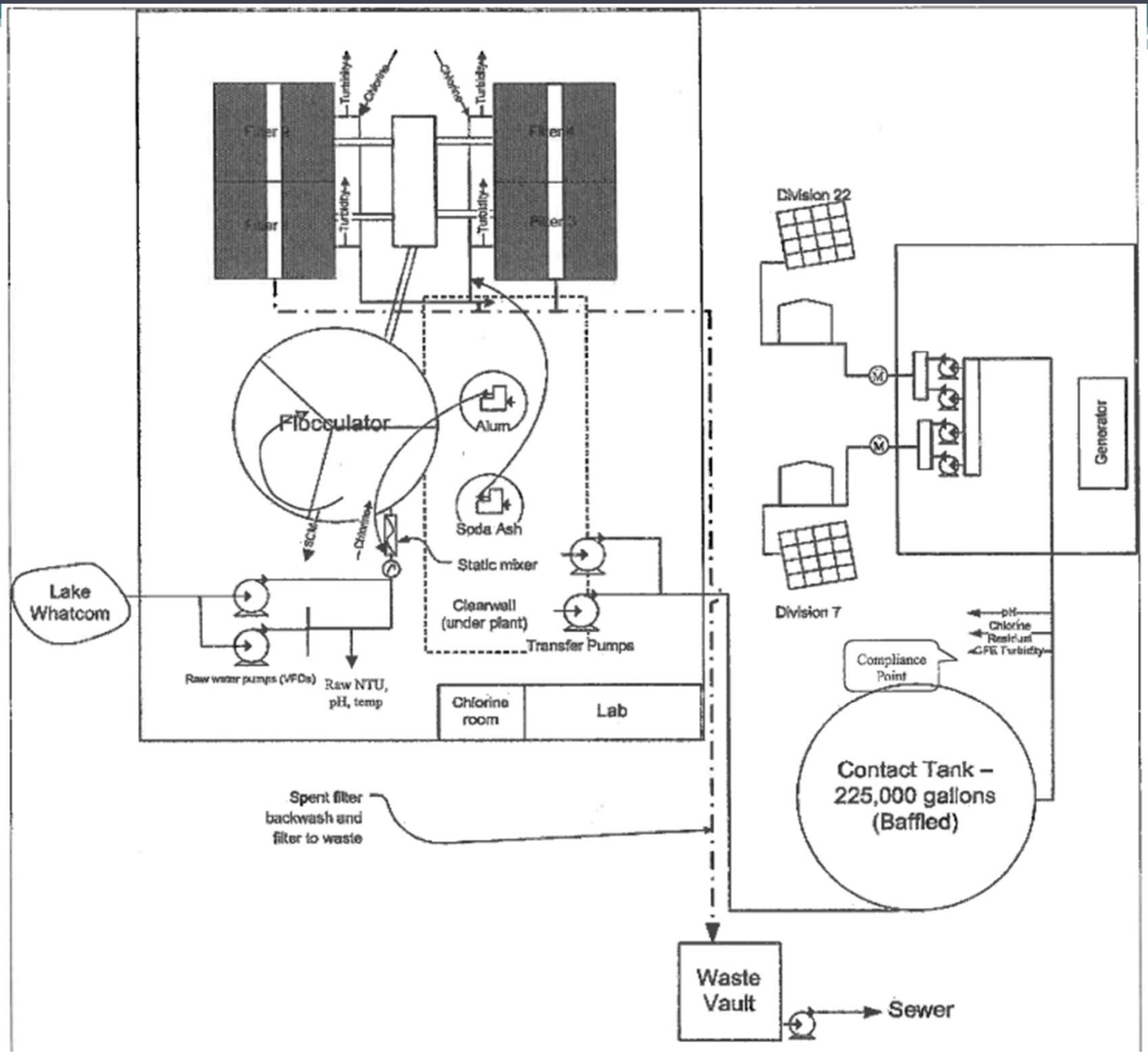
NOTATION LEGEND	
p	Planned (labor not started)
a	Active (labor underway)
c	Completed (no further labor needed)
t	Target Completion

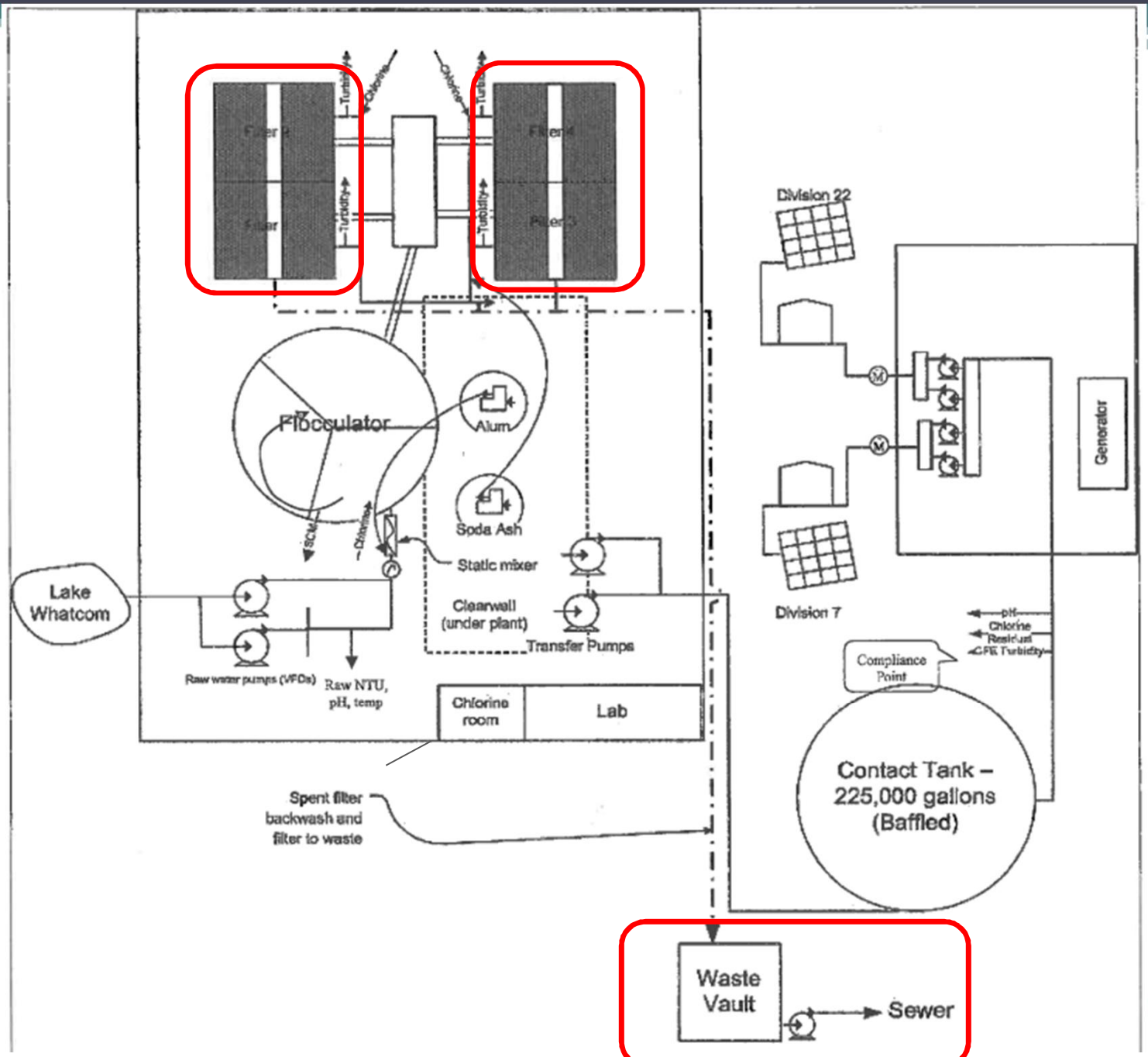
Sudden Valley WTP – Process Flow



Sudden Valley WTP – Process Flow

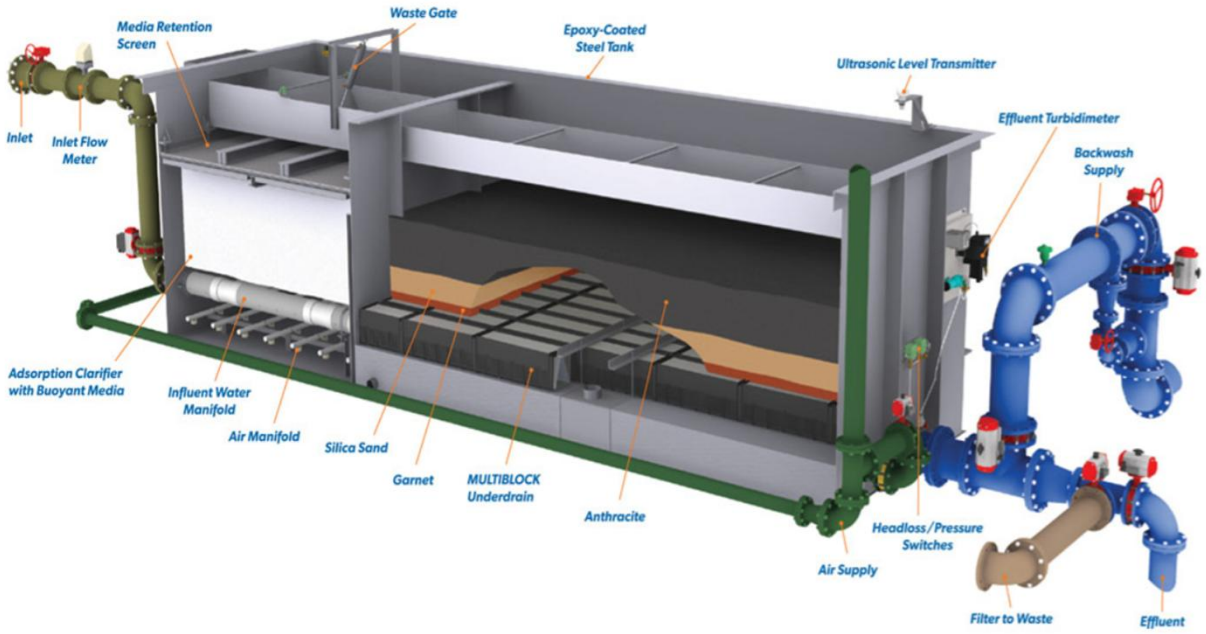



Filter 4
Filter 3
Turbidity
Chlorine
Flocculator
Alum
Soda Ash
SCM
Static mixer
Clearwell
(under plant)
Transfer Pumps
Lake
Whatcom
Raw water pumps (VFDs)
Raw NTU,
pH, temp
Chlorine
room
Lab
Division 22
Division 7
Generator
pH
Chlorine
Residual
CPE Turbidity
Compliance
Point
Contact Tank –
225,000 gallons
(Baffled)
Spent filter
backwash and
filter to waste
Waste
Vault
Sewer


Filter 4
Filter 3
Turbidity
Chlorine
Flocculator
Alum
Soda Ash
Static mixer
Clearwell
(under plant)
Transfer Pumps
Lake
Whatcom
Raw water pumps (VFDs)
Raw NTU,
pH, temp
Chlorine
room
Lab
Spent filter
backwash and
filter to waste
Division 22
Division 7
Generator
pH
Chlorine
Residual
CPE Turbidity
Compliance
Point
Contact Tank –
225,000 gallons
(Baffled)
Waste
Vault
Sewer

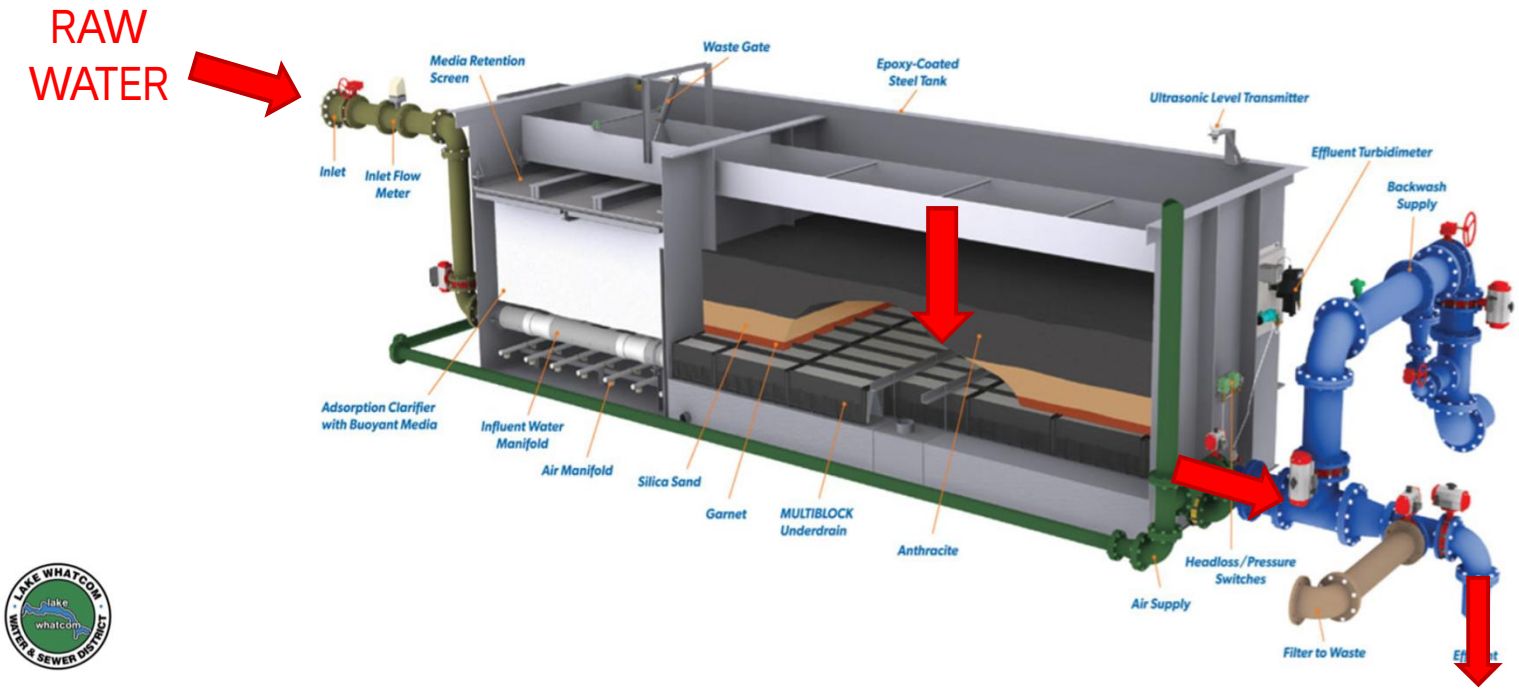
Background Information

- Mixed Media Filter
  - Backwash required to clean filters and remove trapped particles



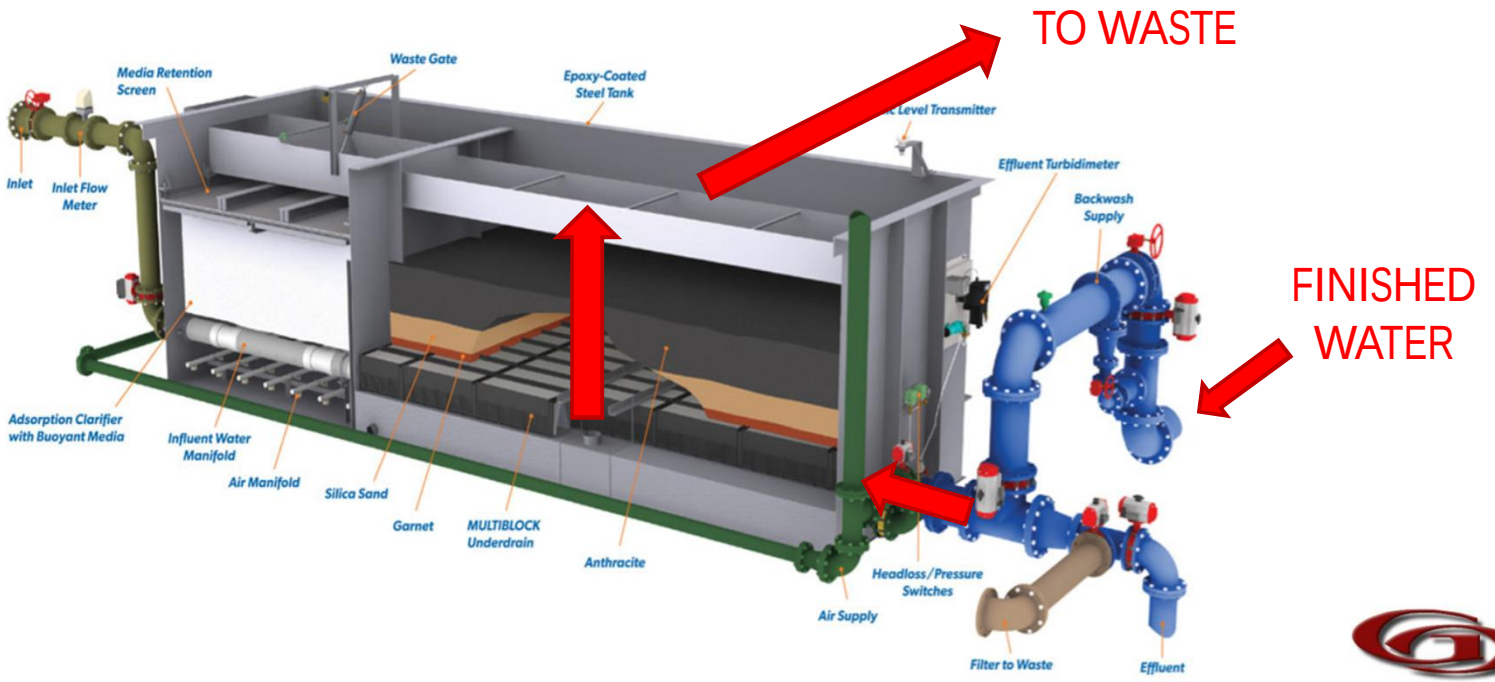
Background Information

- Mixed Media Filter
  - Normal operation



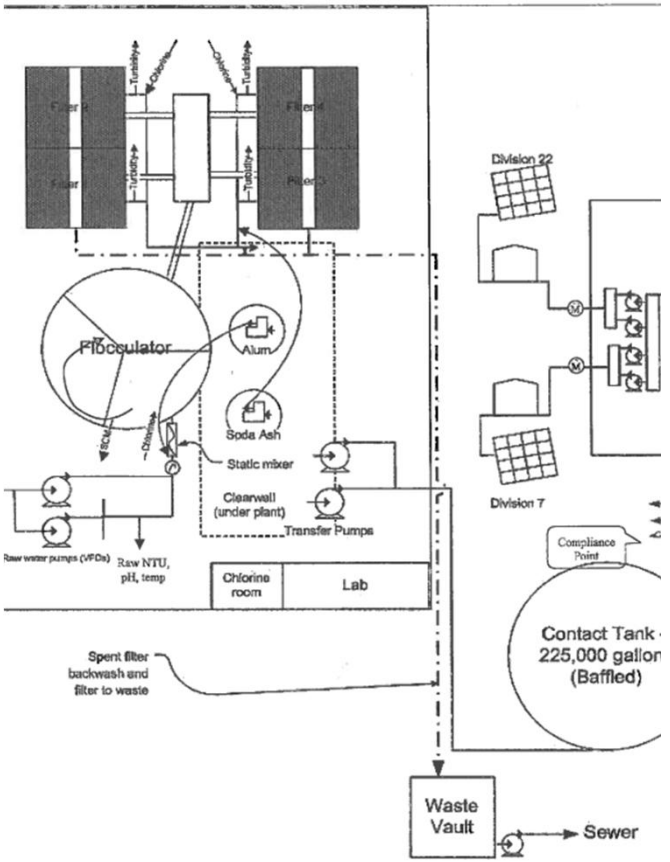
Background Information

- Mixed Media Filter
  - Backwash sequence



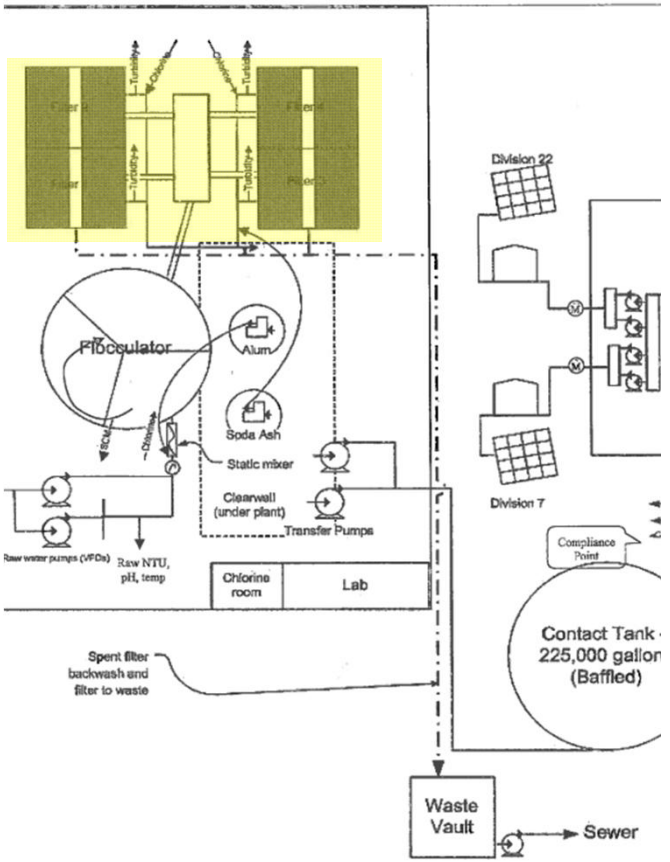
Background Information

- Existing System
  - Backwash daily
    - 1,300 gpm for 9-10 minutes (ea)
    - 45,000-50,000 gallons/day
    - 16.4 MG per year (4-5% annual total)
  - Backwash Storage Basin
    - ~16,000 gallons
    - Two pumps (200/400 gpm)
    - Pumps to manhole, then gravity to lift station
    - Flow in >> Flow out



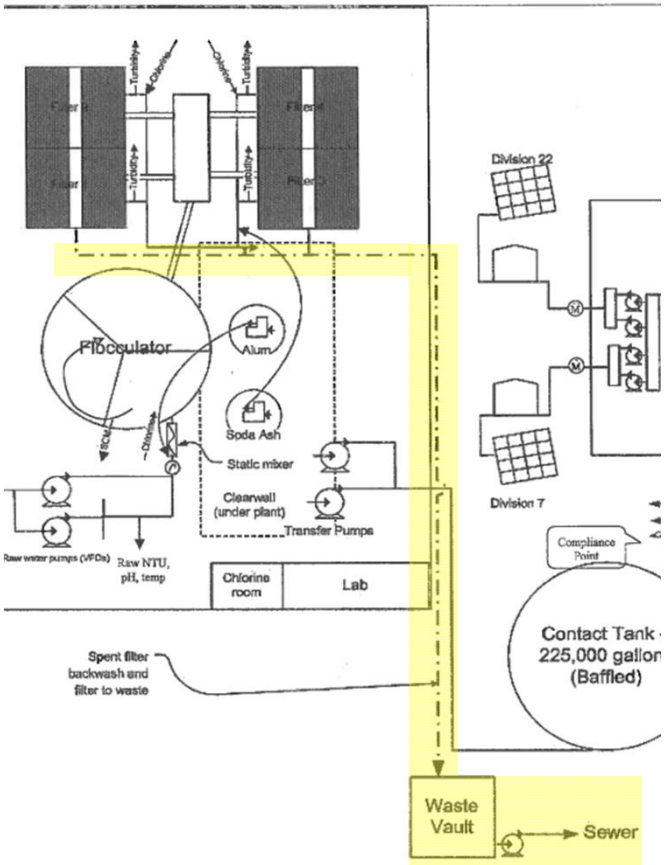
Background Information

- Existing System
  - Backwash daily
    - 1,300 gpm for 9-10 minutes (ea)
    - 45,000-50,000 gallons/day
    - 16.4 MG per year (4-5% annual total)
  - Backwash Storage Basin
    - ~16,000 gallons
    - Two pumps (200/400 gpm)
    - Pumps to manhole, then gravity to lift station
    - Flow in >> Flow out



Background Information

- Existing System
  - Backwash daily
    - 1,300 gpm for 9-10 minutes (ea)
    - 45,000-50,000 gallons/day
    - 16.4 MG per year (4-5% annual total)
  - Backwash Storage Basin
    - ~16,000 gallons
    - Two pumps (200/400 gpm)
    - Pumps to manhole, then gravity to Afternoon Beach Lift Station
    - Flow in >> Flow out



Background Information

- Existing System
  - Cumbersome
    - WTP staff must wait for storage basin pumps prior to backwashing subsequent filters
    - Limited redundancy
  - Expensive
    - ~$40,000/year for sewer disposal costs
  - Limited capacity for future backwash flows
  - Lift Station Impacts
    - Afternoon Beach, Ranchouse, LW Boulevard

Summary of Alternatives

- Continue discharge to municipal sewer
- Discharge to Lake Whatcom
- Recycle to existing treatment plant

Summary of Alternatives

- Continue discharge to municipal sewer
- Discharge to Lake Whatcom
- Recycle to existing filters

→ Each alternative above has two storage options

Summary of Alternatives

Alternative 1: Discharge to Sewer

- Utilize existing backwash storage basin
  - Install new, larger pumps (~600 gpm)
  - Pumps move water to new storage tank
- Install new, additional, 120,000 gallon storage tank
  - Option A – Below grade tank
    - Similar to stormwater detention system
    - Provided in sections and joined in the field
    - New submersible pump station to sewer connection

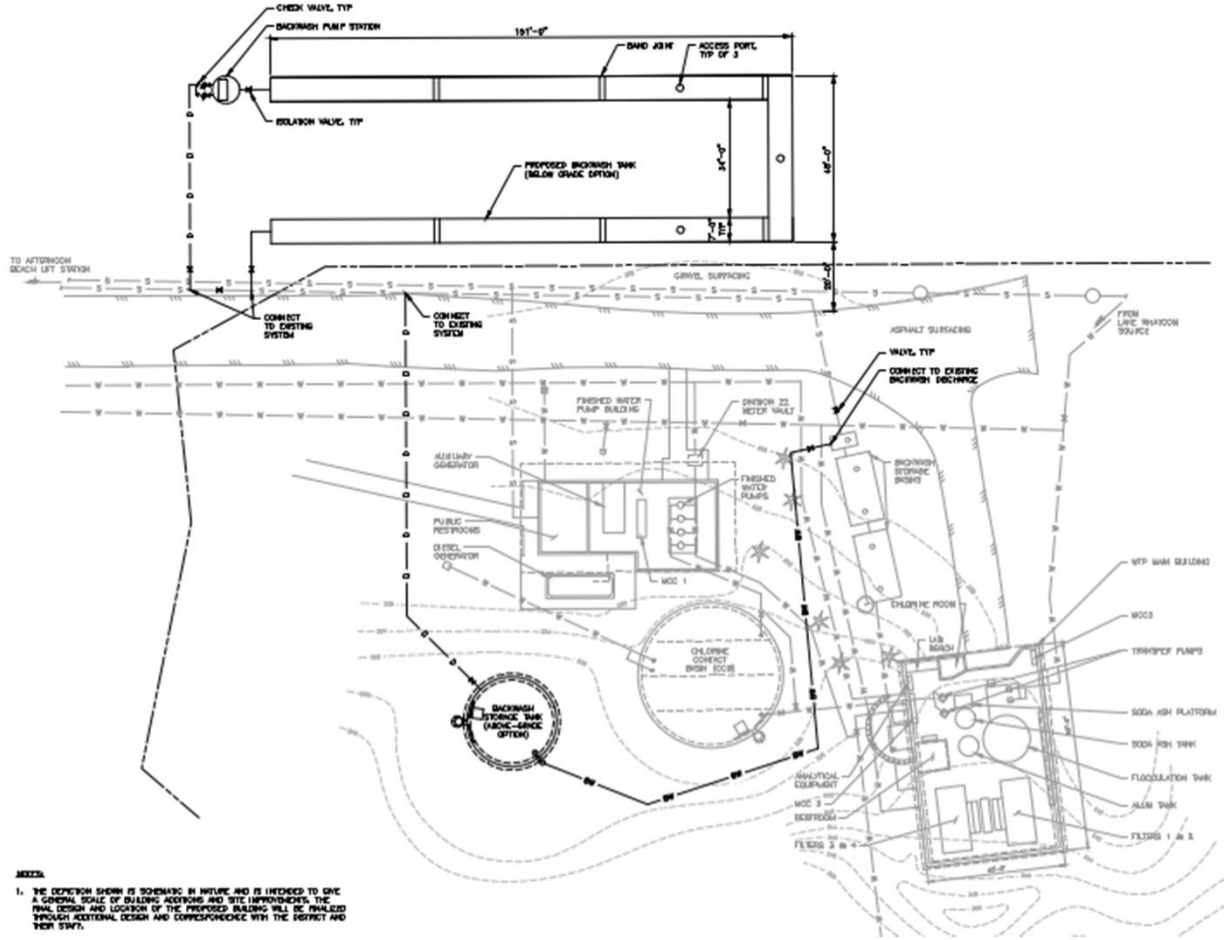
Summary of Alternatives

Alternative 1: Discharge to Sewer

- Option B – Above grade tank
  - Gravity drain to sewer connection
  - Could be new tank, or could utilize the existing chlorine contact basin (CCB) if a new CCB is constructed
- Metered flows
  - Non-peaks hours at lower cost?
  - Continuous, low-flow discharge
- Solids discharge to sewer

Summary of Alternatives

Alternative 1: Discharge to Sewer

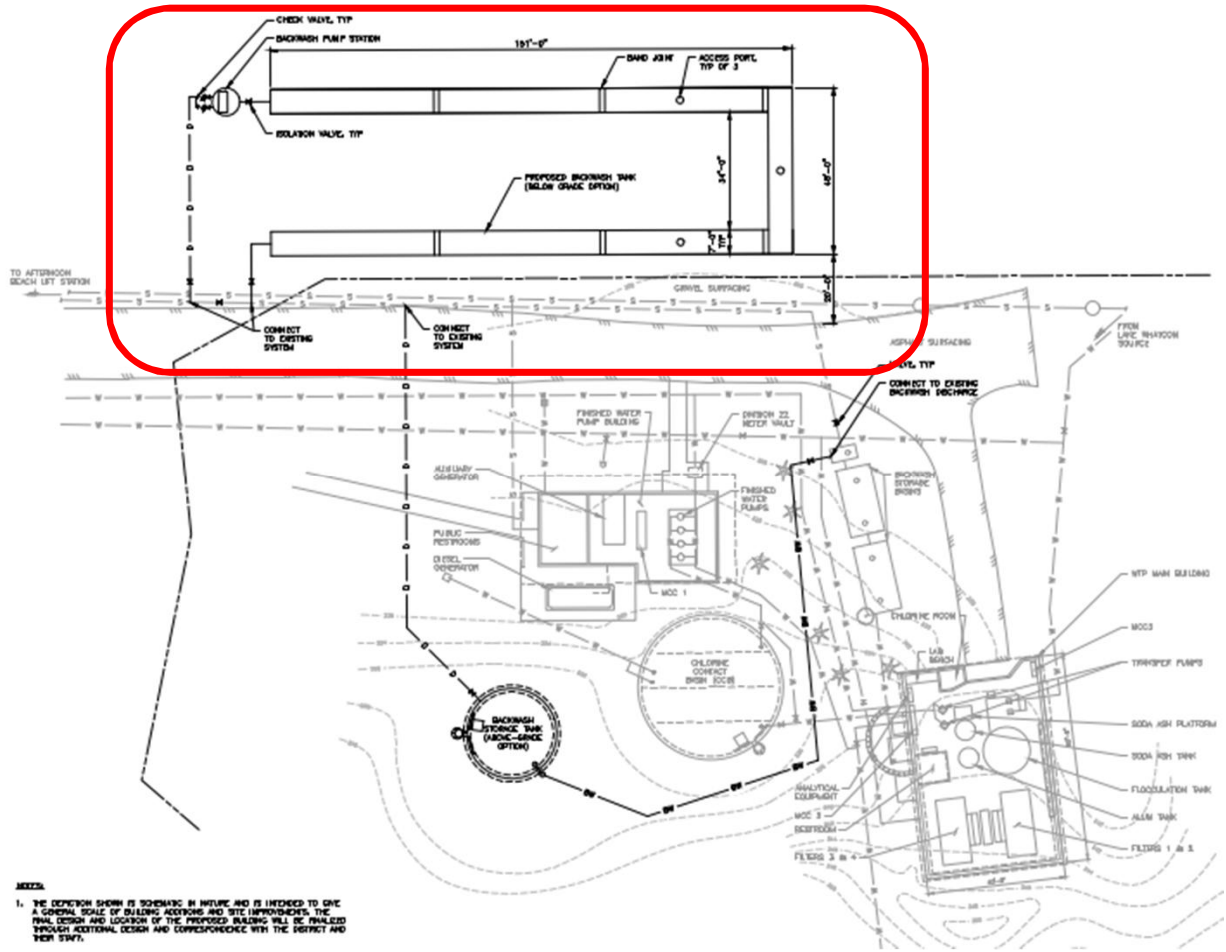


NOTES:

1. THE DIMENSION SHOWN IS SCHEMATIC IN NATURE AND IS INTENDED TO GIVE A GENERAL SCALE OF BUILDING ADDITIONS AND SITE IMPROVEMENTS. THE FINAL DESIGN AND LOCATION OF THE PROPOSED BUILDING WILL BE FINALIZED THROUGH ADDITIONAL DESIGN AND CORRESPONDENCE WITH THE DISTRICT AND PERMITTING AGENCIES.

Summary of Alternatives

Alternative 1: Discharge to Sewer



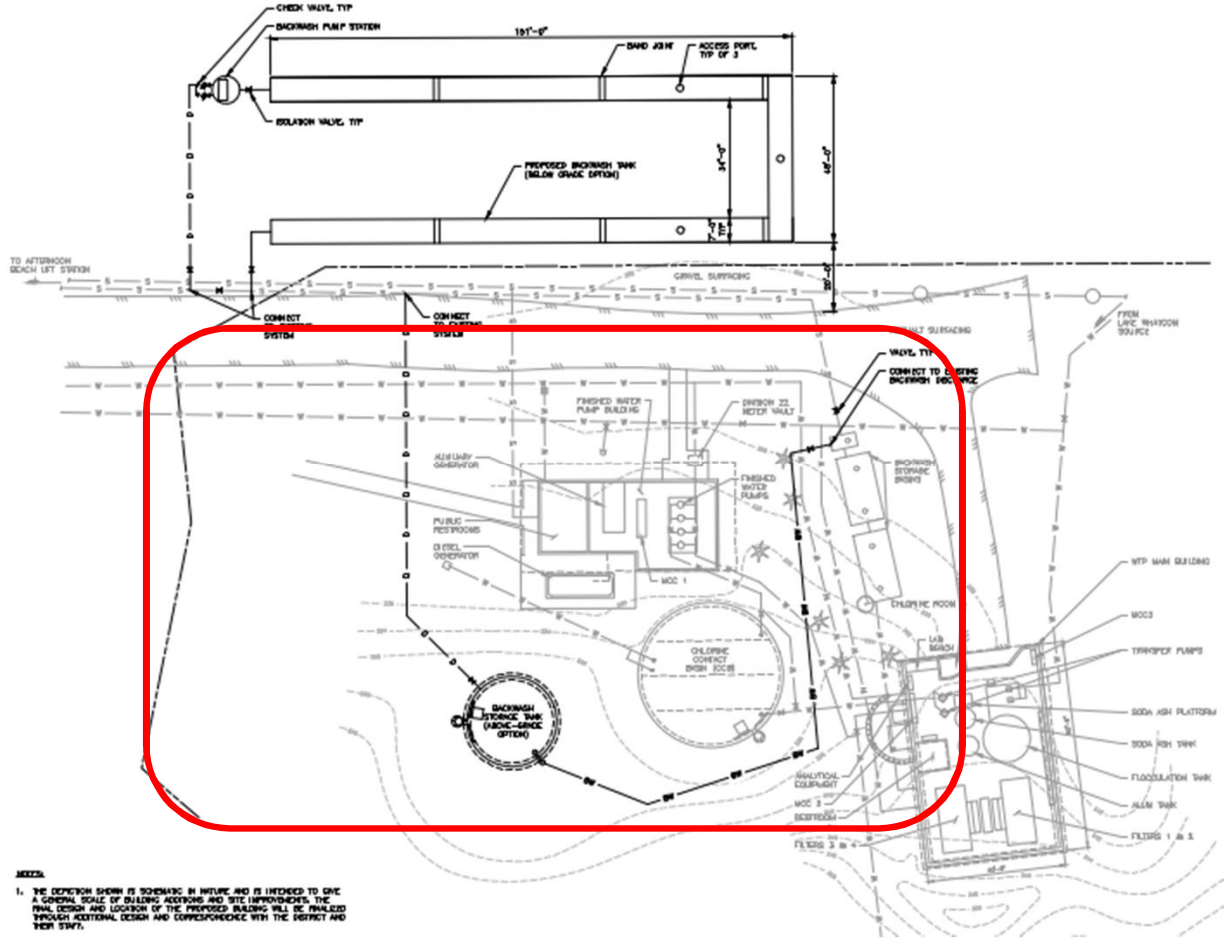
NOTES:

1. THE DEPICTION SHOWN IS SCHEMATIC IN NATURE AND IS INTENDED TO GIVE A GENERAL SCALE OF BUILDING ADDITIONS AND SITE IMPROVEMENTS. THE FINAL DESIGN AND LOCATION OF THE PROPOSED BUILDING WILL BE FINALIZED THROUGH ADDITIONAL DESIGN AND CORRESPONDENCE WITH THE DISTRICT AND PERMITTING AGENCIES.

- Option 1A
  - $1.494M

Summary of Alternatives

Alternative 1: Discharge to Sewer



- Option 1A
  - $1.494M
- Option 1B
  - $1.022M
- O&M similar to existing

Summary of Alternatives

Alternative 2: Discharge to Lake Whatcom

- Utilize existing backwash storage basin
  - Install new, larger pumps (~600 gpm)
  - Pumps move water to new storage tank
- Install new, additional 190,000 gallon storage tank
  - Option A – Below grade tank
    - Provides settling, flow attenuation, and solids storage
    - Similar to stormwater detention system
    - Provided in sections and joined in the field
    - New submersible pump station to new outfall
    - Larger than Alternative 1 to accommodate solids storage

Summary of Alternatives

Alternative 2: Discharge to Lake Whatcom

- Option B – Above grade tank
  - Could be new tank, or could utilize the existing chlorine contact basin (CCB) if a new CCB is constructed
  - New pump station to new outfall
- Solids discharge to sewer
  - Option A requires more maintenance
    - 1-4 times per year
  - Option B could drain to sewer
- Additional monitoring/treatment requirements

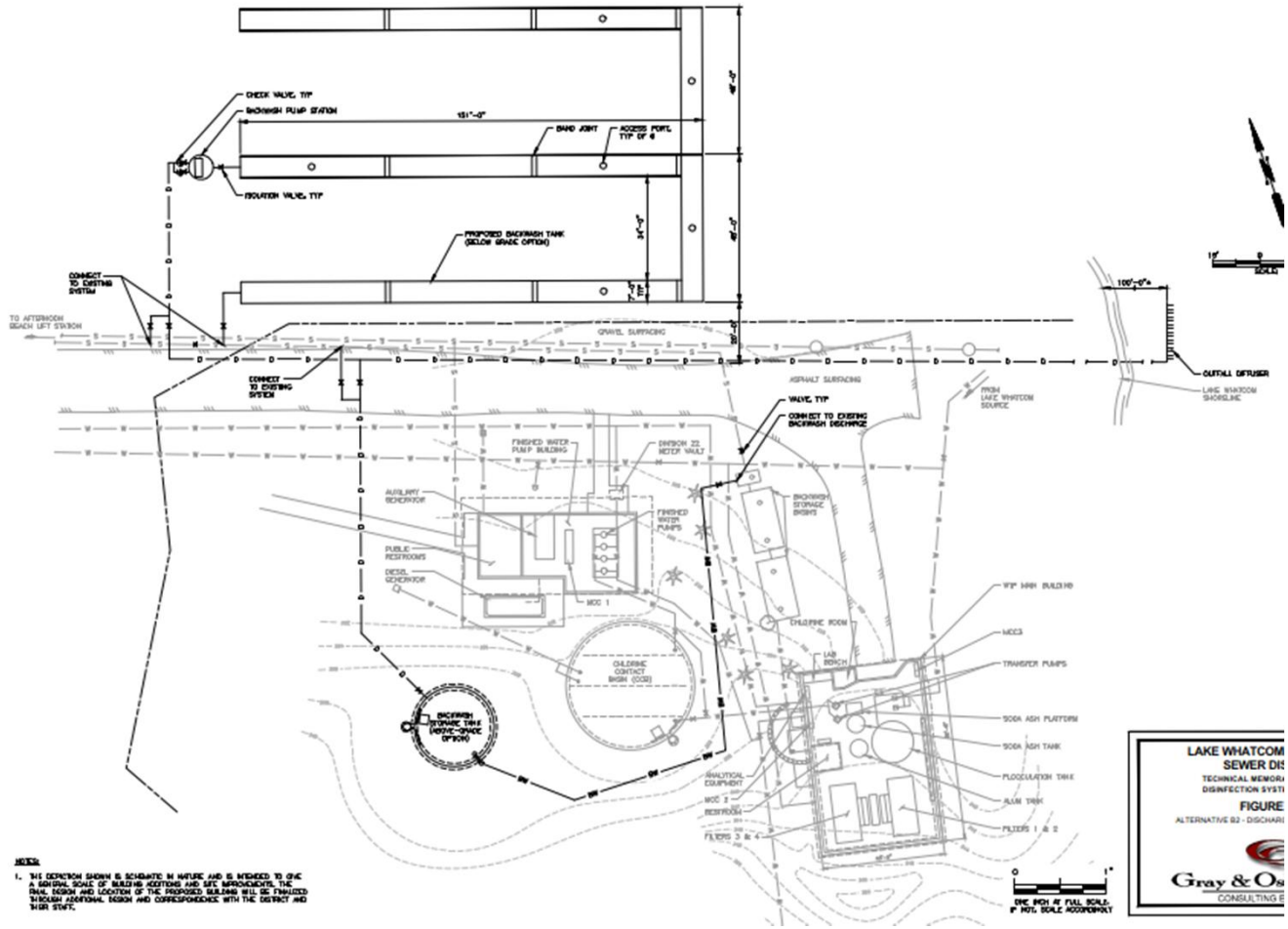
Summary of Alternatives

Alternative 2: Discharge to Lake Whatcom

- Discharge regulated by Ecology NPDES permit
  - WTP must apply for coverage (5 years)
- Meet daily discharge requirements
  - Solids (<0.2 mL/L)
  - pH (6.0 – 9.0)
  - Chlorine (<0.07 mg/L)
    - Prelim testing suggests that additional treatment would be required for chlorine and perhaps solids.
- Maintain current and valid O&M Manual
- Additional monthly/quarterly monitoring
  - DMRs, turbidity, TDS, Fe/Mn, volume, chloride, etc.

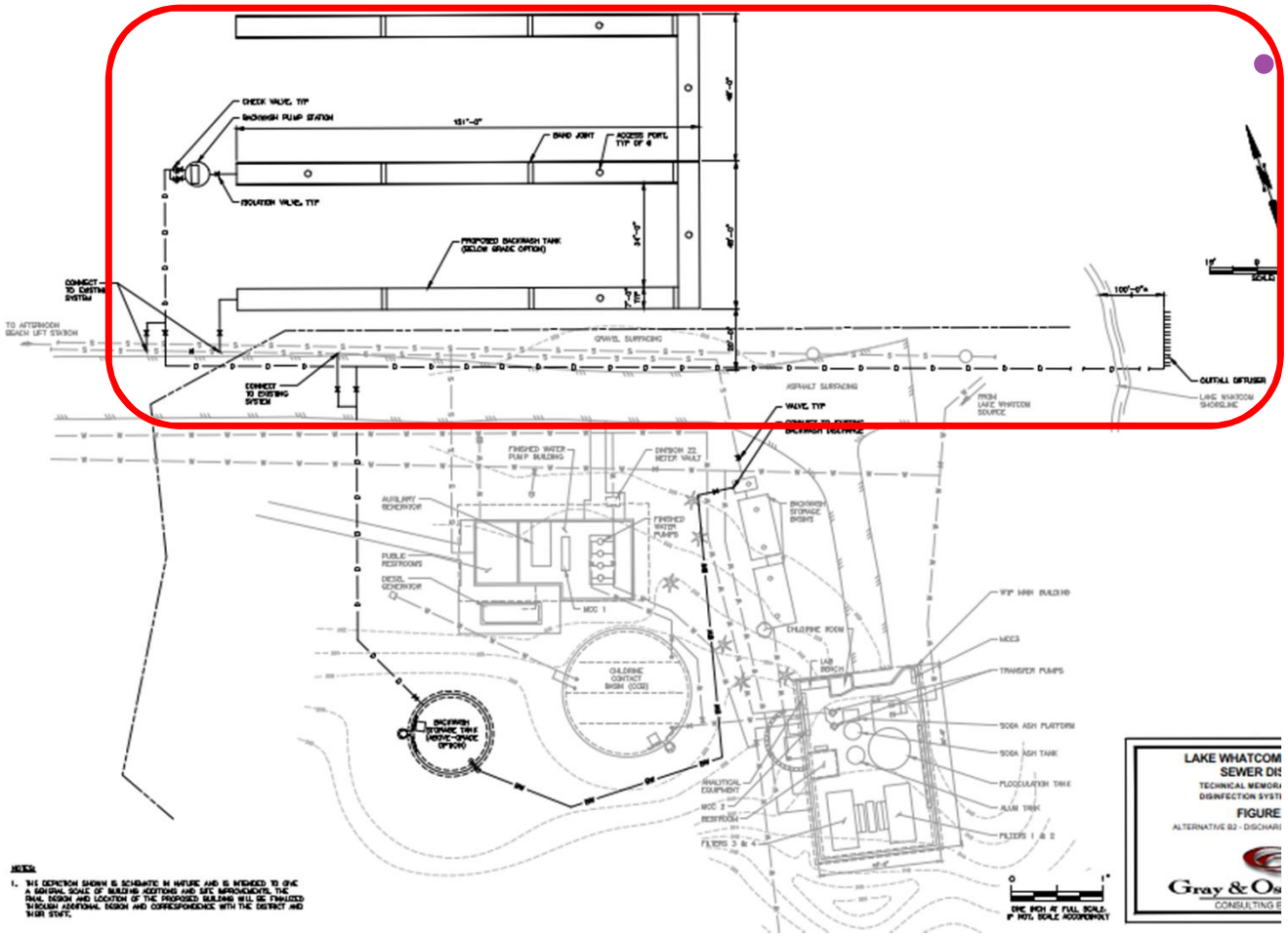
Summary of Alternatives

Alternative 2: Discharge to Lake Whatcom



Summary of Alternatives

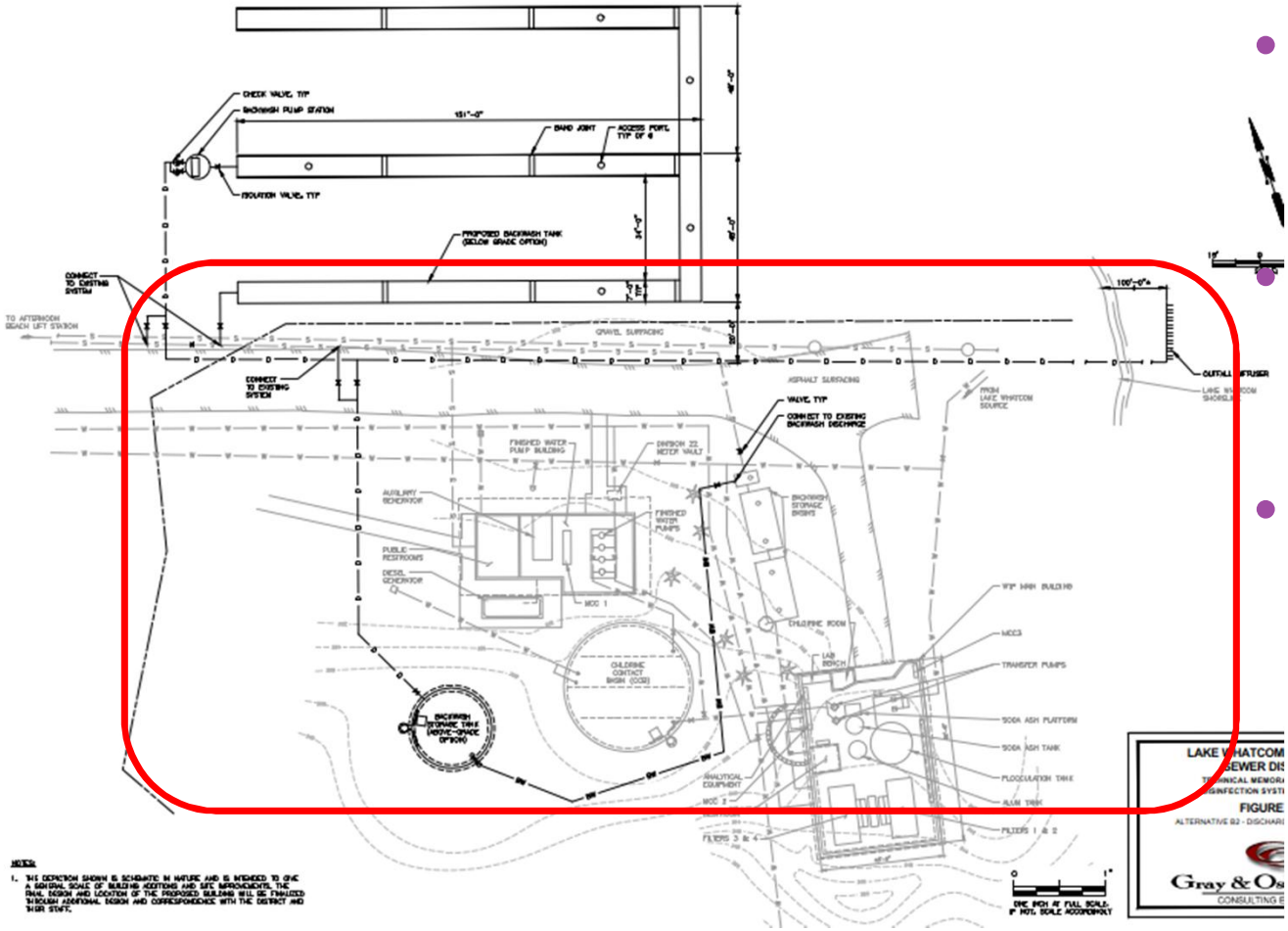
Alternative 2: Discharge to Lake Whatcom



- Option 2A
  - $2.126M

Summary of Alternatives

Alternative 2: Discharge to Lake Whatcom



- Option 2A
  - $2.126M
- Option 2B
  - $1.819M
- O&M increase (monitoring & treatment)

Summary of Alternatives

Alternative 3: Recycle to Filters

- Utilize existing backwash storage basin
  - Install new, larger pumps (~600 gpm)
  - Pumps move water to new storage tank
- Install new, additional 190,000 gallon storage tank
  - Option A – Below grade tank
    - Provides settling, flow attenuation, and solids storage
    - Similar to stormwater detention system
    - Provided in sections and joined in the field
    - New submersible pump station to WTP
    - Larger than Alternative 1 to accommodate solids

Summary of Alternatives

Alternative 3: Recycle to Filters

- Option B – Above grade tank
  - Could be new tank, or could utilize the existing chlorine contact basin (CCB) if a new CCB is constructed
  - New pump station to WTP
- Solids discharge to sewer
  - Option A requires more maintenance
    - 1-4 times per year
  - Option B could drain to sewer
- Maximize use of existing water right
- Some additional monitoring

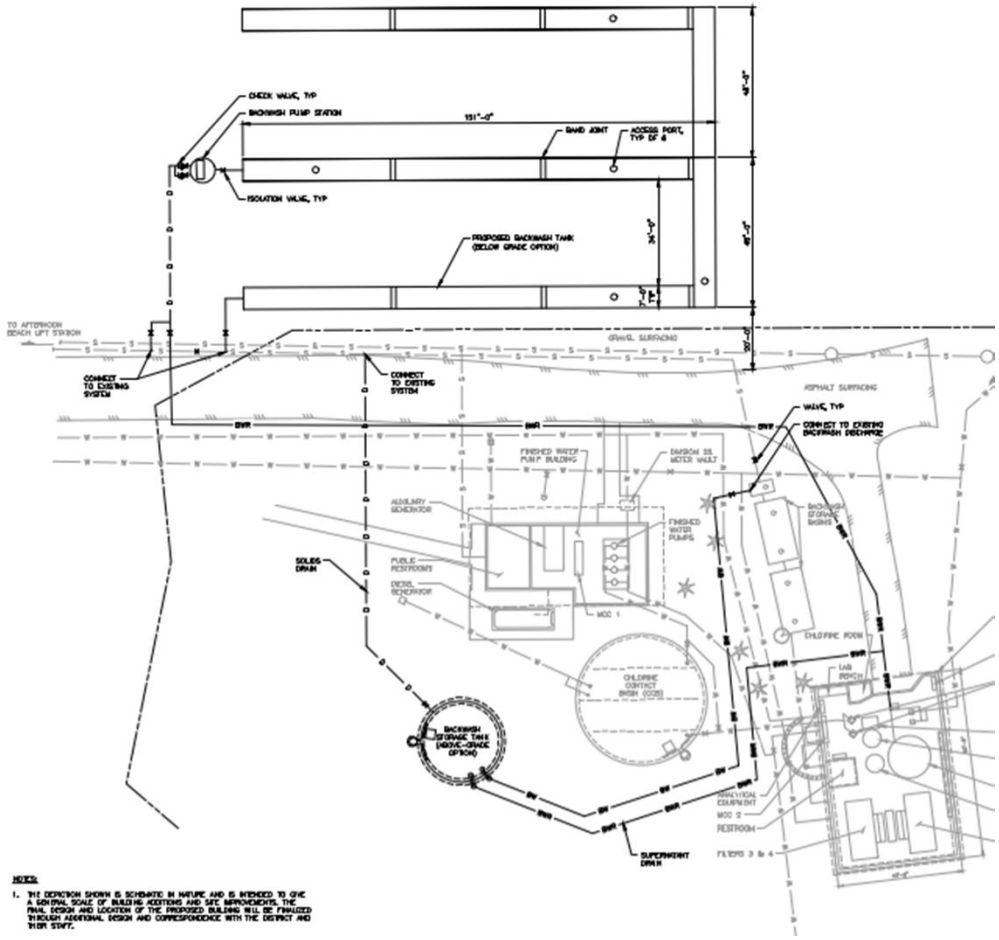
Summary of Alternatives

Alternative 3: Recycle to Filters

- Original rule written by USEPA
  - Filter Backwash Recycle Rule (FBRR)
- Currently regulated by DOH
- Water quality monitoring requirements
  - Less restrictive than discharge to Lake Whatcom
  - Maximum 10% of total flow
    - 70 gpm recycle, 630 gpm raw water
  - Must proceed through ENTIRE treatment process
- Additional monitoring
  - Volume, flow, turbidity, chlorine, pH

Summary of Alternatives

Alternative 3: Recycle to Filters

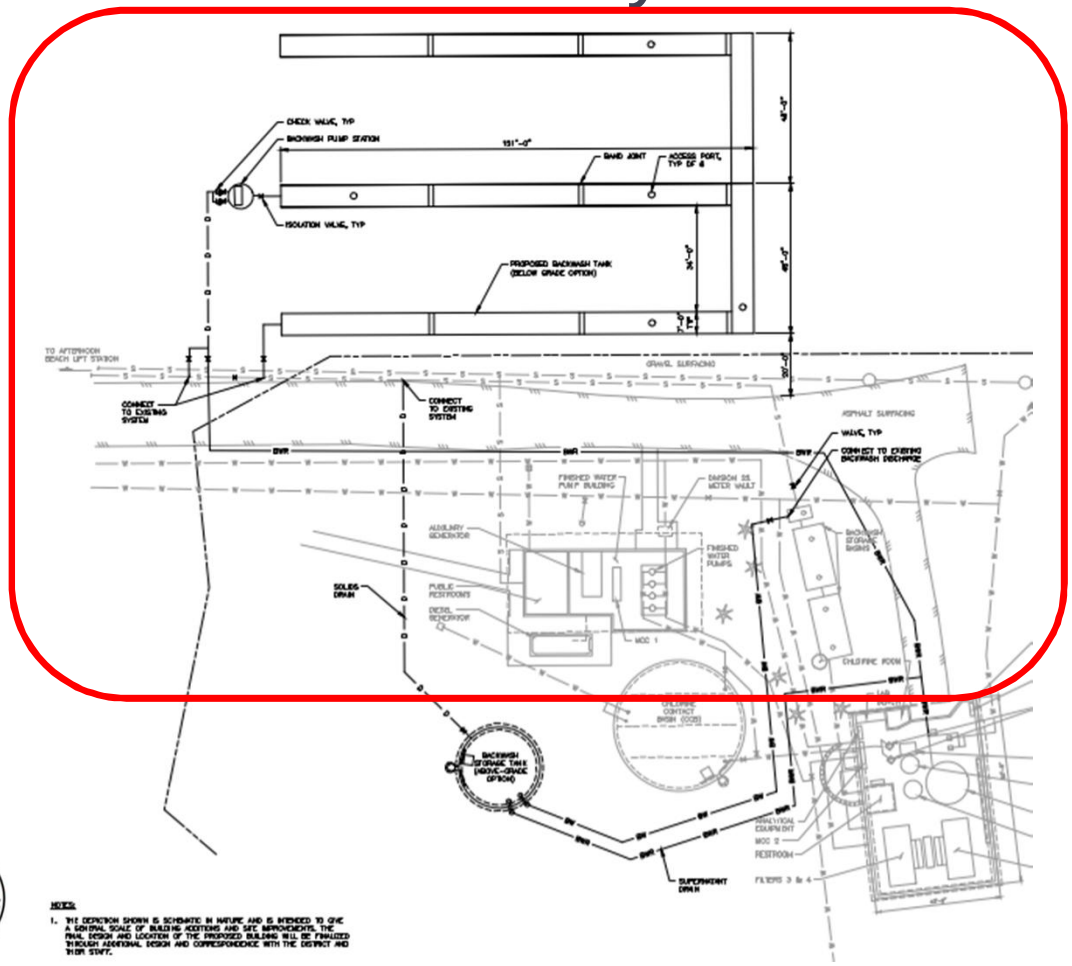


NOTES:

1. THE DEPICTION SHOWN IS SCHEMATIC IN NATURE AND IS INTENDED TO GIVE A GENERAL SCALE OF BUILDING ADDITIONS AND SITE IMPROVEMENTS. THE FINAL DESIGN AND LOCATION OF THE PROPOSED BUILDING WILL BE FINALIZED THROUGH ADDITIONAL DESIGN AND CORRESPONDENCE WITH THE DISTRICT AND THEIR STAFF.

Summary of Alternatives

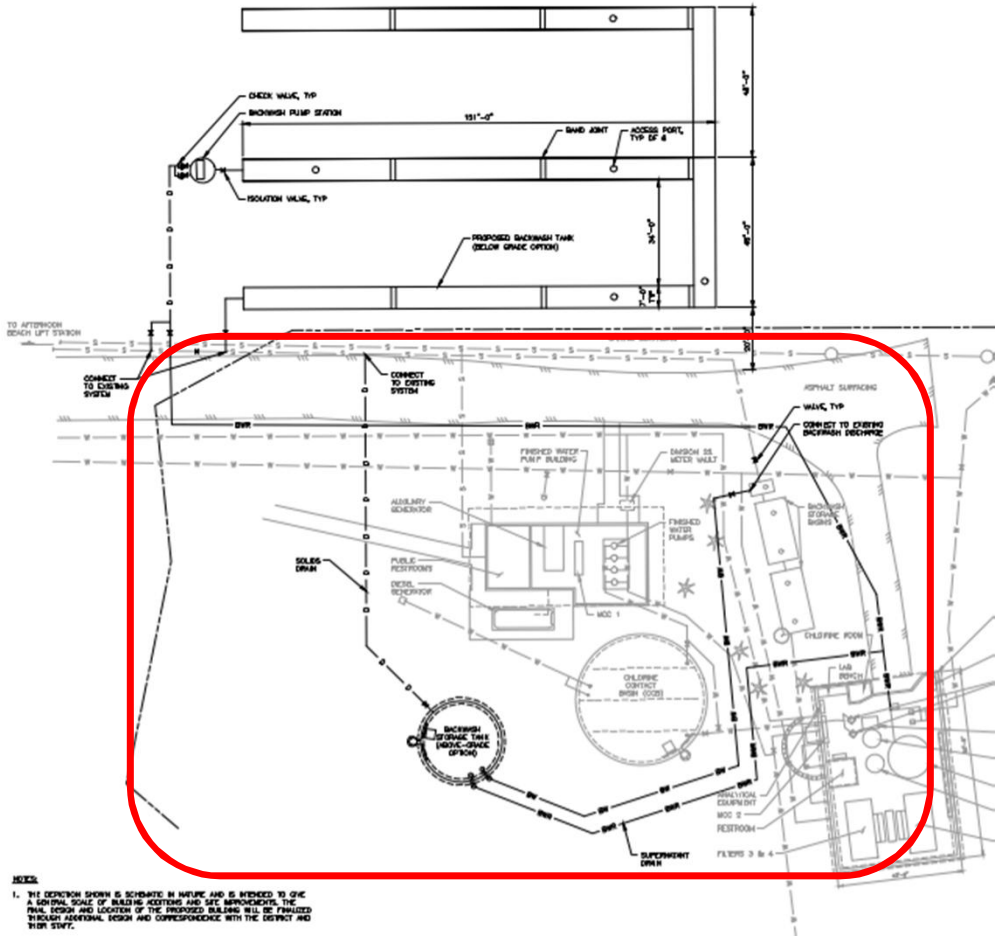
Alternative 3: Recycle to Filters



- Option 3A
  - $1.889M

Summary of Alternatives

Alternative 3: Recycle to Filters



- Option 3A
  - $1.889M
- Option 3B
  - $1.564M
- O&M increase (monitoring & treatment)

Alternative Comparison

Backwash Cost, Benefits, & Drawbacks

No.	Description	Capital Cost* (2020)	Advantage	Disadvantage
1A	Sewer Below grade	$1,494,000	- Familiar - Solids sent to sewer	- New lift station
1B	Sewer Above grade	$1,022,000	- Familiar - Solids sent to sewer	
2A	Lake Whatcom Below grade	$2,126,000	- Reduce load to Afternoon Beach Lift Station (ABLS)	- Additional treatment & testing - Solids handling & permitting - New lift station & outfall - Permitting
2B	Lake Whatcom Above grade	$1,819,000	- Reduce load to ABLS - Reuse existing CCB	- Additional treatment - Additional monitoring - Solids handling & outfall - Permitting
3A	Recycle Below grade	$1,889,000	- Maximize water right use - Environmental impacts - Reduce load to ABLS	- Additional monitoring - Solids handling - New lift station - Impact finished water quality
3B	Recycle Above grade	$1,564,000	- Maximize water right use - Reuse existing CCB - Reduce load to ABLS	- Additional monitoring - Solids handling - Impact finished water quality

Alternative Comparison

Backwash Goal Accomplishment

No.	Description	Cost	O&M Cost	G1	G2	G3	G4	G5	G6
1A	Sewer - BGT	$$	$	X	-	X		X	X
1B	Sewer - AGT	$	$	X	-	X	X	X	X
2A	Lake Whatcom - BGT	$$$	$$	X	-	X		X	X
2B	Lake Whatcom - AGT	$$	$$	X	-	X	X	X	X
3A	Recycle - BGT	$$	$$	X	-	X		X	X
3B	Recycle - AGT	$$	$$	X	-	X	X	X	X

G1 - Maintain exceptional WQ performance record
G2 - Accommodate immediate need for additional space and separation of chemicals/electrical equipment
G3 - Provide adequate equipment and process redundancy
G4 - Improve access and flexibility for equipment repair/rehabilitation and/or future expansion
G5 - Provide capacity for full buildout flow (1,400 gpm)
G6 - Provide treatment equipment for 30-50 year time period

Next Steps

- Technical Memorandum 20434-8
  - Structural/Architectural System Analysis
    - (Present on 3/31/2021)
- Risk Assessment
  - (April/May 2021)
- Final Alt. Analysis & Recommendations Report
  - (May/June 2021)

Questions?