SPANISH FORK AND MAPLETON CITIES

WASTEWATER TREATMENT PLANT
UPDES PERMIT APPLICATION
& ADR LEVEL II

January 2021

Prepared by:

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Project No. 55-20-075

J-U-B Engineers prepared the 2020 Wastewater Facility Plan for the Spanish Fork and Mapleton city Wastewater Treatment Plant. The preferred alternative consists of membrane bioreactors, biological nutrient removal, chemical phosphorus removal, and UV disinfection.

The plant upgrade has triggered an Anti-Degradation Review (ADR) Level II. The UPDES permit and ADR review forms are provided below with supporting documentation as appendices to this report.

The following information is provided for the ADR process:

UPDES Permit Application

Figures

1. Topographic Map of Project Area
2. Existing Plant – Site Layout
3. Greenfield Plant – Proposed Site Layout

Appendices

1. UPDES Permit Part IV_A – Compliance Information, Exceedances
2. UPDES Permit Part IV_B – Compliance Information, Facility Monitoring Data
3. UPDES Permit Part X_C – Antidegradation Review, Social & Economic Benefits
4. UPDES Permit Part X_D – Antidegradation Review, Parameters of Concern
5. UPDES Permit Part X_E2 – Antidegradation Review, Facility Master Plan
6. UPDES Permit Part X_E4 – Antidegradation Review, Alternatives Analysis
7. Utah Division of Water Quality Wasteload Analysis and Antidegradation Review
8. DWQ Spanish Fork Permit Renewal Letter
9. DWQ UPDES Existing Permit
10. Fact Sheet Statement of Basis
    a. Wasteload Parameters for Wastewater Discharge Permit
    b. 2014 Wasteload Analysis and Antidegradation Level 1 Review
    c. Industrial Waste Survey
    d. Reasonable Potential Analysis Model Output

hemical phosphorus removal, biological nutrient removal, with UV disinfection prior to discharge.

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UPDES Program

UPDES Municipal (POTW) Permit Application

Part I. General Information (40 CFR 122.21(j)(1) and (9))

UPDES Permit No.: UT0020109

Facility Name: Spanish Fork City Corporation

Facility Location: 2160 N150 E

City Spanish Fork State UT Zip 84660

Facility Mailing Address: ______

City ______ State ______ Zip ______

Facility Contact: Cory Pierce **Title:** Water/ Wastewater Division Engineer

Phone Number: 801-804-4466 **Email Address:** cpierce@spanishfork.org

Name of Signatory: Cory Pierce **Title:** Wastewater Division Manager

Is the applicant the facility owner, operator or both? (check only one response.)

☐ Owner ■ Operator ☐ Both

Indicate below any existing environmental permits. (Check all that apply and type the corresponding permit number for each.)

☐ RCRA (hazardous waste) ______
☐ UIC (underground injection control) ______
☐ PSD (air emissions) ______
☐ Nonattainment program (CAA) ______
☐ NESHAPs (CAA) ______
☐ Dredge or fill (CWA Section 404) ______
■ Other (specify) SIC 4952

Nature of Business CFR (40 CFR 122.21(f)(8))

Describe the nature of your business

The Spanish Fork WWTP treats wastewater from industrial, commercial and domestic customers from Spanish Fork City and Mapleton City.

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Part II. Facility Information

Population served? 55,385

Design and Actual Flow Rates

Provide design and actual flow rates in designated spaces.

Design Flow Rate	
5	mgd

Annual Average Flow Rates (Actual)					
Five Years Ago (2015)		**Four Years Ago** (2016)		**Three Years Ago** (2017)	
4.61	mgd	3.73	mgd	4.41	mgd
Two Years Ago (2018)		**Last Year** (2019)		**Current Year** (2020 YTD)	
3.98	mgd	4.69	mgd	4.11	mgd

Maximum Daily Flow Rates (Actual) (10 mgd permit)					
Five Years Ago (2015)		**Four Years Ago** (2016)		**Three Years Ago** (2017)	
NA	mgd	4.69	mgd	6.43	mgd
Two Years Ago (2018)		**Last Year** (2019)		**Current Year** (2020 YTD)	
6.88	mgd	6.65	mgd	4.6	mgd

Describe the treatment for each outfall

	Outfall No. 001	**Outfall No.** ________	**Outfall No.** ________
Highest Level of Treatment (check all that apply per outfall)	☐ Primary ☐ Equivalent to secondary ☐ Secondary ■ Advanced ☐ Other (specify) ________	☐ Primary ☐ Equivalent to secondary ☐ Secondary ☐ Advanced ☐ Other (specify) ________	☐ Primary ☐ Equivalent to secondary ☐ Secondary ☐ Advanced ☐ Other (specify) ________
Design Removal Rates by Outfall			
BOD_5	85 %	%	%
TSS	85 %	%	%
Phosphorus	■ Not applicable N/A %	☐ Not applicable %	☐ Not applicable %
Nitrogen	■ Not applicable N/A %	☐ Not applicable %	☐ Not applicable %
Other (specify)	☐ Not applicable %	☐ Not applicable %	☐ Not applicable %

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Part II. Facility Information ***continued***

Does the POTW use chlorine for disinfection, use chlorine elsewhere in the treatment process, or otherwise have reasonable potential to discharge chlorine in its effluent? ■ YES ☐ NO

Describe the type of disinfection used for the effluent for each outfall. If disinfection varies by season, describe below.

The WWTP has both chlorination and dechlorination (sulfur dioxide) systems with a redundant chlorine contact chamber.

	Outfall No. 1	**Outfall No.** ______	**Outfall No.** ______
Disinfection type	Chlorine		
Seasons used	All seasons		
Dechlorination used?	☐ Not applicable ☐ Yes ☐ No	☐ Not applicable ☐ Yes ☐ No	☐ Not applicable ☐ Yes ☐ No

MAP: Attach a USGS topographic map or aerial photo extending one mile beyond the property boundaries of the site, the facility or activity boundaries, any treatment area(s), outfall(s), major drainage patterns, and the receiving surface waters stated above.

■ Map Attached (See Part II Attachment)

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Part II. Facility Information *continued*

Are improvements to the facility scheduled?

■ YES If YES, explain below.

☐ NO If NO, Skip to Part III

Briefly list and describe the schedule improvements.

1. Solids Handling Retrofit: This includes converting the existing anaerobic digester tankage to aerated solids holding, additional mechanical dewatering of waste activated sludge, and landfilling solids. Future plans include moving the solids handling process to the new greenfield site.

2. New WRF: The liquid treatment processes will be relocated to a new greenfield site. A new MBR facility on the new greenfield site includes headworks, biological nutrient removal, MBR basins, and UV disinfection.

3.

4.

Provide scheduled or actual dates of completion for improvements.

Scheduled or Actual Dates of Completion for Improvements

Scheduled Improvement (from above)	Affected Outfalls (list outfall number)	Begin Construction (MM/DD/YYYY)	End Construction (MM/DD/YYYY)	Begin Discharge (MM/DD/YYYY)	Attainment of Operational Level (MM/DD/YYYY)
1. Solids Handling Retrofit	001	Jul. 2021	Mar. 2022	NO CHANGE	
2. New WRF	001	Dec. 2021	Oct. 2024	Oct. 2024	Jan. 2025
3.					
4.					

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Part III. Sampling Information

Provide all parameter sampling data with analytical results, reporting limit and any laboratory flags on an Excel spreadsheet. *An Excel Spreadsheet will be provided upon request.*

Has WET testing been conducted during the last 5 years? ■ YES ☐ NO

Indicate the acute and chronic WET tests (PASS or FAIL) results for the past 5 years. If no WET testing for the quarter, then leave blank (e.g., for semi-annual or annual testing or missed testing events).

Year	Outfall No. 001				Outfall No. ________				Outfall No. ________			
	Acute		Chronic		Acute		Chronic		Acute		Chronic	
2017	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	■ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL
	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ■ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL
	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	■ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL
	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	■ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL
2018	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	■ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL
	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ■ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL
	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ■ FAIL	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL
	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	■ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL
2019	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	■ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL
	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	■ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL
	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	■ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL
	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	■ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL
2020	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	■ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL
	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	■ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL
	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL
	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL
	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL	Qtr 1	☐ PASS ☐ FAIL
	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL	Qtr 2	☐ PASS ☐ FAIL
	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL	Qtr 3	☐ PASS ☐ FAIL
	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL	Qtr 4	☐ PASS ☐ FAIL

Describe any cause(s) of toxicity:

Pass/Fail Static Renewal 7 Day Chronic Ceriodaphnia, TGP3B (results reflected above)
Pass/Fail Statre 7Day Chronic Pimephales Promelas, TGP6C (not required)
Pass/Fail Statre 48Hr Acute Ceriodaphnia (TGM3B) (not required)
Pass/Fail Static Renewal 96Hr Acute Pimephales Promelas (TGN6C) (not required)

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Part IV. Compliance Information

Has the facility had an parameter exceedances over the past five years? ☑ YES ☐ NO

If Yes, provide the below information: SEE PART IV ATTACHMENT

Parameter	Exceedance	Month/Year	Cause

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Part IV. Compliance Information ***continued***

Facility monitoring data. (SEE PART IV ATTACHMENT)

Please provide the past **five years** of all parameters required to be monitored in the UPDES permit. The data can be entered in the section below or an excel spreadsheet. Attached additional sheets if needed.

Month	Year	Parameter	Min	Max	Avg	MDL/RL*

*MDL/RL is the analysis method detection limit or reporting limit located on the laboratory analysis report.

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Part V. Outfalls and Receiving Water(s)

Provide the latitude and longitude to the nearest second for each dewatering outfall. The specified location should be after all treatment and before release to the receiving water. Provide the name of the initial receiving water. If the initial receiving water is unnamed, please also indicate the closed named drainage the receiving water flows into (i.e. unnamed tributary of City Creek). Attach additional sheets if necessary for more outfalls.

Each outfall to a different receiving water segment is subject to additional application fees and annual fees.

Outfall No.	Average daily flow rate	Latitude	Longitude	Receiving Surface Waters (Name)
001	mgd	40 O 8 ‘ 42 “	111 O 39 ‘ 5.76 “	Dry Creek
	mgd	O ‘ “	O ‘ “	
	mgd	O ‘ “	O ‘ “	

Do any of the outfalls described above have a season or periodic discharges?

☐ YES ■ NO

If so, provide the following information for each applicable outfall.

	Outfall No. ______	Outfall No. ______	Outfall No. ______
Number of times per year discharges occurs			
Average duration of each discharge (specify units)			
Average flow of each discharge	mgd	mgd	mgd
Months in which discharge occurs			

Part VI. Collection System

Service Area(s)	Population Served	Miles of Pipe
Spanish Fork	44,623	
Mapleton	10,762	

Total Population Served 55,385 **Total Miles of Pipe** Appx. 135

USMP Program implemented? ■ YES ☐ NO

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Part VII. Pretreatment Information

Does the facility have an approved pretreatment program? ■ YES ☐ NO

If YES, skip to next section

If No, complete the below industrial user forms and inspections as needed.

A. Industrial Pretreatment Wastewater Survey

Check any of the following that have occurred in the past five years either at the wastewater treatment plant or in the collection system:

- ☐ Foaming
- ☐ Unusual colors
- ☐ Plugged collection lines caused by grease
- ☐ Plugged collection lines caused by sand
- ☐ Plugged collection lines caused by other debris
- ☐ Discharging of excessive BOD
- ☐ Discharging of excessive suspended solids
- ☐ Smells unusually bad or unusual smells
- ☐ Upsets of the treatment plant due to unknown conditions

Does the facility have any industrial users (IUs) which meet any of the following criteria:

1. **Has a lot of process wastewater (5% of the flow at the waste treatment facility or more than 25,000 gallons per work day.)**
   a. Examples: food processor, dairy, slaughterhouse, industrial laundry.

☐ YES ☐ NO

1. **Is subject to federal categorical pretreatment standards**;
   a. Examples: metal plating, cleaning or coating of metals, blueing of metals, aluminum extruding, circuit board manufacturing, tanning animal skins, pesticide formulating or packaging, and pharmaceutical manufacturing or packaging,

☐ YES ☐ NO

2. **Is a concern to the POTW.**
   a. Examples: septage hauler, restaurant and food service, car wash, hospital, photo lab, carpet cleaner, commercial laundry.

☐ YES ☐ NO

Do any users of the water treatment facility caused any of the following to occur:

☐ YES ☐ NO A discharge which creates a fire or explosion hazard in the collection system.
☐ YES ☐ NO A discharge which creates toxic gases, vapor or fumes in the collection system.
☐ YES ☐ NO A discharge of solids or thick liquids which creates flow obstructions in the collection system.
☐ YES ☐ NO An acidic discharge (low pH) which causes corrosive damage to the collection system.
☐ YES ☐ NO Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause problems in the collection system or at the waste treatment facility.
☐ YES ☐ NO Waste haulers are prohibited from discharging without permission.
☐ YES ☐ NO Does the facility believe that illegal dumping is occurring in the jurisdiction?

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Part VII. Pretreatment Information *continued*

Complete and submit a preliminary inspection of each business that is discharging process wastewater to the wastewater treatment plant

B. PRELIMINARY INSPECTION FORM

Inspection Date ____________________ Inspection Time ____________________

Name of Business ____________________ Person Contacted ____________________
Street Address ____________________ City ____________________
Email Address ____________________ Phone Number ____________________

Description of Business:

Principal product or service:

Raw Materials used:

Production process is: ☐ Batch ☐ Continuous ☐ Both

If yes, briefly describe seasonal production cycle.

This facility generates the following types of wastes (check all that apply):

1. ☐ Domestic wastes (Restrooms, employee showers, etc.)
2. ☐ Cooling water, non-contact
3. ☐ Boiler/Tower blowdown
4. ☐ Cooling water, contact
5. ☐ Process
6. ☐ Equipment/Facility washdown
7. ☐ Air Pollution Control Unit
8. ☐ Storm water runoff to sewer
9. ☐ Other describe

Wastes are discharged to (check all that apply):

☐ Evaporation
☐ Ground water
☐ Sanitary sewer
☐ Other (describe below)
☐ Storm sewer
☐ Surface water
☐ Waste haulers

Name of waste hauler(s), if used

____________________ ____________________ ____________________

Is a grease trap installed? ☐ Yes ☐ No
Is it operational? ☐ Yes ☐ No

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Part VII. Pretreatment Information *continued*

B. PRELIMINARY INSPECTION FORM *continued*

Does the business discharge a lot of process wastewater?

- More than 5% of the flow to the waste treatment facility? ☐ Yes ☐ No
- More than 25,000 gallons per work day? ☐ Yes ☐ No

Does the business do any of the following or manufacture any of the following?

☐ Adhesives
☐ Aluminum Forming
☐ Battery Manufacturing
☐ Car Wash
☐ Carpet Cleaner
☐ Copper Forming
☐ Dairy
☐ Electric & Electronic Components
☐ Explosives Manufacturing
☐ Food Processor
☐ Foundries
☐ Hospital
☐ Industrial Porcelain Ceramic Manufacturing
☐ Inorganic Chemicals Mfg. or Packaging
☐ Iron & Steel
☐ Laundries
☐ Metal Finishing, Coating or Cleaning
☐ Mining
☐ Nonferrous Metals Manufacturing
☐ Organic Chemicals Manufacturing or Packaging
☐ Paint & Ink Manufacturing
☐ Pesticides Formulating or Packaging
☐ Petroleum Refining
☐ Pharmaceuticals Manufacturing or Packaging
☐ Photo Lab
☐ Plastics Manufacturing
☐ Restaurant & Food Service
☐ Rubber Manufacturing
☐ Septage Hauler
☐ Slaughter House
☐ Soaps & Detergents Manufacturing
☐ Steam Electric Generation
☐ Tanning Animal Skins
☐ Textile Mills

Are any process changes or expansions planned during the next three years? ☐ Yes ☐ No

If yes, attach a separate sheet to this form describing the nature of planned changes or expansions.

____________________________ ____________________________

Inspector Name Printed — Wastewater Treatment Facility

Any questions regarding the form or assistance with inspecting business please contact

Jennifer Robinson
Pretreatment Coordinator
Division of Water Quality
P. O. Box 144870
Salt Lake City, Utah 84114-4870

Phone: (801) 536-4383
Fax: (801) 536-4301
E-Mail:jenrobinson@utah.gov

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Part VII. Pretreatment Information *continued*

Either list all businesses below or provide a list of business licenses issued in the facilities service area.

	Name of Business	Jurisdiction	SIC Codes	Total Average Process Flow (gpd)	Total Average Facility Flow (gpd)	Facility Description (dentist, manufacturing [state product], dairy, assisted living facility, etc.)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						

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Part VIII. Bisolids Information

Was the Biosolids Annual Report submitted? ■ YES ☐ NO

☐ Attach a Biosolids Management Plan with application

Serve Connections?

Provide the total dry metric tons per the latest 365-day period of sewage sludge generated, treated, used and disposed of:

Practice	Dry Metric Tons per 365-day Period
Amount generated at the facility	908
Amount treated at the facility	908
Amount used (i.e., received from offsite) at the facility	
Amount disposed of at the facility	

Treatment Provided at Your Facility

Identify the treatment process(es) used at your facility to reduce pathogens in sewage sludge

- ☐ Preliminary operations (e.g., sludge grindling and degritting)
- ☐ Stablilization
- ☐ Composting
- ☐ Disinfection
- ☐ Heat drying
- ☐ Methane or biogas capture and recovery
- ■ Thickening (concentration)
- ■ Anaerobic digestion
- ☐ Conditioning
- ■ Dewatering (e.g. centrifugation, sludge drying beds, sludge lagoons)
- ☐ Thermal reduction

Sewage Sludge Disposal Method

Land Application of Bulk Sewage Sludge

Is sewage sludge form your facility applied to the land? ■ YES ☐ NO If No, Skip to next section

Total dry metric tons per 365-day period of sewage sludge applied to all land sites:

Surface Disposal

Is sewage sludge from your facility placed on a surface disposal site?
■ YES ☐ NO If No, Skip to next section

Total dry metric tons of sewage sludge from your facility placed on all surface disposal sites per 365-day period: 682

Do you own or operate all surface disposal sites to which you send sewage sludge for disposal?
☐ YES ■ NO If No, complete the below information

Surface disposal site *you do not operate*

Site name Various - Utah County, Class B Solids

Mailing address

City State Zip

Contact Name Title

Phone Number Email Address

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Part VIII. Bisolids Information *continued*

Incineration

Is sewage sludge from your facility fired in a sewage sludge incinerator?

☐ YES ■ NO If No, Skip to next section

Total dry metric tons of sewage sludge from your facility fired in all sewage sludge incinerators per 365-day period: ____________

Do you own or operate all sewage sludge incinerators in which sewage sludge from facility is fired?

☐ YES ☐ NO If No, complete the below information

Incinerator location *you do not operate*

Site name ____________

Mailing address ____________

City ____________ State ____________ Zip

Contact Name ____________ Title ____________

Phone Number ____________ Email Address ____________

Disposal in a Municipal Solid Waste Landfill

Is sewage sludge from your facility placed on a municipal solid waste landfill?

■ YES ☐ NO If No, Skip to next section

Total dry metric tons of sewage sludge from your facility placed in this municipal solid waste landfill per 365-day period: 226

Do you own or operate the municipal solid waste landfill in which sewage sludge is disposed?

☐ YES ■ NO If No, complete the below information

Municipal Solid Waste Landfill *you do not operate*

Site name Bayview Landfill

Mailing address 6800 UT-6

City Elberta State UT Zip 84626

Contact Name ____________ Title ____________

Phone Number ____________ Email Address ____________

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Part IX. Reuse Information

Is wastewater applied to land?
☐ YES ■ NO If YES, complete the below information.

Land Application Site and Discharge Data

Location	Size	Average Daily Volume Applied	How often
	acres	gpd	☐ Seasonal ☐ Continuous ☐ Intermittent
	acres	gpd	☐ Seasonal ☐ Continuous ☐ Intermittent
	acres	gpd	☐ Seasonal ☐ Continuous ☐ Intermittent

Seasonal land application.

Indicate months of seasonal land application

☐ January	☐ April	☐ July	☐ October
☐ February	☐ May	☐ August	☐ November
☐ March	☐ June	☐ September	☐ December

Where is the Reuse water distributed

- ☐ Residential irrigation
- ☐ Urban uses
  - ○ Non-residential landscape irrigation
  - ○ Golf course irrigation
  - ○ Toilet flushing
  - ○ Fire protection
- ☐ Irrigation of food crops (direct contact with edible part) – spray irrigation
- ☐ Irrigation of food crops *(Non direct contact with edible part) – no spray irrigation*
- ☐ Irrigation
  - ○ Sod farms
  - ○ Silviculture
  - ○ Limited access highway rights of way
  - ○ Other areas where human access is restrict or unlikely to occur
- ☐ Irrigation of animal feed crops other than pasture for milking animals
- ☐ Impoundment of wastewater where direct human contact is not allowed or is unlikely to occur
- ☐ Cooling water
- ☐ Soil compaction or duct control in construction areas
- ☐ Other

☐ Attached an updated Reuse Project Plan

An updated Reuse Project Plan is required during every permit renewal.

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Part X. Antidegradation Review

The objective of antidegradation rules and policies is to protect existing high quality waters and set forth a process for determining where and how much degradation is allowable for socially and/or economically important reasons. In accordance with Utah Administrative Code (UAC R317-2-3), an antidegradation review (ADR) is a permit requirement for any project that will increase the level of pollutants in waters of the state. The rule outlines requirements for both Level I and Level II ADRs, as well as public comment procedures. This review form is intended to assist the applicant and Division of Water Quality (DWQ) staff in complying with the rule but is not a substitute for the complete rule in R317-2-3.5. Additional details can be found in the *Utah Antidegradation Implementation Guidance* and relevant sections of the guidance are cited in this review form.

ADRs should be among the first steps of an application for a UPDES permit because the review helps establish treatment expectations. The level of effort and amount of information required for the ADR depends on the nature of the project and the characteristics of the receiving water. To avoid unnecessary delays in permit issuance, DWQ recommends that the process be initiated at least one year prior to the date a final approved permit is required.

DWQ will determine if the project will impair beneficial uses (Level I ADR) using information provided by the applicant and whether a Level II ADR is required. The applicant is responsible for conducting the Level II ADR. For the permit to be approved, the Level II ADR must document that all feasible measures have been undertaken to minimize pollution for socially, environmentally or economically beneficial projects resulting in an increase in pollution to waters of the state.

For permit requiring a Level II ADR, this antidegradation form must be completed and approved by DWQ before any UPDEs permit can be issued. Typically, the ADR form is completed in an iterative manner in consultation with DWQ. The applicant should first complete the statement of social, environmental and economic importance (SEEI) in Section C and determine the parameters of concern (POC) in Section D. Once the POCs' are agreed upon by DWQ, the alternatives analysis and selection of preferred alternative Section E can be conducted based on minimizing degradation resulting from discharge of the POCs. Once the applicant and DWQ agree upon the preferred alternative, the review is considered complete, and the form is submitted to DWQ.

What are the designated uses of the receiving water (R317-2-6)?

- ☐ Domestic Water Supply
- ☐ Recreation
- ☐ Aquatic Life
- ☐ Agricultural Water Supply
- ☐ Great Salt Lake

Agricultural
Secondary Recreation
Warm Water Aquatic Life

Antidegradation Category 1, 2 or 3 of receiving water (R317-2-3.2, -3.3, and -3.4): Level II

UPDES Municipal (POTW) Permit Application

Part X. Antidegradation Review *continued*

Effluent flow reviewed: *typically, this should be the maximum daily discharge at the design capacity of the facility. Exceptions should be noted.*

2020 Existing Conditions:	Existing Permit:	2040 Design Conditions:
Average Day = 4.62 MGD	Max Mo Avg = 5 MGD	Average Day = 6.65 MGD
Max Month = 5.8 MGD	Daily Max = 10 MGD	Max Month = 8.4 MGD
Peak Day = 7.2 MGD		Peak Day = 10.4 MGD
Peak Hour = 11.5 MGD		Peak Hour = 16.6 MGD

What is the application for? (Check all that apply)

- ■ A UPDES permit for a new facility, project, or outfall.
- ■ A UPDES permit renewal with an expansion of modification of an existing wastewater treatment works.
- ☐ A UPDES permit renewal requiring limits for a pollutant not covered by the previous permit and/or an increase to existing permit limits.
- ☐ A UPDES permit renewal with no charges in facility operations.

Section B. Is a Level II ADR required?

This section of the form is intended to help applicants determine if a Level II ADR is required for specific permitted activities. In addition, the Executive Secretary may require a Level II ADR for an activity with the potential for major impact on the quality of waters of the state (R317-2-3.5a.1).

B1. The UPDES permit is new <u>or</u> is being renewed and the proposed effluent concentration and loading limits are higher than the concentration and loading limits in the previous permit and any previous antidegradation review(s).

■ YES – (Proceed to B3 of the Form)
☐ NO – No Level II ADR is required and there is <u>no need to proceed further with the review questions. Continue to the Certification Statement and Signature page.</u>

B2. Will any pollutants use assimilative capacity of the receiving water, i.e. do the pollutant concentrations in the effluent exceed those in the receiving waters at critical conditions? For most pollutants, effluent concentrations that are higher than the ambient concentrations require an antidegradation review? For a few pollutants such as dissolved oxygen, and antidegradation review is required if the effluent concentrations are less than the ambient concentrations in the receiving water. (Section 3.3.3 of Implementation Guidance)

☐ YES – (Proceed to B4 of the Form)
☐ NO – No Level II ADR is required and there is <u>no need to proceed further with the review questions. Continue to the Certification Statement and Signature page.</u>

UPDES Municipal (POTW) Permit Application

Part X. Antidegradation Review ***continued***

B3. Are water quality impacts of the proposed project temporary and limited (Section 3.3.4 of Implementation Guidance)? Proposed projects that will have temporary and limited effects on water quality can be exempted form a Lev le II ADR.

☐ YES – Identify the reason used to justify this determination if B4.1 and proceed to Section G. No Level II ADR is required.

■ NO – A Level II ADR is required (Proceed to Section C)

B3.1 Complete this question only if the applicant is requesting a Level II review exclusion for temporary and limited projects (See R317-2-3.5(b)(3) and R317-2-3.5(b)(4)). For projects requesting a temporary and limited exclusion please indicate the factor(s) used to justify this determination (check all that apply and provide details as appropriate) (Section 3.3.4 of Implementation Guidance):

☐ Water quality impacts will be temporary and related exclusively to sediment or turbidity and fish spawning will not be impaired.

Factors to be considered in determining whether water quality impacts will be temporary and limited:

a) The length of time during which water quality will be lowered:	
b) The perfect change in ambient concentrations of pollutants:	
c) Pollutants affected:	
d) Likelihood for long-term water quality benefits:	
e) Potential for any residual long-term influences on existing uses:	
f) Impairment of fish spawning, survival and development of aquatic fauna excluding fish removal efforts:	
Additional justification, as needed:	

UPDES Municipal (POTW) Permit Application

Part X. Antidegradation Review *continued*

Level II ADR

Section C, D, E, and F of the form constitute the Level II ADR Review. The applicant must provide as much detail as necessary for DWQ to perform the antidegradation review. Questions are provided for the convenience of applicants; however, for more complex permits it may be more effective to provide the required information in a separate report. Applicants that prefer a separate report should record the report name here and proceed to Section G of the form.

Option Report Name: Wastewater Treatment Facility Master Plan

Section C. Is the degradation from the project socially and economically necessary to accommodate important social or economic development in the area in which the waters are located? *The applicant must provide as much detail as necessary for DWQ to concur that the project is socially and economically necessary when answering the questions in the section. More information is available in Section 6.2 of the Implementation Guidance.*

C1. Describe the social and economic benefits that would be realized through the proposed project, including the number and nature of jobs created and anticipated tax revenues.

See Part X.C attachment.

C2. Describe any environmental benefits to be realized through implementation of the proposed project.

See Part X.C attachment.

C3. Describe any social and economic losses that may result from the project, including impacts to recreation or commercial development.

See Part X.C attachment.

C4. Summarize any supporting information from the affected communities on preserving assimilative capacity to support future growth and development.

See Part X.C attachment.

UPDES Municipal (POTW) Permit Application

Part X. Antidegradation Review ***continued***

C5. Please describe any structures or equipment associated with the project that will be placed within or adjacent to the receiving water.

See Part X.C attachment.

C6. Will the discharge potentially impact a drinking water source, e.g., Class 1C waters? Depending upon the locations of the discharge and its proximity to downstream drinking water diversions, additional treatment or more stringent effluent limits or additional monitoring, beyond that which may otherwise be required to meet minimum technology standards or in stream water quality standards, may be required by the Director in order to adequately protect public health and the environment (R317-2-3.5 d.).

☐ YES
■ NO

Section D. Identify and rank (from increasing to decreasing potential threat to designated uses) the parameters of concern. *Parameters of concern are parameters in the effluent at concentrations greater than ambient concentrations in the receiving water. The applicant is responsible for identifying parameter concentrations in the effluent and DWQ will provide parameter concentrations for the receiving water. More information is available in Section 3.3.3 of the Implementation Guidance.*

Parameters of Concern: See Part X.D attachment.

Rank	Pollutant	Ambient Concentration	Effluent Concentration
1.			
2.			
3.			
4.			
5.			

Part X. Antidegradation Review *continued*

Pollutants Evaluated that are not Considered Parameters of Concern: See Part X.D attachment.

Pollutant	Ambient Concentration	Effluent Concentration	Justification
1.			
2.			
3.			
4.			
5.			

Section E. Alternative Analysis Requirements of Level II Antidegradation Review. *Level II ADRs require the applicant to determine whether there are feasible less-degrading alternatives to the proposed project. More information is available in Section 5.5 and 5.6 of the Implementation Guidance.*

E1. The UPDES permit is being renewed without any changes to flow or concentrations. Alternative treatment and discharge options including changes to operations and maintenance were considered and compared to the current processes. NO economically feasible treatment or discharge alternatives were identified that were not previously considered for any previous antigradation review(s).

☐ YES – (Proceed to Section F)

■ NO or Does Not Apply (Proceed to E2)

E2. Attach as an appendix to this form a report that describes that following factors for all alternative treatment options (see 1) a technical descriptions of the treatment process, including construction costs and continued operation and maintenance expenses, 2) the mass and concentration of discharge constituents, and 3) a description of the reliability of the system, including the frequency where recurring operation and maintenance may lead to temporary increases in discharged pollutants. Most of this information is typically available from a Facility Plan, if available.

Report Name: Wastewater Treatment Facility Master Plan, May 2020 (Part X.E2 Attachment)

E3. Describe the proposed method and cost of the baseline treatment alternative. The baseline treatment alternative is the minimum treatment required to meet water quality based effluent limits (WQBEL) as determined by the preliminary or final wasteload analysis (WLC) and any secondary or categorical effluent limits.

See Part X.E2 attachment.

UPDES Municipal (POTW) Permit Application

Part X. Antidegradation Review *continued*

E4. Were any of the following alternatives feasible and affordable?

Alternative	Feasible	Reason Not Feasible/Affordable
Pollutant Trading	☐ YES ☐ NO	See Part X.E4 attachment.
Water Recycling/Reuse	☐ YES ☐ NO	
Land Application	☐ YES ☐ NO	
Connection to Other Facilities	☐ YES ☐ NO	
Upgrade to Existing Facility	■ YES ☐ NO	
Total Containment	☐ YES ☐ NO	
Improved O&M of Existing Systems	☐ YES ☐ NO	
Seasonal or Controlled Discharge	☐ YES ☐ NO	
New Construction	■ YES ☐ NO	
No Discharge	☐ YES ☐ NO	

E5. From the applicant's perspective, what is the preferred treatment option?

Phase 1 MBR alternative at greenfield site. See also Part X.E2 attachment, Chapter 5.0 Proposed Project / Recommended Alternative.

Part X. Antidegradation Review *continued*

E6. Is the preferred option also the least polluting feasible alternative?

■ YES ☐ NO

If No, what were less degrading feasible alternative(s)?

If No, provide a summary of the justification for not selecting the least polluting feasible alternative and if appropriate, provide a more detailed justification as an attachment.

Section F. Optional Information

F1. Does the applicant want to conduct optional public review(s) in addition to the mandatory public review? Level II ADRs are public noticed for a thirty day comment period. More information is available in Section 3.7.1 of the Implementation Guidance.

☐ YES ☐ NO

F2. Does the project include an optional mitigation plan to compensate for the proposed water quality degradation?

☐ YES ☐ NO

Report Name: ______________________________

UTAH DEPARTMENT of ENVIRONMENTAL QUALITY WATER QUALITY

Division of Water Quality (DWQ) UPDES Program

UPDES Municipal (POTW) Permit Application

Part XI. Certification Statement and Signature

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with system designed to assure that quailed personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment of knowing violations.

Cory Pierce	[signature]	Wastewater Div. Mgr.	2/9/2021
PRINT Signatory Authority	**Signature**	**Title**	**Date**

The Division of Water Quality may request addition information.

Important: The UPDES Permit Application will not be considered complete unless you answer every question. If an item does not apply to you, enter "Not Applicable" to show that you considered the question.

The UPDES Permit Application, must be signed as follows:

1) For a corporation, a responsible corporate officer shall sign the NOT, a responsible corporate officer means:
   a. A President, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation; or
   b. The manager of one or more manufacturing, production, or operating facilities, if
      i. The manager is authorized to make management decisions that govern the operation of the regulated facility, including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental statutes and regulations:
      ii. The manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and
      iii. Authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
2) For a partnership of sole proprietorship, the general partner or the proprietor, respectively; or
3) For a municipality, state or other public agency, either a principal executive officer or ranking elected official shall sign the application; in this subsection, a principal executive officer of any agency means;
   a. The chief executive officer of the agency; or
   b. A senior executive officer having responsibility for the overall operations of a principal geographic unit or division of the agency.

Where to File the UPDES Permit Application form:

Please submit the original form with a signature in ink to the below address. Remember to retrain a copy for your records.

UPDES sent by mail:

Division of Water Quality
195 North 1950 West
PO Box 144870
Salt Lake City, UT 84114-4870

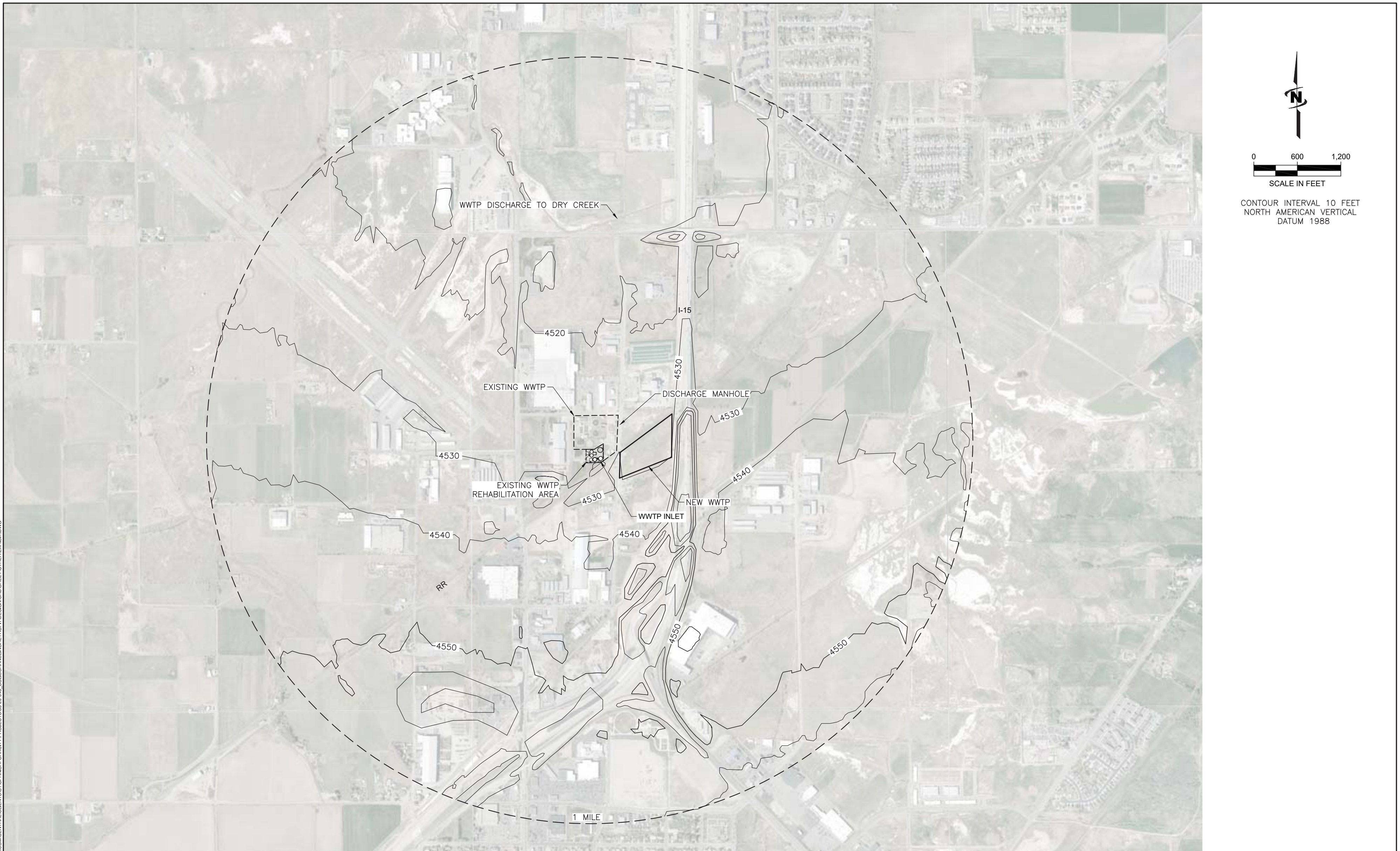
OFFICE USE ONLY

Date received: ___/___/___ **Received by:** ________ **Document No:** ________

via: ☐ Email ☐ Fax ☐ Webportal ☐ Mail ☐ Hand Delivery

Figures

Topographic Map



REUSE OF DRAWINGS
J-U-B SHALL RETAIN ALL COMMON LAW, STATUTORY, COPYRIGHT AND OTHER RESERVED RIGHTS OF THESE DRAWINGS, AND THE SAME SHALL NOT BE REUSED WITHOUT J-U-B'S PRIOR WRITTEN CONSENT. ANY REUSE WITHOUT WRITTEN CONSENT BY J-U-B WILL BE AT CLIENT'S SOLE RISK AND WITHOUT LIABILITY OR LEGAL EXPOSURE TO J-U-B.

NO.	REVISION DESCRIPTION	BY	APR.	DATE

FILE: EXHIBIT
JUB PROJ. #:
PLOT DATE: 7/23/2020
LAST UPDATED: 7/20/2020
DRAWN BY:
DESIGN BY:
CHECKED BY:

J-U-B ENGINEERS, INC.

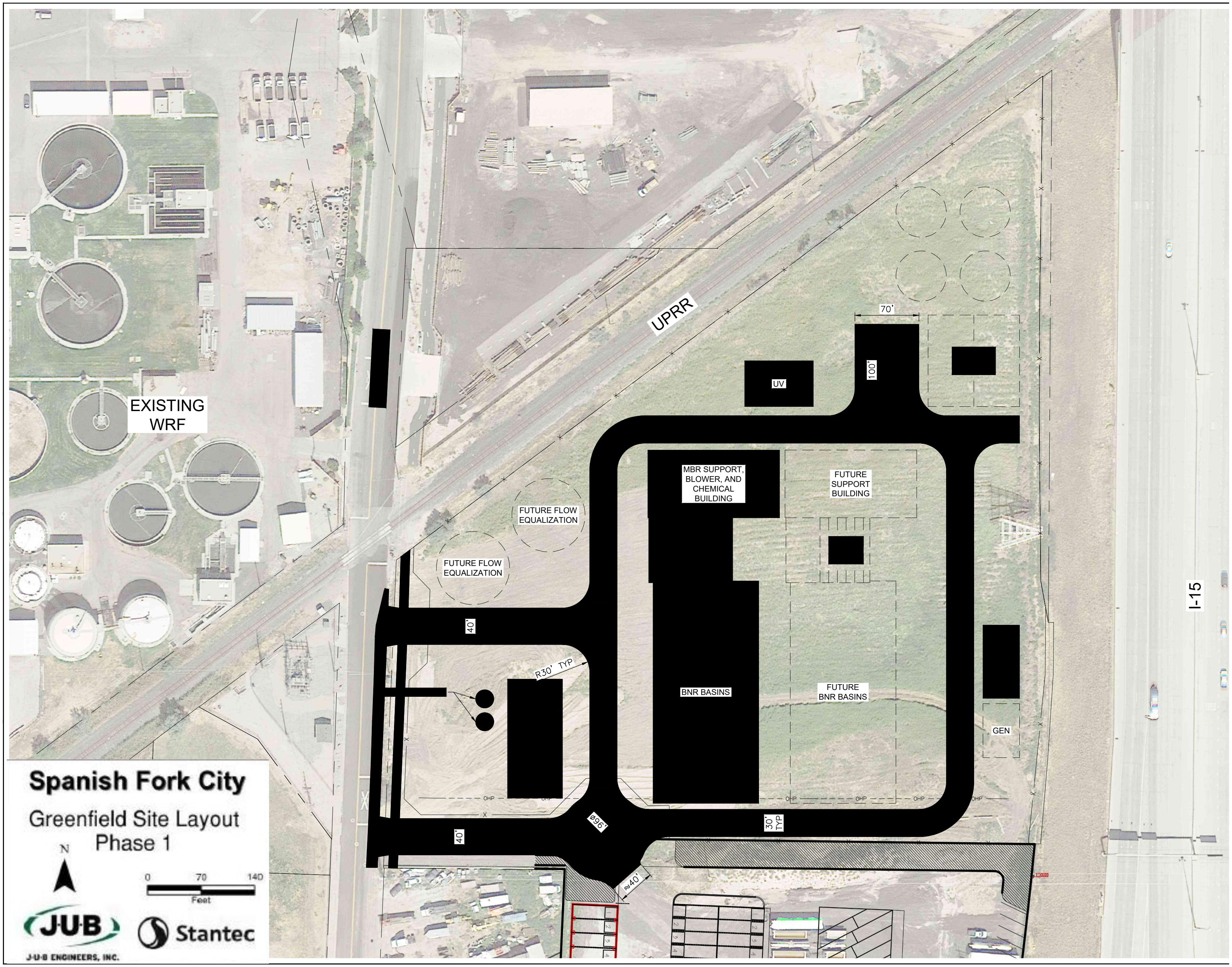
SPANISH FORK CITY
WASTE WATER TREATMENT PLANT
EXHIBIT

SHEET
1

Plot Date 7/23/2020 12:11 PM Plotted By: Matthew Gore
Date Created 7/20/2020 \\JUB.COM\CENTRAL\CLIENTS\UT\SPANISHFORKCITY\PROJECTS\55-20-045_SOLIDSHANDLINGRETROFIT\DESIGN\CAD\SHEET\OTHER\EXHIBIT.DWG

Figure 2-1: Spanish Fork WWTP Existing Site Layout

Greenfield Plant - Proposed Site Layout



Appendices

Appendix 1

Part IV. Compliance Information (2015 - 2020)

Parameter	Exceedence Type	Date	MCL	Value	Units	Violation Severity *(1)*
Solids, total suspended	Max Month Average	5/31/2017	25	44	mg/L	5
Solids, total suspended	Maximum Weekly Average	5/31/2017	35	84	mg/L	5
Solids, total suspended	Maximum Weekly Average	6/30/2017	35	61.5	mg/L	5
Nitrogen, ammonia total [as N]	Daily Maximum	12/31/2017	18	19.2	mg/L	5
Nitrogen, ammonia total [as N]	Daily Maximum	1/31/2018	18	22.1	mg/L	5
Nitrogen, ammonia total [as N]	Daily Maximum	2/28/2018	18	22.2	mg/L	5
Nitrogen, ammonia total [as N]	Daily Maximum	3/31/2018	18	23.5	mg/L	5
Nitrogen, ammonia total [as N]	Daily Maximum	4/30/2018	18	18.4	mg/L	5
Nitrogen, ammonia total [as N]	Daily Maximum	5/31/2018	18	21.8	mg/L	5
Nitrogen, ammonia total [as N]	Daily Maximum	11/30/2018	18	18.2	mg/L	5
Nitrogen, ammonia total [as N]	Daily Maximum	12/31/2018	18	28.8	mg/L	5
Nitrogen, ammonia total [as N]	Daily Maximum	1/31/2019	18	21.5	mg/L	5
Nitrogen, ammonia total [as N]	Daily Maximum	2/28/2019	18	19.4	mg/L	5
Solids, total suspended	Maximum Weekly Average	3/31/2017	35	43.3	mg/L	4
Solids, total suspended	Maximum Weekly Average	4/30/2017	35	44.4	mg/L	4
Solids, total suspended	Maximum Weekly Average	1/31/2019	35	44	mg/L	4
Solids, total suspended	Max Month Average	4/30/2017	25	27	mg/L	3
Solids, total suspended	Maximum Weekly Average	4/30/2019	35	37	mg/L	3

(1) Violation Severity Legend:

5 - Significant

4 - Reportable

3 - Reportable

2 - Non-Reportable

1 - DMR Non-Receipt

(2) Note that only violations with a level of severity of 3-5 are reported on this application.

Appendix 2

Part IV. Facility Monitoring Data (2015 - 2020)

Parameter	Influent				Effluent					Permit Limit
	Max Mo Max	Avg Mo Max	Max Daily Max	Avg Daily Max	Min	Max Mo Max	Avg Mo Max	Max Wk/Day Max	Avg Wk/Day Max	
Flow, MGD	6.07	4.42	7.28	5.27		6.88	4.51	6.88	4.90	5.0 MGD Max Monthly Avg 10.0 MGD Daily Max
BOD, mg/L	283	192				43.0	11.5	59.0	15.9	25 Max Monthly Avg 35 Max Weekly Avg
BOD, % Removal						84.81%	94.03%			85% Min Monthly Removal
TSS, mg/L	313	194				44.0	12.9	84.0	19.4	25 Max Monthly Avg 35 Max Weekly Avg
TSS, % Removal						85.94%	93.33%			85% Min Monthly Removal
Dissolved Oxygen, mg/L					4			5	4.160	4 mg/L Daily Min
pH					6.92			8.15		6.5 Daily Min 9.0 Daily Max
Ammonia, mg/L as N										18 Daily Max (All Year)
Summer						12.80	8.58	16.20	10.95	7 mg/L Max Monthly Avg
Fall						19.00	12.92	28.80	15.57	9 mg/L Max Monthly Avg
Winter						20.10	12.85	23.50	16.20	9 mg/L Max Monthly Avg
Spring						15.50	9.02	21.80	13.14	9 mg/L Max Monthly Avg
Total Residual Chlorine (TRC), mg/L								2.00	1.72	2.0 mg/L Daily Max
E-Coli, No./100mL					1.00	83.96	13.06	150.00	39.64	126 Max Monthly Avg 158 Max Weekly Avg
Orthophosphate, mg/L					0.10	4.00	2.28			
Oil & Grease, mg/L									0.00	10.0 mg/L Daily Max
Total Phosphorus, mg/L	9.00	3.75			1.41	7.80	3.07			3.7 mg/L Yearly Avg (Interim Limit Effective 1/1/2020 - 2/28/2021)
Nitrogen, Kjeldahl, total [as N], mg/L	97.2	30.0				26.1	14.9			NA
Total Nitrogen, mg/L						27.400	6.097			NA
Cyanide [total] mg/L	0.0050	0.0033			0.0030	0.0590	0.0088			NA
Arsenic, mg/L	0.0088	0.0041			0.0023	0.0054	0.0036			NA
Cadmium [total] mg/L	0.0002	0.0002			0.0002	0.0020	0.0003			NA
Chromium [total] mg/L	0.0120	0.0050			0.0008	0.0027	0.0017			NA
Copper, mg/L	0.0390	0.0229			0.0028	0.0100	0.0054			NA
Lead, mg/L	0.0110	0.0026			0.0002	0.0050	0.0008			NA
Molybdenum, dissolved [as Mo], mg/	0.0409	0.0104			0.0040	0.0333	0.0083			NA
Nickel [total] mg/L	0.0106	0.0106			0.0012	0.0110	0.0054			NA
Silver, [total], mg/L	0.0005	0.0005			0.0005	0.0005	0.0005			NA
Zinc, [total], mg/L	0.1600	0.0737			0.0080	0.4000	0.0483			NA
Selenium, [total], mg/L	0.0046	0.0029			0.0011	0.0031	0.0024			NA
Mercury, [total], mg/L	0.0009	0.0002			0.0000	0.0002	0.0001			NA

Appendix 3

Part C. Is the degradation from the project socially and economically necessary to accommodate important social or economic development in the area in which the waters are located?

C1. Describe the social and economic benefits that would be realized through the proposed project, including the number and nature of jobs created and anticipated tax revenues.

The existing Spanish Fork WWTP is aged and deteriorating and can no longer provide effective and reliable treatment to meet current discharge permit requirements and provide the required human health and environmental benefits. Both the capacity and condition of the existing plan are inadequate to meet current and future wastewater disposal needs of the community, and the facility must be upgraded or replaced for that purpose.

The project will be constructed in two phases. Phase I, the Solids Handling Retrofit, includes converting the existing anaerobic digester tankage into aerated solids holding, adding additional mechanical dewatering of waste activated sludge, and landfilling solids until alternative technologies for Class B biosolids mature. At that point additional biosolids treatment will be evaluated. Phase II, the New WRF Construction, will include relocating the liquid treatment processes to a new greenfield site. A new MBR facility located on a greenfield site will include new dual stage screening, grit removal, lift station, biological nutrient removal basins, and UV disinfection. These improvements will result in the complete replacement of the existing facilities and relocation of the liquid train entirely to the new site. This project is anticipated to be completed in 2024.

The plant must reliably provide both the capacity and level of performance needed to protect human health and the environment for existing and future development, and the existing plant is unable to meet this goal. Without this project, future development, commercial and employment income and tax revenues will be curtailed, and existing effluent discharges will not reliably meet discharge permit standards.

C2. Describe any environmental benefits to be realized through implementation of the proposed project.

The expanded capacity of the WWTP will increase its ability to handle additional amount of waste loads. The liquid process changes at the Phase II project will more reliably meet permit limits. This will benefit the environment by providing treatment to consistently meet the effluent concentrations at higher loads.

C3. Describe any social and economic losses that may result from the project, including impacts to recreation or commercial development.

No projected social or economic losses are expected from this project. The proposed project will provide increased protection of human health and the environment.

C4. Summarize any supporting information from the affected communities on preserving assimilative capacity to support future growth and development.

The proposed project's design takes into account projected growth through 2040.

C5. Please describe any structures or equipment associated with the project that will be placed within or adjacent to the receiving water.

There are no proposed structure or equipment to be constructed near the receiving water (Dry Creek).

C6. Will the discharge potentially impact a drinking water source, e.g., Class 1C waters? Depending upon the locations of the discharge and its proximity to downstream drinking water diversions, additional treatment or more stringent effluent limits or additional monitoring, beyond that which may otherwise be required to meet minimum technology standards or in stream water quality standards, may be required by the Director in order to adequately protect public health and the environment (R317-2-3.5 d.).

No.

Appendix 4

Part D. Identify and rank (from increasing to decreasing potential threat to designated uses) the parameters of concern.

The Antidegradation Review process required the identification of the parameters of concern (POCs). POCs are measured characteristics of the discharge that exceed, or potentially exceed ambient concentrations. The list of POCs is ultimately used in the ADR process to select the least degrading project alternative. Ambient concentrations have not yet been determined for the discharge location in Dry Creek. The following is a list of preliminary POCs and will be developed further upon receipt of a Wasteload Analysis from DWQ.

Parameters of Concern:

Rank	Pollutant	Ambient (1)		Effluent	
		Concentration / Units	Basis	Concentration / Units	Basis
1	BOD, mg/L			< 25 mg/L	UPDES Permit Limit
2	TSS, mg/L			< 25 mg/L	UPDES Permit Limit
3	Dissolved Oxygen, mg/L			> 4.0 mg/L	UPDES Permit Limit
4	pH			6.5-9 SU	UPDES Permit Limit
5	Ammonia, mg/L as N Summer (2) Fall (2) Winter (2) Spring (2)			<18 mg/L Daily Max < 7 mg/L < 9 mg/L < 9 mg/L < 9 mg/L	Proposed delayed limit until new plant commisioning, 2026
6	Total Residual Chlorine (TRC), mg/L			< 2.0 mg/L	UPDES Permit Limit
7	Oil & Grease, mg/L			< 10.0 mg/L	UPDES Permit Limit
8	Total Phosphorus, mg/L			4.0 mg/L (3)	Proposed Limit until 2026
9	Total Nitrogen, mg/L			< 27.4	Max Monthly Average (2015-2020)

(1) Ambient data not available.
(2) Ammonia monthly average effluent limit to become effective 12/31/2023.
(3) Interim TP 3.7 mg/L effective 1/1/2020 – 2/28/2021. Final TP mg/L 1.0 effective 3/1/2021.

The following are not anticipated to be considered Parameters of Concern.

Pollutants Evaluated that are not Considered Parameters of Concern:

Pollutant	Ambient Concentration (1)	Effluent Concentration	Justification
E coli., No./100mL		13.0	UPDES Permit Limit
Cyanide mg/L		0.0088	
Arsenic, mg/L		0.0036	
Cadmium, mg/L		0.0003	
Chromium, mg/L		0.0017	
Copper, mg/L		0.0054	
Lead, mg/L		0.0008	
Molybdenum, dissolved, mg/L		0.0083	
Nickel, mg/L		0.0054	
Silver, mg/L		0.0005	
Zinc, mg/L		0.0483	
Selenium, mg/L		0.0024	
Mercury, mg/L		0.0001	

(1) Ambient data not available.

Appendix 5

SPANISH FORK AND MAPLETON CITIES

EST. 1855
SPANISH FORK
PRIDE & PROGRESS

MAPLETON
UTAH

WASTEWATER TREATMENT PLANT MASTER PLAN

REGISTERED PROFESSIONAL ENGINEER
#7279300-2202
GARY MICHAEL VANCE
10-20-20
STATE OF UTAH

FINAL

OCTOBER 2020

Project Number: 55-19-139

LICENSED PROFESSIONAL ENGINEER
No. 5339815
J. CLINTON ROGERS
10/20/2020
STATE OF UTAH

Prepared by:

J-U-B
J-U-B ENGINEERS, INC.

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Foreword

Spanish Fork and Mapleton Cities, in conjunction with J-U-B Engineers and Stantec, has undertaken to complete this Wastewater Treatment Facilities Master Plan. This Master Plan provides a comprehensive, long-term strategy for complying with pending nutrient regulations, accommodating growth in the region, and addressing aging infrastructure needs. This document is suitable for submittal to the Utah Division of Water Quality (DWQ) for potential project funding and for use by the City in planning decisions. This Master Plan was substantially developed in 2020 and covers a 20-year planning period to 2040. Periodic updates are recommended, and all capital cost opinions are based on construction costs observed in the 2020 time period. Future project costs should be escalated with an appropriate inflation factor.

1.0 Background & Information

1.1 Facility Plan Organization

This Master Plan is intended to provide a roadmap to guide Spanish Fork and Mapleton Cities through the significant challenges faced at their wastewater treatment facility. It is understood that previous plant improvements appear to have been improvised or piecemeal and did not address long term planning needs. This report provides a comprehensive and long-term strategy for complying with pending nutrient regulations, accommodating growth in the region, and addressing aging infrastructure needs.

This Facility Plan is organized as described below:

- Chapter 1 defines the design criteria for the new facilities, including the 20-year flow and load design conditions and anticipated UPDES permit limits.
- Chapter 2 reviews the existing facilities and summarizes the condition, age, and hydraulic capacity of the existing processes.
- Chapter 3 evaluates treatment alternatives that can be retrofitted into the existing site while meeting the design flows/loads and permit limits. This chapter also evaluates new greenfield alternatives, as well as summarizing past efforts regarding a regional treatment solution in southern Utah County.
- Chapter 4 summarizes the costs and non-monetary considerations for all of the feasible alternatives and presents an evaluated decision matrix to determine the recommended alternative.
- Chapter 5 presents the overall recommended project, design criteria, project costs, funding considerations, and project implementation schedule.

1.2 Location

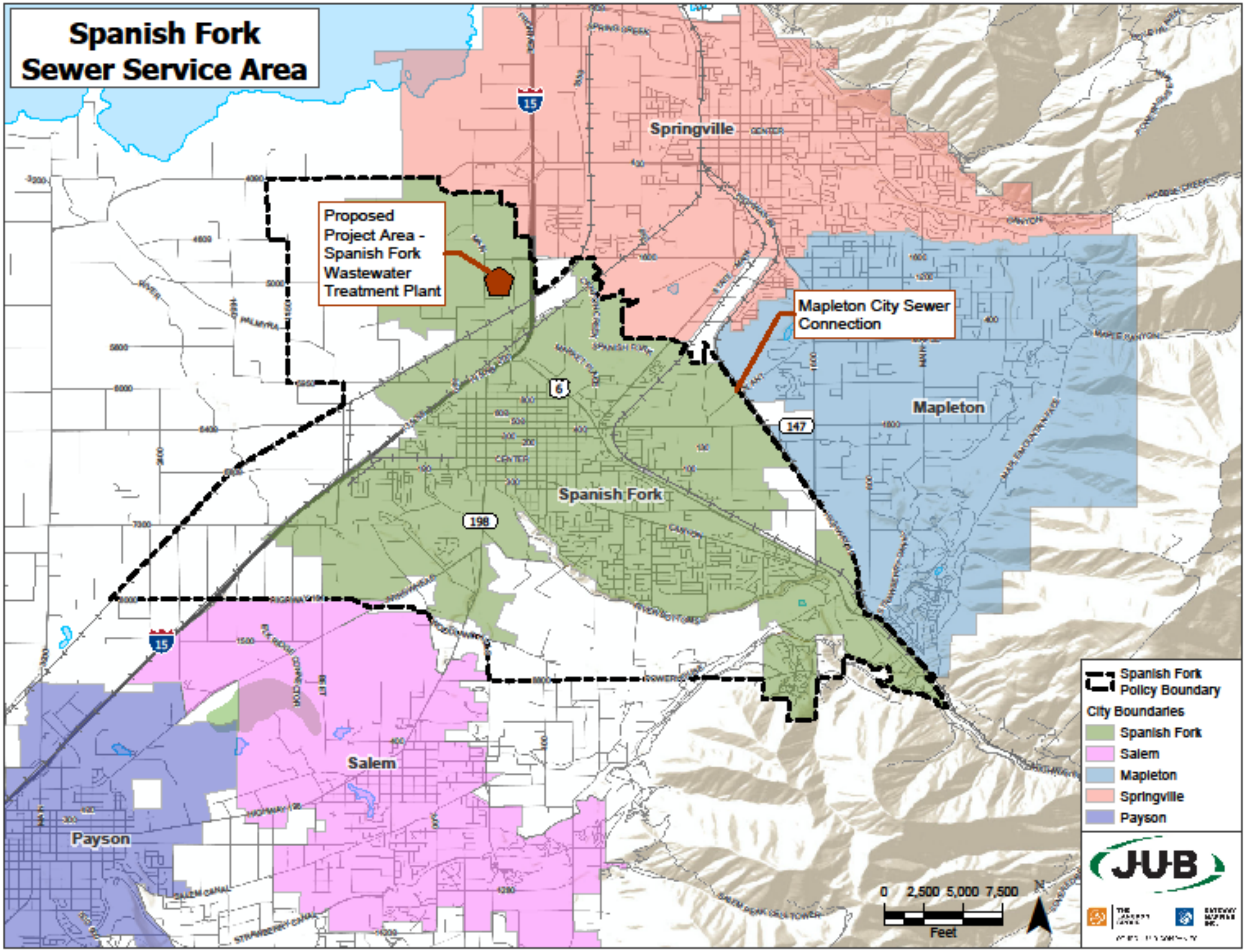
The Spanish Fork Wastewater Treatment Facility is located at 40°08'" north latitude and 111°39'07" west longitude. It is situated between I-15 and Main Street, just south of 2160 North in Spanish Fork. It treats sewage collected from both Spanish Fork and Mapleton City limits. The current Spanish Fork city limits consist of about 16.22 square miles with an estimated population of just under 45,000. The Mapleton city limits span approximately 13.35 square miles and serve a population of almost 11,000.

Spanish Fork City is situated in the south-central portion of Utah County. The City slopes upward from Utah Lake to the southern edge of the Wasatch Mountains. Incorporated in 1851, the City's population boomed to almost 1,100 in the first 10 years due to its industrialization with the opening of both a sawmill and flour mill.

Mapleton is situated between Hobble Creek and the Spanish Fork River, bordered by the foothills of Maple Mountain of the Wasatch Range. The area was used by early settlers in Utah County for livestock grazing, logging and farming and was incorporated in 1948. Mapleton is a unique, somewhat rural community with the advantage of having 60% of its land still undeveloped.

A map showing the project planning area and city limits is included below as Figure 1-1.

Figure 1-1: Spanish Fork & Mapleton Sewer Service Area



1.3 Flow and Load Conditions

This Master Plan has a planning period of 20 years. The report summarizes demographic projections, existing and future flow and load conditions, and anticipated regulatory requirements.

1.3.1. Population

The projected population and growth rate of the WWTP's service area in Spanish Fork and neighboring Mapleton are estimated based on the Governor's Office of Management and Budget (GOMB) and Mountainland Association of Governments (MAG) 2013 projections through the year 2040 and the expected build-out population. Table 1-1 summarizes the anticipated growth rates for the service area over the 20-year planning period. It is estimated the entire area's population will experience 1.95% annual average growth between 2020 and 2040.

Table 1-1: GOMB Population Projection

Year	Spanish Fork		Mapleton		Total Population
	Population	Growth Rate[1]	Population	Growth Rate[1]	
2020	44,623	1.27%	10,762	1.51%	**55,385**
2040	64,607	1.87%	16,901	2.28%	**81,508**
Build-Out[2]	115,971		29,403		**145,374**

[1] Annual Average Growth Rate for previous 20 year period
[2] Expected build-out population taken from Aqua Engineering's 2011 Wastewater Master Plan

To verify the 2013 GOMB population projections in Table 1-1, historic US Census data for Mapleton and Spanish Fork were collected and included in Table 1-2. The 2010 and 2018 population values are provided by the US Census data, showing a 2.08% annual average growth rate for the combined area's population. Using this same annual average growth rate the 2020 and 2040 total populations are estimated to be 52,202 and 78,763. The GOMB's 2040 population projection is 3.5% greater than the US Census' 2040 projection. The more conservative population projection by the GOMP, located in Table 1-1, will be used for the 20-year planning period's flow and load projections for determining the WWTP's design criteria.

Table 1-2: US Census Population Projection

Year	Spanish Fork		Mapleton		Total Population
	Population	Growth Rate[1]	Population	Growth Rate[1]	
2010	34,691		7,979		**42,670**
2018	39,961	1.78%	10,168	3.08%	**50,129**
2020	41,399	1.78%	10,803	3.08%	**52,202**
2040	58,958	1.78%	19,805	3.08%	**78,763**

[1] Annual Average Growth Rate from US Census data between 2010-2018

1.3.2. Flow

The average annual daily flow, AADF was determined using population projections and per capita flows. Contributions from commercial/industrial sources and inflow and infiltration, I&I, were also included. A per capita flow of 60 gpcd was used for the entire population- both Spanish Fork and Mapleton. The current and future flows documented in Table 1-7 was determined in earlier planning documents and is consistent with water use records.

Commercial/industrial flow was determined using potable water use data for each connection. The average daily water use for each connection was approximately 600 gpd/connection. It was assumed that 70% of that usage was returned to the sanitary sewer, giving a per connection flow of 420 gpd/connection. A consistent growth rate of 4.05%, the average rate from 2010-2020, was used for commercial/industrial growth over the 20-year planning period, yielding over 1900 commercial/industrial connections in 2040 with an estimated flow contribution of 0.81 MGD.

Flow attributed to I&I was set at a constant rate of 0.92 MGD for the entire 20-yr period. This value was determined by taking the difference between the recorded influent flow rate at the treatment facility and the estimated residential and commercial/industrial flows. Using average monthly flow data from 2011-2020 the average difference over this period was 0.92 MGD. It is noted that the I&I contribution was held constant, despite expected collection system growth, to reflect the City's stated intent to undertake an aggressive I&I reduction program in coming years. It is anticipated that new collection system growth will result in limited infiltration and inflow due to improved construction methods and materials.

1.3.3. Peaking Factors

Peak flow rates were calculated using peaking factors for maximum month, peak day and peak hour flow conditions, as shown below. Historic plant flow data (2011-2020) were used to establish the maximum month and peak day factors.

Table 1-3: Peaking Factors

Flow Condition	Peaking Factor
Maximum Month	1.26
Peak Day	1.57
Peak Hour	2.5

Plant flow data was not able to be used to determine the peak hour flow factor since the plant's influent and effluent flow meters appear to reach their maximum recording limits of 8 MGD and 10 MGD, respectively, during peak flow events. A comparison with other WRF's in the region and literature values was used to assist in determining the peak hour factor. Table 1-4 and Table 1-5 present flows and peaking factors for the local WRF's.

Table 1-4: **Flows of Local WRFs**

Flow (MGD)	Provo	Springville	Santaquin	Central Valley WRF	Salem	Spanish Fork[1]
AADF	15.9	3.7	0.87	61.7	1.5	6.65
MMF	19.1		0.97	83.9		8.4
PDF	28.7		1.13	116.7		10.4
PHF	38.3	7.4	1.98	140.7	4.4	16.6

[1] Spanish Fork values are 2040 projected flows.

Table 1-5: **Peaking Factors of Local WRFs**

Flow Factor	Provo	Springville	Santaquin	Central Valley WRF	Salem	Spanish Fork
MM	1.2		1.11	1.35		1.26
PD	1.8		1.3	1.89		1.57
PH	2.4	2.0	2.28	2.28	2.93	2.5

Considering the above information, the size of the Spanish Fork WRF and the magnitude of I&I it receives, a peak hour factor of 2.5 was selected. Peak hour flow is critical in facility design as it establishes the hydraulic capacity of the process and therefore dictates the sizing of much of the system. This is particularly important for the proposed Membrane Bioreactor, MBR, process since the membranes are sized to pass peak hourly flows. If the peaking factor is too low there is a risk that the capacity of the membranes or other systems could be exceeded prior to the end of the 20-year planning horizon.

Due to the critical nature of the peak flow rate and the uncertainty in its selection, the following mitigation actions are recommended:

- The existing influent and effluent flow meters should be modified and/or calibrated so that they can record higher flow rates. This will allow accurate recording of peak flows over the next 4-5 years and the ability to confirm a peak flow factor prior to startup of the new SFWRF.
- Mitigation measures to account for uncertainties related to the peak hour flow rate will be incorporated into the final design of the facility. These may include providing spare capacity within the membrane cassettes, constructing additional concrete tankage for future membranes, or other measures to readily increase capacity if the peak flow rates are higher than anticipated.

1.3.4. Loads and Concentrations

Influent concentrations of Five-Day Biochemical Oxygen Demand, BOD_5, Total Suspended Solids, TSS, Total Kjeldahl Nitrogen, TKN, and Total Phosphorus, TP were determined so that the design mass loadings for these contaminants could be predicted. Plant operating data from 2011 -2020, which provided average monthly concentrations for BOD and TSS, was used to determine their average and peak values. These concentrations are consistent with typical values for municipal wastewater.

Influent sampling data for TKN and TP only went back to 2018 and resulted in average concentrations of 30 mg/L and 3.5 mg/L , respectively. These concentrations are considered very low/weak in strength and thought to be unrepresentative since the samples were collected overnight, missing the typical high loading period during the daytime. Recent composite sampling, (March 24-30, 2020) gave average results of 45 mg/L and 5.5 mg/L for TKN and TP respectively. These are more typical strength for municipal wastewater and thought to be more representative of actual concentrations. Therefore, these values are proposed for use in design.

The design concentrations are summarized in Table 1-6 below.

Table 1-6: Spanish Fork WWTP Influent Concentrations

	Units	BOD_5	TSS	TKN	TP
Average Day	mg/L	190	205	45	5.5
Maximum Month	mg/L	230	300	50	6.5
Peak Day	mg/L	300	400	55	7.5

Mass loadings for each parameter were determined by multiplying the design flow rate, average concentration and a conversion factor (8.34 lb/gal). This approach avoids compounding peaking factors.

Existing and projected influent flow and load data is summarized in Table 1-7 for the 20-year planning period. The existing conditions are summarized from the wastewater operator reports and the 2040 loading conditions are estimated by per capita loading and the projected population growth from Table 1-1. The future peak day and peak hour flow rates are likely conservative due to proactive infiltration and inflow management by the City and because new growth typically results in more water-tight, sealed collection systems.

Table 1-7: Flow and Load Summary for Existing and 2040

Description	Existing Condition	Projected 2040 Value
Total Flow (MGD)		
Annual Average Day	4.62	6.65
Max Month (1.26 PF)	5.8	8.4
Peak Daily (1.57 PF)	7.2	10.4
Peak Hour (2.5 PF)	11.5	16.6
Influent BOD (ppd)		
Average Month	7,316	10,538
Max Month	9,205	13,259
Peak Day	11,487	16,546
Total Suspended Solids, TSS (ppd)		
Average Month	7,894	11,370

Description	Existing Condition	Projected 2040 Value
Max Month	9,932	14,306
Peak Day	12,394	17,852
Total Kjeldahl Nitrogen, TKN (ppd)		
Average Month	1,733	2,496
Max Month	2,180	3,140
Peak Day	2,721	3,919
Total Phosphorus, TP (ppd)		
Average Month	212	305
Max Month	266	384
Peak Day	333	479

Buildout flows have also been projected in Table 1-8 and are intended to provide guidance in master planning the SFWRF site.

Table 1-8: Buildout Flows

Buildout	Units	Average Day	Max Month	Peak Day	Peak Hour
Flow	(MGD)	10.7	13.4	16.7	26.7

1.3.5. Temperature

Wastewater temperature is also a critical design parameter since a biological treatment process will be employed and its performance is a function of temperature. Water temperature, specifically the cold water temperature, is also an important factor in membrane system design as the flux rate/capacity of the membranes is reduced with decreasing water temperature. The summer or warmest water temperature is also important as it typically dictates the sizing of the blowers and aeration system.

Plant operational data was reviewed in order to determine the range of water temperatures for design. Historic temperature data was lacking, so recent data from 2019-2020 was reviewed. Since this was a small data set, < 1 yr, the confidence that the full range of water temperatures was represented in this data is lacking. Therefore, conservative values for maximum and minimum design temperatures were selected.

Table 1-9: Spanish Fork WWTP Influent Temperature

Condition	Temperature (^{0}C)
Winter	10
Average	18
Summer	20

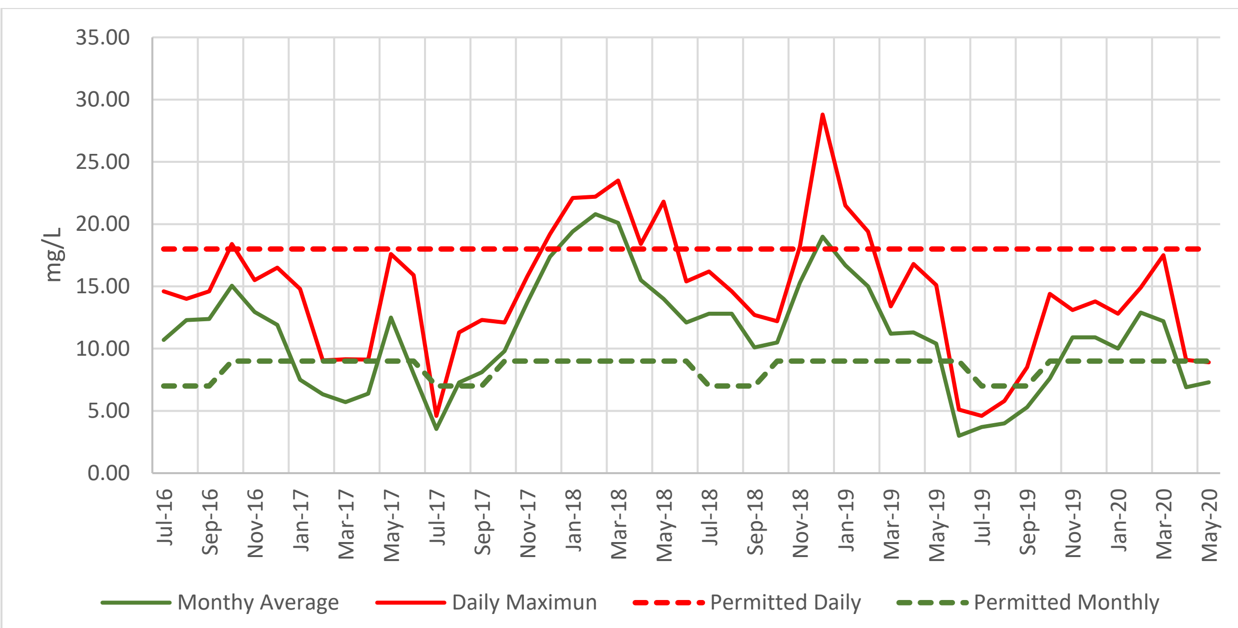
1.4 Regulatory Background and UPDES Permit Requirements

The limitations for discharge of effluent are set forth in the UPDES permit issued by the Utah Division of Water Quality, UDWQ. Based on a review of Discharge Monitoring Report (DMR) data, it appears the WWTP has had difficulty reliably complying with the UPDES permit limits for the following parameters.

- Daily maximum ammonia, particularly during the winter months (recently implemented process improvements have improved ammonia removal)
- TSS removal
- BOD removal
- Effluent flow rate

DWQ has established a schedule for meeting the more stringent, chronic ammonia limits listed in the permit (7 mg/L in the summer and 9 mg/L the rest of the year). Compliance with these new ammonia limits will be required by 2023, unless an extension can be negotiated with DWQ. As currently configured, the WWTP will not be able to meet the new monthly average ammonia limits. Spanish Fork and Mapleton have formally submitted a request to DWQ to delay the implementation of the interim ammonia permit limits until January 1, 2026. The current UPDES permit is located in Appendix A.

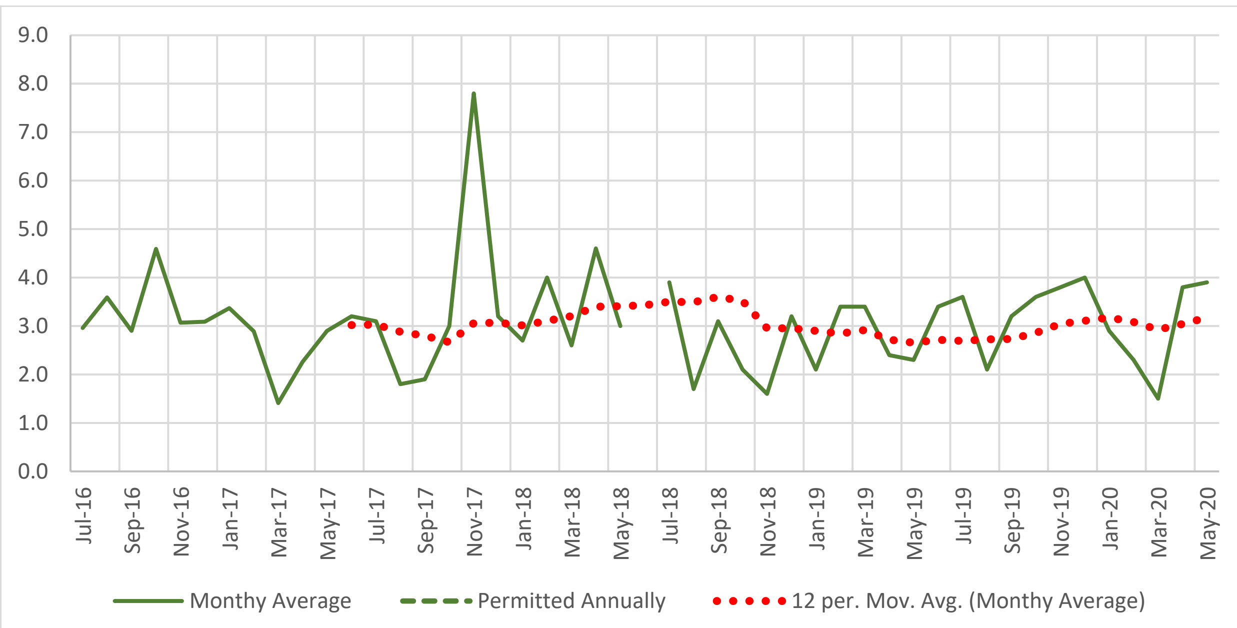
Figure 1-2: Spanish Fork City Effluent Ammonia Concentration (mg/L)



For phosphorus, the City successfully negotiated a variance with DWQ to delay implementation of the 1 mg/L technology-based phosphorus effluent limit (TBPEL). However, per the compliance schedule, DWQ needs to be presented with a viable plan for treating phosphorus by June 1, 2020. This formal variance request has been submitted to DWQ for consideration and is included in Appendix M. The City requested a phosphorus variance extension to Jan 1, 2026. This request includes an additional one year "innovation" extension for phosphorus trading with Springville and other regional entities. The City intends to have the new facilities operational by Jan 1, 2025 but an extension would be beneficial to verify assumptions and optimize phosphorus removal performance and full-scale costs with regional trading partners.

An interim effluent limit of 3.7 mg/L was set by DWQ based on effluent TP data from 2017-2018 as submitted in the DMRs. Since then, the city has proactively made infiltration and inflow repairs and significant growth continues to occur. It appears this interim limit is challenging to reliably meet with the existing treatment system, as illustrated by the chart below. It is requested a higher interim TP limit be implemented based on more recent DMR data so Spanish Fork and Mapleton do not need to install a temporary chemical feed system and other infrastructure for phosphorus removal that will soon be abandoned. The cities are currently in the process of renewing their UPDES permit and completing the Level 2 Antidegradation Review, and these interim limits for total phosphorus and ammonia will be coordinated during this process.

Figure 1-3: Spanish Fork City Effluent Phosphorus Concentration (mg/L)



The permit drivers for WRF improvements are current and proposed regulations for nutrients, specifically phosphorus and nitrogen. A summary of the current and projected future UPDES permit limits are presented in the table on the following page.

Table 1-10: Existing and Projected UPDES Permit Limits for Planning

Description	Unit	Existing Permit	Startup 2023	2030 - 2035
Total Flow				
Max Month Average	MGD	5.0	negotiate with DWQ	
Daily Maximum	MGD	10.0	negotiate with DWQ	
BOD				
Max Month Average	mg/L	25	25	25

Description	Unit	Existing Permit	Startup 2023	2030 - 2035
Max Week Average	mg/L	35	35	35
% Removal	%	85%	85%	85%
Total Suspended Solids (TSS)				
Max Month Average	mg/L	25	25	25
Max Week Average	mg/L	35	35	35
% Removal	%	85%	85%	85%
Ammonia (December 2013)				
Max Month Average, Summer	mg/L	*NA*	7.0	TIN limit
Max Month Average, Fall	mg/L	*NA*	9.0	TIN limit
Max Month Average, Winter	mg/L	*NA*	9.0	TIN limit
Max Month Average, Spring	mg/L	*NA*	9.0	TIN limit
Daily Maximum	mg/L	18.0	18.0	TIN limit
Total Inorganic Nitrogen (TIN)				
Max Month Average	mg/L	*NA*	*NA*	10
Total Phosphorus (TP)				
Max Month Average	mg/L	*NA*	1.0	0.5
pH				
Range	mg/L	6.5-9.0	6.5-9.0	6.5-9.0
Dissolved Oxygen (DO)				
Daily Minimum	mg/L	4.0	4.0	5
Weekly Minimum	mg/L	*NA*	*NA*	6
Total Residual Chlorine (TRC)				
Max Month Average	mg/L	*NA*	0.013	0.013
Daily Maximum	mg/L	2.0	0.022	0.022
E. coli				
Max Month Average	no./100ml	126	126	126
Max Week Average	no./100ml	158	158	158
Oil & Grease				
Daily Maximum	mg/L	10	10	10

1.4.1. Future Permit Considerations

The new facility will continue to discharge to the same outfall on Dry Creek. Dry Creek eventually discharges to Provo Bay on Utah Lake, which is an impaired waterbody according to Section 303(d) of the Clean Water Act, CWA. This requires the state to undertake a study and develop Total Maximum Daily Loads, TMDL, to restore water quality. Nutrients, in particular phosphorus, have been an initial focus of the impairment to Utah Lake and the TMDL is expected to provide limits for TP, which will supersede the TBPEL limits. TP limits lower than the 1.0 mg/L are anticipated, however the TMDL study is in progress and specific limits have not been developed to date. Preliminarily, a future TP limit of 0.5 mg/L has been assumed as a result of the TMDL.

At present, the future limit of most concern is that for Total Nitrogen, TN or Total Inorganic Nitrogen, TIN. (The basis for the nitrogen limit, TN or TIN, has not been established to date.) UDWQ has indicated that technology-based limits for TN/TIN should be expected statewide at some point in the future. A specific timeframe for promulgation has not been established but it has been informally mentioned that limits could take effect within the next 10-20 years. For planning purposes it has been assumed the limit will become effective in the 2030 to 2035 timeframe.

A technology-based TN/TIN limit in the range of 6-10 mg/L has been discussed, however no definitive numbers have been provided. For planning purposes, a TIN limit of 10 mg/L has been selected. Due to the pending TMDL on Utah Lake, the timing and limits for TIN could change. To date, TIN has not been a focus of water quality impairment in the lake, however the TMDL study could change this.

Based on recent UDPES permit limits for other cities in Utah County, it is anticipated future limits for chlorine residual will be substantially reduced in the next permit cycle. Although the city's existing sulfur dioxide system could be utilized to dechlorinate the effluent, this will have a detrimental impact on the dissolved oxygen concentration in the effluent. It is also anticipated dissolved oxygen requirements will become more challenging in future permit cycles. Ultimately, UV disinfection will be required in the near future to meet these new limits.

Future limits for other parameters are always of concern but there has not been any serious discussion on the part of UDWQ to regulate other parameters on a statewide basis.

1.5 Environmental Resources

A detailed assessment of environmental resources present is not part of the scope of this report but may be required in the event the City seeks state or federal funding for projects. The City should be aware when planning potential wastewater treatment projects that environmental resources will likely need to be addressed.

Although not always the case, wastewater improvements are often constructed in existing rights-of-way that have limited impact on the environment (e.g., on the edge of a road or at an existing treatment site). In the event the City seeks state or federal funding, they should consult with potential funding partners relative to the scope of the environmental review required. A less extensive review under a Categorical Exclusion (Cat-Ex) may be feasible. Appendix B is reserved for maps, figures, or analysis that may be needed for a more detailed environmental assessment.

1.5.1. Environmental Information

The planning area is characterized as mostly flat with a gradual slope that drains to the north and generally towards Utah Lake. Appendix B contains a U.S.G.S. topographic map of the Spanish Fork area. The interstate is higher in elevation than surrounding areas, creating a barrier. The groundwater table is generally at a depth of 1 to 6 feet deep at the location of the existing and proposed treatment sites. The predominant soil type at the existing treatment facility is Benjamin silty clay. The soil types at the proposed site are Kirkham silty clay loam and Vineyard fine sandy loam. Appendix B contains soils maps of the area prepared by the Natural Resources Conservation Service.

1.5.2. Historic Sites

According to the National Register of Historic Places there are two historic places in Spanish Fork. The David H. Jones House is located at 143 South Main Street and the Spanish Fork High School Gymnasium is located at 300 South Main Street. These buildings are not within the planning area and it is not anticipated they would be affected by wastewater management changes.

1.5.3. Floodplains and Wetlands

According to Community Panel Number 490241 0025 A of the Flood Insurance Rate Map for Spanish Fork, most of the planning area falls outside of flood hazard areas. These are areas where flood hazards are 100-year floods or areas of minimal flooding. See Appendix B for the Flood Insurance Rate Map for Spanish Fork, made available by the Federal Emergency Management Agency. The proposed wastewater treatment facility improvements are located in Zone C, which is an area of minimal flooding. The proposed improvements are located more than a mile north of Zone A, which is a special flood hazard area subject to inundation by the 100-year flood.

Freshwater emergent wetlands are located east of the existing treatment facility and just north of the proposed facility. Additional freshwater emergent wetlands are located southeast of the proposed site. However, wetlands are not located on the proposed site. This was verified in a site visit from a biologist. Appendix B contains a map of the wetlands as made available by the U.S. Fish and Wildlife Service.

1.5.4. Agricultural Lands

The greenfield site for the new WWTP is approximately 11.2 acres. According to the USGS Web Soil Survey 65% of the area is prime farmland of statewide importance. The prime farmland designation indicates that the soil is well-suited for crops, has a low risk of erosion, and has a reliable irrigation water supply. An additional 3% of the site is considered to be prime farmland if it is irrigated. The state-wide farmland is not as a high a designation as the prime farmland, but it is still important to Utah's agricultural base. These lands require more management than prime lands to avoid soil erosion and maintain productivity. The remaining 32% of the site is not prime farmland. Appendix B contains a map and summary of the farmland classification of the proposed greenfield site.

1.5.5. Wild and Scenic Rivers

According to the National Wild and Scenic Rivers System, the planning area does not contain a wild and scenic river.

1.5.6. Fish and Wildlife Protection

Federally-listed or candidate species under the Endangered Species Act that could potentially occur in Utah County include: Brown (Grizzly) Bear (historically), June Sucker, and Western Yellow-billed Cuckoo, (Utah Division of Wildlife Resources, November 1, 2017).

Additional species listed by the State as species-of-concern by the Utah Division of Wildlife Resources (November 1, 2017) in Utah County include: American Three-Toed Woodpecker, American White Pelican, Bald Eagle, Black Swift, Bobolink, Burrowing Owl, California Floater, Eureka Mountainsnail, Ferruginous Hawk, Fringed Myotis, Greater Sage-Grouse, Kit Fox, Lewis's Woodpecker, Long-billed Curlew, Short-eared Owl, Smooth Greensnake, Southern Bonneville Springsnail, Southern Leatherside

Chub, Spotted Bat, Townsend's Big-eared Bat, Utah Physa, Western Red Bat, Western Toad and the White-tailed Prairie Dog.

Species in Utah County that are listed as receiving special management under a Conservation Agreement in order to preclude the need for Federal listing include the Bluehead Sucker, Bonneville Cutthroat trout, Colorado River Cutthroat Trout, Columbia Spotted Frog, Least Chub, Northern Goshawk, and Roundtail Chub.

It is unlikely that any of the species would be affected by wastewater management changes within the planning area for one or more of the following reasons: lack of a habitat contiguous with the plant and human-made developments not compatible with the species (Yellow-billed Cuckoo and June Sucker), and/or the presumption of extirpation and habitat incompatibility (Brown Bear).

1.5.7. Air Quality

The Utah Division of Air Quality (UDAQ) is responsible for implementing, monitoring and enforcing the air quality standards within Utah. An area that exceeds the air quality standards is considered to be a "non-attainment area" (NAA) for a particular component, or total air quality. Utah County is considered a non-attainment area, which Spanish Fork is located in.

Local automobile emissions and agricultural activities are the primary contributors to air quality degradation. This project would have minimal to no effects on air quality.

1.5.8. Water Quality

Surface water within the planning area consists of Dry Creek as well as storm and snowmelt runoff. The existing and proposed wastewater treatment facilities discharge to Dry Creek. Dry Creek discharges into Utah Lake, which is currently undergoing a TMDL study.

Wastewater quality will be improved after the proposed upgrades are implemented and will be discussed in more detail in the next chapters. Storm and snowmelt runoff quality will not be affected by adding to or updating the current sewer system.

1.6 Water Conservation Plan

Spanish Fork City is committed to water conservation. From infrastructure updates to policy changes and rebates/grants that are offered, they regularly evaluate methods to improve their drinking water and pressurized irrigation system. Two projects to note are the Smart Controller Project and the Meter Update Project. The City's Smart Controller Project provides residents a free smart controller for their pressurized irrigation system, which automatically adjusts their sprinkler schedule to reduce watering during rainy days and reduces peak demands on the City's pressurized irrigation. The Meter Update Project is working to update customer's meters to read in a 1-gallon resolution, which will significantly help with identifying customer leaks throughout the city. The meter ready system recently underwent an upgrade to give city staff the ability to analyze water usage data more efficiently and troubleshoot meters in need of replacement.

The City's website (www.spanishfork.org/conservewater) provides indoor and outdoor conservation tips for their customer's drinking water and pressurized irrigation systems. They have also made the City's most recent Water Conservation Plan available on the website. The Spanish Fork 2014 Water Conservation Plan is included in Appendix E.

1.7 Community Engagement

The City has had several public meetings regarding the project over the past two years. The City believes the public is well informed on the need for the project. The public has been notified of a sewer rate increase and impact fee increase to support the upcoming WRF project. The proposed project has been discussed as an agenda item in several public City Council meetings over the past two years, including most recently in April 2020. The City Council is supportive of the project and demonstrated their support by (1) increasing sewer rates; (2) increasing sewer impact fees; (3) exploring financial assistance with DWQ. The City has taken the following steps to include the public throughout the Wastewater Treatment Facility Master Planning process:

- Public hearings in City Council were held in July of 2018 and 2019 to present the raised sewer rates in anticipation of the new WWTP.
- Engineering team conducted the project kickoff meeting as well as several interim meetings to coordinate findings, questions, and provide project status updates in late 2019 and early 2020. Project status update and coordination meetings will continue throughout the planning and design phases.
- During formal discussion with the City Council during the Mid-year Council Budget Work Session (February 7-8th, 2020), early master planning documents and budgets were presented.
- The Public and the City Council has been notified of the yearly rate increases each year until FY2025.
- The City Council approved parameters to begin the bonding process for the new WWTP on April 21st, 2020.
- A City Council meeting will be scheduled to review and approve the impact fees to be increased with the proposed FY 2021 budget.
- Engineer and City staff met with Utah Division of Water Quality staff in January 2020 and May 2020 to introduce and update the status of the planning effort.
- A public hearing will be held for the purpose of receiving comments on the project. Notification of the hearing will be placed in the local newspaper in accordance with DWQ funding guidelines.
- The City will hold a public meeting, as required by DWQ's funding program. The City will hold a final public hearing once funding is secured.

2.0 Existing Wastewater Treatment Plant Evaluation

2.1 Facility Overview

The Spanish Fork WWTP serves all of Mapleton City and most of Spanish Fork City. Currently the ownership of the treatment facility is split between the two cities with Spanish Fork owning 74% and Mapleton owning 26% of the capacity. As upgrades are implemented the financial requirements are allocated according to the ownership percentages.

The original WWTP was constructed in 1955 with major upgrades in 1983. In 2003 and 2006 additional upgrades including STM Aerotor basins and an additional final clarifier were added. Other upgrades and additions have been made throughout the years to bring the hydraulic capacity of the WWTP to 6 MGD. The current average inflow to the WWTP is 4.5 MGD with a permit limit of 5 MGD.

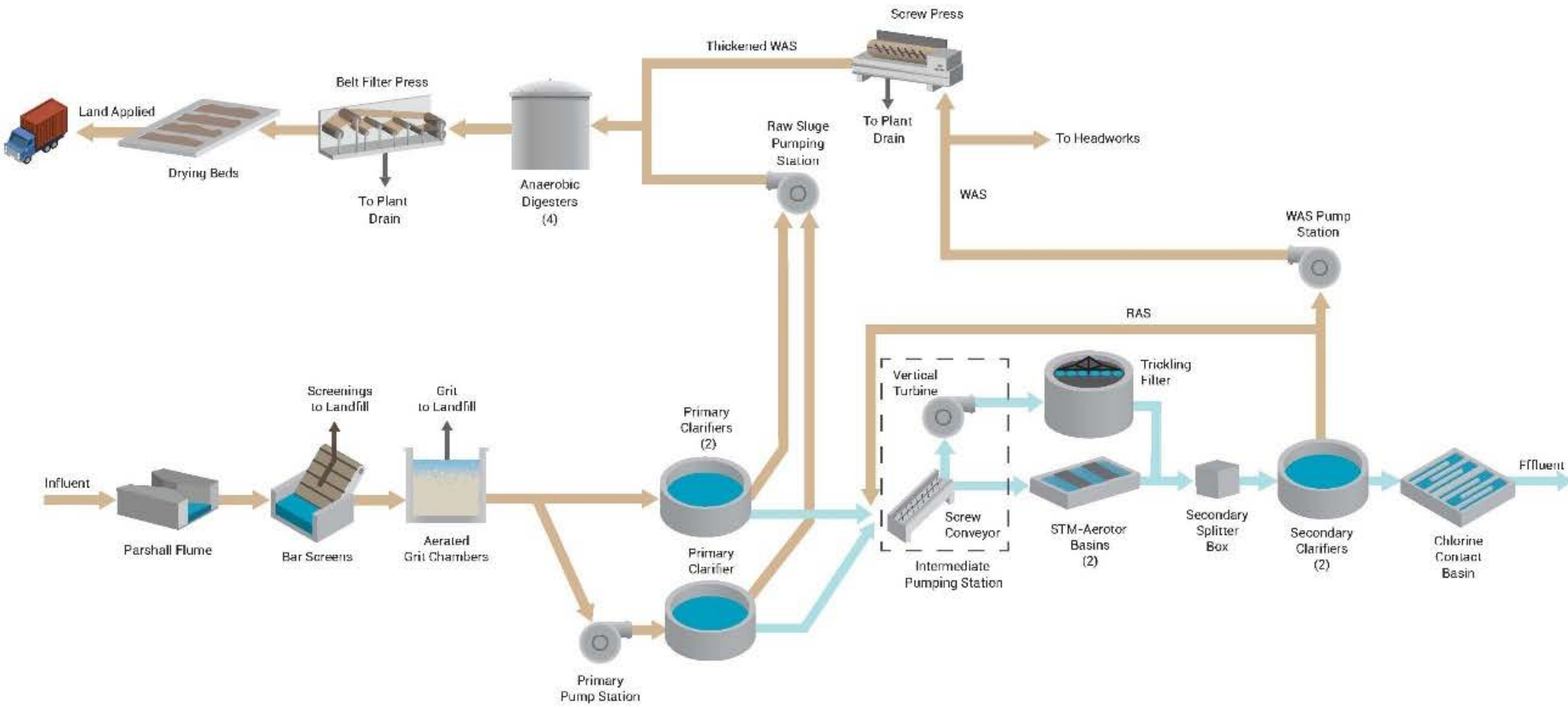
The City recently completed a condition assessment study which indicated the need for significant upgrades and replacement of existing infrastructure. In addition, the WWTP will need substantial modifications to reliably comply with pending nutrient limits that are being implemented by the State. The existing WWTP site layout is shown in Figure 2-1 and its existing process flow diagram is illustrated in Figure 2-2.

Figure 2-1: Spanish Fork WWTP Existing Site Layout

Figure 2-2: Spanish Fork WWTP Existing Process Flow Diagram

Spanish Fork: Existing Process Flow Layout

The current Spanish Fork wastewater treatment process, as illustrated in the process flow diagram below, includes headworks screening, primary clarification, STM Aerotor Basins and parallel trickling filter for BOD removal, secondary clarifiers, and chlorine disinfection prior to discharge to Dry Creek. Solids removed by both the primary and secondary clarifiers are pumped to be digested and dried prior to land application disposable. Secondary sludge can be thickened prior to anaerobic digestion or sent to the headworks for co-settling with primary solids.



2.2 Hydraulic Capacity Assessment

Throughout the WWTP's history, various equipment has been upgraded to increase the capacity of the plant. The treatment facility was originally constructed in 1955 with a design capacity of 1.8 MGD. The most recent capacity upgrade project was completed in 2009 when the anaerobic digestors were upgraded, increasing the WWTP capacity to 6.0 MGD (average day flow). Each process at the existing WWTP has varying capacities, and the current capacity of each process is listed in Table 2-1. Some processes, like the headworks area and the chlorine contact basins, are typically sized at peak hour flow rates. Other areas, like the biological process, are typically sized at maximum month flow rates.

Table 2-1: Existing WWTP Process Design Capacities

Treatment Process	Capacity	Evaluation Condition [2]	Capacity Assessment
Headworks Screening	6.0 MGD per screen	Peak Hour	Needs upgrade soon
Grit Removal	10.0 MGD	Peak Hour	Needs upgrade now
Primary Clarification	6.0 MGD	Max Month	Needs upgrade soon
Intermediate Pumping Station	10.0 MGD	Max Month	Satisfactory
STM Aerotors and Trickling Filter	6.0 MGD	Max Month	Needs upgrade soon
Secondary Clarification	9.0 MGD	Max Month	Satisfactory
Chlorine Contact Basins [1]	9.2 MGD	Peak Hour	Needs upgrade now
Sludge Thickening	10.0 MGD	Ave Day	Satisfactory
Anaerobic Digestion	6.4 MGD	Ave Day	Satisfactory
Sludge Dewatering	10.0 MGD	Ave Day	Satisfactory

[1] Chlorine contact chamber – Existing volume is 191,654 gallons for both chambers operating in parallel per design criteria on drawings. Currently achieving 24 minutes at peak hour flow (30 minutes required per Utah R317 regulations).

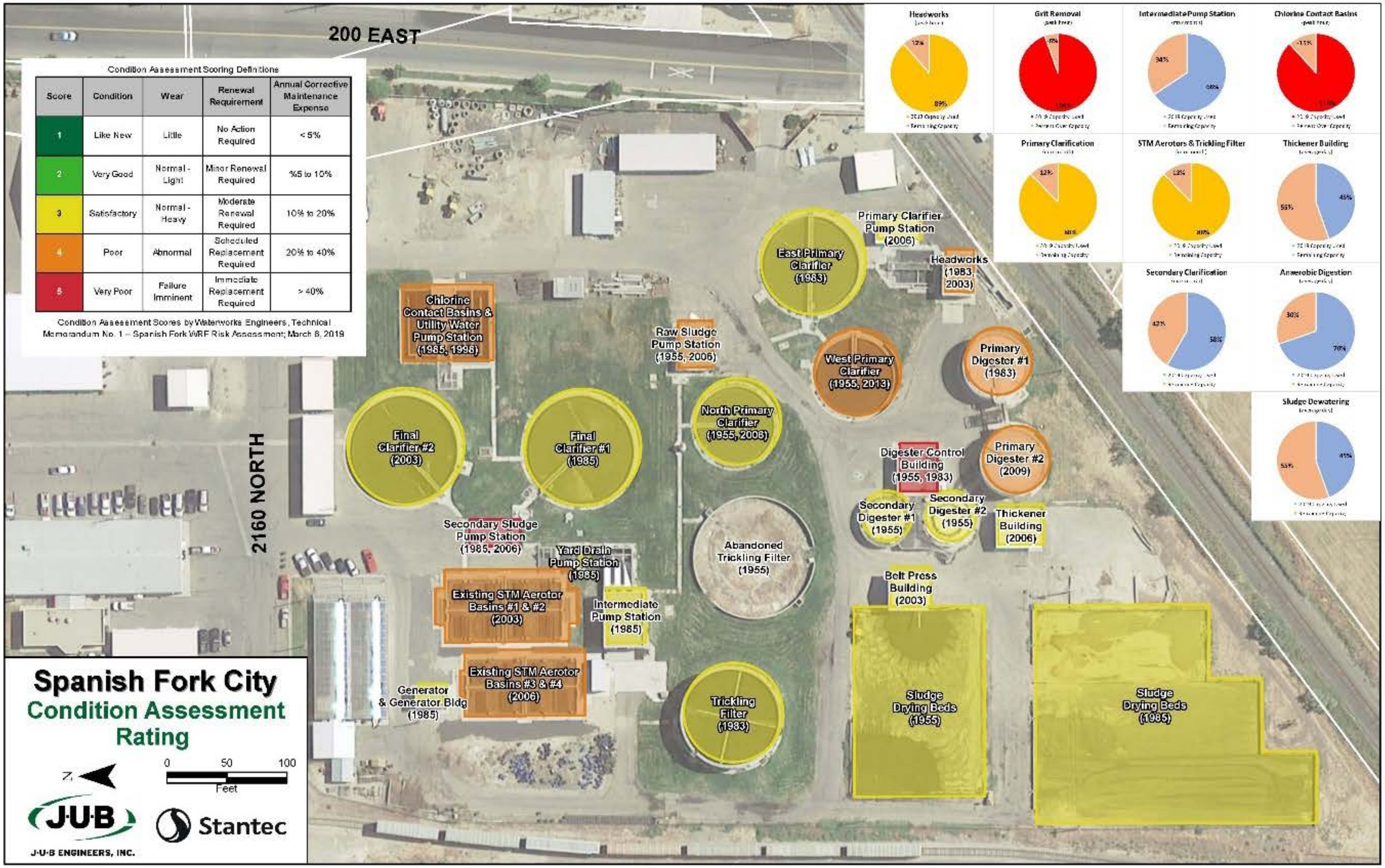
[2] Existing Peak Hour Flow = 11.5 MGD
Existing Max Month Flow = 5.8 MGD
Existing Average Day Flow = 4.6 MGD

2.3 Condition Assessment

In 2019, Waterworks Engineers conducted a general condition assessment for the existing treatment process-related equipment and structures at the Spanish Fork WRF. This condition assessment report is located in Appendix C. Each item's apparent wear and overall reliability were evaluated based on a visual inspection and the historical cost of corrective maintenance required to keep an item in working order and then assigned a score of 1 to 5. The results of the assessment determined asset placement priority based on the remaining useful life of each asset. A graphical representation of the overall condition assessment for each of the treatment processes is shown in

Figure 2-3. Overall, very few of the plant facilities are in "like new" or "very good" condition. The majority of the equipment at the plant are in "satisfactory", "poor", or "very poor" condition.

Figure 2-3: Capacity Analysis & Condition Assessment Rating



Additionally, a performance assessment was completed for each asset. This evaluation compared each piece of equipment to its current and anticipated capacity, regulatory requirements, and plant treatment goals as determined by the plant staff. Both the condition and performance assessment were used to determine the remaining useful life of each asset at the WRF.

To prioritize the replacement and upgrading of assets, a criticality assessment was conducted to determine how critical an asset is to the proper operation of the plant and the magnitude of the impact its failure will have on the continued operation of the facility. Safety, permit compliance/process reliability, redundancy, flexibility, and operational impacts were used to assign a criticality score from 1 to 5. The useful life and criticality scores are used to determine the relative urgency of upgrading/replacing assets as shown in the risk matrix in Table 2-2.

Table 2-2: Risk and Criticality Matrix

		CRITICALITY		
		HIGH (4 - 5)	MEDIUM (3)	LOW (1 – 2)
RISK OF FAILURE	HIGH <-10 YEARS	Replace/Upgrade Immediately	Schedule Upgrade/Replacement High Priority	Schedule Upgrade/Replacement
	MEDIUM: -10 – 0 YEARS	Schedule Upgrade/Replacement High Priority	Schedule Upgrade/Replacement	Plan Upgrade/Replacement
	LOW: < 0 YEARS	Plan Upgrade/Replacement	Plan Upgrade/Replacement	Plan Upgrade/Replacement

The Condition Assessment report summarized the list of high criticality and high-risk assets needing immediate replacement to include the following:

- Electrical and Standby Generator System (exhaust and ventilation)
- Headworks (MCC, flow measurement, grit chamber diffusers, and piping)
- Primary Treatment (1955 clarifier structures)
- Final Clarifiers (piping)
- Intermediate Pump Station (screw pumps)
- Chlorine Disinfection (HVAC, MCC, gates, utility water system)
- Primary and Secondary Digesters (control building, MCC, secondary digester structures and covers, pumps, boilers, gas equipment)
- Solids Process (MCCs, sludge pump controls)

The report then created a secondary list of assets that should be scheduled and flagged as high priority for upgrade/replacement below:

- Emergency Electrical and Generator System (building, generator engine)
- Headworks (grit chambers and related equipment, PLC, building, piping, and step screens)
- Primary Sedimentation (clarifier mechanisms, 1983 clarifier structure, piping)
- Trickling Filters (structure and rotary mechanism)
- STM Aerotors and Intermediate Pump Station (yard drain pump station, all aerotor equipment, MCC, intermediate pump station building)
- Final Clarifiers (2003 clarifier mechanism, 1985 clarifier structure, distribution boxes, gates)
- Chlorine Disinfection (buildings, chlorine injectors, secondary water pumps, contact basins, piping)

- Primary and Secondary Digesters (east primary digester structure, pumps, control building and MCC)
- Solids Processing (thickener, belt press, PLC, sludge pumps, drying beds, raw sludge PS building, HVAC)

It should be noted that the digester lid on Primary Digester #1 failed in early 2020. This rendered this anaerobic digester inoperable and it is now out of service, serving as a reminder of the aging infrastructure present on the site.

2.4 Treatment Performance

Overall, despite the challenges noted above, the treatment facility is in compliance with most existing permit requirements. Generally speaking, the WWTP has had difficulty meeting UPDES permit limits for the following parameters.

- Daily maximum ammonia, particularly during the winter months (recently implemented process improvements have improved ammonia removal)
- TSS removal
- BOD removal
- Effluent flow rate

The following figures show treatment performance versus UPDES permit limits.

Figure 2-4: Spanish Fork WWTP Effluent Flow

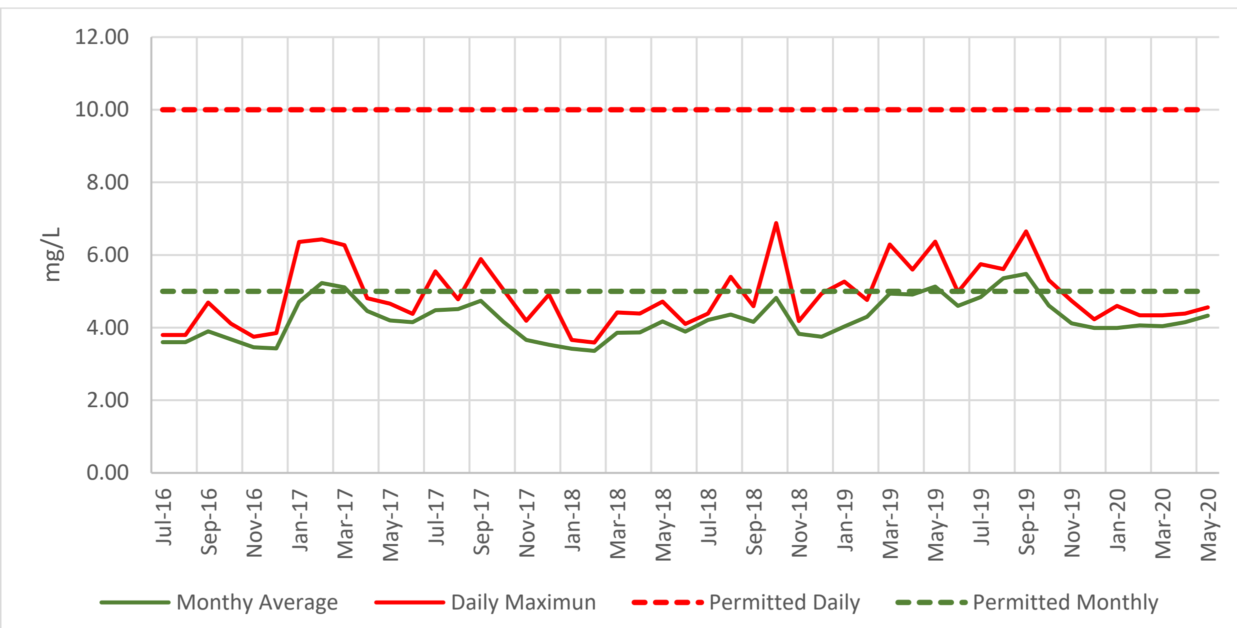


Figure 2-5: Spanish Fork WWTP Effluent BOD

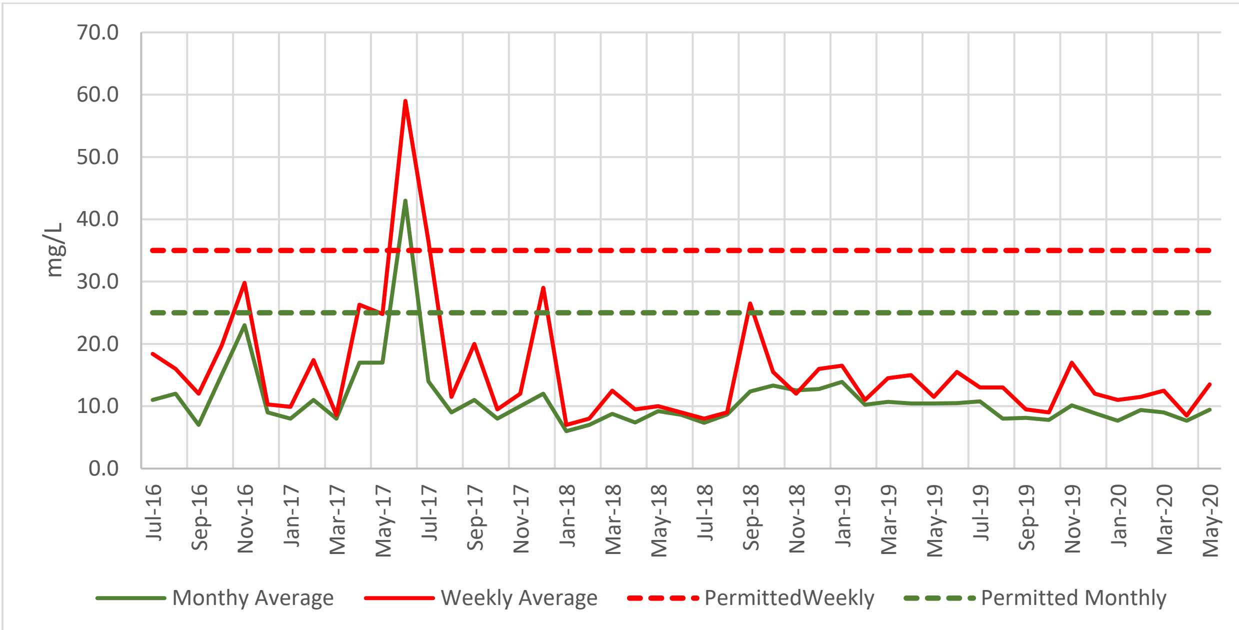


Figure 2-6: Spanish Fork WWTP Effluent TSS

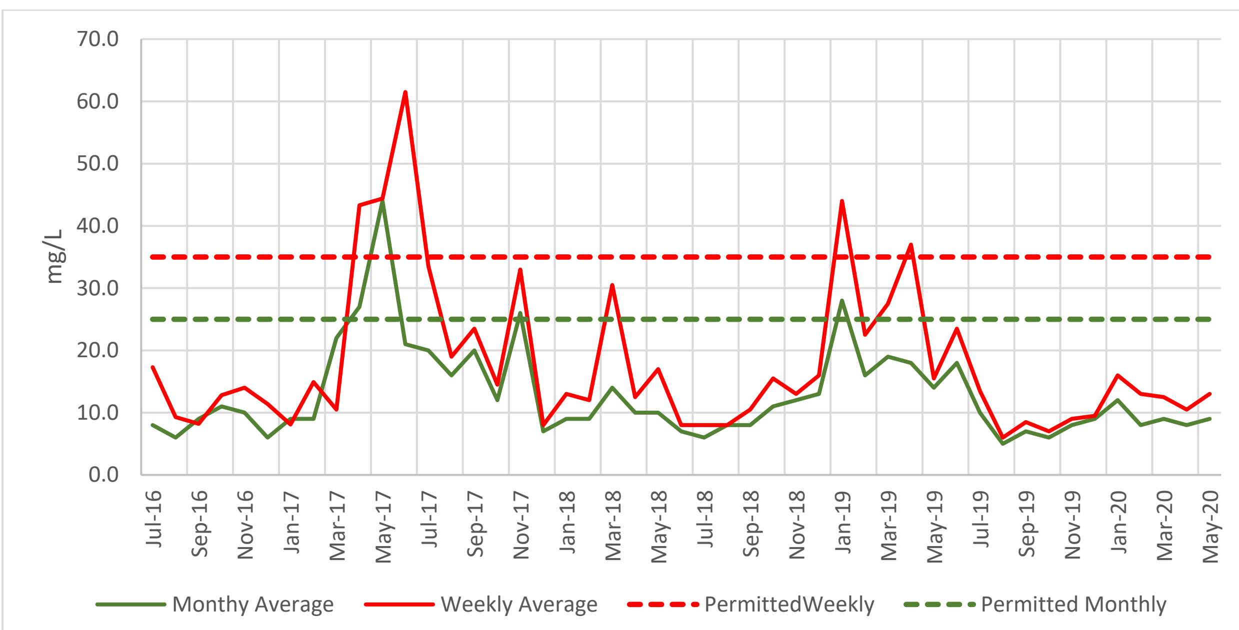


Figure 2-7: Spanish Fork WWTP Effluent Ammonia

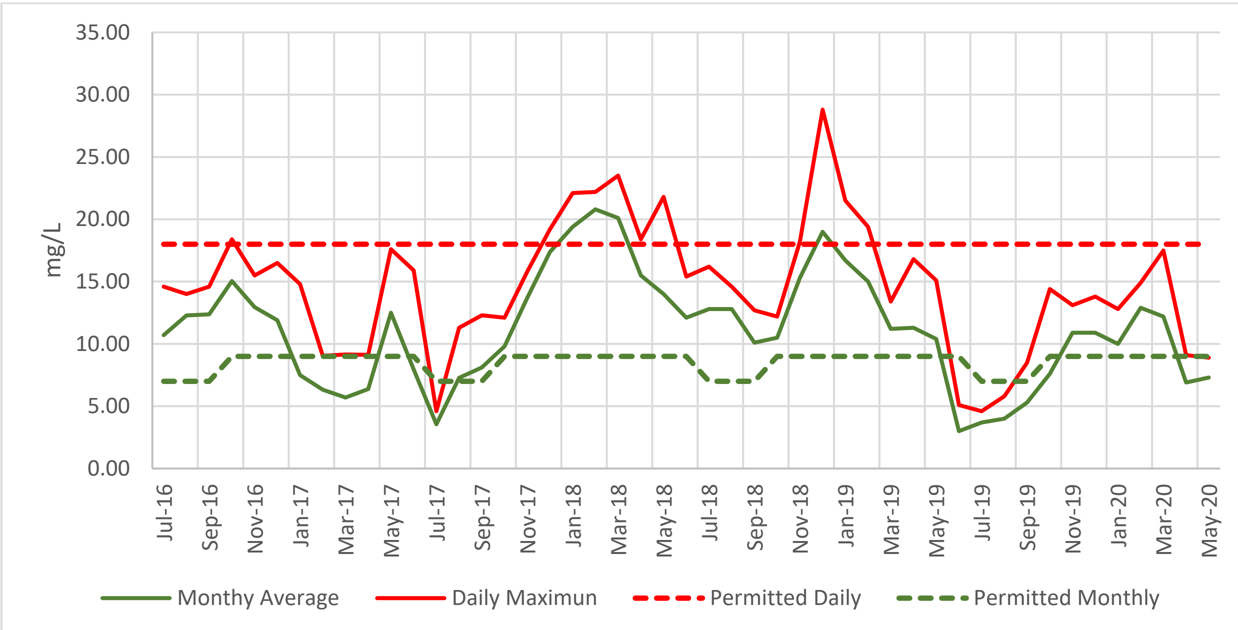


Figure 2-8: Spanish Fork WWTP Effluent TIN

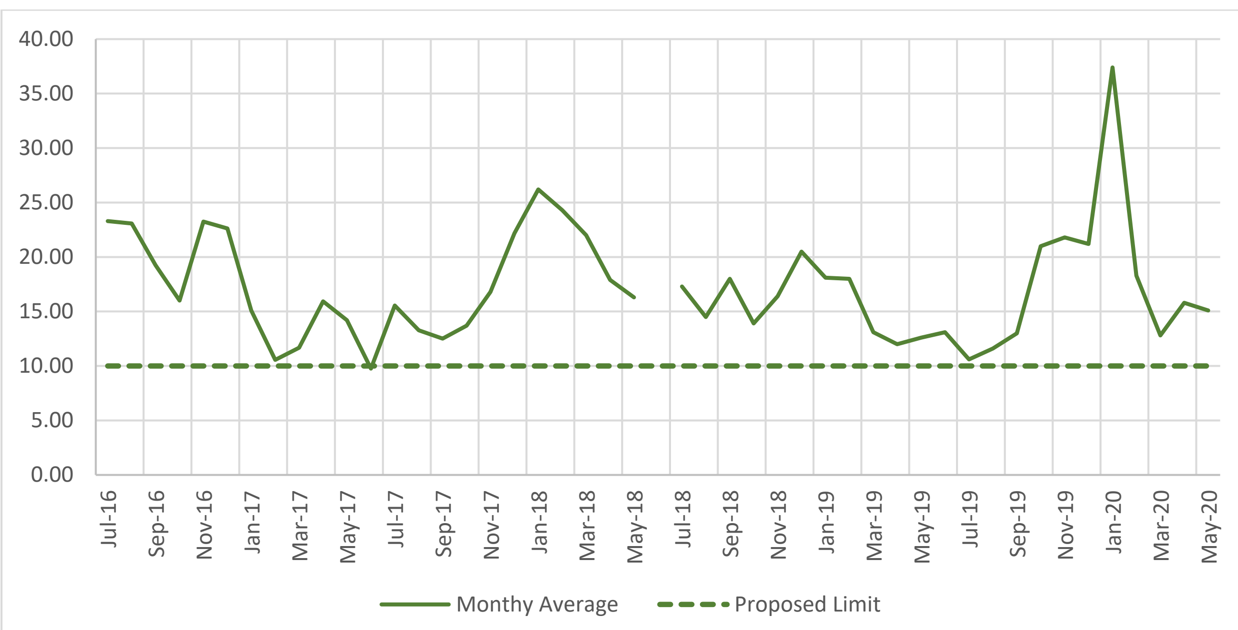


Figure 2-9: Spanish Fork WWTP Effluent Total Kjeldahl Nitrogen

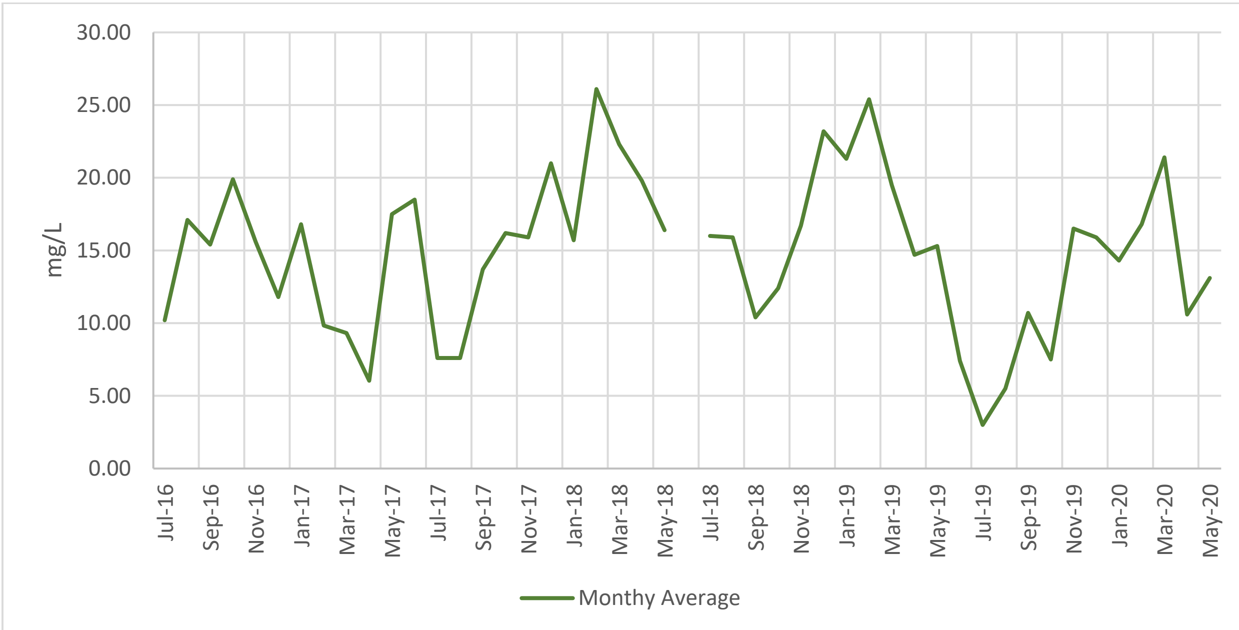


Figure 2-10: Spanish Fork WWTP Effluent Phosphorus

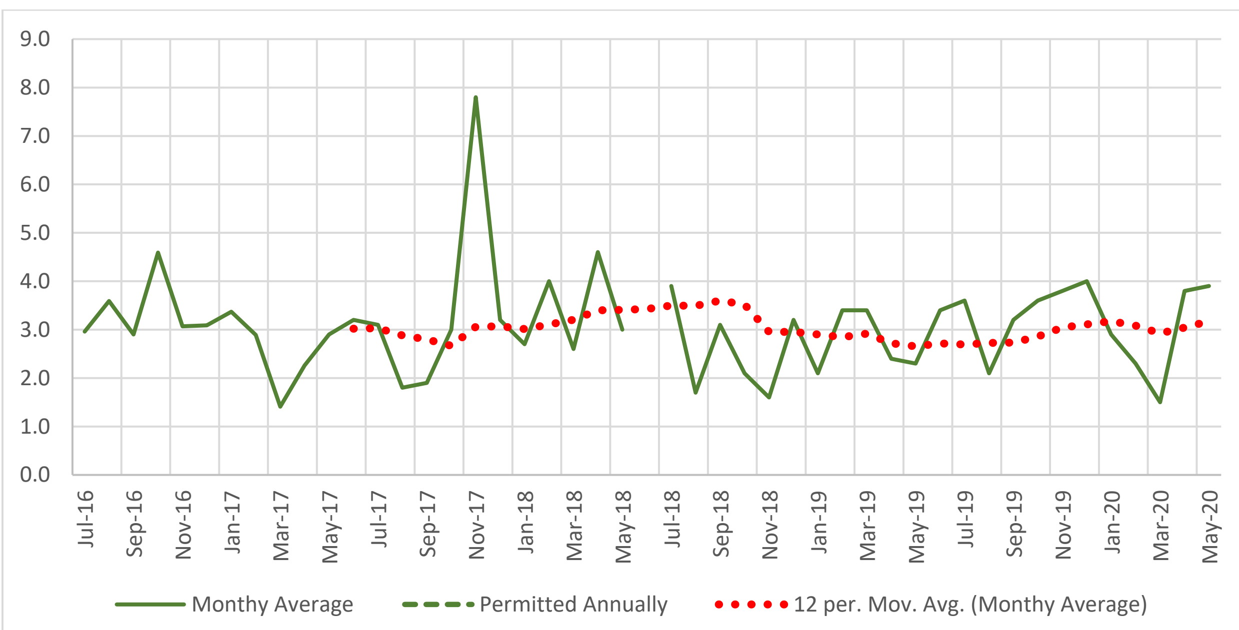


Figure 2-11: Spanish Fork WWTP Effluent pH

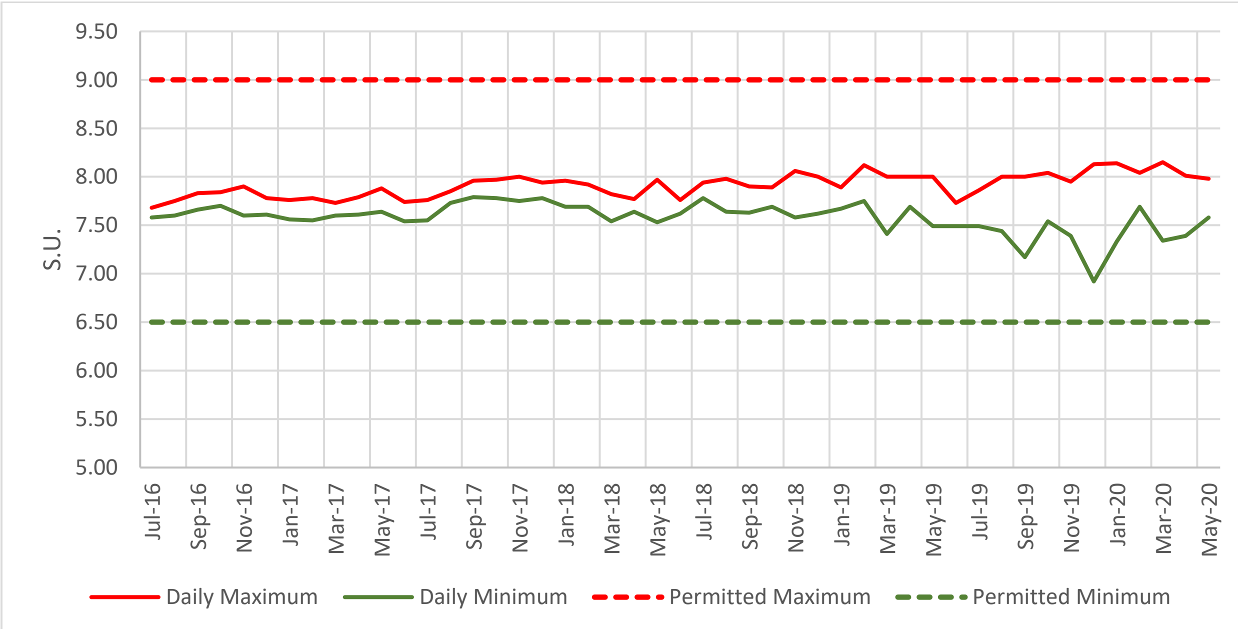


Figure 2-12: Spanish Fork WWTP Effluent Dissolved Oxygen

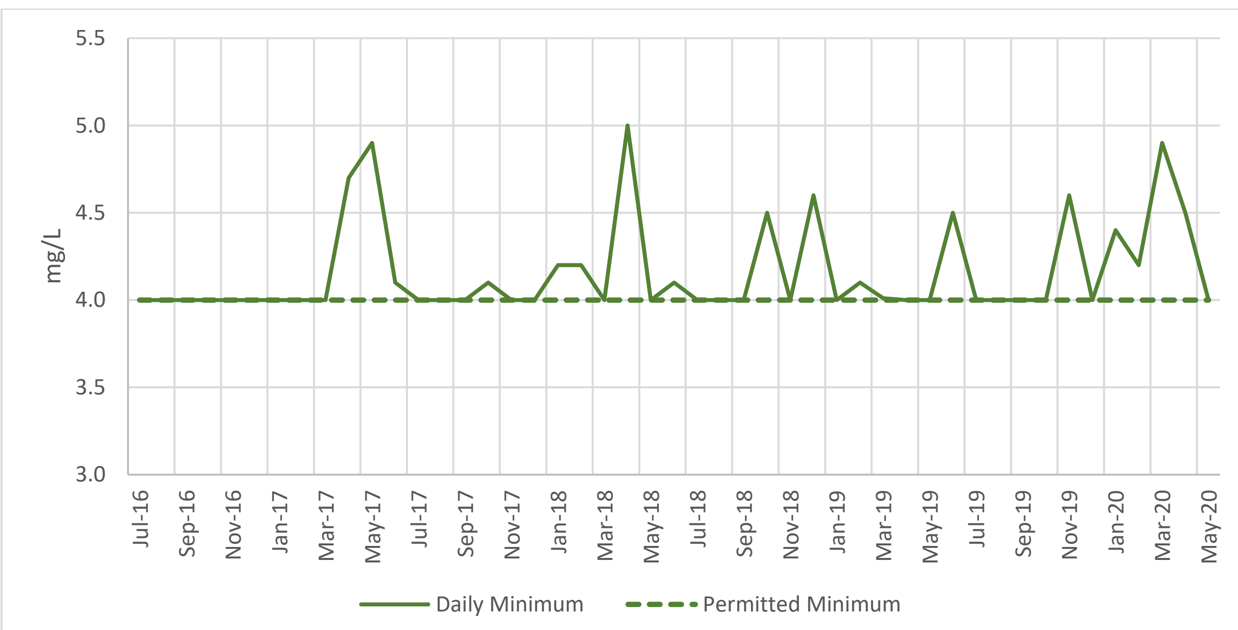


Figure 2-13: Spanish Fork WWTP Effluent Total Residual Chlorine

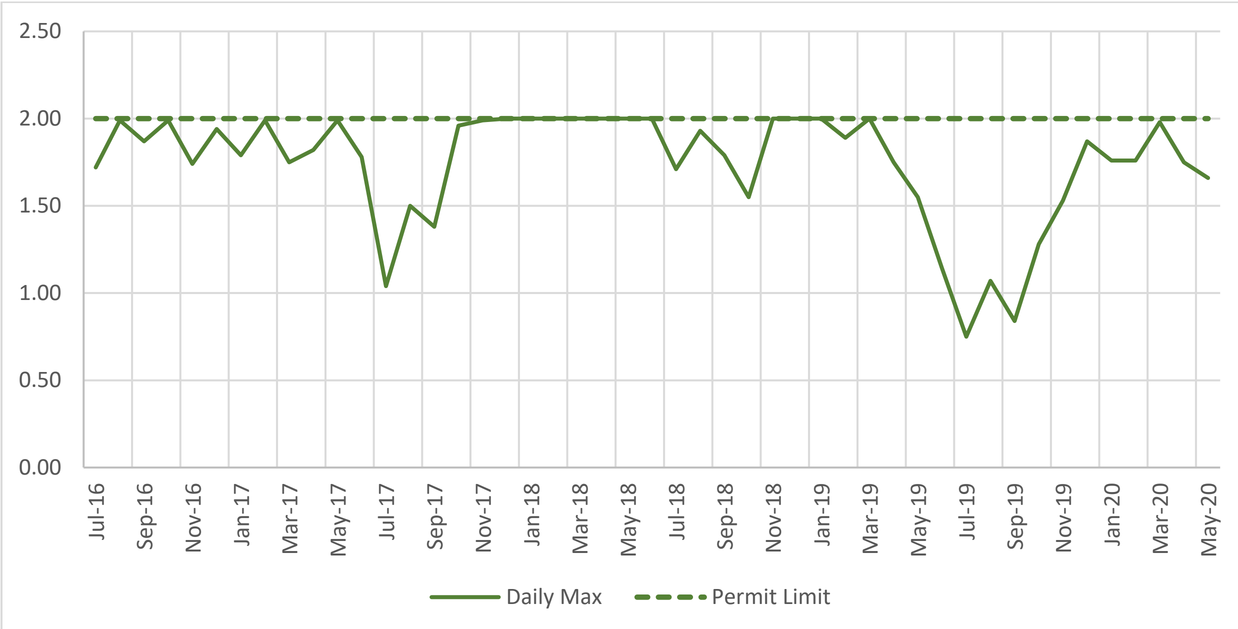


Figure 2-14: Spanish Fork WWTP Effluent E. coli

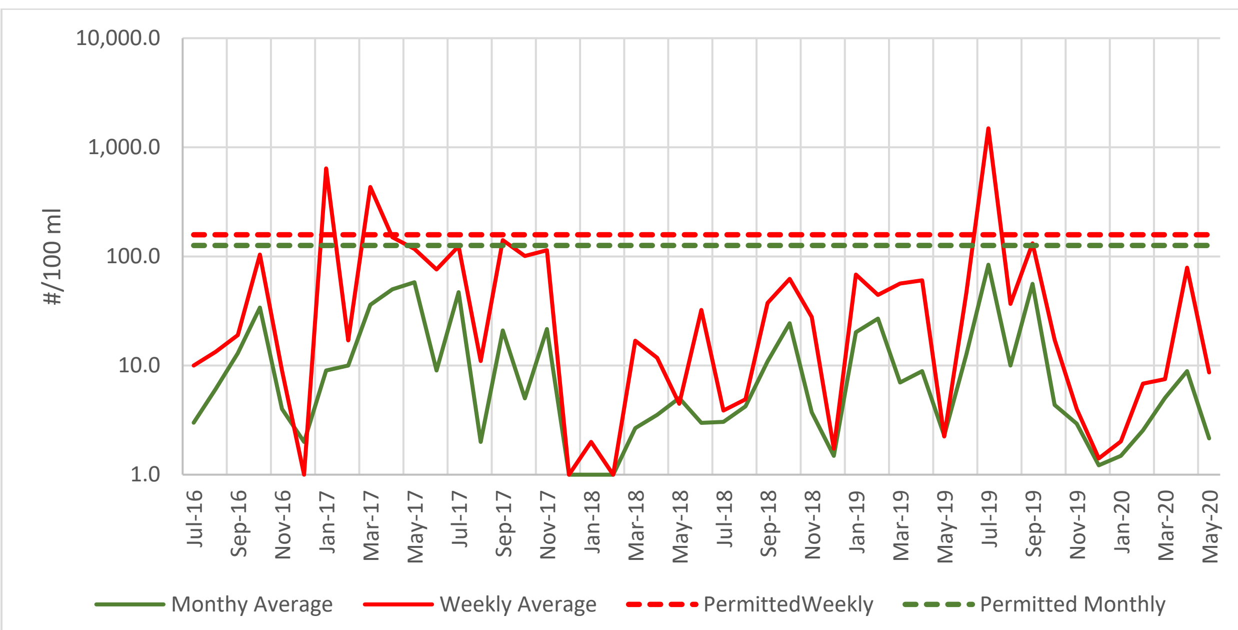
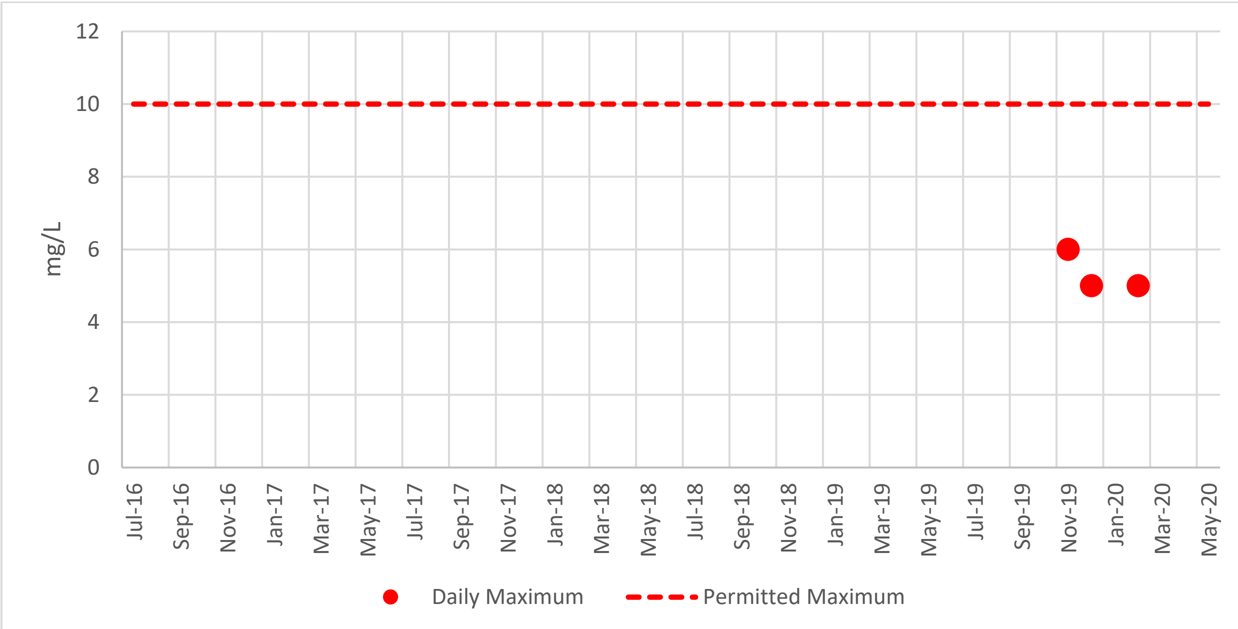


Figure 2-15: Spanish Fork WWTP Effluent Oil & Grease



3.0 Alternatives Evaluation

This section evaluates treatment alternatives that can be retrofit into the existing site, new greenfield alternatives, and a regional treatment solution.

The retrofit alternatives take advantage of existing infrastructure in ways that do not limit performance but ultimately save the city money. All of the retrofit alternatives are designed to meet the anticipated 2023 permit limits of ammonia less than 7 mg/L, total phosphorus less than 1 mg/L, and chlorine residual less than 0.013 mg/L. The site will be master planned for the easy addition of future infrastructure to meet anticipated long-term permit limits of TP < 0.5 mg/L and TIN < 10 mg/L; this additional infrastructure will be constructed in a future phase as required by the permit. It is our understanding based on discussions with DWQ that site-specific TIN limits likely won't be implemented until 2030 at the earliest. Therefore, the site will be master planned to achieve total inorganic nitrogen removal down to 10 mg/L, but we only recommend installing the infrastructure required to meet the proposed ammonia limits of 7 mg/L at this time. It should be noted that all costs presented in the Master Plan are for treatment to the long-term permit limits of TP < 0.5 mg/L and ammonia <7 mg/L.

The greenfield alternatives assume construction of a new facility that can be optimized to your specific needs, so you aren't encumbered by the limitations of existing infrastructure. All of these alternatives will utilize UV disinfection and will meet the immediate anticipated permit limits of TP < 1 mg/L and ammonia < 7 mg/L at plant startup. With the master-planned addition of proposed processes these alternatives will meet future anticipated permits as they are implemented.

Discussion regarding a regionalization alternative is also included.

3.1 No Action

For wastewater treatment facility planning, a "No Action" alternative must be considered as a requirement of the Utah Division of Water Quality (DWQ). For Spanish Fork and Mapleton, No Action is not viable due to pending nutrient regulations that require process upgrades, infrastructure that needs repair or replacement, and additional capacity needed to support these growing communities.

While the eventual consequences of the No Action alternative can be predicted, the actual timing, magnitude, and cost of these consequences are hard to estimate but would likely include emergency engineering, equipment purchase, electrical and structural replacement costs (which are generally significantly higher than planned activities), regulatory fines, intensified regulatory response efforts, and litigation and/or remediation fees associated with environmental impacts and property damage. The cost of fines for regulatory exceedences over 20 years would be considerable, potentially more than the cost to construct a new treatment facility.

Based on discussions with Spanish Fork and Mapleton, the No Action alternative is not considered for the reasons listed above and will not be discussed any further in this facility plan.

3.2 Existing Site

Several retrofit alternatives have been evaluated to address current deficiencies and future treatment requirements. Each alternative was modeled using the projected 2040 flows and loads in Table 1-7: Flow and Load Summary for Existing and 2040 to determine equipment sizing and its feasibility for a retrofit application**.** All alternatives included in the evaluation meet the Startup/2023 design criteria outlined in Table 1-10: Existing and Projected UPDES Permit Limits for Planning.

All alternatives were originally evaluated utilizing existing primary clarification infrastructure, which results in higher quality biosolids that can be land applied. However, the modeling indicated for these scenarios that additional tank volumes and higher carbon sources (such as methanol, Micro-C, etc) will be required to replace carbon lost in the primary sludge in order to achieve adequate phosphorus and nitrogen removal. Also, metal salts (alum or ferric chloride) addition for phosphorus removal will be required.

Therefore, most of the scenarios described below abandon not only primary clarification, but both the primary and secondary anaerobic digesters in favor of aerated solids holding tanks. This allows higher concentrations of BOD to enter the process, which ultimately improves biological nutrient removal performance for the liquid stream and compliance with UPDES permit limits. Biosolids will likely need to be landfilled under these scenarios unless additional solids handling processes are implemented.

Based on the condition assessments, capacity analysis, and BioWin modeling results, all retrofit alternatives propose to demolish the existing headworks, primary clarifiers, primary clarifier pump station, intermediate pump station, and the trickling filter. The existing digesters will be repurposed to aerated sludge holding tanks. A new headworks building will be constructed where the west primary clarifier is currently located and a new intermediate pump station will be constructed where the abandoned trickling filter currently stands. Due to capacity concerns and anticipated UPDES permit limits for chlorine residual and dissolved oxygen, all retrofit alternatives assume conversion of one side of the chlorine contact chamber to UV disinfection. The other chlorine contact chamber will remain intact to provide backup redundancy for the disinfection system and room for future UV expansion.

None of the evaluated retrofit alternatives discussed below in Chapter 3 include improvements to the belt filter press building, thickener building, sludge drying beds, and reuse water pump station as part of the Phase 1 improvements. If additional funds are available, the belt filter press could be replaced with redundant screw presses as part of the initial project. However, in order to reduce the impact to rate payers, it is proposed to maintain operation of the existing dewatering building until a future phase. The belt filter press appears to be operating satisfactorily at this time and there is adequate capacity. The sludge drying beds provide backup redundancy. As discussed in Chapter 4, some of these assumptions were revisited after selecting the preferred treatment technology through a series of design workshops with city staff.

These alternatives are described below and illustrated graphically in the subsequent site plan figures. All biological treatment processes have been modeled at the 2040 maximum month flow rate of 8.4 MGD.

3.2.1. Activated Sludge (Anaerobic/Anoxic/Oxic – A2O) Retrofit

The anaerobic/anoxic/oxic (A2O) process is a type of activated sludge treatment that utilizes sequential anaerobic, anoxic, and aerobic stages for simultaneous, biological BOD and phosphorus removal. An anaerobic selector is established by mixing and contacting the BOD in the influent wastewater with recycled activated sludge in the absence of oxygen causing microbes to release any stored phosphorus. As a cost savings measure, the A/O process can be implemented at startup and then be converted to the A2O process (i.e. add anoxic zone to the treatment train) once the permit requirement for TIN < 10 mg/L is implemented. It is anticipated that chemical phosphorus removal would be required with this process, as it would be difficult to reliably achieve 1 mg/L total phosphorus biologically.

In the next step, wastewater is aerated in the oxic zone. Phosphorus accumulating organisms (PAOs) uptake soluble phosphorus, the remaining BOD is consumed, and ammonia is oxidized to nitrate via nitrifying bacteria. Sludge is then settled out in the secondary clarifiers and is either returned to the anaerobic zone or removed with the wasted sludge. The A2O process is a widely used wastewater treatment process at both small and large facilities and is favored for its simplicity, high efficiency, and low energy consumption. Table 1-1 summarizes the pros and cons of the A2O process.

Table 3-1: A2O – Pros and Cons

Pros	Cons
• Proven and simple process, many installations	• Large additional footprint is required
• Low to medium O&M cost	• Chemical phosphorus removal requires addition of carbon source and metal salts (alum or ferric chloride) along with tertiary filters to achieve TP < 1 mg/L
• Can achieve low ammonia and TP	• During winter months there is possibility of process going in and out of nitrification, if process is not closely controlled
• The anoxic zone in the A2O process can provide the ability to meet low total nitrogen limits.	

Two A2O retrofit alternatives were investigated. The A2O retrofit alternative Option 1, shown in

Figure 3-1, converts the existing STM Aerotor basins to A2O basins each including an anerobic zone and an anoxic zones which are then followed by two oxic zones with new aeration equipment. To meet 2040 flow requirements, two new larger size A2O basins and a third new similar size secondary clarifier is needed. Depending on influent BOD and carbon removal in the primary clarifier, this retrofit option will require additional carbon and metal salt addition along with cloth media filters prior to UV disinfection to achieve TP < 1 mg/L. Option 1 proposes continued operation of one primary clarifier, the existing sludge anaerobic digestion, dewatering system, and land application of biosolids with no additional improvements. The A2O retrofit alternative Option 1 process flow diagram is demonstrated in

Figure **3-2**. The A2O retrofit alternative Option 2 is similar to Option 1 but without the primary clarifier and digesters (**Figure 3-3**). Similar to Option 1, an A2O retrofit of the existing STM Aerotor basins is proposed. This option can eliminate the addition of metal salts and tertiary filters, due to higher carbon going to the secondary treatment for TP removal. However, it is recommended to install tertiary filters to ensure reliable TP removal during plant upsets in order to meet TP < 1 mg/L. Removal of the primary clarifier and digesters will reduce 10 to 25% of nitrogen and phosphorus loads back to the main liquid stream, resulting in more reliable treatment. Further, landfill discharge fees may be offset by less energy required for sludge heating and mixing and to maintain & operate the primary clarifier. Methanol addition may only be required during very low influent BOD scenarios (possibly due to high I&I). The existing primary digesters will be retrofitted with blowers and diffusers to become aerated sludge holding tanks and the secondary digesters will be demolished. Waste activated sludge from the final clarifiers will be pumped to the aerated solids holding tanks and then to the belt press for dewatering before going to the landfill for disposal. Return activated sludge will be pumped back the A2O process.

Due to increased process control requirements and the risk of in and out nitrification during winter months, it may be difficult for this treatment technology to meet low TIN limits. The process flow diagram for the A2O retrofit alternative Option 2 is shown in Figure 3-4.

Both A2O alternative options are estimated to require one additional operator.

3.2.2. Membrane Bioreactor (MBR) Retrofit

The membrane bioreactor (MBR) process is a combination of biological wastewater treatment and membrane filtration used to separate the final effluent from the mixed liquor. The membrane is suspended in the mixed liquor and the product is drawn through the membrane with a pump. The membrane has a very small pore size of less than 0.1 microns which means that the effluent is high quality (low BOD and suspended solids). The high-quality effluent enables the effluent to be reused in the City's pressure irrigation system or be discharged into sensitive receiving waters. MBR technology is also an attractive treatment option when treating high strength wastes as the membrane area is determined based on hydraulic load and not biological load.

Another benefit of MBRs is that they can easily be modified to achieve denitrification with the construction of an anoxic zone before the aeration basin, resulting in decreased aeration requirements and consequently the power requirements. MBRs are an attractive treatment alternative to conventional processes for all plant sizes when land available for construction is limited, sludge production should be minimized, and where high-quality effluent is required. Table 3-2 summarizes the pros and cons of the MBR process.

Figure 3-1: A2O Retrofit Alternative – Option 1

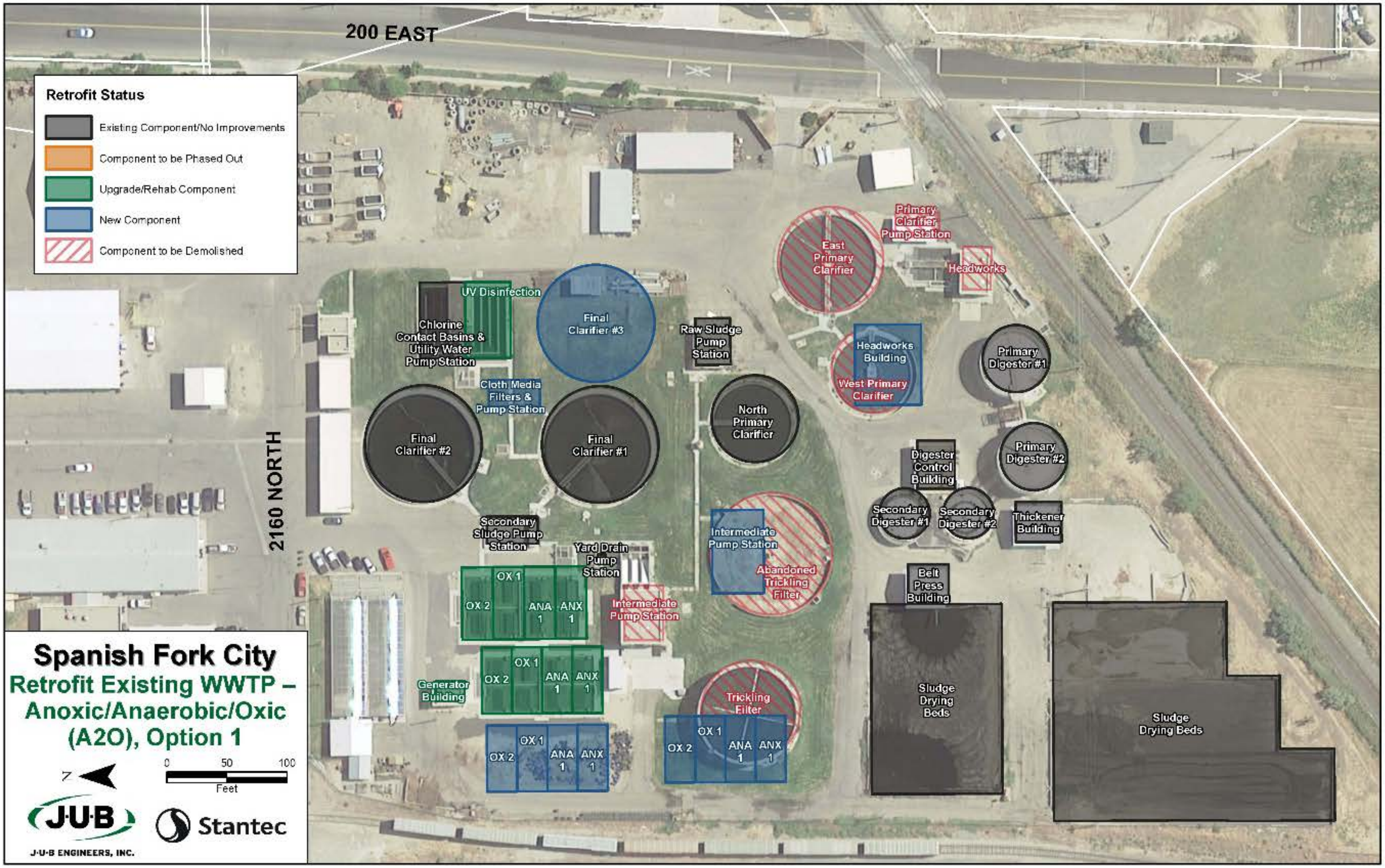


Figure 3-2: Option 1 Process Flow Diagram

Spanish Fork: Retrofit Existing WWTP - Anoxic/Anaerobic/Oxic (A2O) - Option 1

A process retrofit option for the Spanish Fork Wastewater Treatment Facility is the anoxic/anaerobic/oxic (A2O) process outlined in the process flow diagram below. Facility improvements include a new headworks with coarse screens sized to handle increased influent flows projected for the planning period and as well as new vortex style grit removal chambers to improve removal and prevent the addition of oxygen ahead of the A2O process, a new intermediate pump station to lift flows into the A2O process basins as well as house new RAS/WAS pumps, chemical storage for phosphorus removal, and new electrical gear. The STM Aerotor equipment would be removed and replaced with new mixing equipment for the anoxic and anaerobic zones and aeration equipment for the oxic zones. The one primary clarifier that is in better condition than the other two remains in service and a bypass line to take more influent flow directly to the A2O process would be installed. Digestion of primary and thickened secondary solids would continue, although landfill disposal will be required as the higher concentration of secondary solids prevents land application disposal. The chlorine contact chamber will be retrofit to UV disinfection due to regulatory and capacity concerns.

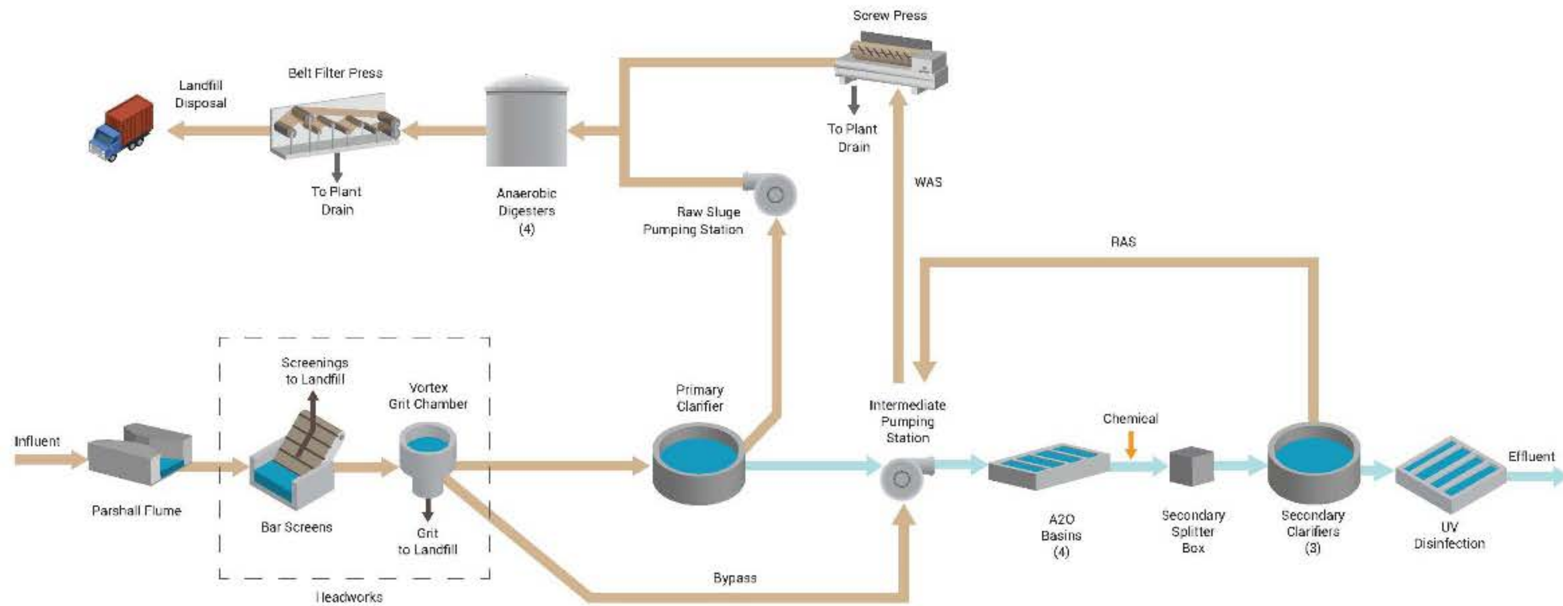


Figure 3-3: A2O Retrofit Alternative – Option 2

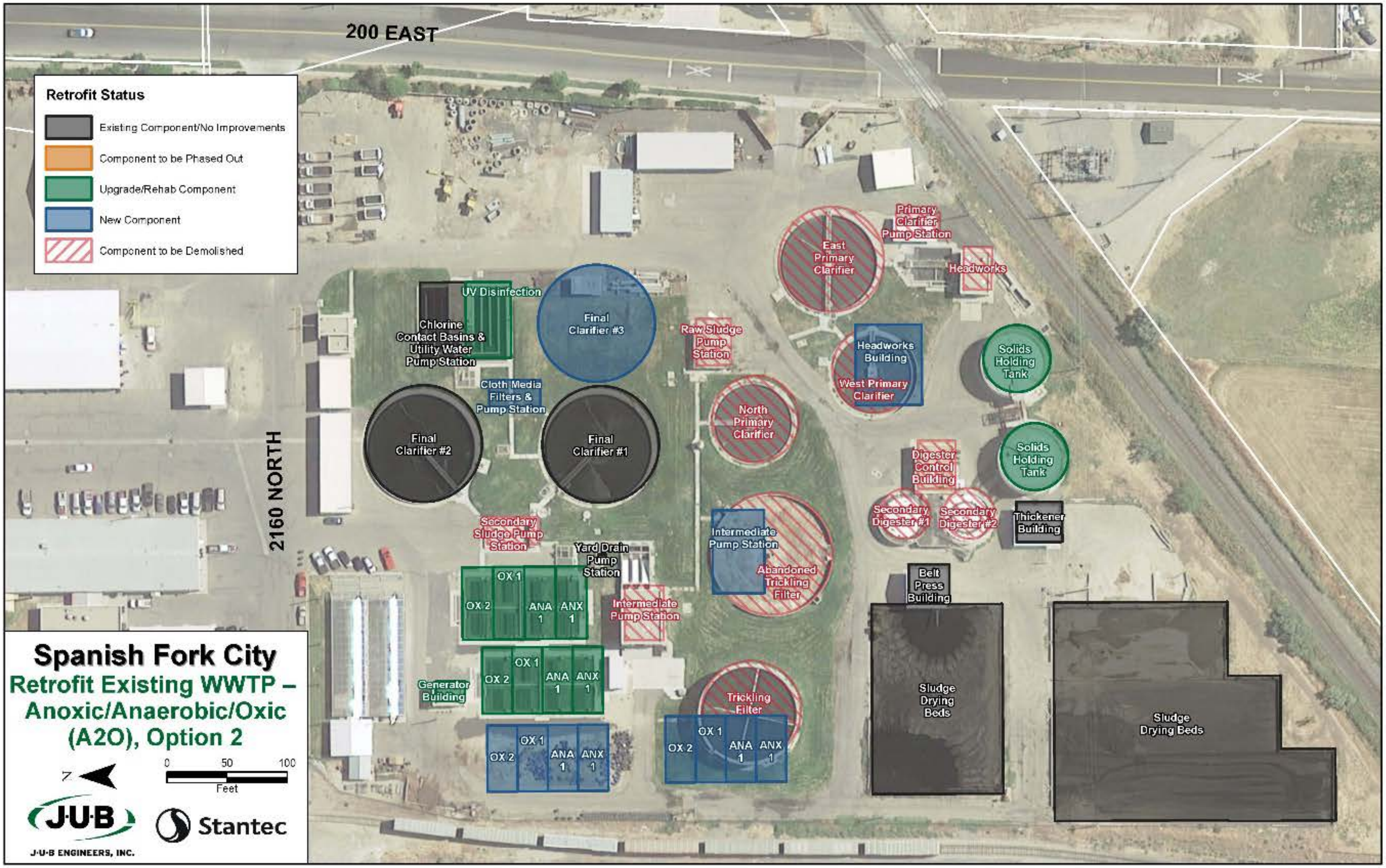


Figure 3-4: Option 2 Process Flow Diagram

Spanish Fork: Retrofit Existing WWTP - Anoxic/Anaerobic/Oxic (A2O) - Option 2

A process retrofit option for the Spanish Fork Wastewater Treatment Facility is the anoxic/anaerobic/oxic (A2O) process outlined in the process flow diagram below. Facility improvements include a new headworks with coarse screens sized to handle increased influent flows projected for the planning period and as well as new vortex style grit removal chambers to improve removal and prevent the addition of oxygen ahead of the A2O process, a new intermediate pump station to lift flows into the A2O process basins as well as house new RAS/WAS pumps, chemical storage for phosphorus removal, and new electrical gear. The STM Aerotor equipment would be removed and replaced with new mixing equipment for the anoxic and anaerobic zones and aeration equipment for the oxic zones. All primary clarifiers, secondary sludge thickening, and older anaerobic digestion would be removed and replaced with mechanical dewatering and landfill disposal of solids. The two newest digesters would be retrofitted to sludge holding tanks. The chlorine contact chamber will be retrofit to UV disinfection due to regulatory and capacity concerns.

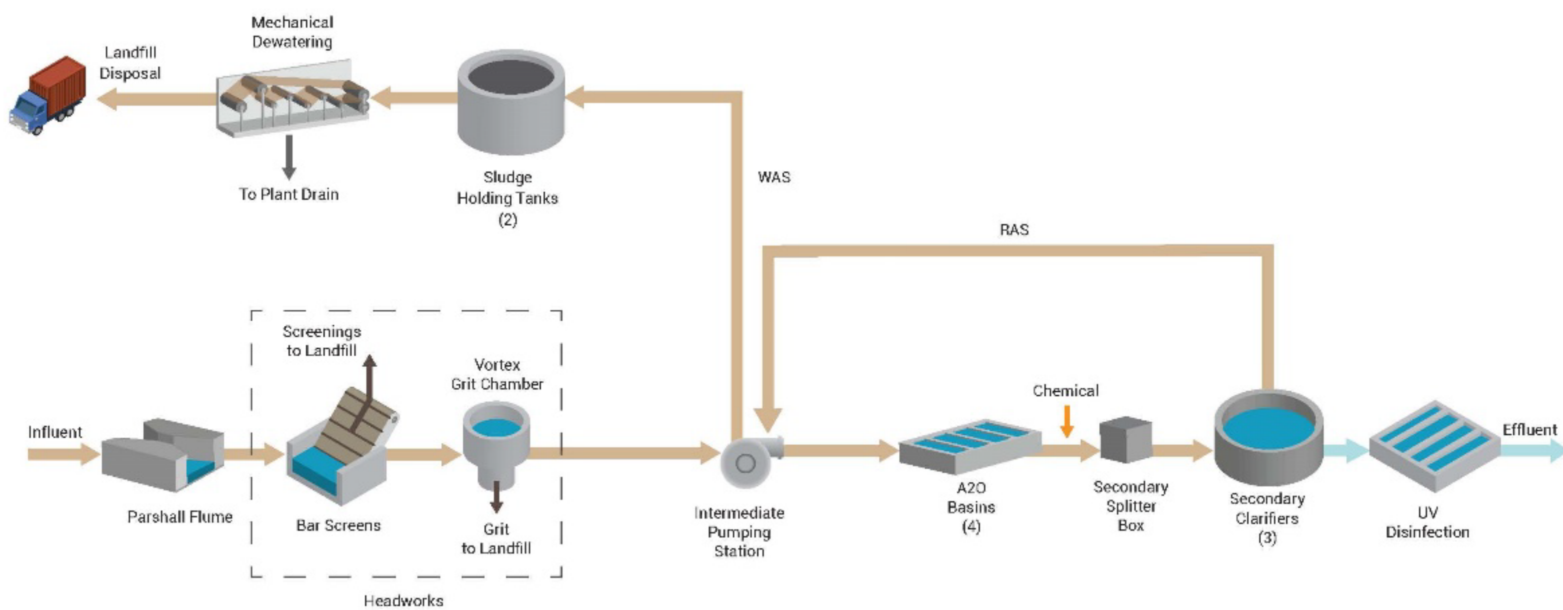


Table 3-2: Membrane Bioreactor Process – Pros and Cons

Pros	Cons
• High quality effluent (reuse compatible)	• Medium to High O&M cost
• MBRs operate at high mixed liquor concentration which greatly reduces footprint.	• Increased complexity due to additional equipment and cleaning of membranes.
• MBR processes can fit within existing infrastructure (repurposed Aerotor basins and secondary clarifiers) to meet 2040 flows and loads and can achieve TIN < 10 mg/L	• Flow equalization may be required. Existing primary clarifier or digester tankage could potentially be utilized for EQ if required.
• Seasonal reuse in pressure irrigation system reduces nutrient load to Utah Lake and relaxed effluent permit limits can be negotiated	• Depending on available carbon to MBR, chemical phosphorus removal may or may not required
• Improved constructability and work sequencing due to small footprint and use of existing infrastructure	
• Provides ability to meet an annual average of 1.0 mg/L Total Phosphorus without chemical addition.	

Figure 3-5 presents a site layout for the MBR retrofit alternative. Duty/standby fine screens and vortex-style grit removal system will be installed at the new headworks building prior to the MBR process. Fine screens (2mm screens) are required to protect the downstream membranes. The two existing STM Aerotor basins will be converted to conventional A20 basins by retrofitting the existing basins with an anaerobic and two oxic zones and constructing a new basin that will provide the anoxic zone for the A2O process. One of the existing secondary clarifiers will be converted to an MBR basin. The new MBR basin will be covered so the membranes are protected from dust and debris. The other existing secondary clarifier will be reserved for future retrofitting into an MBR to achieve 12 mgd flow capacity. Depending on very low influent BOD, metal salt (alum or ferric chloride) addition prior to entering the MBR basin may be required for phosphorus removal. Overall, this option will reliably meet all future proposed permits.

Figure 3-6 presents the process flow diagram for this alternative.

This alternative and the remaining alternatives propose to discontinue the use of the existing primary clarification and digesters. Each of the remaining alternatives include retrofitting the existing primary digesters with blowers and diffusers to become aerobic sludge holding tanks. Waste activated sludge will be pumped to the aerated solids holding tanks. The secondary digesters will be demolished. Sludge from the aerobic holding tanks will be dewatered by the existing belt press before going to the landfill for disposal.

Retrofitting the existing treatment facility with an MBR alternative is estimated to require an additional two operators.

3.2.3. Integrated Fixed-Film Activated (IFAS) Sludge Retrofit

Integrated Fixed-Film Activated Sludge (IFAS) systems use fixed media in an activated sludge basin to encourage the growth of biomass. IFAS systems essentially increase the amount of available biomass to work with using high surface area media. IFAS media can be plastic or fabric. The amount and type of biomass that grows on the media depends on several factors, including loading, dissolved oxygen, temperature, solids retention time, etc. The fixed biomass combines with the suspended concentration to achieve a greater total biomass. IFAS can be used as a stand-alone system or in an addition to an activated sludge process. IFAS systems are often implemented at existing wastewater treatment plants to expand the capacity of the activated sludge system within the same tank volume by providing more biomass. Table 3-3 summarizes the pros and cons of the IFAS process.

Table 3-3: Integrated Fixed-Film Activated Sludge Process – Pros and Cons

Pros	Cons
• Proven and simple process, many installations	• Less flexibility and operator control
• Moderate O&M	• Periodic media replacement
	• Depending on the secondary clarifier performance, this option may require tertiary filters to meet TP < 1 mg/L.

An IFAS retrofit alternative is presented in **Figure 3-7**. The two existing STM Aerotor basins are converted to traditional anaerobic zone basins followed by an IFAS basin. To meet flow requirements two new, slightly larger (compared to the existing STM Aerotor Basins) anaerobic/IFAS basins and a third new secondary clarifier will be needed. This option will not require tertiary filters; however, we recommend providing filters to achieve reliable TP removal during any process upset. In the case of low influent BOD, methanol and metal salts (alum or ferric chloride) addition prior to the clarifiers may be required for phosphorus removal. The process flow diagram for this alternative is shown in Figure 3-8.

The IFAS retrofit alternative is estimated to require an additional one to two operators.

Figure 3-5: MBR Retrofit Alternative

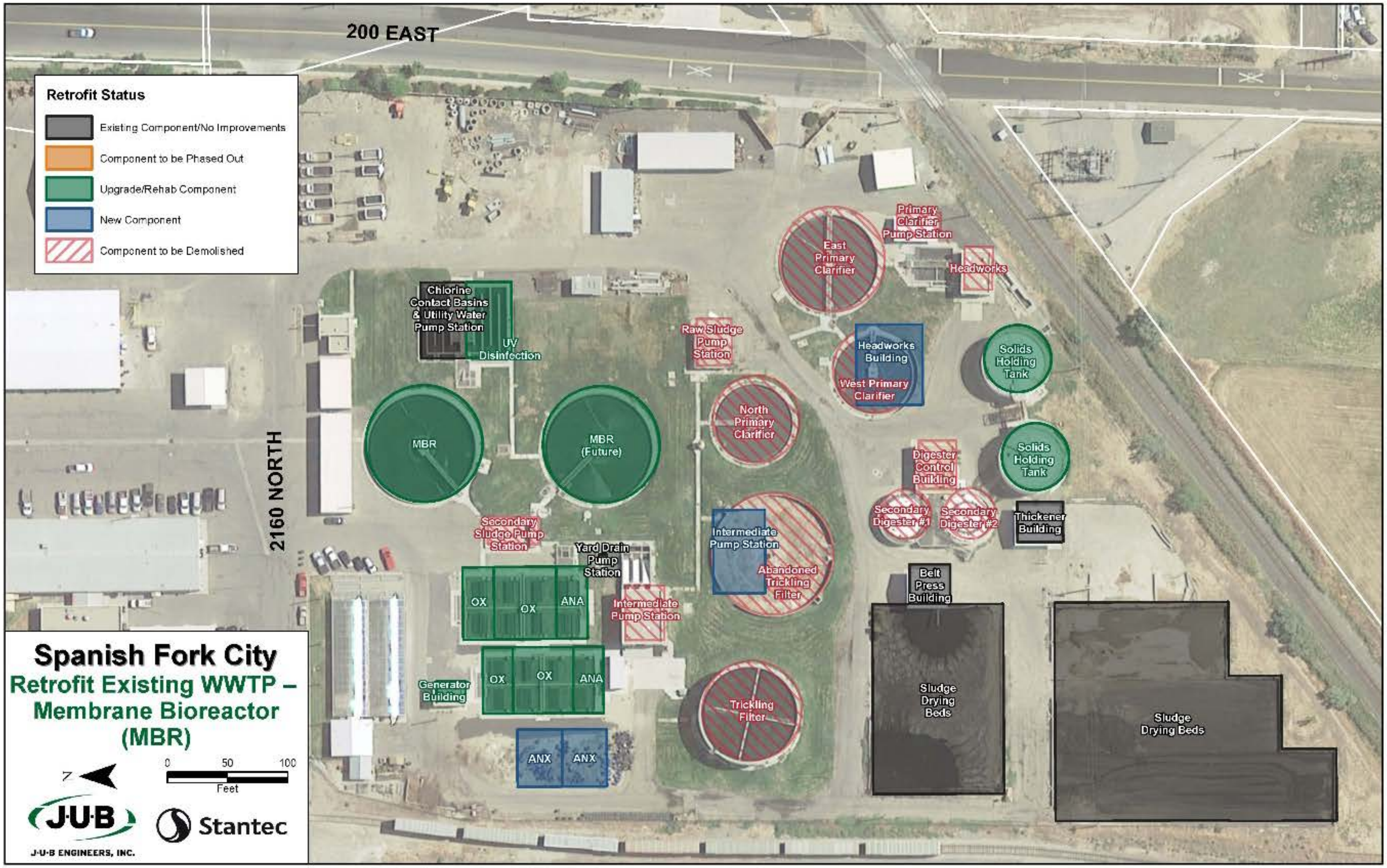


Figure 3-6: MBR Process Flow

Spanish Fork: Retrofit Existing WWTP - Membrane Bioreactor (MBR)

A process retrofit option for the Spanish Fork Wastewater Treatment Facility is an improved aeration process coupled with membrane bioreactors for improved solids separation and effluent quality. Facility improvements include a new headworks with coarse and fine screens sized to handle increased influent flows projected for the planning period and as well as new vortex style grit removal chambers to improve removal and prevent the addition of oxygen ahead of the A2O process, a new intermediate pump station to lift flows into the A2O process basins as well as house new RAS/WAS pumps, aeration equipment, chemical storage for phosphorus removal, and new electrical gear. The STM Aerotor equipment would be removed and replaced with new mixing equipment for the anoxic and anaerobic zones and aeration equipment for the oxic zones. All primary clarifiers, secondary sludge thickening, and older anaerobic digestion would be removed and replaced with mechanical dewatering and landfill disposal of solids. The two newest digesters would be retrofitted to sludge holding tanks.

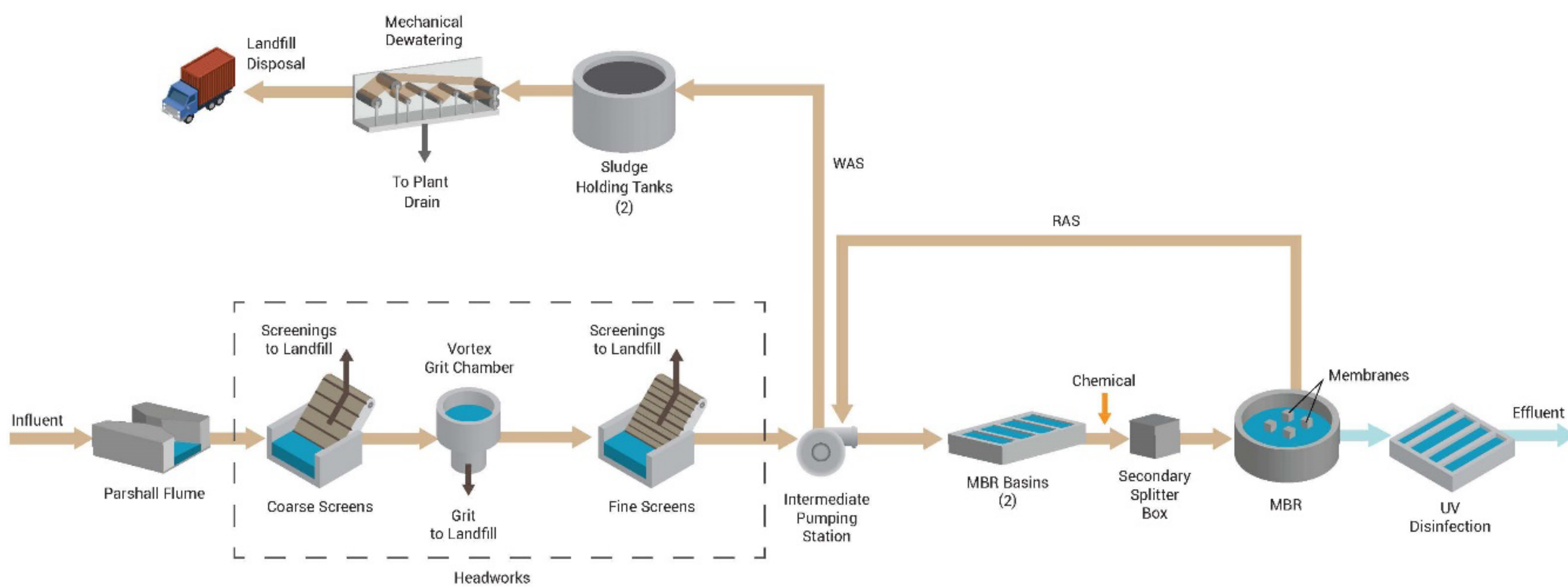


Figure 3-7: IFAS Retrofit Alternative

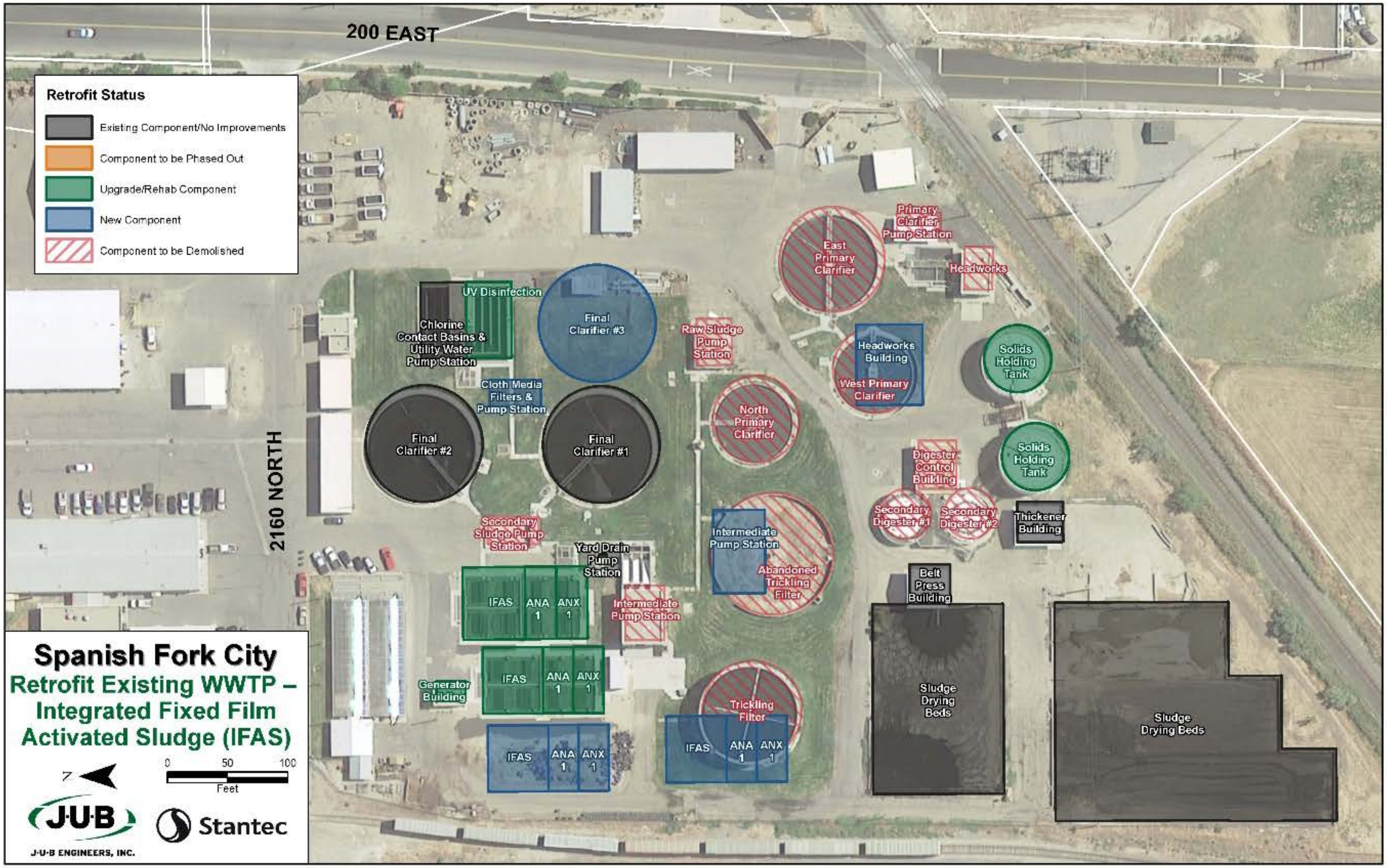
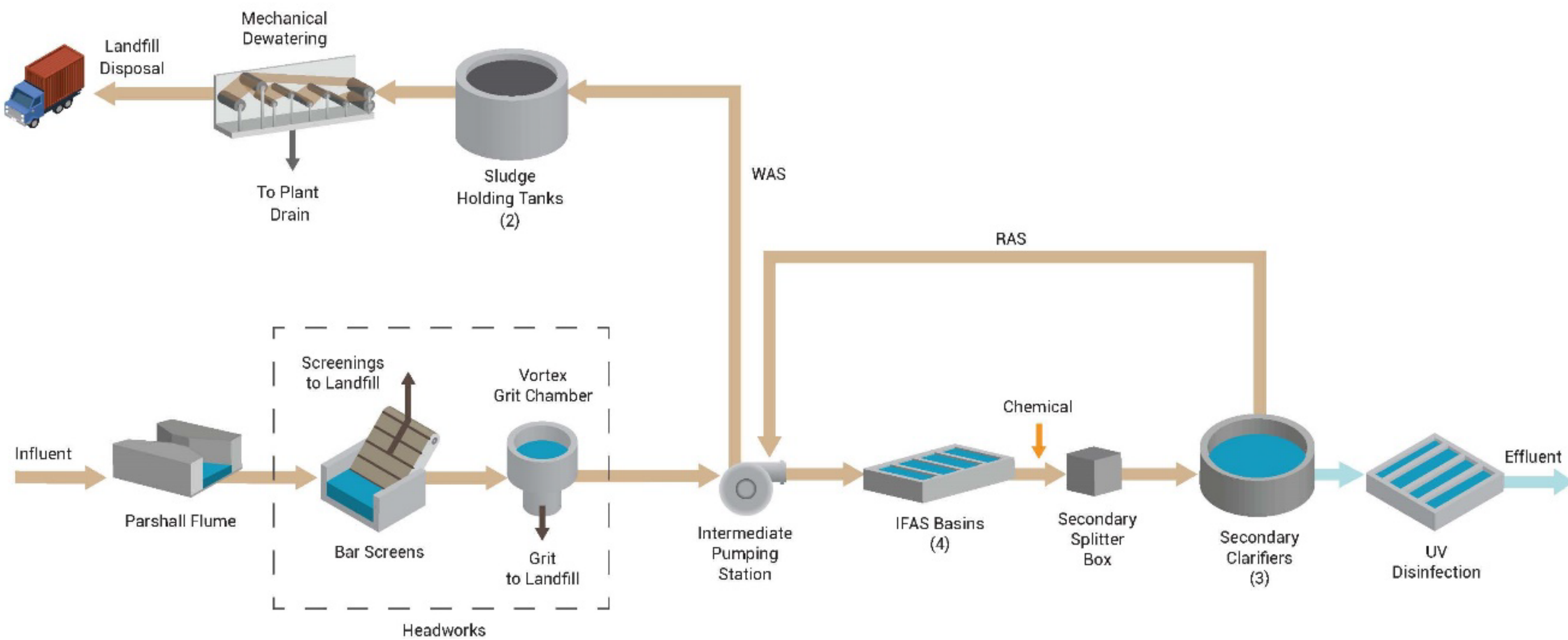


Figure 3-8: IFAS Retrofit Alternative Process Flow Diagram

Spanish Fork: Retrofit Existing WWTP - Integrated Fixed Film Activated Sludge (IFAS)

A process retrofit option for the Spanish Fork Wastewater Treatment Facility is the Integrated Fixed Film Activated Sludge (IFAS) process outlined in the process flow diagram below. Facility improvements include a new headworks with coarse screens sized to handle increased influent flows projected for the planning period and as well as new vortex style grit removal chambers to improve removal and prevent the addition of oxygen ahead of the A2O process, a new intermediate pump station to lift flows into the A2O process basins as well as house new RAS/WAS pumps, chemical storage for phosphorus removal, and new electrical gear. The STM Aerotor equipment would be removed and replaced with new mixing equipment for the anoxic and anaerobic zones and aeration equipment for the oxic zones. All primary clarifiers, secondary sludge thickening, and older anaerobic digestion would be removed and replaced with mechanical dewatering and landfill disposal of solids. The two newest digesters would be retrofitted to sludge holding tanks. The chlorine contact chamber will be retrofit to UV disinfection due to regulatory and capacity concerns.



3.2.4. BioMag Retrofit

The BioMag system is a patented technology that uses magnetite, fine particles of iron ore, to enhance the clarification process. Magnetite is a very dense material with a specific gravity of 5.2 and, when combined with either a chemical or biological floc, increases the specific gravity and thus the settling rate of the floc. The high rate settling enables capacity increases without new tank volume as the system can handle greater loads, flows, or both. It also allows operators greater control of the sludge blanket, contaminant removal, and load and flow management. Magnetite powder is added to the activated sludge process and then reclaimed from the waste activated solids prior to dewatering. Table 3-4: BioMag Process – Pros and ConsTable 3-4 summarizes the pros and cons of the BioMag process.

Table 3-4: BioMag Process – Pros and Cons

Pros	Cons
• Improved sludge settleability	• New technology with few installations, patent fees
• Smaller footprint, increased capacity in existing concrete	• Increased complexity
• Improved effluent water quality (sweep floc)	• Additional mixing in aeration basins
	• High O&M (replacement cost and availability of magnetite)
	• Depending on influent quality chemical phosphorus removal may be required (metal salt addition and tertiary filters)

A BioMag retrofit alternative is presented in Figure 3-9 in conjunction with the A2O Option 2 process previously described. See Figure 3-10 for the BioMag retrofit alternative's process flow diagram. The BioMag is added to the return activated sludge in the A2O process and recovered from the waste activated sludge. The two existing STM Aerotor basins will be converted to the A2O process. A third new A2O process basin and a third new secondary clarifier is also required to meet the design flows and loads of 2040. BioMag equipment for the addition and recovery of magnetite would be located in intermediate pump station.

The BioMag retrofit alternative is estimated to require an additional two to three operators.

Figure 3-9: BioMag Retrofit Alternative

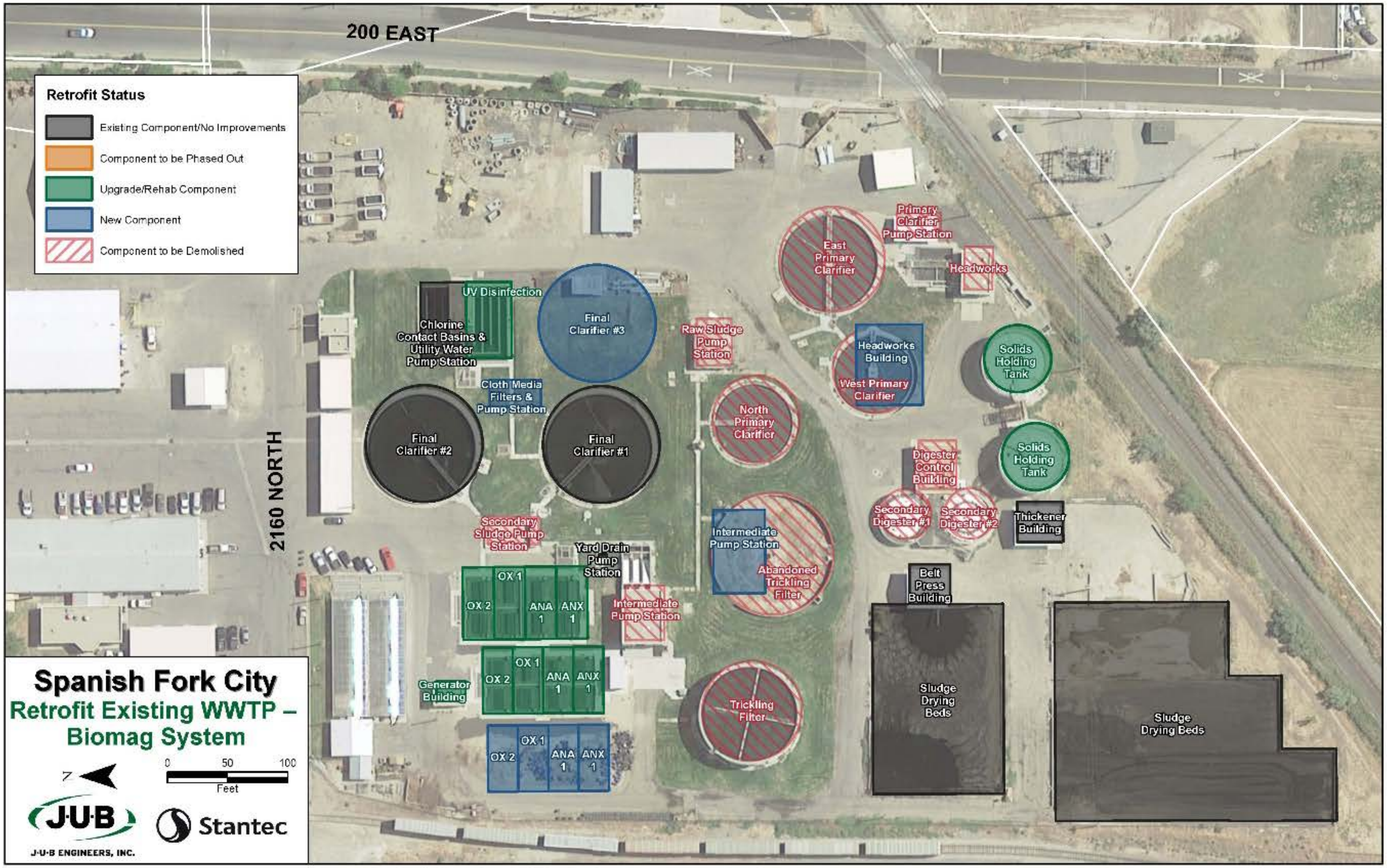
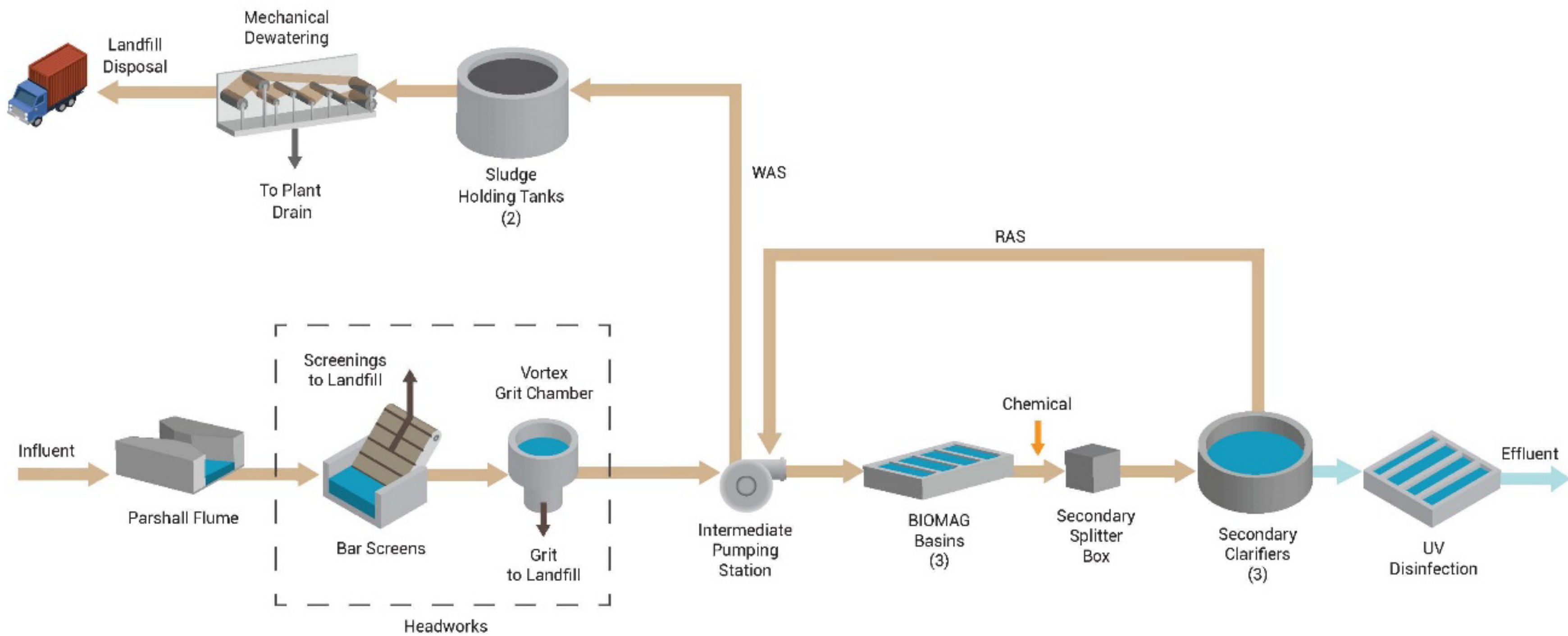


Figure 3-10: BioMag Retrofit Alternative Process Flow Diagram

Spanish Fork: Retrofit Existing WWTP - Biomag System

A process retrofit option for the Spanish Fork Wastewater Treatment Facility is the Biomag system. This retrofit includes construction of a new headworks building with coarse screening able to handle future projected flow needs and vortex grit chambers to prevent oxygen addition before the subsequent anoxic zones in the A2O basins. A new basin would need to be constructed after the headworks building as well as a third secondary clarifier for adequate secondary treatment. A new intermediate pump station would need to be constructed to lift flows into the A2O process basins as well as house the Biomag equipment needed to add and remove magnetite from the RAS and WAS streams, new RAS/WAS pumps, chemical storage for phosphorus removal, and new electrical gear. Modification to existing infrastructure would include converting the chlorine contact basin into a UV disinfection chamber and converting the newer of the four anaerobic digesters to sludge holding tanks. Without digestion, WAS thickening is no longer required and the dewatered sludge would need to be disposed of at the landfill, no longer meeting land application standards.



3.2.5. CLEARAS Retrofit

CLEARAS Water Recovery is a patented technology that provides tertiary biological wastewater treatment with microalgae filtration technology. Wastewater effluent from a secondary process is mixed with a blend of algae and other microorganisms and enters a photobioreactor typically housed in a greenhouse to control temperature. Algae growth within the photobioreactor consumes phosphorus and nitrogen. The treated water is then separated from algae and other microorganisms to produce a stream ready for discharge or reuse. The biomass (recovered phosphorus, nitrogen, and other constituents) is dewatered before it can then be sold to potential downstream markets such as plastics, foams, feeds, and/or soil enhancements. CLEARAS is often integrated as an extension to existing wastewater treatment infrastructure for tertiary applications. Table 3-5summarizes the pros and cons of the CLEARAS process.

Table 3-5: CLEARAS Process – Pros and Cons

Pros	Cons
• High effluent water quality (reuse compatible)	• New technology with few installations, patent fees
• Green process that is environmentally sustainable	• Increased complexity
	• Uncertainty with algal product sales (revenue recovery)
	• High O&M
	• Large footprint (greenhouse enclosures)

A CLEARAS retrofit alternative is presented in Figure 3-11. This alternative will remove primary clarification and continue to operate the existing STM Aerotor Basins and final clarifiers. To meet flow requirements, a third STM Aerotor Basin and a third final clarifier will be required. The CLEARAS system will treat effluent from the final clarifiers prior to UV disinfection. A new pump station will be required from the final clarifiers to the Clearas system.

This alternative gives the City the option to either abandon the primary clarifiers and anaerobic sludge digestion or continue to operate those processes under their current condition. If the primary clarifiers and digesters are not abandoned, then additional carbon source will be required for the Clearas System. This being the case, it is recommended the existing primary digesters be retrofitted with blowers and diffusers to become aerated sludge holding tanks and the secondary digesters will be demolished. Waste activated sludge from the final clarifiers will be pumped to the aerated solids holding tanks and then to the belt press for dewatering before going to the landfill for disposal.

CLEARAS is the most expensive alternative; however, depending on the quality and quantity of the product recovered the City can generate substantial income. This option becomes more viable when treating primary effluent and new construction for secondary treatment is not required. The process flow diagram for a CLEARAS retrofit alternative is shown in Figure 3-12.

The CLEARAS retrofit alternative is estimated to require an additional three to four operators.

Figure 3-11: CLEARAS Retrofit Alternative

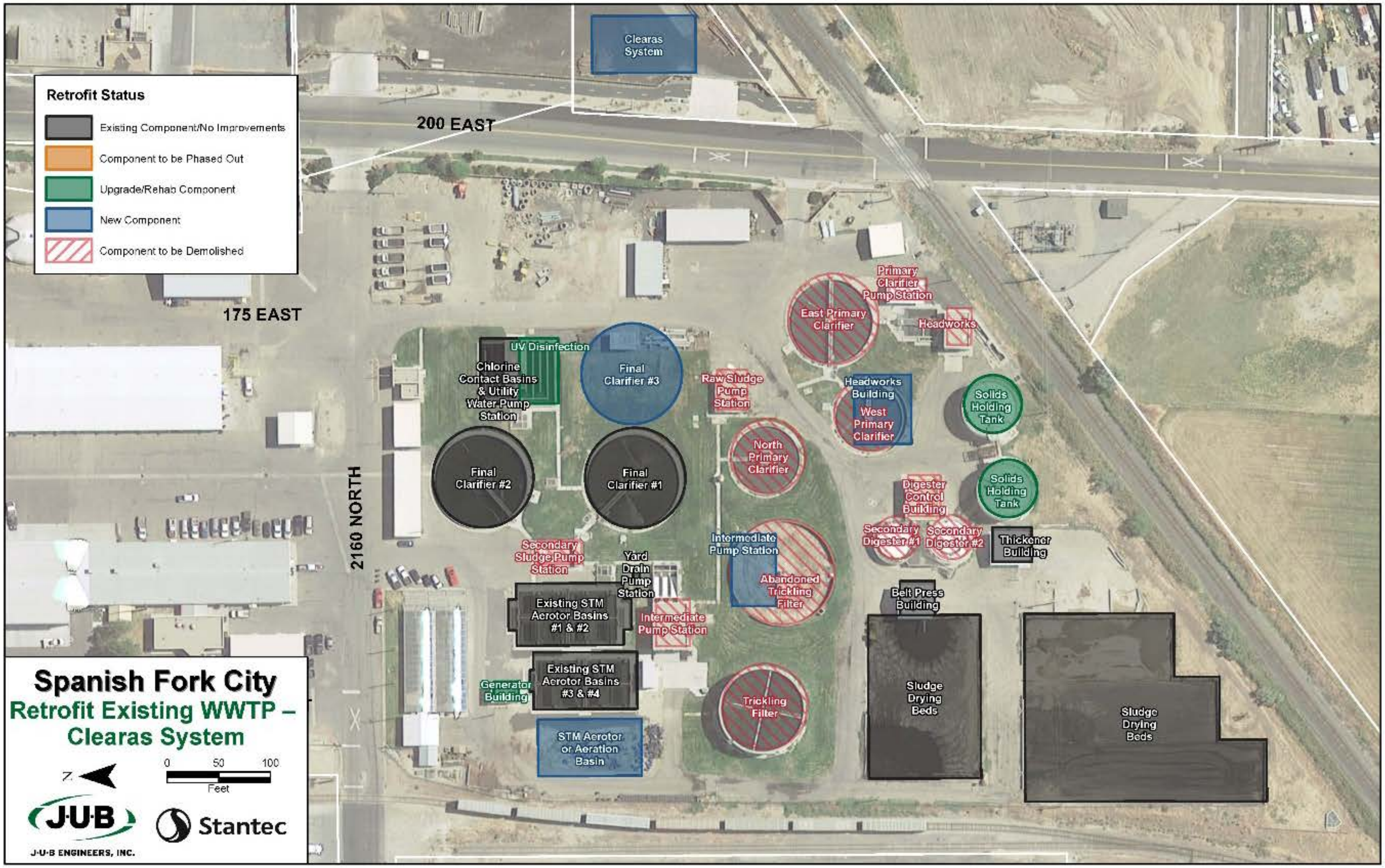
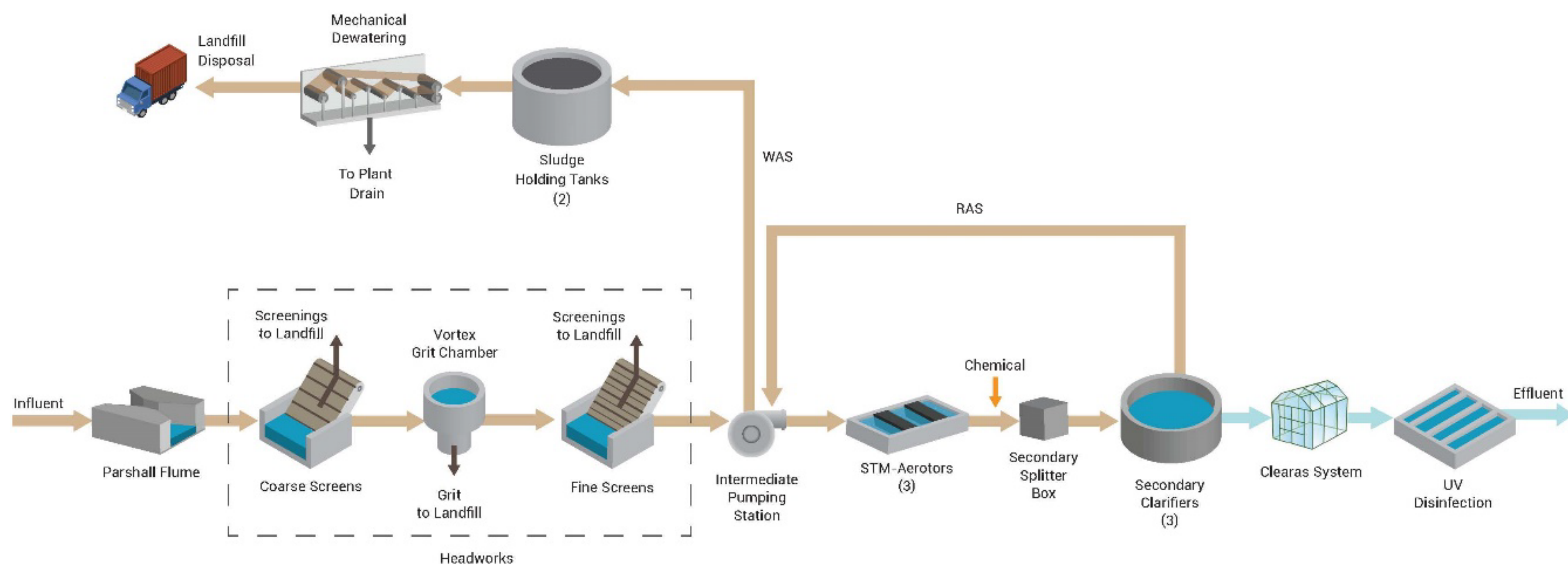


Figure 3-12: CLEARAS Retrofit Alternative Process Flow Diagram

Spanish Fork: Retrofit Existing WWTP - Clearas System

A process retrofit option for the Spanish Fork Wastewater Treatment Facility is the Clearas process outlined in the process flow diagram below. This retrofit includes construction of a new headworks building with coarse screening able to handle future projected flow needs as well as new grit chambers. A new basin would need to be constructed after the headworks building as well as a third secondary clarifier for adequate secondary treatment. A new intermediate pump station would need to be constructed to lift flows into the STM-Aerotor process basins as well as house new RAS/WAS pumps, chemical storage for phosphorus removal, and new electrical gear. A greenhouse would need to be built for the Clearas system which will be added on subsequent to the secondary clarifiers to provide additional nitrogen and phosphorus removal. Modification to existing infrastructure would include converting the chlorine contact basin into a UV disinfection chamber and converting the newer of the four anaerobic digesters to sludge holding tanks. Without digestion, WAS thickening is no longer required and the dewatered sludge would need to be disposed of at the landfill, no longer meeting land application standards.



3.2.6. AquaNereda Retrofit

The AquaNereda Aerobic Granular Sludge Technology is a patented technology that provides biological wastewater treatment, including enhanced nutrient removal, using aerobic granular biomass. Potential advantages of aerobic granular sludge include smaller footprint, less energy, and reduced chemical consumption compared to conventional activated sludge systems. Also, in contrast to conventional activated sludge systems, no secondary clarifiers or return sludge pumping stations are needed. The unique characteristics of the granular biomass allow for an optimized batch cycle process. There are three main phases to the cycle: simultaneous fill/draw, react, and fast settling. The duration of these phases depends on the specific wastewater characteristics, flow, and effluent standards. There are aerobic, anoxic, and anaerobic zones in the granules that allow for nitrification, denitrification, and VFA uptake/phosphorus release, respectively. These granules have excellent settling properties, thus a separate decant phase, as utilized for conventional sequencing batch reactors, is not required. Also, less chemicals are needed for nutrient removal due to the structure of the granules

Table 3-6 summarizes the pros and cons of the AquaNereda process.

Table 3-6: AquaNereda Process – Pros and Cons

Pros	Cons
• Low to Moderate O&M	• New technology with few installations, patent fees
• Consolidated footprint	• Increased complexity and the ability to maintain granular size sludge over a long period of time is unproven
• Better sludge settling	• Some type of chemical phosphorus removal required
• Promising technology for nutrient removal	• Batch process, therefore pre- and post-equalization is required.
	• Deeper basins are required making it difficult to retrofit into existing shallow basins

A site plan for retrofitting the AquaNereda system at the existing treatment facility is shown in Figure 3-13. The two existing secondary clarifiers will be repurposed to AquaNereda basins and two new basins of equivalent size will be constructed as AquaNereda Reactors. Converting the existing secondary clarifiers to AquaNereda Reactors will require raising the side walls by at least 3 ft to achieve the required reactor volume and side water depth. This would make the sequencing of this option a major challenge. Instead of using the existing secondary clarifiers it is recommended to construct four new AquaNereda Reactors. Later, the existing secondary clarifiers can be repurposed to AquaNereda Reactors to achieve a future 12 mgd flow capacity. For both options, one of the existing STM Aerotor basins will be retrofitted for pre-secondary buffer equalization and the other will be retrofitted as a sludge buffer tank. A new STM Aerotor or conventional diffused aeration basin and a new post-secondary equalization will need to be constructed to complete the required treatment. This option will not require tertiary filters; however, we recommend providing filters to achieve reliable TP removal during any process upset. See Figure 3-14 for a process flow diagram for this alternative.

The retrofit AquaNereda alternative is estimated to require an additional one to two operators.

Figure 3-13: Nereda Retrofit Alternative

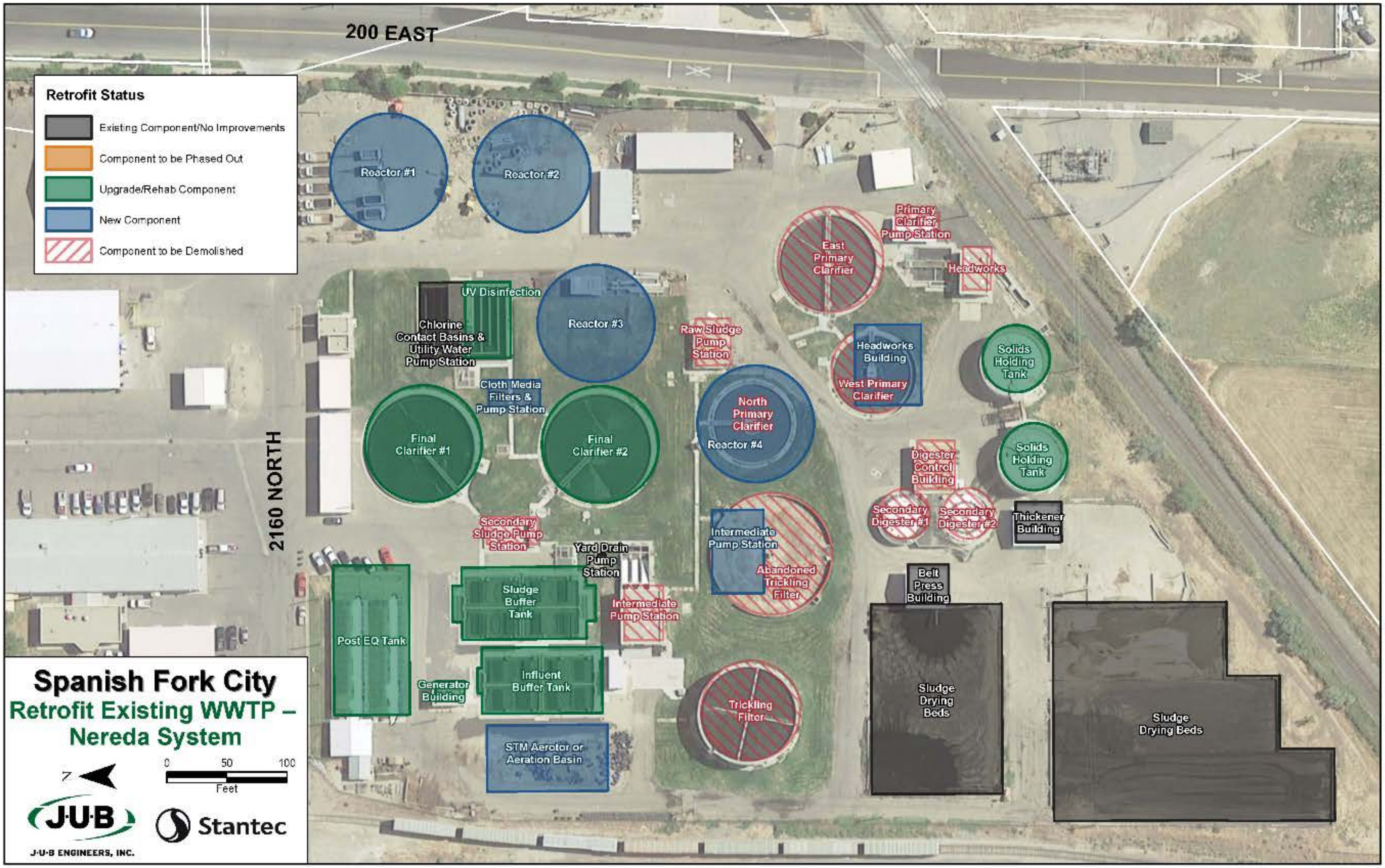
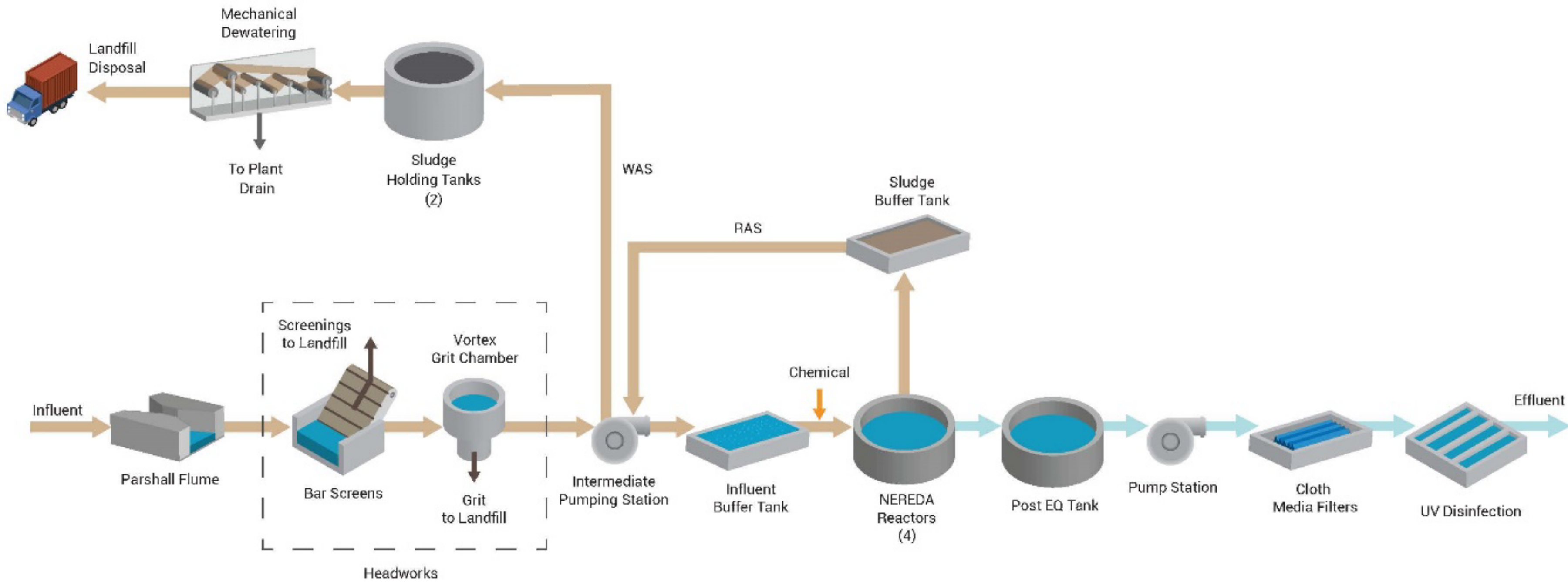


Figure 3-14: Nereda Retrofit Alternative Process Flow Diagram

Spanish Fork: Retrofit Existing WWTP - NEREDA System

A process retrofit option for the Spanish Fork Wastewater Treatment Facility is the Nereda system outlined below. This retrofit includes construction of a new headworks building with coarse screening and vortex grit chambers able to handle future projected flow needs. The existing basins would be retrofitted to become influent and sludge buffer tanks. Four new Nereda reactors would need to be constructed for secondary treatment.. A new intermediate pump station would need to be constructed to lift flows into the Nereda reactors as well as house new RAS/WAS pumps, chemical storage for phosphorus removal, and new electrical gear. A post equalization tank would need to be constructed or retrofitted into an existing secondary clarifier and subsequent cloth media filters would need to be constructed. Modification to existing infrastructure would include converting the chlorine contact basin into a UV disinfection chamber and converting the newer of the four anaerobic digesters to sludge holding tanks. Without digestion, WAS thickening is no longer required and the dewatered sludge would need to be disposed of at the landfill, no longer meeting land application standards.



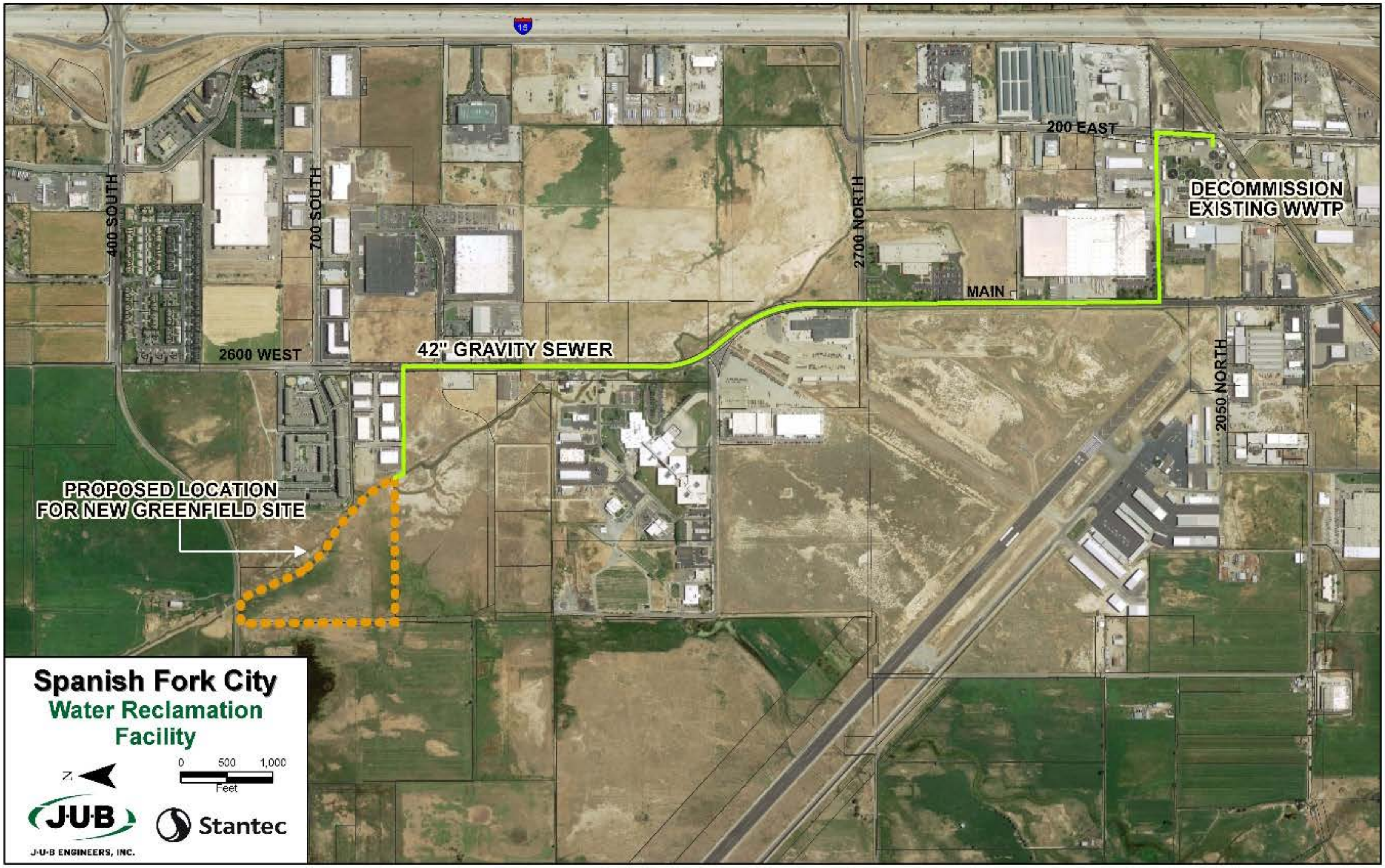
3.3 Greenfield Site

Abandoning the existing WWTP and developing a greenfield site for a new Water Reclamation Facility was also considered as an alternative. A potential 11.5-acre greenfield site was identified near 3600 N and 400 S, north of the existing WWTP as shown in Figure 3-15. Since the proposed greenfield site is approximately 25 feet lower in elevation relative to the existing WWTP, it is anticipated the sewer could gravity flow to the new location. To convey raw wastewater to the greenfield location, approximately 9,600 feet of new 42” gravity sewer will need to be installed. Two crossings of Dry Creek will be required. It is anticipated the existing Jail and Industrial sewer lift stations can be abandoned and tied into the new trunk line. The WRF effluent will be discharged into Dry Creek, which is adjacent to the proposed greenfield location. This is the same waterbody as the existing discharge, which will simplify UPDES discharge permit negotiations.

The greenfield alternatives are described below. Several of the treatment processes that were discussed in the retrofitting alternatives are also being considered for the greenfield alternative. All of the greenfield alternatives are designed to meet the start-up permit limits with easy expansion to comply with the anticipated future 2030-2035 permit limits of TP < 0.5 mg/L and TIN < 10 mg/L.

As discussed in Chapter 4, a new greenfield site located closer to the existing facility recently became available. This new site was discussed extensively with city staff during the design workshops. Cost opinions and specific analysis were developed for the new site in Chapter 4, this information is supplemental to the greenfield analysis presented below at an alternate site. Although more expensive than the retrofit options, the greenfield alternatives reduce the risk of construction sequencing and permit violations inherent in a retrofit project and they also set the facility up for future regionalization options.

Figure 3-15: Potential Greenfield Site Location



3.3.1. Activated Sludge

A greenfield activated sludge alternative will look similar to the retrofit A2O Alternative – Option 2. That said, with new construction the A2O basins can be sized appropriately to fit the application and reduce the number of basins. Figure 3-16 shows the site layout of the greenfield A2O alternative and Figure 3-17 demonstrates the process flow diagram.

A new greenfield treatment alternative is estimated to require one additional operator.

Figure 3-16: Greenfield A2O Alternative

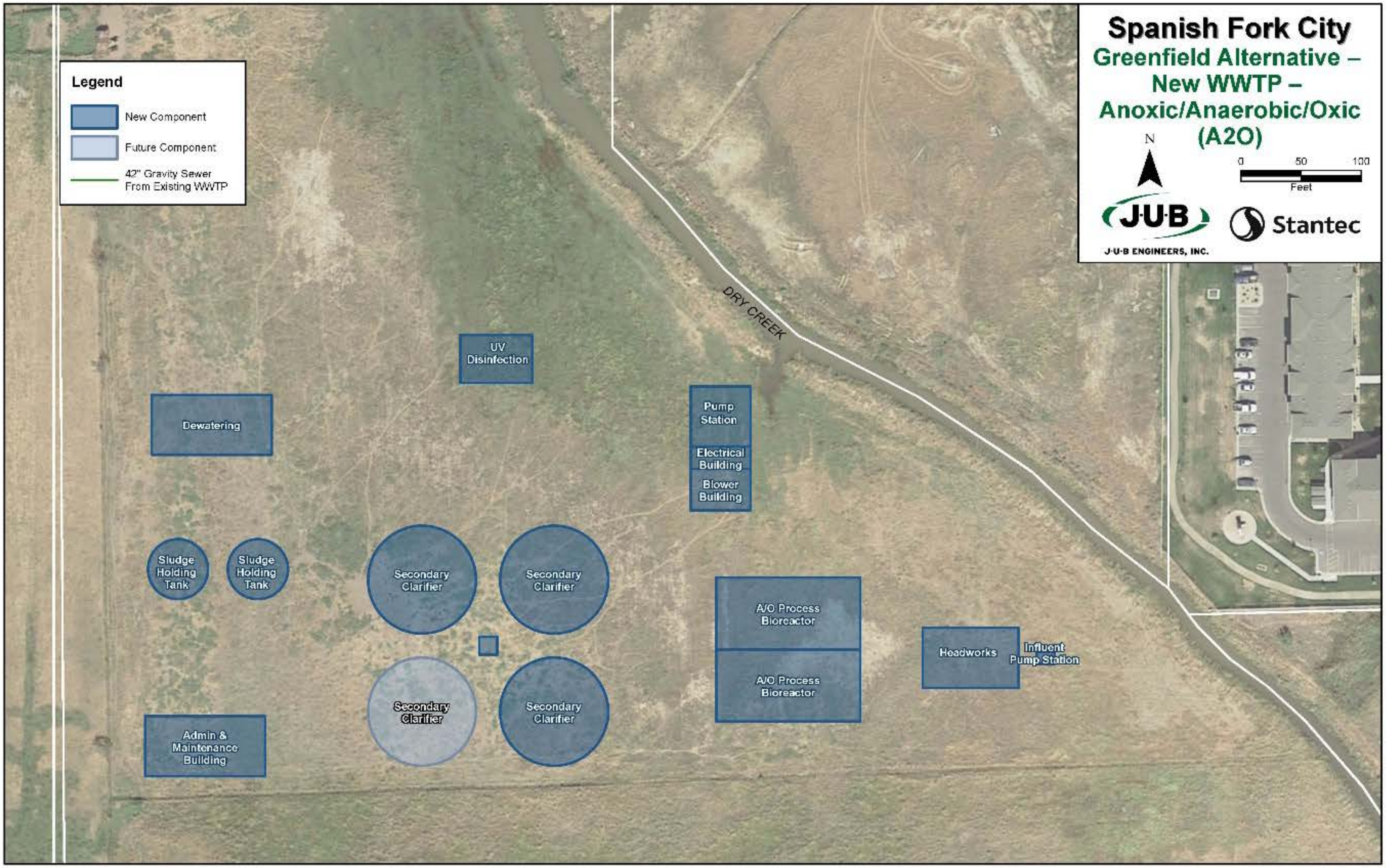
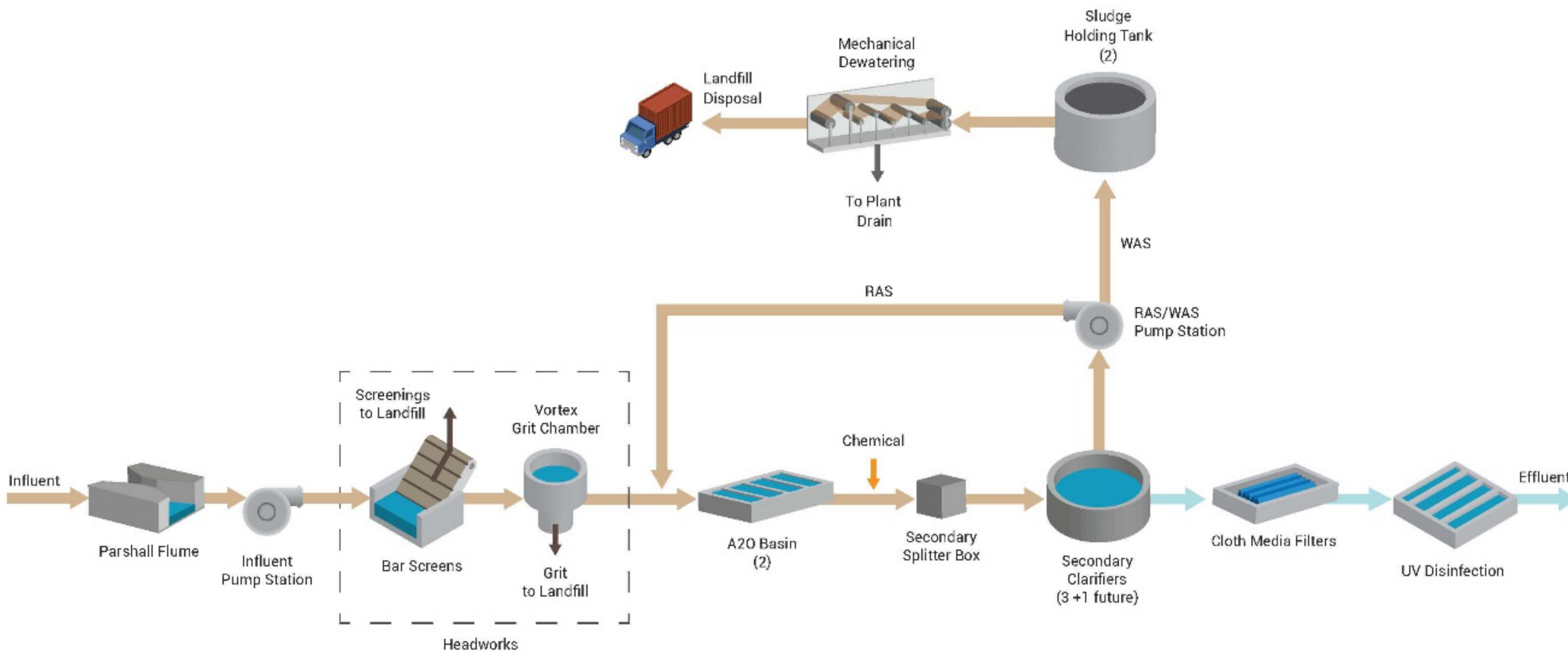


Figure 3-17: Greenfield A2O Process Flow Diagram

Spanish Fork: New WWTP - Anoxic/Anaerobic/Oxic (A2O)

A greenfield option for the Spanish Fork Wastewater Treatment Facility is the anoxic/anaerobic/oxic (A2O) process outlined below in the process flow diagram. This design includes a headworks building with a lift station, coarse screening, and vortex grit removal able to handle future projected flow needs. The headworks is followed by two trains of the A2O process with mixing in the anoxic and anaerobic zones and aeration in the oxic zones. The secondary treatment process ends with three secondary clarifiers. Effluent from the secondary clarifiers enters a UV chamber before discharge into dry creek while a RAS/WAS pump station recycles RAS back to the basins and wastes WAS to sludge holding tanks. The WAS is then mechanically dewatered before landfill disposal.



3.3.2. Membrane Bioreactor

A greenfield MBR alternative was also investigated. Figure 3-18 presents the MBR greenfield alternative. The process flow is similar to the retrofit alternative, see Figure 3-19 for the process flow diagram. However, the bioreactor and MBR basins are larger in volume and fewer bioreactor/MBR basins are required.

A greenfield MBR alternative is estimated to require an additional two operators.

Figure 3-18: Greenfield MBR Alternative

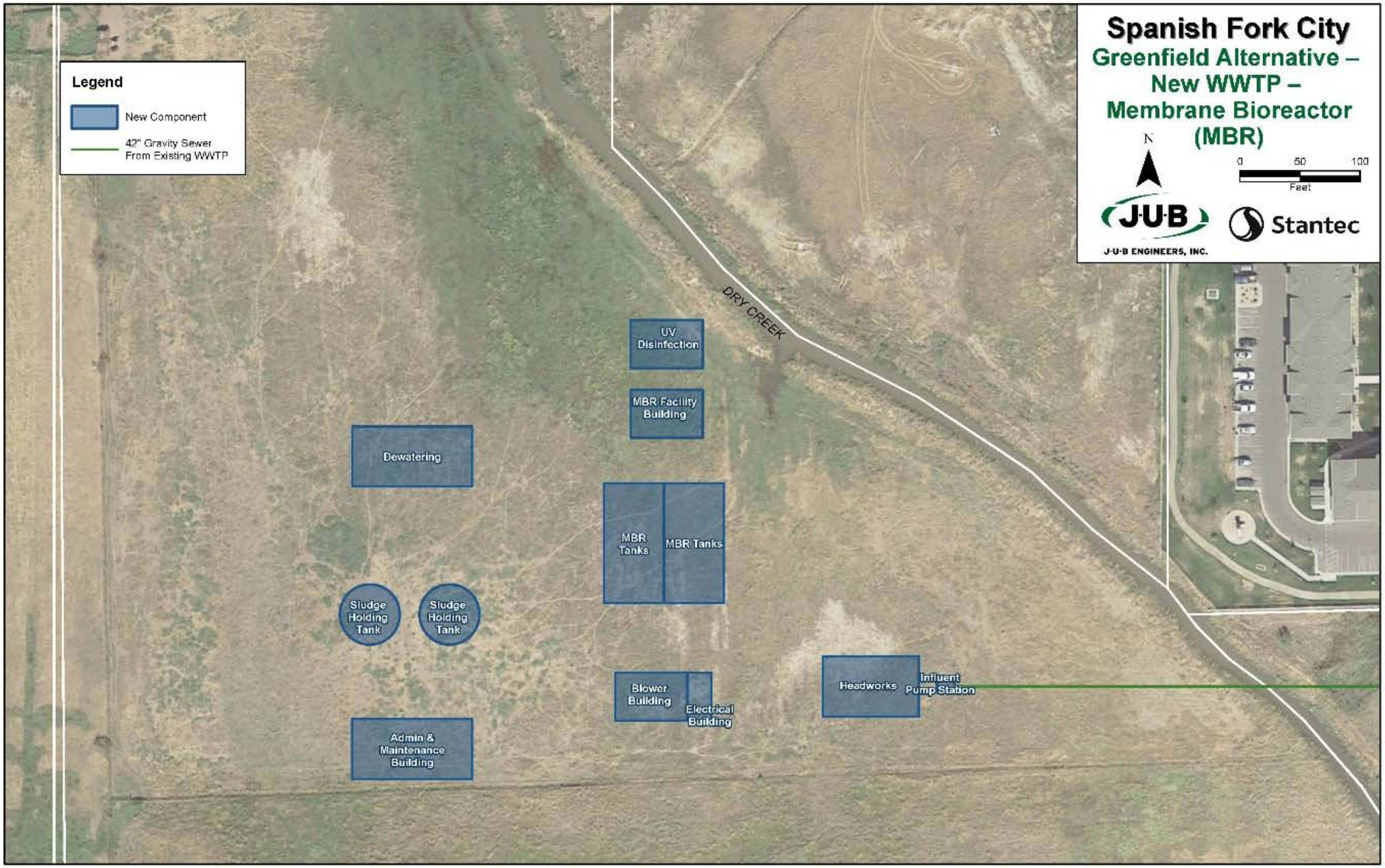
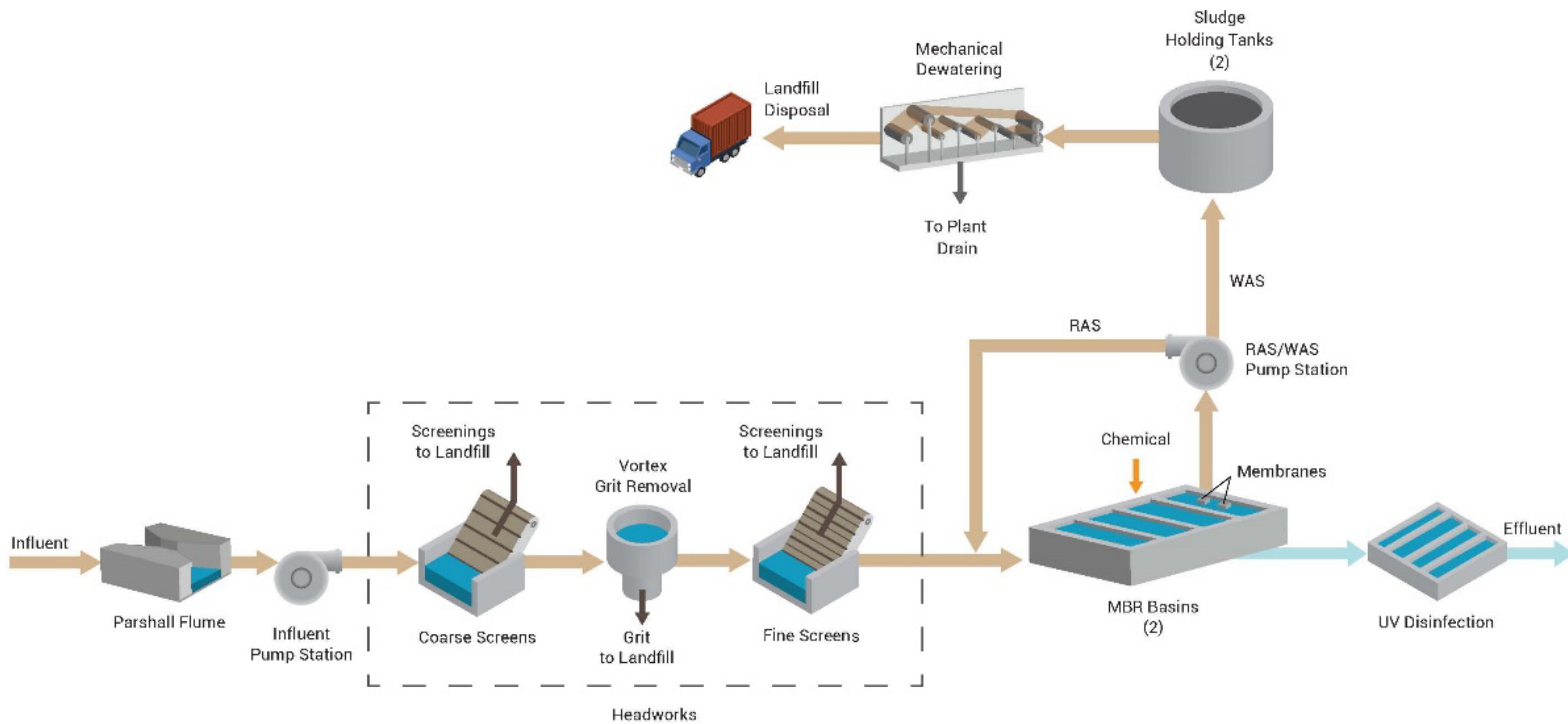


Figure 3-19: Greenfield MBR Process Flow Diagram

Spanish Fork: New WWTP - Membrane Bioreactor (MBR)

A greenfield option for the Spanish Fork Wastewater Treatment Facility is the membrane bioreactor (MBR) process outlined below in the process flow diagram. This design includes a headworks building with a lift station, coarse screening, vortex grit removal, and fine screening able to handle future projected flow needs. The headworks is followed by two trains of the A2O process with mixing in the anoxic and anaerobic zones and aeration in the oxic zones. At the end of each train membranes will be within the basin to filter water before it enters UV disinfection and discharges into Dry Creek. A RAS/WAS pump station will remove solids from the process, recycling RAS back to the A2O basins and wasting WAS to sludge holding tanks. The WAS is then mechanically dewatered before landfill disposal.



3.3.3. Nereda

The greenfield AquaNereda alternative process is similar to the retrofit alternative as shown in Figure 3-20. However, the pre-secondary equalization basin and AquaNereda basins are larger in volume. Therefore, fewer AquaNereda basins are required along with no post-secondary equalization basin. The process flow diagram for a greenfield AquaNereda alternative is shown in Figure 3-21.

The greenfield AquaNereda alternative is estimated to require an additional one to two operators.

Figure 3-20: Greenfield Nereda Alternative

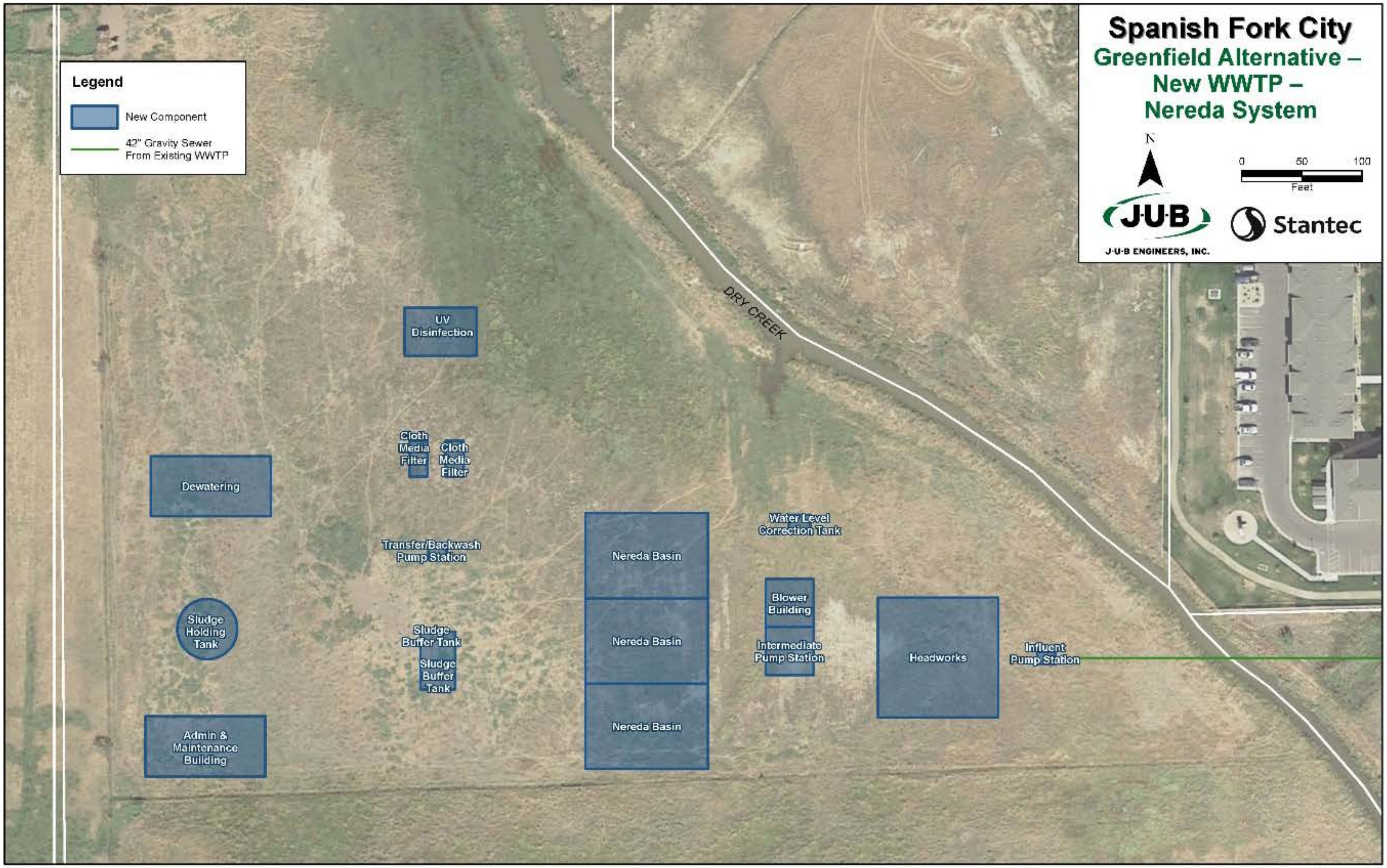
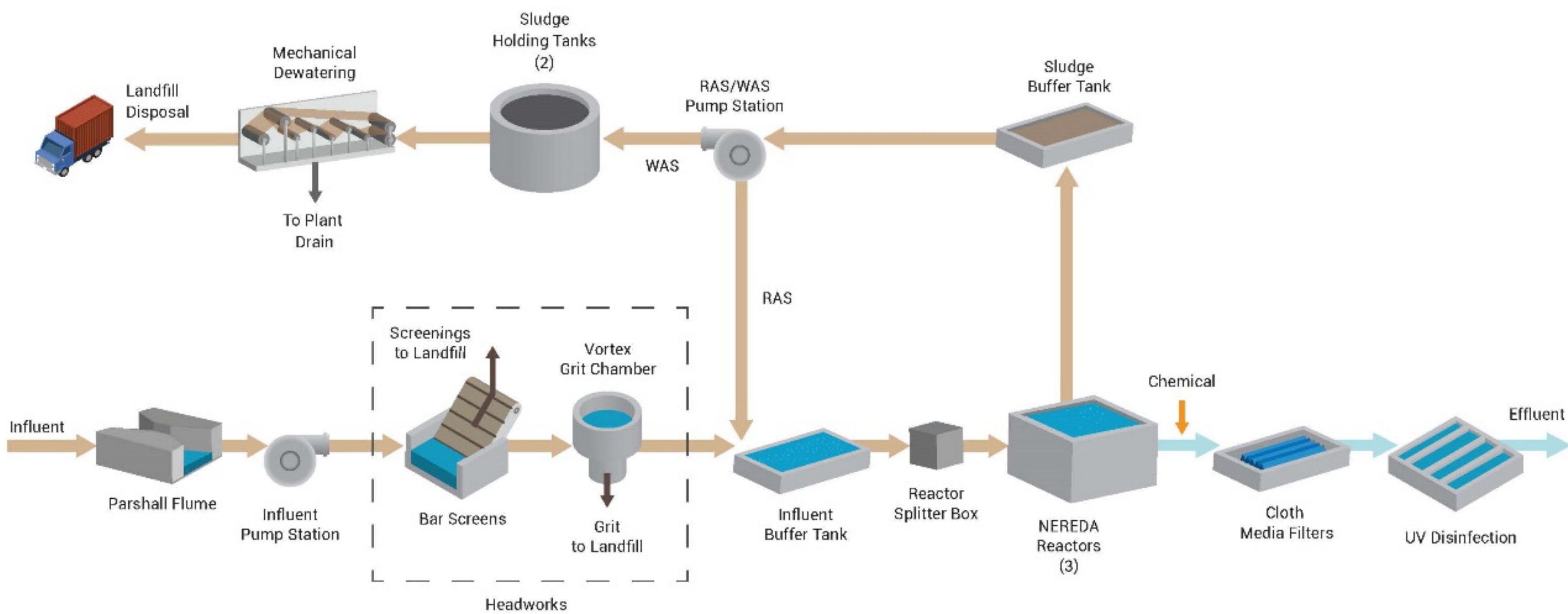


Figure 3-21: Greenfield Nereda Process Flow Diagram

Spanish Fork: New WWTP - NEREDA

A greenfield option for the Spanish Fork Wastewater Treatment Facility is the Nereda process outlined below in the process flow diagram. This design includes a headworks building with a lift station, coarse screening, and vortex grit removal able to handle future projected flow needs. The headworks is followed by an influent buffer tank that fill up each Nereda reactor one at a time. Solids are removed from the Nereda reactor and are stored in sludge buffer tanks before the RAS/WAS pump station wastes WAS to the sludge holding tanks or recycles RAS back to the reactors. The WAS is then mechanically dewatered before landfill disposal. Reactor effluent is send through cloth media filters before it enters UV disinfection and discharges into Dry Creek.



3.3.4. Sequencing Batch Reactor

The sequencing batch reactor (SBR) is an activated sludge treatment process that uses a fill-and-draw or "batch" sequence. Influent wastewater is added to the SBR and once full, the SBR acts like a conventional activated sludge system but without continuous influent or effluent flow. When the reaction is complete, aeration and mixing are stopped, biomass settles, and treated water is discharged. The difference between the SBR and a conventional activated sludge system is that the SBR performs equalization, biological treatment, and clarification in a single basin using a time-controlled sequence. SBR systems can be modified for nutrient removal by changing the programming and timing sequences. SBR systems are most suited for low or intermittent flow wastewater treatment plants and areas where available land is limited. Due to the nature of the batch process, SBRs can become overwhelmed by high flow rates that can occur during periods of infiltration and inflow. It is recommended flow equalization be installed to minimize this risk.

Table 3-7 summarizes the pros and cons of the SBR process.

Table 3-7: SBR Process – Pros and Cons

Pros	Cons
• Moderate O&M	• Batch process - not recommended for facilities with high peaking factors
• Consolidated footprint since treatment processes all occur in a single reactor	• Increased complexity
• Potential capital cost savings by eliminating clarifiers and other equipment	• Chemical addition required
	• Traditionally used for smaller facilities (< 3 MGD)
	• Equalization required to handle varying influent flow. Equalization of effluent is also recommended to minimize filtration and UV sizing.

The SBR retrofit alternative was eliminated as the existing STM Aerotor basins are not deep enough for this technology to function reliably. The SBR was considered for a greenfield alternative as presented below in Figure 3-22. The flow is pumped into the headworks facility, where it passes through 6 mm mechanical screens and then through a vortex grit chamber. Four SBR basins are required. Cloth media filters are required prior to UV disinfection to meet low TP limits.

The SBR greenfield alternative is estimated to require an additional one to two operators.

Figure 3-22: Greenfield SBR Alternative

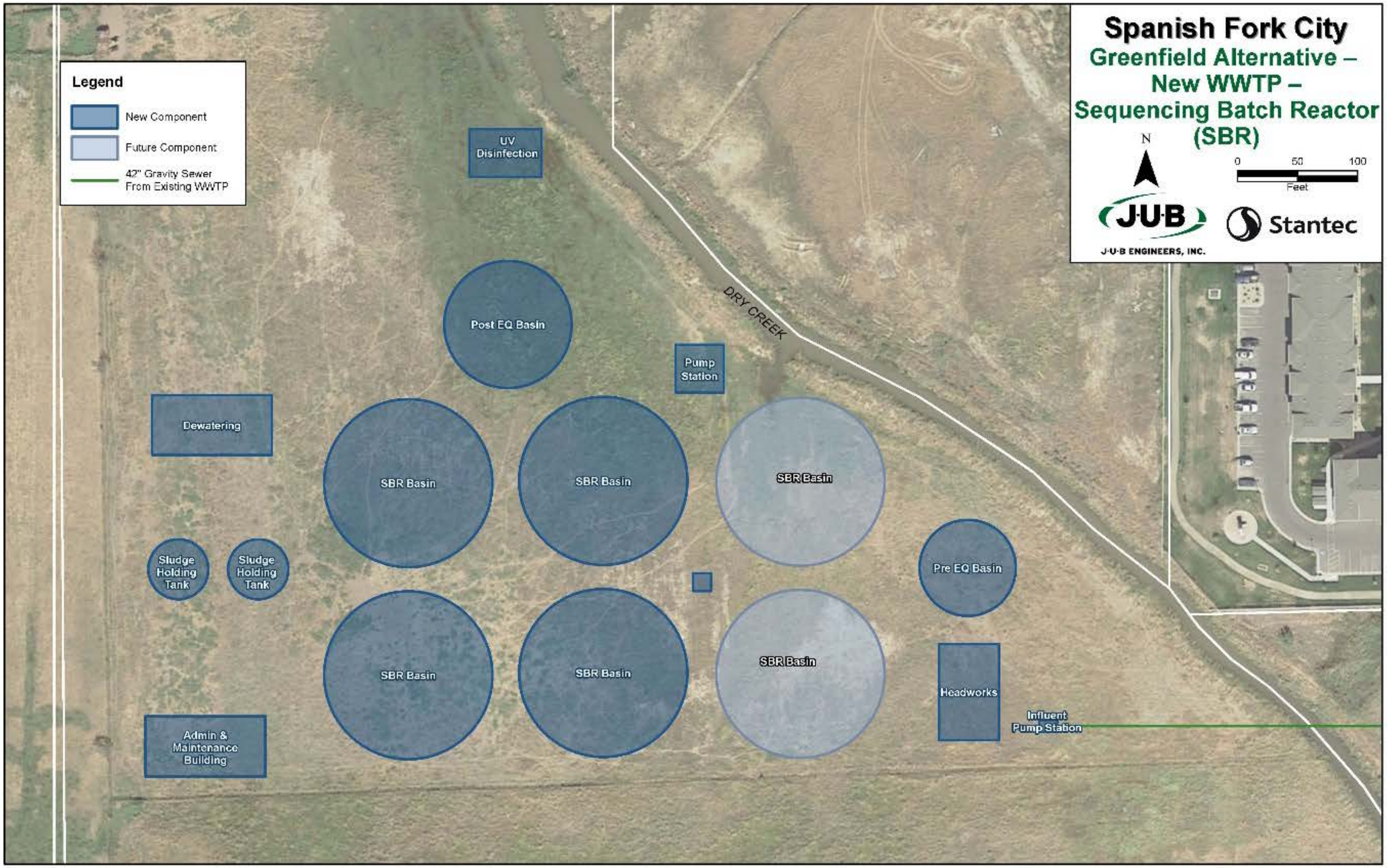
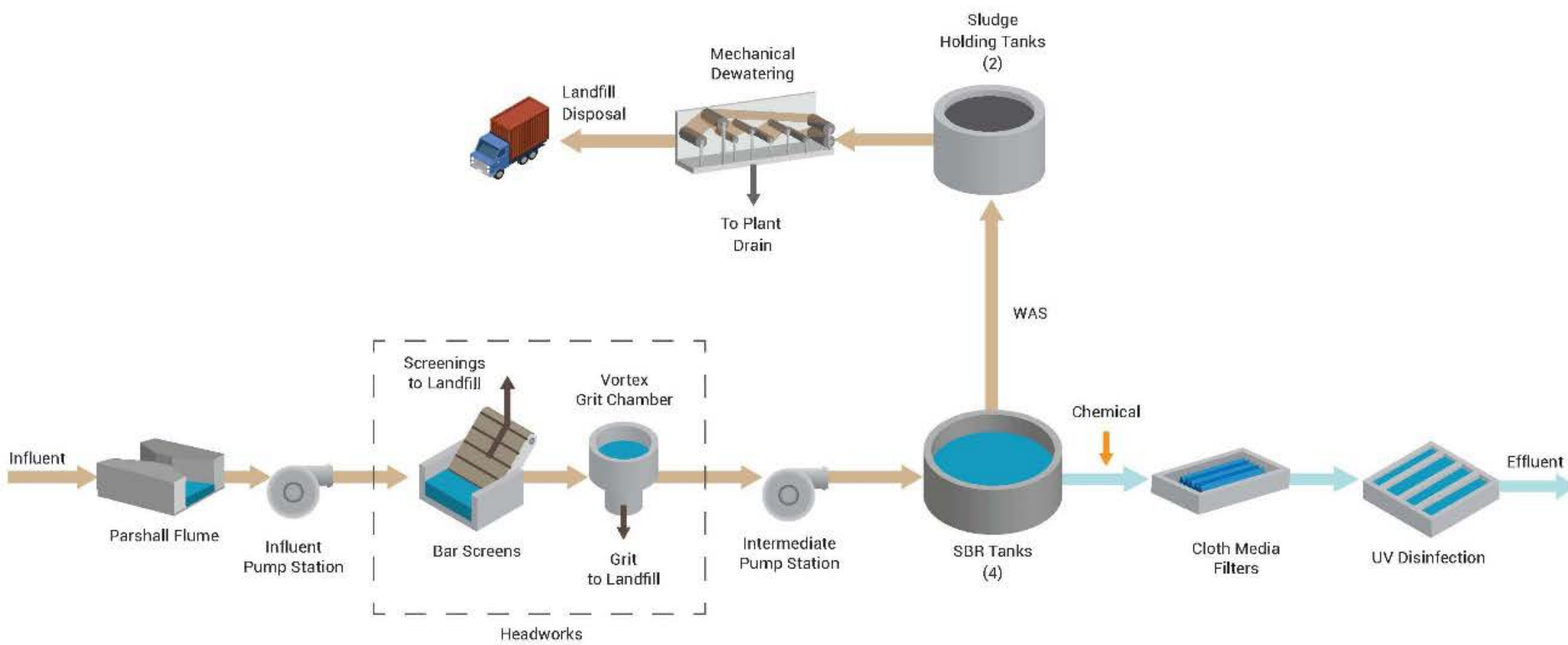


Figure 3-23: SBR Process Flow Diagram

Spanish Fork: New WWTP - Sequencing Batch Reactor (SBR)

A greenfield option for the Spanish Fork Wastewater Treatment Facility is the sequencing batch reactor (SBR) process outlined below in the process flow diagram. This design includes a headworks building with coarse screening and vortex grit removal able to handle future projected flow needs. Subsequent to the headworks building will be an influent pump station that will fill each SBR tank in sequence. After treatment WAS from the process will be stored in sludge holding tanks before being mechanically dewatered and landfill disposed. Effluent from the SBR tanks is sent through cloth media filters before it enters UV disinfection and discharges into Dry Creek.



3.4 Regional Water Reclamation Facility

The Southern Utah Valley Municipal Water Association (SUVMWA) has conducted a feasibility study for regionalizing wastewater treatment for the southern part of Utah County. The Regional WRF Study is located in Appendix D. The Cites identified to be compatible with a regional wastewater treatment facility near Utah Lake include Santaquin, Payson, Salem, Elkridge, Woodland Hills, Spanish Fork, Mapleton, and Springville. Creating a district to operate the existing treatment facilities in the area as well as organizing the transition to a regional facility will require agreement and collaboration between the existing facility owners.

Sewer trunkline routing, lift stations and a general location for a regional facility were also selected in the study. The study's recommended site is agricultural land, 2 miles west of Springville on the south side of Provo Bay. The SUMVWA has already purchased this parcel intended to be the regional facility in the future. That said, there are quite a few issues that still need to be worked through before a regional facility becomes a reality. Among the Cities identified to contribute to a regional treatment facility, Payson is currently in design of a new WWTP and new WWTP's have recently been constructed at both Salem and Santaquin. With these new developments the driving force for the South Valley regionalized wastewater treatment plant has diminished since its conception. At this time, the SUVMWA regional facility is not being carried forward.

As part of the funding package for the new Provo WRF improvements, Utah Division of Water Quality encouraged Provo to consider a Regional WRF in conjunction with Springville, Mapleton, and Spanish Fork. All four of these cities participated in this second regionalization feasibility study. The new study's Regional WRF sites were evaluated based on GIS data, readily available data from published reports, and preliminary analyses and facility cost estimates. The land parcel that SUVMWA has already acquired was considered again as a potential regional WRF site.

The new regional WRF facility would need to meet capacity for a projected 2040 population of 314,912 people with a build-out population of 403,940 people. This would require the facility to treat an average flow of 42.5 MGD and a peak flow of 90 MGD.

The study identified the following challenges for a regional WRF;

- Costly conveyance system to connect existing systems to a regional facility
- Limited reuse opportunities for the existing WRF facilities after regional implementation
- New UPDES permit required for the proposed regional WRF facility discharge location
- Future discharge permit risk due to more stringent standards
- Potential environmental issues impacting wetlands and sensitive species
- Rezoning required and potential conflicts with the airport
- High capital costs
- High operation and maintenance costs

A summary of costs developed in the Regional WRF Study that are attributed to Spanish Fork and Mapleton is located in Table 3-8. It should be noted that the costs developed in this Master Plan for upgrading/replacing the existing Spanish Fork WRF are less than what was shown in the Regional WRF study due to project phasing and optimization.

Table 3-8: Regional WRF Costs

Costs Attributed to Spanish Fork and Mapleton	New Regional WRF with Provo and Springville	Upgrade or Replace Existing Spanish Fork WRF
Total Allocated Construction Cost	\$166 million to \$187 million, depending on selected alternative	\$135 million
Annual Allocated O&M Costs	\$1.8 million to \$2.2 million, depending on selected alternative	\$1.8 million

Not only is upgrading or replacing Spanish Fork's existing facility more cost effective than regionalization, it also is more favorable when considering non-monetary considerations such as no new UPDES permit required, no wetlands or floodplain impacts, and no rezoning required. Additionally, it should be noted that Provo City is already moving forward with the design and construction of a new membrane bioreactor facility that will accommodate their needs for the foreseeable future. As such, it is highly unlikely they would be interested in a regionalization alternative.

It is understood that although the Division of Water Quality will continue to encourage efforts towards regionalization, the complex logistics and politics of regionalization make this alternative unlikely at this time for the existing Spanish Fork and Mapleton areas. As a result of the above analysis and considerations, the specific regionalization alternatives as discussed in the Regional WRF Study will not be considered further in this Master Plan.

It should be noted that there may be a feasible scenario where the Spanish Fork / Mapleton treatment facility is constructed at a new greenfield site and it could become a regional facility in the future when regional partners decide they are ready to connect. The site could be master planned for easy expansion to accommodate sewer connections from county land toward West Mountain and/or Springville City if these entities are interested in connecting in the future. This potential regionalization scenario is discussed further in Chapters 4 and 5.

4.0 Alternative Analysis

4.1 Overall Alternatives Analysis

In the previous chapter, treatment technologies were presented and considered for the Spanish Fork Wastewater Treatment Facility. The purpose of this section is to present the results of a cost estimating analysis for each of the treatment technologies including capital, annual operations and maintenance (O&M), and an overall life-cycle cost over the 20-year planning period and provide a recommendation as to the preferred technology. The alternatives considered included A20, IFAS, MBR, Biomag, Nereda, and Clearas.

The Master Plan considers both retrofit and "Greenfield" alternatives and all recommended improvements are based on an overall, holistic strategy rather than add-on unit processes that only address short-term needs. Primary focus was on utilizing proven technologies that are capable of consistently and reliably meeting regulatory limits and can be designed with operational flexibility and expandability. In addition to capital cost, for each alternative, thoughtful consideration was also given to personnel needs, degree of operational complexity, O&M requirements, and construction sequencing. For any proposed retrofit alternatives, the pros and cons to rehabilitate, re-use or re-purpose existing assets were also closely evaluated.

4.1.1. Cost Estimating and Life Cycle Cost Analysis

For each of the alternatives, capital cost estimating began with contacting equipment manufacturers and requesting quotations based on the sizing criteria outlined in Chapter 1. Equipment was sized to handle the projected flows and loads for the planning period as well to meet the worst-case anticipated permit conditions of effluent total phosphorus (<0.5 mg/L) and effluent ammonia (<7 mg/L). Once equipment costs were known, the next step of the estimate was to consider conceptual level building layouts and footprints and associated excavation, backfill, and concrete quantities. Total estimated project costs were then assembled by escalating the base equipment and building costs by percentage for items such as site work, electrical and instrumentation, contingency, contractor overhead and profit, and engineering. These percentages are based on past project history for similar wastewater projects. The total estimated project costs for the various treatment technologies are presented in Table 4-1 and Table 4-2 for retrofit and greenfield alternatives, respectively. Costs for the greenfield alternatives also include constructing a new sewer line to convey the wastewater to a new site location. Additional summary information can be found in Appendix G.

Annual O&M costs for each alternative were estimated based on the total connected load in terms of horsepower for pumps and motors, chemical addition required for cleaning or phosphorus removal, and replacement schedules for equipment such as membranes. The annual O&M payments were converted to a net present worth amount based on a 3 percent interest rate over 20 years and added to the total estimated project cost to determine an estimated total life-cycle cost for all alternatives as in Table 4-1 and Table 4-2 and Figure 4-1 and Figure 4-2.

It should be noted that the costs developed in this section are Class 5 cost estimates (AACE International Recommended Practice No 18R-97). Class 5 estimates are high level and prepared based on very limited information and subsequently have a wide accuracy range. For initial screening and comparisons of treatment technologies, this approach is appropriate. Appendix H provides more information on the AACE International Cost Estimate Classification System.

For the retrofit alternatives considered, the MBR, A20, and Nereda processes have similar capital costs. Nereda and Biomag have the lowest annual O&M cost, and the MBR process has the highest due to electrical load and membrane replacement. Nereda has the overall lowest net present worth (NPW) cost of all the retrofit alternatives.

For the greenfield alternatives considered, Nereda and A2O have the lowest capital and NPW costs when compared to the other alternatives.

It should be noted that poor soils and liquefaction potential are a condition that must be mitigated as part of a project at either the existing plant site or newly acquired property. An additional 5 percent contingency for soils mitigation is included in all of the greenfield cost opinions.

Table 4-1: Retrofit Cost Summary

Process	Total Estimated Project Cost[1,2]	O&M Cost/Equipment Replacement Cost	Total NPW Cost
A2O	$ 67,110,000	$ 21,900,000	$ 89,000,000
IFAS	$ 76,610,000	$ 26,300,000	$ 101,700,000
MBR	$ 66,780,000	$ 29,200,000	$ 93,900,000
BIOMAG	$ 78,280,000	$ 19,500,000	$ 105,700,000
NEREDA	$ 67,810,000	$ 19,500,000	$ 87,300,000
CLEARAS[(1)]	$ 146,960,000	$ 39,000,000	$ 116,500,000

1 Total net present worth cost for Clearas includes income of $3,000,000 per year from product sale and 1.5% interest on the income over planning period.
2 All costs include engineering fees and 30 percent construction contingency; Opinion of Probably Construction Cost (OPCC) Class 5 cost estimate.
3 All costs are for treatment to future permit limits (TP < 0.5 mg/L and NH3 < 7 mg/L).

Figure 4-1: Retrofit Cost Summary

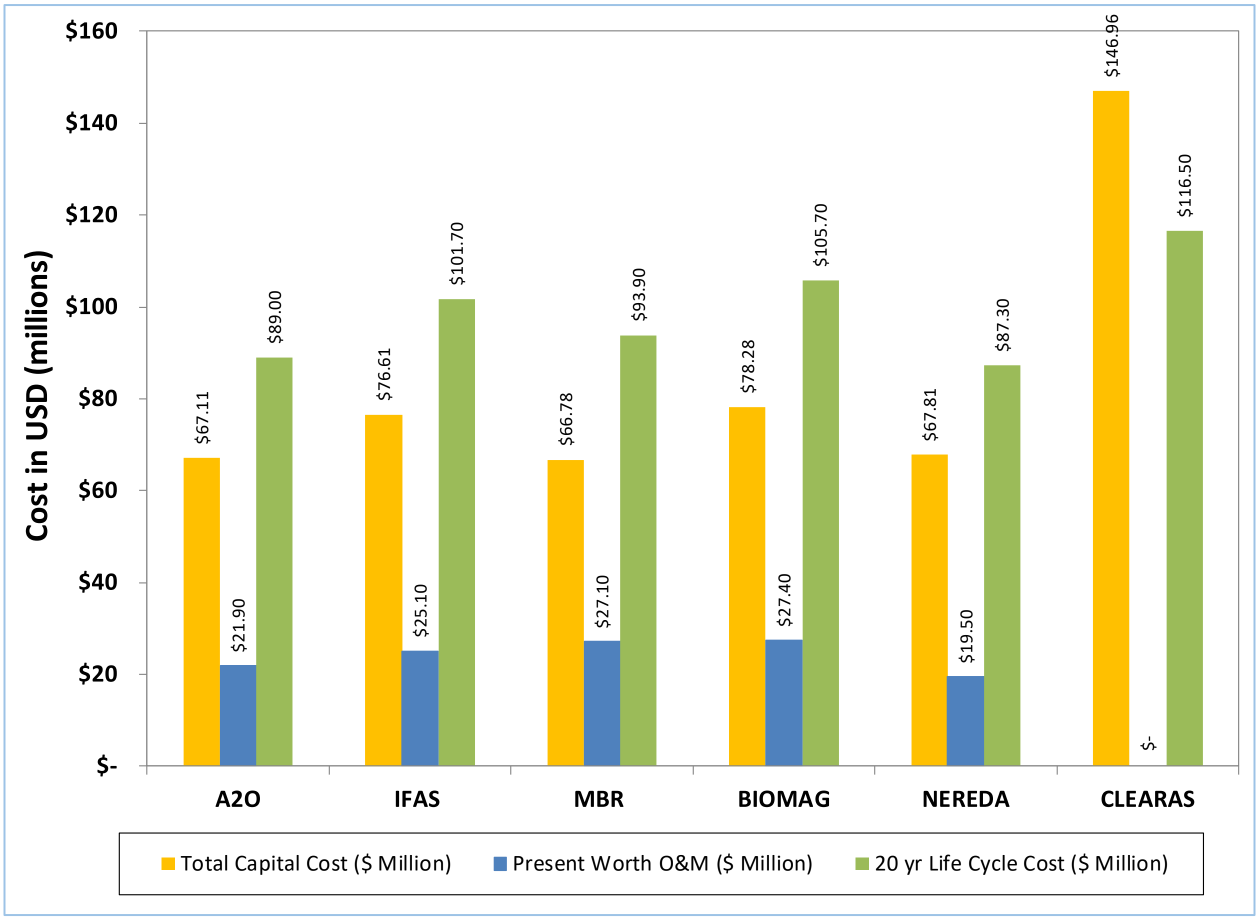
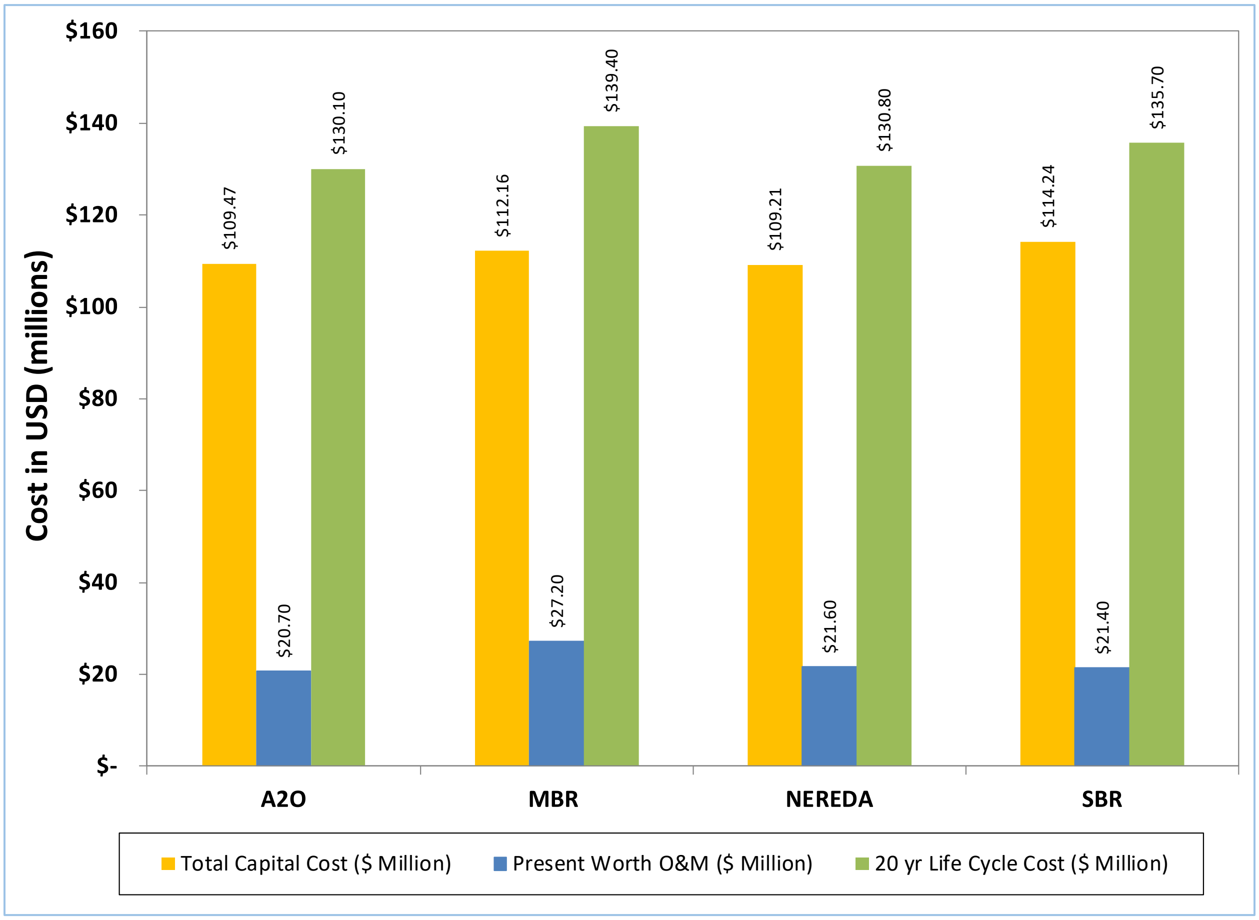


Table 4-2: Greenfield Cost Summary

Process	Total Estimated Project Cost	O&M Cost/Equipment Replacement Cost	Total NPW Cost
A2O	$ 109,468,000	$ 20,700,000	$ 130,100,000
MBR	$ 112,158,000	$ 27,200,000	$ 139,400,000
NEREDA	$ 109,208,000	$ 21,600,000	$ 130,800,000
SBR	$ 114,238,000	$ 21,400,000	$ 135,700,000

[1] All costs include engineering fees and 30 percent construction contingency; Opinion of Probable Construction Cost (OPCC) Class 5 cost estimate.
[2] All costs are for treatment to future permit limits (TP < 0.5 mg/L and NH3 < 7 mg/L).

Figure 4-2: Greenfield Cost Summary



4.1.2. Decision Matrix

In order to provide a recommendation on a preferred treatment technology, a decision matrix was developed to evaluate the alternatives based on capital and O&M costs as well as non-economic factors such as regulatory compliance, replacement of aging infrastructure, and ease of operations and maintenance. The results of this evaluation are shown in Table 4-3. Each alternative is scored based out of 100 points possible, with points possible for each category weighted based upon importance. Alternatives judged to score best in each category receive full points.

Based on the comparison of alternatives, the MBR alternative was most favorable with high scores in the non-cost related categories making up for higher O&M cost. MBR is a proven technology with numerous installations, provides the highest effluent water quality (providing the opportunity for future reuse and reducing the size of UV disinfection), requires the least footprint (which is beneficial in poor soil conditions), and has the most flexibility to meet nutrient requirements.

The second and third most favorable technologies were the A2O and Nereda processes, respectively. Both alternatives were most favorable based on high points awarded for capital cost and O&M cost. Nereda has the highest effluent water quality without chemical addition for the lowest cost, however, tertiary filtration is required. That said, it is a newer technology with only a few full-scale installations in the US. Usually, it is recommended that the Nereda process be piloted on your wastewater prior to full scale implementation. The A2O process is well-proven but requires higher aeration and chemical addition demands to meet future permit limits. Compared to MBR and Nereda, the A2O process would not be as flexible in meeting future stringent nutrient regulations.

Table 4-3: Decision Matrix for All Treatment Technology Alternatives

Evaluation Category Description	Points Possible	A2O	IFAS	MBR	Biomag	Nereda	Clearas
Lowest Capital Cost	20	20	16	17	16	20	10
Lowest O&M Cost	10	9	7	6	10	10	4
Long-Term Regulatory Compliance	15	12	12	15	12	12	12
Addresses Aging Infrastructure	10	6	6	8	6	10	4
Easiest Expansion Potential, Footprint	10	7	7	10	7	10	5
Least Siting Challenges	10	6	6	10	6	10	1
Easiest to Operate and Maintain	10	10	9	7	8	7	6
Proven Technology, Reliability	15	15	12	15	8	5	2
Scoring (higher is more favorable)	100	85	75	88	72	84	44

4.2 MBR Alternatives Analysis

After the City's review of the alternatives presented in the previous section, a workshop was held with City staff to discuss all of the treatment alternatives that were described in Chapter 3. At that time, the preliminary recommendation was to retrofit the existing facility with MBR technology. The purpose of this section is to summarize key decisions from the workshop and further develop the alternatives analysis for the MBR process, including cost estimates and the decision matrix.

Shortly after the technology selection workshop, a piece of property became available adjacent to the existing wastewater treatment facility. The property was large enough for a new greenfield MBR facility and would require fewer modifications to the existing collection system as compared to the greenfield options that were previously considered, thus reducing the projected greenfield cost. The adjacent location also opened up discussions related to project phasing to minimize capital expenditures, such as maintaining the solids handling at the existing site. Additionally, Spanish Fork identified scenarios where reuse water would be beneficial for them in the future. This resulted in two new MBR greenfield alternatives that are evaluated in this section.

4.2.1. Workshop Design Decisions

With the decision to pursue MBR technology for facility upgrade and expansion, several other design decisions were made and are summarized in this section. Based on influent wastewater characteristics and process modeling it was decided that primary clarification and anaerobic digestion will be eliminated from the treatment process as biological phosphorus and nutrient removal can be challenging to achieve with these processes due to the decreased carbon availability and high nutrient load return. Going away from anaerobic solids digestion for the new facility will require the Cities to consider alternative biosolids management strategies as the biosolids will no longer meet Class B standards. The City and the design team met with Bayview Landfill to verify they would be willing to accept unclassified biosolids from the treatment facility. Bayview agreed to take the biosolids based on an analysis of similar unclassified biosolids delivered from the Santaquin MBR facility.

Other decisions were made regarding ancillary unit processes. The headworks will include coarse screens followed by grit chambers and fine screens. A chain and rake bar screen is preferred by the City as well as a vortex-type grit chamber system. It is anticipated a grit washer will be required to keep organics in the system. Another key item discussed was that UV disinfection will likely be required in the City's future UPDES permit. UV disinfection will be designed to accomodate Type 1 reuse effluent water requirements for the upgraded facility, although reuse may not be pursued right away.

4.2.2. Greenfield Site Alternatives – Phase 1 and Phase 2

The City's purchase of an undeveloped property adjacent to the existing wastewater treatment facility allowed for the consideration of a new greenfield alternative for MBR treatment. Evaluation of this new alternative considered two potential phasing options. The Phase 1 option includes retrofitting the solids handling facility at the existing site while the liquid treatment process is constructed at the newly purchased property, resulting in a split plant bisected by the railroad. Phase 1 includes converting existing anaerobic digester tankage to solids holding, mechanical dewatering of waste activated sludge, and landfilling solids until alternative technologies for Class B biosolids mature. The Phase 2 option is a new MBR facility on the greenfield site that includes new sludge holding tanks, mechanical dewatering for solids handling, and administration/operations building. Phase 2 results in the complete replacement of the existing facilities and relocation of wastewater treatment entirely to the new site.

Figure 4-3 shows the Phase 1 greenfield alternative at this site with the preferred MBR process. This layout will allow use of existing solids handling infrastructure to reduce construction costs. Although more expensive than a retrofit option, this alternative reduces risk of construction sequencing and permit violations inherent in a retrofit project. This alternative will also require new sludge piping and drains between the existing and greenfield sites. The new liquid treatment processes would be sized for the current planning period but also designed with future expansion in mind. Phase 2 greenfield alternative includes a new solids handling facility and administration/operations building at the greenfield site as shown in Figure 4-4. This alternative includes all the treatment processes (liquid and solid) at the same site, including the preferred MBR process. As the case with the Phase 1 alternative, the facility would be designed with the ability for future expansion and increased treatment capacity.

Figure 4-3: MBR Greenfield Site Layout – Phase 1

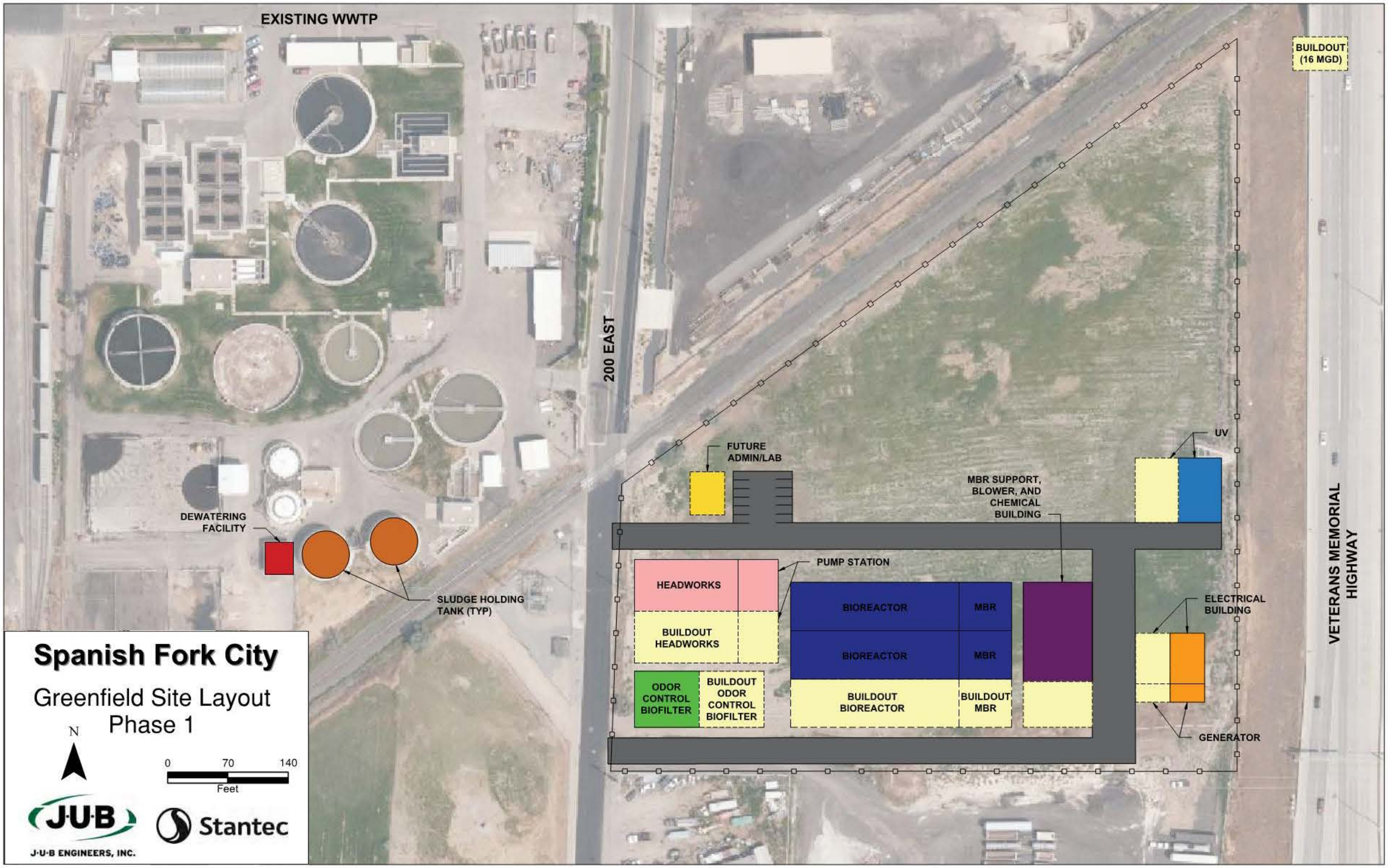
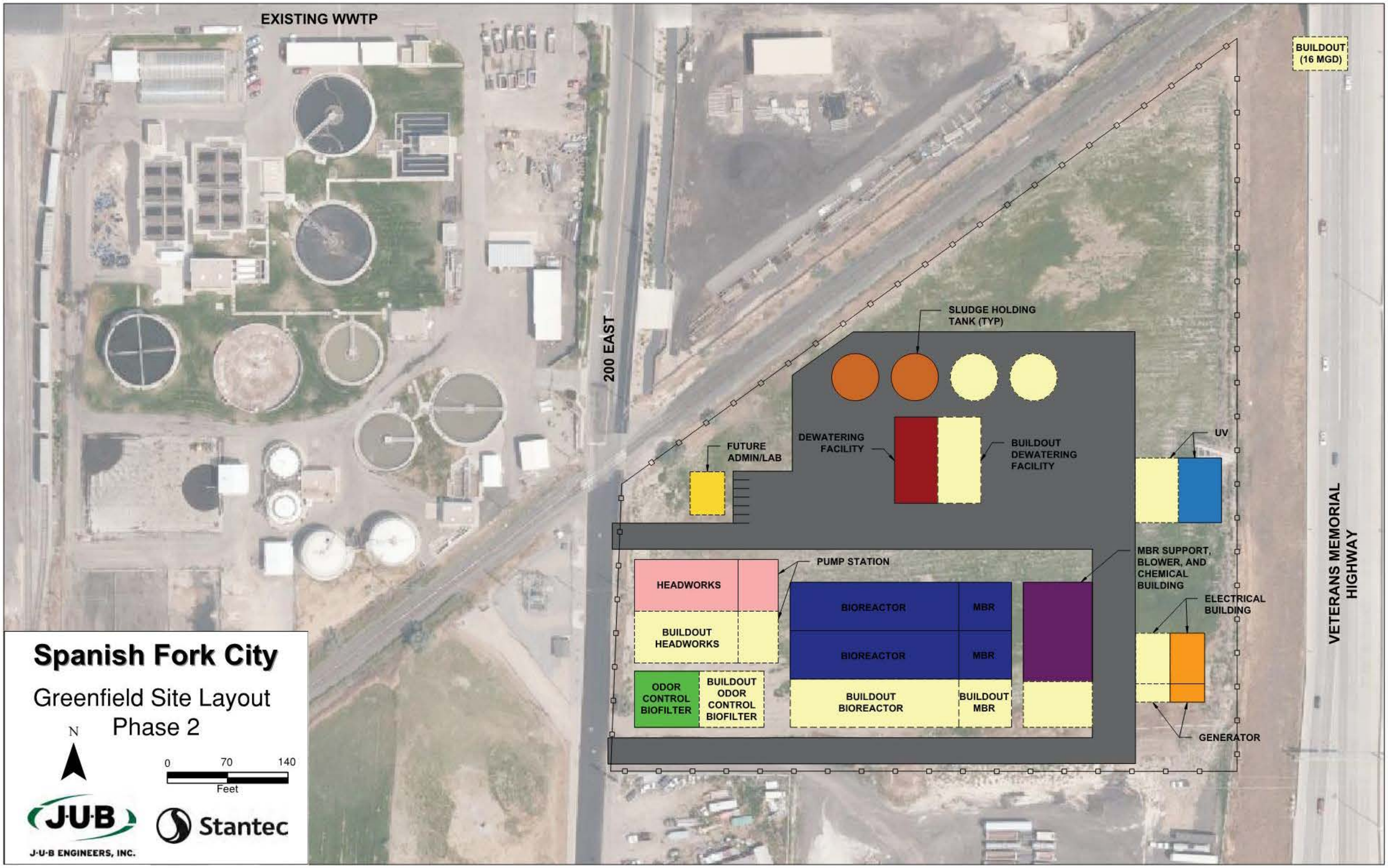


Figure 4-4: MBR Greenfield Site Layout – Phase 2



4.2.3. Cost Estimating and Life Cycle Cost Analysis

Capital cost estimates were developed similarly as described in Section 4.1.1 The annual O&M payments were converted to a net present worth amount based on a 3 percent interest rate over 20 years and added to the total estimated project cost to determine an estimated total life-cycle cost as shown in Table 4-4 and Figure 4-5. Additional summary information can be found in Appendix G.

It should be noted that the costs developed in this section are Class 4 cost estimates (AACE International Recommended Practice No 18R-97). Class 4 estimates are based on more detailed project information and more accurate than Class 5 estimates (as developed in Section 4.1.1.). For project screening and preliminary budget approval, this approach is appropriate for evaluation of the MBR alternatives. Appendix H provides more information on the AACE International Cost Estimate Classification System.

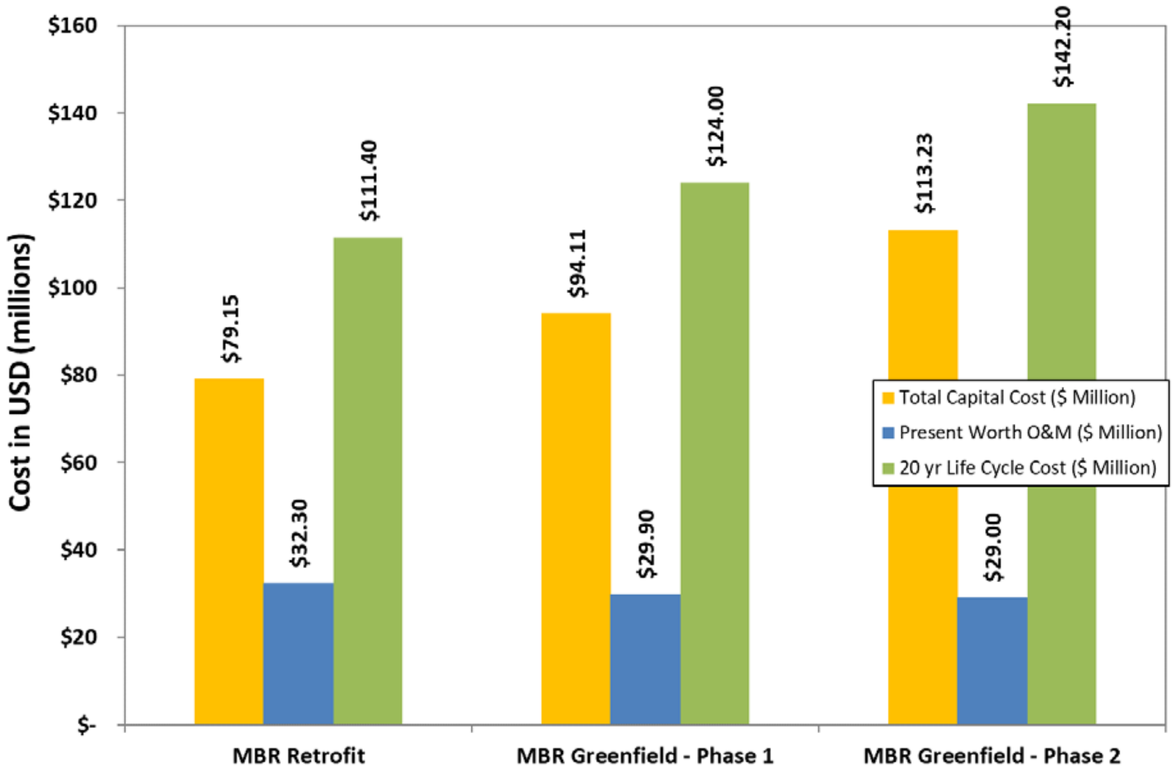
For the MBR alternatives considered, the Phase 2 greenfield alternative had the highest capital and NPW costs. Retrofit had the lower capital and NPW costs, but the highest O&M costs due to aging infrastructure and equipment.

Table 4-4: MBR Alternatives Cost Summary

Process	Total Estimated Project Cost[1,2]	O&M Cost/ Equipment Replacement Cost	Total NPW Cost
MBR Retrofit	$ 79,150,000	$ 32,300,000	$ 111,400,000
MBR Greenfield - Phase 1	$ 94,110,000	$ 29,900,000	$ 124,000,000
MBR Greenfield - Phase 2	$ 113,230,000	$ 29,000,000	$ 142,200,000

[1] All costs include engineering and legal fees plus 25 percent construction contingency; Opinion of Probable Construction Cost (OPCC) Class 4 cost estimate.
[2] All costs are for treatment goal to future permit limits (TP < 0.5 mg/L and NH3 < 3 mg/L).

Figure 4-5: MBR Alternatives Cost Summary



4.2.4. Decision Matrix

A decision matrix was also developed (as described in Section 4.1.2.) to evaluate the alternatives for the preferred MBR process, including retrofit at the existing site, greenfield while retrofitting the solids handling facility at the existing site (Phase 1), and greenfield with the solids handling facility at the new site (Phase 2). For MBR alternatives considered, the retrofit alternative was least favorable due to risks associated with sequencing and permit compliance during construction, continued use of aging infrastructure, and higher O&M complexity and cost. The Phase 1 greenfield alternative was most favorable based on high points awarded for expansion potential, constructability, new infrastructure, and reduced O&M. The Phase 2 greenfield alternative also had high scoring, but capital cost is higher than Phase 1.

Table 4-5: Decision Matrix for MBR Alternatives

Evaluation Category Description	Points Possible	Retrofit	Phase 1 Greenfield	Phase 2 Greenfield
Lowest Capital Cost	30	30	25	15
Lowest O&M Cost	20	10	18	20
Addresses Aging Infrastructure	20	10	18	20
Easiest Expansion Potential	10	5	8	10
Constructability, risk, construction sequencing	10	5	8	10
Easiest to Operate and Maintain	10	5	9	10
Scoring (higher is more favorable)	**100**	**65**	**86**	**85**

5.0 Proposed Project / Recommended Alternative

A wide range of alternatives were considered in this study both for retrofitting the existing facility and constructing a new facility on a greenfield site. Based on the comparison of alternatives, the MBR alternative was most favorable with high scores in the non-cost related categories making up for higher O&M cost. MBR is a proven technology with numerous installations, provides the highest effluent water quality (providing the opportunity for future water reuse), requires the least footprint (which is beneficial in poor soil conditions), and has the most flexibility to meet stringent nutrient requirements.

It is recommended Spanish Fork and Mapleton implement the Phase 1 MBR alternative at the adjacent greenfield site. This alternative reduces the risk associated with construction sequencing, potential permit violations, and unknowns that are inherent on a retrofit site. It also allows for easier expansion to accommodate potential regionalization partners in the future. The Phase 1 option includes retrofitting the solids handling facility at the existing site to reduce construction costs while the liquid treatment process is constructed at the newly purchased property. Phase 1 includes converting existing anaerobic digester tankage to aerated solids holding, mechanical dewatering of waste activated sludge, and landfilling solids until alternative technologies for Class B biosolids mature.

Although more expensive than a retrofit option, the greenfield option reduces risk during construction, does not utilize aging infrastructure, and sets the city up better for future expansion. The new liquid treatment processes would be sized for the current planning period but will be designed with future expansion in mind to accommodate regionalization partners in the future. Figure 5-1 shows the Phase 1 greenfield alternative at the selected site with the preferred MBR process. Figure 5-2 shows the recommended alternative process flow diagram.

Figure 5-1: Recommended Alternative

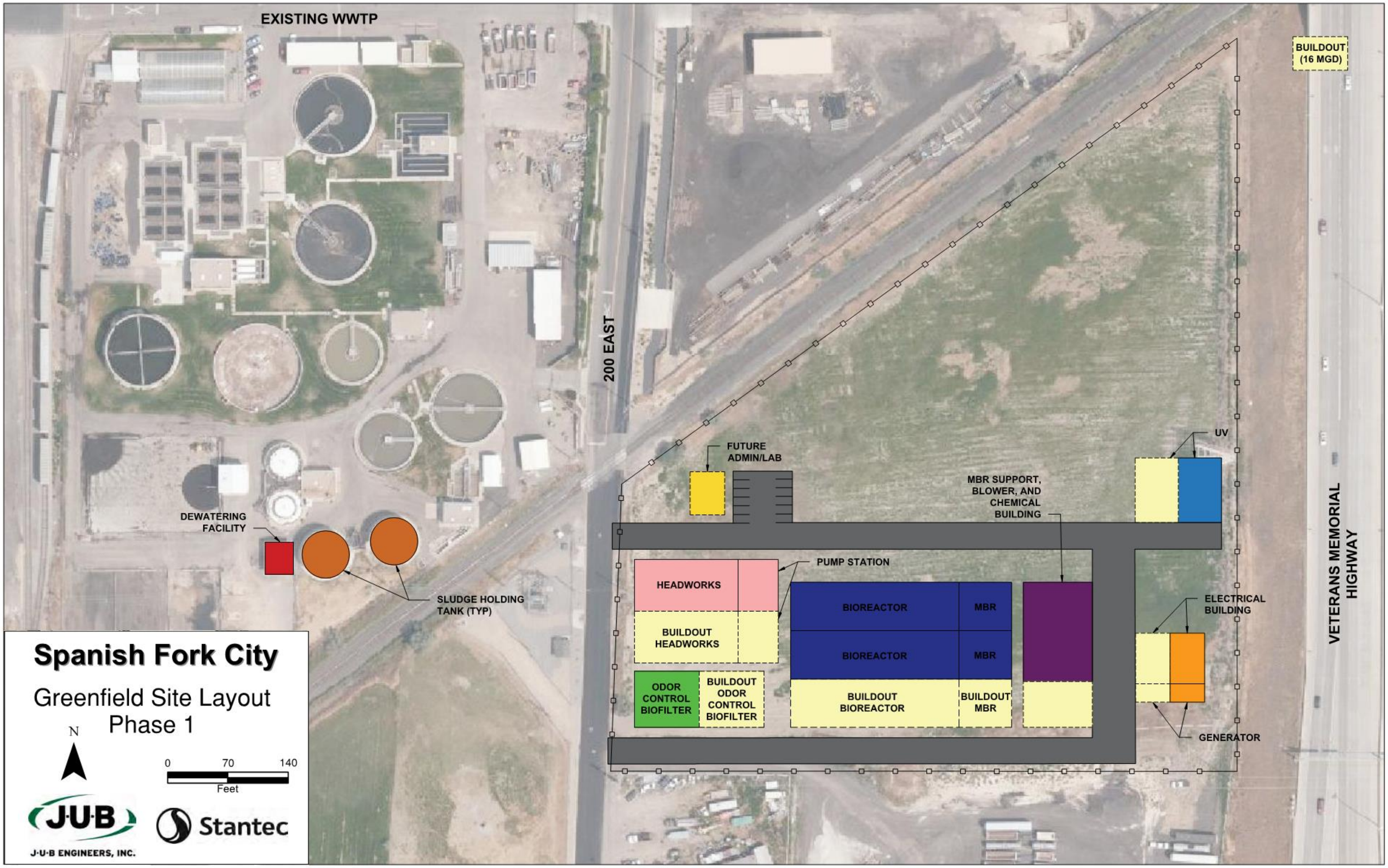
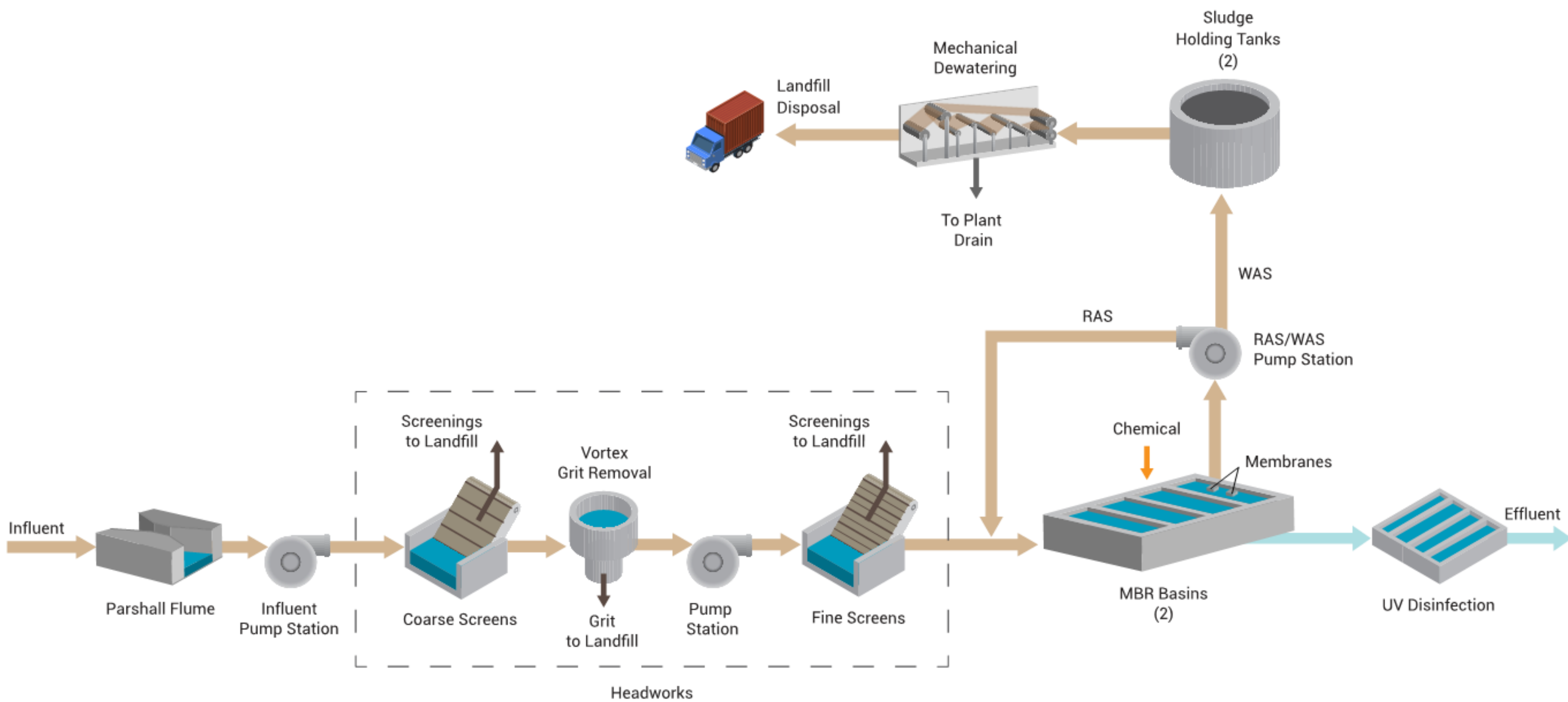


Figure 5-2: Recommended Alternative Process Flow Diagram

Spanish Fork: New WWTP - Membrane Bioreactor (MBR)

A greenfield option for the Spanish Fork Wastewater Treatment Facility is the membrane bioreactor (MBR) process outlined below in the process flow diagram. This design includes a headworks building with a lift station, coarse screening, vortex grit removal, and fine screening able to handle future projected flow needs. The headworks is followed by two trains of the A2O process with mixing in the anoxic and anaerobic zones and aeration in the oxic zones. At the end of each train membranes will be within the basin to filter water before it enters UV disinfection and discharges into Dry Creek. A RAS/WAS pump station will remove solids from the process, recycling RAS back to the A2O basins and wasting WAS to sludge holding tanks. The WAS is then mechanically dewatered before landfill disposal.



5.1 Preliminary Hydraulic Profile

A preliminary hydraulic profile has been developed, Figure 5-3, that establishes the proposed elevation of each of the major unit processes. The elevations of the influent sewer, outfall and topography all factor into the plant hydraulics. Geotechnical conditions will influence the hydraulic profile, as initial investigations have indicated poor soils and shallow ground water. Additional geotechnical evaluation is planned to determine preferred soil improvement methods and structural design approaches which may dictate unit process elevations, sizing and hydraulics. At this time, the preliminary hydraulic profile is considered a preferred approach but is subject to change pending the results of the Phase II geotechnical evaluation.

Figure 5-3 : Proposed Hydraulic Profile

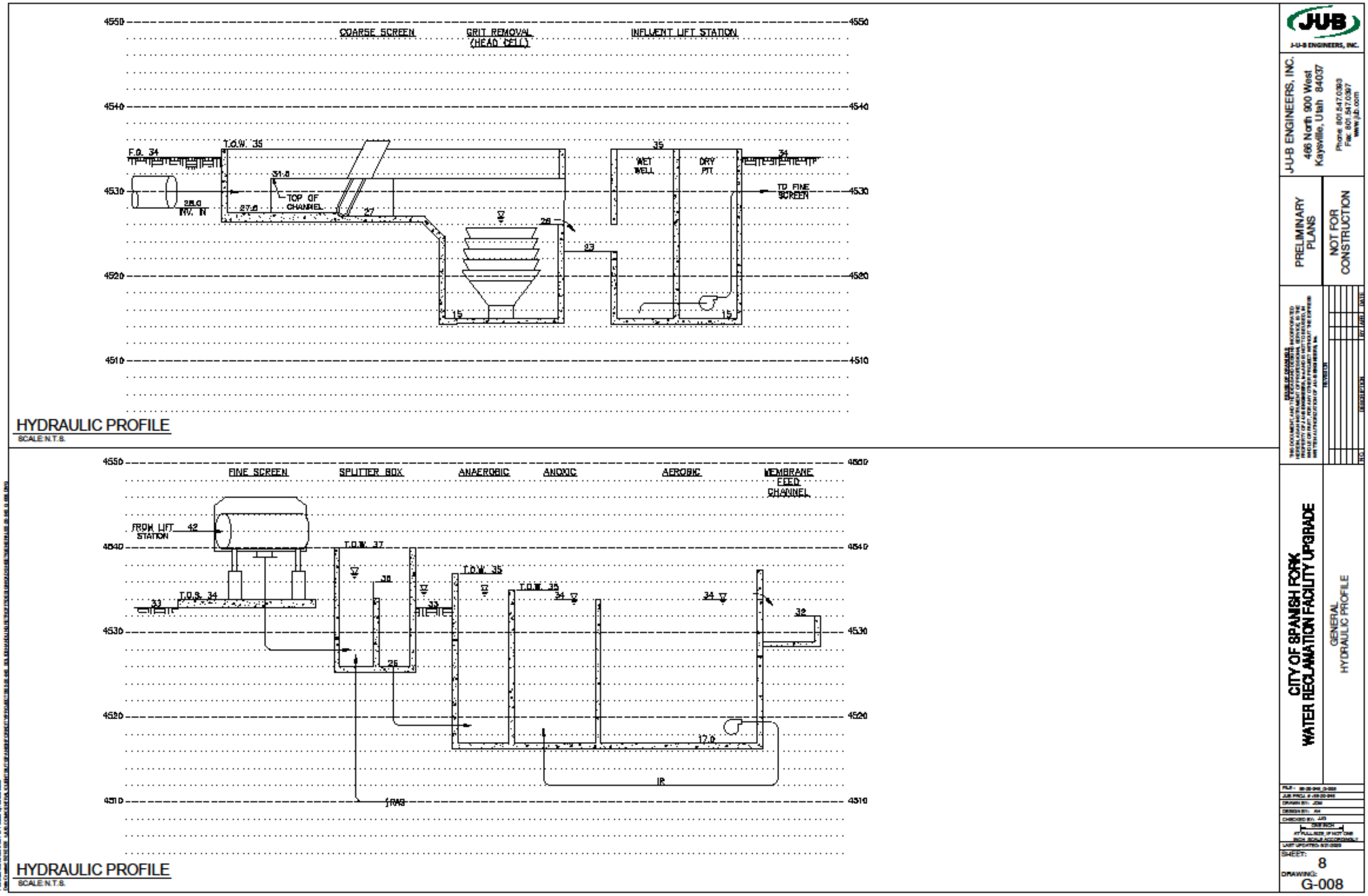
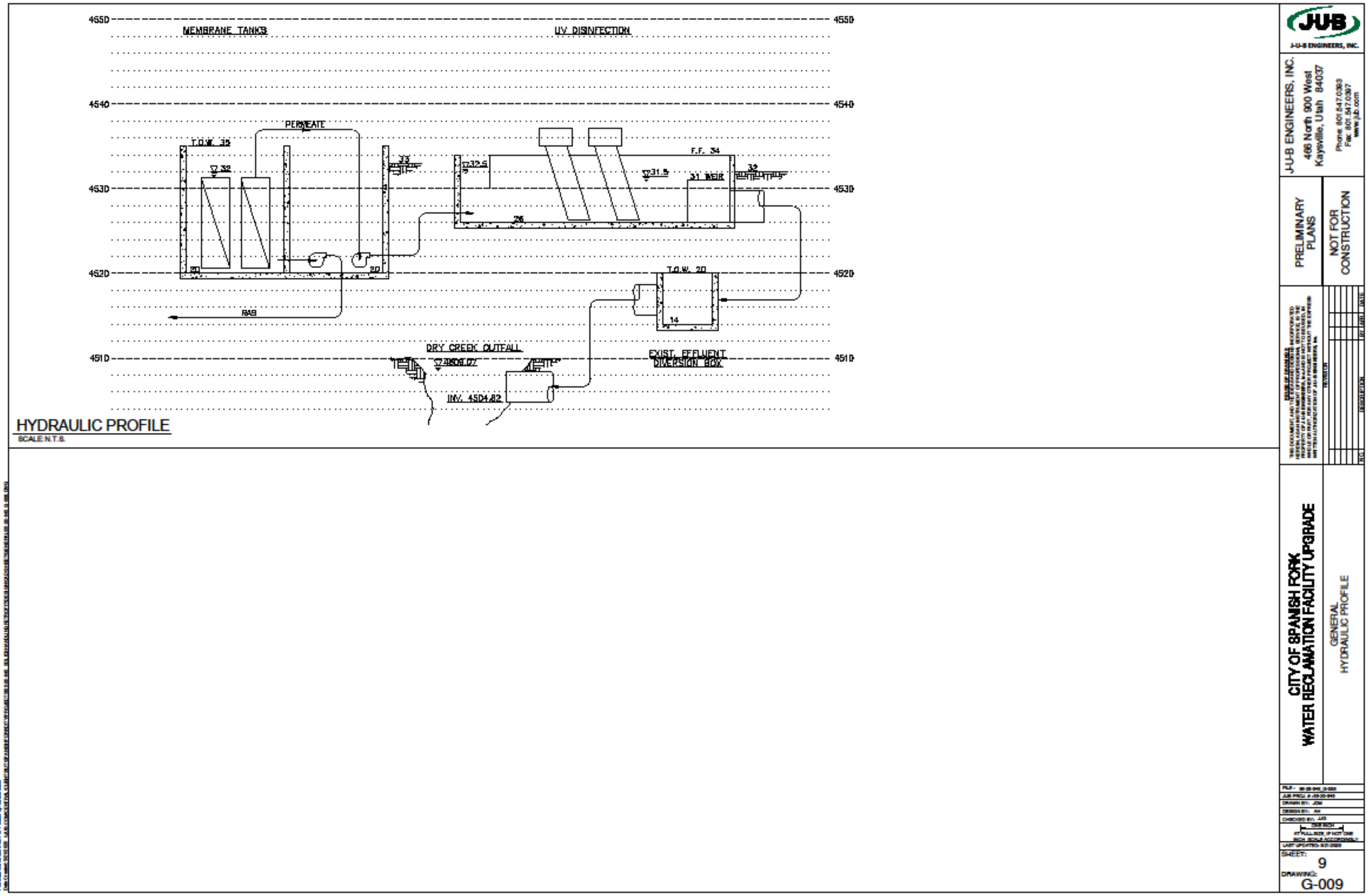


Figure 5-3: Proposed Hydraulic Profile



5.1.1. Headworks

The influent sewer elevations dictate the starting elevation of the headworks. Three separate influent lines are expected to enter the headworks. Two lines, a 24" and 36", are located on 200 E at the south west corner of the site. A 36" line from Main Street will be realigned along the south side of the railroad tracks and cross 200 E to enter the plant. This line is expected to control the inlet elevation to the headworks and preliminary assessment indicates the invert elevation will be about 4228.0 ft entering the headworks.

The headworks will first have a forebay/splitter that precedes the flow channels for the coarse screens. Open channel flow will exist through the flow channels. The coarse screens will create the bulk of the headloss through the channels, with a minor amount of losses attributed to friction through the channel. The screen headloss can be controlled by adjusting the frequency of screen cleaning. Headloss through the coarse screens is expected to be maintained in the range 6-12 inches with upstream and downstream water depths of about 2.5 ft and 2.0 ft, respectively

A vortex type grit removal system will follow the screens and flow will feed into the grit system via gravity. The elevation of the flow channels will drop slightly between the inlet and grit system to provide some drop through the channel and also to accommodate the screen installation. A drop of about 1 ft is anticipated. Following the screens, the open channel will funnel down to direct flow into the grit system inlets. The grit removal system generates minimal headloss with most losses being generated by the grit system weir. Head losses will vary depending on flow rate, with headloss in the range of 1-12 inches expected between average and peak flows. A horizontal weir will be used to control the water level through the grit removal process. Preliminarily the weir length will be 10-15 ft in length and a sharp or broad crested weir is planned.

Following the grit system, wastewater will enter the wet well for the influent lift station. A lift station is proposed at this point due to depth. The inlet into the wet well from the grit removal system has an estimated elevation of 4523.0 ft with the base of the wet well 8 ft deeper at 4515.0. This would put the deepest portions of the headworks about 20 ft below existing grade. Without the lift station, the fine screening system would be costly to locate this deep below grade, would be difficult to dispose of screenings, and would also drive a following lift station deeper.

Another alternative would be to locate the lift station upstream of the headworks and then pump up to the headworks systems allowing the headworks systems to be elevated. This alternative was not favored since this would require that the lift station handle the raw sewage containing heavy solids, rags and grit – increasing the wear and tear/maintenance on the pumps. This would also require that the headworks be elevated approximately 20 ft or more above existing grade so that gravity flow could be maintained all the way to the MBR basins. Otherwise a second lift station may be required. An elevated headworks also has cost implications and is not favorable for the reasons described above.

The lift station will pump up to the fine screens which will be located about 10 ft above finished grade, about 4542.0. Flow from the fine screens will be collected in a common header pipe and conveyed via gravity to the activated sludge process splitter box. From here, flow will be conveyed via gravity through the biological process basins to the MBR basins where it will need to be pumped again.

5.1.2. Activated Sludge/MBR Process

The activated sludge splitter box will receive flow from the fine screens and return activated sludge, RAS, from the MBR basins. Weir gates in the splitter box will regulate flow to each of the active process trains. The headloss attributed to the weir gates will be approximately 1 ft at peak flows. The activated sludge process will consist of a series of tanks with common walls. The flow control devices used in the separating walls between the tanks create head losses through the process. The flow control devices are typically weirs and/or submerged ports or orifices. These can be designed to minimize losses such that the total headloss through the activated sludge process is 1 ft or less. The water surface elevation through the activated sludge process is expected to be in the range of 4530-4529 ft. A horizontal weir and launder are planned at the end of each basin to collect its effluent. The weir will be long (>20 ft) to minimize losses.

The activated sludge process basins will have a total depth of about 24 ft which includes about 2-3 ft of freeboard. The preliminary design has these basins mostly below grade with the top 3-4 ft of the tanks above grade. This arrangement allows simple access to the basins and associated equipment. Locating the tanks 20 ft below grade may not be a favorable design from a geotechnical perspective due to the high groundwater and poor soils. If this is the case, the activated sludge tanks could be elevated without much difficulty from a hydraulic perspective since flow is pumped to these tanks.

Effluent from the activated sludge process will be collected in a flow channel for distribution to the membrane basins. A common open channel is envisioned for the feed to the membrane basins. Each membrane basin will have a slide gate to control (open/close) flow to the basin. Headloss through the feed channel and gate openings should be minimal. Once flow/mixed liquor enters the membrane basins it must be pumped out through one of two pathways 1) permeate pumps or 2) recycle pumps. Permeate pumps pull the liquid through the membranes and will pump it to UV disinfection. Recycle pumps return mixed liquor to the front of the activated sludge process and prevent concentration of solids in the membrane tanks.

The permeate pumps will be operated to maintain a certain level in the membrane basins. The preliminary water surface elevation in the membrane tanks is approximately 4519.0. The membrane tanks will have an overall depth of about 12 feet with the base of the tank at an elevation of about 4509.

5.1.3. UV Disinfection

Permeate pumps will convey flow to the UV disinfection process. The UV system will employ an open channel type UV process consisting of three flow channels. The flow channels will be relatively shallow having a total depth of about 6-8 ft. The disinfection building is therefore planned to be constructed at grade with the flow channels extending slightly below grade. The finished floor of the UV building will be at approximately 4534 ft and the bottom of the flow channels will be at about 4526 ft.

A splitter box will precede the UV channels and the permeate pumps will discharge to the splitter box in a common pipe. Each UV flow channel will have a slide gate to control flow and a baffle plate to reduce turbulence in the flow channel. Banks of UV lamps vertically oriented in the channel will create headloss through the channel. The UV system prefers to have a relatively constant water level which will be regulated by a serpentine weir at the end of the UV channel. The serpentine weir, with its long weir length, provides minimal headloss over a wide range of flows. The total headloss through the UV channel is expected to be about 1 ft and the UV weir elevation is estimated as 4531 ft. After the UV weir flow will be collected in a vault and directed to a Parshall flume for flow metering. A total drop through the flume of about 1-2 ft is anticipated, which would put the elevation of the plant's discharge pipe at about 4524-4525 ft.

5.1.4. Outfall

UV disinfection is the final treatment step and effluent will then be conveyed to the outfall. The outfall of the existing SFWRF into Dry Creek will continue to be used for the new facility. To do so, discharge from the new WRF will be conveyed to the existing effluent diversion box located after the chlorine contact chamber. The existing piping from the diversion box to the outfall is believed to have ample capacity for the projected flows and will be reused. This capacity will need to be confirmed with the new flow design criteria. The diversion box has an invert elevation of approximately 4514 ft, giving a fall of about 12 ft between the discharge from UV at the new facility and the tie-in at the existing diversion box, a distance of approximately 1000 ft. An effluent siphon beneath the railroad tracks will likely be required. The elevation at the outfall in Dry Creek is approximately 4505 ft.

5.2 Geotechnical Considerations

Spanish Fork and Mapleton have purchased a parcel of land that is intended to serve as the site for the new greenfield water reclamation facility. The site, which is currently undeveloped, is situated just to the southeast of the existing WRF facility and is approximately nine acres in size. In March 2020, a geotechnical investigation (RB&G, March 2020) of the site was conducted to assess the subsurface conditions and related considerations for design and construction of a new WRF at this site. The initial geotechnical investigation found that the subsurface conditions at the site are challenging and posed a few significant considerations for construction on the site. These include:

1. The upper 14-18 ft of soils are poor and likely not suitable for construction. These soils will either need to be removed or improved to allow construction
2. Soil improvements such as densification/reinforcement were recommended
3. Groundwater at the site is high, about 1-6 ft below existing grade. Dewatering of the site will be required.

These challenges have significant implications for the design, construction and associated costs of the proposed facilities. The preliminary geotechnical investigation identified a handful of strategies to overcome the poor soils that included either removal via over excavation or a variety of soil improvement methods.

Continued coordination with the geotechnical engineer is required to establish a preferred design approach that will reduce cost implications related to structural and geotechnical considerations. During preliminary design of the new facilities, the following items will be evaluated:

1. Establish the structural design approach for each of the facilities primary structures
2. Establish the most economical hydraulic profile and structures layout as related to geotechnical considerations
3. Evaluate and compare the costs of different soil improvement techniques/methods
4. Determine if additional geotechnical investigations are necessary for final design

Ultimately, these continued investigations will result in a recommended WRF design approach and quantify costs associated with the geotechnical conditions and related soil improvements.

5.3 Design Criteria

The planning period for the design is 20 years from 2020 to 2040 and the influent design criteria are summarized in Table 5-1 and Table 5-2 below. Buildout flows have also been projected and are intended to provide guidance in master planning the proposed site. The site can accommodate higher flow rates than the buildout flows for Spanish Fork and Mapleton, if regionalization with other entities occurs in the future.

Table 5-1: Design Flow and Load Summary

2040	Units	Average Day	Max Month	Peak Day	Peak Hour
Flow	(MGD)	6.65	8.4	10.4	16.6
BOD	(ppd)	10,538	13,259	16,546	
TSS	(ppd)	11,370	14,306	17,852	
TKN	(ppd)	2,496	3,140	3,919	
TP	(ppd)	305	384	479	

Table 5-2: Buildout Flow Factors

Buildout	Units	Average Day	Max Month	Peak Day	Peak Hour
Flow	(MGD)	10.7	13.4	16.7	26.7

A summary of the current and projected future UPDES permit limits are presented in Table 5-3.

Table 5-3: Existing and Projected UPDES Permit Limits for Planning

Description	Unit	Existing Permit	Startup 2023	2030 - 2035
Total Flow				
Max Month Average	MGD	5.0	negotiate with DWQ	
Daily Maximum	MGD	10.0	negotiate with DWQ	
BOD				
Max Month Average	mg/L	25	25	25
Max Week Average	mg/L	35	35	35
% Removal	%	85%	85%	85%
Total Suspended Solids (TSS)				
Max Month Average	mg/L	25	25	25
Max Week Average	mg/L	35	35	35
% Removal	%	85%	85%	85%
Ammonia (December 2013)				
Max Month Average, Summer	mg/L	*NA*	7.0	TIN limit
Max Month Average, Fall	mg/L	*NA*	9.0	TIN limit
Max Month Average, Winter	mg/L	*NA*	9.0	TIN limit
Max Month Average, Spring	mg/L	*NA*	9.0	TIN limit
Daily Maximum	mg/L	18.0	18.0	TIN limit
Total Inorganic Nitrogen (TIN)				

Description	Unit	Existing Permit	Startup 2023	2030 - 2035
Max Month Average	mg/L	*NA*	*NA*	10
Total Phosphorus (TP)				
Max Month Average	mg/L	*NA*	1.0	0.5
pH				
Range	mg/L	6.5-9.0	6.5-9.0	6.5-9.0
Dissolved Oxygen (DO)				
Daily Minimum	mg/L	4.0	4.0	5
Weekly Minimum	mg/L	*NA*	*NA*	6
Total Residual Chlorine (TRC)				
Max Month Average	mg/L	*NA*	0.013	0.013
Daily Maximum	mg/L	2.0	0.022	0.022
E. coli				
Max Month Average	no./100ml	126	126	126
Max Week Average	no./100ml	158	158	158
Oil & Grease				
Daily Maximum	mg/L	10	10	10

The new WRF will be designed to meet current and future TP limits through both biological and chemical removal of phosphorus.

The treatment process will include provisions to allow process upgrades that will achieve the future TIN limit. Preliminarily, the planned upgrades would include increased anoxic zone volume or a post-anoxic zone and the addition of an external carbon source- typically methanol. As the process design evolves, the planned upgrades to achieve future TIN removal will be refined.

UV disinfection is proposed to comply with stringent chlorine residual limits that are anticipated in the next permit cycle.

5.3.1. Reuse

The proposed MBR treatment process will produce effluent quality suited for Type I (public contact likely) reuse and the City plans to practice wastewater reuse in the future. From a permitting perspective there are significant differences in the permit limits for stream discharge versus Type I reuse. The limits for Type I reuse are presented in Table 5-4.

Table 5-4: Type I Reuse Permit Limits

Parameter	Type I Reuse Limits
BOD_5	<10 mg/L
TSS	<5 mg/L
Turbidity	<2.0 NTU- Monthly Average <5.0 NTU- Instantaneous Maximum
E-coli	Non-Detect- Monthly Average <9 org/100 mL- Daily Maximum

The BOD_5, TSS and Turbidity limits should be readily achievable by the proposed MBR process. The parameter that will require some process upgrades in order to reliably meet is that for E-coli. To do so, the proposed UV disinfection system will need to be expanded and the system will be designed to do so.

5.3.2. Headworks

The new WRF will include a headworks facility designed to remove coarse particulate non-biodegradable material from the incoming wastewater. The headworks will be made up of a series of unit processes that will include the following:

1) Coarse Screening
2) Grit Removal
3) Influent Lift Station
4) Fine Screening

Coarse Screens: Design Criteria

Wastewater will enter the new facility through three gravity sewer mains that will be combine in a vault or manhole just before the headworks structure. A single pipe carrying all influent flow will enter the headworks. it is also expected the return flows from within the plant will be discharged upstream of the screens.

Coarse screens will be the first treatment step provided and will remove large solids and stringy material from the incoming wastewater. The screens will be installed in open channels constructed of concrete. A total of three parallel flow channels are proposed each channel having a width and depth of 4 ft. Two channels will be outfitted with a screen at the start and as influent flow increases the third channel can be outfitted. Channels will include slide gates on each end to allow channel isolation.

The screens are sized based primarily on hydraulic capacity and must be capable of passing peak flows without creating excessive headloss. Initially it is proposed that two screens, each rated at 16 MGD be installed. This will provide 16 MGD of firm capacity, enough to handle the 2040 peak day flow of 16.6 MGD with one unit out of service.

The third channel will initially be provided with a manual bar rack as a backup should one of the screens be out of service or if flow exceeds the capacity of the installed units. In the future if the third train needs to be outfitted with a screen, a piped bypass line with a vault and bar rack is envisioned to keep this redundant feature.

The type of coarse screen that is planned is a multi-rake bar screen. Such screens have been in use for decades and it is a well proven and reliable design. Screening is provided by vertical bars that are equally spaced, in this case ¼ inch or 6 mm bar spacing is proposed. As debris is retained and builds up on the screen surface, i.e. blinding, a rake mechanism is used to remove the screenings. The allowable blinding on the screen dictates the amount of headloss through the unit and the frequency of cleaning. Blinding of 25-30% is proposed for these units which will give a headloss at peak hour flows of less than 8 inches.

Multiple rakes rotate and remove the captured debris from the face of the screen and lift it up to the top of the unit where it is dropped through an enclosed chute into a washpress for further processing. The washpress is an integrated component of the screening system and will be provided as part of the system by the screen manufacturer. The washpress is used to clean the screenings of organic material and to compact and dewater the screenings to reduce odor potential and make handling easier. The washpress will discharge the screenings through a discharge chute directly to a dumpster for removal and disposal.

Table 5-5: Coarse Screen Design Criteria

Design Criteria	Value
Screen Type	Mechanical Rake
Quantity	2 (1 duty/1 standby + bar rack)
Design Peak Hour Flow (MGD)	16.6 MGD each
Design Average Daily Flow (MGD)	6.65 MGD each
Screen Headloss	4-8 inches
Screen Blinding	25-30%
Bar Spacing	¼- inch / 6 mm
Bar Angle	75^0
Screen Materials	304L SS
Unit Width	4 ft
Unit Height	8-10 ft
Channel Dimensions	4 ft W x 4 ft H x 20 ft L
Drive	Constant Speed/Intermittent
Motor	½-1 HP
Power	460/3/60
Classification	C1D1/NEMA 7
Screenings Washer	
Type	Shafted Auger
Quantity	2 (1/screen)
Screenings Capacity	70 ft3/hr
Discharge	SS Chute
Washwater Demand	10-15 gpm @ 30-60 psi
Drive	Constant Speed
Motor	5 HP
Power	460/3/60
Classification	C1D1/NEMA 7

A building will be located adjacent to the screenings structure to house the ancillary components of the headworks system, including the dumpsters or containers for screenings and grit. The building will also assist in containing and mitigating odors, although ventilation will be required during occupancy. Preliminarily it is planned that the screen channels and grit removal tanks will be uncovered and open to the atmosphere. This will require that these systems include measures to prevent freezing.

Coarse Screens: Electrical & Controls

The primary power requirements for the coarse screening system are the motors for each screen and washpress. The motors will be relatively small with the screen units expected to be <1 HP while the washpress should be 5HP or less and will use 460V/3PH/60 HZ power. Electrical components for the screens and washpress must be Class 1 Division 1 rated, except for the main control panel assuming it's located in an unclassified area.

The screens and washpresses will be supplied with control panels from the manufacturer. Both a local control station and a main control panel will be provided. Each unit will have an individual local control station, but the remote main panel will monitor and control both units.

The screen will be designed to operate automatically based on the headloss across the unit. Differential level between the upstream and downstream water levels will trigger the rake mechanism to clean the screen. The screen will also have torque overloads to reverse, alarm and/or shut down the unit if the rake is restricted. Each screen will include a level instrument to monitor the differential level. Ultrasonic sensors will be located upstream and downstream of each screen.

Grit Removal: Design Criteria

The coarse screens will be followed by a vortex type grit removal system. The current basis of design is the Headcell™ type grit concentrator system that passes flow through a stack of trays to capture and settle grit without any moving parts- functioning on hydraulics. The grit settles on the trays and then is directed to the center of the trays and falls through an opening to a hopper from where it is pumped.

Two Headcell™ units in parallel are planned and the influent will gravity flow through this grit removal process. Each unit will be designed to process peak hour flow for redundancy if a unit is out of service. Performance of the units in terms of grit capture is a function of flow rate. The units will be designed to capture 95% of all grit ≥75 um up to a flow rate of 10 MGD and 95% of grit ≥ 106 um up to 20 MGD. Since the units have no mechanical or moving parts and are self-cleaning, they require little maintenance and are highly reliable. The grit trays are made of polyethylene and the support structure is stainless steel. A fully redundant unit is therefore not planned, although a bypass will be provided.

The Headcell plates will have a diameter of about 12 ft and 6 trays are planned resulting in a unit height of about 12 ft. They will each be installed in a dedicated concrete tank that will have an inlet channel and isolation gate. Each tank will have dimensions of about 14 ft x 14 ft x 15 ft deep. One of the walls will include a horizontal weir to control the level in the Headcell tank. The weirs will discharge into a common flow channel that conveys wastewater into the lift station wet well. The headloss through each Headcell unit is expected to be less than 1 ft at peak flows.

Grit is collected at the base of the Headcell trays and is then pumped to a washing and classifying unit. Grit pumps will be located in the basement of the headworks and will be situated as close as practical to the grit sumps to limit suction piping length and the chance for blockages. The pumps will also be located at the same elevation as the grit sumps to avoid a suction lift condition. Three pumps are planned in a 2 duty, 1 standby arrangement. Recessed impeller pumps designed for pumping grit and abrasive materials are planned for the grit pumps. The pumps will operate intermittently on a timed interval. The capacity of each pumps is expected to be in the range of 150-250 gpm. Since settled grit can get packed and is difficult to pump, a washwater flush into the grit sump will be used to fluidize the grit and facilitate pumping. This washwater flush will be sequenced with the timed operation of the pumps.

The grit pumps will pump the grit slurry up to the grit washing units. The grit washers will be located on the ground floor of the headworks building. Grit washing removes any organic material and dewaters the grit prior to disposal. Two grit washing units are planned with both units planned for normal operation, however one unit will have the capacity handle all grit. The grit washers will also include a screw conveyor to dewater and discharge the grit directly into a container for disposal.

Table 5-6: Grit Removal System Design Criteria

Design Criteria	Value
Grit Removal Type	Vortex, Stacked Tray (HeadCell^{TM})
Quantity	2 (1 duty/1 standby)
Design Peak Hour Flow (MGD)	16.6 MGD each
Design Average Daily Flow (MGD)	6.65 MGD each
Headloss	1-12 inches
Grit Capture	95% @ >75 um up to 10 MGD
Grit Capture	95% @ >106 um up to 20 MGD
Tray Diameter	12 ft
Number of Trays	5/unit
Surface Area	565 ft^2/unit
Loading Rate	23.6 gpm/ft^2
Washwater Demand	80 gpm @ 50 psi - Intermittent
Grit Pumps	
Pump Type	Recessed Impeller
Quantity	3 (2 duty/1 standby)
Capacity	150-250 gpm
TDH	30-40 ft
Drive	Constant Speed
Motor	5 - 7.5 HP
Power	460/3/60
Classification	C1D1
Grit Washer/Classifier	
Type	Coanda
Quantity	2 (2 duty)
Capacity (Each)	1.5 DT/hr
Design Flow	150-250 gpm
Grit Removal Efficiency	95% $\geq$ 106 um
Washwater Demand	25 gpm @ 30 psi

Design Criteria	Value
Drive	Constant Speed
Motor	0.75 HP (mixer) / 1.5 HP (screw)
Power	460/3/60
Classification	C1D1/NEMA 7

Grit Removal: Electrical and Controls

The grit pumps and the grit washer represent the main power demands for this system, each requiring 460V/3Ph/60HZ power supply. All electrical shall be rated for a Class 1 Division 1 classification. Local control/disconnects will be provided for the pumps and the washing units.

A headworks electrical room/MCC is planned which will distribute power the headworks equipment. This room will be designed to be unclassified and the main control panels for all equipment will be located here.

The grit pumps are expected to operate intermittently based on a timed cycle. Cycle frequency will be variable, and will increase with flow as the grit load increases. The grit washer will operate in sequence with the grit pump discharge and will operate in a batch mode.

Influent Pump Station: Design Criteria

The grit removal system will be followed by the influent pump station which will receive all influent flow and pump it up to the fine screens. Return flows from plant may also be directed to the lift station either from a plant pump station or via gravity. The pumps station must have capacity to pump the peak hour flow so the firm capacity of the station must be 16.6 MGD or approximately 12,000 gpm.

The station will be wet pit/dry pit design and preliminarily will include four pumps, 3 duty, 1 standby. Space for a fifth pump will be provided. The pumps will be centrifugal non-clog solids handling type capable of passing 3-inch solids. Dry pit submersible type pumps are planned. Each pump will have a nominal capacity of 4,000 gpm at approximately 35-40 ft TDH. The pump drives will be variable speed to allow turndown of the pumps to maintain a consistent flow and to prevent excessive cycling. The use a of a smaller jockey pump may be considered to handle low flow periods or trim the flow if turndown of the primary pumps is not adequate.

The pumps will be located in the basement of the headworks about 20 ft below finished grade. An access hatch in the station roof will allow the pumps to be removed with the use of a crane.

Table 5-7: Influent Pump Station Design Criteria

Design Criteria	Value
Station Type	Wet Pit/Dry Pit
Pump Type	Centrifugal, Solids Handling
Quantity	4 (3 duty/1 standby w/ space for 5th)
Capacity (each)	4,000 gpm
TDH	35-40 ft
Drive	Variable Speed
Motor	~75 HP

Design Criteria	Value
Power	460/3/60
Classification	C1D1

The wet well will be a concrete vault approximately 20 ft deep with a footprint of 10 ft W x 40 ft L. A self-cleansing type wet well is planned to help prevent the buildup of debris and reduce maintenance. The invert elevation of the inlet channel will be approximately 4523 ft and giving an operating depth of about 8 ft in the wet well. The pumps will be variable speed and they will be paced to maintain a level in the wet well. The normal drawdown in the wet well of about 5 ft is anticipated. Corrosion is a concern and a protective coating on the interior of the wet well will be used.

Influent Pump Station: Electrical and Controls

An MCC in the headworks building is planned in order to power the headworks equipment. The MCC will be located at ground level and will be separated from other areas to provide an unclassified space. VFD's for the pumps will be located in the MCC. Locally the pumps will have disconnects and HOA switches.

Starting and stopping of the pumps will normally be controlled via wet well level. If the wet well level continues to rise with one pump on, then a second pump will come on and so forth. As the wet well level drops the pumps will ramp down or turn off. Pump controls shall also include a cleaning program to sequence the pumps for wet well cleaning. Pump controls shall be programmed into the SCADA system where monitoring and control of the lift station will occur. A remote SCADA control panel is proposed to be located in the headworks MCC.

Fine Screens: Design Criteria

Following the influent lift station, fine screens will be used to remove small particulate material. The fine screens are required for the MBR process in order to protect the membranes from damage. This is a warranty requirement for the membranes and a robust and reliable fine screening system is necessary.

Rotary drum type fine screens are proposed for use on this project. The drum screens will have a piped inlet and outlet which provides minimal chance for bypassing of solids around the screen or through seals, which are typical of channel mounted screens.

The opening size planned for the fine screens is 2 mm. This is dictated by the membrane manufacturer. The screen type will be a perforated plate. A total of 4 screens are planned in 3 duty, 1 standby arrangement. Each screen will have a nominal capacity of 5.5 MGD, providing a firm capacity of 16.5 MGD, consistent with the peak hour design flow of 16.6 MGD.

Flow will be piped into each screen and a common header pipe is envisioned before the screens with a tee, inlet pipe and isolation valve to each unit. Flow will be introduced into the center of the drum with a weir box that distributes the flow to the screen. Wastewater will pass through the screen openings and be collected below the drum in a drain pan with a piped outlet. Screenings remain in the drum and flights within the drum move them to the end of the open drum where they drop into a washer and compactor unit.

Table 5-8: Fine Screen Design Criteria

Design Criteria	Value
Screen Type	Rotary Drum
Quantity	4 (3 duty/1 standby)
Capacity (each)	5.5 MGD
Screen Type	Perforated Plate
Screen Opening	2 mm
Unit Dimensions	92 in W x 178 in L x 120 in H
Unit Weight	5200 lb (dry), 10,700 lb (wet)
Washwater Demand	~70 gpm @ 40-80 psi
Drive	Constant Speed
Motor	1.5 HP TEFC
Power	460/3/60
Classification	C1D1
Screenings Washer	
Type	Screw Auger
Quantity	4 (1/screen)
Discharge	SS Chute
Drive	½ HP/ Constant Speed
Motor	½ HP
Power	460/3/60
Classification	C1D1

The screens will precede the activated sludge process and for hydraulic reasons the screens will be elevated above the finished grade. The centerline of the screens is estimated at 4542 ft, roughly 6-8 ft above final grade. The screened wastewater will be collected in a pipe manifold under the screens and then conveyed via gravity to the process splitter box.

Each screen will have its own dedicated washer-compactor to clean, compact and dewater the screenings. This unit will also convey the screenings through a discharge chute to a container for disposal.

Fine Screens: Electrical and Controls

Each screen and washer/compactor will include a small gearmotor with sizes in the range of 0.5-1.5 HP. These will be the primary 3 phase power demands for the screening system. Other electrical components for the fine screens will primarily be control systems operated on 120 VAC. The screen manufacturer will provide a control panel with an HMI designed to monitor, operate and control the four screens. Each screen will have a local disconnect switch and an e-stop button on the unit.

The screens will be started and stopped based on flow rate from the influent pump station. When flow approaches the capacity of the operating screen(s) another unit will automatically be brought online by starting the unit and opening the influent isolation valve. As flow decreases units will be shut off. This programming will be provided by the manufacturer and included with the main control panel.

Headworks Building: Design Criteria

A headworks building will be provided to contain ancillary equipment, screenings/grit containers and an electrical and control room. It is anticipated that the building will also enclose the fine screen system. The building design is expected to be a slab on grade with CMU walls. Building height will need to accommodate trucks for container/dumpster exchange, which will put the height at about 15-20 ft. The footprint of the building is estimated to be about 5,000-6,000 SF. The building will also include lower level or basement where the grit and lift station pumps will be located. The building will serve to contain and mitigate odors. An odor control system is not anticipated initially but the building will be designed to facilitate the addition of a system should it be needed in the future. Ventilation will be included for operator entry.

5.3.3. Chemical Feed Systems

Three different chemicals will be used regularly at the proposed plant. These chemicals and their purpose are summarized below.

Table 5-9: Required Chemical Feed Systems

Chemical	Usage/Purpose
Aluminum Sulfate (or Other)	Phosphorus Removal
Sodium Hypochlorite	Membrane Cleaning
Citric Acid	Membrane Cleaning

The use of alum will be discussed here, and the membrane system discussion covers the cleaning chemicals.

Chemical treatment of the wastewater will be used to remove phosphorus. The chemical planned for use is aluminum sulfate or alum, which is in widespread use in this application. When mixed with the wastewater, alum reacts with and bonds to phosphorus to create a precipitate that can be removed from the bulk liquid by liquid/solids separation, i.e. settling/clarification or filtering—in this case by the membranes. The activated sludge process will be designed to biologically remove phosphorus as the primary means of phosphorus removal and chemical removal is considered a supplemental or backup method of removal. The addition of alum does increase the solids in the treatment process creating additional sludge.

Aluminum sulfate for use in wastewater applications is typically provided as either a solution or in dry form as pellets or granules. The solution form is proposed for use since it minimizes chemical handling and maintenance needs compared to working with the dry form. Alum solution is typically available as 48% solution strength and the design is based on this. Bulk deliveries of alum are planned loads being delivered via tanker truck.

This alum solution is a hazardous chemical that requires certain health and safety precautions. MSDS sheets for the chemical indicate this solution has the following ratings: 2 Health, 0 Fire, 1 Reactivity. The alum solution is acidic with a pH typically in the range of 2.0-2.5 SU. Contact with the solution is therefore hazardous and appropriate protective gear must be worn when handling the chemical. An eyewash station must also be located near the chemical feed and storage equipment. Being highly acidic, alum is therefore incompatible with alkaline substances and should be stored separately and not mixed. Alum solution is a clear to greenish colored liquid that is viscous and has a greasy or slippery texture making spills of alum solution a slipping hazard.

The alum solution will be added to the treatment process using chemical metering pumps. The amount of alum required is a function of the amount of phosphorus to be removed. The chemical characteristics of the wastewater also factor into the alum dosage since alum will react with other constituents in the wastewater. Site specific testing, once the new facility is operational, should be conducted to determine the required alum dosage.

Estimates of alum requirements have been made based on the process modeling and indicate that at an alum requirement of about 120 gpd of alum solution will be required under maximum month conditions. Preliminarily, this requirement will be used to size the alum storage tanks since a 30-day supply is targeted and this represents the highest demand. Short term peak demands are also anticipated, and the feed pumps will be sized to meet these.

Alum will be introduced to the process using chemical metering pumps. A diaphragm or peristaltic type chemical metering pumps will be used. Preliminarily three pumps in a 2 duty, 1 standby arrangement are planned to provide both flexibility and redundancy. A skid mounted metering pump system will be employed where the metering pumps and all accessories are supplied as a complete package. This type of system simplifies installation and provides sole source responsibility for the metering pump system. The metering pumps will normally operate in a flow paced mode where the pump output is proportional to the plant's flow rate. Alternatively, the chemical can be dosed based on feedback from an online phosphorus analyzer if this approach is selected.

Alum will be stored on site in bulk chemical storage tanks. These tanks will be constructed of polyethylene, specifically cross link polyethylene, XLPE, tanks are proposed. The tank will be designed to hold chemicals with a specific gravity up to 1.65 as alum has specific gravity of 1.34. The tank type is considered a vertical tank having a flat bottom, vertical sidewalls and a domed cover, all seamlessly constructed. The tanks will be designed for atmospheric pressure.

Based on the projected alum requirements, a total storage volume of about 4,000 gallons is needed to provide about 30 days of storage on site. A single tank with a capacity of 4,000 gallons is therefore proposed. Secondary containment, to contain any chemical leakage, will be provided by a concrete basin in which the tanks will be located. The storage volume of the secondary containment will be 110% of the tank's total storage volume or about 4,500 gallons.

The proposed location for alum storage is adjacent to the membrane building nearby the membrane cleaning chemicals. The bulk chemicals used at the plant will be located in close proximity so that common access, safety and delivery features can be combined for use where applicable and for the occupancy rating of that space.

Multiple locations are proposed for the introduction of alum to the process in order to provide process flexibility. In all cases the dosing point must be upstream of the membranes since these will separate the alum precipitates from the liquid allowing them to be removed from the process in the WAS. Initially, three alum dosing points are suggested: 1) process splitter box, 2) beginning of the aerobic zone and 3) at the end of aerobic zone. A key consideration in the alum dosing location is mixing. Adequate mixing is required to disperse the alum into liquid and to promote its efficacy.

Since alum is acidic and corrosive, material selection is an important factor in alum system design. Plastics are generally compatible with alum and resist corrosion and are the preferred material for handling alum. Piping will be specified as SCH 80 PVC and as noted the storage tanks will be XLPE. Gasket material will be EPDM. Ferrous metals should be avoided, but when necessary, typically for fasteners, 316 stainless steel will be specified.

Table 5-10: Alum Feed System Design Criteria

Design Criteria	Value
Chemical	Aluminum Sulfate Solution ($Al_2(SO_4)_3*14H_2O$)
Solution Strength	~48%
Specific Gravity	1.34
pH	2.0 – 2.5
Appearance	Clear/Light Green Liquid, Odorless
Maximum Month Requirement	120 gpd
Peak Requirement	500 gpd
Metering Pump Type	Diaphragm or Peristaltic
Quantity	3 (2 duty/1 standby)
Capacity (each)	0.5 gpm
Turndown	100:1
Storage Tank Type	Vertical, Single Wall w/ Cover & Manway
Tank Material	XLPE
Tank Capacity	4,000 gal
Specific Gravity Rating	1.65

Chemical Feed System: Electrical and Controls

The alum feed system will not be a significant power demand as the feed pumps are small, <1 hp. Single phase power, 120 VAC, will be sufficient to power all components of the alum feed system. The proposed metering pump skid will be supplied with a vendor provided control panel to operate the feed pumps.

The pumps will normally be controlled to dose in proportion to the plant's flow rate. Therefore, input to the pumps of plant flow, likely from the lift station flow meter, will be required for control. Feedback from the pumps on speed/output will also be needed. A number of other devices to monitor tank level, pump pressure, etc. will also be included with the system.

5.3.4. Biological Process

The anaerobic/anoxic/oxic (A2O) process configuration will be used for biological treatment upstream of MBR. The A2O process is a type of activated sludge treatment that utilizes sequential anaerobic, anoxic, and aerobic stages for simultaneous biological BOD and phosphorus removal. An anaerobic selector is established by mixing and contacting the BOD in the influent wastewater with recycled activated sludge in the absence of oxygen causing microbes to release any stored phosphorus. In the next step, nitrate is removed in an anoxic zone equipped with submersible mixers. Then, the wastewater is aerated in the oxic zone and then continues to MBR tanks for filtration. Phosphorus accumulating organisms (PAOs) uptake soluble phosphorus, the remaining BOD is consumed, and ammonia is oxidized to nitrate via nitrifying bacteria. Sludge in the MBR tanks is either returned upstream of secondary treatment and/or removed with the wasted sludge. The A2O process is a widely used wastewater treatment process at both small and large facilities and is favored for its simplicity, high efficiency, and low energy consumption. The A2O process followed by MBR will be able to meet the anticipated effluent limits of TP (< 1 mg/L but the goal is < 0.5 mg/L) and ammonia (< 7 mg/L but the goal is < 3 mg/L). A summary of the A2O process design criteria is provided in Table 5-11.

The bioreactors will be arranged in two parallel trains and membrane tanks will be arranged in 6 to 8 parallel tanks (depending on the membrane manufacturer). Membrane modules have been arranged into cassettes to provide sufficient membrane area to meet the treatment flow and flux requirements. The designed cassettes/modules will provide sufficient area to meet the design basis flow conditions (flux requirements should not exceed 24 gallons per day per square-foot of membrane area for peak hour flow conditions). Depending on the membrane manufacturer, nominal pore size could range between 0.04 to 0.2 microns. The pore size is such that nearly all particulate material is retained within the membrane tank and the filtrate contains TSS < 1 mg/L with turbidities generally well below 0.5 NTU. Any precipitated phosphorus, through the addition of alum, is retained within the MLSS and does not pass through the membrane thus ensuring a low concentration total phosphorus is maintained in the membrane permeate.

Utah DWQ has indicated that there may be a total nitrogen (TN) or total inorganic nitrogen limit (TIN) limit in the future (TN or TIN limits of < 10 mg/L). Preliminary process modeling suggests that the A2O process may not be able to reliably achieve this TN limit based on the Spanish Fork's specific wastewater characteristics. If greater nitrogen removal is required, the A2O process may need to be converted to a five stage Bardenpho process by the addition of post anoxic zone to the treatment train, downstream of the oxic basin. Depending on influent carbon substrate concentrations and required level of nitrogen removal, process modeling indicates that an external carbon source may be required (i.e., a methanol feed system). A post anoxic zone and external carbon addition will not be designed for this expansion. However, space will be reserved for these facilities should they be required in the future.

Equipment indicated in the table below summarize the membrane system components proposed by each membrane manufacturer under consideration. During the membrane selection process, additional membrane manufacturers will be evaluated along with those included in table below.

Biological Process: Electrical and Controls

Electrical and controls for the bioreactor and MBR treatment units will be located in an adjacent MBR support building. This building will include a dedicated electrical room where an MCC and controls (MBR SCADA, PLC, and HMI) will be located. Almost all membrane processes will be automatically controlled by the PLC (i.e., relaxation, permeate flow, backwashing, maintenance clean, RAS flow control, membrane air scour flow, DO control). Recovery clean will be a manually initated process. Process aeration blowers and MBR air scour blowers will be located the MBR support facility. The process aeration blower flow rates will be controlled based on either DO setpoint control or ammonia readings (depending on type of control City selects during preliminary design). Air scour will be the primary method for cleaning the MBR system. VFDs are required for both Process Air and MBR air scour blowers.

Chemical feed systems will include: alum, sodium hypochlorite, and citric acid. Permeate control equipment will include permeate pumps, pressure transmitters, turbidity meters and transmitters, flow meters, flow control valves, and solenoid valves. VFDs are required for the permeate pumps. Depending on the manufacturer, backpulsing pumps will be used for regular cleaning and/or a relaxing process will be used. RAS and WAS control equipment includes duty and standby pumps and flow meters. VFDs are required for the RAS and WAS pumps. WAS Pumps will pump the WAS from the RAS line to the Sludge Holding Tank on the existing site.

Anaerobic and Anoxic tanks will require submersible mixers, DO probes, ORP probes, and pH probes. The oxic tanks will require fine bubble diffusers, DO meters, pH meters, and TSS sensors. The MBR tanks will require level switches, submerged membrane units, DO meters, pH meters, and lifting tools.

A bridge crane extending beyond the MBR basin footprint is required for loading and unloading as required for replacement of the membrane cassettes or maintenance at the membrane tanks.

Table 5-11: Design Criteria for Biological Process and Ancillary Facilities

Parameter	Units	Value
Bioreactor Configuration(1)		
SRT, Total	days	9 - 12
Number of Trains	-	2
Max Month Flow per Train	MGD	4.2
Total Bioreactor Volume	MG	2.5
Anaerobic Tank Volume	MG	0.9
Anoxic Tank Volume	MG	0.5
Aerobic (Oxic) Tank Volume	MG	1.1
Membrane Tank Volume(2)	MG	0.4
Side Water Depth	FT	18
RAS Flow	times Q	4
Mixed Liquor Characteristics(3)		
Aerobic MLSS	mg/L	7,000
Membrane MLSS	mg/L	10,500
Dissolved Oxygen Characteristics		
Anoxic Dissolved Oxygen	mg/L	0
Aerobic Dissolved Oxygen	mg/L	1 – 3
Membrane Tank Dissolved Oxygen	mg/L	1 - 3
Process Aeration		
Total Airflow	SCFM	8,000 – 15,000
Blower Design Parameter (Process)		
Blower Design Capacity	SCFM	5,000
Quantity (duty + stanby)	No.	3 + 1
Max Motor HP	HP	450
Total Blower HP	HP	1,800

Parameter	Units	Value
Total Number of Mixers (4 Anaerobic, 2 Anoxic)	No.	6
Power Consumption of Mixer, ea.	HP	< 10
Blower Room, Chemical Room, MBR Support Facility Building	SQFT	8,400
Power Requirements	VAC/Phase/Hz	460/3/60

1 Reactor Volumes are based on max months flows and average concentrations. Temperature between 10oC to 28oC

2 Membrane tank volume and shape will vary depending membrane vendor elected.

3 Aerobic MLSS will vary between 6,000 to 8,000 mg/L and MBR MLSS will vary between 9,000 to 11,000 mg/L.

4 Air flow demand range is based on average to peak day demand. During low flow or minimum flow and load conditions the air demand could be lowered and single blowers should be able to meet the demand with minimum energy wastage.

Table 5-12: Design Criteria for MBR and Ancillary Facilities

Parameter	Suez ZeeWeed Hollow Fiber MBR	Kubota Flat-Sheet MBR
Total Number of cassettes	54	144
Total Number of MBR Basins	6	8
Total number of cassettes/Basin	9	18
Additional Space for Cassettes/Basin	2	-
Basin dimensions per Basin	66 ft x 82 ft x 13 ft SWD	52 ft x 52 ft x 16 ft SWD
Membrane Average Pore Size (microns)	0.04 (ultrafiltration)	0.2 (microfiltration)
Permeate Pumps	6 Pumps	8 FIRM + 1 Redundant Blower
Air scour blowers	4 FIRM + 1 Redundant Blower	8 FIRM + 1 Redundant Blower
Other equipment	1 FIRM +1 Redundant back pulse Pump, Permeate collection & air distribution header piping, level transmitter, air ejector assembly w/ air supply, pump isolation and check valves, pressure transmitter, pressure gauge, flow meter, chemical injection ports and valves, turbidimeters, Sodium hypochlorite feed system, citric acid chemical	MBR Blower Pressure Transmitter, Air Flow Meter Air Flow Distribution, Level Switch, Permeate Flow Meter Permeate Flow Control Valve, Permeate Turbidity Meter, Permeate, Pressure Transmitter, In-Basin Permeate, Piping Excluding Headers, In-Basin Air Scour Drop

Parameter	Suez ZeeWeed Hollow Fiber MBR	Kubota Flat-Sheet MBR
	feed system, air compressor for pneumatic valves, digi modem, master control panel	Piping excluding Headers, CIP System, Caustic Soda Dosing System, Control Panel, HMI, SCADA
Typical Power Consumption	5,000,530 KWh/year	-

[1] Number of cassettes or modules will vary depending on manufacturer selected. Similarly, volume of tank and other ancillary equipment will vary per manufacturer selected.

[2] Value provided is based on one hollow fiber memebrane manufacturer, Suez. Membrane manufacturer will be competitively procured during preliminary design.

[3] Power consumption, number of pumps, CIP chemicals and frequency, air demand, # of diffusers, and # of blowers will vary based on membrane manufacturer selected.

[4] Typical power requirements is 460/3/60 (VAC/Phase/Hz).

Membrane Cleaning Systems

Each membrane system will require chemical agents for regular maintenance and intermittent recovery cleanings. The following recommendations from MBR manufacturers were used for determining storage requirements and power requirements on site:

Table 5-13: MBR Chemical Facility Requirements

Parameter	Quantity	Units
	Sodium Hypochlorite Feed	
Flow Rate	150	gal/week
Maintenance Cleans	2	clean/week @ 200 mg/L
Recovery Cleans	2	cleans/year @ 1,000 mg/L
Storage Design	4	weeks
275 Gallon Totes Required	3	each
Actual Storage	5.5	weeks
	Citric Acid Feed	
Flow Rate	130	gal/week
Maintenance Cleans	1	clean/week @ 2,000 mg/L
Recovery Cleans	2	cleans/year @ 1,000 mg/L
Storage Design	4	weeks
275 Gallon Totes Required	3	each
Actual Storage	6.3	weeks

MBR manufacturers will provide one duty and one standby metering pump system per chemical provided. Actual chemical quantity and dosing rates will be specific to the selected membrane manufacturer.

5.3.5. Disinfection

Disinfection of wastewater is required in order to inactivate pathogens present in the wastewater prior to discharge. UPDES permits typically give a numerical e-coli limit that must be met in the discharge and this is achieved via disinfection. Disinfection at the existing facility is accomplished using chlorine in the form of gas, which is commonly practiced. For the new facility ultraviolet, UV, disinfection is planned rather than chlorine. Numerous factors influenced the decision to use UV disinfection including:

- Chlorine residual limits for discharge to Utah Lake have become increasingly stringent and require dechlorination (another chemical feed system) in order to meet the low limits.
- Chlorine is a hazardous chemical that present numerous challenges with handling and safety. The same is true for the sulfur-based compounds typically used for dechlorination.
- UV disinfection is a mature technology that is widely applied in this application
- The proposed MBR system will produce a high-quality effluent that will reduce the amount of fouling on the UV system and prolong its service life

The City has expressed interest in reuse of their treated wastewater which has an impact on the design of the disinfection system. Reclaimed water suitable for Type 1 reuse, what the City is considering, must meet stricter requirements with respect to e-coli inactivation. Governing standards for disinfection of reuse water also require/recommend establish a minimum dosage of 80 mJ/cm^2. It is expected that these requirements can be met by supplementing the UV system to increase output, which can be accomplished with additional banks of bulbs

At this time the UV system will be equipped to meet the stream discharge standards for e-coli, but the system will be designed to be easily upgraded to allow reuse in the future.

An open channel type UV disinfection system is proposed that will consist of three flow channels. Initially two channels will be outfitted with equipment and the third will be for future expansion. Preliminarily each channel will be rated for about 8 MGD, giving a combined capacity of about 16 MGD to handle peak flows. A single channel is designed to handle average and maximum month flows.

Instead of a redundant channel, redundant banks of UV bulbs are planned to provide reliability. Each channel will include multiple banks of UV bulbs such that if one bank is out of service the remining banks are capable of providing the required UV dosage.

The UV system will follow the membranes and will receive permeate pumped from the membranes. Permeate will be introduced into a stilling basin/splitter box from where it will flow into each channel. Isolation gates on each channel will allow channels to be taken out of service as needed.

A UV system with vertically oriented bulbs is envisioned and this will dictate channel dimensions to some extent. Preliminarily the UV channels are expected to be about 2-4 ft wide and 6-8 ft deep, depending on the selected system. Channel length is estimated to be 50-60 ft. A flow control weir will be located at the end of flow channel to control channel level.

The UV system will be housed in dedicated building that will enclose the UV channels and include separate room for electrical and controls equipment. The building structural design is intended to be CMU on a slab on grade foundation having the flow channels extending below grade. Preliminarily the footprint of the building is expected to be about 3,000 SF.

Table 5-14: UV Disinfection Design Criteria

Design Criteria	Value
Type/Configuration	Vertical Lamp, Open Channel
Number of Channels	2 (plus future 3rd)
Peak Flow per Channel	8.5 MGD
Minimum UVT - Stream Discharge	48%
Minimum UVT – Type I Reuse	65%
Minimum UV Dose – Stream Discharge	30 mJ/cm^2
Minimum UV Dose – Type I Reuse	80 mJ/cm^2
UV Banks/Channel- Stream Discharge	5 (4duty/1 Standby)
UV Banks/Channel- Type I Reuse	8 (7 duty/1 Standby)
Power Requirement (current)	~ 75 kW
Power Requirement (future)	~200 kW

Electrical and Controls

The UV system is primarily a vendor supplied system and pre-procurement of this system is being considered. Much of the electrical and controls equipment required for the UV system will be supplied by the system vendor. The UV system does have a robust electrical demand and separate MCC/electrical room is planned to serve the system. Power supply to the UV system will be 460V/3ph/60hz. It is anticipated the UV system will be flow placed to reduce energy requirements.

A vendor supplied control panel with PLC and HMI will also be included with the UV system to monitor and control the system. This panel will reside in the UV electrical/control room and be integrated with the plantwide SCADA system.

5.3.6. Sludge Holding Tanks and Dewatering Facility

Through the facility planning process, the City has chosen to adopt a phased approach to sludge dewatering. Failure of one of the existing plant's anaerobic digesters and the future plan to move away from anaerobic digestion has prompted to the City to implement Phase 1 dewatering improvements at the existing plant within the next year, prior to construction of the new WRF. The Phase 1 improvements will involve separate dewatering of WAS at the existing plant, with conversion of an existing anaerobic digester to an aerated holding tank and the addition of new dewatering equipment, preliminarily screw press technology.

This approach to managing solids is what is proposed for the new WRF, and it is anticipated that the equipment installed with Phase 1 will be transferred to the new WRF as part of Phase 2. Phase 2 is planned for implementation in about 10-15 years and dewatering will be handled at the existing facility until that time. A WAS pipeline from the new WRF to the existing is required as part of this plan.

The Phase 1 project is being completed independent of this master plan and its design is not covered here. The following discussion focuses on Phase 2 and what is required at the new plant at the end of the design period- 2040.

The plans for Phase 2 envision a new dewatering building and aerated sludge holding tanks designed for handling all WAS. The dewatering equipment from Phase 1 will be transferred to the new facility if possible and practical. Additional equipment will be added to increase capacity as well.

In Phase 2, new aerated sludge holding tanks will be constructed at the greenfield site to provide operations staff flexibility for wasting and biosolids dewatering. These tanks allow the city to continue wasting during a long holiday weekend, but to hold the WAS in the holding tank and not need to dewater. Typically, aerated sludge holding tanks are sized to allow 4 to 7 days of WAS storage at the average day flow condition. The tanks are not large enough to digest or reduce the quantity of solids. However, they are cost effective and they do not result in nutrient feeback to the process.

Prior to constructing the sludge holding tanks in Phase 2, new digestion and energy production technologies will be evaluated to determine if they would be a feasible solution for Spanish Fork. These technologies are currently in development, and potentially could be utilized to achieve Class B biosolids as these processes become more proven.

Preliminarily four screw presses will be needed in 2040 to handle maximum month conditions in 3 duty, 1 standby arrangement. Assuming 40 hours of press operation per week, the total throughput of the dewatering system will be nearly 3,000 lb DS/hr with an expected flow of about 500 gpm. Each unit will have a 12 DT/day capacity. This is subject to change based on equipment selected in Phase 1.

Dewatered cake will be conveyed directly to trailers for load out and disposal. A belt conveyor will be used to convey the dewatered cake from the presses to the truck bay where a distributing conveyor will be used to fill the trailer. A loadout system with a hopper may be considered depending on truck scheduling.

A polymer feed system will be located within dewatering building. An emulsion type polymer feed system is planned and will require a make down system. Following make down, progressive cavity pumps will deliver the polymer to the presses. The emulsion polymer is expected to be supplied in IBC totes and will be fed directly from the totes.

Table 5-15: Design Criteria for Sludge Holding Tanks

Parameter	Units	Value
Number of Sludge Storage Tanks		2
Sludge Storage Volume (each)	MG	0.38
Aeration System		Jet Aeration

Table 5-16: Dewatering System Design Criteria

Design Criteria	Value
Type	Screw Press
Quantity	4 (3 duty/1 standby)
Capacity (each)	12DT/day
Cake Dryness	16-18%
Solids Capture	>94%
Washwater Demand	~70 gpm @ 40-80 psi
Drive	Variable Speed, VFD
Motor	10 HP TEFC
Power	460/3/60
Classification	C1D2
Conveyer	
Type	Belt
Quantity	1
Drive	Constant Speed
Motor	½ HP
Power	460/3/60
Classification	C1D2
Polymer Feed System	
Polymer Type	Emulsion
Expected Dose	20-30 lb/DT
Polymer Demand	30-45 lb/hr
Feed Pump Type	Progressive Cavity
Quantity	5 (4 duty, 1 standby)
Neat Polymer Storage	IBC Totes (~300 gal each)
Drive	Variable Speed
Motor	½ HP/TEFC
Power	460/3/60
Classification	C1D2

5.3.7. Yard Piping /Site Civil

Site Layout

The topography of the new site for the proposed WRF is generally flat and slopes slightly to the north. The site is bounded to the north by railroad tracks, on the east by I-15, on the west by a road (200E) and by private property to the south. The initial site concept is to construct on the southern half of the property with the process aligned west to east across the site for the initial phase. It is expected the headworks, activated sludge/MBR and disinfection facilities can be aligned across the width of the site. In the future, the process will be expanded to the north.

Plant access will be from 200 E which is the western border of the property. The primary entry into the plant is expected to be in the southwest corner of the property to keep traffic as far away as possible from the railroad crossing. A west to east access corridor is envisioned that parallels the southern property line.

Many of the plant's facilities will need to accommodate routine truck traffic and the site will be designed to facilitate vehicle access and circulation. A general vehicle circulation pattern through the plant will be entry in the southwest corner and a counterclockwise circulation around the plant back to the entry point. Provisions to accommodate future expansion, particularly the Phase 2 residuals relocation which will bring daily truck traffic, will be included in the site design.

The site has high groundwater which suggests that it may be beneficial to raise structures by building up the site in certain locations. Due to the poor soils, a considerable amount of spoils are expected which could be employed to raise areas of the site. As planning and pre-design progress, the opportunity to raise structures may be further assessed. The preliminary hydraulic profile keeps the site's finished grade about the same as existing.

Pavement

The need for vehicular access to each building/process will require that much of the site will need to be paved. Asphalt cement pavement is planned for use for all access driveways throughout the site. In areas where heavy truck traffic is expected, such as loading and unloading areas, concrete pavement or aprons will be considered.

Landscaping

Landscaping at the plant is expected to be modest. The plant is located in an industrial area and there is not a need to blend the facility in with its surroundings or to make it visually appealing. The focus of the landscaping from a planning perspective is low maintenance- to design landscape features that require minimal attention. This suggests that turf grass will be kept to a minimum so there's no need to mow and irrigate. Gravel or xeriscaping may be considered in lieu of turf. One area that may benefit from landscaping would be the frontage with 200E where landscaping could be used to shelter the plant from view from the road. A berm with trees or bushes could be considered for this purpose. In areas of the plant planned for future expansion, landscaping will be kept to a minimum with just final grading and hydroseeding anticipated.

Stormwater

The low point of the site appears to be the northeast corner and this area will be planned for stormwater management. A small detention pond is envisioned but will need to be evaluated further. A stormwater collection system dedicated to the site will be used to convey stormwater to the detention basin. Catch basins will be located at pavement low points in the to capture runoff. Where possible stormwater treatment and best management practices, BMP's, will be employed to manage and reduce site runoff.

Site Security

Fencing is planned around the perimeter of the property to prevent unauthorized entry. Preliminarily a masonry wall is envisioned along 200 East and along the south side of the property, with the reminder of the fencing being chain link. At the main entry point an automated gate is planned, with either keypad/access card entry for staff and an intercom/phone system to allow access for visitors. At this time a single-entry point to the site is planned.

Yard Piping

A number of different piping systems will need to be routed around the throughout the site. Large pipelines, in the range of 24”- 42” in diameter will include interconnections between unit processes that carry the plant’s mainstream flow. Ancillary piping systems will be smaller in size and will include plantwide networks for potable water, plant/utility water and plant drain among others.

A yard piping corridor is planned to consolidate the yard piping into one area as much as practical. The piping corridor will serve to simplify maintenance and facilitate future expansion. Preliminarily a yard piping corridor is envisioned which parallels the unit process across the site from west to east. If possible, the piping corridor will be unpaved to facilitate future access.

Key to yard piping design and selection is the high groundwater and corrosive soils. These conditions suggest that a thermoplastic piping system, such as PVC or HDPE, may be preferred due to corrosion resistance. To prevent infiltration, a fused piping system such as HDPE may be preferable. Where piping material needs dictate the use of metal/ferrous piping systems, provisions to account for corrosion such as pipe wrap or cathodic protection systems may be considered. Fittings on pressure pipe systems will be designed with restraints. A preliminary schedule for yard piping is presented in Table 5-17 and illustrates the planned use of thermoplastic piping materials.

Table 5-17: Preliminary Yard Piping Schedule

Service	Piping Material
Sanitary Sewer -Gravity	SDR 35 PVC
Sanitary Sewer-Pressure	HDPE DR 11
Potable Water	C-900 PVC
Plant Utility Water	HDPE DR 11
Storm Drain	HDPE, ASTM F2306
Building Drain	SCH 40 PVC-DWV, ASTM D2665

5.3.8. Plant Water Pump Station

The plant will produce high quality effluent suitable for direct use in a plant or utility water system throughout the facility. There are numerous utility water demands throughout the plant that collectively require a considerable amount of flow. A pumping system and plant water distribution systems will therefore be constructed to meet these demands.

The pump station will follow UV disinfection, with a portion of the effluent being diverted to the pump station. The station will include a wet well to provide a sump from which the utility pumps can draw. Vertical turbine pumps will be employed, and three units are planned, 2 duty, 1 standby. The required capacity of the pumps is unclear at this point, but rough estimates would be in the range of 250-500 gpm/pump. The pumps will utilize variable speed drives to better match demands and one of the pumps could be a smaller unit or, jockey pump, to handle low demand periods. It is anticipated that pressure in the plant water system will be in the range of 80 psi, depending on equipment washwater demands, with pump TDH expected to be around 200 ft.

The plant water pump station is intended to be a standalone structure located adjacent to the disinfection building. The concept is to have an at grade building that sits atop the wet well. The pump motors and discharge heads will be mounted to the finished floor along with related piping and valves. Preliminary building dimensions are roughly 25 ft x 20 ft.

Table 5-18: Plant Water Pump Station Design Criteria

Design Criteria	Value
Pump Type	Vertical Turbine
Quantity	3 (2 duty/1 standby)
Capacity (each)	250-500 gpm
TDH	150 - 200 ft
System Pressure	80 psi
Drive	Variable Speed
Motor	20-40 HP
Power	460/3/60
Classification	Unclassified

Plant Water Pump Station: Electrical and Controls

The power requirements for the pump motors will be 460V, 3PH., 60 Hz, and motor size is expected to in the range of 20-40 HP. All pumps will have VFD’s. All other power requirements in this station are expected to be 120VAC for instrumentation controls and ancillary demands. Depending on the proximity to the disinfection building power may be supplied from the disinfection building MCC. Otherwise a small MCC will be located in the building.

The control strategy for the pumps will be to maintain the pressure in the distribution system within a certain range. A hydro-pneumatic tank may be considered in order to minimize pump cycling and this will be further evaluated during detailed design.

The plant water system will supply yard hydrants and hose bibs throughout the facility. Since the water in non-potable, all locations will include signage to state the water is not for consumption.

5.4 Sampling Plan and Updated Biowin Model Results

5.4.1. Special Sampling

As described in Section 1, the basis of planning, design flows, and loads values were derived from historic (2014 – 2019) process operational data provided by the City. The information included influent flows and wastewater characteristics (e.g., BOD, TSS, TKN, ammonia, TP), effluent parameter concentrations, and some solids data. However, any data collected before March 2020 was based on approximately 10 to 14 hour composite samples, not 24 hours composite samples, which suggests that the wastewater characteristics data may not be actually representative of the plant loadings, as sampling cycles may not have included highs or lows. Therefore, it is recommended the City begin collecting comprehensive influent (flow and loads) and process data that will help the City to reevaluate the capacity of the new treatment facility especially when stringent effluent nutrient limits are imposed.

For modeling and design purposes, the City's operations team conducted additional sampling between March 24, 2020 and April 18, 2020 focusing on specific constituents that are not monitored on a regular basis. A Sampling and Analysis Plan (SAP) was developed specifically for this project. The SAP, including schedule, parameters, and location map, is provided in Appendix J. The special sampling included 7-days of 24-hour composite samples and 4-days of diurnal sampling conducted at 2-hour intervals. Special sampling lab results are provided in Appendix J. Additional sampling was performed during the COVID-19 pandemic lockdown when most commercial and industrial businesses were not normally operating and discharging to the sewer system, suggesting that values obtained may not be representative of long-term data. We recommend that once the situation is normal (i.e., post COVID-19 pandemic) the City should perform additional special sampling to confirm wastewater fractions for sizing of the secondary process.

5.4.2. Model Development and Setup

During analysis some parameters were not analyzed or were not available. Therefore, those parameters were assumed and adjusted within the typical range during modeling. The sampling data was used to develop plant specific wastewater fractions for Spanish Fork and Mapleton raw wastewater. The comparison of default wastewater fractions versus plant specific data is given in Appendix K. Developed wastewater fractions along with design flows and loads were used for process modeling of the preferred MBR alternative. Each scenario was modeled using the projected 2040 flows and loads in Table 5-19. Other parameters used in the models are given in Table 5-20.

Table 5-19: Design Flows and Loads Used for Model Input

Influent Wastewater Characteristics used in Model			
Parameters	Unit	Annual Average	Max Month(1)
Flows	MGD	6.65	8.4
BOD5	lb/day	10,538	13,259
TSS	lb/day	11,370	14,306
TKN	lb/day	2,496	3,140
TP	lb/day	305	384

1 Max month loading was calculated based on peak flows and average concentrations of BOD = 190 mg/L, TSS = 205 mg/L, TKN = 45 mg/L, and TP = 5.5 mg/L

2 VSS/TSS ratio is assumed to be 0.80.

Table 5-20: Additional Physical, Chemical, and Environmental Parameters for Model Input

Parameters	Unit	Annual Average
pH	STD	7.78
Alkalinity	mg/L	300[1]
Temperature		
min	Degree Celsius	10
max	Degree Celsius	28

1 Note that the 300 mg/L alkalinity is conservative. Limited sampling data indicates the influent alkalinity is approximately 400 mg/L. Additionally, it is assumed the biological nutrient removal denitrification process will recover alkalinity and it will be sufficient for nitrification such that alkalinity addition will not be required. This will be evaluated in more detail in preliminary design of the new facilities.

Biowin® 6.0 was utilized to model the selected MBR treatment process and verify that the effluent water quality design criteria can be met. The modeling indicates the proposed treatment process will meet all required effluent limits as illustrated in Table 5-21.

Table 5-21: Effluent Design Criteria

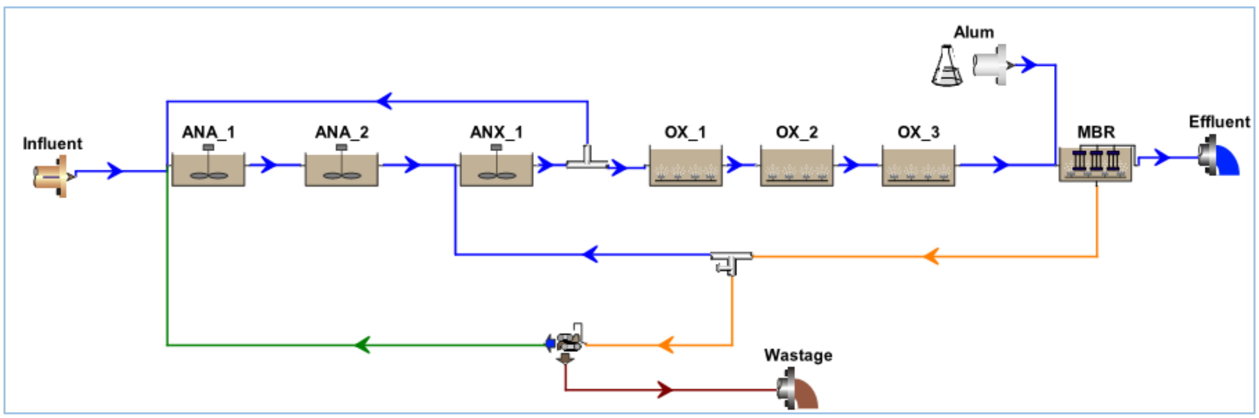
Design Loads	Unit	Current/Coming Limit (Goal)(1)	Future(2)
BOD5	mg/L	< 30 (< 20)	-
TSS	mg/L	< 30 (< 20)	-
NH3-N	mg/L	< 7 (< 3)	-
TP	std	< 1 (< 0.5)	-
TIN	mg/L	-	< 10

1 Plant will be designed to meet the current limit (goal).

2 Future limits are for planning purposes only and may vary with permit cycles. Design does not include meeting future limits; however, provision will be provided to accommodate those limits.

As discussed in previous sections, the proposed treatment process includes preliminary treatment, pumping station, secondary treatment (anaerobic, anoxic, and oxic zones) with an activated sludge process, MBR tanks, UV disinfection, and solids handling. Only plant processes that are integral to biological treatment were included in the model. For example, influent screening, pumping, and UV disinfection are not included in the model as they do not impact biological process simulations. The Biowin® Modeling dashboard depicting the plant layout used for the sizing of the secondary treatment is shown in Figure 5-4.

Figure 5-4: Biowin© Schematic Layout of Selected MBR Technology



5.4.3. Model Results

Different scenarios for MBR alternatives were evaluated to meet the effluent goals. The following simulations were modeled using Biowin®:

1. Average Flow and Average Loads
    a. Summer (Wastewater Temperature = 28°C)
    b. Winter (Wastewater Temperature = 10°C)
2. Max Month Flow and Average Loads

c. Summer (Wastewater Temperature = 28ºC)
d. Winter (Wastewater Temperature = 10ºC)

Table 5-22 illustrates the model simulation results for the various scenarios performed. MBR can achieve the targeted effluent quality year-round goal. To achieve lower TP, chemical (alum) addition is required. The design criteria for bioreactors and MBR is provided in Section 895.3. Detailed Biowin® Model results are provided in Appendix K.

Table 5-22: Biowin® Model Results

Design Loads	Current/Coming Limit (Goal)	Avg Flow and Avg Loads		Max Mo Flow and Avg Loads	
		Summer[(2)]	Winter[(2)]	Summer[(2)]	Winter[(2)]
BOD5, mg/L[(1)]	< 30 (< 20)	< 5	< 5	< 5	< 5
TSS, mg/L[(1)]	< 30 (< 20)	< 1	< 1	< 1	< 1
NH3-N, mg/L	< 7 (< 3)	< 0.3	0.6	< 0.3	0.5
TP, mg/L[(3)]	< 1 (< 0.5)	0.48	0.45	0.49	0.39

[1] BOD and TSS in effluent were less than 5 and 1 mg/L, respectively.
[2] Winter temperature of 10ºC and summer temperature of 28ºC.
[3] To achieve TP < 0.5, chemical addition is required mainly due to low carbon substrate.

5.5 Environmental Considerations

A brief review of environmental resources for this project was included in Section 1.5. A detailed assessment of environmental resources present is not part of the scope of this report but may be required in the event the City seeks state or federal funding for projects. The City should be aware when planning potential wastewater treatment projects that environmental resources will likely need to be addressed. It is recommended to consult with potential funding partners to determine the scope of the environmental review required; a less extensive review under a Categorical Exclusion (Cat-Ex) may be feasible. Appendix B is reserved for maps, figures, or analysis that may be needed for a more detailed environmental assessment.

5.6 Permitting Requirements

The treatment facility's UPDES permit expires June 30, 2021 and the City is currently working on the renewal application. It is anticipated that interim permit limits will be discussed as part of the permit renewal effort. The City is also completing the Level 2 Anti-degradation Review and coordinating with DWQ regarding the wasteload allocation process. All of these documents will be included in this Facilities Plan as Appendix A and Appendix L when they are completed.

5.7 Other Considerations

5.7.1. Regionalization

The proposed greenfield site for the Spanish Fork Wastewater Treatment Facility is adequately sized to expand to a regional treatment facility and to accommodate additional flows from neighboring cities and unincorporated county land. The design capacity for the proposed facility is 8.4 MGD max month with footprint available to accommodate more than 16 MGD of flow. Additionally, Spanish Fork has plans to extend their trunk line southwest to service new development in the city. This trunk line will be sized to accommodate future connection to unincorporated county land further to the west. Another possible regionalization partner is the City of Springville. Springville's wastewater treatment facility is located approximately 4 miles north of the proposed greenfield site.

Regionalization in the short term is likely not a viable solution for Spanish Fork and Mapleton due to complex logistics, politics, costs, and project timing. However, the Spanish Fork Water Reclamation Facility will be designed to facilitate future expansion as described above. Figure 5-1: Recommended Alternative shows the expansion capability for the greenfield site. It should be noted that all costs in this Master Plan are for treating the projected 20-year flowrates from Spanish Fork and Mapleton (8.4 MGD max month). If other entities would like to tie into the facility in the future, cost allocations for additional treatment capacity will need to be negotiated with that entity at that time.

5.7.2. Phosphorus Trading

One potential revenue source for Spanish Fork and Mapleton to consider is the sale of phosphorus credits. This involves treating beyond the regulatory requirement of 1 mg/L TBPEL and selling the resulting credits to a municipality or industry that also discharges to Utah Lake. This supplemental revenue could help mitigate other treatment costs for Spanish Fork. While the cities of Provo, Salem, and Payson are either in design or construction of new facilities expected to meet phosphorus limits, potential nearby phosphorus credit purchasers include the city of Springville, Payson Power, Lakeside Power, and Shepherd Eggs. These facilities could delay their capital improvement projects and purchase phosphorus credits from Spanish Fork to meet the regulatory requirements. It should be noted that at this time it is unclear whether industrial facilities will be regulated under the TBPEL.

The value of selling phosphorus credits depends on the purchasing entity's current treatment capabilities. The cost of this entity to remove phosphorus on their own would be the approximate value of the phosphorus credits to Spanish Fork. MBR technology can reliably achieve phosphorus concentrations less than 1 mg/L, so the additional cost to the City to treat below the regulatory limit to make phosphorus credits available to sell is expected to be minimal. However, pilot testing is needed to confirm phosphorus removal and potential phosphorus trading revenue for the City.

A variance extension to January 1, 2026 has been requested, see Appendix M. This additional year would also extend implementation of the phosphorus trading plan with the purchasing entity. The goal would still be to have the facility operational by January 1, 2025, but this extension would provide a safeguard to optimize phosphorus removal performance and full-scale costs with the credit purchasing entity.

5.7.3. Water Reuse

Spanish Fork is considering implementing Type 1 reuse in their pressure irrigation system upon completion of this project. MBR is the only process that will provide reuse quality water without the need for a tertiary filtration system. The UV system will be sized to accomodate future Type 1 reuse requirements. The reuse pump station would be located offsite at the discharge location into Dry Creek. When implemented by the City, the reuse pump station would come out of the water department budget and is not included in these project costs.

The City has formally requested a variance for reuse, this correspondence is included in Appendix M. Any effluent that is reused in the City's existing pressure irrigation system will result in reduced phosphorus loading to Utah Lake. Given this, it is anticipated the City may qualify for adjusted seasonal limits. DWQ's preferred reuse project is where water isn't being removed from the watershed, as is the case with this project. Spanish Fork has adequate water supply and distribution piping throughout their pressure irrigation system to utilize the effluent, but not enough source and transmission piping on the west side of I-15. In addition to a potential relaxation of effluent nutrient limits, Type 1 reuse could eliminate the need for an additional pressure irrigation transmission line beneath I-15.

5.7.4. Interim Nutrient Limits for Phosphorus and Ammonia

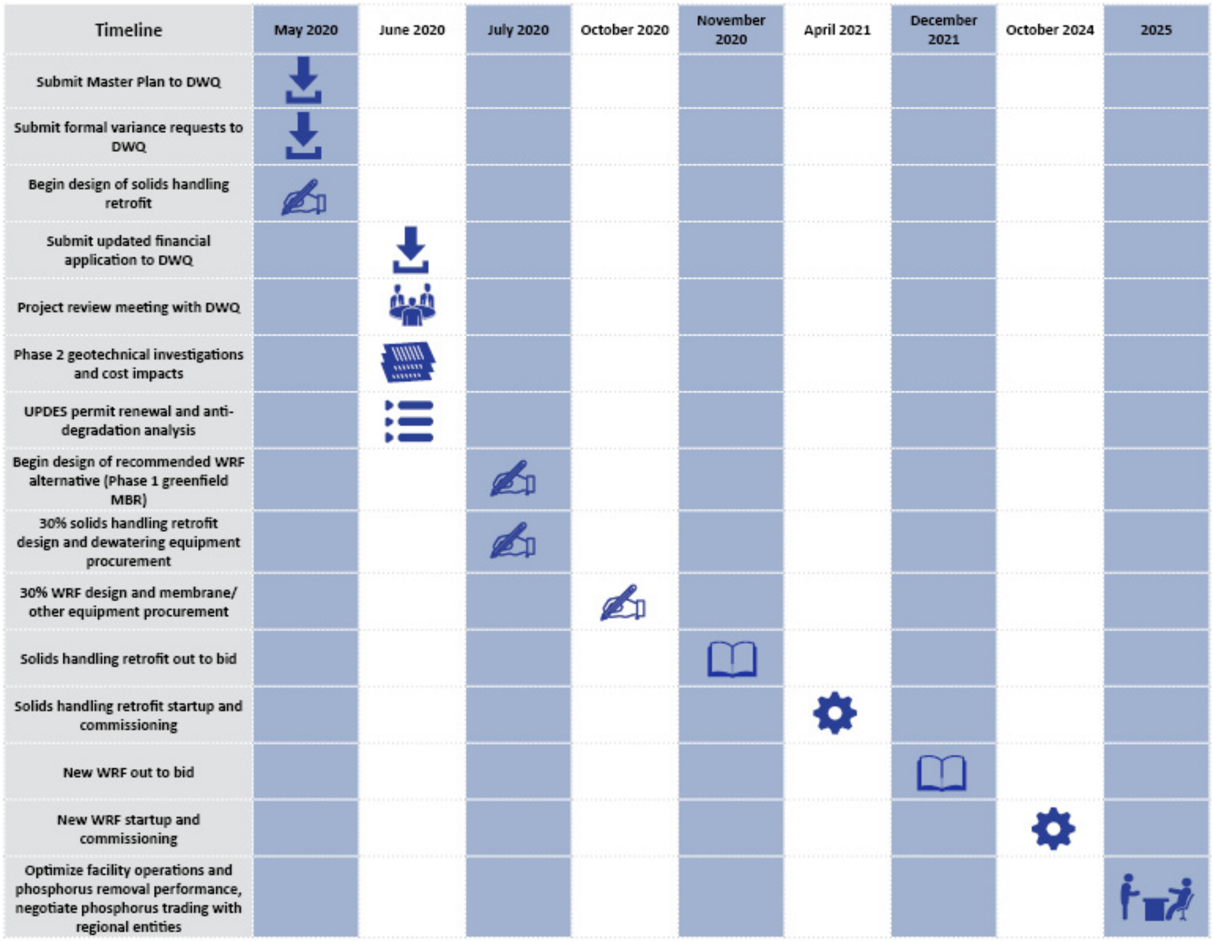
DWQ has established a schedule for meeting the more stringent, chronic ammonia limits listed in the permit (7 mg/L in the summer and 9 mg/L the rest of the year). Compliance with these new ammonia limits will be required by 2023, unless an extension can be negotiated with DWQ. As currently configured, the WWTP will not be able to meet the new monthly average ammonia limits. Spanish Fork and Mapleton have formally submitted a request to DWQ to delay the implementation of the interim ammonia permit limits until January 1, 2026.

Also, an interim effluent limit of 3.7 mg/L was set by DWQ based on effluent TP data from 2017-2018 as submitted in the DMRs. Since then, the city has proactively made infiltration and inflow repairs, there have been some dry years, and significant growth continues to occur. In combination, it appears these items may be increasing the influent phosphorus concentration to the treatment facility. This interim limit is challenging to reliably meet with the existing treatment system. It is requested a higher interim TP limit be implemented based on more recent DMR data so Spanish Fork and Mapleton do not need to install a temporary chemical feed system and other infrastructure for phosphorus removal that will soon be abandoned.

The cities are currently in the process of renewing their UPDES permit and completing the Level 2 Antidegradation Review, and these interim limits for total phosphorus and ammonia will be coordinated during this process.

5.8 Project Implementation Schedule

Figure 5-5: Implementation Schedule



5.9 Project Costs

Detailed capital, O&M, and life cycle costs including short-lived asset replacement are located in Appendix G. The following table summarizes the Opinion of Probable Capital Costs for the recommended Phase I Greenfield MBR alternative. It should be noted these costs do not include the solids handling retrofit at the existing facilities, as that is a separate project that is currently being designed.

Table 5-23: Opinion of Probable Capital Costs for Recommended Alternative

DESCRIPTION	QTY	UNITS	UNIT COST		TOTAL
			MBR		
Collection System	1	LS	$2,249,000	$	2,249,000
Headworks and Influent Pump Station	1	LS	$5,386,000	$	5,386,000
Plant Water Pumping Station	1	LS	$448,000	$	448,000
Aeration Basins/Other Basins					
Concrete and Earthwork	1	LS	$4,594,020	$	4,594,020
MBR Support and Blower Building	1	LS	$2,254,000	$	2,254,000
Electrical Building	1	LS	$1,384,000	$	1,384,000
BNR Ancillary Equipment	1	LS	$2,680,600	$	2,680,600
Membrane System					
MBR Equipment	1	LS	$7,850,000	$	7,850,000
Concrete and Earthwork	1	LS	$1,904,047	$	1,904,047
UV Disinfection	1	LS	$1,945,000	$	1,945,000
Installation of All Equipment	1	LS	$2,232,700	$	2,233,000
Direct Costs				**$**	**32,927,667**
Miscellaneous Piping and Utilities			20%	$	6,585,533
Subtotal				**$**	**39,513,201**
Site work			10%	$	3,951,320
Subtotal				**$**	**43,464,521**
Electrical, Instrumentation, and Controls			25%	$	10,866,130
Subtotal				**$**	**54,330,651**
Construction Contingency			25%	$	13,582,663
Subtotal				**$**	**67,913,314**
Soil Improvements			5%	$	3,395,666
Subtotal				**$**	**71,308,979**
Sales Tax (7.25%) on 50% of Direct Cost			7%	$	1,193,628
Subtotal				**$**	**72,502,607**
Contractor Overhead and Profit			10%	$	7,250,261
Subtotal				**$**	**79,752,868**
TOTAL ESTIMATED CONSTRUCTION COST				**$**	**79,752,868**
Engineering Design, Construction Administration, and Legal			18%	$	14,355,516
TOTAL ESTIMATED CAPITAL COST				**$**	**94,110,000**

5.10 Project Funding

It is anticipated the proposed project will increase the sewer user rate by approximately $15-$20/month depending on the interest rate and loan terms that are secured by the City. Low interest loan and grant money is typically available from the Utah Division of Water Quality and the Water Quality Board. However, due to the recently implemented nutrient limits in Utah and resulting increase in treatment facility design and construction in the region, funds are extremely limited at this time.

Grant money from DWQ is typically provided to those communities that face an "economic hardship", which is defined by DWQ as the user rate exceeding 1.4% of the median adjusted gross income (MAGI). The 2018 MAGI in Spanish Fork is $54,600, so grant money would not be available from DWQ under this criterion until the user rate surpasses $63.70/month. The 2018 MAGI in Mapleton is $74,400, which results in a maximum allowable user rate of $86.80/month.

There are other forms of hardship that the Water Quality Board may consider when reviewing grant applications. In the case of Spanish Fork and Mapleton, the following items should be considered:

- The anaerobic digester lid is damaged and there currently is no redundancy in the solids handling process. The City is moving forward with a solids handling retrofit that will be designed to serve both the existing and new treatment facilities.
- The proposed greenfield site helps meet a DWQ goal for facilitating regionalization in the area, both for Springville and for developable county land toward West Mountain. Spanish Fork intends to treat future entities that tie into their system as partners rather than customers. Future regionalization partners will buy into the facility and have a voice at the table for all decisions. This is a preferred model for DWQ.
- Some lower income areas of the city will have difficulty paying substantially higher user rates. Any grant money that is obtained will be leveraged to reduce coverage requirements and minimize user rates.
- In the absence of DWQ loan money, Spanish Fork and Mapleton are willing to obtain bonds from the private market. They would like to leverage their loans with government grant money. They are willing to delay receipt of this grant money to a time when the WQB has additional money available.

The preference for Spanish Fork and Mapleton would be to obtain a low interest loan from DWQ, but it is understood that this money is not available at this time. Instead, the cities intend to procure bonding from the private market, which requires a 3-year spend down. Spanish Fork and Mapleton plan to request $500,000 per year in grant from the Water Quality Board for the next 7 years, resulting in a total of $3.5 million in hardship grant. City policy requires the city to collect 1.5 times the bond payment amount to maintain coverage. The DWQ grant would reduce the coverage amount, allowing the city to keep user rates lower. This $3.5 million in grant would save residents more than $11 million in user rates over the 20-year planning period.

5.11 Financial Analysis and User Rates

See Appendix I for Spanish Fork's financial documentation including budgetary numbers and other financial projections. In planning for this project, Spanish Fork and Mapleton have proactively increased both user rates and impact fees. In 2018, the average residential sewer rate was $23.70/month. In 2020, the average residential sewer rate was $27.67/month and annual increases of $3.20/month are planned each subsequent year for the foreseeable future. In 2019, the residential impact fee for sewer was $622, by 2022 the impact fee will be raised incrementally to $2,544. Budgeted income into the sewer fund in 2020 is $4.7 million from user rates plus $0.92 million from impact fees. Annual O&M expenses in 2020 for the collection system and treatment facilities are approximately $3.3 million. The cities do not have any existing debt service for their sewer system. Spanish Fork and Mapleton currently have approximately $13 million in cash reserves that can be utilized for this project.

It is anticipated the proposed project will increase user rates to the $45/month/ERU range. Ultimately, the final user rate will be substantially impacted by the amount of grant money that is provided, the interest rate of the loan, and the length of the loan. The City has been proactively increasing the user rate each year in anticipation of funding this project. The City intends to continue to increase the user rates to the amount required to sustainably fund the recommended improvements.

5.12 Public Participation

The City has had several public meetings regarding the project over the past two years. The City believes the public is well informed on the need for the project. The public has been notified of a sewer rate increase and impact fee increase to support the upcoming WRF project. The proposed project has been discussed as an agenda item in several public City Council meetings over the past two years, including most recently in April 2020. The City Council is supportive of the project and demonstrated their support by (1) increasing sewer rates; (2) increasing sewer impact fees; (3) exploring financial assistance with DWQ. The City has taken the following steps to include the public throughout the Wastewater Treatment Facility Master Planning process:

- Public hearings in City Council were held in July of 2018 and 2019 to present the raised sewer rates in anticipation of the new WWTP.
- Engineering team conducted the project kickoff meeting as well as several interim meetings to coordinate findings, questions, and provide project status updates in late 2019 and early 2020. Project status update and coordination meetings will continue throughout the planning and design phases.
- During formal discussion with the City Council during the Mid-year Council Budget Work Session (February 7-8th, 2020), early master planning documents and budgets were presented.
- City Council approved a plan for rate increases from FY21 to FY25 with the budget revision on June 16, 2020.
- The City Council approved parameters to begin the bonding process for the new WWTP on April 21, 2020. The bond was purchased on July 23, 2020.
- The impact fees were increased to $2,248.85 by the City Council on June 2, 2020.
- Engineer and City staff met with Utah Division of Water Quality staff in January 2020 and May 2020 to introduce and update the status of the planning effort.
- A public hearing will be held for the purpose of receiving comments on the project. Notification of the hearing will be placed in the local newspaper in accordance with DWQ funding guidelines.
- The City will hold a public meeting, as required by DWQ's funding program. The City will hold a final public hearing once funding is secured.

Appendix 6

Part E. Alternative Analysis Requirements of a Level II Antidegradation Review.

E4. Were any of the following alternatives feasible and affordable?

Alternative	Feasible	Reason Not Feasible/Affordable
Pollutant Trading	NO	Trading program not established in project area.
Water Recycling/Reuse	NO	Costs to produce and convey reclaimed water would be prohibitively expensive compared to current secondary water supply. Facility does currently produce reclaimed water for local golf course irrigation, but this is a small percent of the total flow.
Land Application	NO	Land requirements would be high for the volume of flow. Local land availability is scarce and costs are high.
Connection to Other Facilities	NO	Not practical to direct all flow to another facility. Diverting a portion of flow would still require upgrades to existing facility to meet TBPEL and future nutrient limits.
Upgrade to Existing Facility	Yes	This is the selected alternative, Phase I.
Total Containment	NO	Not practical given the volume of flow.
Improved O&M of Existing Systems	NO	This would not achieve the required levels of nutrient removal.
Seasonal or Controlled Discharge	NO	Not feasible due to the large volume of flow.
New Construction	Yes	This is the selected alternative, Phase II.
No Discharge	NO	Not feasible due to the large volume of flow.

Appendix 7

Utah Division of Water Quality
Statement of Basis
ADDENDUM
Wasteload Analysis and Antidegradation Level I Review
Facility Upgrade and Expansion– Preliminary WLA Intended for Planning Purposes

Date:	**October 28, 2020**
Prepared by:	**Nicholas von Stackelberg, P.E.** **Watershed Protection Section**
Facility:	**Spanish Fork Wastewater Treatment Plant** **UPDES No. UT0021741**
Receiving water:	**Dry Creek (2B, 3E, 4)** **Provo Bay/Utah Lake (2A, 3B, 3D, 4)**

This addendum summarizes the wasteload analysis that was performed to determine water quality based effluent limits (WQBEL) for this discharge. Wasteload analyses are performed to determine point source effluent limitations necessary to maintain designated beneficial uses by evaluating projected effects of discharge concentrations on in-stream water quality. The wasteload analysis also takes into account downstream designated uses (UAC R317-2-8). Projected concentrations are compared to numeric water quality standards to determine acceptability. The numeric criteria in this wasteload analysis may be modified by narrative criteria and other conditions determined by staff of the Division of Water Quality.

Discharge
Outfall 001: Discharge pipe to Dry Creek.

The maximum daily design discharge is 10.4 MGD and the maximum monthly design discharge is 8.4 MGD for the facility.

Receiving Water
The receiving water for Outfall 001 is Dry Creek, which drains to Provo Bay of Utah Lake.

Per UAC R317-2-13.5.c, the designated beneficial uses for Dry Creek and tributaries from Utah Lake (Provo Bay) to Highway-US are 2B, 3E, and 4.

- *Class 2B - Protected for infrequent primary contact recreation. Also protected for secondary contact recreation where there is a low likelihood of ingestion of water or a low degree of bodily contact with the water. Examples include, but are not limited to, wading, hunting, and fishing.*
- *Class 3E -- Severely habitat-limited waters. Narrative standards will be applied to protect these waters for aquatic wildlife.*
- *Class 4 - Protected for agricultural uses including irrigation of crops and stock watering.*

Per UAC R317-2-8 Protection of Downstream Uses, all actions to control waste discharges under these rules shall be modified as necessary to protect downstream designated uses. Since the aquatic life use class for Dry Creek (3E) only has narrative standards, the numeric standards for Utah Lake (Provo Bay) were used to determine the aquatic life use WQBELs for this discharge. Per UAC R317-2-13.12.x, the designated beneficial uses for Utah Lake are 2A, 3B, 3D, and 4.

- *Class 2A - Protected for frequent primary contact recreation where there is a high likelihood of ingestion of water or a high degree of bodily contact with the water. Examples include, but are not limited to, swimming, rafting, kayaking, diving, and water skiing.*
- *Class 3B -- Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.*
- *Class 3D -- Protected for waterfowl, shore birds and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain.*

Water Quality Standards

Numeric criteria based on designated beneficial uses are specified in UAC R317-2-14. In addition, narrative water quality standards must not be violated per UAC R317-2-7.2:

> *It shall be unlawful, and a violation of these rules, for any person to discharge or place any waste or other substance in such a way as will be or may become offensive such as unnatural deposits, floating debris, oil, scum or other nuisances such as color, odor or taste; or cause conditions which produce undesirable aquatic life or which produce objectionable tastes in edible aquatic organisms; or result in concentrations or combinations of substances which produce undesirable physiological responses in desirable resident fish, or other desirable aquatic life, or undesirable human health effects, as determined by bioassay or other tests performed in accordance with standard procedures; or determined by biological assessments in Subsection R317-2-7.3.*

Critical Low Flow

Typically, the critical flow for the wasteload analysis is considered the lowest stream flow for seven consecutive days with a ten year return frequency (7Q10). Due to a lack of flow records for Dry Creek, the 20th percentile of flow measurements from monitoring site 4996030 Dry Creek above Spanish Fork WWTP was calculated to estimate seasonal critical low flow in the receiving water (Table 1). The flows for an unnamed channel that discharges into Dry Creek near the outlet to Provo Bay was estimated from monitoring site 4996044 Drainage Canal 0.5 mile below I-15 at about 2500 West, Springville.

Table 1: Seasonal critical low flow

Season	Dry Creek (cfs)	Unnamed Channel Flow (cfs)
Summer	7.7	3.8
Fall	13.2	3.8
Winter	13.2	3.8
Spring	10.2	3.8

Impaired Waters and Total Maximum Daily Loads (TMDL)
Dry Creek (Assessment Unit UT16020202-035) is not listed as impaired for any parameters according to the 303(d) list in *Utah's 2016 Integrated Report* (UDWQ 2016). Provo Bay (Assessment Unit UT-L-16020201-004_02) is listed as impaired for total phosphorus, ammonia and PCBs in fish tissue. Utah Lake (Assessment Unit UT-L-16020201-004_01) is listed as impaired for harmful algal blooms, total phosphorus, total dissolved solids and PCBs in fish tissue. No TMDLs have been approved for these impairments.

Mixing Zone
Per UAC R317-2-5, the discharge is considered instantaneously fully mixed since the discharge is more than half the background receiving water flow.

Parameters of Concern
The potential parameters of concern identified for the discharge/receiving water were total suspended solids (TSS), dissolved oxygen (DO), BOD_5, total phosphorus (TP), total nitrogen (TN), total ammonia (TAN), E. coli, pH, and total residual chlorine (TRC) as determined in consultation with the UPDES Permit Writer.

Water Quality Modeling
A QUAL2Kw model of the receiving water was built and calibrated under contract by Utah State University (USU) (Neilson et al. 2012). The model was calibrated to synoptic survey data collected in the summer of 2010 by USU and DWQ. The model extends from immediately above the plant discharge to upstream of the crossing at North Main Street (approximately 0.85 km).

The QUAL2Kw model of Dry Creek was extended to Provo Bay based on physiographic information from Google Earth and site data collected by DWQ staff (approximately 5.15 km total). To validate the model parameterization, an additional synoptic survey was conducted by DWQ staff in October 2012 using standard operating procedures (DWQ 2020). Both the QUAL2Kw calibration and validation models are available for review by request.

A wasteload QUAL2Kw model was built based on the calibrated model and using seasonal flow and water quality data for the receiving water. Receiving water quality data was obtained from monitoring site 4996030 Dry Creek above Spanish Fork WWTP. The average seasonal value was calculated for each constituent with available data in the receiving water. The wasteload model is available for review by request.

The QUAL2Kw model was used for determining the WQBELs related to eutrophication and low dissolved oxygen, including ammonia. Effluent concentrations were adjusted so that water quality standards were not exceeded in the receiving water. Where WQBELs exceeded secondary standards or categorical limits, the concentration in the model was set at the secondary standard or categorical limit. QUAL2Kw rates, input and output are summarized in Appendix A.

A mass balance mixing analysis was conducted for conservative constituents such as dissolved metals. The WQBELs determined using the mass balance mixing analysis are summarized in Appendix B.

The limits for total residual chlorine were dependent on travel time and decay rate. The travel time was determined by adding the travel time in the outlet pipe (2,700 linear feet) to the travel time in Dry Creek prior to discharge to Provo Bay (per travel time in QUAL2Kw). Based on field sampling conducted by AQUA Engineering (2014), an average decay rate of 29.9 /day at 20 ºC was used for determining chlorine decay through the outlet pipe and Dry Creek. The analysis for TRC is summarized in Appendix C.

Ammonia Limits

The QUAL2Kw model was utilized to determine seasonal limits for ammonia. Ammonia exerts an oxygen demand on the water column through nitrification to nitrate and is toxic to aquatic life above certain thresholds that are pH and temperature dependent. Seasonal limits were determined that meet both in-stream DO criteria and in-stream toxicity criteria.

The pH and temperature of the discharge from the existing plant were assumed appropriate for the upgraded and expanded facility. Annual average pH and seasonal average temperature was used for determining chronic limits (30-day average) and maximum pH was used for determining acute limits (1-hour).

In 2013, EPA adopted new criteria for ammonia that are lower than current criteria based on the presence of unionid mussels and nonpulmonate snails. States are required to adopt the criteria or establish alternative, scientifically defensible criteria. Utah is initiating studies to support adoption of new ammonia criteria. For planning purposes, ammonia limits were calculated to meet the new criteria assuming presence of the most sensitive species (Table 3). Acute limits were only evaluated up to the current permit limit of 18.0 mg/l).

Table 3: Ammonia Limits to Meet EPA 2013 Ammonia Criteria with Mussels Present

Effluent Constituent	Acute			Chronic		
	Standard	Limit	Averaging Period	Standard	Limit	Averaging Period
Ammonia (mg/l) [Toxicity]						
Summer	Varies	18.0	1 hour	Varies	3.0	30 days
Fall		18.0			4.0	
Winter		18.0			4.0	
Spring		18.0			4.0	

Whole Effluent Toxicity (WET) Limits

The percent of effluent in the receiving water in a fully mixed condition, and acute and chronic dilution in a not fully mixed condition are calculated in the WLA in order to generate WET limits. The LC_{50} (lethal concentration, 50%) percent effluent for acute toxicity and the IC_{25} (inhibition concentration, 25%) percent effluent for chronic toxicity, as determined by the WET test needs to be below the WET limits as determined by the WLA. Per UAC R317-2-5, at no time shall concentrations within the mixing zone be allowed which are acutely lethal as determined by bioassay. Therefore, the WET limit for LC_{50} is 100% effluent for all seasons.

Table 2: WET Limits for IC_{25}

Season	Percent Effluent
Summer	63%
Fall	50%
Winter	50%
Spring	56%

Effluent Limits

The effect of the effluent on the DO in the receiving water was evaluated using the QUAL2Kw model. A large amount of filamentous benthic algae growth was observed and predicted in the model downstream of the treatment plant discharge, resulting in a DO sag and high diel range. Other factors contributing to the low minimum DO include low reaeration rate due to the flat gradient of Dry Creek, decay of BOD in the effluent, and sediment oxygen demand (SOD) resulting from decomposition of organic matter. The DO sag recovered somewhat within the model extents; however, in order to meet the minimum DO standard at the mouth of Dry Creek at Provo Bay, ammonia had to be limited during the summer (Table 4).

Table 4: Water Quality Based Effluent Limits Summary

Effluent Constituent	Acute			Chronic		
	Standard[a]	Limit	Averaging Period	Standard[a]	Limit	Averaging Period
Flow (MGD)		10.4	1 day		8.4	30 days
Min. Dissolved Oxygen (mg/L)	5.0	5.0	Instantaneous	5.5	5.0	30 days
BOD_5 (mg/L)[c]	None	35	7 days	None	25	30 days
Ammonia (mg/L)	Varies		1 hour	Varies		30 days
Summer		18[b]			6	
Fall		18[b]			6	
Winter		18[b]			6	
Spring		18[b]			9	
Total Residual Chlorine (mg/L)	0.019		1 hour	0.011		4 days
Summer		45.8			181.7	
Fall		5.4			7.3	
Winter		2.6			3.1	
Spring		4.7			6.2	

a: Applicable standard in Provo Bay.
b: Limit from previous permit – meets water quality standards for this analysis.
c: Limits based on Utah Secondary Treatment Standards (*UAC R317-1-3.2*).

Models and supporting documentation are available for review upon request.

Antidegradation Level I Review

The objective of the Level I ADR is to ensure the protection of existing uses, defined as the beneficial uses attained in the receiving water on or after November 28, 1975. No evidence is known that the existing uses deviate from the designated beneficial uses for the receiving water. Therefore, the beneficial uses will be protected if the discharge remains below the WQBELs presented in this wasteload.

A Level II Antidegradation Review (ADR) is required for this discharge, as this wasteload is for an increased discharge of pollutants to the receiving water.

Documents:

WLA Document: *SpanishForkWLA_Upgrade_2020-10-28.docx*
QUAL2Kw Models:
  Calibration: *Qual2kw Spanish Fork 1.1a.xls*
  Validation: *spanish_fork_val_2012_v2.xlsm*
  Wasteload: *SpanishForkWLA_2020Upgrade.xlsm*

References:

AQUA Engineering. 2014. *Spanish Fork City Waste-Load Parameters for Wastewater Discharge Permit*. City of Spanish Fork.

Neilson, B.T., A.J. Hobson, N. von Stackelberg, M. Shupryt, and J.D. Ostermiller. 2012. *Using QUAL2K Modeling to Support Nutrient Criteria Development and Wasteload Analyses in Utah*. Utah State University Department of Civil and Environmental Engineering and Utah Department of Environmental Quality, Division of Water Quality.

Utah Division of Water Quality. 2012a. *Field Data Collection for QUAL2Kw Model Build and Calibration Standard Operating Procedures Version 1.0*.

Utah Division of Water Quality. 2012b. *Utah Wasteload Analysis Procedures Version 1.0*.

Utah Division of Water Quality. 2020. *QUAL2Kw Model Validation Report for Dry Creek/Spanish Fork WWTP.*

WASTELOAD ANALYSIS [WLA] Date: 10/28/2020
Appendix A: QUAL2Kw Analysis for Eutrophication

Discharging Facility:	Spanish Fork WWTP		
UPDES No:	UT-0021741		
Permit Flow [MGD]:	8.40	Maximum Monthly Flow	
	10.40	Maximum Daily Flow	
Receiving Water:	Dry Creek		
Stream Classification:	2B, 3E, 4		
Stream Flows [cfs]:	7.66	Summer (July-Sept)	Critical Low Flow
	13.20	Fall (Oct-Dec)	
	13.20	Winter (Jan-Mar)	
	10.20	Spring (Apr-June)	
Acute River Width:	100.0%		
Chronic River Width:	100.0%		

Modeling Information

A QUAL2Kw model was used to determine these effluent limits.

Model Inputs

The following is upstream and discharge information that was utilized as inputs for the analysis.
Dry washes are considered to have an upstream flow equal to the flow of the discharge.

Headwater/Upstream Information	Summer	Fall	Winter	Spring
Flow (cfs)	7.7	13.2	13.2	10.2
Temperature (deg C)	23.6	8.1	6.3	13.2
Specific Conductance (μmhos)	950	950	950	950
Inorganic Suspended Solids (mg/L)	59.8	52.4	58.7	47.7
Dissolved Oxygen (mg/L)	8.7	11.2	12.3	10.5
$CBOD_5$ (mg/L)	1.5	1.5	1.5	3.2
Organic Nitrogen (mg/L)	0.519	0.354	0.425	0.729
NH4-Nitrogen (mg/L)	0.044	0.076	0.118	0.090
NO3-Nitrogen (mg/L)	2.468	3.484	3.457	2.000
Organic Phosphorus (mg/L)	0.009	0.109	0.209	0.309
Inorganic Ortho-Phosphorus (mg/L)	0.082	0.982	1.882	2.782
Phytoplankton (μg/L)	3.7	3.7	3.7	3.7
Detritus [POM] (mg/L)	6.6	3.1	4.0	4.9
Alkalinity (mg/L)	321	353	386	324
pH	8.0	8.2	8.2	8.0

Discharge Information

Chronic	Summer	Fall	Winter	Spring
Flow (cfs)	8.4	8.4	8.4	8.4
Temperature (deg C)	20.1	14.7	11.2	14.5
Inorganic Suspended Solids (mg/L)	5.9	1.1	0.0	5.7
Organic Nitrogen (mg/L)	5.953	6.840	4.576	6.386
NO3-Nitrogen (mg/L)	7.425	9.175	6.347	7.135
Organic Phosphorus (mg/L)	0.200	0.200	0.200	0.200
Inorganic Phosphorus (mg/L)	0.800	0.800	0.800	0.800
Alkalinity (mg/L)	314	308	339	317
pH	7.5	7.5	7.5	7.5

Acute	Summer	Fall	Winter	Spring
Flow (cfs)	10.4	10.4	10.4	10.4
Temperature (deg C)	20.1	14.7	11.2	14.5
Inorganic Suspended Solids (mg/L)	5.9	1.1	0.0	5.7
Organic Nitrogen (mg/L)	5.953	6.840	4.576	6.386
NO3-Nitrogen (mg/L)	7.425	9.175	6.347	7.135
Organic Phosphorus (mg/L)	0.200	0.200	0.200	0.200
Inorganic Phosphorus (mg/L)	0.800	0.800	0.800	0.800
Alkalinity (mg/L)	314	308	339	317
pH	7.7	7.7	7.7	7.7

All model numerical inputs, intermediate calculations, outputs and graphs are available for discussion, inspection and copy at the Division of Water Quality.

Effluent Limitations

Current State water quality standards are required to be met under a variety of conditions including in-stream flows targeted to the 7-day, 10-year low flow (R317-2-9).

Other conditions used in the modeling effort reflect the environmental conditions expected at low stream flows.

Effluent Limitations based upon Water Quality Standards for DO and Ammonia Toxicity

In-stream criteria of downstream segments for Dissolved Oxygen will be met with an effluent limitation as follows:

Chronic	Standard	Averaging Period	Summer	Fall	Winter	Spring
Flow (MGD)	N/A	30-day	8.4	8.4	8.4	8.4
NH4-Nitrogen (mg/L)	Varies	30-day	6.0	6.0	6.0	9.0
$CBOD_5$ (mg/L)	N/A	30-day	25.0	25.0	25.0	25.0
Dissolved Oxygen (mg/L)	5.5	30-day	5.0	5.0	5.0	5.0

Acute	Standard	Averaging Period	Summer	Fall	Winter	Spring
Flow (cfs)	N/A	Max-day	10.4	10.4	10.4	10.4
NH4-Nitrogen (mg/L)	Varies	1-hour	18.0	18.0	18.0	18.0
$CBOD_5$ (mg/L)	N/A	7-day	35.0	35.0	35.0	35.0
Dissolved Oxygen (mg/L)	5.0	Minimum	5.0	5.0	5.0	5.0

Summary Comments

The mathematical modeling and best professional judgement indicate that violations of receiving water beneficial uses with their associated water quality standards, including important down-stream segments, will not occur for the evaluated parameters of concern as discussed above if the effluent limitations indicated above are met.

Coefficients and Other Model Information

Parameter	*Value*	*Units*
Stoichiometry:		
Carbon	40	gC
Nitrogen	7.2	gN
Phosphorus	1	gP
Dry weight	100	gD
Chlorophyll	1	gA
Inorganic suspended solids:		
Settling velocity	0.2	m/d
Oxygen:		
Reaeration model	USGS(channel-control)	
Temp correction	1.024	
Reaeration wind effect	None	
O2 for carbon oxidation	2.69	gO2/gC
O2 for NH4 nitrification	4.57	gO2/gN
Oxygen inhib model CBOD oxidation	Exponential	
Oxygen inhib parameter CBOD oxidation	0.60	L/mgO2
Oxygen inhib model nitrification	Exponential	
Oxygen inhib parameter nitrification	0.60	L/mgO2
Oxygen enhance model denitrification	Exponential	
Oxygen enhance parameter denitrification	0.60	L/mgO2
Oxygen inhib model phyto resp	Exponential	
Oxygen inhib parameter phyto resp	0.60	L/mgO2
Oxygen enhance model bot alg resp	Exponential	
Oxygen enhance parameter bot alg resp	0.60	L/mgO2
Slow CBOD:		
Hydrolysis rate	0	/d
Temp correction	1.047	
Oxidation rate	0.103	/d
Temp correction	1.047	
Fast CBOD:		
Oxidation rate	10	/d
Temp correction	1.047	
Organic N:		
Hydrolysis	0.25219	/d
Temp correction	1.07	
Settling velocity	0.072248	m/d
Ammonium:		
Nitrification	3.840973	/d
Temp correction	1.07	
Nitrate:		
Denitrification	0.440663	/d
Temp correction	1.07	
Sed denitrification transfer coeff	0.89485	m/d
Temp correction	1.07	
Organic P:		
Hydrolysis	0.11173	/d
Temp correction	1.07	
Settling velocity	0.153214	m/d
Inorganic P:		
Settling velocity	1.49684	m/d
Sed P oxygen attenuation half sat constant	1.22794	mgO2/L

Phytoplankton:		
Max Growth rate	2.817285	/d
Temp correction	1.07	
Respiration rate	0.183875	/d
Temp correction	1.07	
Death rate	0.75246	/d
Temp correction	1	
Nitrogen half sat constant	15	ugN/L
Phosphorus half sat constant	2	ugP/L
Inorganic carbon half sat constant	1.30E-05	moles/L
Phytoplankton use HCO3- as substrate	Yes	
Light model	Smith	
Light constant	57.6	langleys/d
Ammonia preference	16.22865	ugN/L
Settling velocity	0.217562	m/d
Bottom Plants:		
Growth model	Zero-order	
Max Growth rate	39.236835	gD/m2/d or /d
Temp correction	1.07	
First-order model carrying capacity	100	gD/m2
Basal respiration rate	0.196733	/d
Photo-respiration rate parameter	0.01	unitless
Temp correction	1.07	
Excretion rate	0.002735	/d
Temp correction	1.07	
Death rate	0.00755	/d
Temp correction	1.07	
External nitrogen half sat constant	464.684	ugN/L
External phosphorus half sat constant	56.1985	ugP/L
Inorganic carbon half sat constant	7.79E-05	moles/L
Bottom algae use HCO3- as substrate	Yes	
Light model	Smith	
Light constant	47.8192	mgO^2/L
Ammonia preference	23.29875	ugN/L
Subsistence quota for nitrogen	0.8422416	mgN/gD
Subsistence quota for phosphorus	0.1719125	mgP/gD
Maximum uptake rate for nitrogen	956.625	mgN/gD/d
Maximum uptake rate for phosphorus	98.1245	mgP/gD/d
Internal nitrogen half sat ratio	3.5499945	
Internal phosphorus half sat ratio	3.8810835	
Nitrogen uptake water column fraction	1	
Phosphorus uptake water column fraction	1	
Detritus (POM):		
Dissolution rate	1.071086	/d
Temp correction	1.07	
Settling velocity	0.4923905	m/d
pH:		
Partial pressure of carbon dioxide	370	ppm

Atmospheric Inputs:	Summer	Fall	Winter	Spring
Min. Air Temperature, F	57.7	29.5	24.0	45.0
Max. Air Temperature, F	90.5	51.0	44.9	74.2
Dew Point, Temp., F	58.6	35.0	30.3	48.5
Wind, ft./sec. @ 21 ft.	9.8	7.5	7.6	9.2
Cloud Cover, %	10%	10%	10%	10%

Other Inputs:	
Bottom Algae Coverage	100%
Bottom SOD Coverage	100%
Prescribed SOD, gO_2/m^2/day	0

WASTELOAD ANALYSIS [WLA] Date: 10/28/2020
Appendix B: Mass Balance Mixing Analysis

Discharging Facility:	Spanish Fork WWTP		
UPDES No:	UT-0021741		
Permit Flow [MGD]:	8.40	Max. Monthly	
	10.40	Max. Daily	
Receiving Water:	Dry Creek		
Beneficial Uses:	2B, 3E, 4		
Stream Flows [cfs]:	7.66	Summer (July-Sept)	Critical Low Flow
	13.20	Fall (Oct-Dec)	
	13.20	Winter (Jan-Mar)	
	10.20	Spring (Apr-June)	
Acute River Width:	100.0%		
Chronic River Width:	100.0%		

Modeling Information

A mass balance mixing analysis was used to determine the effluent limits.

All model numerical inputs, intermediate calculations, outputs and graphs are available for discussion, inspection and copy at the Division of Water Quality.

Model Inputs

Headwater/Upstream Information

	7Q10 Flow cfs
Summer	7.7
Fall	13.2
Winter	13.2
Spring	10.2

Discharge Information

	Flow MGD
Maximum Daily	10.4
Maximum Monthly	8.4

All model numerical inputs, intermediate calculations, outputs and graphs are available for discussion, inspection and copy at the Division of Water Quality.

Effluent Limitations

Current State water quality standards are required to be met under a variety of conditions including in-stream flows targeted to the 7-day, 10-year low flow (R317-2-9).

Other conditions used in the modeling effort reflect the environmental conditions expected at low stream flows.

Effluent Limitations for Protection of Recreation (Class 2A Waters)

Physical	Concentration	
Parameter	Minimum	Maximum
pH	6.5	9.0
Turbidity Increase (NTU)		10.0

Bacteriological

E. coli (30 Day Geometric Mean)	206	(#/100 mL)
E. coli (Maximum)	668	(#/100 mL)

Effluent Limitations for Protection of Aquatic Wildlife (Class 3B Waters)

Physical	Concentration	
Parameter	Minimum	Maximum
pH	6.5	9.0

Dissolved Oxygen (mg/L)	Minimum Concentration
Instantaneous	3.0
30-day Average	5.0

Inorganics — Acute Standard (1 Hour Average)

Parameter	Standard
Phenol (mg/L)	0.010
Hydrogen Sulfide (Undissociated) [mg/L]	0.002

Metals-Total Recoverable	Chronic (4-day ave)				Acute (1-hour ave)			
Parameter	Standard[1]	Background[2]	Conc. Limit (µg/L)	Load Limit (lbs/day)	Standard[1]	Background[2]	Conc. Limit (µg/L)	Load Limit (lbs/day)
Aluminum	N/A[3]	12.0	N/A[3]	N/A[3]	750	12.0	1,294	112.3
Arsenic	150	5.9	281	19.7	340	5.9	586	50.9
Cadmium	0.7	0.1	1.2	0.1	7.4	0.1	13	1.1
Chromium VI	11.0	2.3	19	1.3	16.0	2.3	26	2.3
Chromium III	234	2.3	445	31.2	4,889	2.3	8,488	737
Copper	26.4	2.0	49	3.4	44.1	2.0	75	6.5
Cyanide[2]	5.2	2.6	7.6	0.5	22.0	2.6	36	3.1
Iron					1,000	23.5	1,719	149
Lead	15.0	0.3	28	2.0	385	0.3	668	58.0
Mercury[2]	0.012	0.006	0.017	0.001	2.4	0.006	4.2	0.4
Nickel	146	2.8	277	19.4	1,315	2.8	2,281	198
Selenium	4.6	1.0	7.9	0.6	18.4	1.0	31	2.7
Silver					30.7	0.3	53	4.6
Tributylin[2]	0.072	0.036	0.105	0.007	0.46	0.036	0.8	0.07
Zinc	336	8.2	635	44.5	336	8.2	578	50.2

1: Based upon a Hardness of 1000 mg/l as CaCO3

2: Background concentration assumed 50% of chronic standard

3: Where the pH is equal to or greater than 7.0 and the hardness is equal to or greater than 50 ppm as $CaC0_3$ in the receiving water after mixing, the 87 ug/L chronic criterion (expressed as total recoverable) will not apply, and aluminum will be regulated based on compliance with the 750 ug/L acute aluminum criterion (expressed as total recoverable).

Organics [Pesticides]	Chronic (4-day ave)				Acute (1-hour ave)			
Parameter	Standard	Background	Conc. Limit (µg/L)	Load Limit (lbs/day)	Standard	Background	Conc. Limit (µg/L)	Load Limit (lbs/day)
Aldrin					1.5	0.75	2.05E+00	1.78E-01
Chlordane	0.0043	0.00215	6.26E-03	4.39E-04	1.2	0.00215	2.08E+00	1.81E-01
DDT, DDE	0.001	0.0005	1.46E-03	1.02E-04	0.55	0.0005	9.55E-01	8.29E-02
Diazinon	0.17	0.085	2.48E-01	1.74E-02	0.17	0.085	2.33E-01	2.02E-02
Dieldrin	0.0056	0.0028	8.15E-03	5.72E-04	0.24	0.0028	4.15E-01	3.60E-02
Endosulfan, a & b	0.056	0.028	8.15E-02	5.72E-03	0.11	0.028	1.70E-01	1.48E-02
Endrin	0.036	0.018	5.24E-02	3.67E-03	0.086	0.018	1.36E-01	1.18E-02
Heptachlor & H. epoxide	0.0038	0.0019	5.53E-03	3.88E-04	0.26	0.0019	4.50E-01	3.91E-02
Lindane	0.08	0.04	1.16E-01	8.17E-03	1.0	0.04	1.71E+00	1.48E-01
Methoxychlor					0.03	0.015	4.10E-02	3.56E-03
Mirex					0.001	0.0005	1.37E-03	1.19E-04
Nonylphenol	6.6	3.3	9.61E+00	6.74E-01	28.0	3.3	4.62E+01	4.01E+00
Parathion	0.0130	0.0065	1.89E-02	1.33E-03	0.066	0.0065	1.10E-01	9.53E-03
PCB's	0.014	0.007	2.04E-02	1.43E-03				
Pentachlorophenol	15.0	7.5	2.18E+01	1.53E+00	19.0	7.5	2.75E+01	2.38E+00
Toxephene	0.0002	0.0001	2.91E-04	2.04E-05	0.73	0.0001	1.27E+00	1.10E-01

1: Background concentration assumed 50% of standard

Radiological — Maximum Concentration

Parameter	Standard
Gross Alpha (pCi/L)	15

Numeric Criteria for the Protection of Human Health from Consumption of Water and Fish

	Class 1C (Water and Organism)				Class 3 (Organism Only)			
Toxic Organics	**Standard**	**Background**	**Conc. Limit (µg/L)**	**Load Limit (lbs/day)**	**Standard**	**Background**	**Conc. Limit (µg/L)**	**Load Limit (lbs/day)**
Antimony	5.6	2.8	8.15E+00	5.72E-01	640	2.8	1.11E+03	9.63E+01
Copper	1300	650	1.89E+03	1.33E+02				
Nickel	610	305	8.88E+02	6.23E+01	4600	305	7.76E+03	6.74E+02
Selenium	170	85	2.48E+02	1.74E+01	4200	85	7.23E+03	6.28E+02
Thallium	0.24	0.12	3.49E-01	2.45E-02	0.47	0.12	7.28E-01	6.32E-02
Zinc	7400	3700	1.08E+04	7.55E+02	26000	3700	4.24E+04	3.68E+03
Cyanide	4	2	5.82E+00	4.08E-01	400	2	6.93E+02	6.02E+01
Asbestos (million fibers/L)	7	3.5	1.02E+01	7.14E-01				
2,3,7,8-TCDD Dioxin	5.00E-09	2.50E-09	7.28E-09	5.10E-10	5.1E-09	2.5E-09	7.02E-09	6.09E-10
Acrolein	3	1.5	4.37E+00	3.06E-01	400	1.5	6.94E+02	6.02E+01
Acrylonitrile	0.061	0.0305	8.88E-02	6.23E-03	7	0.0305	1.21E+01	1.05E+00
Benzene	2.1	1.05	3.06E+00	2.14E-01	51	1.05	8.78E+01	7.62E+00
Bromoform	7	3.5	1.02E+01	7.14E-01	120	3.5	2.06E+02	1.79E+01
Carbon Tetrachloride	0.4	0.2	5.82E-01	4.08E-02	5	0.2	8.54E+00	7.41E-01
Chlorobenzene	100	50	1.46E+02	1.02E+01	800	50	1.35E+03	1.17E+02
Chlorodibromomethane	0.8	0.4	1.16E+00	8.17E-02	21	0.4	3.62E+01	3.14E+00
Chloroform	60	30	8.74E+01	6.12E+00	2000	30	3.45E+03	3.00E+02
Dalapon	200	100	2.91E+02	2.04E+01				
Dichlorobromomethane	0.95	0.475	1.38E+00	9.70E-02	27	0.475	4.65E+01	4.04E+00
1,2-Dichloroethane	9.9	4.95	1.44E+01	1.01E+00	2000	4.95	3.47E+03	3.01E+02
1,1-Dichloroethylene	300	150	4.37E+02	3.06E+01	20000	150	3.46E+04	3.00E+03
1,2-Dichloropropane	0.9	0.45	1.31E+00	9.19E-02	31	0.45	5.35E+01	4.64E+00
1,3-Dichloropropene	0.27	0.135	3.93E-01	2.76E-02	12	0.135	2.07E+01	1.80E+00
Ethylbenzene	68	34	9.90E+01	6.94E+00	130	34	2.01E+02	1.74E+01
Ethylene Dibromide	0.05	0.025	7.28E-02	5.10E-03				
Methyl Bromide	100	50	1.46E+02	1.02E+01	10000	50	1.73E+04	1.50E+03
Methylene Chloride	20	10	2.91E+01	2.04E+00	1000	10	1.73E+03	1.50E+02
1,1,2,2-Tetrachloroethane	0.2	0.1	2.91E-01	2.04E-02	3	0.1	5.14E+00	4.46E-01
Tetrachloroethylene	10	5	1.46E+01	1.02E+00	29	5	4.67E+01	4.05E+00
Toluene	57	28.5	8.30E+01	5.82E+00	520	28.5	8.82E+02	7.66E+01
1,2 -Trans-Dichloroethyle	100	50	1.46E+02	1.02E+01	4000	50	6.91E+03	6.00E+02
1,1,1-Trichloroethane	10000	5000	1.46E+04	1.02E+03	200000	5000	3.44E+05	2.98E+04
1,1,2-Trichloroethane	0.55	0.275	8.01E-01	5.61E-02	8.9	0.275	1.53E+01	1.32E+00
Trichloroethylene	0.6	0.3	8.74E-01	6.12E-02	7	0.3	1.19E+01	1.04E+00
Vinyl Chloride	0.022	0.011	3.20E-02	2.25E-03	1.6	0.011	2.77E+00	2.40E-01
2-Chlorophenol	30	15	4.37E+01	3.06E+00	800	15	1.38E+03	1.20E+02
2,4-Dichlorophenol	10	5	1.46E+01	1.02E+00	60	5	1.01E+02	8.72E+00
2,4-Dimethylphenol	100	50	1.46E+02	1.02E+01	3000	50	5.17E+03	4.49E+02
2-Methyl-4,6-Dinitrophenol	2	1	2.91E+00	2.04E-01	30	1	5.14E+01	4.46E+00
2,4-Dinitrophenol	10	5	1.46E+01	1.02E+00	300	5	5.17E+02	4.49E+01
3-Methyl-4-Chlorophenol	500	250	7.28E+02	5.10E+01	2000	250	3.29E+03	2.85E+02
Penetachlorophenol	0.03	0.015	4.37E-02	3.06E-03	0.04	0.015	5.84E-02	5.07E-03
Phenol	4000	2000	5.82E+03	4.08E+02	300000	2000	5.19E+05	4.51E+04
2,4,5-Trichlorophenol	300	150	4.37E+02	3.06E+01	600	150	9.31E+02	8.08E+01
2,4,6-Trichlorophenol	1.5	0.75	2.18E+00	1.53E-01	2.8	0.75	4.31E+00	3.74E-01
Acenaphthene	70	35	1.02E+02	7.14E+00	90	35	1.31E+02	1.13E+01
Anthracene	300	150	4.37E+02	3.06E+01	400	150	5.84E+02	5.07E+01
Benzidine	0.00014	0.00007	2.04E-04	1.43E-05	0.011	0.00007	1.91E-02	1.65E-03
BenzoaAnthracene	0.0012	0.0006	1.75E-03	1.22E-04	0.0013	0.0006	1.82E-03	1.58E-04
BenzoaPyrene	0.00012	0.00006	1.75E-04	1.22E-05	0.00013	0.00006	1.82E-04	1.58E-05
BenzobFluoranthene	0.0012	0.0006	1.75E-03	1.22E-04	0.0013	0.0006	1.82E-03	1.58E-04
BenzokFluoranthene	0.012	0.006	1.75E-02	1.22E-03	0.013	0.006	1.82E-02	1.58E-03

Toxic Organics	Class 1C (Water and Organism) Standard	Background	Conc. Limit (µg/L)	Load Limit (lbs/day)	Class 3 (Organism Only) Standard	Background	Conc. Limit (µg/L)	Load Limit (lbs/day)
Bis2-Chloro1methylether	0.00015	0.000075	2.18E-04	1.53E-05	0.017	0.000075	2.95E-02	2.56E-03
Bis2-Chloro1methylethylether	200	100	2.91E+02	2.04E+01	4000	100	6.87E+03	5.96E+02
Bis2-ChloroethylEther	0.03	0.015	4.37E-02	3.06E-03	2.2	0.015	3.81E+00	3.31E-01
Bis2-Chloroisopropy1Ether	1400	700	2.04E+03	1.43E+02	65000	700	1.12E+05	9.75E+03
Bis2-EthylhexylPhthalate	0.32	0.16	4.66E-01	3.27E-02	0.37	0.16	5.25E-01	4.55E-02
Butylbenzyl Phthalate	0.1	0.05	1.46E-01	1.02E-02	0.1	0.05	1.37E-01	1.19E-02
2-Chloronaphthalene	800	400	1.16E+03	8.17E+01	1000	400	1.44E+03	1.25E+02
Chrysene	0.12	0.06	1.75E-01	1.22E-02	0.13	0.06	1.82E-01	1.58E-02
Dibenzoa, (h)Anthracene	0.00012	0.00006	1.75E-04	1.22E-05	0.00013	0.00006	1.82E-04	1.58E-05
1,2-Dichlorobenzene	1000	500	1.46E+03	1.02E+02	3000	500	4.84E+03	4.20E+02
1,3-Dichlorobenzene	7	3.5	1.02E+01	7.14E-01	10	3.5	1.48E+01	1.28E+00
1,4-Dichlorobenzene	300	150	4.37E+02	3.06E+01	900	150	1.45E+03	1.26E+02
3,3-Dichlorobenzidine	0.049	0.0245	7.13E-02	5.00E-03	0.15	0.0245	2.42E-01	2.10E-02
Diethyl Phthalate	600	300	8.74E+02	6.12E+01	600	300	8.21E+02	7.13E+01
Dimethyl Phthalate	2000	1000	2.91E+03	2.04E+02	2000	1000	2.74E+03	2.38E+02
Di-n-Butyl Phthalate	20	10	2.91E+01	2.04E+00	30	10	4.47E+01	3.88E+00
2,4-Dinitrotoluene	0.049	0.0245	7.13E-02	5.00E-03	1.7	0.0245	2.93E+00	2.55E-01
Dinitrophenols	10	5	1.46E+01	1.02E+00	1000	5	1.73E+03	1.50E+02
1,2-Diphenylhydrazine	0.03	0.015	4.37E-02	3.06E-03	0.2	0.015	3.36E-01	2.92E-02
Fluoranthene	20	10	2.91E+01	2.04E+00	20	10	2.74E+01	2.38E+00
Fluorene	50	25	7.28E+01	5.10E+00	70	25	1.03E+02	8.95E+00
Hexachlorobenzene	0.000079	0.0000395	1.15E-04	8.06E-06	0.000079	0.0000395	1.08E-04	9.38E-06
Hexachlorobutedine	0.01	0.005	1.46E-02	1.02E-03	0.01	0.005	1.37E-02	1.19E-03
Hexachloroethane	0.1	0.05	1.46E-01	1.02E-02	0.1	0.05	1.37E-01	1.19E-02
Hexachlorocyclopentadiene	4	2	5.82E+00	4.08E-01	4	2	5.47E+00	4.75E-01
Ideno 1,2,3-cdPyrene	0.0012	0.0006	1.75E-03	1.22E-04	0.0013	0.0006	1.82E-03	1.58E-04
Isophorone	34	17	4.95E+01	3.47E+00	1800	17	3.11E+03	2.70E+02
Nitrobenzene	10	5	1.46E+01	1.02E+00	600	5	1.04E+03	9.01E+01
N-Nitrosodiethylamine	0.0008	0.0004	1.16E-03	8.17E-05	1.24	0.0004	2.15E+00	1.87E-01
N-Nitrosodimethylamine	0.00069	0.000345	1.00E-03	7.04E-05	3	0.000345	5.21E+00	4.52E-01
N-Nitrosodi-n-Propylamine	0.005	0.0025	7.28E-03	5.10E-04	0.51	0.0025	8.84E-01	7.67E-02
N-Nitrosodiphenylamine	3.3	1.65	4.80E+00	3.37E-01	6	1.65	9.20E+00	7.99E-01
N-Nitrosopyrrolidine	0.016	0.008	2.33E-02	1.63E-03	34	0.008	5.90E+01	5.12E+00
Pentachlorobenzene	0.1	0.05	1.46E-01	1.02E-02	0.1	0.05	1.37E-01	1.19E-02
Pyrene	20	10	2.91E+01	2.04E+00	30	10	4.47E+01	3.88E+00
1,2,4-Trichlorobenzene	0.071	0.0355	1.03E-01	7.25E-03	0.076	0.0355	1.06E-01	9.19E-03
Aldrin	0.00000077	0.000000385	1.12E-06	7.86E-08	0.00000077	0.000000385	1.05E-06	9.14E-08
alpha-BHC	0.00036	0.00018	5.24E-04	3.67E-05	0.00039	0.00018	5.45E-04	4.73E-05
beta-BHC	0.008	0.004	1.16E-02	8.17E-04	0.014	0.004	2.14E-02	1.85E-03
gamma-BHC (Lindane)	4.2	2.1	6.12E+00	4.29E-01	4.4	2.1	6.09E+00	5.29E-01
Hexachlorocyclohexane (HCH)	0.0066	0.0033	9.61E-03	6.74E-04	0.01	0.0033	1.49E-02	1.30E-03
Chlordane	0.00031	0.000155	4.51E-04	3.16E-05	0.00032	0.000155	4.42E-04	3.83E-05
4,4-DDT	0.00003	0.000015	4.37E-05	3.06E-06	0.00003	0.000015	4.10E-05	3.56E-06
4,4-DDE	0.000018	0.000009	2.62E-05	1.84E-06	0.000018	0.000009	2.46E-05	2.14E-06
4,4-DDD	0.00012	0.00006	1.75E-04	1.22E-05	0.00012	0.00006	1.64E-04	1.43E-05
Dieldrin	0.0000012	0.0000006	1.75E-06	1.22E-07	0.0000012	0.0000006	1.64E-06	1.43E-07
alpha-Endosulfan	20	10	2.91E+01	2.04E+00	30	10	4.47E+01	3.88E+00
beta-Endosulfan	20	10	2.91E+01	2.04E+00	40	10	6.21E+01	5.39E+00
Endosulfan Sulfate	20	10	2.91E+01	2.04E+00	40	10	6.21E+01	5.39E+00
Endrin	0.03	0.015	4.37E-02	3.06E-03	0.03	0.015	4.10E-02	3.56E-03
Endrin Aldehyde	1	0.5	1.46E+00	1.02E-01	1	0.5	1.37E+00	1.19E-01
Heptachlor	0.0000059	0.00000295	8.59E-06	6.02E-07	0.0000059	0.00000295	8.07E-06	7.01E-07
Heptachlor Epoxide	0.000032	0.000016	4.66E-05	3.27E-06	0.000032	0.000016	4.38E-05	3.80E-06
Methoxychlor	0.02	0.01	2.91E-02	2.04E-03	0.02	0.01	2.74E-02	2.38E-03
Polychlorinated Biphenyls (PCB)	0.000064	0.000032	9.32E-05	6.53E-06	0.000064	0.000032	8.76E-05	7.60E-06
Toxaphene	0.0007	0.00035	1.02E-03	7.14E-05	0.00071	0.00035	9.75E-04	8.46E-05

Effluent Limitation for Protection of Agriculture (Class 4 Waters)

Maximum Concentration

Parameter	Standard	Background	Conc. Limit	Load Limit (lbs/day)	
Total Dissolved Solids (mg/L)	1,200		1,200	84,122	Impaired
Boron (µg/L)	750	348	1.05E+03	9.08E+01	
Arsenic, Dissolved (µg/L)	100	13.6	1.64E+02	1.42E+01	
Cadmium, Dissolved (µg/L)	10	0.1	1.73E+01	1.50E+00	
Chromium, Dissolved (µg/L)	100	1.3	1.73E+02	1.50E+01	
Copper, Dissolved (µg/L)	200	1.5	3.46E+02	3.00E+01	
Lead, Dissolved (µg/L)	100	0.4	1.73E+02	1.50E+01	
Selenium, Dissolved (µg/L)	50	1.1	8.60E+01	7.47E+00	
Gross Alpha (pCi/L)	15		2.60E+01	2.26E+00	

WASTELOAD ANALYSIS [WLA]
Appendix C: Total Residual Chlorine

Date: 10/28/2020

Discharging Facility: Spanish Fork WWTP
UPDES No: UT-0021741

CHRONIC

	Season	Receiving Water	Standard	Total Effluent	Mixing Zone Boundary	Effluent Limit Without Decay	Temperature (°C)	Decay Rate (/day) @ 20 deg C	Decay Rate (/day) @ T deg C	Travel Time (min)	Decay Coefficient	Effluent Limit
Discharge (cfs)	Summer	7.7		13.0	20.7							
	Fall	13.2		13.0	26.2							
	Winter	13.2		13.0	26.2							
	Spring	10.2		13.0	23.2							
TRC (mg/L)	Summer	0.000	0.011			0.017	20.1	29.86	30.0	443	0.0001	**181.668**
	Fall	0.000	0.011			0.022	14.7	29.86	23.4	357	0.0031	**7.269**
	Winter	0.000	0.011			0.022	11.2	29.86	19.9	357	0.0072	**3.096**
	Spring	0.000	0.011			0.020	14.5	29.86	23.2	357	0.0032	**6.152**

ACUTE

	Season	Receiving Water	Standard	Total Effluent	Mixing Zone Boundary	Effluent Limit Without Decay	Temperature (°C)	Decay Rate (/day) @ 20 °C	Decay Rate (/day) @ T °C	Travel Time (min)	Decay Coefficient	Effluent Limit
Discharge (cfs)	Summer	7.7		16.1	23.7							
	Fall	13.2		16.1	29.3							
	Winter	13.2		16.1	29.3							
	Spring	10.2		16.1	26.3							
TRC (mg/L)	Summer	0.000	0.019			0.028	20.1	29.86	30.0	355	0.0006	**45.833**
	Fall	0.000	0.019			0.035	14.7	29.86	23.4	311	0.0064	**5.422**
	Winter	0.000	0.019			0.035	11.2	29.86	19.9	311	0.0134	**2.575**
	Spring	0.000	0.019			0.031	14.5	29.86	23.2	311	0.0066	**4.678**

Appendix 8

State of Utah
GARY R. HERBERT
Governor
SPENCER J. COX
Lieutenant Governor

Department of
Environmental Quality
L. Scott Baird
Executive Director
DIVISION OF WATER QUALITY
Erica Brown Gaddis, PhD
Director

April 28, 2020

Cory Pierce, P.E.
Wastewater Division Engineer/Manager
City of Spanish Fork Waste Water Treatment Plant
40 South Main Street
Spanish Fork, UT 84660
Via Email

Subject: Renewal of UPDES Permit UT0020109
Spanish Fork City Wastewater Treatment Plant

Dear Mr. Pierce**:**

The above-referenced Utah Pollutant Discharge Elimination System (UPDES) permit will expire next year on **June 30, 2021**. The Division of Water Quality (DWQ) likes to provide facilities with ample time to complete and submit the required permit application forms well in advance of the expiration date to help facilitate an on-time permit renewal. Pursuant to UAC R317-8-3.1(4), all UPDES permittees must apply for reissuance of the permit not less than 180 days prior to the expiration date of the existing permit. A copy of the application forms may be found at https://deq.utah.gov/water-quality/updes-permitting-program#individual. From there, Click on "UPDES Permit Application Forms" to expand into the UPDES Industrial Permit Application forms.

You may also need to complete the "Utah Antidegradation Review Form for Applicants" found near the bottom of the following DWQ web page: https://deq.utah.gov/water-quality/antidegradation-reviews-water-quality. Please complete and return all applicable forms to DWQ as soon as possible, but no later than **July 31, 2020**, so that we can begin to process your permit for an on-time renewal.

Thanks for your continued efforts to protect Utah's Water Quality. If you have any questions, please contact me at lshull@utah.gov or at 801-536-4394. I look forward to working with once again you as your permit facilitator.

Sincerely,

Lonnie M Shull III

Lonnie Shull, Environmental Scientist
UPDES Surface Water Section

LNS/blj

Cc: Via Email
Amy Clark, US EPA R8
Bryce Larsen, Utah County Health Department

DWQ-2020-008970
File: UPDES Section 2

Appendix 9

STATE OF UTAH
DIVISION OF WATER QUALITY
DEPARTMENT OF ENVIRONMENTAL QUALITY
SALT LAKE CITY, UTAH

UTAH POLLUTANT DISCHARGE ELIMINATION SYSTEM (UPDES) PERMITS

Major Municipal Permit No. **UT0020109**
Biosolids Permit No. **UTL020109**
Storm Water Permit No. **UTR020109**

In compliance with provisions of the Utah *Water Quality Act, Title 19, Chapter 5, Utah Code Annotated ("UCA") 1953, as amended* (the *"Act"*),

SPANISH FORK WASTEWATER TREATMENT PLANT

is hereby authorized to discharge from its wastewater treatment facility to receiving waters named

DRY CREEK,

to dispose of biosolids,

and to discharge storm water,

in accordance with specific limitations, outfalls, and other conditions set forth herein.

This **modified** permit shall become effective on January 3, 2020.

This permit expires at midnight on June 30, 2021.

Signed this 3rd day of January 2020.

Erica B. Gaddis

Erica Brown Gaddis, PhD
Director

DWQ-2019-020019

Table of Contents

Outline Page Number

I. DISCHARGE LIMITATIONS AND REPORTING REQUIREMENTS

A. Description of Discharge Point. The authorization to discharge wastewater provided under this part is limited to those outfalls specifically designated below as discharge locations. Discharges at any location not authorized under a UPDES permit are violations of the *Act* and may be subject to penalties under the *Act*. Knowingly discharging from an unauthorized location or failing to report an unauthorized discharge may be subject to criminal penalties as provided under the *Act*.

Outfall Number	Location of Discharge Outfall
001	Located at latitude 40°08'43" and longitude 111°35'54". The discharge is through a gravity flow concrete pipe leading from the chlorine contact basin to Dry Creek which flows to the Provo Bay area of Utah Lake.

B. Narrative Standard. It shall be unlawful, and a violation of this permit, for the permittee to discharge or place any waste or other substance in such a way as will be or may become offensive such as unnatural deposits, floating debris, oil, scum, or other nuisances such as color, odor or taste, or cause conditions which produce undesirable aquatic life or which produce objectionable tastes in edible aquatic organisms; or result in concentrations or combinations of substances which produce undesirable physiological responses in desirable resident fish, or other desirable aquatic life, or undesirable human health effects, as determined by a bioassay or other tests performed in accordance with standard procedures.

C. Specific Limitations and Self-Monitoring Requirements.

1. Effective immediately, and lasting through the life of this permit, there shall be no chronic toxicity in Outfall 001 as defined in *Part VIII*, and determined by test procedures described in *Part I. C.4.a & b* of this permit.

2.
   a. Effective immediately and lasting the duration of this permit, the permittee is authorized to discharge from Outfall 001. Such discharges shall be limited and monitored by the permittee as specified below:

Parameter	Effluent Limitations *a				
	Maximum Monthly Avg	Maximum Weekly Avg	Yearly Average	Daily Minimum	Daily Maximum
Total Flow, MGD	5	--	--	--	10
BOD_5, mg/L	25	35	--	--	--
BOD_5 Min. % Removal	85	--	--	--	--
TSS, mg/L	25	35	--	--	--
TSS Min. % Removal	85	--	--	--	--
Dissolved Oxygen, mg/L	--	--	--	4.0	--
Ammonia, mg/L					
Summer (Jul-Sep)	7 *j	--	--	--	18
Fall (Oct-Dec)	9 *j	--	--	--	18
Winter (Jan-Mar)	9 *j	--	--	--	18
Spring (Apr-Jun)	9 *j	--	--	--	18
TRC, mg/L	--	--	--	--	2.0
E-Coli, No./100mL	126	158	--	--	--
Oil & Grease, mg/L	--	--	--	--	10.0
pH, Standard Units	--	--	--	6.5	9

Interim Total Phosphorous, mg/L (Effective Jan 1, 2020 – February 28, 2021	--	--	3.7	--	--
Final Total Phosphorous, mg/L, (Effective March 1, 2021	--	--	1.0	--	--

Self-Monitoring and Reporting Requirements *a			
Parameter	Frequency	Sample Type	Units
Total Flow *b, *c	Continuous	Recorder	MGD
BOD_5, Influent *d Effluent	2 x Weekly 2 x Weekly	Composite Composite	mg/L mg/L
TSS, Influent *d Effluent	2 x Weekly 2 x Weekly	Composite Composite	mg/L mg/L
E. Coli	2 x Weekly	Grab	No./100mL
pH	2 x Weekly	Grab	SU
Ammonia	2 x Weekly	Grab	mg/L
DO	2 x Weekly	Grab	mg/L
WET – Biomonitoring *h Ceriodaphnia – Chronic Fathead Minnows - Chronic	 Quarterly Variable Species	 Composite Composite	 Pass/Fail Pass/Fail
TRC, mg/L, *e,	Daily	Grab	mg/L
Oil & Grease *f	Monthly	Grab	mg/L
Total Ammonia, (as N) *k	2 x Weekly	Composite	mg/L
Orthophosphate, (as P) *k Effluent	 Monthly	 Composite	 mg/L
Phosphorus, Total *k Influent Effluent	 Monthly Monthly	 Composite Composite	 mg/L mg/L
Total Kjeldahl Nitrogen, (TKN as N) *k Influent Effluent	 Monthly Monthly	 Composite Composite	 mg/L mg/L
Nitrate, NO3 *k	Monthly	Composite	mg/L
Nitrite, NO2 *k	Monthly	Composite	mg/L
Metals, Influent *i Effluent	Quarterly Quarterly	Composite Composite	mg/L mg/L
Organic Toxics *i	Yearly	Grab	mg/L

*a See Definitions, *Part VIII*, for definition of terms.

*b Flow measurements of influent/effluent volume shall be made in such a manner that the permittee can affirmatively demonstrate that representative values are being obtained.

*c If the rate of discharge is controlled, the rate and duration of discharge shall be reported.

*d In addition to monitoring the final discharge, influent samples shall be taken and analyzed for this constituent at the same frequency as required for this constituent in the discharge.

*e Analytical results less than 0.06 mg/l will not be considered out of compliance with the permit. For purposes of calculating averages and reporting on the Discharge Monitoring Report form, the following will apply:
1) analytical values less than 0.02 mg/L shall be considered zero; and
2) analytical values less than 0.06 mg/L and equal to or greater than 0.02 mg/L will be recorded as measured.

*f Oil & Grease sampled when sheen is present or visible. If no sheen is present or visible, report NA.

*h Spanish Fork will monitor for Chronic WET with an IC_{25} > 82 %, but will not have a limit associated with it in the permit. Spanish Fork will also have the option to choose which species it wishes to test each quarter. The species is not tested in a quarter it is reported as NA.

*i See table in *Part II.H.1* (Influent and Effluent Monitoring and Reporting Requirements) of the Permit for target minimum detection limits (MDL) requirements. The Organic Toxics report is due the same day as the Pretreatment Report (Part II,C, of the permit).

*j The monthly average effluent limit for this parameter will become effective on December 31, 2023.

*k These reflect monitoring changes required with the adoption of *UCA R317-1-3.3*, Technology-based Phosphorus Effluent Limits rule.

1. <u>Compliance Schedules</u>

a. <u>Local Limits</u>

(1) January 1, 2017 — Per the requirements of the Pretreatment Audit on October 16, 2012, Spanish Fork will have 6 months following the issuance of the UPDES permit to submit draft local limits. The draft local limits must include technical based local limits with the calculations and summary of how the local limits were derived.

b. <u>Spanish Fork Optimization and Ammonia Compliance</u>

(1) By July 1, 2017: Spanish Fork shall submit a detailed optimization schedule and plan for facility upgrades necessary to comply with the Chronic Ammonia limit in *Part 1,C,2* of the permit.

(2) Annually July 1, 2018 – July 1, 2022: Submit progress report to DWQ outlining the status of optimization and construction, including timeframes to obtain a construction permit and construction schedule. This report shall be due by July 1st of each year.

(3) July 1, 2023: Spanish Fork shall complete optimization and construction of wastewater treatment upgrades necessary to comply with the Chronic Ammonia limits in *Part 1.C.2* of the permit.

(4) December 31, 2023: Spanish Fork shall achieve compliance with the Chronic Ammonia limits in *Part 1,C,2* of the permit.

c. Spanish Fork TBPEL Compliance

On November 23, 2018, DWQ approved the Spanish Fork Wastewater Treatment Plant variance request not to extend beyond March 1, 2021 and with an interim total phosphorous annual average limit of 3.7 mg/L (Approved Interim Limit) mg/L beginning January 1, 2020. This permit modification is incorporating the approved variance with the interim limits and dates that were previously public noticed in the local newspaper, in which no comments were received.

	Effluent Limitations Changes		
Parameter		Current Annual Average	New Annual Average
Interim Total Phosphorous, mg/L (Effective Jan 1, 2020 – February 28, 2021		No Limit	3.7 mg/L
Final Total Phosphorous, mg/L, (Effective March 1, 2021		No Limit	1.0 mg/L

(1) By no later than March l, 2020, Spanish Fork in partnership with Springville shall submit to DWQ:
   a. A formal letter committing to the selected phosphorus removal technology including project schedule, and budget analysis (including project costs and funding information).
   b. A City Council resolution supporting the pursuit of the facility upgrade or replacement for the selected phosphorus removal technology. The resolution shall include the approximate budget for the facility upgrade or replacement.

(2) By no later than June 1, 2020, Spanish Fork shall submit to DWQ a request for extension of this variance. The variance extension request shall be a formal letter committing to construct a new regional treatment plant including project schedule, and budget analysis (including project costs and funding information).

(3) By no later than March 1, 2021, Spanish Fork shall submit to DWQ documentation of financial planning required to construct a new regional treatment plant. In addition, if rate increases are necessary Spanish Fork shall have passed the required rate increase resolution by no later than March 1,2021.

2. Chronic Whole Effluent Toxicity (WET) Testing.

a. *Whole Effluent Testing – Chronic Toxicity*. Starting on July 1, 2016, the permittee shall conduct chronic short-term toxicity tests on a composite sample of the final effluent. The sample shall be collected at outfall 001.

The monitoring frequency shall be quarterly. Samples shall be collected on a two-day progression starting on a Monday[1]. If chronic toxicity is detected, the test shall be repeated in less than four weeks from the date the initial sample was taken. The need for any additional samples, and/or a Toxicity Reduction Evaluation (TRE), see Part I.C.4.b , shall be determined by the Director. If the second test shows no chronic toxicity, routine monitoring shall be resumed.

The chronic toxicity tests shall be conducted in general accordance with the procedures set out in the latest revision of Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, 4th Edition, (EPA- 821-R-02-013), October 2002 as per 40 CFR 136.3(a) TABLE 1A- LIST OF APPROVED BIOLOGICAL METHODS. Testing shall vary species with test species consisting of Ceriodaphnia dubia and Pimephales promelas (fathead minnow). A CO2 atmosphere may be used (in conjunction with an unmodified test) in order to account for artificial pH drift.

Chronic toxicity occurs when the IC_{25} , using a five dilution test plus the control, is less than or equal to an effluent concentration of 82%. If any of the acceptable control performance criteria are not met, the test shall be considered invalid. IC_{25} is the inhibition concentration of toxicant (given in % effluent) that would cause a 25% reduction in mean young per female, or a 25% reduction in overall growth for the test population.

If the permit contains a total residual chlorine limitation greater than 0.20 mg/L, the permittee may request from the Director approval to de-chlorinate the sample.

Quarterly test results shall be reported along with the Discharge Monitoring Report (DMR) submitted for the end of the reporting calendar quarter (e.g., biomonitoring results for the calendar quarter ending March 31 shall be reported with the DMR due April 28, with the remaining biomonitoring reports submitted with DMRs due each July 28, October 28, and January 28). All test results shall be reported along with the DMR or netDMR submitted for that reporting period. The format for the report shall be consistent with the latest revision of the *Region VIII Guidance for Chronic Whole Effluent Reporting* and shall include all the physical testing as specified.

If the results for a minimum of ten consecutive tests indicate no chronic toxicity, the permittee may request a reduction in testing frequency and/or reduction to one species. The Director may approve, partially approve, or deny the request based on results and other available information. If approval is given, the modification will take place without a public notice.

The current Utah whole effluent toxicity (WET) policy is in the process of being updated and revised to assure its consistency with the Environmental Protection Agency's national and regional WET policy. When said revised WET policy has been finalized and officially adopted, this permit will be reopened and modified to incorporate satisfactory follow-up chronic toxicity language (chronic pattern of toxicity, PTI and/or TIE/TRE, etc.) without a public notice, as warranted and appropriate.

b. *Toxicity Reduction Evaluation (TRE)*. If toxicity is detected during the life of this permit and it is determined by the Director that a TRE is necessary, the permittee

1 Composite sample volumes are collected and sent off to the lab on Monday, Wednesday and Friday

shall be so notified and shall initiate a TRE immediately thereafter. The purpose of the TRE will be to establish the cause of toxicity, locate the source(s) of the toxicity, and control or provide treatment for the toxicity.

A TRE may include but is not limited to one, all, or a combination of the following:

(1) Phase I – Toxicity Characterization

(2) Phase II – Toxicity Identification Procedures

(3) Phase III – Toxicity Control Procedures

(4) Any other appropriate procedures for toxicity source elimination and control.

If the TRE establishes that the toxicity cannot be immediately eliminated, the permittee shall submit a proposed compliance plan to the Director. The plan shall include the proposed approach to control toxicity and a proposed compliance schedule for achieving control. If the approach and schedule are acceptable to the Director, this permit may be reopened and modified.

If the TRE shows that the toxicity is caused by a toxicant(s) that may be controlled with specific numerical limitations, the permittee may:

(a) Submit an alternative control program for compliance with the numerical requirements.

(b) If necessary, provide a modified biomonitoring protocol, which compensates for the pollutant(s) being controlled numerically.

If acceptable to the Director, this permit may be reopened and modified to incorporate any additional numerical limitations, a modified compliance schedule if judged necessary by the Director, and/or a modified biomonitoring protocol.

Failure to conduct an adequate TRE, or failure to submit a plan or program as described above, or the submittal of a plan or program judged inadequate by the Director, shall be considered a violation of this permit.

B. Reporting of Monitoring Results.

1. Reporting of Wastewater Monitoring Results Monitoring results obtained during the previous month shall be summarized for each month and reported on a Discharge Monitoring Report Form (EPA No. 3320-1) or by NetDMR[2], post-marked or entered into NetDMR no later than the 28th day of the month following the completed reporting period. The first report is due on August 28, 2016. If no discharge occurs during the reporting period, "no discharge" shall be reported. Legible copies of these, and all other reports including whole effluent toxicity (WET) test reports required herein, shall be signed and certified in accordance with the requirements of *Signatory Requirements (see Part VII.G*), and submitted by NetDMR, or to the Division of Water Quality at the following address:

2 Starting January 1, 2017 monitoring results must be submitted using NetDMR unless the permittee has successfully petitioned for an exception.

Department of Environmental Quality
Division of Water Quality
PO Box 144870
Salt Lake City, Utah 84114-4870

II. INDUSTRIAL PRETREATMENT PROGRAM

A. Pretreatment Program Delegation. The permittee has been delegated primary responsibility for enforcing against discharges prohibited by *40 CFR 403.5* and applying and enforcing any national Pretreatment Standards established by the United States Environmental Protection Agency in accordance with Section 307 (b) and (c) of *The Clean Water Act (CWA)*, as amended by *The Water Quality Act (WQA), of 1987*.

The permittee shall implement the Industrial Pretreatment Program in accordance with the legal authorities, policies, and procedures described in the permittee's approved Pretreatment Program submission. Such program commits the permittee to do the following:

1. Carry out inspection, surveillance, and monitoring procedures, which will determine, independent of information supplied by the industrial user, whether the industrial user is in compliance with the pretreatment standards. At a minimum, all significant industrial users shall be inspected and sampled by the permittee at least once per year;

2. Control through permit, order, or similar means, the contribution to the POTW by each industrial user to ensure compliance with applicable pretreatment standards and requirements;

3. Require development, as necessary, of compliance schedules by each industrial user for the installation of control technologies to meet applicable pretreatment standards;

4. Maintain and update industrial user information as necessary, to ensure that all IUs are properly permitted and/or controlled at all times;

5. Enforce all applicable pretreatment standards and requirements and obtain appropriate remedies for noncompliance by any industrial user;

6. Annually publish a list of industrial users that were determined to be in significant noncompliance during the previous year. The notice must be published before March 28 of the following year;

7. Maintain an adequate revenue structure and staffing level for continued implementation of the Pretreatment Program.

8. Evaluate all significant industrial users at least once every two years to determine if they need to develop a slug prevention plan. If a slug prevention plan is required, the permittee shall insure that the plan contains at least the minimum elements required in *40 CFR 403.8(f)(2)(v);*

9. Notify all significant industrial users of their obligation to comply with applicable requirements under *Subtitles C and D* of the *Resource* Conservation and Recovery Act (RCRA); and

10. Develop, implement, and maintain an enforcement response plan as required by *40 CFR 403.8(f)(5)* which shall, at a minimum,

    a. Describe how the POTW will investigate instances of noncompliance;

    b. Describe the types of escalating enforcement responses the POTW will take in response to all anticipated type of industrial user violations; and

c. Describe the time periods within which such responses will be taken and identify the POTW staff position(s) responsible for pursuing these actions.

11. Establish and enforce specific local limits as necessary to implement the provisions of the *40 CFR Parts 403.5(a)* and *(b)*, and as required by *40 CFR Part 403.5(c)*.

B. Program Updates. The permittee is required to modify its pretreatment program, as necessary, to reflect changes in the regulations of *40 CFR 403*. Such modifications shall be completed within the time frame set forth by the applicable regulations. Modification of the approved pretreatment program must be done in accordance with the requirements of *40 CFR 403.18*. Modifications of the approved program which result in less stringent industrial user requirements shall not be effective until after approval has been granted by the Director.

C. Annual Report. The permittee shall provide the Division of Water Quality and EPA with an annual report briefly describing the permittee's pretreatment program activities over the previous calendar year. Reports shall be submitted no later than March 28 of each year. These annual reports shall, at a minimum, include:

1. An updated listing of the permittee's industrial users.

2. A descriptive summary of the compliance activities including numbers of any major enforcement actions, i.e., administrative orders, penalties, civil actions, etc.

3. An assessment of the compliance status of the permittee's industrial users and the effectiveness of the permittee's Pretreatment Program in meeting its needs and objectives.

4. A summary of all sampling data taken of the influent and effluent for those pollutants listed in *Part II.H.*

5. A description of all substantive changes made to the permittee's pretreatment program referenced in *Section B* of this section. Substantive changes include, but are not limited to, any change in any ordinance, major modification in the program's administrative structure or operating agreement(s), a significant reduction in monitoring, or a change in the method of funding the program.

6. Other information as may be determined necessary by the Director.

D. General and Specific Prohibitions. Pretreatment standards (*40 CFR 403.5*) specifically prohibit the introduction of the following pollutants into the waste treatment system from any source of non-domestic discharge:

1. Pollutants which create a fire or explosion hazard in the publicly owned treatment works (POTW), including, but not limited to, wastestreams with a closed cup flashpoint of less than 140oF (60oC);

2. Pollutants, which will cause corrosive structural damage to the POTW, but in no case, discharges with a pH lower than 5.0;

3. Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW resulting in interference;

4. Any pollutant, including oxygen demanding pollutants (BOD, etc.), released in a discharge at such volume or strength as to cause interference in the POTW;

5. Heat in amounts, which will inhibit biological activity in the POTW, resulting in interference, but in no case, heat in such quantities that the influent to the sewage treatment works exceeds 104^{o}F (40^{o}C);

6. Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;

7. Pollutants, which result in the presence of toxic gases, vapor, or fumes within the POTW in a quantity that may cause worker health or safety problems;

8. Any trucked or hauled pollutants, except at discharge points designated by the POTW; or

9. Any pollutant that causes pass through or interference at the POTW.

10. Any specific pollutant which exceeds any local limitation established by the POTW in accordance with the requirement of *40 CFR 403.5(c)* and *40 CFR 403.5(d)*.

E. Categorical Standards. In addition to the general and specific limitations expressed in *Part A and D* of this section, applicable National Categorical Pretreatment Standards must be met by all industrial users of the POTW. These standards are published in the federal regulations at *40 CFR 405* et. seq.

F. Enforcement Notice. *UCA 19-5-104* provides that the State may issue a notice to the POTW stating that a determination has been made that appropriate enforcement action must be taken against an industrial user for noncompliance with any pretreatment requirements within 30 days. The issuance of such notice shall not be construed to limit the authority of the Director.

G. Formal Action. The Director retains the right to take legal action against any industrial user and/or POTW for those cases where a permit violation has occurred because of the failure of an industrial user to meet an applicable pretreatment standard.

H. Self-Monitoring and Reporting Requirements.

1. Influent and Effluent Monitoring and Reporting Requirements. The permittee shall sample and analyze both the influent and effluent quarterly, for the following parameters.

Monitoring for Pretreatment Program				
Parameter	MDL a*	Sample Type	Frequency	Units
Total Arsenic	0.175	Composite	Quarterly	mg/L
Total Cadmium	0.0008			
Total Chromium	0.273			
Total Copper	0.031			
Total Cyanide	0.025			
Total Lead	0.018			
Total Mercury	0.000014	Composite/Grab		
Total Molybdenum	NA	Composite		
Total Nickel	0.171			
Total Selenium	0.0054			
Total Silver	0.033			
Total Zinc	0.39			
TTOs, b*	NA	Composite/Grab	Annually	

a* The minimum detection limit (MDL) of the test method used for analysis must be below this limit, if a test method is not available the permittee must submit documentation to the Director regarding the method that will be used.

b* In addition, the permittee shall analyze the treatment facility influent and effluent for the presence of the toxic pollutants listed in 40 CFR 122 Appendix D Table II (Organic Toxic Pollutants) yearly. The pesticides fraction of Appendix D, Table II is suspended unless pesticides are expected to be present.

The results of the analyses of metals, cyanide and toxic organics shall be submitted along with the Discharge Monitoring Report (DMR) at the end of the earliest possible reporting period.

2. In accordance with the requirements of *40 CFR Part 403.5(c)*, the permittee shall determine if there is a need to develop or revise its local limits in order to implement the general and specific prohibitions of *40 CFR Part 403.5 (a)* and *Part 403.5 (b)*. A technical evaluation of the need to develop or revise local limits shall be submitted to the Division within **12 months** of the effective date of this permit. This evaluation should be conducted in accordance with the latest revision of the *Utah Model industrial Pretreatment Program, Section 4, Local Limits*. If a technical evaluation, which may be based on the *Utah Model Industrial Pretreatment Program, Section 4, Local Limits*, reveals that development or revision of local limits is necessary, the permittee shall submit the proposed local limits revision to the Division of Water Quality for approval, and after approval implement the new local limits, within **12 months** of the Division's determination that a revision is necessary.

III. BIOSOLIDS REQUIREMENTS

A. Biosolids Treatment and Disposal. The authorization to dispose of biosolids provided under this permit is limited to those biosolids produced from the treatment works owned and operated by the permittee. The treatment methods and disposal practices are specifically designated below.

1. Treatment.

   a. Biosolids produced at the permittee are stabilized in the anaerobic digesters for at least 15 days at a temperature of at least 35˚ C (95˚ F). The biosolids are removed from the drying beds and formed into small windrows 3-4 feet high, and 5-6 feet wide, stored on a concrete pad and turned several times during the summer and will be tested for pathogens to meet Class A Standards.

2. Description of Biosolids Disposal Method.

   a. Class A biosolids may be sold or given away to the public for lawn and garden use or land application.

   b. Class B biosolids may be land applied for agriculture use or at reclamation sites at agronomic rates.

   c. Biosolids may be disposed of in a landfill or transferred to another facility for further treatment.

3. Changes in Treatment Systems and Disposal Practices.

   a. Should the permittee change their disposal methods or the biosolids generation and handling processes of the plant, the permittee must notify the Director at least 30 days in advance if the process/method is specified in *40 CFR 503*. This includes, but is not limited to, the permanent addition or removal of any biosolids treatment units (i.e., digesters, drying beds, belt presses, etc.) and/or any other change.

   b. Should the permittee change their disposal methods or the biosolids generation and handling processes of the plant, the permittee must notify the Director at least 180 days in advance if the process/method is not specified in 40 CFR 503. This includes, but is not limited to, the permanent addition or removal of any biosolids treatment units (i.e., digesters, drying beds, belt presses, etc.) and/or any other change.

   For any biosolids that are land filled, the requirements in *Section 2.12* of the latest version of the *EPA Region VIII Biosolids Management Handbook* must be followed.

B. Specific Limitations and Monitoring Requirements. All biosolids generated by this facility to be sold or given away to the public shall meet the requirements of *Part III.B.1, 2, 3* and *4* listed below.

1. Metals Limitations. All biosolids sold or given away in a bag or similar container for application to lawns and home gardens must meet the metals limitations as described below. If these metals limitations are not met, the biosolids must be landfilled. Any violation of these limitations shall be reported in accordance with the requirements of *Part III.F.1.* of the permit.

Pollutant Limits, (40 CFR Part 503.13(b)) Dry Weight Basis				
Heavy Metals	Table 1	Table 2	Table 3	Table 4
	Ceiling Conc. Limits, (mg/kg)	CPLR[3], (mg/ha)	Pollutant Conc. Limits, (mg/kg)	APLR[4], (mg/ha-yr)
Total Arsenic	75	41	41	41
Total Cadmium	85	39	39	39
Total Copper	4300	1500	1500	1500
Total Lead	840	300	300	300
Total Mercury	57	17	17	17
Total Molybdenum	75	N/A	N/A	N/A
Total Nickel	420	420	420	420
Total Selenium	100	100	100	100
Total Zinc	7500	2800	2800	2800

2. Pathogen Limitations. All biosolids sold or given away in a bag or a similar container for application to lawns and home gardens must meet the pathogen limitations for Class A. Land applied biosolids must meet the pathogen limitations for Class B as described below. If the pathogen limitations are not met, the biosolids must be landfilled.

   a. Class A biosolids shall meet one of the pathogen measurement requirements in the following Pathogen Control Class table or shall meet the requirements for a Process to Further Reduce Pathogens as defined in *40 CFR Part 503.32(a) Sewage Sludge – Class A.*

   b. Class B biosolids shall meet the pathogen measurement requirements in the following Pathogen Control Class table or shall meet the requirements for a Process to Significantly Reduce Pathogens as defined in *40 CFR Part 503.32(b) Sewage Sludge – Class B*. In addition, the permittee shall comply with all applicable site restrictions listed below *(40 CFR Part 503.32,(b),(5)):*

      (1) Food crops with harvested parts that touch the biosolids/soil mixture and are totally above the land surface shall not be harvested for 14 months after application.

      (2) Food crops with harvested parts below the land surface shall not be harvested for 20 months after application if the biosolids remains on the land surface for four months or more prior to incorporation into the soil.

      (3) Food crops with harvested parts below the surface of the land shall not be harvested for 38 months after application of sewage sludge when the sewage sludge remains on the land surface for less than four months prior to incorporation into the soil.

      (4) Food crops, feed crops, and fiber crops shall not be harvested from the land for 30 days after application.

3 CPLR -- Cumulative Pollutant Loading Rate
4 APLR – Annual Pollutant Loading Rate

(5) Animals shall not be allowed to graze on the land for 30 days after application.

(6) Turf grown on land where biosolids is applied shall not be harvested for one year after application if the harvested turf is placed on either land with a high potential for public exposure or a lawn.

(7) Public access to land with a high potential for public exposure shall be restricted for one year after application.

(8) Public access to land with a low potential for public exposure shall be restricted for 30 days after application.

(9) The sludge or the application of the sludge shall not cause or contribute to the harm of a threatened or endangered species or result in the destruction or adverse modification of critical habitat of a threatened or endangered species after application.

c.

Pathogen Control Class	
Class A	Class B
B Salmonella species –less than three (3) MPN[5] per four (4) grams total solids (or less than 1,000 fecal coliforms per gram total solids)	Fecal Coliforms –less than 2,000,000 colony forming units (CFU) per gram total solids
Enteric viruses –less than one (1) MPN (or plaque forming unit) per four (4) grams total solids	
Viable helminth ova –less than one (1) MPN per four (4) grams total solids	

3. Vector Attraction Reduction Requirements.

a. The permittee will meet vector attraction reduction through use of one of the methods listed in *40 CFR 503.33*. Spanish Fork is meeting the requirements though the following methods.

(1) Under *40 CFR 503.33(b)(1)*, the solids need to be treated through anaerobic digestion for at least 15 days at a temperature of a least 35° C (95° F) with a 38% reduction of volatile solids"

(2) Spanish Fork transfers solids to another facility (Southern Utah Solid Waste District) where they are stabilized through composting to Class A, and distributed to the public and cities.

The permittee is meeting vector attraction reduction through a 38% reduction of the volatile solids through anaerobic digestion

[5] MPN –Most Probable Number

If the permittee intends to use another one of the alternatives, the Director and the EPA must be informed at least thirty (30) days prior to its use. This change may be made without additional public comment

4. Self-Monitoring Requirements.

   a. At a minimum, upon the effective date of this permit, all chemical pollutants, pathogens and applicable vector attraction reduction requirements shall be monitored according to *40 CFR 503.16(1)(a)*.

Minimum Frequency of Monitoring (40 CFR Part 503.16, 503.26. and 503.46)		
Amount of Biosolids Disposed Per Year		Monitoring Frequency
Dry US Tons	Dry Metric Tons	Per Year or Batch
> 0 to < 320	> 0 to < 290	Once Per Year or Batch
> 320 to < 1650	> 290 to < 1,500[6]	Once a Quarter or Four Times
> 1,650 to < 16,500	> 1,500 to < 15,000	Bi-Monthly or Six Times
> 16,500	> 15,000	Monthly or Twelve Times

   b. Sample collection, preservation and analysis shall be performed in a manner consistent with the requirements of *40 CRF 503* and/or other criteria specific to this permit. A metals analysis is to be performed using *Method SW 846* with *Method 3050* used for digestion. For the digestion procedure, an amount of biosolids equivalent to a dry weight of one gram shall be used. The methods are also described in the latest version of the *Region VIII Biosolids Management Handbook*.

   c. The Director may request additional monitoring for specific pollutants derived from biosolids if the data shows a potential for concern.

   d. After two (2) years of monitoring at the frequency specified, the permittee may request that the Director reduce the sampling frequency for the heavy metals. The frequency cannot be reduced to less than once per year for biosolids that are sold or given away to the public for any parameter. The frequency also cannot be reduced for any of the pathogen or vector attraction reduction requirements listed in this permit.

C. Management Practices of Biosolids.

1. Biosolids Distribution Information

   a. For biosolids that are sold or given away, an information sheet shall be provided to the person who receives the biosolids. The label or information sheet shall contain:

      (1) The name and address of the person who prepared the biosolids for a sale or to be given away.

      (2) A statement that prohibits the application of the biosolids to the land except in accordance with the instructions on the label or information sheet.

2. Biosolids Application Site Storage

6 Spanish Fork produced 290 Dry Metric Tons in 2014. Accordingly, they will sample at least 4 times per year.

a. For biosolids or material derived from biosolids that are stored in piles for one year or longer, measures shall be taken to ensure that erosion (whether by wind or water) does not occur. However, best management practices should also be used for piles used for biosolids treatment. If a treatment pile is considered to have caused a problem, best management practices could be added as a requirement in the next permit renewal

3. Land Application Practices

a. The permittee shall operate and maintain the land application site operations in accordance with the following requirements:

(1) The permittee shall provide to the Executive Secretary and the EPA within 90 days of the effective date of this permit a land application plan.

(2) Application of biosolids shall be conducted in a manner that will not contaminate the groundwater or impair the use classification for that water underlying the sites.

(3) Application of biosolids shall be conducted in a manner that will not cause a violation of any receiving water quality standard from discharges of surface runoff from the land application sites. Biosolids shall not be applied to land 10 meters or less from waters of the United States (as defined in *40 CFR 122.2*).

(4) No person shall apply biosolids for beneficial use to frozen, ice-covered, or snow-covered land where the slope of such land is greater than three percent and is less than or equal to six percent unless one of the following requirements is met:

(a) there is 80 percent vegetative ground cover; or,

(b) approval has been obtained based upon a plan demonstrating adequate runoff containment measures.

(5) Application of biosolids is prohibited to frozen, ice-covered, or snow covered sites where the slope of the site exceeds six percent.

(6) Agronomic Rate

(a) Application of biosolids shall be conducted in a manner that does not exceed the agronomic rate for available nitrogen of the crops grown on the site. At a minimum, the permittee is required to follow the methods for calculating agronomic rate outlined in the latest version of the *Region VIII Biosolids Management Handbook* (other methods may be approved by the Director). The treatment plant shall provide written notification to the applier of the biosolids of the concentration of total nitrogen (as N on a dry weight basis) in the biosolids. Written permission from the Director is required to exceed the agronomic rate.

(b) The permittee may request the limits of *Part III, C, 6* be modified if different limits would be justified based on local conditions. The limits are required to be developed in cooperation with the local agricultural extension office or university.

(c) Deep soil monitoring for nitrate-nitrogen is required for all land application sites (does not apply to sites where biosolids are applied less than once every five years). A minimum of six samples for each 320 (or less) acre area is to be collected. These samples are to be collected down to either a 5 foot depth, or the confining layer, whichever is shallower (sample at 1 foot, 2 foot, 3 foot, 4 foot and 5 foot intervals). Each of these one-foot interval samples shall be analyzed for nitrate-nitrogen. In addition to the one-foot interval samples, a composite sample of the 5 foot intervals shall be taken, and analyzed for nitrate-nitrogen as well. Samples are required to be taken once every five years for non-irrigated sites that receive more than 18 inches of precipitation annually or for irrigated sites

(7) Biosolids shall not be applied to any site area with standing surface water. If the annual high groundwater level is known or suspected to be within five feet of the surface, additional deep soil monitoring for nitrate-nitrogen as described in *Part III.C.(6),(c).* is to be performed. At a minimum, this additional monitoring will involve a collection of more samples in the affected area and possibly more frequent sampling. The exact number of samples to be collected will be outlined in a deep soil monitoring plan to be submitted to the Director and the EPA within 90 days of the effective date of this permit. The plan is subject to approval by the Director.

(8) The specified cover crop shall be planted during the next available planting season. If this does not occur, the permittee shall notify the Director in writing. Additional restrictions may be placed on the application of the biosolids on that site on a case-by-case basis to control nitrate movement. Deep soil monitoring may be increased under the discretion of the Director.

(9) When weather and or soil conditions prevent adherence to the biosolids application procedure, biosolids shall not be applied on the site.

(10) For biosolids that are sold or given away, an information sheet shall be provided to the person who receives the biosolids. The label or information sheet shall contain:

(a) The name and address of the person who prepared the biosolids for sale or give away for application to the land.

(b) A statement that prohibits the application of the biosolids to the land except in accordance with the instructions on the label or information sheet.

(c) The annual whole biosolids application rate for the biosolids that do not cause the metals loading rates in Tables 1, 2, and 3 (*Part III.B.1.*) to be exceeded.

(11) Biosolids subject to the cumulative pollutant loading rates in Table 2 (*Part III.B.1.*) shall not be applied to agricultural land, forest, a public contact site, or a reclamation site if any of the cumulative pollutant loading rates in Table 2 have been reached.

(12) If the treatment plant applies the biosolids, it shall provide the owner or leaseholder of the land on which the biosolids are applied notice and necessary information to comply with the requirements in this permit.

(13) The permittee shall inspect the application of the biosolids to active sites to prevent malfunctions and deterioration, operator errors and discharges, which may cause or lead to the release of biosolids to the environment or a threat to human health. The permittee must conduct these inspections often enough to identify problems in time to correct them before they harm human health or the environment. The permittee shall keep an inspection log or summary including at least the date and time of inspection, the printed name and the handwritten signature of the inspector, a notation of observations made and the date and nature of any repairs or corrective action.

D. Special Conditions on Biosolids Storage. Permanent storage of biosolids is prohibited. Biosolids shall not be temporarily stored for more than two (2) years. Written permission to store biosolids for more than two years must be obtained from the Director. Storage of biosolids for more than two years will be allowed only if it is determined that significant treatment is occurring.

E. Representative Sampling. Biosolids samples used to measure compliance with Part III of this Permit shall be collected at locations representative of the quality of biosolids generated at the treatment works and immediately prior to land application.

F. Reporting of Monitoring Results.

1. Biosolids. The permittee shall provide the results of all monitoring performed in accordance with *Part III.B*, and information on management practices, biosolids treatment, site restrictions and certifications shall be provided no later than February 19 of each year. Each report is for the previous calendar year. If no biosolids were sold or given away during the reporting period, "no biosolids were sold or given away" shall be reported. Legible copies of these, and all other reports required herein, shall be signed and certified in accordance with the *Signatory Requirements (see Part VII.G)*, and submitted to the Utah Division of Water Quality and the EPA at the following addresses:

Original to: Biosolids Coordinator
Utah Division of Water Quality
P. O. Box 144870
Salt Lake City Utah, 84114-4870

G. Additional Record Keeping Requirements Specific to Biosolids.

1. Unless otherwise required by the Director, **the permittee is not required to keep records** on compost products if the permittee prepared them from biosolids that meet the limits in Table 3 (*Part III.B.1*), the Class A pathogen requirements in *Part III.B.2* and the vector attraction reduction requirements in *Part III.B.3*. The Director may notify the permittee that additional record keeping is required if it is determined to be significant to protecting public health and the environment.

2. **The permittee is required** to keep the following information for at least 5 years:

   a. Concentration of each heavy metal in Table 3 (*Part III.B.1*).

   b. A description of how the pathogen reduction requirements in *Part III.B.2* were met.

   c. A description of how the vector attraction reduction requirements in *Part III.B.3* were met.

d. A description of how the management practices in *Part III.C* were met (if necessary).

e. The following certification statement:

"I certify under the penalty of law, that the heavy metals requirements in *Part III.B.1*, the pathogen requirements in *Part III.B.2*, the vector attraction requirements in *Part III.B.3*, the management practices in *Part III.C*. This determination has been made under my direction and supervision in accordance with the system designed to assure that qualified personnel properly gather and evaluate the information used to determine that the pathogen requirements, the vector attraction reduction requirements and the management practices have been met. I am aware that there are significant penalties for false certification including the possibility of imprisonment."

3. The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit and records of all data used to complete the application for this permit for the life of the permit. Data collected on site, copies of Biosolids Report forms, and a copy of this UPDES biosolids-only permit must be maintained on site during the duration of activity at the permitted location.

IV. STORM WATER REQUIREMENTS.

A. Coverage of This Section. The requirements listed under this section shall apply to storm water discharges. Storm water discharges from the following portions of the facility may be eligible for coverage under this permit: biosolids drying beds, haul or access roads on which transportation of biosolids may occur, grit screen cleaning areas, chemical loading, unloading and storage areas, salt or sand storage areas, vehicle or equipment storage and maintenance areas, or any other wastewater treatment device or system, used in the storage, treatment, recycling, and reclamation of municipal or domestic sewage, including lands dedicated to the disposal of sewage sludge that are located within the confines of the facility that may have a reasonable expectation to contribute to pollutants in a storm water discharge.

B. Prohibition of Non-Storm Water Discharges. Except for discharges identified in *Part I.*, and discharges described below in this paragraph, non-storm water discharges are prohibited. The following non-storm water discharges may be authorized under this permit provided the non-storm water component of the discharge is in compliance with this section; discharges from firefighting activities; fire hydrant flushing; potable water sources including waterline flushing; drinking fountain water; irrigation drainage and lawn watering; routine external building wash down water where detergents or other compounds have not been used in the process; pavement wash waters where spills or leaks of toxic or hazardous materials (including oils and fuels) have not occurred (unless all spilled material has been removed) and where detergents are not used; air conditioning condensate; uncontaminated compressor condensate; uncontaminated springs; uncontaminated ground water; and foundation or footing drains where flows are not contaminated with process materials such as solvents.

C. Storm Water Pollution Prevention Plan Requirements. The permittee must have (on site) or develop and implement a storm water pollution prevention plan as a condition of this permit.

1. Contents of the Plan. The plan shall include, at a minimum, the following items:

a. *Pollution Prevention Team*. Each plan shall identify a specific individual or individuals within the facility organization as members of a storm water Pollution Prevention Team who are responsible for developing the storm water pollution prevention plan and assisting the facility or plant manager in its implementation, maintenance, and revision. The plan shall clearly identify the responsibilities of each team member. The activities and responsibilities of the team shall address all aspects of the facility's storm water pollution prevention plan.

b. *Description of Potential Pollutant Sources*. Each plan shall provide a description of potential sources which may reasonably be expected to add significant amounts of pollutants to storm water discharges or which may result in the discharge of pollutants during dry weather from separate storm sewers draining the facility. Each plan shall identify all activities and significant materials, which may be reasonably expected to have the potential as a significant pollutant source. Each plan shall include, at a minimum:

(1) *Drainage*. A site map indicating drainage areas and storm water outfalls. For each area of the facility that generates storm water discharges associated with the waste water treatment related activity with a reasonable potential for containing significant amounts of pollutants, a prediction of the direction of flow and an identification of the types of pollutants that are likely to be present in storm water discharges associated with the activity. Factors to consider include the toxicity of the pollutant; quantity of chemicals used, produced or discharged; the likelihood of contact with storm water; and history of

significant leaks or spills of toxic or hazardous pollutants. Flows with a significant potential for causing erosion shall be identified. The site map shall include but not be limited to:

(a) Drainage direction and discharge points from all wastewater associated activities including but not limited to grit screen cleaning, bio-solids drying beds and transport, chemical/material loading, unloading and storage areas, vehicle maintenance areas, salt or sand storage areas.

(b) Location of any erosion and sediment control structure or other control measures utilized for reducing pollutants in storm water runoff.

(c) Location of bio-solids drying beds where exposed to precipitation or where the transportation of bio-solids may be spilled onto internal roadways or tracked off site.

(d) Location where grit screen cleaning or other routinely performed industrial activities are located and are exposed to precipitation.

(e) Location of any handling, loading, unloading or storage of chemicals or potential pollutants such as caustics, hydraulic fluids, lubricants, solvents or other petroleum products, or hazardous wastes and where these may be exposed to precipitation.

(f) Locations where any major spills or leaks of toxic or hazardous materials have occurred.

(g) Location of any sand or salt piles.

(h) Location of fueling stations or vehicle and equipment maintenance and cleaning areas that are exposed to precipitation.

(i) Location of receiving streams or other surface water bodies.

(j) Locations of outfalls and the types of discharges contained in the drainage areas of the outfalls.

(2) *Inventory of Exposed Materials*. An inventory of the types of materials handled at the site that potentially may be exposed to precipitation. Such inventory shall include a narrative description of significant materials that have been handled, treated, stored or disposed in a manner to allow exposure to storm water between the time of 3 years prior to the effective date of this permit and the present; method and location of onsite storage or disposal; materials management practices employed to minimize contact of materials with storm water runoff between the time of 3 years prior to the effective date of this permit and the present; the location and a description of existing structural and nonstructural control measures to reduce pollutants in storm water runoff; and a description of any treatment the storm water receives.

(3) *Spills and Leaks*. A list of significant spills and significant leaks of toxic or hazardous pollutants that occurred at areas that are exposed to precipitation or that otherwise drain to a storm water conveyance at the facility after the date of 3 years prior to the effective date of this permit. Such list shall be updated as appropriate during the term of the permit.

(4) *Sampling Data*. A summary of existing discharge sampling data describing pollutants in storm water discharges from the facility, including a summary of sampling data collected during the term of this permit.

(5) *Summary of Potential Pollutant Sources and Risk Assessment*. A narrative description of the potential pollutant sources from the following activities associated with treatment works: access roads/rail lines; loading and unloading operations; outdoor storage activities; material handling sites; outdoor vehicle storage or maintenance sites; significant dust or particulate generating processes; and onsite waste disposal practices. Specific potential pollutants shall be identified where known.

(6) *Measures and Controls*. The permittee shall develop a description of storm water management controls appropriate for the facility, and implement such controls. The appropriateness and priorities of controls in a plan shall reflect identified potential sources of pollutants at the facility. The description of storm water management controls shall address the following minimum components, including a schedule for implementing such controls:

(7) *Good Housekeeping*. All areas that may contribute pollutants to storm waters discharges shall be maintained in a clean, orderly manner. These are practices that would minimize the generation of pollutants at the source or before it would be necessary to employ sediment ponds or other control measures at the discharge outlets. Where applicable, such measures or other equivalent measures would include the following: sweepers and covered storage to minimize dust generation and storm runoff; conservation of vegetation where possible to minimize erosion; sweeping of haul roads, bio-solids access points, and exits to reduce or eliminate off site tracking; sweeping of sand or salt storage areas to minimize entrainment in storm water runoff; collection, removal, and proper disposal of waste oils and other fluids resulting from vehicle and equipment maintenance; other equivalent measures to address identified potential sources of pollution.

(8) *Preventive Maintenance*. A preventive maintenance program shall involve timely inspection and maintenance of storm water management devices (e.g., cleaning oil/water separators, catch basins) as well as inspecting and testing facility equipment and systems to uncover conditions that could cause breakdowns or failures resulting in discharges of pollutants to surface waters, and ensuring appropriate maintenance of such equipment and systems.

(9) *Spill Prevention and Response Procedures*. Areas where potential spills that can contribute pollutants to storm water discharges can occur, and their accompanying drainage points, shall be identified clearly in the storm water pollution prevention plan. Where appropriate, specifying material handling procedures, storage requirements, and use of equipment such as diversion valves in the plan should be considered. Procedures and equipment for cleaning up spills shall be identified in the plan and made available to the appropriate personnel.

(10) *Inspections*. In addition to the comprehensive site evaluation required under paragraph (*Part IV.C.1.b.(16))* of this section, qualified facility personnel shall be identified to inspect designated equipment and areas of the facility on a periodic basis. The following areas shall be included in all inspections: access

roads/rail lines, equipment storage and maintenance areas (both indoor and outdoor areas); fueling; material handling areas, residual treatment, storage, and disposal areas; and wastewater treatment areas. A set of tracking or follow-up procedures shall be used to ensure that appropriate actions are taken in response to the inspections. Records of inspections shall be maintained. The use of a checklist developed by the facility is encouraged.

(11) *Employee Training*. Employee training programs shall inform personnel responsible for implementing activities identified in the storm water pollution prevention plan or otherwise responsible for storm water management at all levels of responsibility of the components and goals of the storm water pollution prevention plan. Training should address topics such as spill response, good housekeeping and material management practices. The pollution prevention plan shall identify how often training will take place, but training should be held at least annually (once per calendar year). Employee training must, at a minimum, address the following areas when applicable to a facility: petroleum product management; process chemical management; spill prevention and control; fueling procedures; general good housekeeping practices; proper procedures for using fertilizers, herbicides and pesticides.

(12) *Record keeping and Internal Reporting Procedures*. A description of incidents (such as spills, or other discharges), along with other information describing the quality and quantity of storm water discharges shall be included in the plan required under this part. Inspections and maintenance activities shall be documented and records of such activities shall be incorporated into the plan.

(13) *Non-storm Water Discharges*.

(a) *Certification*. The plan shall include a certification that the discharge has been tested or evaluated for the presence of non-storm water discharges. The certification shall include the identification of potential significant sources of non-storm water at the site, a description of the results of any test and/or evaluation for the presence of non-storm water discharges, the evaluation criteria or testing method used, the date of any testing and/or evaluation, and the onsite drainage points that were directly observed during the test. Certifications shall be signed in accordance with *Part VII.G* of this permit.

(b) *Exceptions*. Except for flows from firefighting activities, sources of non-storm water listed in *Part IV.B.* (Prohibition of Non-storm Water Discharges) of this permit that are combined with storm water discharges associated with industrial activity must be identified in the plan. The plan shall identify and ensure the implementation of appropriate pollution prevention measures for the non-storm water component(s) of the discharge.

(c) *Failure to Certify*. Any facility that is unable to provide the certification required (testing for non-storm water discharges), must notify the *Director* within 180 days after the effective date of this permit. If the failure to certify is caused by the inability to perform adequate tests or evaluations, such notification shall describe: the procedure of any test conducted for the presence of non-storm water discharges; the results of such test or other relevant observations; potential sources of non-storm water discharges to the storm sewer; and why adequate tests for such storm sewers were not feasible. Non-storm water discharges to waters of the State, which are not, authorized by a *UPDES* permit are unlawful, and must be terminated.

(14) *Sediment and Erosion Control*. The plan shall identify areas, which, due to topography, activities, or other factors, have a high potential for significant soil erosion, and identify structural, vegetative, and/or stabilization measures to be used to limit erosion.

(15) *Management of Runoff*. The plan shall contain a narrative consideration of the appropriateness of traditional storm water management practices (practices other than those which control the generation or source(s) of pollutants) used to divert, infiltrate, reuse, or otherwise manage storm water runoff in a manner that reduces pollutants in storm water discharges from the site. The plan shall provide that measures that the permittee determines to be reasonable and appropriate shall be implemented and maintained. The potential of various sources at the facility to contribute pollutants to storm water discharges associated with industrial activity *Part IV.C.1.b* (Description of Potential Pollutant Sources) of this permit] shall be considered when determining reasonable and appropriate measures. Appropriate measures or other equivalent measures may include: vegetative swales and practices, reuse of collected storm water (such as for a process or as an irrigation source), inlet controls (such as oil/water separators), snow management activities, infiltration devices, wet detention/retention devices and discharging storm water through the waste water facility for treatment.

(16) *Comprehensive Site Compliance Evaluation*. Qualified personnel shall conduct site compliance evaluations at appropriate intervals specified in the plan, but in no case less than once a year. Such evaluations shall provide:

(a) Areas contributing to a storm water discharge associated with industrial activity shall be visually inspected for evidence of, or the potential for, pollutants entering the drainage system. Measures to reduce pollutant loadings shall be evaluated to determine whether they are adequate and properly implemented in accordance with the terms of the permit or whether additional control measures are needed. Structural storm water management measures, sediment and erosion control measures, and other structural pollution prevention measures identified in the plan shall be observed to ensure that they are operating correctly. A visual inspection of equipment needed to implement the plan, such as spill response equipment, shall be made.

(b) Based on the results of the evaluation, the description of potential pollutant sources identified in the plan in accordance with *Part IV.C.1.b* (Description of Potential Pollutant Sources) of this section and pollution prevention measures and controls identified in the plan in accordance with *Part IV.C.1.b.(6)* (Measures and Controls) of this section shall be revised as appropriate within 2 weeks of such evaluation and shall provide for implementation of any changes to the plan in a timely manner, but in no case more than 12 weeks after the evaluation.

(c) A report summarizing the scope of the evaluation, personnel making the evaluation, the date(s) of the evaluation, major observations relating to the implementation of the storm water pollution prevention plan, and actions taken in accordance with paragraph *i.* (above) shall be made and retained as part of the storm water pollution prevention plan for at least 3 years after the date of the evaluation. The report shall identify any incidents of noncompliance. Where a report does not identify any incidents of noncompliance, the report shall contain a certification that the facility is in compliance with the storm water pollution prevention plan and this permit. The report shall be signed in accordance with *Part VII.G* (Signatory Requirements) of this permit.

(17) *Deadlines for Plan Preparation and Compliance*. The permittee shall prepare and implement a plan in compliance with the provisions of this section within 270 days of the effective date of this permit. If the permittee already has a plan, it shall be revised according to *Part IV.C.1.b.(16)*, Comprehensive Site Evaluation.

(18) *Keeping Plans Current*. The permittee shall amend the plan whenever there is a change in design, construction, operation, or maintenance, that has a significant effect on the potential for the discharge of pollutants to the waters of the state or if the storm water pollution prevention plan proves to be ineffective in eliminating or significantly minimizing pollutants from sources identified by the plan, or in otherwise achieving the general objective of controlling pollutants in storm water discharges associated with the activities at the facility.

D. Monitoring and Reporting Requirements.

1. Quarterly Visual Examination of Storm Water Quality. Facilities shall perform and document a visual examination of a storm water discharge associated with industrial activity from each outfall, except discharges exempted below. The examination must be made at least once in each of the following designated periods during daylight hours unless there is insufficient rainfall or snow melt to produce a runoff event: January through March; April through June; July through September; and October through December.

   a. *Sample and Data Collection*. Examinations shall be made of samples collected within the first 30 minutes (or as soon thereafter as practical, but not to exceed 1 hour) of when the runoff or snowmelt begins discharging. The examinations shall document observations of color, odor, clarity, floating solids, settled solids, suspended solids, foam, oil sheen, and other obvious indicators of storm water pollution. The examination must be conducted in a well lit area. No analytical tests are required to be performed on the samples. All such samples shall be collected from the discharge resulting from a storm event that is greater than 0.1 inches in magnitude and that occurs at least 72 hours from the previously measurable (greater than 0.1 inch rainfall) storm event. Where practicable, the same individual should carry out the collection and examination of discharges for entire permit term.

   b. *Visual Storm Water Discharge Examination Reports*. Visual examination reports must be maintained onsite in the pollution prevention plan. The report shall include the examination date and time, examination personnel, the nature of the discharge (i.e., runoff or snow melt), visual quality of the storm water discharge (including observations of color, odor, clarity, floating solids, settled solids, suspended solids, foam, oil sheen, and other obvious indicators of storm water pollution), and probable sources of any observed storm water contamination.

   c. *Representative Discharge*. When the permittee has two or more outfalls that, based on a consideration of industrial activity, significant materials, and management practices and activities within the area drained by the outfall, the permittee reasonably believes discharge substantially identical effluents, the permittee may collect a sample of effluent of one of such outfalls and report that the observation data also applies to the substantially identical outfall(s) provided that the permittee includes in the storm water pollution prevention plan a description of the location of the outfalls and explains in detail why the outfalls are expected to discharge substantially identical effluents. In addition, for each outfall that the permittee believes is representative, an estimate of the size of the drainage area (in square feet) and an estimate of the runoff coefficient of the drainage area [e.g., low (under 40 percent), medium (40 to 65 percent), or high (above 65 percent)] shall be provided in the plan.

d. *Adverse Conditions*. When a discharger is unable to collect samples over the course of the visual examination period as a result of adverse climatic conditions, the discharger must document the reason for not performing the visual examination and retain this documentation onsite with the results of the visual examination. Adverse weather conditions, which may prohibit the collection of samples, include weather conditions that create dangerous conditions for personnel (such as local flooding, high winds, hurricane, tornadoes, electrical storms, etc.) or otherwise make the collection of a sample impracticable (drought, extended frozen conditions, etc.).

e. *Inactive and Unstaffed Site*. When a discharger is unable to conduct visual storm water examinations at an inactive and unstaffed site, the operator of the facility may exercise a waiver of the monitoring requirement as long as the facility remains inactive and unstaffed. The facility must maintain a certification with the pollution prevention plan stating that the site is inactive and unstaffed so that performing visual examinations during a qualifying event is not feasible.

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V. MONITORING, RECORDING & GENERAL REPORTING REQUIREMENTS

A. Representative Sampling. Samples taken in compliance with the monitoring requirements established under *Part I* shall be collected from the effluent stream prior to discharge into the receiving waters. Samples and measurements shall be representative of the volume and nature of the monitored discharge. Samples of biosolids shall be collected at a location representative of the quality of biosolids immediately prior to the use-disposal practice.

B. Monitoring Procedures. Monitoring must be conducted according to test procedures approved under *Utah Administrative Code ("UAC") R317-2-10 and 40CFR Part 503*, unless other test procedures have been specified in this permit.

C. Penalties for Tampering. The *Act* provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both.

D. Compliance Schedules. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any Compliance Schedule of this permit shall be submitted no later than 14 days following each schedule date.

E. Additional Monitoring by the Permittee. If the permittee monitors any parameter more frequently than required by this permit, using test procedures approved under *UAC R317-2-10* and *40 CFR 503* or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or the Biosolids Report Form. Such increased frequency shall also be indicated. Only those parameters required by the permit need to be reported.

F. Records Contents. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements:
2. The individual(s) who performed the sampling or measurements;
3. The date(s) and time(s) analyses were performed;
4. The individual(s) who performed the analyses;
5. The analytical techniques or methods used; and,
6. The results of such analyses.

G. Retention of Records. The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least five years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time. A copy of this UPDES permit must be maintained on site during the duration of activity at the permitted location

H. Twenty-four Hour Notice of Noncompliance Reporting.

1. The permittee shall (orally) report any noncompliance including transportation accidents, spills, and uncontrolled runoff from biosolids transfer or land application sites which may seriously endanger health or environment, as soon as possible, but no later than twenty-four (24) hours from the time the permittee first became aware of circumstances. The

report shall be made to the Division of Water Quality, (801) 536-4300, or 24-hour answering service (801) 536-4123.

2. The following occurrences of noncompliance shall be reported by telephone (801) 536-4300 as soon as possible but no later than 24 hours from the time the permittee becomes aware of the circumstances:

    a. Any noncompliance which may endanger health or the environment;

    b. Any unanticipated bypass, which exceeds any effluent limitation in the permit (See *Part VI.G, Bypass of Treatment Facilities.)*;

    c. Any upset which exceeds any effluent limitation in the permit (See *Part VI.H*, *Upset Conditions*.);

    d. Violation of a maximum daily discharge limitation for any of the pollutants listed in the permit; or,

    e. Violation of any of the Table 3 metals limits, the pathogen limits, the vector attraction reduction limits or the management practices for biosolids that have been sold or given away.

3. A written submission shall also be provided within five days of the time that the permittee becomes aware of the circumstances. The written submission shall contain:

    a. A description of the noncompliance and its cause;

    b. The period of noncompliance, including exact dates and times;

    c. The estimated time noncompliance is expected to continue if it has not been corrected;

    d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance; and,

    e. Steps taken, if any, to mitigate the adverse impacts on the environment and human health during the noncompliance period.

4. The Director may waive the written report on a case-by-case basis if the oral report has been received within 24 hours by the Division of Water Quality, (801) 536-4300.

5. Reports shall be submitted to the addresses in *Part I.D*, *Reporting of Monitoring Results*.

I. <u>Other Noncompliance Reporting.</u> Instances of noncompliance not required to be reported within 24 hours shall be reported at the time that monitoring reports for *Part I.D* are submitted. The reports shall contain the information listed in *Part V.H.3*

J. <u>Inspection and Entry</u> The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of the permit;

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit, including but not limited to, biosolids treatment, collection, storage facilities or area, transport vehicles and containers, and land application sites;

4. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the *Act*, any substances or parameters at any location, including, but not limited to, digested biosolids before dewatering, dewatered biosolids, biosolids transfer or staging areas, any ground or surface waters at the land application sites or biosolids, soils, or vegetation on the land application sites; and,

5. The permittee shall make the necessary arrangements with the landowner or leaseholder to obtain permission or clearance, the Director, or authorized representative, upon the presentation of credentials and other documents as may be required by law, will be permitted to enter without delay for the purposes of performing their responsibilities.

VI. COMPLIANCE RESPONSIBILITIES

A. Duty to Comply. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity, which may result in noncompliance with permit requirements.

B. Penalties for Violations of Permit Conditions. The *Act* provides that any person who violates a permit condition implementing provisions of the *Act* is subject to a civil penalty not to exceed $10,000 per day of such violation. Any person who willfully or negligently violates permit conditions or the Act is subject to a fine not exceeding $25,000 per day of violation. Any person convicted under *UCA 19-5-115(2)* a second time shall be punished by a fine not exceeding $50,000 per day. Except as provided at *Part VI.G*, *Bypass of Treatment Facilities* and *Part VI.H*, *Upset Conditions*, nothing in this permit shall be construed to relieve the permittee of the civil or criminal penalties for noncompliance.

C. Need to Halt or Reduce Activity not a Defense. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

D. Duty to Mitigate. The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit, which has a reasonable likelihood of adversely affecting human health or the environment. The permittee shall also take all reasonable steps to minimize or prevent any land application in violation of this permit.

E. Proper Operation and Maintenance. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems, which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

F. Removed Substances. Collected screening, grit, solids, sludge, or other pollutants removed in the course of treatment shall be disposed of in such a manner so as to prevent any pollutant from entering any waters of the state or creating a health hazard. Sludge/digester supernatant and filter backwash shall not directly enter either the final effluent or waters of the state by any other direct route.

G. Bypass of Treatment Facilities.

1. Bypass Not Exceeding Limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to paragraph 2 and 3 of this section.

2. Prohibition of Bypass.

a. Bypass is prohibited, and the Director may take enforcement action against a permittee for bypass, unless:

(1) Bypass was unavoidable to prevent loss of human life, personal injury, or severe property damage;

(2) There were no feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgement to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance, and

(3) The permittee submitted notices as required under *section VI.G.3*.

b. The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed in *sections VI.G.2.a (1), (2) and (3)*.

3. <u>Notice</u>.

a. *Anticipated bypass*. Except as provided above in *section VI.G.2* and below in *section VI.G.3.b*, if the permittee knows in advance of the need for a bypass, it shall submit prior notice, at least ninety days before the date of bypass. The prior notice shall include the following unless otherwise waived by the Director:

(1) Evaluation of alternative to bypass, including cost-benefit analysis containing an assessment of anticipated resource damages:

(2) A specific bypass plan describing the work to be performed including scheduled dates and times. The permittee must notify the Director in advance of any changes to the bypass schedule;

(3) Description of specific measures to be taken to minimize environmental and public health impacts;

(4) A notification plan sufficient to alert all downstream users, the public and others reasonably expected to be impacted by the bypass;

(5) A water quality assessment plan to include sufficient monitoring of the receiving water before, during and following the bypass to enable evaluation of public health risks and environmental impacts; and,

(6) Any additional information requested by the Director.

b. *Emergency Bypass*. Where ninety days advance notice is not possible, the permittee must notify the Director, and the Director of the Department of Natural Resources, as soon as it becomes aware of the need to bypass and provide to the Director the information in *section VI.G.3.a.(1) through (6)* to the extent practicable.

c. *Unanticipated bypass*. The permittee shall submit notice of an unanticipated bypass to the Director as required under *Part IV.H*, Twenty Four Hour Reporting. The permittee shall also immediately notify the Director of the Department of Natural Resources, the public and downstream users and shall implement measures to minimize impacts to public health and environment to the extent practicable.

H. Upset Conditions.

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with technology based permit effluent limitations if the requirements of paragraph 2 of this section are met. Director's administrative determination regarding a claim of upset cannot be judiciously challenged by the permittee until such time as an action is initiated for noncompliance.

2. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

   a. An upset occurred and that the permittee can identify the cause(s) of the upset;

   b. The permitted facility was at the time being properly operated;

   c. The permittee submitted notice of the upset as required under *Part V.H*, *Twenty-four Hour Notice of Noncompliance Reporting*; and,

   d. The permittee complied with any remedial measures required under *Part VI.D*, *Duty to Mitigate*.

3. Burden of proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

VII. GENERAL REQUIREMENTS

A. Planned Changes. The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when the alteration or addition could significantly change the nature or increase the quantity of parameters discharged or pollutant sold or given away. This notification applies to pollutants, which are not subject to effluent limitations in the permit. In addition, if there are any planned substantial changes to the permittee's existing sludge facilities or their manner of operation or to current sludge management practices of storage and disposal, the permittee shall give notice to the Director of any planned changes at least 30 days prior to their implementation.

B. Anticipated Noncompliance. The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity, which may result in noncompliance with permit requirements.

C. Permit Actions. This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

D. Duty to Reapply. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee shall apply for and obtain a new permit. The application shall be submitted at least 180 days before the expiration date of this permit.

E. Duty to Provide Information. The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

F. Other Information. When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or any report to the Director, it shall promptly submit such facts or information.

G. Signatory Requirements. All applications, reports or information submitted to the Director shall be signed and certified.

1. All permit applications shall be signed by either a principal executive officer or ranking elected official.

2. All reports required by the permit and other information requested by the Director shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

    a. The authorization is made in writing by a person described above and submitted to the Director, and,

b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters. A duly authorized representative may thus be either a named individual or any individual occupying a named position.

3. Changes to authorization. If an authorization under *paragraph VII.G.2* is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of *paragraph VII.G.2.* must be submitted to the Director prior to or together with any reports, information, or applications to be signed by an authorized representative.

4. Certification. Any person signing a document under this section shall make the following certification:

   "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

H. Penalties for Falsification of Reports. The *Act* provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction be punished by a fine of not more than $10,000.00 per violation, or by imprisonment for not more than six months per violation, or by both.

I. Availability of Reports. Except for data determined to be confidential under *UAC R317-8-3.2*, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the office of Director. As required by the *Act*, permit applications, permits and effluent data shall not be considered confidential.

J. Oil and Hazardous Substance Liability. Nothing in this permit shall be construed to preclude the permittee of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under the *Act*.

K. Property Rights. The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations.

L. Severability. The provisions of this permit are severable, and if any provisions of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

M. Transfers. This permit may be automatically transferred to a new permittee if:

1. The current permittee notifies the Director at least 20 days in advance of the proposed transfer date;

2. The notice includes a written agreement between the existing and new permittee's containing a specific date for transfer of permit responsibility, coverage, and liability between them; and,

3. The Director does not notify the existing permittee and the proposed new permittee of his or her intent to modify, or revoke and reissue the permit. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in paragraph *2* above.

N. State or Federal Laws. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authority preserved by *UCA 19-5-117* and *Section 510* of the *Act* or any applicable Federal or State transportation regulations, such as but not limited to the Department of Transportation regulations.

O. Water Quality - Reopener Provision. This permit may be reopened and modified (following proper administrative procedures) to include the appropriate effluent limitations and compliance schedule, if necessary, if one or more of the following events occurs:

1. Water Quality Standards for the receiving water(s) to which the permittee discharges are modified in such a manner as to require different effluent limits than contained in this permit.

2. A final wasteload allocation is developed and approved by the State and/or EPA for incorporation in this permit.

3. Revisions to the current CWA § 208 areawide treatment management plans or promulgations/revisions to TMDLs (40 CFR 130.7) approved by the EPA and adopted by DWQ which calls for different effluent limitations than contained in this permit.

P. Biosolids – Reopener Provision. This permit may be reopened and modified (following proper administrative procedures) to include the appropriate biosolids limitations (and compliance schedule, if necessary), management practices, other appropriate requirements to protect public health and the environment, or if there have been substantial changes (or such changes are planned) in biosolids use or disposal practices; applicable management practices or numerical limitations for pollutants in biosolids have been promulgated which are more stringent than the requirements in this permit; and/or it has been determined that the permittees biosolids use or land application practices do not comply with existing applicable state of federal regulations.

Q. Toxicity Limitation - Reopener Provision. This permit may be reopened and modified (following proper administrative procedures) to include, whole effluent toxicity (WET) limitations, a compliance date, a compliance schedule, a change in the whole effluent toxicity (biomonitoring) protocol, additional or modified numerical limitations, or any other conditions related to the control of toxicants if one or more of the following events occur;

1. Toxicity is detected, as per *Part I.C.4.a* of this permit, during the duration of this permit.

2. The TRE results indicate that the toxicant(s) represent pollutant(s) that may be controlled with specific numerical limits, and the Director agrees that numerical controls are the most appropriate course of action.

3. Following the implementation of numerical control(s) of toxicant(s), the Director agrees that a modified biomonitoring protocol is necessary to compensate for those toxicant that are controlled numerically.

4. The TRE reveals other unique conditions or characteristics, which in the opinion of the permit issuing authority justify the incorporation of unanticipated special conditions in the permit.

R. Storm Water-Reopener Provision. At any time during the duration (life) of this permit, this permit may be reopened and modified (following proper administrative procedures) as per *UAC R317.8*, to include, any applicable storm water provisions and requirements, a storm water pollution prevention plan, a compliance schedule, a compliance date, monitoring and/or reporting requirements, or any other conditions related to the control of storm water discharges to "waters-of-State".

VIII. DEFINITIONS

A. <u>Wastewater.</u>

1. The “7-day (and weekly) average”, other than for e-coli bacteria, fecal coliform bacteria, and total coliform bacteria, is the arithmetic average of all samples collected during a consecutive 7-day period or calendar week, whichever is applicable. Geometric means shall be calculated for e-coli bacteria, fecal coliform bacteria, and total coliform bacteria. The 7-day and weekly averages are applicable only to those effluent characteristics for which there are 7-day average effluent limitations. The calendar week, which begins on Sunday and ends on Saturday, shall be used for purposes of reporting self-monitoring data on discharge monitoring report forms. Weekly averages shall be calculated for all calendar weeks with Saturdays in the month. If a calendar week overlaps two months (i.e., the Sunday is in one month and the Saturday in the following month), the weekly average calculated for that calendar week shall be included in the data for the month that contains Saturday.

2. The "30-day (and monthly) average," other than for e-coli bacteria, fecal coliform bacteria and total coliform bacteria, is the arithmetic average of all samples collected during a consecutive 30-day period or calendar month, whichever is applicable. Geometric means shall be calculated for e-coli bacteria, fecal coliform bacteria and total coliform bacteria. The calendar month shall be used for purposes of reporting self-monitoring data on discharge monitoring report forms.

3. “Act,” means the *Utah Water Quality Act*.

4. “Bypass,” means the diversion of waste streams from any portion of a treatment facility.

5. “Chronic toxicity” occurs when the survival, growth, or reproduction for either test species exposed to a specific percent effluent dilution is significantly less (at the 95 percent confidence level) than the survival, growth, or reproduction of the control specimens.

6. "IC_{25}" is the concentration of toxicant (given in % effluent) that would cause a 25% reduction in mean young per female, or a 25% reduction in overall growth for the test population.

7. “Composite Samples” shall be flow proportioned. The composite sample shall, as a minimum, contain at least four (4) samples collected over the compositing period. Unless otherwise specified, the time between the collection of the first sample and the last sample shall not be less than six (6) hours nor more than 24 hours. Acceptable methods for preparation of composite samples are as follows:

   a. Constant time interval between samples, sample volume proportional to flow rate at time of sampling;

b. Constant time interval between samples, sample volume proportional to total flow (volume) since last sample. For the first sample, the flow rate at the time the sample was collected may be used;

c. Constant sample volume, time interval between samples proportional to flow (i.e., sample taken every "X" gallons of flow); and,

d. Continuous sample volume, with sample collection rate proportional to flow rate.

8. "CWA," means *The Federal Water Pollution Control Act*, as amended, by *The Clean Water Act of 1987*.

9. "Daily Maximum" (Daily Max.) is the maximum value allowable in any single sample or instantaneous measurement.

10. "EPA," means the United States Environmental Protection Agency.

11. "Director," means Director of the Division of Water Quality.

12. A "grab" sample, for monitoring requirements, is defined as a single "dip and take" sample collected at a representative point in the discharge stream.

13. An "instantaneous" measurement, for monitoring requirements, is defined as a single reading, observation, or measurement.

14. "Severe Property Damage," means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

15. "Upset," means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

B. Biosolids.

1. "Biosolids," means any material or material derived from sewage solids that have been biologically treated.

2. "Dry Weight-Basis," means 100 percent solids (i.e. zero percent moisture).

3. "Land Application" is the spraying or spreading of biosolids onto the land surface; the injection of biosolids below the land surface; or the incorporation of biosolids into the land so that the biosolids can either condition the soil or fertilize crops or vegetation

grown in the soil. Land application includes distribution and marketing (i.e. the selling or giving away of the biosolids).

4. "Pathogen," means an organism that is capable of producing an infection or disease in a susceptible host.

5. "Pollutant" for the purposes of this permit is an organic substance, an inorganic substance, a combination of organic and inorganic substances, or pathogenic organisms that after discharge and upon exposure, ingestion, inhalation, or assimilation into an organism either directly from the environment or indirectly by ingestion through the food-chain, could on the basis of information available to the Administrator of EPA, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunction in reproduction), or physical deformations in either organisms or offspring of the organisms.

6. "Runoff" is rainwater, leachate, or other liquid that drains over any part of a land surface and runs off the land surface.

7. "Similar Container" is either an open or closed receptacle. This includes, but is not limited to, a bucket, a box, a carton, and a vehicle or trailer with a load capacity of one metric ton or less.

8. "Total Solids" are the materials in the biosolids that remain as a residue if the biosolids are dried at 103^{o} or 105^{o} Celsius.

9. "Treatment Works" are either Federally owned, publicly owned, or privately owned devices or systems used to treat (including recycling and reclamation) either domestic sewage or a combination of domestic sewage and industrial waste or liquid manure.

10. "Vector Attraction" is the characteristic of biosolids that attracts rodents, flies mosquito's or other organisms capable of transporting infectious agents.

11. "Animals" for the purpose of this permit are domestic livestock.

12. "Annual Whole Sludge Application Rate" is the amount of sewage sludge (dry-weight basis) that can be applied to a unit area of land during a cropping cycle.

13. "Agronomic Rate is the whole sludge application rate (dry-weight basis) designed to: (1) provide the amount of nitrogen needed by the crop or vegetation grown on the land; and (2) minimize the amount of nitrogen in the sewage sludge that passes below the root zone of the crop or vegetation grown on the land to the ground water.

14. "Annual Pollutant Loading Rate" is the maximum amount of a pollutant (dry-weight basis) that can be applied to a unit area of land during a 365-day period.

15. "Application Site or Land Application Site" means all contiguous areas of a users' property intended for sludge application.

16. "Cumulative Pollutant Loading Rate" is the maximum amount of an inorganic pollutant (dry-weight basis) that can be applied to a unit area of land.

17. "Grit and Screenings" are sand, gravel, cinders, other materials with a high specific gravity and relatively large materials such as rags generated during preliminary treatment of domestic sewage at a treatment works and shall be disposed of according to *40 CFR 258*.

18. "High Potential for Public Contact Site" is land with a high potential for contact by the public. This includes, but is not limited to, public parks, ball fields, cemeteries, plant nurseries, turf farms, and golf courses.

19. "Low Potential for Public Contact Site" is the land with a low potential for contact by the public. This includes, but is not limited to, farms, ranches, reclamation areas, and other lands which are private lands, restricted public lands, or lands which are not generally accessible to or used by the public.

20. "Monthly Average" is the arithmetic mean of all measurements taken during the month.

21. "Volatile Solids" is the amount of the total solids in sewage sludge lost when the sludge is combusted at 550 degrees Celsius for 15-20 minutes in the presence of excess air.

C. Storm Water.

1. "Best Management Practices" ("BMPs") means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the State. BMPs also include treatment requirements, operating procedures, and practices to control facility site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

2. "Coal pile runoff" means the rainfall runoff from or through any coal storage pile.

3. "Co-located industrial activity" means when a facility has industrial activities being conducted onsite that are described under more than one of the coverage sections of *Appendix II* in the General Multi-Sector Permit for Storm Water Discharges Associated with Industrial Activity. Facilities with co-located industrial activities shall comply with all applicable monitoring and pollution prevention plan requirements of each section in which a co-located industrial activity is described.

4. "Commercial Treatment and Disposal Facilities" means facilities that receive, on a commercial basis, any produced hazardous waste (not their own) and treat or dispose of those wastes as a service to the generators. Such facilities treating and/or disposing exclusively residential hazardous wastes are not included in this definition.

5. "Landfill" means an area of land or an excavation in which wastes are placed for permanent disposal, and that is not a land application unit, surface impoundment, injection well, or waste pile.

6. “Land application unit” means an area where wastes are applied onto or incorporated into the soil surface (excluding manure spreading operations) for treatment or disposal.

7. “Municipal separate storm sewer system” (large and/or medium) means all municipal separate storm sewers that are either:

    a. Located in an incorporated place (city) with a population of 100,000 or more as determined by the latest Decennial Census by the Bureau of Census (at the issuance date of this permit, Salt Lake City is the only city in Utah that falls in this category); or

    b. Located in the counties with unincorporated urbanized populations of 100,000 or more, except municipal separate storm sewers that are located in the incorporated places, townships or towns within such counties (at the issuance date of this permit Salt Lake County is the only county that falls in this category); or

    c. Owned or operated by a municipality other than those described in paragraph *a.* or *b.* (above) and that are designated by the *Director* as part of the large or medium municipal separate storm sewer system.

8. “NOI” means ”notice of intent”, it is an application form that is used to obtain coverage under the General Multi-Sector Permit for Storm Water Discharges Associated with Industrial Activity.

9. “NOT” means “notice of termination”, it is a form used to terminate coverage under the General Multi-Sector Permit for Storm Water Discharges Associated with Industrial Activity.

10. “Point source” means any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

11. “Section 313 water priority chemical” means a chemical or chemical categories that:

    a. Are listed at *40 CFR 372.65* pursuant to *Section 313* of the *Emergency Planning and Community Right-to-Know Act* (*EPCRA*) (also known as *Title III of the Superfund Amendments and Reauthorization Act* (*SARA*) of 1986);

    b. Are present at or above threshold levels at a facility subject to *EPCRA Section 313* reporting requirements; and

    c. Meet at least one of the following criteria:

        (1) Are listed in *Appendix D* of *40 CFR Part 122* on either Table II (organic priority pollutants), Table III (certain metals, cyanides, and phenols) or Table V (certain toxic pollutants and hazardous substances);

(2) Are listed as a hazardous substance pursuant to *Section 311(b)(2)(A)* of the *CWA* at *40 CFR 116.4*; or

(3) Are pollutants for which EPA has published acute or chronic water quality criteria. See *Appendix III* of this permit. This appendix was revised based on final rulemaking EPA published in the *Federal Register* November 30, 1994.

12. "Significant materials" includes, but is not limited to: raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under *Section 101(14)* of *CERCLA*; any chemical the facility is required to report pursuant to *EPCRA Section 313*; fertilizers; pesticides; and waste products such as ashes, slag and sludge that have the potential to be released with storm water discharges.

13. "Significant spills" includes, but is not limited to: releases of oil or hazardous substances in excess of reportable quantities under *Section 311 of the Clean Water Act* (see *40 CFR 110.10* and *CFR 117.21*) or *Section 102* of *CERCLA* (see *40 CFR 302.4*).

14. "Storm water" means storm water runoff, snowmelt runoff, and surface runoff and drainage.

15. "SWDMR" means "storm water discharge monitoring report", a report of the results of storm water monitoring required by the permit. The Division of Water Quality provides the storm water discharge monitoring report form.

16. "Storm water associated with industrial activity" (*UAC R317-8-3.8(6)(c) & (d)*) means the discharge from any conveyance that is used for collecting and conveying storm water and that is directly related to manufacturing, processing or raw materials storage areas at an industrial plant. The term does not include discharges from facilities or activities excluded from the *UPDES* program. For the categories of industries identified in paragraphs *(a)* through *(j)* of this definition, the term includes, but is not limited to, storm water discharges from industrial plant yards; immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility; material handling sites; refuse sites; sites used for the application or disposal of process waste waters (as defined in *40 CFR Part 401*); sites used for the storage and maintenance of material handling equipment; sites used for residual treatment, storage, or disposal; shipping and receiving areas; manufacturing buildings; storage areas (including tank farms) for raw materials, and intermediate and finished products; and areas where industrial activity has taken place in the past and significant materials remain and are exposed to storm water. For the categories of industries identified in paragraph *(k)* of this definition, the term includes only storm water discharges from all areas (except access roads and rail lines) listed in the previous sentence where material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products, or industrial machinery are exposed to storm water. For the purposes of this paragraph, material handling activities include the storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, finished product, by-product or waste product. The term excludes areas located on plant lands separate from the plant's industrial activities, such

as office buildings and accompanying parking lots as long as the drainage from the excluded areas is not mixed with storm water drained from the above described areas. Industrial facilities (including industrial facilities that are Federally, State, or municipally owned or operated that meet the description of the facilities listed in paragraphs *(a)* to *(k)* of this definition) include those facilities designated under *UAC R317-8-3.8(1)(a)5.* The following categories of facilities are considered to be engaging in "industrial activity" for purposes of this subsection:

a. Facilities subject to storm water effluent limitations guidelines, new source performance standards, or toxic pollutant effluent standards under *40 CFR Subchapter N* (except facilities with toxic pollutant effluent standards that are exempted under category (k) of this definition);

b. Facilities classified as Standard Industrial Classifications 24 (except 2434), 26 (except 265 and 267), 28 (except 283 and 285), 29, 311, 32 (except 323), 33, 3441, 373;

c. Facilities classified as Standard Industrial Classifications 10 through 14 (mineral industry) including active or inactive mining operations (except for areas of coal mining operations no longer meeting the definition of a reclamation area under *40 CFR 434.11(l)* because the performance bond issued to the facility by the appropriate SMCRA authority has been released, or except for areas of non-coal mining operations that have been released from applicable State or Federal reclamation requirements after December 17, 1990) and oil and gas exploration, production, processing, or treatment operations, or transmission facilities that discharge storm water contaminated by contact with or that has come into contact with, any overburden, raw material, intermediate products, finished products, byproducts or waste products located on the site of such operations; inactive mining operations are mining sites that are not being actively mined, but that have an identifiable owner/operator;

d. Hazardous waste treatment, storage, or disposal facilities, including those that are operating under interim status or a permit under Subtitle C of RCRA;

e. Landfills, land application sites, and open dumps that have received any industrial wastes (waste that is received from any of the facilities described under this subsection) including those that are subject to regulation under *Subtitle D* of *RCRA*;

f. Facilities involved in the recycling of materials, including metal scrapyards, battery reclaimers, salvage yards, and automobile junkyards, including but limited to those classified as Standard Industrial Classification 5015 and 5093;

g. Steam electric power generating facilities, including coal handling sites;

h. Transportation facilities classified as Standard Industrial Classifications 40, 41, 42 (except 4221-25), 43, 44, 45 and 5171 that have vehicle maintenance shops, equipment cleaning operations, or airport deicing operations. Only those portions of the facility that are either involved in vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fueling, and lubrication), equipment cleaning operations, airport deicing operations, or that are otherwise identified under paragraphs (a) to (g) or (I) to (k) of this subsection are associated with industrial activity;

i. Treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system, used in the storage treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated to the disposal of sewage sludge that are located within the confines of the facility, with a design flow of 1.0 mgd or more, or required to have an approved pretreatment program under *40 CFR Part 403*. Not included are farm lands, domestic gardens or lands used for sludge management where sludge is beneficially reused and that are not physically located in the confines of the facility, or areas that are in compliance with *40 CFR Part 503*;

j. Construction activity including clearing, grading and excavation activities except: operations that result in the disturbance of less than 5 acres of total land area that are not part of a larger common plan of development or sale;

k. Facilities under Standard Industrial Classifications 20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 285, 30, 31 (except 311), 323, 34 (except 3441), 35, 36, 37 (except 373), 38, 39, 4221-25, (and that are not otherwise included within categories (a) to (j))

17. "Waste pile" means any non-containerized accumulation of solid, non-flowing waste that is used for treatment or storage.

Appendix 10

FACT SHEET STATEMENT OF BASIS
SPANISH FORK WASTEWATER TREATMENT PLANT
PERMIT MODIFICATION
UPDES PERMIT NUMBER: UT0020109
UPDES BIOSOLIDS PERMIT NUMBER: UTL0020109
UPDES MULTI-SECTOR STORM WATER GENERAL PERMIT NUMBER: UTR020109
MAJOR MUNICIPAL

FACILITY CONTACTS

Person Name:	Cory Pierce, P.E.
Position:	Wastewater Manager
Telephone:	(801) 804-4466
Person Name:	Ben Wimm
Position:	Assistant POTW Manager
Person Name:	Chris Thompson
Position:	Public Works Director
Facility Name:	Spanish Fork Wastewater Treatment Plant
Mailing Address:	40 South Main Street Spanish Fork, Utah 84660
Telephone:	(801) 798-5000
Actual Address:	2160 North 150 East

DESCRIPTION OF PERMIT MODIFICATIONS

On December 16, 2014, the Utah Water Quality Board adopted *Utah Administrative Code (UAC) R317-1-3.3, Technology-Based Limits for Controlling Phosphorous Pollution*. The Technology-Based Phosphorous Effluent Limits (TBPEL) establishes new regulations for the discharge of phosphorus to surface waters and is self-implementing. The TBPEL rule includes the following requirements for non-lagoon wastewater treatment plants:

The TBPEL requires that all non-lagoon wastewater treatment works discharging wastewater to surface waters of the state shall provide treatment processes which will produce effluent less than or equal to an annual mean of 1.0 mg/L for total phosphorus. This TBPEL shall be achieved by January 1, 2020 unless a variance has been granted by DWQ. On November 23, 2018, DWQ approved the Spanish Fork Wastewater Treatment Plant variance request not to extend beyond March 1, 2021 and with an interim total phosphorous annual average limit of 3.7 mg/L (Approved Interim Limit) mg/L beginning January 1, 2020. This permit modification is incorporating the approved variance with the interim limits and dates that were previously public noticed in the local newspaper, in which no comments were received.

The permit effluent limits will incorporate the following changes:

Effluent Limitations Changes		
Parameter	Current Annual Average	New Annual Average
Interim Total Phosphorous, mg/L (Effective Jan 1, 2020 – February 28, 2021	No Limit	3.7 mg/L
Final Total Phosphorous, mg/L, (Effective March 1, 2021	No Limit	1.0 mg/L

PERMIT DURATION

It is recommended that this permit modification be effective through the current permit expiration date, June 30, 2021

Drafted by
Lonnie Shull
Environmental Scientist
Utah Division of Water Quality
Permit Modification Drafted December 19, 2019

DWQ-2019-020017

**FACT SHEET AND STATEMENT OF BASIS
SPANISH FORK WASTEWATER TREATMENT PLANT
RENEWAL PERMIT: DISCHARGE, BIOSOLIDS & STORM WATER
UPDES PERMIT NUMBER: UT0020109
UPDES BIOSOLIDS PERMIT NUMBER: UTL0020109
UPDES MULTI-SECTOR STORM WATER GENERAL PERMIT NUMBER: UTR020109
MAJOR MUNICIPAL**

FACILITY CONTACTS

Person Name:	Dennis R. Sorensen
Position:	POTW Manager
Person Name:	Ben Wimm
Position:	Assistant POTW Manager
Person Name:	Chris Thompson
Position:	Public Works Director
Facility Name:	Spanish Fork Wastewater Treatment Plant
Mailing Address:	40 South Main Street Spanish Fork, Utah 84660
Telephone:	(801) 798-5000
Actual Address:	2160 North 150 East

DESCRIPTION OF FACILITY

The Spanish Fork Wastewater Treatment Plant (Spanish Fork) is located at 2160 North 150 East, Spanish Fork, Utah and serves the City of Spanish Fork with the outfall located at latitude 40°08'43" and longitude 11°35'54". The State of Utah Database Storet number is 499602. The design flow of the facility is 5.0 MGD average daily flow with a peak flow of 10 MGD.

The influent enters the plant through a rectangular channel and is monitored by a Flowdar flow meter. The headwork's building separates the influent flow into two 4' channels equipped with two step screens. Both screens have two pressure washers, compactors and an automatic bag system.

Following the headwork's building are two aerated grit chambers with a volume totaling 3200 ft^3. The detention time in the grit chambers at a flow of 5 MGD equals 3.45 minutes. Approximately 10 ft^3/day is removed from the grit chambers. Aeration is provided by two 20 HP, 200 cfm positive displacement air blowers. Following the grit chambers, the flow enters three primary clarifiers. Two of the primary clarifier dimensions are 60 ft with a 7 ft sidewall depth and the other clarifier is 75 ft with a 12 ft sidewall. At the above mentioned flow, the detention time in the primary clarifiers equals 2.6 hours. The effluent from the primary clarifiers then enters the Intermediate Pumping Station that has two 60" screw pumps each equipped with a pumping capacity of 7000 gpm.

The flow enters a wet well for the trickling filter pumps where there the flow is split between aerotors and a plastic media trickling filter. The plastic media filter is 80 ft in diameter with a total media volume of 80,000 ft^3. The aerotors are in 4 basins each approximately 266,000 gallons, combining to 1,066,000 gallons total. The effluent leaving the trickling filter and aerotors then enters the final clarifiers.

The two final clarifiers have a diameter of 90 ft with a sidewall depth of 14 ft. The detention time in the two clarifiers is 6.4 hours at the above mentioned flow rate. The flow then enters the Chlorine Contact Basin where chlorine is injected by a Chlor-A-Vac. The chlorine introduced to the system is controlled by Capital Control Rotometers and Stranco ORP equipment with a capacity of 200 pounds per day (ppd) of chlorine. The Chlorine Contact Basin has a detention time of 60 minutes at 5 MGD and 30 minutes at peak flows of 10 MGD. The Chemical Control Building stores one ton containers of chlorine along with the control equipment. The effluent flows approximately 300 ft east and 3300 ft north to the discharge point.

Spanish Fork has four anaerobic digesters. The two fixed lid primary digesters are 50 ft in diameter with a total volume of 102,100 ft^3 and two 40 ft diameter floating lid secondary digesters with a combined total volume of 25,130 ft^3. The detention time of the primary digester is 60 days. One of the secondary digesters is heated to help digestion and water removal. The remaining digesters primary responsibility is settling. The sludge from the two primary clarifiers is pumped to the primary digester by two positive displacement pumps at regular intervals. The pumping rate is controlled by adjusting the time that the pumps are to pump each hour. Spanish Fork contains two boilers that produce 60,000,000 BTU/hr and two heat exchangers with a sludge rate and hot water rate of 250 gpm. The total detention time is approximately 75 days for all four digesters combined.

Spanish Fork has six drying beds with a capacity of 26 lbs dry solids/ ft^2 / year. During the winter months a two meter belt press is used to de-water the bio-solids. The bio-solids are removed from the drying beds and are either sent to a land fill or used for agriculture land application. Approximately 200 metric tons of dry bio-solids are produced each year by the facility.

The Utah Water Quality Board revised the bacteriological criteria in the Standards of Quality for Waters of the State effective June 1, 2005. Based, in part, on a long-standing recommendation from the Environmental Protection Agency, numeric criteria for E. coli bacteria were added to the standards. The new E. coli criteria is 126 (no.)/100 mL (30-day geometric mean) and 158 (no.)/100 mL (7-day geometric mean), which is considered equivalent to 200 (no.)/100 mL and 250 (no.)/100 mL fecal coliforms (*UAC R317-1-3.2*), respectively.

In January 2004, the Water Quality Board adopted new standards that significantly affect ammonia limits. Other parameters affected are dissolved oxygen (DO), ammonia and total residual chlorine (TRC). Metals testing frequency was increased to quarterly during a permit modification in 2005 as part of a Settlement Agreement.

SUMMARY OF CHANGES FROM PREVIOUS PERMIT

There were no changes to the Spanish Fork facility process or operations during the previous permit cycle. However, use of a new model, new rule implementation, etc. resulted in changes in the permit from the last permit cycle. These are outlined below.

A new model is used by Water Quality to develop a waste load allocation (WLA) for dischargers to Waters of the State. In preparing for using this model for Spanish Fork, Water Quality determined that the receiving stream should have a synoptic study completed on it to improve the understanding of the waterway and improve the WLA. This study was conducted during the summer of 2012. The study contributed to a larger data set for use in running the model. The study was also used to calibrate the model to more closely reflect the ammonia decay conditions in Dry Creek and Provo Bay. After the completion of the study, the WLA was completed.

Upon review of the WLA the facility noted a few items that they believed needed further evaluation. They completed and submitted their own study to Water Quality. The report is titled "Waste-Load Parameters for Wastewater Discharge Permit" (DWQ-2014-012161) and is included as an attachment to the FSSOB. As a result of the findings in the report, Water Quality modified the WLA as below:

1. Added the irrigation canal return flow as a tributary in the QUAL2Kw model. The flow is estimated to be 1.55 cfs and the quality will be based on the sampling event conducted by DWQ in July 2013.

2. Applied a TRC decay rate of 21.34 and 29.86 /d at 20 deg C.
3. Included travel time from the plant to the outfall in calculating TRC decay.

The WLA was re-calculated with no mixing zone granted for Provo Bay and the flow being in compliance at the Provo bay – Dry Creek boundary. The WLA is included as an attachment to the FSSOB. (DWQ-2013-045153)

The recalculated limits did not change the acute ammonia limit, but did result in a lower chronic limit for ammonia. DWQ also started including flow limits in all UPDES permits. These changes are included in the table below.

Parameter	Previous Limit		New Limit	
Ammonia, mg/l	Monthly Ave	Daily Max	Monthly Ave	Daily Max
Summer (Jul-Sept)	NA	18	7	18
Fall (Oct-Dec)	NA	18	9	18
Winter (Jan-Mar)	NA	18	9	18
Spring (Apr-Jun)	NA	18	9	18
	Monthly Ave	Daily Min	Monthly Ave	Daily Min
Flow, MGD	NA	NA	5.0	10

A review of Whole Effluent Toxicity (WET) results showed that Spanish Fork has not had a failure in the last fifteen (15) years, and they have requested a reduction and elimination of WET testing. The Elimination or reduction in frequency and/or species is allowed in a permit if a pattern of passing can be shown. Water Quality has been working to add or include Chronic WET in permits. To balance these two concepts a compromise has been struck. The Acute WET will be eliminated completely. Spanish Fork will start monitoring for Chronic WET on a Quarterly basis. The permit will only require Spanish Fork to monitor WET and report the results on a quarterly basis; no limit will be associated with the monitoring. Spanish Fork will also have the option to choose which species they will test each quarter.

Water Quality adopted UAC R317-1-3.3, Technology-Based Phosphorus Effluent Limit (TBPEL) Rule in 2014. The TBPEL rule as it relates to "non-lagoon" wastewater treatment plants establishes new regulations for the discharge of phosphorus to surface waters and is self-implementing. The TBPEL rule includes the following requirements for non-lagoon wastewater treatment plants:

The TBPEL requires that all non-lagoon wastewater treatment works discharging wastewater to surface waters of the state shall provide treatment processes which will produce effluent less than or equal to an annual mean of 1.0 mg/L for total phosphorus. This TBPEL shall be achieved by January 1, 2020.

The TBPEL discharging treatment works are required to implement, at a minimum, monthly monitoring of the following beginning July 1, 2015:

R317-1-3.3, D, 1 Influent for total phosphorus (as P) and total Kjeldahl nitrogen (as N) concentrations;

R317-1-3.3, D, 2. Effluent for total phosphorus and orthophosphate (as P), ammonia, nitrate-nitrite and total Kjeldahl nitrogen (an N);

In R317-1-3.3, D, 3 the rule states that all monitoring shall be based on 24-hour composite samples by use of an automatic sampler or a minimum of four grab samples collected a minimum of two hours apart.

Recent rule and anticipated future standards changes have lead Spanish Fork to look into a total upgrade of the facility's treatment process in order to meet future requirements. An upgrade to the facility will be costly and take some time, but would result in a facility that is able to treat the effluent to meet the anticipated stringent future effluent limits. Currently, they are unsure how well the facility can remain incompliance with the proposed ammonia limits in their permit. Therefore, time is needed to study the optimization potential of the existing facility until a facility upgrade can be developed and completed.

Based on past performance, the Spanish Fork facility anticipates not being able to consistently meet the monthly average effluent limit for Ammonia in the Winter Months (Jan - Mar) of 7 mg/L indicated in the WLA. Previous WLAs and permits have not included a monthly average effluent limit for Ammonia. Compliance with this effluent limit will likely require upgrades, improvements and optimization of the facility. To allow the facility time to complete the planning and optimization process, the facility will not be required to comply with the chronic ammonia limit indicated in the WLA until December 31, 2023. At which time, more information will be available that will better predict what is needed for the facility and how long it will take to complete work needed to come into compliance..

To complete the optimization and upgrades process, a compliance schedule is included in the renewal permit. This will require that the facility submit an annual report on the optimization efforts detailing the overall progress and any upsets/setbacks that occurred and the steps taken to return to compliance with the effluent limits. It will also contain a summary of the upgrade planning actions and progress from the previous year and an updated schedule/time line for future activity. This will assist in the Division being up to date on the progress and activity.

The Compliance Schedule for ammonia is included below;

Spanish Fork Optimization and Ammonia Limit Compliance.

(1) By July 1, 2017: Spanish Fork shall submit a detailed optimization schedule and plan for facility upgrades necessary to comply with the Chronic Ammonia limit in *Part 1,C,2* of the permit.

(2) Annually July 1, 2018 – July 1, 2022: Submit progress report to DWQ outlining the status of optimization and construction, including timeframes to obtain a construction permit and construction schedule. This report shall be due by July 1st of each year.

(3) By July 1, 2023: Spanish Fork shall complete optimization and construction of wastewater treatment upgrades necessary to comply with the Chronic Ammonia limits in *Part 1,C,2* of the permit.

(4) By December 31, 2023: Spanish Fork shall achieve compliance with the Chronic Ammonia limits in *Part 1,C,2* of the permit.

By the time the permit renewal application is due in 2021, a decision of what process and facility changes will be necessary for the facility to comply with the ammonia effluent limits, and what other changes might need to be incorporated into the facility should be identified. This will allow more defined and comprehensive compliance schedule can be added into what is already planned out for the renewal permit. This time frame allowed in the compliance schedule will allow the facility to organize the needed resources to facilitate any plant upgrades required.

DISCHARGE

DESCRIPTION OF DISCHARGE
The Spanish Fork has been reporting self-monitoring results on Discharge Monitoring Reports on a monthly basis. A summary of the last 3 years of data is attached and there were no significant violations.

Outfall	Description of Discharge Point
001	Located at latitude 40°08'43" and longitude 111°35'54". The discharge is through a gravity flow concrete pipe leading from the chlorine contact basin to Dry Creek which flows to the Provo Bay area of Utah Lake.

RECEIVING WATERS AND STREAM CLASSIFICATION
The discharge flows into Dry Creek, which then flows into Utah Lake (Provo Bay). Dry Creek is classified as 2B, 3E, 4, and Utah Lake is classified as 2B, 3B, 3D, 4 according to *Utah Administrative Code (UAC) R317-2-13.*

Dry Creek
Class 2B -Protected for secondary contact recreation such as boating, wading, or similar uses.
Class 3E -Severely habitat-limited waters. Narrative standards will be applied to protect these waters for aquatic wildlife.
Class 4 -Protected for agricultural uses including irrigation of crops and stock watering.

Utah Lake
Class 3B - Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.

Class 3D - Protected for waterfowl, shore birds and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain.

EPA Region VIII completed the Triennial Review (Review) on January 6, 2004. The Review reassessed the stream classification on Dry Creek and determined the class to be 3E replacing the original classification of 2B, 3C and 4. Class 3E is defined as severely habitat-limited waters.

BASIS FOR EFFLUENT LIMITATIONS
Limitations on total suspended solids (TSS), biochemical oxygen demand (BOD_5), E-Coli coliform, pH and percent removal for BOD_5 and TSS are based on current Utah Secondary Treatment Standards, *UAC R317-1-3.2*. The dissolved oxygen (DO), ammonia, and total residual chlorine (TRC) are based on the attached wasteload analysis. The oil and grease is based on best professional judgment (BPJ). The permit limitations are:

Parameter	Effluent Limitations			
	Maximum Monthly Average	Maximum Weekly Average	Daily Minimum	Daily Maximum
Total Flow, MGD	5	-	-	10
BOD_5, mg/L BOD_5 Min. % Removal	25 85	35 -	- -	- -
TSS, mg/L TSS Min. % Removal	25 85	35 -	- -	- -
Dissolved Oxygen, mg/l	-	-	4.0	-
Ammonia, mg/l July – September October – December January – March April – June	 7 *j 9 *j 9 *j 9 *j	 - - - -	 - - - -	 18 18 18 18
E. Coli, no./100mL	126	158	-	-
TRC, mg/L	-	-	-	2.0
Oil & Grease, mg/L	-	-	-	10
pH, Standard Units	-	-	6.5	9.0

SELF-MONITORING AND REPORTING REQUIREMENTS

The following self-monitoring frequency requirements have increased since the previous permit. The permit will require reports to be submitted monthly and quarterly, as applicable, on Discharge Monitoring Report (DMR) forms due 28 days after the end of the monitoring period. Lab sheets for biomonitoring must be attached to the biomonitoring DMR.

Self-Monitoring and Reporting Requirements *a			
Parameter	Frequency	Sample Type	Units
Total Flow *b, *c	Continuous/	Recorder	MGD
BOD_5, Influent *d Effluent	2 x Weekly 2 x Weekly	Composite Composite	mg/L mg/L
TSS, Influent *d Effluent	2 x Weekly 2 x Weekly	Composite Composite	mg/L mg/L
E. Coli	2 x Weekly	Grab	No./100mL
pH	2 x Weekly	Grab	SU
Ammonia	2 x Weekly	Grab	mg/L
DO	2 x Weekly	Grab	mg/L
WET – Biomonitoring *h Ceriodaphnia - Chronic Fathead Minnows - Chronic	Quarterly Variable Species	Composite Composite	Pass/Fail Pass/Fail
TRC, mg/L, *e,	Daily	Grab	mg/L
Oil & Grease *f	Monthly	Grab	mg/L
Total Ammonia, (as N) *k	Monthly	Composite	mg/L
Orthophosphate, (as P) *k Effluent	Monthly	Composite	mg/L
Phosphorus, Total *k Influent Effluent	Monthly Monthly	Composite Composite	mg/L mg/L
Total Kjeldahl Nitrogen, (TKN as N) *k Influent Effluent	Monthly Monthly	Composite Composite	mg/L mg/L
Nitrate, NO3 *k	Monthly	Composite	mg/L
Nitrite, NO2 *k	Monthly	Composite	mg/L
Metals, Influent *i Effluent	Quarterly Quarterly	Composite Composite	mg/L mg/L
Organic Toxics *i	Yearly	Grab	mg/L

*a See Definitions, *Part VIII*, for definition of terms.

*b Flow measurements of influent/effluent volume shall be made in such a manner that the permittee can affirmatively demonstrate that representative values are being obtained.

*c If the rate of discharge is controlled, the rate and duration of discharge shall be reported.

*d In addition to monitoring the final discharge, influent samples shall be taken and analyzed for this constituent at the same frequency as required for this constituent in the discharge.

*e Analytical results less than 0.06 mg/l will not be considered out of compliance with the permit. For purposes of calculating averages and reporting on the Discharge Monitoring Report form, the following will apply:

1) analytical values less than 0.02 mg/L shall be considered zero; and
2) analytical values less than 0.06 mg/L and equal to or greater than 0.02 mg/L will be recorded as measured.

*f Oil & Grease sampled when sheen is present or visible. If no sheen is present or visible, report NA.

*h Spanish Fork will monitor for Chronic WET with an $IC_{25} > 82$ %, but will not have a limit associated with it in the permit. Spanish Fork will also have the option to choose which species it wishes to test each quarter. If the species is not tested in a quarter it is reported as NA.

*i See table in *Part II.H.1* (Influent and Effluent Monitoring and Reporting Requirements) of the Permit for target minimum detection limits (MDL) requirements. The Organic Toxics report is due the same day as the Pretreatment Report (Part II,C, of the permit).

*j The monthly average effluent limit for this parameter will not become effective until December 31, 2023.

*k These reflect monitoring changes required with the adoption of UCA R317-1-3.3, Technology-based Phosphorus Effluent Limits rule.

Reasonable Potential Analysis

Water Quality has worked to improve our reasonable potential analysis (RP) for the inclusion of limits for parameters in the permit by using an EPA provided model. As a result of the model, more parameters may be included in a renewal permit. An initial check for metals showed that the full model needed to be run on Cyanide, Cadmium, Copper, Selenium, and Mercury for this facility.

The results of the RP Model indicate that Cadmium, Copper, Selenium, and Mercury do not present a reasonable potential for inclusion of limits in this renewal permit. The data does indicate that there are issues with consistent and/or sensitive enough reporting limits for the metals. Spanish Fork will need to work to comply with the sampling requirements in the permit under PART II.H..

Cyanide does require further RP investigation by DWQ. The results for the Cyanide analysis were frequently reported as non-detect and those detection levels varied over the five year period evaluated. Improving the consistency of the analytical detection level for Cyanide could reduce the RP for Cyanide and eliminate the need for a permit limit.

To address the issues above, Water Quality requests that the facility has the samples analyzed in a way to ensure that the laboratory is attaining the lowest method detection level as consistently as possible. Currently the values for some parameters listed in Part II.H of the permit are below current MDL's, and there is no evidence that the levels are impairing downstream water quality. In these cases, the parameters will not be added to the permit as limits, but will remain as parameters requiring monitoring.

BIOMONITORING REQUIREMENTS

A nationwide effort to control toxic discharges where effluent toxicity is an existing or potential concern is regulated in accordance with the *State of Utah Permitting and Enforcement Guidance Document for Whole Effluent Toxicity Control (biomonitoring)*. Authority to require effluent biomonitoring is provided in *Permit Conditions, UAC R317-8-4.2, Permit Provisions, UAC R317-8-5.3* and *Water Quality Standards, UAC R317-2-5* and *R317 -2-7.2*.

The receiving water low flow dilution is less than 20 to one and this facility has passed acute toxicity testing over the last ten years. Since we know acute toxicity is not present, based on past acute testing results, and the dilution is less than twenty to one chronic toxicity testing will be required and acute testing will be dropped from the renewal permit. Chronic toxicity will be required quarterly with alternation of species [1]. The standard chronic toxicity language will be incorporated into the permit, along with appropriate reopener language.

The WLA did indicate possible seasonal IC_{25} % WET Limits. These are indicated in the table below. No limit is being included in the permit but the Chronic WET IC_{25} monitoring value is the worst case scenario ($IC_{25} > 82$ %), and is more conservative than seasonal limits would be. In the event of a chronic test failure in any season other than summer, the seasonal values from this WLA will be used for evaluating the results of the test.

Seasonal Chronic WET Limits as Taken From Table 2 in The WLA	
Season	Chronic WET IC25 % Eff.
Summer	>82
Fall	>40
Winter	>43
Spring	>43

TOTAL MAXIMUM DAILY LOAD REQUIREMENTS

Spanish Fork discharges wastewater into Utah Lake, which has been identified as impaired for total dissolved solids (TDS) and total phosphorus (TP) based on the 1998, 303(d) assessment process as defined in the Clean Water Act. As required under federal regulation a total maximum daily load (TMDL) will be developed for all impaired waters. The TMDL will focus on developing limitations for those parameters of concern (POC) that were identified during the 305(b) and 303(d) assessment process. POC's are parameters that are in violation of water quality standards or that contribute to impairment of a beneficial use (a major component of the water quality standards).

Currently, a TMDL evaluation is underway for the Utah Lake. If the results of the TMDL process establish effluent limits for any of the POC's, then it is required by 40 CFR Part 130 to include the effluent limits in the UPDES permit. Therefore, it is strongly recommended that the facility staff participate in the TMDL development process. The staff at the Division of Water Quality will be responsible for scheduling and notifying appropriate facility personnel regarding TMDL meetings. Please contact your UPDES permit writer for information on scheduled TMDL meetings.

PRETREATMENT REQUIREMENTS

The pretreatment requirements remain the same as in the current permit with the permittee administering an approved pretreatment program. Any substantial changes to the program must be submitted for approval to the Division of Water Quality. Authority to require a pretreatment program is provided for in *19-5-108 UCA, 1953 ann.* and *UAC R317-8-8.*

The permittee will be required to perform an annual evaluation of the need to revise or develop technically based local limits to implement the general and specific prohibitions of *40 CFR, Part 403.5(a)* and *Part 403.5(b)*. This evaluation may indicate that present local limits are sufficiently protective, or that they must be revised. As part of this evaluation, the permit requires quarterly influent and effluent monitoring for metals and yearly organic toxics listed in *R317-8-7.5* and sludge monitoring for potential pollutants listed in *40 CFR 503.*

[1] Composite sample volumes are collected and sent off to the lab on Monday, Wednesday and Friday

Per the requirements of the Pretreatment Audit on October 16, 2012, Spanish Fork will have 6 months following the issuance of the UPDES permit to submit draft local limits. The draft local limits must include technical based local limits with the calculations of how the local limits were derived and the summary of how the local limits were developed.

BIOSOLIDS

For clarification purposes, sewage sludge is considered solids, until treatment or testing shows that the solids are safe, and meet beneficial use standards. After the solids are tested or treated, the solids are then known as biosolids. Class A biosolids, may be used for high public contact sites, such as home lawns and gardens, parks, or playing fields, etc. Class B biosolids may be used for low public contact sites, such as farms, rangeland, or reclamation sites, etc.

SUBSTANTIAL BIOSOLIDS TREATMENT CHANGES

Spanish Fork has completed the addition of new 50 foot digesters with mixers. This will improve the biosolids quality.

DESCRIPTION OF TREATMENT AND DISPOSAL

Biosolids at Spanish Fork are stabilized in three anaerobic digesters to meet Class B standards and dewatered with a belt press, up to twenty percent solids. Spanish Fork has beneficially used all of their biosolids during the last five years for crop production, or pasture land for grazing and plans to do the same for the life of this permit. The only thing that may change is where the biosolids are land applied for crop production and grazing.

The Permittee submitted their 2014 annual biosolids report on February 10, 2015. The report states the Permittee produced 719 dry metric tons (DMT) of solids. Of which 290 DMT were land applied for crop production and pasture grazing. The remaining 429 DMT was transferred to Southern Utah Solid Waste District (Permit #ULT-025585, Bayview Landfill) for composting by that facility.

The solids are stabilized through anaerobic digesters that have a minimum retention time of 15 days at 95° F (35° C) or 60 days at 68° F (20°C). This process stabilizes the solids through a minimum 38% reduction in volatile solids. After stabilization, the solids are dewatered by belt presses to about 15 percent solids.

The last inspection conducted at the facility was September 30, 2015. The inspection showed that Spanish Fork was in compliance with all aspects of the biosolids management program.

SELF-MONITORING REQUIREMENTS

Under *40 CFR 503.16(a)(1),* the self-monitoring requirements are based upon the amount of biosolids disposed per year and shall be monitored according to the chart below.

Minimum Frequency of Monitoring [40 CFR 503.16(1)(a).]		
Amount of Biosolids Disposed Per Year		Monitoring Frequency
Dry US Tons	Dry Metric Tons	Per Year or Batch
> 0 to < 320	> 0 to < 290	Once Per Year or Batch
> 320 to < 1650	> 290 to < 1,500	Once a Quarter or Four Times
> 1,650 to < 16,500	> 1,500 to < 15,000	Bi-Monthly or Six Times
> 16,500	> 15,000	Monthly or Twelve Times

In 2014, Spanish fork disposed of 719 DMT of biosolids, therefore they need to sample at least four times a year.

Landfill Monitoring

Under *40 CFR 258,* the landfill monitoring requirements include a paint filter test. If the biosolids do not pass a paint filter test, the biosolids cannot be disposed in the sanitary landfill *(40 CFR 258.28(c)(1).* No biosolids were landfilled in 2014, They were transferred for composting at a landfill facility who then distributed the biosolids to cities and public. Therefore a paint filter test was not required.

BIOSOLIDS LIMITATIONS

Heavy Metals

Class A Biosolids for Home Lawn and Garden Use
The intent of the heavy metals regulations of Table 3, *40 CFR 503.13* is to ensure the heavy metals do not build up in the soil in home lawn and gardens to the point where the heavy metals become phytotoxic to plants. The permittee will be required to produce an information sheet (see *Part III. C.* of the permit) to made available to all people who are receiving and land applying Class A biosolids to their lawns and gardens. If the instructions of the information sheet are followed to any reasonable degree, the Class A biosolids will be able to be land applied year after year, to the same lawns and garden plots without any deleterious effects to the environment. The information sheet must be provided to the public, because the permittee is not required, nor able to track the quantity of Class A biosolids that are land applied to home lawns and gardens.

Class A Requirements With Regards to Heavy Metals
If the biosolids are to be applied to a lawn or home garden, the biosolids shall not exceed the maximum heavy metals in Table 1 and the monthly average pollutant concentrations in Table 3 (see Table 1 and Table 3 below). If the biosolids do not meet these requirements, the biosolids cannot be sold or given away for applications to home lawns and gardens.

Class B Requirements for Agriculture and Reclamation Sites
The intent of the heavy metals regulations of Tables 1, 2 and 3, of *40 CFR 503.13* is to ensure that heavy metals do not build up in the soil at farms, forest land, and land reclamation sites to the point where the heavy metals become phytotoxic to plants. The permittee will be required to produce an information sheet (see *Part III. C.* of the permit) to be handed out to all people who are receiving and land applying Class B biosolids to farms, ranches, and land reclamation sites (if biosolids are only applied to land owned by the permittee, the information sheet requirements are waived). If the biosolids are land applied according to the regulations of *40 CFR 503.13*, to any reasonable degree, the Class B biosolids will be able to be land applied year after year, to the same farms, ranches, and land reclamation sites without any deleterious effects to the environment.

Class B Requirements With Regards to Heavy Metals
If the biosolids are to be land applied to agricultural land, forest land, a public contact site or a reclamation site it must meet at all times:

> The maximum heavy metals listed in Table 1 and the heavy metals loading rates in Table 2; or
>
> The maximum heavy metals in Table 1 and the monthly heavy metals concentrations in Table 3.

Tables 1, 2, and 3 of Heavy Metal Limitations

Pollutant Limits, (40 CFR Part 503.13(b)) Dry Weight Basis				
Heavy Metals	Table 1	Table 2	Table 3	Table 4
	Ceiling Conc. Limits, (mg/kg)	CPLR[2], (mg/ha)	Pollutant Conc. Limits, (mg/kg)	APLR[3], (mg/ha-yr)
Total Arsenic	75	41	41	41
Total Cadmium	85	39	39	39
Total Copper	4300	1500	1500	1500
Total Lead	840	300	300	300
Total Mercury	57	17	17	17
Total Molybdenum	75	N/A	N/A	N/A
Total Nickel	420	420	420	420
Total Selenium	100	100	100	100
Total Zinc	7500	2800	2800	2800

Any violation of these limitations shall be reported in accordance with the requirements of *Part III.F.1.* of the permit. If the biosolids do not meet these requirements they cannot be land applied.

Pathogens

A Pathogen Control class method listed in the table below must be met;

Pathogen Control Class	
Class A	Class B
B Salmonella species –less than three (3) MPN[4] per four (4) grams total solids (or less than 1,000 fecal coliforms per gram total solids)	Fecal Coliforms –less than 2,000,000 colony forming units (CFU) per gram total solids
Enteric viruses –less than one (1) MPN (or plaque forming unit) per four (4) grams total solids	
Viable helminth ova –less than one (1) MPN per four (4) grams total solids	

Class A Requirements for Home Lawn and Garden Use

If biosolids are land applied to home lawns and gardens, the biosolids need to be treated by a specific process to further reduce pathogens (PFRP), and meet a microbiological limit of less than less than 3 most probable number (MPN) of *Salmonella* per 4 grams of total solids (or less than 1,000 most probable number (MPN/g) of fecal coliform per gram of total solids) to be considered Class A biosolids. Spanish Fork transfers the biosolids to the Southern Utah Solid Waste District (Permit #ULT-025585) for further processing to Class A through composting prior to distribution to the public.

---

[2] CPLR -- Cumulative Pollutant Loading Rate
[3] APLR – Annual Pollutant Loading Rate
[4] MPN –Most Probable Number

The practice of sale or giveaway to the public is an acceptable use of biosolids of this quality as long as the biosolids continue to meet Class A standards with respect to pathogens. If the biosolids do not meet Class A pathogen standards the biosolids cannot be sold or given away to the public, and the permittee will need find another method of beneficial use or disposal.

Pathogens Class B

If biosolids are to be land applied for agriculture or land reclamation the solids need to be treated by a specific process to significantly reduce pathogens (PSRP). The PSRP for Spanish Fork will be accomplished through Anaerobic Digesters:

1. Under *40 CFR 503.32 (b)(3)Appendix (B)(3),* The PSRP may be accomplished through anaerobic digesters that have a minimum retention time of 15 days at 95° F (35° C) or 60 days at 68° F (20°C).

Vector Attraction Reduction (VAR)

If the biosolids are land applied Spanish Fork will be required to meet VAR through the use of a method of listed under *40 CFR 503.33.* Spanish Fork intends to meet the vector attraction reduction requirements through one of the methods listed below.

1. Under *40 CFR 503.33(b)(1),* the solids need to be treated through anaerobic digestion for at least 15 days at a temperature of a least 35° C (95° F) with a 38% reduction of volatile solids.

2. Spanish Fork transfers solids to another facility (Southern Utah Solid Waste District) where they are stabilized through composting to Class A, and distributed to the public and cities.

If the biosolids do not meet a method of VAR, the biosolids cannot be land applied.

If the permittee intends to use another one of the listed alternatives in *40 CFR 503.33*, the Director and the EPA must be informed at least thirty (30) days prior to its use. This change may be made without additional public notice

Landfill Monitoring

Under *40 CFR 258,* the landfill monitoring requirements include a paint filter test to determine if the biosolids exhibit free liquid. If the biosolids do not pass a paint filter test, the biosolids cannot be disposed in the sanitary landfill *(40 CFR 258.28(c)(1).*

Record Keeping

The record keeping requirements from *40 CFR 503.17* are included under *Part III.G.* of the permit. The amount of time the records must be maintained are dependent on the quality of the biosolids in regards to the metals concentrations. If the biosolids continue to meet the metals limits of *Table 3* of *40 CFR 503.13*, and are sold or given away the records must be retained for a minimum of five years. If the biosolids are disposed in a landfill the records must retained for a minimum of five years.

Reporting

Spanish Fork must report annually as required in *40 CFR 503.18*. This report is to include the results of all monitoring performed in accordance with *Part II.C* of the permit, information on management practices, biosolids treatment, and certifications. This report is due no later than February 19 of each year. Each report is for the previous calendar year.

MONITORING DATA

METALS MONITORING DATA

Spanish Fork was required to sample for metals at least four times in 2014. Spanish Fork sampled the Class B biosolids four times. All biosolids land applied in 2014 met *Table 3* of *40 CFR 503.13,* therefore Spanish Fork biosolids qualify as EQ with regards to metals. The monitoring data is below.

Spanish Fork Metals Monitoring Data 2014

PERMITTEE Metals Monitoring Data, 2014 (Land Application)			
Parameter	Table 3, mg/kg (Exceptional Quality)	Average, mg/kg	Maximum, mg/kg
Arsenic	41.0	9.44	13.1
Cadmium	39.0	1.2	21.4
Copper	1,500.0	400.75	435
Lead	300.0	19	23.7
Mercury	17.0	1.35	1.65
Molybdenum	75.0	18.25	21.5
Nickel	400.0	18.18	21.5
Selenium	36.0	15.63	1020
Zinc	2,800.0	854	

PATHOGEN MONITORING DATA (Anaerobic Cake)

The **Permittee** was not required to monitor the anaerobic biosolids (sludge cake) for pathogens. Therefore, there is not any monitoring data for the Class B biosolids. All biosolids land applied in 2014 met the Class B pathogen standards through anaerobic digestion.

STORM WATER

STORMWATER REQUIREMENTS

Storm water provisions are included in this combined UPDES permit.

The storm water requirements are based on the UPDES Multi-Sector General Permit for Storm Water Discharges for Industrial Activity, General Permit No. UTR000000 (MSGP). All sections of the MSGP that pertain to discharges from wastewater treatment plants have been included and sections which are redundant or do not pertain have been deleted.

The permit requires the preparation and implementation of a storm water pollution prevention plan for all areas within the confines of the plant. Elements of this plan are required to include:

1. The development of a pollution prevention team:
2. Development of drainage maps and materials stockpiles:
3. An inventory of exposed materials:
4. Spill reporting and response procedures:
5. A preventative maintenance program:
6. Employee training:
7. Certification that storm water discharges are not mixed with non-storm water discharges:
8. Compliance site evaluations and potential pollutant source identification, and:
9. Visual examinations of storm water discharges.

Spanish Fork is currently covered under the UPDES Multi Sector General Permit for Industrial Activities.

PERMIT DURATION

It is recommended that this permit be effective for a duration no greater than five (5) years.

Drafted by
Dan Griffin P.E., Discharge
Dan Griffin P.E., Biosolids
Mike George, Storm Water
Jennifer Robinson, Pretreatment
Utah Division of Water Quality
Utah Division of Water Quality, (801) 536-4300

PUBLIC NOTICE

Began: March 8, 2016
Ended: May 4, 2016

Comments will be received at: 195 North 1950 West
PO Box 144870
Salt Lake City, UT 84114-4870

The Public Noticed of the draft permit was published in The Daily Herald.

During the public comment period provided under R317-8-6.5, any interested person may submit written comments on the draft permit and may request a public hearing, if no hearing has already been scheduled. A request for a public hearing shall be in writing and shall state the nature of the issues proposed to be raised in the hearing. All comments will be considered in making the final decision and shall be answered as provided in R317-8-6.12.

ADDENDUM TO FSSOB

Questions regarding the compliance schedule were raised during the comment period along with a request to extend the public notice period to answer those questions. As a result, the public notice period was extended to May 4, and the compliance schedule was clarified. The clarification is not considered a Major change; as a result, the permit does not require another public notice. During finalization of the Permit certain dates, spelling edits and minor language corrections were completed. Due to the nature of these changes they were not considered Major and the permit is not required to be re-Public Noticed.

ATTACHMENT 1

Waste-Load Parameters for Wastewater Discharge Permit

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Spanish Fork City

Waste-Load Parameters for Wastewater Discharge Permit

February 2014

AQUA ENGINEERING

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www.aquaeng.com

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Introduction

This report is intended to address several different parameters used to determine the waste load allocation for the Spanish Fork City Wastewater Treatment Facility. There are two constituents that are changing substantially from the previous permit. The constituents that are changing are Total Residual Chlorine (TRC) and Ammonia.

Several discharge permit cycles ago some of this information was gathered on the receiving water Dry Creek, and at that time the data was used to determine the waste load allocation for the discharge permit. However, the data was given to DWA and it appears that most of that information is no longer available. A new model is being used to establish the waste load allocation and it is important to use the best data possible to calibrate the model.

This report will provide the information gathered by the City which should be used in the waste load allocation for the Spanish Fork Discharge Permit. TRC and ammonia are the primary parameters of concern because they are being proposed to change in the new discharge permit. The City staff was used to sample Dry Creek and the sampling data was used to determine decay rates for each of the two parameters.

Total Residual Chlorine

The Total Residual Chlorine (TRC) permit requirement is recommended to be substantially lowered. The City staff collected TRC concentrations on several locations of Dry Creek as shown in Figure 1. The TRC was measured on several days in June 2013. The purpose of the sampling was to determine the first order decay rate for chlorine in Dry Creek. The travel times were based on the model developed for the waste load allocation. The sampling data is along with the first order decay rate is contained in Appendix A. A summary of the decay rates are shown in Table 1.

The water temperatures were not recorded as part of the sampling effort for TRC. The temperature used to normalize the decay rate to 20 deg C was based on the average value of the river temperature (16.9 deg C) taken during Ammonia sampling on four days between June 5th, 2013 and June 11th, 2013.

Table 1

Date	Decay Rate (1/day)	Decay Rate @20 deg C (1/day)
6/4/2013	19.43	24.00
6/6/2013	17.27	21.34
6/7/2013	25.01	30.90
6/8/2013	17.24	21.30
6/11/2013	32.47	40.11
6/12/2013	32.21	39.79
Min	17.24	21.30
Max	32.47	40.11
Average	24.17	29.86
20th Percentile	17.27	21.34

Decay rate was normalized to 20 degrees C using the modified van't Hoff Arrhenius equation as follows;

$K_2=K_1 * \Theta^{(T_2-T_1)}$ **Equation 1**

Where;
K_2: Normalized Decay Rate at 20 deg C
K_1:Decay Rate at River Temp
Θ: Temperature Coefficient (1.07)
(Typical value range from 1.02 to 1.10)
T_2: Temperature (20 deg C)
T_1: Temperature (Measured)

The Temperature Coefficient used by Qual2Kw appears to be 1.07 and that is what was used to adjust the decay rate to a normalized 20 deg C rate. However, the literature values range from 1.02 to 1.10.

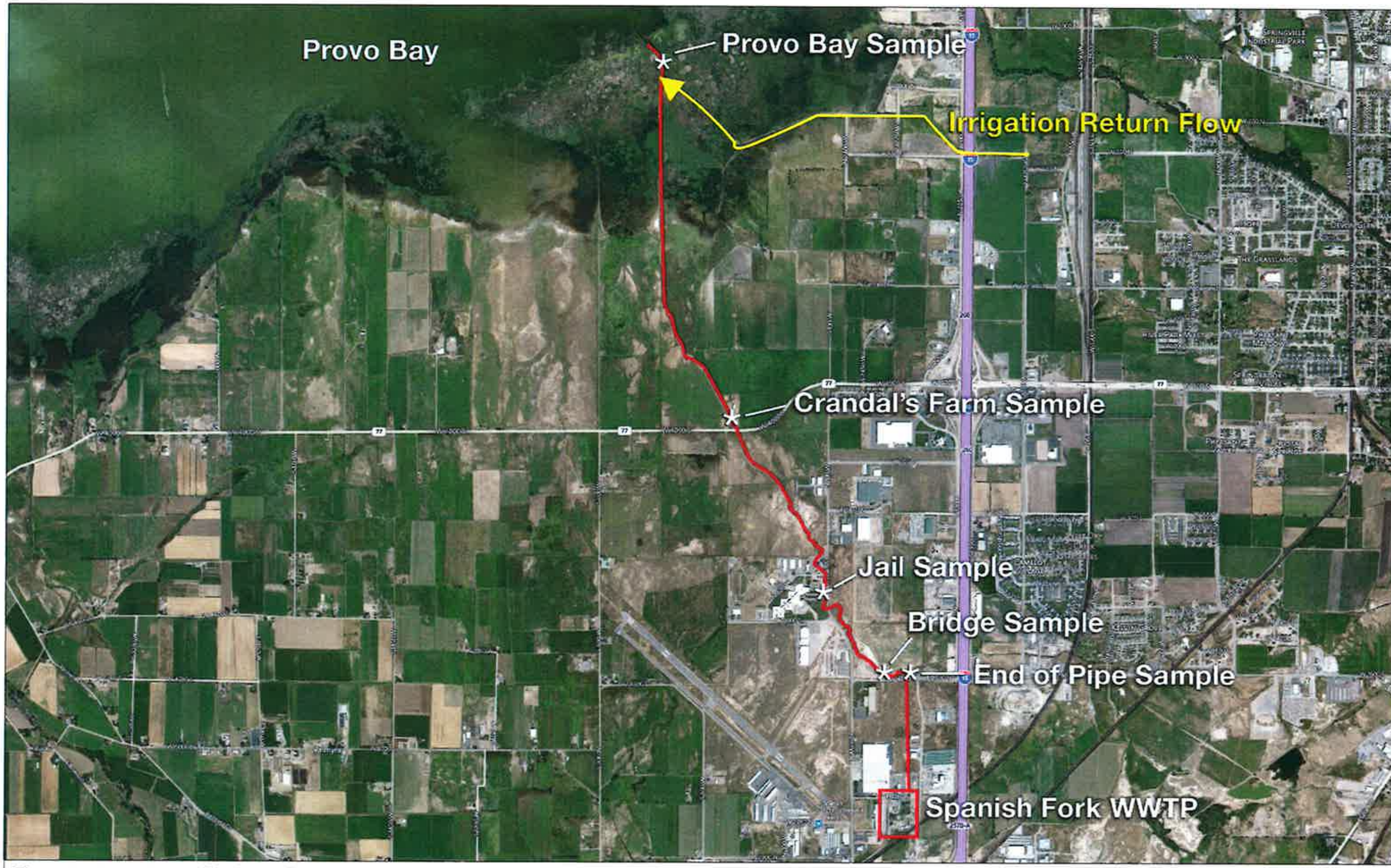


Figure 1 - Spanish Fork Discharge Dry Creek Sample Locations

The normalized decay rates vary depending on the temperature coefficient used in the equation. The lowest (ϴ value of 1.02) average decay rate based on the TRC measurement would be25.71/day. The highest (ϴ value of 1.10) average decay rate would be 32.55/day. The TRC concentration at the Provo Bay Sample site never had a concentration that could be measured. The Crandal's Farm Sample site only had a single sample that was above detectable capability of the TRC sampling equipment.

Based on the travel time assumptions the normalized decay rate varied from 21.30/day to 40.11/day. The average was 29.86/day and the 20th percentile was 21.34/day. It would be best to run the model using both the average decay rate and the 20th percentile to see what each one would do to the discharge permit.

Flow

One of the major components of the model is the flow. The summer flow is substantially lower because most of the flow is diverted upstream from the discharge of the treatment facility. However, a portion of the diverted flow returns to the creek prior to entering Provo Bay. The location of the drainage ditch is shown in Figure 1. This flow should be included in the model. The City estimated the flow to be about 1 MGD.

Ammonia

The water quality standard for ammonia is determined by water temperature, and pH. In addition to the sampling done to verify the decay rate used for ammonia the pH and water temperature were gathered to better determine the water quality limit on ammonia. Dry Creek should not have an ammonia standard because of the classification of 3E. The ammonia standard is critical as Dry Creek reaches Provo Bay because this is the concentration that will determine the permit limits for the wastewater facility.

The City staff sampled ammonia at several locations along Dry Creek as shown in Figure 1. A summary of the data is contained in Appendix B-Ammonia Decay Rates. The data is summarized and a first order decay rate is calculated for each day of sampling. The lab data from the sampling is shown in Appendix C- Ammonia Sampling.

The normalized decay rates vary depending on the temperature coefficient used in the equation. The lowest (ϴ value of 1.02) average decay rate based on the ammonia measurement was 3.72/day and the highest (ϴ value of 1.10) average decay rate was 4.59/day.

Normalized decay rate was calculated using the modified van't Hoff Arrhenius equation explained in Equation 1 using the measured river temperature at the time of ammonia sampling. The normalized decay rates varied from 1.73/day to 6.112/day. The average decay rate was 4.20/day with a 20th percentile of 2.16/day as shown in Table 2. It would be best to run the model using both the average and the 20th percentile to see how the difference would change the discharge permit limit.

Table 2

Date	temp (deg C)	Decay Rate (1/day)	Normalized Decay Rate @20 C (1/day)
6/5/2013	16	2.95	3.87
6/6/2013	15.5	1.28	1.73
6/10/2013	20	5.64	5.64
6/11/2013	16	4.66	6.11
Min		1.28	1.73
Max		5.64	6.11
Average		3.57	4.20
20th Percentile		1.61	2.16

Historical temperature and pH information was evaluated from the sample sites shown in Figure 2. Storet stations 4995970 and 4996000 were both in similar locations on Dry Creek. The data was combined in the two stations to evaluate both Temperature and pH.

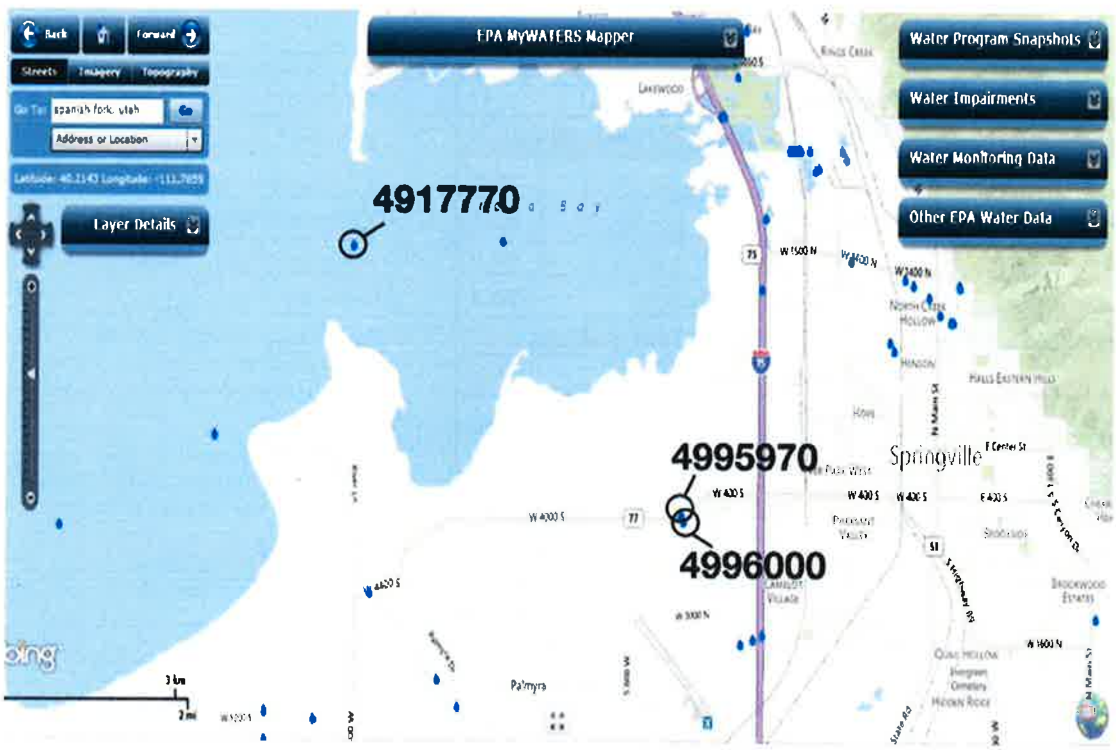


Figure 2

Table 3 is a summary of the data sampled at the Storet sites on Dry Creek. The data was sorted seasonally to reflect the breakdown in the model.

Table 3

Dry Creek pH Summary				
Winter pH			Summer pH	
Min	7.2		Min	6.8
Max	8.6		Max	8.5
Average	8.0		Average	7.8
80th Percentile	8.2		80th Percentile	8.1
Spring pH			Fall pH	
Min	6.7		Min	6.5
Max	8.7		Max	8.3
Average	7.8		Average	7.9
80th Percentile	8.3		80th Percentile	8.1

The temperature summary is shown in Table 4.

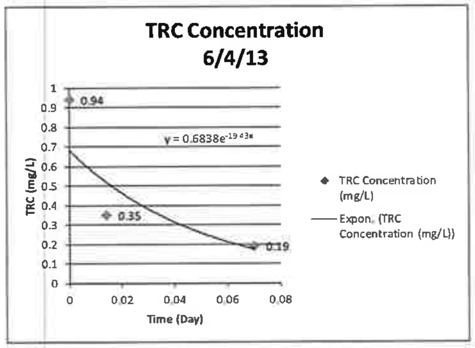
Table 4

Dry Creek Temperature Summary				
Winter Temperature			Summer Temperature	
Min	3.6		Min	15.6
Max	11.1		Max	22.7
Average	7.2		Average	18.9
80th Percentile	8.3		80th Percentile	20.2
Spring Temperature			Fall Temperature	
Min	7.9		Min	8.3
Max	21.1		Max	15.0
Average	13.5		Average	11.1
80th Percentile	16.8		80th Percentile	12.3

Appendix A – TRC Sampling

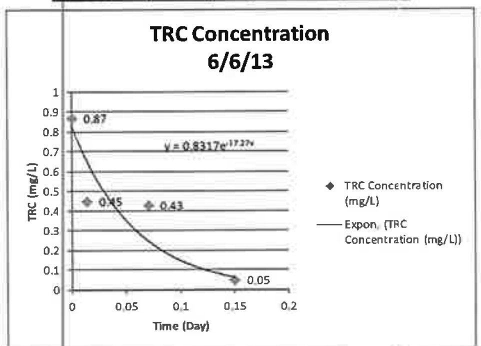
6/4/2013 10:05

Location Description	Location Station	Travel Time (Day)	TRC Concentration (mg/L)	Ph
End of Pipe	5.08	0	0.94	7.7
Bridge	4.88	0.014	0.35	7.9
Jail	4.1	0.07	0.19	7.7
Crandal's Farm	2.7	0.15		
Provo Bay	0.1	0.3		



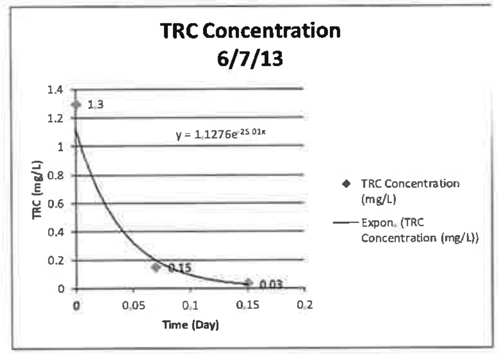
6/6/2013 9:05

Location Description	Location Station	Travel Time (Day)	TRC Concentration (mg/L)	Ph
End of Pipe	5.08	0	0.87	8.05
Bridge	4.88	0.014	0.45	8.12
Jail	4.1	0.07	0.43	8.32
Crandal's Farm	2.7	0.15	0.05	8.11
Provo Bay	0.1	0.3	0	7.97



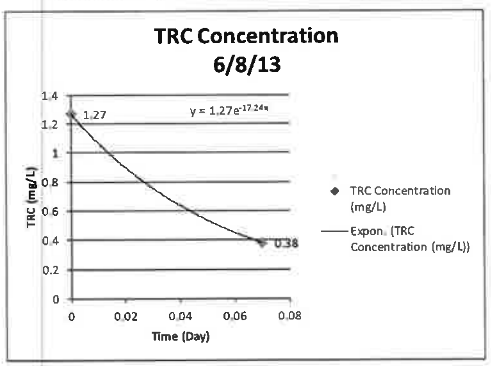
6/7/2013 7:10

Location Description	Location Station	Travel Time (Day)	TRC Concentration (mg/L)	Ph
End of Pipe	5.08	0	1.3	8.05
Jail	4.1	0.07	0.15	8.32
Crandal's Farm	2.7	0.15	0.03	8.11
Provo Bay	0.1	0.3	0	7.97



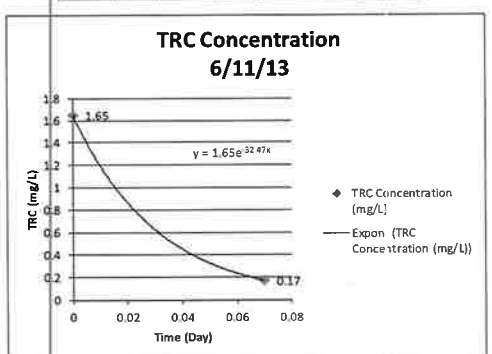
6/8/2013 9:35

Location Description	Location Station	Travel Time (Day)	TRC Concentration (mg/L)	Ph
End of Pipe	5.08	0	1.27	7.72
Jail	4.1	0.07	0.38	7.93
Crandal's Farm	2.7	0.15	0	8.07
Provo Bay	0.1	0.3	0	8.03



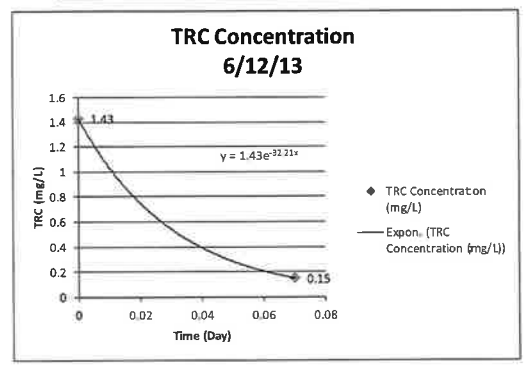
6/11/2013 7:35

Location Description	Location Station	Travel Time (Day)	TRC Concentration (mg/L)	Ph
End of Pipe	5.08	0	1.65	7.94
Jail	4.1	0.07	0.17	7.78
Crandal's Farm	2.7	0.15	0	7.88
Provo Bay	0.1	0.3	0	7.95



6/12/2013 7:20

Location Description	Location Station	Travel Time (Day)	TRC Concentration (mg/L)	Ph
End of Pipe	5.08	0	1.43	7.94
Jail	4.1	0.07	0.15	7.78
Crandal's Farm	2.7	0.15	0	7.88
Provo Bay	0.1	0.3	0	7.95



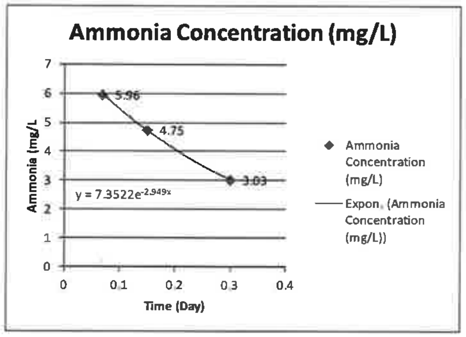
Summary TRC Decay

Date	Measured Decay Rate (1/day)	Decay Rate @20 deg C (1/day)		
		Θ: Temperature Coefficient		
		1.07	1.02	1.1
6/4/2013	19.43	24.00	20.67	26.17
6/6/2013	17.27	21.34	18.37	23.26
6/7/2013	25.01	30.90	26.61	33.69
6/8/2013	17.24	21.30	18.34	23.22
6/11/2013	32.47	40.11	34.54	43.74
6/12/2013	32.21	39.79	34.27	43.39
Min	17.24	21.30	18.34	23.22
Max	32.47	40.11	34.54	43.74
Average	24.17	29.86	25.71	32.55
20th Percentile	17.27	21.34	18.37	23.26

Appendix B-Ammonia Decay Rates

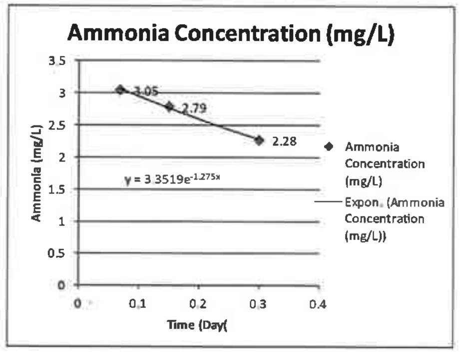
6/5/2013

Location Description	Location Station	Travel Time (Day)	Ammonia Concentration (mg/L)	pH	Temp (°C)
End of Pipe	5.08	0	9.85	8.05	16
Jail	4.1	0.07	5.96	8.32	16
Crandal's Farm	2.7	0.15	4.75	8.11	16
Provo Bay	0.1	0.3	3.03	7.79	16



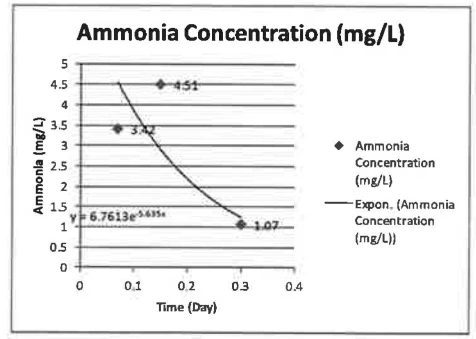
6/6/2013

Location Description	Location Station	Travel Time (Day)	Ammonia Concentration (mg/L)	pH	Temp (°C)
End of Pipe	5.08	0	10.1	7.59	16
Jail	4.1	0.07	3.05	7.95	15
Crandal's Farm	2.7	0.15	2.79	7.98	14
Provo Bay	0.1	0.3	2.28	7.97	16



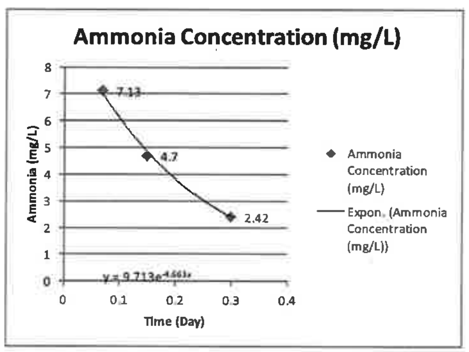
6/10/2013

Location Description	Location Station	Travel Time (Day)	Ammonia Concentration (mg/L)	pH	Temp (°C)
End of Pipe	5.08	0	9.95	7.94	20
Jail	4.1	0.07	3.42	7.78	20
Crandal's Farm	2.7	0.15	4.51	7.88	20
Provo Bay	0.1	0.3	1.07	7.95	20



6/11/2013

Location Description	Location Station	Travel Time (Day)	Ammonia Concentration (mg/L)	pH	Temp (°C)
End of Pipe	5.08	0	10.8	7.67	16
Jail	4.1	0.07	7.13	7.89	16
Crandal's Farm	2.7	0.15	4.7	7.84	16
Provo Bay	0.1	0.3	2.42	7.9	16



Summary Ammonia Decay

Date	temp (deg C)	Measured Decay Rate (1/day)	Decay Rate @20 C (1/day)		
			Θ=1.07	Θ=1.02	Θ=1.1
6/5/2013	16	2.949	3.866	3.192	4.318
6/6/2013	15.5	1.275	1.729	1.394	1.958
6/10/2013	20	5.635	5.635	5.635	5.635
6/11/2013	16	4.663	6.112	5.047	6.827
Min		1.275	1.729	1.39	1.96
Max		5.635	6.112	5.64	6.83
Average		3.572	4.197	3.72	4.59
20th Percentile		1.610	2.156	1.75	2.43

Appendix C- Ammonia Sampling

Timpview Analytical Laboratories

1165 North 1600 West, Orem, Utah, 84057 (801) 229-2282

Certificate of Analysis

Spanish Fork City (WW)
Dennis Sorensen
40 South Main
Sp. Fork, UT 84660
Fax: 801-804-4521
DW System # :

Work Order #: 56704
PO# / Project Name:
Date / Time Received: 6/6/13 13:13
Batch Temp °C: 6.8 Rec'd on Ice
Date Reported: 6/7/13

Sample Name: #1 End of Pipe
Collected: 6/5/13 9:45 **Matrix:** Wastewater **Collected By:**

Parameter	Lab ID #	Method	Analysis Date / Time	Result	Units	MRL	Flags
Ammonia (NH3-N), Direct ISE	F306-252A	4500(NH3)D	6/7/13 12:00	9.85	mg/L	0.5	

Sample Name: #2 Jail
Collected: 6/5/13 9:55 **Matrix:** Wastewater **Collected By:**

Parameter	Lab ID #	Method	Analysis Date / Time	Result	Units	MRL	Flags
Ammonia (NH3-N), Direct ISE	F306-253A	4500(NH3)D	6/7/13 12:00	5.96	mg/L	0.5	

Sample Name: #3 Crandal's Farm
Collected: 6/5/13 10:05 **Matrix:** Wastewater **Collected By:**

Parameter	Lab ID #	Method	Analysis Date / Time	Result	Units	MRL	Flags
Ammonia (NH3-N), Direct ISE	F306-254A	4500(NH3)D	6/7/13 12:00	4.75	mg/L	0.5	

Sample Name: #4 Provo Bay
Collected: 6/5/13 14:00 **Matrix:** Wastewater **Collected By:**

Parameter	Lab ID #	Method	Analysis Date / Time	Result	Units	MRL	Flags
Ammonia (NH3-N), Direct ISE	F306-255A	4500(NH3)D	6/7/13 12:00	3.03	mg/L	0.5	

Comments:

Reviewed by: Ryan Freeman

Ryan Freeman, Technical Director

Flag Legend

P- Sample not properly preserved (preservative added upon receipt) C- Sample not submitted in proper container type B- Batch Blank contains detectable level of analyte D- Batch Duplicate outside QC limits M- Matrix Spike recovery outside QC limits L- Lab Control Standard outside QC limits H- Sample hold time exceeded S- Analysis performed by a certified subcontract laboratory N- Laboratory does not carry NELAP certification for this parameter B2- BOD dilution water blank DO uptake greater than 0.2 Jhi- Estimated Value. Result may be biased slightly high. Spike or Surrogate recovery above QC limits. Jlo- Estimated Value. Result may be biased slightly low. Spike or Surrogate recovery below QC limits. UJ- Spike or Surrogate recovery below QC limits, but no analyte detected. O- BOD oxygen uptake not in ideal range.

Timpview Analytical Laboratories

1165 North 1600 West, Orem, Utah, 84057 (801) 229-2282

Certificate of Analysis

Spanish Fork City (WW)
Dennis Sorensen
40 South Main
Sp. Fork, UT 84660
Fax: 801-804-4521
DW System # :

Work Order #: 56707
PO# / Project Name:
Date / Time Received: 6/6/13 13:13
Batch Temp °C: 6.8 Rec'd on Ice
Date Reported: 6/7/13

Sample Name: #1 End of Pipe
Collected: 6/6/13 7:10 **Matrix:** Wastewater **Collected By:**

Parameter	Lab ID #	Method	Analysis Date / Time	Result	Units	MRL	Flags
Ammonia (NH3-N), Direct ISE	F306-258A	4500(NH3)D	6/7/13 12:00	10.1	mg/L	0.5	

Sample Name: #2 Jail
Collected: 6/6/13 7:30 **Matrix:** Wastewater **Collected By:**

Parameter	Lab ID #	Method	Analysis Date / Time	Result	Units	MRL	Flags
Ammonia (NH3-N), Direct ISE	F306-259A	4500(NH3)D	6/7/13 12:00	3.05	mg/L	0.5	

Sample Name: #3 Crandal's Farm
Collected: 6/6/13 7:45 **Matrix:** Wastewater **Collected By:**

Parameter	Lab ID #	Method	Analysis Date / Time	Result	Units	MRL	Flags
Ammonia (NH3-N), Direct ISE	F306-260A	4500(NH3)D	6/7/13 12:00	2.79	mg/L	0.5	

Sample Name: #4 Provo Bay
Collected: 6/6/13 8:20 **Matrix:** Wastewater **Collected By:**

Parameter	Lab ID #	Method	Analysis Date / Time	Result	Units	MRL	Flags
Ammonia (NH3-N), Direct ISE	F306-261A	4500(NH3)D	6/7/13 12:00	2.28	mg/L	0.5	

Comments:

Reviewed by: Ryan Freeman

Ryan Freeman, Technical Director

Flag Legend

P- Sample not properly preserved (preservative added upon receipt) C- Sample not submitted in proper container type B- Batch Blank contains detectable level of analyte D- Batch Duplicate outside QC limits M- Matrix Spike recovery outside QC limits L- Lab Control Standard outside QC limits H- Sample hold time exceeded S- Analysis performed by a certified subcontract laboratory N- Laboratory does not carry NELAP certification for this parameter B2- BOD dilution water blank DO uptake greater than 0.2 Jhi- Estimated Value. Result may be biased slightly high. Spike or Surrogate recovery above QC limits. Jlo- Estimated Value. Result may be biased slightly low. Spike or Surrogate recovery below QC limits. UJ- Spike or Surrogate recovery below QC limits, but no analyte detected. O- BOD oxygen uptake not in ideal range.

Analyses presented in this report were performed in accordance with the National Environmental Laboratory Accreditation Program

Timpview Analytical Laboratories

1165 North 1600 West, Orem, Utah, 84057 (801) 229-2282

Certificate of Analysis

Spanish Fork City (WW)
Dennis Sorensen
40 South Main
Sp. Fork, UT 84660
Fax: 801-804-4521
DW System # :

Work Order #: 56758
PO# / Project Name:
Date / Time Received: 6/11/13 12:17
Batch Temp °C: 6 Rec'd on Ice
Date Reported: 6/13/13

Sample Name: End of Pipe
Collected: 6/10/13 9:10 **Matrix:** Wastewater **Collected By:**

Parameter	Lab ID #	Method	Analysis Date / Time	Result	Units	MRL	Flags
Ammonia (NH3-N), Direct ISE	F311-401A	4500(NH3)D	6/13/13 10:50	9.95	mg/L	0.5	

Sample Name: Jail
Collected: 6/10/13 9:45 **Matrix:** Wastewater **Collected By:**

Parameter	Lab ID #	Method	Analysis Date / Time	Result	Units	MRL	Flags
Ammonia (NH3-N), Direct ISE	F311-402A	4500(NH3)D	6/13/13 10:50	3.42	mg/L	0.5	

Sample Name: Crandal's Farm
Collected: 6/10/13 9:57 **Matrix:** Wastewater **Collected By:**

Parameter	Lab ID #	Method	Analysis Date / Time	Result	Units	MRL	Flags
Ammonia (NH3-N), Direct ISE	F311-403A	4500(NH3)D	6/13/13 10:50	4.51	mg/L	0.5	

Sample Name: Provo Bay
Collected: 6/10/13 10:20 **Matrix:** Wastewater **Collected By:**

Parameter	Lab ID #	Method	Analysis Date / Time	Result	Units	MRL	Flags
Ammonia (NH3-N), Direct ISE	F311-404A	4500(NH3)D	6/13/13 10:50	1.07	mg/L	0.5	

Comments:

Reviewed by: R Freeman

Ryan Freeman, Technical Director

Flag Legend

P- Sample not properly preserved (preservative added upon receipt) C- Sample not submitted in proper container type B- Batch Blank contains detectable level of analyte D- Batch Duplicate outside QC limits M- Matrix Spike recovery outside QC limits L- Lab Control Standard outside QC limits H- Sample hold time exceeded S- Analysis performed by a certified subcontract laboratory N- Laboratory does not carry NELAP certification for this parameter B2- BOD dilution water blank DO uptake greater than 0.2 Jhi- Estimated Value. Result may be biased slightly high. Spike or Surrogate recovery above QC limits. Jlo- Estimated Value. Result may be biased slightly low. Spike or Surrogate recovery below QC limits. UJ- Spike or Surrogate recovery below QC limits, but no analyte detected. O- BOD oxygen uptake not in ideal range.

Timpview Analytical Laboratories

1165 North 1600 West, Orem, Utah, 84057 (801) 229-2282

Certificate of Analysis

Spanish Fork City (WW)
Dennis Sorensen
40 South Main
Sp. Fork, UT 84660
Fax: 801-804-4521
DW System # :

Work Order #: 56759
PO# / Project Name:
Date / Time Received: 6/11/13 12:17
Batch Temp °C: 6 Rec'd on Ice
Date Reported: 6/14/13

Sample Name: End of Pipe
Collected: 6/11/13 7:35 **Matrix:** Wastewater **Collected By:**

Parameter	Lab ID #	Method	Analysis Date / Time	Result	Units	MRL	Flags
Ammonia (NH3-N), Direct ISE	F311-405A	4500(NH3)D	6/14/13 10:40	10.8	mg/L	0.5	

Sample Name: Jail
Collected: 6/11/13 7:50 **Matrix:** Wastewater **Collected By:**

Parameter	Lab ID #	Method	Analysis Date / Time	Result	Units	MRL	Flags
Ammonia (NH3-N), Direct ISE	F311-406A	4500(NH3)D	6/14/13 10:40	7.13	mg/L	0.5	

Sample Name: Crandal's Farm
Collected: 6/11/13 8:02 **Matrix:** Wastewater **Collected By:**

Parameter	Lab ID #	Method	Analysis Date / Time	Result	Units	MRL	Flags
Ammonia (NH3-N), Direct ISE	F311-407A	4500(NH3)D	6/14/13 10:40	4.70	mg/L	0.5	

Sample Name: Provo Bay
Collected: 6/11/13 8:37 **Matrix:** Wastewater **Collected By:**

Parameter	Lab ID #	Method	Analysis Date / Time	Result	Units	MRL	Flags
Ammonia (NH3-N), Direct ISE	F311-408A	4500(NH3)D	6/14/13 10:40	2.42	mg/L	0.5	

Comments:

Reviewed by: Ryan Freeman, Technical Director

Flag Legend

P- Sample not properly preserved (preservative added upon receipt) C- Sample not submitted in proper container type B- Batch Blank contains detectable level of analyte D- Batch Duplicate outside QC limits M- Matrix Spike recovery outside QC limits L- Lab Control Standard outside QC limits H- Sample hold time exceeded S- Analysis performed by a certified subcontract laboratory N- Laboratory does not carry NELAP certification for this parameter B2- BOD dilution water blank DO uptake greater than 0.2 Jhi- Estimated Value. Result may be biased slightly high. Spike or Surrogate recovery above QC limits. Jlo- Estimated Value. Result may be biased slightly low. Spike or Surrogate recovery below QC limits. UJ- Spike or Surrogate recovery below QC limits, but no analyte detected. O- BOD oxygen uptake not in ideal range.

Analyses presented in this report were performed in accordance with the National Environmental Laboratory Accreditation Program nelap

ATTACHMENT 2

Wasteload Analysis

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Utah Division of Water Quality
Statement of Basis
ADDENDUM
Wasteload Analysis and Antidegradation Level I Review - FINAL

Date:	**April 7, 2014**
Prepared by:	**Nicholas von Stackelberg, P.E.** **Water Quality Management Section**
Facility:	**Spanish Fork Wastewater Treatment Plant** **UPDES No. UT0021741**
Receiving water:	**Dry Creek (2B, 3E, 4)** **Provo Bay/Utah Lake (2B, 3B, 3D, 4)**

This addendum summarizes the wasteload analysis that was performed to determine water quality based effluent limits (WQBEL) for this discharge. Wasteload analyses are performed to determine point source effluent limitations necessary to maintain designated beneficial uses by evaluating projected effects of discharge concentrations on in-stream water quality. The wasteload analysis also takes into account downstream designated uses (UAC R317-2-8). Projected concentrations are compared to numeric water quality standards to determine acceptability. The numeric criteria in this wasteload analysis may be modified by narrative criteria and other conditions determined by staff of the Division of Water Quality.

Discharge
Outfall 001: Dry Creek

The maximum daily design discharge is 10.0 MGD and the maximum monthly design discharge is 5.0 MGD for the facility.

Receiving Water
The receiving water for Outfall 001 is Dry Creek, which is tributary to Utah Lake (Provo Bay).

Per UAC R317-2-13.5.c, the designated beneficial uses for Dry Creek and tributaries from Utah Lake (Provo Bay) to Highway-US are 2B, 3E, and 4.

- *Class 2B - Protected for infrequent primary contact recreation. Also protected for secondary contact recreation where there is a low likelihood of ingestion of water or a low degree of bodily contact with the water. Examples include, but are not limited to, wading, hunting, and fishing.*

- *Class 3E -- Severely habitat-limited waters. Narrative standards will be applied to protect these waters for aquatic wildlife.*

- *Class 4 - Protected for agricultural uses including irrigation of crops and stock watering.*

Since the aquatic life use class for Dry Creek (3E) only has narrative standards, the numeric standards for Utah Lake (Provo Bay) were used to determine the WQBELs for this discharge. Per UAC R317-2-13.12.x, the designated beneficial uses for Utah Lake are 2B, 3B, 3D, and 4.

- *Class 3B -- Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.*

- *Class 3D -- Protected for waterfowl, shore birds and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain.*

Typically, the critical flow for the wasteload analysis is considered the lowest stream flow for seven consecutive days with a ten year return frequency (7Q10). Due to a lack of flow records for Dry Creek, the 20th percentile of flow measurements from water quality monitoring above the facility outfall was calculated to estimate seasonal critical flow in the receiving water (Table 1). The assumed flows for an unnamed irrigation canal that discharges into Dry Creek near the outlet to Provo Bay is also shown in Table 1.

Table 1: Seasonal critical low flow

Season	Dry Creek (cfs)	Irrigation Canal Return Flow (cfs)
Summer	1.7	1.55
Fall	11.4	0
Winter	10.1	0
Spring	10.2	0

TMDL

Dry Creek is not listed as impaired for any parameters according to the 2010 303(d) list. Utah Lake is listed as impaired for Total Phosphorus and Total Dissolved Solids.

Mixing Zone

The discharge is considered instantaneously fully mixed in the summer since the discharge is more than twice the background receiving water flow. For the remainder of the year, the discharge is assumed to be fully mixed in Dry Creek by the time it enters Provo Bay, which is the compliance point for numeric aquatic life criteria.

Parameters of Concern

The potential parameters of concern identified for the discharge/receiving water were total suspended solids (TSS), dissolved oxygen (DO), BOD_5, total phosphorus (TP), total nitrogen (TN), total ammonia (TAM), E. coli, pH, and total residual chlorine (TRC) as determined in consultation with the UPDES Permit Writer.

WET Limits

The percent of effluent in the receiving water in a fully mixed condition, and acute and chronic dilution in a not fully mixed condition are calculated in the WLA in order to generate WET limits. The LC_{50} (lethal concentration, 50%) percent effluent for acute toxicity and the IC_{25} (inhibition concentration, 25%) percent effluent for chronic toxicity, as determined by the WET test, needs to be below the WET limits, as determined by the WLA. The WET limit for LC_{50} is typically 100% effluent and does not need to be determined by the WLA.

Table 2: WET Limits for IC_{25}

Season	Percent Effluent
Summer	82%
Fall	40%
Winter	43%
Spring	43%

Water Quality Modeling

A QUAL2Kw model of the receiving water was built and calibrated under contract by Utah State University (USU) (Neilson et al. 2012). The model was calibrated to synoptic survey data collected in the summer of 2010 by USU and DWQ. The model extends from immediately above the plant discharge to upstream of the crossing at North Main Street (approximately 0.85 km).

The QUAL2Kw model of Dry Creek was extended to Provo Bay based on physiographic information from Google Earth and site data collected by DWQ staff (approximately 5.15 km total). To validate the model parameterization, an additional synoptic survey was conducted by DWQ staff in October 2012 using standard operating procedures (DWQ 2012a). Both the calibrated and validated QUAL2Kw models are available for review by request.

A wasteload QUAL2Kw model was built based on the calibrated model and using seasonal flow and water quality data for the receiving water. Receiving water quality data was obtained from monitoring site 4996030 Dry Creek above Spanish Fork WWTP. The average seasonal value was calculated for each constituent with available data in the receiving water. The wasteload model is available for review by request.

The QUAL2Kw model was used for determining the WQBELs related to eutrophication and low dissolved oxygen, including ammonia. Effluent concentrations were adjusted so that water quality standards were not exceeded in the receiving water. Where WQBELs exceeded secondary standards or categorical limits, the concentration in the model was set at the secondary standard or categorical limit. QUAL2Kw rates, input and output are summarized in Appendix A.

A mass balance mixing analysis was conducted for conservative constituents such as dissolved metals. The WQBELs determined using the simple mixing analysis are summarized in Appendix B.

The limits for total residual chlorine were dependent on travel time and decay rate. The travel time was determined by adding the travel time in the outlet pipe (2,700 linear feet) to the travel time in Dry Creek prior to discharge to Provo Bay (per travel time in QUAL2Kw). Based on field sampling conducted by AQUA Engineering (2014), an average decay rate of 29.9 /day was used for determining chlorine decay through the outlet pipe and Dry Creek. The analysis for TRC is summarized in Appendix C.

Effluent Limits

The effect of the effluent on the DO in the receiving water was evaluated using the QUAL2Kw model. A large amount of filamentous benthic algae growth was observed and predicted in the model downstream of the treatment plant discharge, resulting in a DO sag and high diel range. Other factors contributing to the low minimum DO include low reaeration rate due to the flat gradient of Dry Creek, decay of BOD in the effluent, and sediment oxygen demand (SOD) resulting from decomposition of organic matter. The DO sag recovered somewhat within the model extents; however, in order to meet the minimum DO standard at the mouth of Dry Creek at Provo Bay, ammonia had to be limited during the summer (Table 3).

Table 3: Water Quality Based Effluent Limits Summary

Effluent Constituent	Acute			Chronic		
	Standard[a]	Limit	Averaging Period	Standard[a]	Limit	Averaging Period
Flow (MGD)		10.0	1 day		5.0	30 days
Min. Dissolved Oxygen (mg/L)	3.0	4.0	Instantaneous	5.0	4.0	30 days
BOD_5 (mg/L)[d]	None	35	7 days	None	25	30 days
Ammonia (mg/L)	Varies		1 hour	Varies		30 days
Summer		18[c]			7[b]	
Fall/Winter/Spring		18[c]			9	
Total Residual Chlorine (mg/L)	0.019		1 hour	0.011		4 days
Summer		48.2			212.1	
Fall		7.0			12.6	
Winter		2.1			3.1	
Spring		5.1			8.7	

a: Applicable standard in Provo Bay.
b: Limit due to minimum DO. All other seasonal ammonia limits due to toxicity criteria.
~~c: Limit from previous permit – meets water quality standards for this analysis.~~
d: Limits based on Utah Secondary Treatment Standards (*UAC R317-1-3.2*).

Models and supporting documentation are available for review upon request.

Antidegradation Level I Review

The objective of the Level I ADR is to ensure the protection of existing uses, defined as the beneficial uses attained in the receiving water on or after November 28, 1975. No evidence is known that the existing uses deviate from the designated beneficial uses for the receiving water. Therefore, the beneficial uses will be protected if the discharge remains below the WQBELs presented in this wasteload.

A Level II Antidegradation Review (ADR) is not required for this discharge since the pollutant concentration and load are not increasing beyond the design capacity of the facility.

Documents:

WLA Document: *spanish_fork_potw_wla_2014_final.docx*
QUAL2Kw Wasteload Model: *spanish_fork_wla_2014.xlsm*

References:

AQUA Engineering. 2014. *Spanish Fork City Waste-Load Parameters for Wastewater Discharge Permit.* City of Spanish Fork.

Neilson, B.T., A.J. Hobson, N. von Stackelberg, M. Shupryt, and J.D. Ostermiller. 2012. *Using QUAL2K Modeling to Support Nutrient Criteria Development and Wasteload Analyses in Utah.* Utah Department of Environmental Quality, Division of Water Quality.

Utah Division of Water Quality. 2012a. *Field Data Collection for QUAL2Kw Model Build and Calibration Standard Operating Procedures Version 1.0.*

Utah Division of Water Quality. 2012b. *Utah Wasteload Analysis Procedures Version 1.0.*

WASTELOAD ANALYSIS [WLA]
Appendix A: QUAL2Kw Analysis for Eutrophication

Date: 2/13/2014

Discharging Facility:	Spanish Fork WWTP	
UPDES No:	UT-0021741	
Permit Flow [MGD]:	5.00	Maximum Monthly Flow
	10.00	Maximum Daily Flow
Receiving Water:	Dry Creek	
Stream Classification:	2B, 3E, 4	
Stream Flows [cfs]:	1.70	Summer (July-Sept) Critical Low Flow
	11.40	Fall (Oct-Dec)
	10.10	Winter (Jan-Mar)
	10.20	Spring (Apr-June)
Acute River Width:	100.0%	
Chronic River Width:	100.0%	

Modeling Information

A QUAL2Kw model was used to determine these effluent limits.

Model Inputs

The following is upstream and discharge information that was utilized as inputs for the analysis.
Dry washes are considered to have an upstream flow equal to the flow of the discharge.

Headwater/Upstream Information	Summer	Fall	Winter	Spring
Flow (cfs)	1.7	11.4	10.1	10.2
Temperature (deg C)	20.1	9.6	11.0	4.0
Specific Conductance (μmhos)	950	950	950	950
Inorganic Suspended Solids (mg/L)	46.0	56.6	43.4	79.1
Dissolved Oxygen (mg/L)	8.4	10.5	10.3	10.7
$CBOD_5$ (mg/L)	2.1	1.9	2.5	2.7
Organic Nitrogen (mg/L)	0.185	0.185	0.185	0.185
NH4-Nitrogen (mg/L)	0.045	0.090	0.082	0.268
NO3-Nitrogen (mg/L)	2.585	3.461	2.122	3.191
Organic Phosphorus (mg/L)	0.075	0.047	0.032	0.068
Inorganic Ortho-Phosphorus (mg/L)	0.124	0.051	0.081	0.059
Phytoplankton (μg/L)	3.7	3.7	3.7	3.7
Detritus [POM] (mg/L)	5.1	6.3	4.8	8.8
Alkalinity (mg/L)	296	296	296	296
pH	8.2	8.3	8.2	8.3

Discharge Information

Chronic	Summer	Fall	Winter	Spring
Flow (cfs)	5.0	5.0	5.0	5.0
Temperature (deg C)	21.1	15.9	10.6	14.8
Inorganic Suspended Solids (mg/L)	13.6	12.7	9.8	11.1
Organic Nitrogen (mg/L)	5.000	5.000	5.000	5.000
NO3-Nitrogen (mg/L)	6.943	7.144	5.843	8.242
Organic Phosphorus (mg/L)	1.000	1.000	1.000	1.000
Inorganic Phosphorus (mg/L)	4.000	4.000	4.000	4.000
Alkalinity (mg/L)	275	275	275	275
pH	7.5	7.6	7.6	7.5

Acute	Summer	Fall	Winter	Spring
Flow (cfs)	10.0	10.0	10.0	10.0
Temperature (deg C)	21.1	15.9	10.6	14.8
Inorganic Suspended Solids (mg/L)	13.6	12.7	9.8	11.1
Organic Nitrogen (mg/L)	10.000	10.000	10.000	10.000
NO3-Nitrogen (mg/L)	6.943	7.144	5.843	8.242
Organic Phosphorus (mg/L)	2.000	2.000	2.000	2.000
Inorganic Phosphorus (mg/L)	8.000	8.000	8.000	8.000
Alkalinity (mg/L)	275	275	275	275
pH	7.8	8.1	8.1	8.0

All model numerical inputs, intermediate calculations, outputs and graphs are available for discussion, inspection and copy at the Division of Water Quality.

Effluent Limitations

Current State water quality standards are required to be met under a variety of conditions including in-stream flows targeted to the 7-day, 10-year low flow (R317-2-9).

Other conditions used in the modeling effort reflect the environmental conditions expected at low stream flows.

Effluent Limitations based upon Water Quality Standards for DO and Ammonia Toxicity

In-stream criteria of downstream segments for Dissolved Oxygen will be met with an effluent limitation as follows:

Chronic	Standard	Summer	Fall	Winter	Spring
Flow (MGD)	N/A	5.0	5.0	5.0	5.0
NH4-Nitrogen (mg/L)	Varies	7.0	9.0	9.0	9.0
$CBOD_5$ (mg/L)	N/A	25.0	25.0	25.0	25.0
Dissolved Oxygen [30-day Ave] (mg/L)	5.0	5.0	5.0	5.0	5.0

Acute	Standard	Summer	Fall	Winter	Spring
Flow (cfs)	N/A	10.0	10.0	10.0	10.0
NH4-Nitrogen (mg/L)	Varies	18.0	18.0	18.0	18.0
$CBOD_5$ (mg/L)	N/A	35.0	35.0	35.0	35.0
Dissolved Oxygen [Minimum] (mg/L)	3.0	4.0	4.0	4.0	4.0

Summary Comments

The mathematical modeling and best professional judgement indicate that violations of receiving water beneficial uses with their associated water quality standards, including important downstream segments, will not occur for the evaluated parameters of concern as discussed above if the effluent limitations indicated above are met.

Coefficients and Other Model Information

Parameter	Value	Units
Stoichiometry:		
Carbon	40	gC
Nitrogen	7.2	gN
Phosphorus	1	gP
Dry weight	100	gD
Chlorophyll	1	gA
Inorganic suspended solids:		
Settling velocity	0.2	m/d
Oxygen:		
Reaeration model	USGS(channel-control)	
Temp correction	1.024	
Reaeration wind effect	None	
O2 for carbon oxidation	2.69	gO2/gC
O2 for NH4 nitrification	4.57	gO2/gN
Oxygen inhib model CBOD oxidation	Exponential	
Oxygen inhib parameter CBOD oxidation	0.60	L/mgO2
Oxygen inhib model nitrification	Exponential	
Oxygen inhib parameter nitrification	0.60	L/mgO2
Oxygen enhance model denitrification	Exponential	
Oxygen enhance parameter denitrification	0.60	L/mgO2
Oxygen inhib model phyto resp	Exponential	
Oxygen inhib parameter phyto resp	0.60	L/mgO2
Oxygen enhance model bot alg resp	Exponential	
Oxygen enhance parameter bot alg resp	0.60	L/mgO2
Slow CBOD:		
Hydrolysis rate	0	/d
Temp correction	1.047	
Oxidation rate	0.103	/d
Temp correction	1.047	
Fast CBOD:		
Oxidation rate	10	/d
Temp correction	1.047	
Organic N:		
Hydrolysis	0.25219	/d
Temp correction	1.07	
Settling velocity	0.072248	m/d
Ammonium:		
Nitrification	3.840973	/d
Temp correction	1.07	
Nitrate:		
Denitrification	0.440663	/d
Temp correction	1.07	
Sed denitrification transfer coeff	0.89485	m/d
Temp correction	1.07	
Organic P:		
Hydrolysis	0.11173	/d
Temp correction	1.07	
Settling velocity	0.153214	m/d
Inorganic P:		
Settling velocity	1.49684	m/d
Sed P oxygen attenuation half sat constant	1.22794	mgO2/L

Phytoplankton:		
Max Growth rate	2.817285	/d
Temp correction	1.07	
Respiration rate	0.183875	/d
Temp correction	1.07	
Death rate	0.75246	/d
Temp correction	1	
Nitrogen half sat constant	15	ugN/L
Phosphorus half sat constant	2	ugP/L
Inorganic carbon half sat constant	1.30E-05	moles/L
Phytoplankton use HCO3- as substrate	Yes	
Light model	Smith	
Light constant	57.6	langleys/d
Ammonia preference	16.22865	ugN/L
Settling velocity	0.217562	m/d
Bottom Plants:		
Growth model	Zero-order	
Max Growth rate	39.236835	gD/m2/d or /d
Temp correction	1.07	
First-order model carrying capacity	100	gD/m2
Basal respiration rate	0.196733	/d
Photo-respiration rate parameter	0.01	unitless
Temp correction	1.07	
Excretion rate	0.002735	/d
Temp correction	1.07	
Death rate	0.00755	/d
Temp correction	1.07	
External nitrogen half sat constant	464.684	ugN/L
External phosphorus half sat constant	56.1985	ugP/L
Inorganic carbon half sat constant	7.79E-05	moles/L
Bottom algae use HCO3- as substrate	Yes	
Light model	Smith	
Light constant	47.8192	mgO^2/L
Ammonia preference	23.29875	ugN/L
Subsistence quota for nitrogen	0.8422416	mgN/gD
Subsistence quota for phosphorus	0.1719125	mgP/gD
Maximum uptake rate for nitrogen	956.625	mgN/gD/d
Maximum uptake rate for phosphorus	98.1245	mgP/gD/d
Internal nitrogen half sat ratio	3.5499945	
Internal phosphorus half sat ratio	3.8810835	
Nitrogen uptake water column fraction	1	
Phosphorus uptake water column fraction	1	
Detritus (POM):		
Dissolution rate	1.071086	/d
Temp correction	1.07	
Settling velocity	0.4923905	m/d
pH:		
Partial pressure of carbon dioxide	370	ppm

Atmospheric Inputs:	Summer	Fall	Winter	Spring
Min. Air Temperature, F	57.7	29.5	24.0	45.0
Max. Air Temperature, F	90.5	51.0	44.9	74.2
Dew Point, Temp., F	58.6	35.0	30.3	48.5
Wind, ft./sec. @ 21 ft.	9.8	7.5	7.6	9.2
Cloud Cover, %	10%	10%	10%	10%

Other Inputs:	
Bottom Algae Coverage	100%
Bottom SOD Coverage	100%
Prescribed SOD, gO_2/m^2/day	0

WASTELOAD ANALYSIS [WLA] Date: 2/13/2014
Appendix B: Mass Balance Mixing Analysis for Conservative Constituents

Discharging Facility:	Spanish Fork WWTP	
UPDES No:	UT-0021741	
Permit Flow [MGD]:	5.00	Maximum Monthly Flow
	10.00	Maximum Daily Flow

Receiving Water:	Dry Creek		
Stream Classification:	2B, 3E, 4		
Stream Flows [cfs]:	1.70	Summer (July-Sept)	Critical Low Flow
	11.40	Fall (Oct-Dec)	
	10.10	Winter (Jan-Mar)	
	10.20	Spring (Apr-June)	

Acute River Width:	100.0%
Chronic River Width:	100.0%

Modeling Information

A simple mixing analysis was used to determine these effluent limits.

Model Inputs

The following is upstream and discharge information that was utilized as inputs for the analysis. Dry washes are considered to have an upstream flow equal to the flow of the discharge.

Headwater/Upstream Information

	7Q10 Flow cfs
Summer	1.7
Fall	11.4
Winter	10.1
Spring	10.2

Discharge Information

	Flow MGD
Maximum Daily	10.0
Maximum Monthly	5.0

All model numerical inputs, intermediate calculations, outputs and graphs are available for discussion, inspection and copy at the Division of Water Quality.

Effluent Limitations

Current State water quality standards are required to be met under a variety of conditions including in-stream flows targeted to the 7-day, 10-year low flow (R317-2-9).

Other conditions used in the modeling effort reflect the environmental conditions expected at low stream flows.

Effluent Limitations for Protection of Recreation (Class 2B Waters)

Parameter	Maximum Concentration
Physical	
pH Minimum	6.5
pH Maximum	9.0
Bacteriological	
E. coli (30 Day Geometric Mean)	206 (#/100 mL)
E. coli (Maximum)	668 (#/100 mL)

Effluent Limitations for Protection of Aquatic Wildlife (Class 3D Waters)

Parameter	Maximum Concentration
Physical	

Inorganics	Chronic Standard (4 Day Average)		Acute Standard (1 Hour Average)	
	Standard	Limit	Standard	Limit
Phenol			0.010	0.010 mg/L
Hydrogen Sulfide (Undissociated)			0.002	0.002 mg/L

Total Recoverable Metals

	Chronic Standard (4 Day Average)			Acute Standard (1 Hour Average)		
Parameter (µg/L)	Standard	Background	Limit	Standard	Background	Limit
Aluminum	87.0	43.5	101.8	750.0	43.5	870.1
Arsenic	150.0	75.0	175.5	340.0	75.0	385.1
Cadmium	0.7	0.3	0.8	7.4	0.3	8.6
Chromium VI	11.0	5.5	12.9	16.0	5.5	17.8
Chromium III	233.7	116.8	273.4	4888.7	116.8	5699.9
Copper	26.4	13.2	30.9	44.1	13.2	49.4
Cyanide	22.0	11.0	25.7	5.2	11.0	4.2
Iron				1000.0	500.0	1085.0
Lead	15.0	7.5	17.5	384.8	7.5	448.9
Mercury	0.012	0.006	0.014	2.4	0.0	2.8
Nickel	146.2	73.1	171.0	1314.6	73.1	1525.7
Selenium	4.6	2.3	5.4	18.4	2.3	21.1
Silver				30.7	15.4	33.4
Tributylin	0.072	0.036	0.084	0.46	0.04	0.53
Zinc	336.3	168.1	393.4	336.3	168.1	364.8

Based upon a Hardness of 338 mg/l as $CaCO_3$

Organics [Pesticides]

Parameter (µg/L)	Chronic Standard (4 Day Average) Standard	Background	Limit	Acute Standard (1 Hour Average) Standard	Background	Limit
Aldrin				1.500	0.750	1.628
Chlordane	0.0043	0.00215	0.0050	1.200	0.600	1.302
DDT, DDE	0.001	0.0005	0.0012	0.550	0.275	0.597
Diazinon	0.17	0.085	0.199	0.17	0.085	0.184
Dieldrin	0.0056	0.0028	0.0066	0.240	0.120	0.260
Endosulfan, a & b	0.056	0.028	0.066	0.110	0.055	0.119
Endrin	0.036	0.018	0.042	0.086	0.043	0.093
Heptachlor & H. epoxide	0.0038	0.0019	0.0044	0.260	0.130	0.282
Lindane	0.08	0.04	0.09	1.000	0.500	1.085
Methoxychlor				0.030	0.015	0.033
Mirex				0.001	0.001	0.001
Nonylphenol	6.6	3.3	7.7	28.0	14.0	30.4
Parathion	0.0130	0.0065	0.0152	0.066	0.033	0.072
PCB's	0.014	0.007	0.016			
Pentachlorophenol	15.00	7.5	17.6	19.000	9.500	20.615
Toxephene	0.0002	0.0001	0.000234	0.730	0.365	0.792

Radiological

Parameter	Maximum Concentration
Gross Alpha	15 pCi/L

Effluent Limitation for Protection of Agriculture (Class 4 Waters)

Parameter	Maximum Concentration Standard	Background	Limit
Total Dissolved Solids (mg/L)	1200	637	1296
Boron (µg/L)	75	37.5	81.4
Arsenic (µg/L)	100	50	109
Cadmium (µg/L)	10	5	10.9
Chromium (µg/L)	100	50	109
Copper (µg/L)	200	100	217
Lead (µg/L)	100	50	109
Selenium (µg/L)	50	25	54.3
Gross Alpha (pCi/L)	15	7.5	16.3

Utah Division of Water Quality

WASTELOAD ANALYSIS [WLA]
Appendix C: Total Residual Chlorine

Date: 4/7/2014

Discharging Facility: Spanish Fork WWTP
UPDES No: UT-0021741

CHRONIC

	Season	Receiving Water	Standard	Total Effluent	Mixing Zone Boundary	Effluent Limit Without Decay	Temperature (°C)	Decay Rate (/day) @ 20 deg C	Decay Rate (/day) @ T deg C	Travel Time (min)	Decay Coefficient	Effluent Limit
Discharge (cfs)	Summer	1.7		7.7	9.4							
	Fall	11.4		7.7	19.1							
	Winter	10.1		7.7	17.8							
	Spring	10.2		7.7	17.9							
TRC (mg/L)	Summer	0.000	0.011			0.013	21.1	29.86	31.4	443	0.0001	212.061
	Fall	0.000	0.011			0.027	15.9	29.86	24.8	357	0.0022	12.611
	Winter	0.000	0.011			0.025	10.6	29.86	19.4	357	0.0082	3.100
	Spring	0.000	0.011			0.026	14.8	29.86	23.5	357	0.0029	8.700

ACUTE

	Season	Receiving Water	Standard	Total Effluent	Mixing Zone Boundary	Effluent Limit Without Decay	Temperature (°C)	Decay Rate (/day) @ 20 °C	Decay Rate (/day) @ T °C	Travel Time (min)	Decay Coefficient	Effluent Limit
Discharge (cfs)	Summer	1.7		15.5	17.2							
	Fall	11.4		15.5	26.9							
	Winter	10.1		15.5	25.6							
	Spring	10.2		15.5	25.7							
TRC (mg/L)	Summer	0.000	0.019			0.021	21.1	29.86	31.4	355	0.0004	48.202
	Fall	0.000	0.019			0.033	15.9	29.86	24.8	311	0.0047	6.998
	Winter	0.000	0.019			0.031	10.6	29.86	19.4	311	0.0151	2.081
	Spring	0.000	0.019			0.032	14.8	29.86	23.5	311	0.0062	5.116

ATTACHMENT 3

Industrial Waste Survey

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Industrial Pretreatment Wastewater Survey

Do you periodically experience any of the following treatment works problems:

foam, floaties or unusual colors
plugged collection lines caused by grease, sand, flour, etc.
discharging excessive suspended solids, even in the winter
smells unusually bad
waste treatment facility doesn't seem to be treating the waste right

Perhaps the solution to a problem like one of these may lie in investigating the types and amounts of wastewater entering the sewer system from industrial users.

An industrial user (IU) is defined as a non-domestic user discharging to the waste treatment facility which meets any of the following criteria:

1. **has a lot of process wastewater (5% of the flow at the waste treatment facility or more than 25,000 gallons per work day.)**

   Examples: Food processor, dairy, slaughterhouse, industrial laundry.

2. **is subject to Federal Categorical Pretreatment Standards**;

   Examples: metal plating, cleaning or coating of metals, blueing of metals, aluminum extruding, circuit board manufacturing, tanning animal skins, pesticide formulating or packaging, and pharmaceutical manufacturing or packaging,

3. **is a concern to the POTW.**

   Examples: septage hauler, restaurant and food service, car wash, hospital, photo lab, carpet cleaner, commercial laundry.

All users of the water treatment facility are **prohibited** from making the following types of discharges:

1. A discharge which creates a fire or explosion hazard in the collection system.
2. A discharge which creates toxic gases, vapor or fumes in the collection system.
3. A discharge of solids or thick liquids which creates flow obstructions in the collection system.
4. An acidic discharge (low pH) which causes corrosive damage to the collection system.
5. Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause problems in the collection system or at the waste treatment facility.
6. Waste haulers are prohibited from discharging without permission. (No midnight dumping!)

When the solution to a sewer system problem may be found by investigating the types and amounts of wastewater entering the sewer system discharged from IUs, it's appropriate to conduct an Industrial Waste Survey.

An Industrial Wastc Survey consists of:

Step 1: Identify Industrial Users

Make a list of all the commercial and industrial sewer connections.

Sources for the list:

business license, building permits, water and wastewater billing, Chamber of Commerce, newspaper, telephone book, yellow pages.

Split the list into two groups:

domestic wastewater only--no further information needed
everyone else (IUs)

Step 2: Preliminary Inspection

Go visit each IU identified on the "everybody else" list.

Fill out the **Preliminary Inspection Form** during the site visit.

Step 3: Informing the State

Please fax or send a copy of the Preliminary inspection form (both sides) to:

Jennifer Robinson

Division of Water Quality
288 North 1460 West
P.O. Box 144870
Salt Lake City, UT 84114-4870

Phone: (801) 536-4383
Fax: (801) 536-4301
E-mail: jenrobinson@utah.gov

PRELIMINARY INSPECTION FORM

INSPECTION DATE ___ / ____ /

Name of Business ________________ **Person Contacted** ________________

Address ________________ **Phone Number** ________________

____

Description of Business ________________

Principal product or service: ________________

Raw Materials used: ________________

____

Production process is: [ ] Batch [ ] Continuous [ ] Both

Is production subject to seasonal variation? [ ] yes [ ] no
If yes, briefly describe seasonal production cycle.

____

This facility generates the following types of wastes (check all that apply):

1. [ ] Domestic wastes (Restrooms, employee showers, etc.)
2. [ ] Cooling water, non-contact
3. [ ] Boiler/Tower blowdown
4. [ ] Cooling water, contact
5. [ ] Process
6. [ ] Equipment/Facility washdown
7. [ ] Air Pollution Control Unit
8. [ ] Storm water runoff to sewer
9. [ ] Other describe

Wastes are discharged to (check all that apply):

[ ] Sanitary sewer
[ ] Storm sewer
[ ] Surface water
[ ] Ground water
[ ] Waste haulers
[ ] Evaporation
[ ] Other (describe)

Name of waste hauler(s), if used

____

Is a grease trap installed? Yes No
Is it operational? Yes No

Does the business discharge a lot of process wastewater?

- **More than 5% of the flow to the waste treatment facility? Yes No**
- **More than 25,000 gallons per work day? Yes No**

Does the business do any of the following:

[ ] Adhesives
[ ] Aluminum Forming
[ ] Battery Manufacturing
[ ] Copper Forming
[ ] Electric & Electronic Components
[ ] Explosives Manufacturing
[ ] Foundries
[ ] Inorganic Chemicals Mfg. or Packaging
[ ] Industrial Porcelain Ceramic Manufacturing
[ ] Iron & Steel
[ ] Metal Finishing, Coating or Cleaning
[ ] Mining
[ ] Nonferrous Metals Manufacturing
[ ] Organic Chemicals Manufacturing or Packaging
[ ] Paint & Ink Manufacturing
[ ] Pesticides Formulating or Packaging
[ ] Petroleum Refining
[ ] Pharmaceuticals Manufacturing or Packaging
[ ] Plastics Manufacturing
[ ] Rubber Manufacturing
[ ] Soaps & Detergents Manufacturing
[ ] Steam Electric Generation
[ ] Tanning Animal Skins
[ ] Textile Mills
[ ] Car Wash
[ ] Carpet Cleaner
[ ] Dairy
[ ] Food Processor
[ ] Hospital
[ ] Laundrics
[ ] Photo Lab
[ ] Restaurant & Food Service
[ ] Septage Hauler
[ ] Slaughter House

Are any process changes or expansions planned during the next three years? Yes No If yes, attach a separate sheet to this form describing the nature of planned changes or expansions.

____
Inspector

____
Waste Treatment Facility

Please send a copy of the preliminary inspection form (both sides) to:

Jennifer Robinson
Division of Water Quality
P. O. Box 144870
Salt Lake City, Utah 84114-4870

Phone: (801) 536-4383
Fax: (801) 536-4301
E-Mail: jenrobinson@utah.gov

	Industrial User	Jurisdiction	SIC Codes	Categorical Standard Number	Total Average Process Flow (gpd)	Total Average Facility Flow (gpd)	Facility Description
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							

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ATTACHMENT 4

Reasonable Potential Analysis Model Output

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Effluent, Metals, mg/L

Metal		CN	As	Cd	Cr	Cu	Pb	Ni	Ag	Zn	Mo	Se	Hg
ARP Val		0.0042	0.385	0.0086	0.0178	0.0494	0.4489	1.5257	0.0334	0.3648	1	0.0211	0.0028
CRP Val		0.0257	0.1755	0.0008	0.0129	0.0309	0.0175	0.171	1	0.3934	1	0.0054	0.000014
2009	Fall	0.008	0.0027	ND	0.003	0.0081	ND	0.0087	ND	0.03	0.0046	0.0023	ND
2010	Win	ND	0.0028	ND	0.003	0.0085	ND	0.0074	ND	0.03	0.0126	0.0019	ND
	Spr	ND	0.004	ND	0.002	0.0076	ND	0.0077	ND	0.04	0.0088	0.0026	0.00000011
	Sum	ND	0.0028	ND	0.001	0.0008	ND	0.0057	0.001	0.03	0.0075	0.0028	ND
	Fall	ND	0.0029	ND	0.001	0.0092	ND	0.0058	ND	0.03	0.0073	0.0021	ND
2011	Win	ND	0.0048	ND	0.0042	0.0227	0.0011	0.007	0.001	0.08	0.0065	0.0033	0.00000313
	Spr	ND	0.0042	ND	0.0023	0.0062	ND	0.0073	0.0005	0.03	0.0121	0.0029	ND
	Sum	ND	0.0035	ND	0.0013	0.007	ND	0.0071	ND	0.03	0.0136	0.0027	0.0000032
	Fall	0.007	0.0028	ND	0.0033	0.0074	ND	0.007	ND	0.03	0.0106	0.0028	0.0000038
2012	Win	0.005	0.0042	ND	0.0012	0.0087	ND	0.0068	ND	0.04	0.0149	0.0036	0.0000029
	Spr	0.005	0.0047	ND	0.0017	0.0091	0.0006	0.0042	0.002	0.06	0.0217	0.0038	0.0000049
	Sum	0.004	0.0036	ND	0.0021	0.0077	0.0005	0.0048	0.002	0.03	0.0068	0.003	0.0000029
	Fall	0.004	0.0046	0.0002	0.0016	0.0067	ND	0.0106	0.0008	0.04	0.0233	0.0042	0.0000044
2013	Win	ND	0.0056	ND	0.008	0.0079	ND	0.0055	ND	0.059	0.088	0.0042	ND
	Spr	ND	0.0046	ND	0.014	0.011	ND	0.0082	ND	0.068	0.0079	0.0033	ND
	Sum	0.004	0.0036	ND	0.0021	0.0077	ND	0.0048	0.002	0.03	0.0068	ND	0.0000029
	Fall	ND	0.0048	ND	0.0084	0.0074	ND	0.0038	ND	0.041	0.0064	ND	ND
2014	Win	ND	0.005	ND	ND	0.0054	ND	ND	ND	ND	0.028	ND	ND
	Spr	ND	0.004	ND	ND	0.006	ND	0.0022	ND	ND	0.015	0.0034	ND
	Sum	ND	0.004	ND	ND	0.0067	ND	0.0041	0.00051	0.059	0.016	0.0021	ND
ND Value		0.005	0.0005	0.0005	0.005	0.001	0.0005	0.0005	0.0005	0.05	0.005	0.0002	0.0001
Max		0.008	0.0056	0.0005	0.014	0.0227	0.0011	0.0106	0.002	0.08	0.088	0.0042	0.0001
Run A RP?		YES	No	No	YES	No	No	No	No	No	No	No	No
Run C RP?		No	No	YES	YES	YES	No	No	No	No	No	YES	YES

Month	Flow, MGD Ave	Flow, MGD Max	E. coli Ave	E. coli Max	DO Min	pH Min	pH Max	O&G Max	BOD5, mg/L Ave	BOD5, mg/L Max	TSS, mg/L Ave	TSS, mg/L Max	Ammonia Max	TRC MAX
Limit	5	10	126	157	4	6.5	9	10	25	35	25	35	18	2
Jan-11	5	7	46	117	4.0	7.3	7.5	0	7	10	7	18	7.1	1.7
Feb-11	5	7	10	30	4.5	7.3	7.7	0	8	10	8	10	10.1	1.8
Mar-11	5	737	10	124	4.0	7.6	7.8	0	8	10	7	8	16.0	1.7
Apr-11	5	8	19	523	4.0	7.6	7.9	0	8	10	7	9	16.0	2.0
May-11	5	8	19	523	4.0	7.6	7.9	0	8	10	7	9	16.0	2.0
Jun-11	5	7	1	3	4.0	7.4	7.8	0	11	15	7	8	9.3	1.9
Jul-11	5	8	2	5	4.0	7.6	7.7	0	7	9	6	8	9.0	1.9
Aug-11	5	7	2	9	4.0	7.2	7.5	0	9	12	7	8	10.0	1.7
Sep-11	5	8	9	25	4.0	7.2	7.6	0	7	8	5	6	6.8	1.7
Oct-11	5	10	14	100	4.0	7.2	7.5	0	6	7	4	5	8.5	1.9
Nov-11	4	7	13	38	4.0	7.2	7.5	0	6	8	6	8	8.8	1.7
Dec-11	4	4	9	38	4.0	7.4	7.5	0	8	9	5	5	13.8	2.0
Jan-12	4	5	5	54	4.5	7.3	7.5	0	8	6	9	6	14.4	2.0
Feb-12	4	5	10	50	4.5	7.4	7.6	0	9	13	6	16	14.0	2.0
Mar-12	4	4	10	25	4.2	7.4	7.7	0	11	15	6	6	12.6	1.9
Apr-12	4	4	13	73	4.5	7.6	7.8	0	10	12	9	12	13.7	1.7
May-12	4	5	6	44	4.3	7.5	7.7	0	9	10	10	13	9.7	2.0
Jun-12	4	5	14	40	4.3	7.5	7.7	0	9	12	9	13	5.5	1.9
Jul-12	4	5	5	18	4.0	7.5	7.7	0	10	11	8	8	7.2	1.9
Aug-12	4	5	5	66	4.0	7.4	7.5	0	10	12	7	9	6.7	1.9
Sep-12	4	5	9	66	4.3	7.4	7.6	0	8	12	6	7	8.3	2.0
Oct-12	4	5	6	12	4.0	7.4	7.6	0	9	12	6	10	9.0	1.9
Nov-12	4.2	4.7	6	36	4	7.3	7.6	0	10	13	8	10	8.7	1.4
Dec-12	4.2	4.9	7	126	4.5	7.4	7.6	0	9	11	9	11	13.5	1.5
Jan-13	4.1	4.6	13	121	5.25	6.4	7.5	0	7	10	8	10	10	1.7
Feb-13	4.6	4.5	17	96	5.25	6.7	7.2	0	9	12	11	18	12.1	1.9
Mar-13	4.3	4.5	13	53	5	6.9	7.0	0	12	14	10	17	10.5	2.0
Apr-13	4.3	4.7	2	15	4.5	6.7	7.3	0	10	12	9	19	12.9	2.0
May-13	4.7	7.1	4	36	4	7.3	7.4	0	9	12	5	6	12.1	1.6
Jun-13	4.6	6.8	1	4	4	7.5	7.8	0	12	16	6	7	12.9	2.0
Jul-13	4.6	4.6	5	5.3	4	7.6	7.7	0	8	11	8	11	20.7	1.3
Aug-13	4.6	7.8	3	4	4	7.4	7.9	0	7	8	6	9	7.55	1.7
Sep-13	4.7	6.4	6	8	4	7.5	7.8	0	9	11	10	15	13.5	1.6
Oct-13	3.9	5.5	9	12.6	4	7.6	7.8	0	9	12	10	12	12	1.4
Nov-13	3.4	4.3	5	130	4.5	7.4	7.8	0	7	9	8	10	14.1	2.0
Dec-13	3.4	8	5	130	4	7.5	7.8	0	9	12	6	8	19.2	2.0
Jan-14	3.2	4.3	1	1	4.5	7.6	7.7	0	7	9	8	16	17.9	2.0
Feb-14	3.6	5.1	1	1	4.25	7.6	7.7	0	10	13	6	10	18.9	2.0
Mar-14	3.4	4.5	1	3	4.5	7.5	7.7	0	8	9	5	5	17.6	1.6
Apr-14	3.9	4.4	5	126	4	7.4	7.7	0	10	11	7	9	10.9	1.6
May-14	4.4	4.8	30	1039	4	7.5	7.8	0	11	19	10	23	18.5	2.0
Jun-14	4.2	4.9	7	7	4.25	7.5	7.7	0	10	11	12	18	12.9	2.0
Jul-14	4.4	4.8	2	2	4	7.1	7.6	0	10	12	10	12	7.4	1.4
Aug-14	4.5	6.4	3	18.9	4	7.6	7.7	0	7	13	6	8	6.79	1.0
Sep-14	4.8	6.3	3	6	4.5	7.1	7.8	0	14	26	6	7	9.01	1.6

RP Procedure Output			Effluent Data	
Facility Name:	Spanish Fork		#	
Permit Number:	UT0020109		1	0.008
Outfall Number:	OO1		2	ND
Parameter	Cyanide (Total)		3	ND
Distribution	Normal		4	ND
Data Units	mg/L		5	ND
Reporting Limit	0.002		6	ND
Significant Figures	2		7	ND
Confidence Interval	99		8	ND
			9	0.007
Maximum Reported Effluent Conc.	0.008	mg/L	10	0.005
Coefficient of Variation (CV)	0.3		11	0.005
RP Multiplier	1.7		12	0.004
Projected Maximum Effluent Conc. (MEC)	0.014	mg/L	13	0.004
Facility Flow	10	MGD	14	ND
Acute Dilution Factor	1		15	ND
Acute Low Flow	2.64	MGD	16	ND
Background Pollutant Conc. (acute)	0.0023	mg/L	17	ND
Acute Receiving Water Conc. (RWCa)	0.014	mg/L	18	ND
Acute Criterion	0.0042	mg/L	19	ND
Chronic Dilution Factor	1		20	ND
Chronic Low Flow	2.64	MGD		
Background Pollutant Conc. (chronic)	0.0023	mg/L		
Chronic Receiving Water Conc. (RWCc)	0.014	0		
Chronic Criterion	0.0257	mg/L		
RP for Acute?	YES			
RP for Chronic?	NO			

RP Procedure Output			Effluent Data	
Facility Name:	Spanish Fork		#	
Permit Number:	UT0020109		1	0.0005
Outfall Number:	OO1		2	0.0005
Parameter	Cadmium		3	0.0005
Distribution	Normal		4	0.0005
Data Units	mg/L		5	0.0005
Reporting Limit	0.0005		6	0.0005
Significant Figures	2		7	0.0005
Confidence Interval	95		8	0.0005
			9	0.0005
Maximum Reported Effluent Conc.	0.0002	mg/L	10	0.0005
Coefficient of Variation (CV)	0.47		11	0.0005
RP Multiplier	2.8		12	0.0002
Projected Maximum Effluent Conc. (MEC)	0.00055	mg/L	13	0.0002
Facility Flow	0	MGD	14	0.0005
Acute Dilution Factor	1		15	0.0005
Acute Low Flow	0	MGD	16	0.0002
Background Pollutant Conc. (acute)	0	mg/L	17	0.0005
Acute Receiving Water Conc. (RWCa)	0.00055	mg/L	18	0.0005
Acute Criterion	0.0086	mg/L	19	0.0005
Chronic Dilution Factor	1		20	0.0005
Chronic Low Flow	0	MGD		
Background Pollutant Conc. (chronic)	0	mg/L		
Chronic Receiving Water Conc. (RWCc)	0.00055	0		
Chronic Criterion	0.0008	mg/L		
RP for Acute?	NO			
RP for Chronic?	NO			

RP Procedure Output			#	Effluent Data
Facility Name:	Spanish Fork		#	
Permit Number:	UT0020109		1	0.0081
Outfall Number:	OO1		2	0.0085
Parameter	Copper		3	0.0076
Distribution	Normal		4	0.0008
Data Units	mg/L		5	0.0092
Reporting Limit	0.0005		6	0.0227
Significant Figures	2		7	0.0062
Confidence Interval	95		8	0.007
			9	0.0074
Maximum Reported Effluent Conc.	0.0227	mg/L	10	0.0087
Coefficient of Variation (CV)	0.56		11	0.0091
RP Multiplier	1.2		12	0.0077
Projected Maximum Effluent Conc. (MEC)	0.027	mg/L	13	0.0067
Facility Flow	0	MGD	14	0.0079
Acute Dilution Factor	1		15	0.011
Acute Low Flow	0	MGD	16	0.0077
Background Pollutant Conc. (acute)	0	mg/L	17	0.0074
Acute Receiving Water Conc. (RWCa)	0.027	mg/L	18	0.0054
Acute Criterion	0.0494	mg/L	19	0.006
Chronic Dilution Factor	1		20	0.0067
Chronic Low Flow	0	MGD		
Background Pollutant Conc. (chronic)	0	mg/L		
Chronic Receiving Water Conc. (RWCc)	0.027	0		
Chronic Criterion	0.0309	mg/L		
RP for Acute?	NO			
RP for Chronic?	NO			

RP Procedure Output			Effluent Data	
Facility Name:	Spanish Fork		#	
Permit Number:	UT0020109		1	0.0023
Outfall Number:	OO1		2	0.0019
Parameter	Selenium		3	0.0026
Distribution	Normal		4	0.0028
Data Units	mg/L		5	0.0021
Reporting Limit	0.002		6	0.0033
Significant Figures	2		7	0.0029
Confidence Interval	95		8	0.0027
			9	0.0028
Maximum Reported Effluent Conc.	0.0042	mg/L	10	0.0036
Coefficient of Variation (CV)	0.33		11	0.0038
RP Multiplier	1.1		12	0.003
Projected Maximum Effluent Conc. (MEC)	0.0048	mg/L	13	0.0042
Facility Flow	0	MGD	14	0.0042
Acute Dilution Factor	1		15	0.0033
Acute Low Flow	0	MGD	16	0.003
Background Pollutant Conc. (acute)	0	mg/L	17	0.0002
Acute Receiving Water Conc. (RWCa)	0.0048	mg/L	18	0.002
Acute Criterion	0.0211	mg/L	19	0.0034
Chronic Dilution Factor	1		20	0.0021
Chronic Low Flow	0	MGD		
Background Pollutant Conc. (chronic)	0	mg/L		
Chronic Receiving Water Conc. (RWCc)	0.0048	0		
Chronic Criterion	0.0054	mg/L		
RP for Acute?	NO			
RP for Chronic?	NO			

RP Procedure Output			#	Effluent Data
Facility Name:	Spanish Fork		#	
Permit Number:	UT0020109		1	ND
Outfall Number:	OO1		2	ND
Parameter	Mercury		3	0.00000011
Distribution	Normal		4	ND
Data Units	mg/L		5	ND
Reporting Limit	0.0001		6	0.00000313
Significant Figures	2		7	ND
Confidence Interval	95		8	0.0000032
			9	0.0000038
Maximum Reported Effluent Conc.	0.0000049	mg/L	10	0.0000029
Coefficient of Variation (CV)	0.43		11	0.0000049
RP Multiplier	1.4		12	0.0000029
Projected Maximum Effluent Conc. (MEC)	0.0000067	mg/L	13	0.0000044
Facility Flow	0	MGD	14	ND
Acute Dilution Factor	1		15	ND
Acute Low Flow	0	MGD	16	0.0000029
Background Pollutant Conc. (acute)	0	mg/L	17	ND
Acute Receiving Water Conc. (RWCa)	0.0000067	mg/L	18	ND
Acute Criterion	0.0028	mg/L	19	ND
Chronic Dilution Factor	1		20	ND
Chronic Low Flow	0	MGD		
Background Pollutant Conc. (chronic)	0	mg/L		
Chronic Receiving Water Conc. (RWCc)	0.0000067	0		
Chronic Criterion	0.000014	mg/L		
RP for Acute?	NO			
RP for Chronic?	NO			