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CITY OF AURORA, OR
WASTEWATER FACILITIES PLANNING STUDY

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NOV. 10, 2009
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11/22/2023
EXPIRES: 12-31-2024

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KA PROJECT NO. 222041-008

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ES. EXECUTIVE SUMMARY

The City of Aurora, Oregon contracted with Keller Associates, Inc. to complete a wastewater facilities plan for the City's sanitary sewer wastewater treatment plant (WWTP). This chapter summarizes the major findings of the facilities plan, including brief discussions of alternatives considered and final recommendations.

ES.1. PLANNING CRITERIA

Regulatory requirements, engineering best practices, and City-defined goals and objectives form the basis for planning and design. Applicable regulatory requirements include the National Pollutant Discharge Elimination System (NPDES) permit, Total Maximum Daily Loads (TMDLs), State Water Quality Standards, Recycled Water (Reuse) Regulations, and Land Use and Comprehensive Plan Requirements.

ES.2. DESIGN CONDITIONS

ES.2.1. Study Area and Land Use

The study area consists of all areas within the City of Aurora Urban Growth Boundary (UGB). Figures 1 and 2 in Appendix A show the study area and existing service areas, including the Zoning and Study Area (Figure 1) and Topography and Flood Plain (Figures 2 and 2A). The study area sits between Mill Creek and the Pudding River.

ES.2.2. Demographics

The City's population has been increasing over the past few decades. Historical populations were obtained from the U.S. Census and Marion County in cooperation with Portland State University (PSU). PSU analyzes historical trends and anticipates growth patterns to develop growth rates for 5-year increments. The most current, certified population estimate from the U.S. Census was 985 in 2020. The overall estimated population growth rate from 2022-2043 is 2.3%. Using this growth rate, the population projection for 2043 is 1,869. Growth calculation details can be found in Chapter 1.3.

ES.2.3. Wastewater Flows

Data on daily and monthly treatment plant flows from 2017 to 2021 were provided by the City for analysis. The design influent flows listed in Table ES-1 were calculated from this information using methods recommended by the Oregon DEQ (see Chapter 3.2 for further details).

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TABLE ES-1: PROJECTED FLOWS

	Planning Flow (MGD)	Planning Unit Flow (gpcd)	Projected Planning Flow (MGD)				
Year	--	--	2023	2028	2033	2038	2043
Population	1,133	1,133	1,186	1,328	1,488	1,668	1,869
ADWF	0.062	55	0.065	0.073	0.082	0.092	0.103
$MMDWF_{10}$	0.062	55	0.065	0.073	0.082	0.092	0.103
AADF	0.062	55	0.065	0.073	0.082	0.092	0.103
AWWF	0.068	60	0.071	0.079	0.089	0.100	0.112
$MMWWF_5$	0.068	60	0.071	0.079	0.089	0.100	0.112
PWkF	0.080	70	0.084	0.094	0.105	0.117	0.132
$PDAF_5$	0.120	106	0.126	0.141	0.158	0.177	0.198
PIF_5	0.153	135	0.160	0.179	0.200	0.225	0.252

* MGD – million gallons per day, gpcd – gallons per capita per day, ADWF – Average Dry-Weather Flow, $MMDWF_{10}$ – Max Month Dry-Weather Flow, AADF – Average Annual Daily Flow, AWWF – Average Wet-Weather Flow, $MMWWF_5$ – Max Month Wet-Weather Flow, PWkF – Peak Week Flow, $PDAF_5$ – Peak Daily Average Flow, PIF_5 – Peak Instantaneous Flow.

ES.2.4. Wastewater Composition

The influent BOD_5 and TSS data for the time period of 2017 to 2021 was evaluated to determine annual average, dry weather average, dry weather maximum month, wet weather average, and wet weather maximum month loads (pounds per day). The pounds per day BOD_5 and TSS loading data was used to calculate the pounds per capita per day (ppcd) for the various flows; these values were used to estimate the design year 2043 loadings using the 2043 population of 1,869. A summary of the BOD_5 and TSS data and projections are provided in Tables 3-5 through 3-7.

ES.3. WASTEWATER TREATMENT

ES.3.1. Existing Facilities

The Aurora WWTP consists of an aerated lagoon plant with effluent storage and disinfection. Figure 5 in Appendix A illustrates the layout and Figure 6 provides a general schematic. The influent wastewater is sampled and screened adjacent to the aerated lagoon. Following the influent mechanical fine screen, the wastewater flows by gravity into the aerated lagoon where it is aerated in three (3) aeration cells and the solids are settled in two (2) settling cells. Following treatment in the aerated lagoon, the wastewater is stored in a 7.2-million-gallon effluent storage lagoon. If there is a process upset in the aerated lagoon, the wastewater can be diverted and temporarily stored in this effluent storage lagoon. When the wastewater leaves the effluent storage lagoon it typically flows by gravity through a magnetic flow meter, past a modulating flow control valve, and enters a chlorine contact basin where it can be chlorinated and dechlorinated.

Following the disinfection process the flow is sampled in accordance with NPDES Permit No. 101772. From May 1st to October 31st the treated wastewater is pumped by the River Pump Station/Irrigation Pump Station and land applied on approximately 6 acres of City land adjacent to the WWTP. From November 1st to April 30th the effluent is dechlorinated and pumped by the River Pump Station/Irrigation Pump Station to the Pudding River. In the river, the effluent discharges through a single-port diffuser, which helps distribute and mix the effluent with the river channel flow.

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Solids generated in the aerated lagoon are pumped out of the settling cells to dewatering bags, which are later picked up for disposal. Water from the dewatering bags is drained to the Return Pump Station. The bathroom in the WWTP Office and the drain for the Chlorine Contact Basin are also connected to the Return Pump Station.

Deficiencies of the existing wastewater treatment include:

Headworks – There is no grit removal at the headworks, which can contribute to grit buildup in the aerated lagoon. Also, there is no freeze protection for the influent screen and composite sampler. There is also limited room around the screen for maintenance.

Aerated Lagoon – The lagoon aeration system does not have sufficient capacity. There is only one aerated lagoon and limited space around the lagoon, which makes maintenance difficult. There is no emergency overflow if the effluent pipe plugs. There are also no permanent pumps, piping, and flow meter for solids removal and process control.

Effluent Storage Lagoon – The effluent storage lagoon is nearing its storage capacity. There is insufficient storage volume and/or land application area for the 20-year design flows. There has been some history of TSS and BOD_5 removal percent being a challenge. There is limited space around the lagoon, which makes maintenance difficult; there is no emergency overflow if the effluent pipes plug; and the lagoon has not been structurally inspected recently, which may be an issue since it is reaching capacity.

Disinfection – The chemical storage buildings are not well ventilated, are prone to freezing, and have experienced significant corrosion. There are no automatic alarms if a dosing pump fails or if the chlorine residual rises. There also is no railing around the chlorine contact basin. Further evaluation of the disinfection capacity is recommended as baffles and/or mixer modifications in the chlorine contact basin may be necessary to disinfect future flows.

River Pump Station/Irrigation Pump Station – There is no fence to secure the area, no fall protection for the wet well, and no sign reading “confined space, entry by authorized personnel only”. The pumps cycle on/off rather than being continuously controlled via VFDs for energy savings. There is no permanent irrigation system, which means that the operators need to spend time manually moving the pipes and sprinklers.

Return Pump Station – This pump station also needs a fence, fall protection, and a sign reading “confined space, entry by authorized personnel only”. There is no flow meter on this line, so the return flows, (which can have an effect on the aerated lagoon), are not measured. There also may be some gases that are making their way to the control panel, which may require modifications.

Solids Treatment –There is no solids treatment and mechanical dewatering, which can limit where the solids can be disposed and increases the cost of hauling.

Other – It is difficult (due to the programming language) to incorporate new items into the SCADA system. There is a gate on Millrace Road, but a fence is missing around part of the WWTP including the WWTP Office, disinfection buildings, pump stations, and Sludge Transfer Station. The stormwater detention basin near the WWTP Office washed out and bank stabilization is urgently needed in this area. The road down to the WWTP Office and around the WWTP is gravel and periodically washes out.

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ES.3.2. Effluent Disposal Alternatives

Currently, the WWTP effluent is disinfected in a chlorine contact chamber. From November 1st to April 30th, the disinfected effluent is dechlorinated and discharged to the Pudding River under NPDES Permit No. 101772. From May 1st to October 31st, the wastewater is land applied to an approved site adjacent to the WWTP Office. Alternative disposal options were evaluated in this wastewater facilities plan, including summer storage (no land application) and year-round river discharge.

ES.3.3. Treatment Alternatives

Process alternatives were considered to address WWTP deficiencies. The treatment options considered included constructing a sequencing batch reactor (SBR), a membrane bioreactor (MBR), or an extended aeration activated sludge system.

The options considered for the solids handling included continuing to use the sludge dewatering bags, adding dewatering via a screw press, or adding sludge treatment and dewatering.

ES.4. CAPITAL IMPROVEMENT PLAN AND FINANCING

ES.4.1. Summary of Costs

Table ES-2 presents the 20-year capital improvement plan (CIP). Projects are organized by priority. Costs reflect planning-level estimates and should be refined in pre-design and design phases of implementation. Priority 1 improvement expenses are anticipated to occur over the next six years. Priority 2 improvements are items targeted as funds become available. Additional details on the CIP are discussed in Chapter 6. A proposed layout of treatment plant improvements is shown in Figure 7 (Appendix A).

TABLE ES-2: 20-YEAR CAPITAL IMPROVEMENT PLAN

ID#	Site	Total Estimated Cost (2022)	SDC Growth Apportionment		City's Estimated Portion
			%	Cost	
Priority 1 Improvements (0-6 years)					
1.1	Sequencing Batch Reactor	$ 6,303,000	73%	$ 4,615,000	$ 1,688,000
1.2	Additional Effluent Storage Lagoon	$ 4,133,000	42%	$ 1,724,000	$ 2,409,000
1.3	Influent Screen Relocation	$ 49,000	39%	$ 19,000	$ 30,000
1.4	SCADA Upgrade	$ 240,000	39%	$ 95,000	$ 145,000
1.5	Chlorination/Dechlorination System Upgrade	$ 457,000	39%	$ 180,000	$ 277,000
	Total Priority 1 Improvements (rounded)	**$ 11,182,000**		**$ 6,633,000**	**$ 4,549,000**
Priority 2 Improvements					
2.1	Screw Press Dewatering	$ 3,020,000	39%	$ 1,189,000	$ 1,831,000
2.2	Site Work At WWTP	$ 212,000	39%	$ 83,000	$ 129,000
2.3	Fall Protection	$ 147,000	39%	$ 58,000	$ 89,000
2.4	Fencing	$ 123,000	39%	$ 48,000	$ 75,000
2.5	WWTP Pump Station VFDs	$ 59,000	39%	$ 23,000	$ 36,000
2.6	Paving Access Road	$ 385,000	39%	$ 152,000	$ 233,000
2.7	Lagoon Overflow, Structural Inspection, and Bank Stabilization	$ 362,000	39%	$ 143,000	$ 219,000
2.8	Grit Chamber and Headworks Upgrade	$ 1,743,000	39%	$ 680,000	$ 1,063,000
2.9	Aerobic Digester	$ 912,000	39%	$ 359,000	$ 553,000
	Total Priority 2 Improvements (rounded)	**$ 6,963,000**		**$ 2,735,000**	**$ 4,228,000**
	TOTAL WASTEWATER PLANT IMPROVEMENTS COSTS (rounded)	**$ 18,145,000**		**$ 9,368,000**	**$ 8,777,000**

All costs in 2022 Dollars. Costs include contractor mobilization (10%), contractor overhead and profit (OH&P; 15%), contingency (30%), and soft costs (e.g. engineering and construction management services, legal, administrative, and permitting services) (25%).
The cost estimate herein is concept level information only based on our perception of current conditions at the project location and its accuracy is subject to variation depending upon project definition and other factors. This estimate reflects our opinion of probable costs at this time and is subject to change as the project design matures. This cost opinion is in 2022 dollars and does not include escalation to time of actual construction.

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Table ES-3 illustrates how the Priority 1 improvement expenses are anticipated to occur over the next several years. This 6-year CIP should be used by the City's financial consultant to complete a more detailed rate study.

TABLE ES-3: 6-YEAR CAPITAL IMPROVEMENT PLAN

ID#	Item	Cost	Opinion of Probable Costs (2022 Dollars)					
			2024	2025	2026	2027	2028	2029
Priority 1 Improvements (0-6 years)								
1.1	Sequencing Batch Reactor	$ 6,303,000		$ 6,303,000				
1.2	Additional Effluent Storage Lagoon	$ 4,133,000			$ 4,133,000			
1.3	Influent Screen Relocation	$ 49,000			$ 9,000	$ 40,000		
1.4	SCADA Upgrade	$ 240,000				$ 60,000	$ 180,000	
1.5	Chlorination/Dechlorination System Upgrade	$ 457,000					$ 228,500	$ 228,500
Total (rounded)		**$ 11,182,000**	**$ -**	**$ 6,303,000**	**$ 4,142,000**	**$ 100,000**	**$ 408,500**	**$ 228,500**

All costs in 2022 Dollars. Costs include engineering and contingencies (30%).

ES.4.2. Budget and Rate Impacts

Funding for the recommended system improvements may come from any number of sources. The potential user rate impacts if all priority improvements are funded through a low interest loan with debt service payments (20 year, 2.1%) made through a user rate increase are shown below. Table ES-4 outlines the potential residential user rate impacts and assumes a flat rate increase to all 475 sewer EDUs. As shown in Table ES-4, actual rate impacts can vary depending on the City's available System Development Charge (SDC) funds, the rate structure, existing budget surplus, funding source(s), potential grants, and terms of the loan. A separate user rate study is recommended to complete a more detailed evaluation of potential user rate impacts. Details about budget and rate impacts can be found in Chapter 6.

TABLE ES-4: POTENTIAL MONTHLY USER RATE IMPACT TO FUND PRIORITY IMPROVEMENTS

	Annual Payment (20 year, 2.1%)	Monthly User Rate without SDCs	Monthly User Rate Including SDCs
Existing User Rates (2021)	-	$68.59	$68.59
Priority 1 Improvements	$690,472	$189.72	$117.86
Priority 2 Improvements	$429,955	$265.15	$163.67

ES.4.3. Other Annual Costs

In addition to the capital improvement costs presented in the previous section, Keller Associates recommends including additional annual operation and maintenance costs associated with the Capital Improvement Plan (additional aerators, aerobic digestion, grit removal, etc.) in setting annual budgets. It is anticipated that this cost may be close to twice the current amount by year 2043, most of which is associated with increased power usage.

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ES.4.4. SDCs

The scope of this study included estimating the SDC eligibility for each identified capital improvement. It is the intent that this information will be utilized by the City's financial consultant to update the City's SDCs. The estimated SDC eligibility (%) for each identified capital improvement is shown in Table ES-2. The SDC percentage was calculated using the capacity that can be utilized for future connections divided by the future capacity in 2043. For projects that did not have an increase in flows, the percent SDC eligible is derived from the percent growth in population over the 20-year planning period.

ES.4.5. Financing Options

Financing and incentive options that may assist with offsetting costs associated with implementing the CIP include, but are not limited to: user rate increases, SDCs, DEQ State Revolving Fund Loan Program, Oregon Infrastructure Finance Authority grants and loans, USDA Rural Utilities Services loans and grants, direct state loans appropriations, revenue bonds, general obligation bonds, US Economic Development Administration grants, and Energy Trust of Oregon. Additional financing options are discussed in Chapter 6.

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CHAPTER 1 - PROJECT PLANNING

The City of Aurora owns and operates a municipal sewage collection system and wastewater treatment plant (WWTP). This study acts as an update to the Wastewater Facilities Planning Study (WWFPS) adopted in 2019. Recent influent data indicated an increase in WWTP influent loading necessitating a reevaluation. This project will update the WWFPS WWTP evaluation with population, flow, and loading projections for a 20-year planning period through 2043. The WWTP improvements from the 2019 WWFPS will be reviewed, and the evaluation, alternatives, and recommendations updated if necessary. The collection system will not be evaluated as part of this WWFPS.

1.1. PROJECT PLANNING AREA

The study area consists of all areas within the City of Aurora Urban Growth Boundary (UGB). Figures 1 and 2 in Appendix A show the study area and existing service areas, including the zoning and study area (Figure 1) and topography and flood plain (Figure 2). Figures with a date of May 2019 were created for a previous study where the data did not change. The study area sits between Mill Creek and the Pudding River. The WWTP is located between the Southern Pacific railroad tracks and Mill Creek, just north of the westerly extension of the Ottaway Road.

1.2. ENVIRONMENTAL RESOURCES

An inventory of the existing environmental resources is used to consider the environmental impacts of alternatives. The factors analyzed in this section include land use/prime farmland, floodplains, wetlands, cultural resources, coastal resources, and socio-economic conditions.

1.2.1. Zoning

Aurora zoning is shown in Figure 1 (Appendix A). The majority of the City is zoned for medium and low density residential, with some scattered split zoning. There is one industrial area at the west end of Ottaway Road, and commercial zoning along Highway 99E. The areas between the city limits and UGB are zoned as urban transition farm.

1.2.2. Floodplains

The Federal Emergency Management Agency (FEMA) publishes flood insurance studies that classify land into different flood zone designations. As shown in Figures 2 and 2.A (Appendix A), some portions of the study area are located inside the 100-year and 500-year floodplains of the Pudding River and Mill Creek.

1.2.3. Wetlands

The Oregon Department of State Lands (ODSL) keeps an inventory of the local wetland areas in Oregon. Wetland delineation was not within the scope of this project, so the U.S. Fish and Wildlife National Wetlands Inventory was used to determine the wetland areas that could potentially be impacted. The map of delineated wetlands from the National Wetlands Inventory is shown in Figure 3 (Appendix A). The City has four sites delineated by the National Wetlands Inventory. Two on the north side of the City are designated as freshwater ponds. One on the northeast side of town along Highway 99E is designated as a freshwater forested/shrub wetland. The fourth is a freshwater emergent wetland on the eastern border of the city limits.

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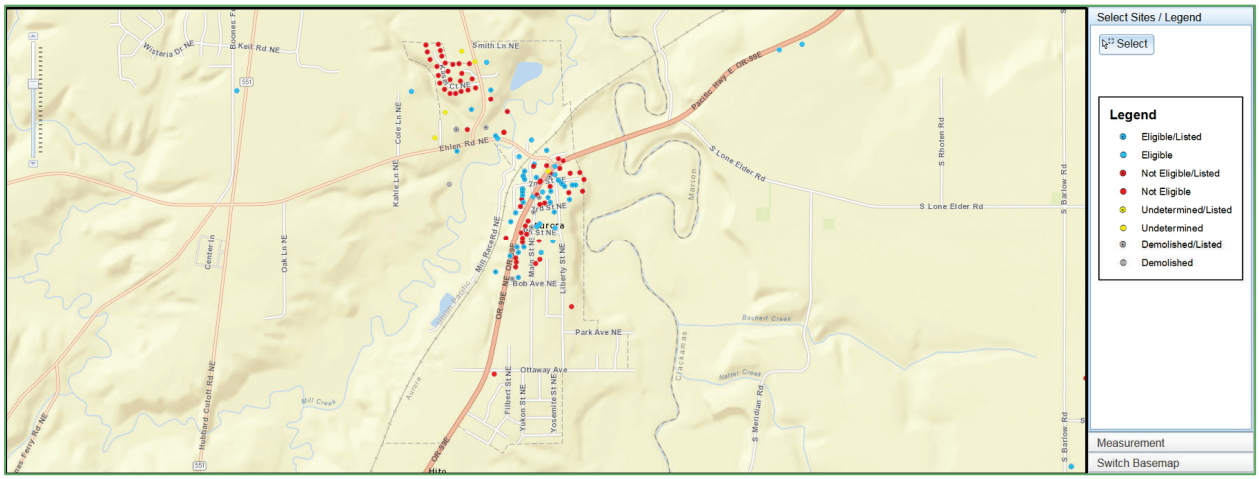
1.2.4. Cultural Resources

The State Historic Preservation Office (SHPO) maps above-ground cultural resources on their website. According to the SHPO website, there are many structures that are listed as "eligible" cultural resources within the UGB. The map from the SHPO website is shown in Figure 1-1. The SHPO also keeps track of underground cultural resources. They only provide information from their database to professional archaeologists, with one exception. They will provide information for small project areas if provided the complete legal description of the project location, a United States Geological Survey (USGS) map of the project area, and a description of the project and ground disturbance. The SHPO should be consulted as part of the design process of any proposed recommendation.

FIGURE 1-1. ABOVE-GROUND CULTURAL RESOURCES



1.2.5. Biological Resources

Pacific Northwest Interagency Special Status / Sensitive Species Program lists the endangered, threatened, and sensitive species for the state and county by Bureau of Land Management (BLM) district. The City of Aurora lies within the Salem BLM District. Endangered species in the district include the Fender's blue butterfly, Taylor's checkerspot, Bradshaw's desert parsley, and Willamette Valley daisy. The fish in the Salem district that are listed as federally threatened include the Coho salmon, Steelhead, Chinook salmon, and Pacific eulachon.

1.2.6. Water Resources

The Pudding River is classified (OAR-340-041-0340) for public and private domestic water supply, industrial water supply, irrigation and livestock watering, fish and aquatic life (including salmonid rearing, migration and spawning), wildlife and hunting, fishing, boating, water contact recreation, aesthetic quality, hydro power, and commercial navigation and transportation uses. There are no wild or scenic rivers in the study area.

Mill Creek flows through the study area and outfalls into the Pudding River north of the City. As of the most recent Integrated Report in 2022, the Pudding River is water quality limited for temperature, Guthion, DDT 4,4', Dieldrin, dissolved oxygen, and iron. There are several active TMDLs on the Pudding River including the Willamette Basin TMDL, the Molalla-Pudding Subbasin TMDL, and the Pudding River, Molalla-Pudding TMDL. The wasteload allocations that are applicable to the City are E. coli bacteria and the pesticides DDT and Dieldrin. The discharge permit includes limits for E. coli that are below the wasteload allocation. DDT and Dieldrin are monitored but have not caused an issue.

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A wasteload for temperature was not provided since the WWTP effluent discharge occurs from November 1 through April 30, which is outside the critical period between June 1 and September 30.

1.2.7. Coastal Resources

There are no coastal areas within the study area.

1.2.8. Socio-Economic Conditions

According to the US Census Bureau for Marion County, the median household income is $61,817, 12.1% of people are in poverty, 10.2% are without health insurance, and 85.2% of people attained a high school diploma or higher.

Effective on January 1, 2008, Oregon Senate Bill 420 established an environmental justice task force and requires the natural resources agencies to follow prescribed steps to provide greater public participation and to ensure the involvement of persons who may be affected by agency actions. Passing of this law places greater emphasis on inclusive public outreach for state agency projects. Environmental justice aims to take appropriate steps to identify and address any disproportionately high and adverse human health or environmental effects of potential projects on minority and low-income populations to the greatest extent practicable and permitted by law.

The WWFPS addresses deficiencies and makes recommendations for the WWTP. All areas of the City have equal access to the City collection system, which delivers the City designated level of service to all users. Recommended improvements presented in this plan are to be designed to achieve and maintain the desired level of service for all users. The WWTP does not impact one area more or less, therefore recommended improvements will benefit/impact all residents equally. City Council holds a public meeting to review and adopt the WWFPS.

1.2.9. Miscellaneous Issues

Other environmental resources considered were air quality and soils. Aurora is not located in an area designated as an air maintenance or nonattainment area by DEQ. A soils map is provided in Figure 4 (Appendix A). Soils in the area are generally various forms of silt loam.

1.3. POPULATION TRENDS

The official population projections and records of the City of Aurora are currently coordinated by collaborative efforts of Marion County and Portland State University (PSU). The collaborating agencies published a document in July 2021 establishing the official coordinated population projection rates for all the cities in Marion County. The document also includes a summary of historical populations from the U.S. Census.

The historical populations presented in the referenced document are shown in Table 1-1. Each year, PSU establishes a certified population estimate. These population estimates were used as the base starting point for population projections. The projections shown in Table 1-1 were calculated using the growth rates presented in the referenced document. The overall estimated population annual average growth rate from 2022 to 2043 is 2.3%.

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TABLE 1-1. POPULATION HISTORY AND PROJECTIONS

Year	Population	AAGR	Source
1990	567	-	U.S. Census
2000	655	-	U.S. Census
2010	918	-	U.S. Census
2020	985	-	U.S. Census
2021	1,133	-	AAGR*: 2021 Marion County Forecast Report (PSU PRC)**
2022	1,159	2.3%	AAGR: 2021 Marion County Forecast Report (PSU PRC)
2023	1,186	2.3%	AAGR: 2021 Marion County Forecast Report (PSU PRC)
2028	1,328	2.3%	AAGR: 2021 Marion County Forecast Report (PSU PRC)
2033	1,488	2.3%	AAGR: 2021 Marion County Forecast Report (PSU PRC)
2038	1,668	2.3%	AAGR: 2021 Marion County Forecast Report (PSU PRC)
2043	1,869	2.3%	AAGR: 2021 Marion County Forecast Report (PSU PRC)

*AAGR is Average Annual Growth Rate

**PSU PRC is Portland State University Population Research Center

1.4. COMMUNITY ENGAGEMENT

The City provided opportunities for the community to engage in the planning process and provide comments or ask questions through the City website and City Council meeting.

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CHAPTER 2 - EXISTING FACILITIES

This section contains a description and evaluation of the existing wastewater treatment plant (WWTP) for the City of Aurora.

2.1. LOCATION MAP

Maps of the existing WWTP facilities are included in Figure 5 (Appendix A). A schematic process layout of the WWTP is located in Figure 6 (Appendix A).

2.2. HISTORY

WWTP and collection system were constructed in the fall of 1999 through the winter of 2001. Prior to this time the City of Aurora depended on septic tanks and drain fields for wastewater treatment. The WWTP includes a multi-cell lagoon (three aerated cells followed by two settling cells), an effluent storage lagoon, chlorine disinfection and de-chlorination, and an effluent pump station. An influent screen, adjacent to the aerated lagoon, was added in 2007. Also, all but one of the floating aerators in the lagoon were replaced by diffusers and blowers in 2012.

2.3. WWTP DESCRIPTION

The wastewater influent flow is measured using a magnetic flow meter in a vault near the WWTP. Inside the WWTP fence, the wastewater is sampled and screened adjacent to the aerated lagoon. The screenings are placed in a 55-gallon barrel or rolling garbage container until they are periodically taken to the landfill. Following the influent mechanical fine screen, the wastewater flows by gravity into the aerated lagoon where it is aerated in three (3) aeration cells and the solids are settled in two (2) settling cells. Following treatment in the aerated lagoon, the wastewater is stored in a 7.2-million gallon effluent storage lagoon. If there is a process upset, the wastewater can be diverted and temporarily stored in this effluent storage lagoon. When the wastewater leaves the effluent storage lagoon it flows by gravity through a magnetic flow meter, modulating valve to control the flow, and enters a chlorine contact basin where it can be chlorinated and then dechlorinated.

Following the disinfection process the flow is sampled in accordance with NPDES Permit No. 101772. From May 1st to October 31st the treated wastewater is pumped by the River Pump Station/Irrigation Pump Station and land applied on approximately 6 acres of City land adjacent to the WWTP. From November 1st to April 30th the effluent is pumped by the River Pump Station/Irrigation Pump Station to the Pudding River. In the river, the effluent discharges through a single-port diffuser, which helps distribute and mix the effluent with the river channel flow.

Previously, solids generated in the aerated lagoon were pumped out of the settling cells to the new Sludge Holding Tanks in the Sludge Transfer Station area of the treatment plant. Solids were held in these tanks, periodically removed using a vacuum truck, and hauled to the City of Salem for treatment. Since the City of Salem no longer accepts solids, biodegradable dewatering bags are used for sludge containment and disposal in a landfill.

The WWTP does not currently accept septage. Also, the WWTP does not treat a significant amount of industrial wastewater as there are no major industrial facilities connected to the collection system. Septage and industrial discharges can be significant sources of load to a plant, so the City should carefully consider each case before allowing septage or industrial discharge into the WWTP.

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2.4. CONDITIONS OF EXISTING FACILITIES

2.4.1. Pump Stations

The River Pump Station/Irrigation Pump Station conveys the treated WWTP effluent to the Pudding River during the winter and in the summer the effluent is land applied on City land near the WWTP. The Return Pump Station pumps the water from the Sludge Holding Tanks (Sludge Transfer Station) to the aerated lagoon. The bathroom in the WWTP Office and the drain for the Chlorine Contact Basin are also connected to the Return Pump Station.

River Pump Station / Irrigation Pump Station

The River Pump Station/Irrigation Pump Station is located near the chlorine contact basin. The pump station has two (2) 20 HP Hydromatic Model S4LVX submersible centrifugal pumps for river discharge and one (1) 7.5 HP PACO Model 1570-5 surface mounted centrifugal pump for irrigation. The pump station was constructed in 2000 and includes a 6 ft. diameter wet well, a pressure transducer level sensor, valves, pressure gauges, and a control panel. The surface mounted centrifugal pump, pump valves and control panel are adjacent to the wet well under a fiberglass hinged hood manufactured by Hydronix. The surface mounted PACO irrigation pump was installed in 2016. Valves were also installed in 2016 that allow the river discharge pumps to be used for irrigation as well.

River Pump Station / Irrigation Pump Station

In order to discharge to the Pudding River, the wastewater is pumped approximately 1,400 ft. in a 6 in. diameter pipe and then travels an additional 850 ft. in an 8 in. diameter gravity line before discharging through a single-port diffuser. Temporary piping is used for land application at the WWTP. An AMIAD SAF-3000 irrigation filter was installed in 2000. The City cleans the filter periodically to maintain proper operation.

The submersible pumps are controlled by the pressure transducer level sensor using a lead on, lag on, and pump off operational strategy. The City has tested the level sensor. There have been no known issues with the pump station overflowing or with pumps running continually for an extended period of time. The pumps are being throttled to prevent the pumps from cycling too frequently. However, replacing the existing starters with variable frequency drives (VFDs) may be more energy efficient. Another option would be to replace the river discharge pumps with smaller horsepower pumps. The irrigation pump was replaced with a smaller horsepower pump, which has reduced the pump's cycle frequency. An autodialer is used to send alarms to the City. The permanent diesel generator powers the pump station whenever the power goes out. The facility is not fenced, but the City has not had problems with security or vandalism with the pump station.

<u>Deficiencies</u>

- There is no fence to secure the area.
- There is no fall protection for the wet well.
- There is no sign reading, "Confined space, entry by authorized personnel only".
- Pumps are cycled on/off, which increases power use, rather than ramping up/down with a VFD.

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- The irrigation system uses temporary piping, which has had issues.

Return Pump Station

The Return Pump Station is also located near the chlorine contact basin. The pump station consists of two (2) Pentaire Hydromatic Model HPGX 200 grinder pumps. The pump station was constructed in 2000 and consists of a 6 ft. diameter wet well, a pressure transducer level sensor, submersible chopper pumps, valves, and a control panel. The Return Pump Station pumps through a 2 in. PVC line to the head of the WWTP. Previously, this line may have connected with the influent line upstream of the influent screen and WWTP influent sampling. The City has modified the return piping so that it enters directly into the aerated lagoon and no longer impacts the influent sample results.

Return Pump Station

Both of the original pumps were replaced in 2016 with the Pentaire pumps. The pumps are controlled by the pressure transducer level sensor using a lead on, lag on, and pump off operational strategy. The City has tested the level sensor. The pumps are being throttled to prevent the pumps from cycling too frequently. Per City staff, the pump station runs approximately once a day. Energy savings from replacing the existing starters with VFDs would be negligible.

There have been no known issues with the pump station overflowing or with pumps running continually for an extended period of time. It is unclear if the control panel is receiving gases from the pump station. An autodialer is used to send alarms to the City. The permanent diesel generator powers the pump station whenever the power goes out. The facility is not fenced, but the City has not had problems with security or vandalism with the pump station.

<u>Deficiencies</u>

- There is no fence to secure the area.
- There is no fall protection for the wet well.
- There is no sign reading, “Confined space, entry by authorized personnel only”.
- There is no way to measure the amount of water being pumped from this station into the treatment process.

2.4.2. Headworks

Wastewater flows into the WWTP through a 6 in. sewer line. The influent is measured with a MAG 3100 magnetic flow meter near the influent screen, but outside of the WWTP fence. An ISCO Model 3700FR refrigerated composite sampler is located in a control building inside the WWTP fencing, adjacent to the aerated lagoon. The sampler pulls samples from near the influent screen and it is programmed to collect influent samples based on the influent flow measurements.

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Influent Screen

A WesTech CleanFlo™ Spiral Screen Model FST2 influent screen was installed in 2007. The screen has 0.25 in. perforated plate openings. Screenings from the unit are automatically washed, bagged and deposited into a barrel or rolling garbage can adjacent to the screen. If the influent screen malfunctions, the wastewater will automatically overflow into a bypass with a manual bar rack that is connected to the influent screen. The WWTP does not have a grit removal system following the influent screen, which would provide additional solids removal. The influent screen is not covered, so freezing can be a problem. Also, there is limited space between the screen and the lagoon for maintenance.

Deficiencies

- Grit continues to accumulate in the aerated lagoon.
- There is no freeze protection on the screen.
- There is limited room for maintenance.
- There is no fall protection between the screen and the lagoon.

2.4.3. Aerated Lagoon – Aeration Cells

The lagoon was constructed in 2000 and is an HDPE-lined lagoon basin. From the surface, the lagoon appears to be in relatively good condition. The cells in the lagoon are separated by polypropylene floating baffles. The lagoon has approximate dimensions of 200 ft. long x 50 ft. wide x 10 ft. deep and has a total volume (including settling cells) of approximately 356,000 gallons. The aerated portion of the lagoon is approximately 313,000 gallons. There is no fall protection around the outside of the aerated lagoon to protect operators. See Figures 5 and 6 in Appendix A for the lagoon layout and process flow diagram.

Two (2) 10 HP Tuthill PneuMaxII™ rotary positive displacement blowers and 56 fine bubble diffusers provide oxygen for the lagoon system in the aeration cells. There are 28 diffuser lines with ball valves, which can be turned off to decrease the air in that cell for process control. According to the operators the diffusers appear to be in good shape (no major leaks), but they have not been able to take the lagoon down to inspect them. Also, one of the original 7.5 HP Aeration Industries Aire-O2® aerator remains in the first aeration cell, primarily to provide mixing. Historically, two (2) HACH LDO™ dissolved oxygen (DO) probes monitor the DO concentrations in the aeration cells. The DO measurements were sent to the SCADA system in the WWTP Office. Currently, the DO probes are not operational. The City takes grab samples from the lagoon and measures DO concentrations at the WWTP office with a handheld DO probe. The blowers can be manually turned off/on depending on the DO measurements in the aerated cells. The aerator, however, is generally left on in order to provide mixing. Algae and solids deposition have been observed on the sides of the aeration cells, so the mixing is likely limited on the sides.

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The aerated lagoon, based on the 2021 design maximum month wet weather flow, has an average hydraulic retention time in the aerated portion of the lagoon of approximately 5 days.

Aerated Lagoon

While Aurora does not currently have an ammonia river discharge permit limit, as discussed in Chapter 1, one may possibly be added in the future. For this reason, the ability of the WWTP to continually achieve nitrification was evaluated. It is normally desirable to maintain 2.0 mg/l DO in the aerated lagoon to ensure adequate oxygen is available for metabolism of the influent organic matter (BOD) by the microorganisms in the process and for nitrification. The surface aerator and the blowers/diffusers have a combined firm capacity (with one of the 10 HP blowers out of service) of approximately 370 lbs. oxygen (O2)/day. Assuming influent concentrations of BOD_5 of 456 mg/L and TKN of 60 mg/L, and a peaking factor of 1.25, and aeration requirements of 1.2 lbs. O_2/lb. BOD_5 and 4.6 lbs. O_2/lb. total Kjeldahl nitrogen (TKN), the existing aeration system has firm capacity to handle a maximum flow of approximately 0.043 MGD, which means that the aeration system is currently under capacity.

Additionally, although there are several cells, there is only one aerated lagoon. If maintenance is required on the diffusers or if there is a process upset, then the wastewater will be transferred directly into the effluent storage lagoon. If there is a power loss, the aerator and blowers will be automatically powered through a permanent 100 kW, diesel generator with automatic transfer switch located next to the WWTP Building. The City periodically uses temporary pumps to recycle the water in the aerated lagoon to keep the scum off the surface.

See Section 2.6 for a discussion on the treatment performance of the aerated lagoon.

Deficiencies

- The lagoon aeration is currently under capacity.
- With only one aeration lagoon, maintenance can be difficult.
- The DO probes are not operational and do not connect with the SCADA system.
- There is no fall protection around the aerated lagoon.

2.4.4. Aerated Lagoon – Settling Cells

There are two (2) settling cells in the aerated lagoon, which operate in series. Wastewater from the aerated cells flows through windows in the baffle walls into the first settling cell and then into the second settling cell. There are no diffusers in the settling cells, so there is little to disturb the solids settling process. At the end of the second settling cell, the wastewater exits through submerged pipes into an aerated lagoon outlet structure, where it travels through an 8 in. pipe to the effluent storage lagoon. There are three (3) effluent pipes with valves located at different levels in the settling cell, which allow the operator the ability to control the level in the aerated lagoon. Solids and scum that accumulate in the settling cells are periodically removed using temporary submersible pumps and disposed of using biodegradable dewatering bags.

Deficiencies

- The sludge pumps and piping are temporary and require manual operation.

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- There is no measurement on the amount of solids being wasted to the biodegradable dewatering bags; however, a timer is being installed to allow a rough solids volume to be calculated based on the estimated sludge pump rate.
- There is no emergency overflow if the effluent pipe plugs.

2.4.5. Effluent Storage Lagoon

The Effluent Storage Lagoon is HDPE lined and was constructed in 2000. The storage lagoon has a net storage capacity of approximately 7.2 million gallons. It appears to be in relatively good condition although there is no fall protection around the lagoon to protect the operators. There are three (3) submerged effluent pipes with valves located at different levels in the effluent lagoon outlet structure, which allow the operator the ability to control the level in the storage lagoon. The wastewater exits the storage lagoon through the effluent lagoon outlet structure, where it travels through an 8 in. pipe to the WWTP Building. Solids and scum that accumulate in the lagoon are periodically removed using portable submersible pump. During the summer months, the portable pumps are used in conjunction with portable sprinklers to evaporate and aerate the water in the Effluent Storage Lagoon. Evaporation concentrates the total dissolved solids in the water, making it typically less desirable to plants, so this should be performed only as needed, such as to avoid overflowing the storage lagoon.

Land application can take place during the growing season at an agronomic uptake rate, which is approximately 15.5 inches per acre per year on a grass seed crop (Oregon Crop Water Use and Irrigation Requirements, 1992, OSU ext. Pub. 8530). The 2043 theoretical irrigated farmland needed to land apply the effluent during the growing season, (based on the 2043 ADWF and assuming 75% irrigation efficiency), is approximately 34 acres. Currently the City performs land application on approximately 6 acres using a temporary sprinkler system.

A water balance for the existing WWTP was developed using 2043 average dry-weather design flow, 2010 monthly precipitation data from the City's rain gauge, and evaporation data from the Western Regional Climate Center – North Willamette Research and Extension Station. The water balance, (located in Appendix B), showed that the Effluent Storage Lagoon is at capacity without land application. Approximately 12 million gallons of additional storage capacity is needed to store the 2043 average dry-weather design flow without land application. If land application continued to take place on the 6-acre land application site, the amount of additional storage necessary would decrease to approximately 9 million gallons.

Although not fully shown in the 2017-2021 data in Section 3.6, achieving the TSS and BOD_5 percent removal at certain times during 2016 and the beginning of 2017 was a challenge. This has been speculated to be due to algae. Since 2018, operators have not experienced difficulty meeting the percent removals.

<u>Deficiencies</u>

- There is insufficient storage volume and/or land application area for the 20-year design flows.
- There is no fall protection around the Effluent Storage Lagoon.
- There is no emergency overflow if the effluent pipe plugs.
- The Effluent Storage Lagoon has not been inspected recently.

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2.4.6. Chlorination and Dechlorination Systems

After water leaves the Effluent Storage Lagoon it travels to the WWTP Building. In the WWTP Building, the flow is measured using a Siemens Sitrans F M MAG 5000/6000 magnetic flow meter. A butterfly valve downstream of the flow meter is modulated to control the effluent flow. The flow to the chlorine contact basin is currently controlled to around 100-120 gallons per minute (gpm). Through controlling the effluent flow, the chlorine and dechlorination chemicals are being conserved and contact time extended for better disinfection.

Chlorine Dosing System

The chlorine contact basin, (constructed in 2000), is located adjacent to the WWTP Building. Based on the 1999 plans for Aurora's Wastewater Treatment Plant, the chlorine contact basin has approximate dimensions of 26 ft. x 10 ft. x 5 ft. deep for a total volume of approximately 7,800 gallons. At the beginning of the chlorine contact basin, sodium hypochlorite is added using a Stenner Pump Model 85MJH2A1STAA pump. The dosing changes are made manually. An improvised, inline, static mixer is used to mix the chlorine with the effluent. When discharging to the river, the wastewater is dechlorinated at the end of the chlorine contact basin with sodium bisulfite. The sodium bisulfite is added using a Stenner Pump Model 85MJH2A1STAA pump; dosing changes are made manually. The treated effluent enters the River Pump Station/Irrigation Pump Station wet well prior to being pumped.

The chlorine and dechlorination pumps are both located in the chlorine storage building, since the corrosion in the sodium bisulfate building is extreme. Neither building has adequate ventilation and both have had problems with freezing. A spare dosing pump is stored at the WWTP in case a dosing pump fails.

Because there is storage in the effluent storage lagoon and the effluent flow can be halted while the channel is cleaned or repaired, the City proposes that no redundant chlorine contact basin be required. The chlorine contact basin is cleaned several times a year.

An ISCO Model 3700FR refrigerated composite sampler is programmed to collect effluent samples from the River Pump Station/Irrigation Pump Station based on the effluent flow measurements.

Deficiencies

- There is no reliable ventilation system in the chemical storage buildings, so fumes can become trapped inside. Excessive corrosion was observed on the buildings.
- Freezing has been observed by the operators in the chemical storage buildings despite the use of temporary heaters.
- The inline, static mixer is improvised and needs to be replaced.
- There is no fall protection around the chlorine contact basin.
- There is currently no alarm sent to the SCADA system if the dosing pump fails.

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2.4.7. Solids Handling

Since the City of Salem no longer accepts sludge, the City now places the sludge into dewatering bags, which are later picked up for disposal. The Sludge Holding Tanks in the Sludge Transfer Station are currently unused. Water from the dewatering bags is drained to the Return Pump Station. The Return Pump Station pumps to the aerated lagoon. There is limited solids treatment occurring prior to disposal.

Deficiencies

- The solids likely cannot be land applied (EPA Part 503-Standards for the Use or Disposal of Sewage Sludge) without further treatment.
- There is no mechanical dewatering which would provide more reliable dewatering.

2.4.8. SCADA

The SCADA system in the WWTP Office controls the pump stations, displays flow measurements, and receives alarms from motors throughout the plant. The autodialer is also connected to the SCADA system. The control panel for the influent screen is located under an overhang of a building near the influent screen. The control panel for the blowers and aerator is located in a building near the aerated lagoon. The only deficiency noted for the SCADA system is the difficulty to incorporate new functions, due to the programming language.

2.4.9. Electricity

All of the electricity at the WWTP is provided by Portland General Electric. A permanent 100 kW diesel generator located near the WWTP Building powers the WWTP equipment if the electricity goes out and an autodialer notifies the operator of a power outage. The generator is exercised periodically. No deficiencies were noted for the electrical system.

2.4.10. Plant Water

The WWTP uses potable City water for general cleaning/use. There is currently no use of WWTP effluent for plant water. It is recommended that the City investigate installing a plant water system – using treated and disinfected effluent rather than potable water – to reduce City water usage. Backflow pressure reducing devices, pumps, and additional piping would be necessary.

2.4.11. WWTP Office

The WWTP Office was constructed in 2000. It currently houses a laboratory, shop, office, and bathroom. No deficiencies were noted for the WWTP Office.

2.4.12. WWTP Operators

The City currently has one Treatment Level III T-10510 operator and one Treatment Level I T-13754 operator.

2.4.13. Site Security and Roads

There is a gate on Millrace Road. Although the lagoons at the WWTP are fenced, the WWTP Office, the chlorine contact basin, and the pump stations are not fenced. It is recommended that the remainder of the WWTP be fenced. The gate can remain open during business hours.

The stormwater detention basin near the WWTP Office washed out and bank stabilization is urgently needed in this area. The road into the WWTP is gravel and has periodically been washed out. It is recommended that the road be paved to prevent washout and that storm drains be installed to collect and disperse the stormwater.

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2.5. WWTP OPERATIONS

2.5.1. WWTP Performance

This section evaluates the effluent quality from the existing plant relative to current effluent limits for BOD_5, TSS, E. coli bacteria, pH, chlorine residual, and total coliform.

BOD_5

Monthly and weekly effluent BOD_5 data from January 2017 to December 2021 are shown in Figures 2-1 and 2-2, along with discharge limits per the current permit. January 2017 through May of 2017 exceeded the limit of 30 mg/l. Likewise, as shown in Figure 2-3, the plant did not meet the current 85% BOD_5 removal requirement for January 2017 through April in 2017 and just barely meet the requirement in May 2017. As shown in Figure 2-4, the maximum average monthly load was higher than the permitted limit in March 2017 and April 2021. The maximum average weekly load was higher than permit requirements in March of 2017 as shown in Figure 2-5. The effluent BOD_5 load was consistently lower than the permitted average daily maximum loads, as shown in Figure 2-6.

FIGURE 2-1: WWTP EFFLUENT BOD_5 CONCENTRATIONS (MONTHLY)

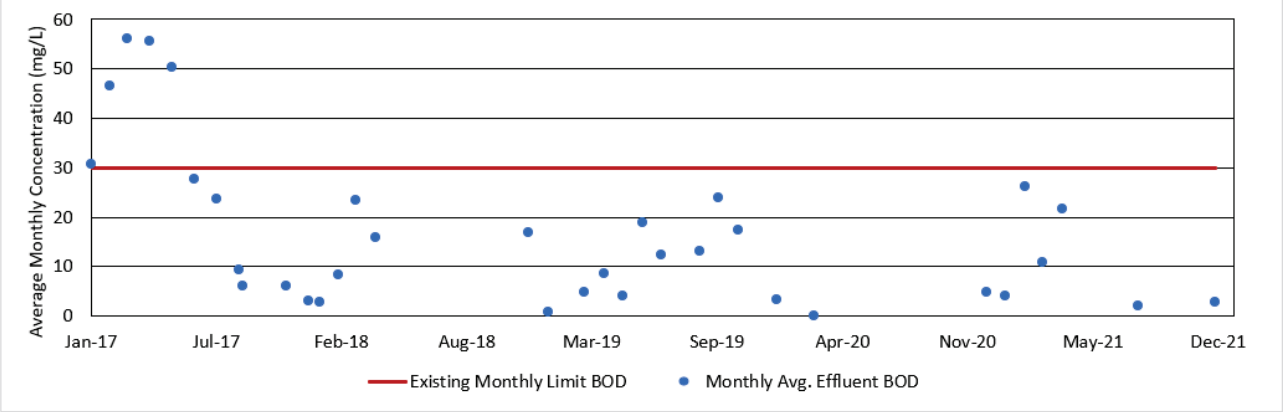

FIGURE 2-2: WWTP EFFLUENT BOD_5 CONCENTRATIONS (WEEKLY)

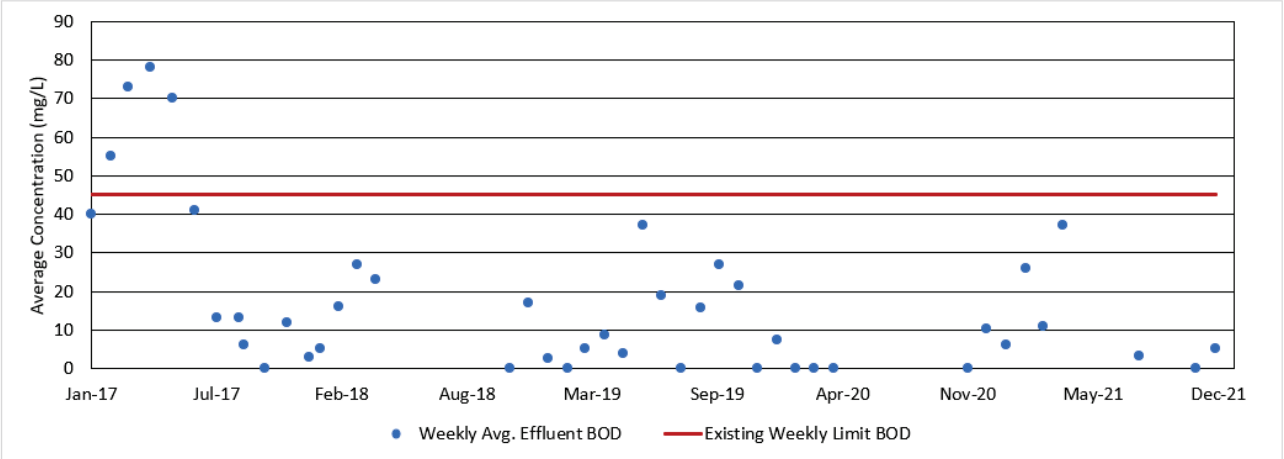

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FIGURE 2-3: WWTP EFFLUENT BOD_5 PERCENT REMOVAL (MONTHLY)

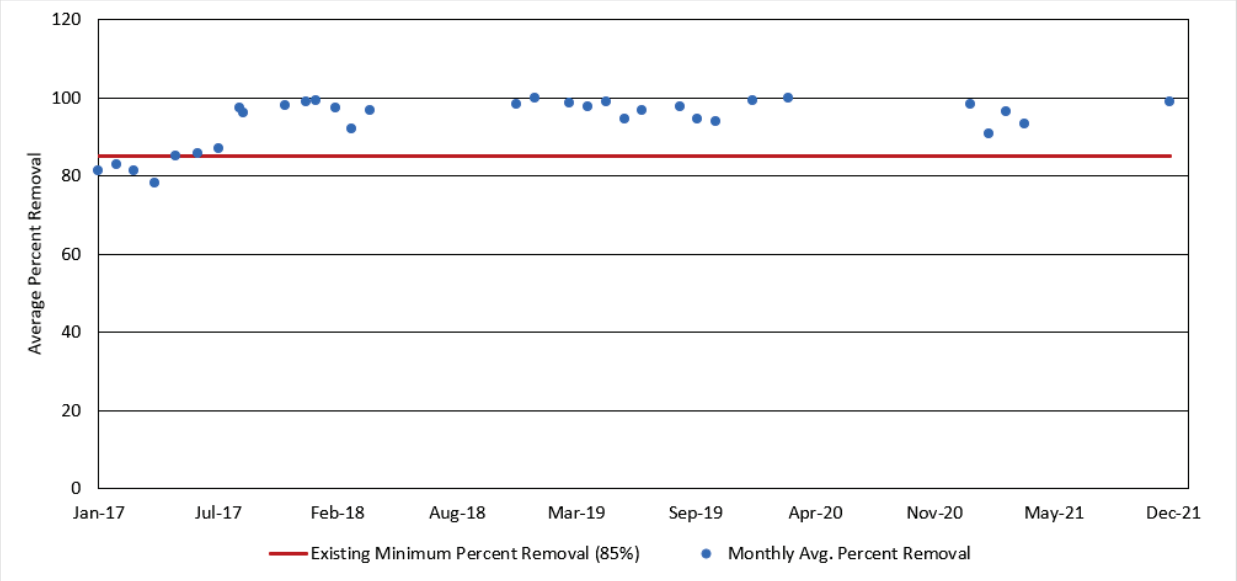

FIGURE 2-4: WWTP EFFLUENT BOD_5 LOADING (AVERAGE MONTHLY)

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FIGURE 2-5: WWTP EFFLUENT BOD_5 LOADING (AVERAGE WEEKLY)

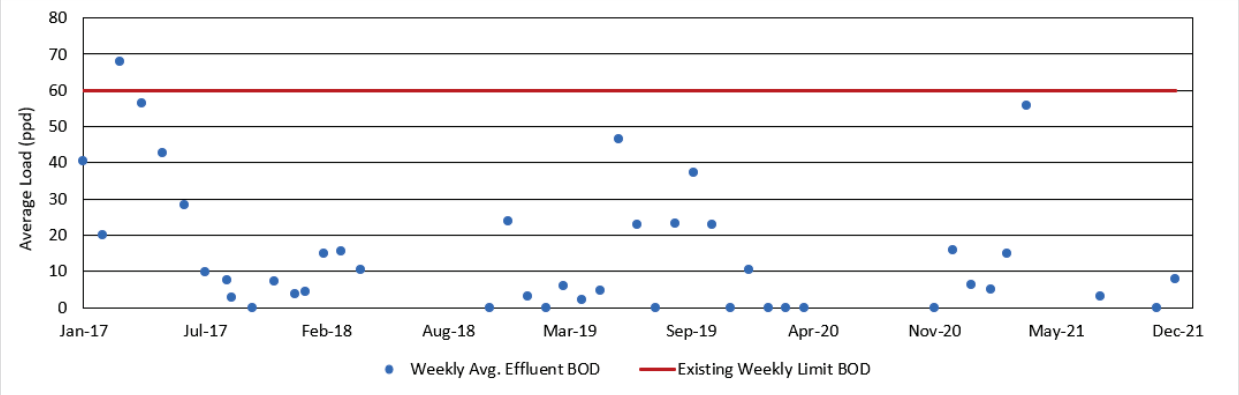
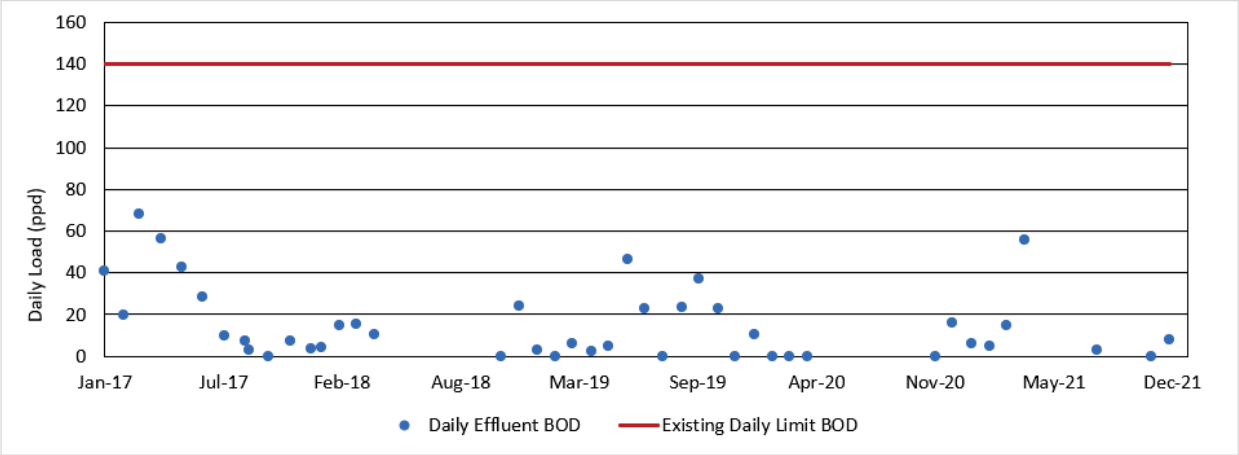


FIGURE 2-6: WWTP EFFLUENT BOD_5 LOADING (DAILY MAXIMUM)



TSS

Monthly and weekly effluent TSS data from January 2017 to December 2021 are shown in Figures 2-7 and 2-8 with discharge limits per the current permit. The wastewater treatment plant experienced monthly average TSS permit violations in June and October of 2019. TSS removals have consistently been above the permit requirement of 65% other than in June of 2019 (Figure 2-9). The effluent TSS loads have been lower than the permitted maximum average monthly limit other than in September and October of 2019 (Figure 2-10). Loads exceeded the maximum average weekly limit in October of 2019 (Figure 2-11). Daily maximum loads are consistently lower than the limit as shown in Figure 2-12.

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FIGURE 2-7: WWTP EFFLUENT TSS CONCENTRATIONS (MONTHLY)

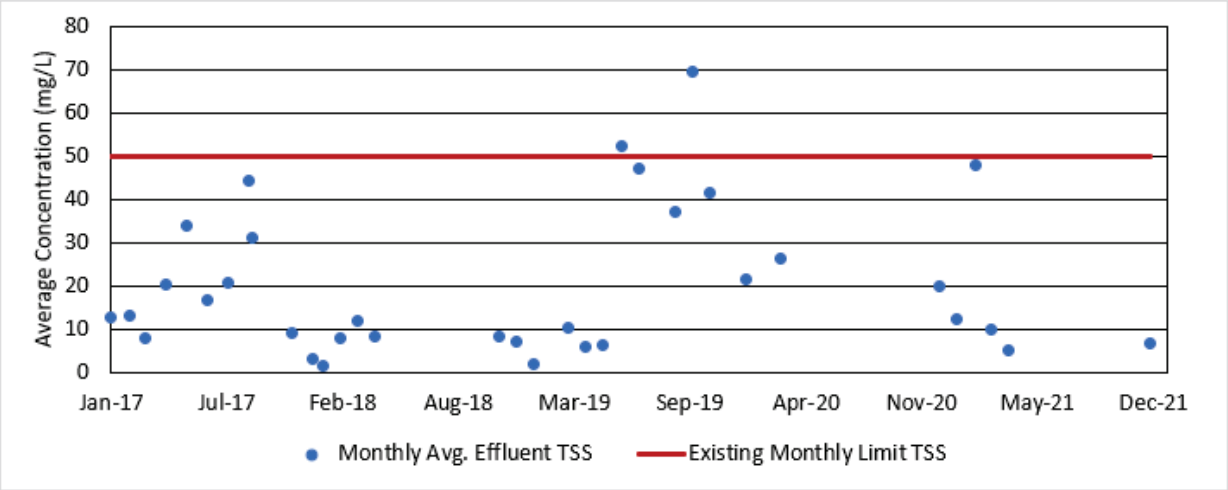

FIGURE 2-8: WWTP EFFLUENT TSS CONCENTRATIONS (WEEKLY)

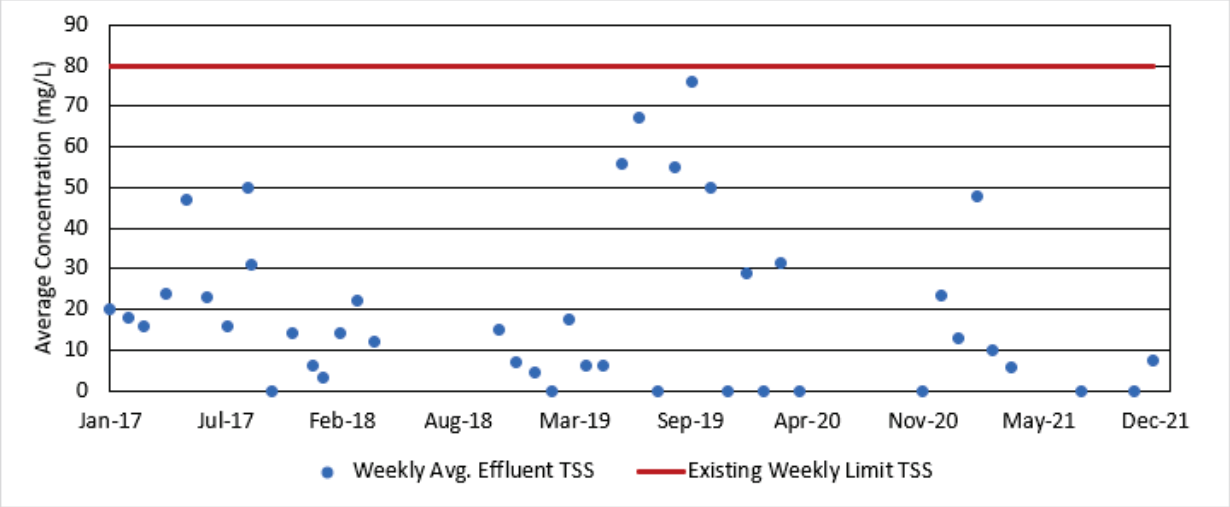

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FIGURE 2-9: WWTP EFFLUENT TSS PERCENT REMOVAL (MONTHLY)

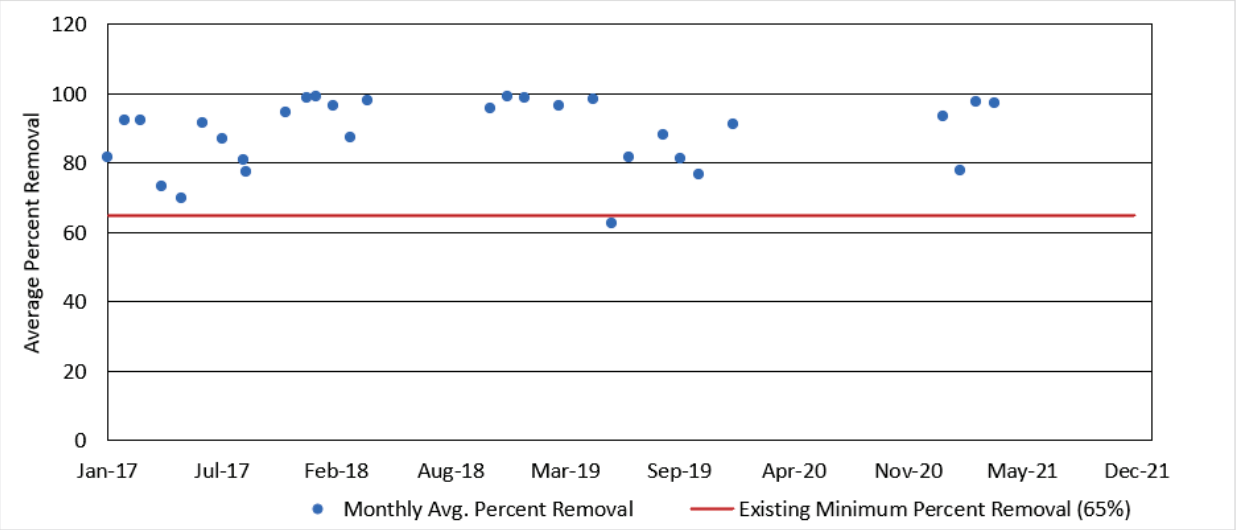

FIGURE 2-10: WWTP EFFLUENT TSS LOADING (AVERAGE MONTHLY)

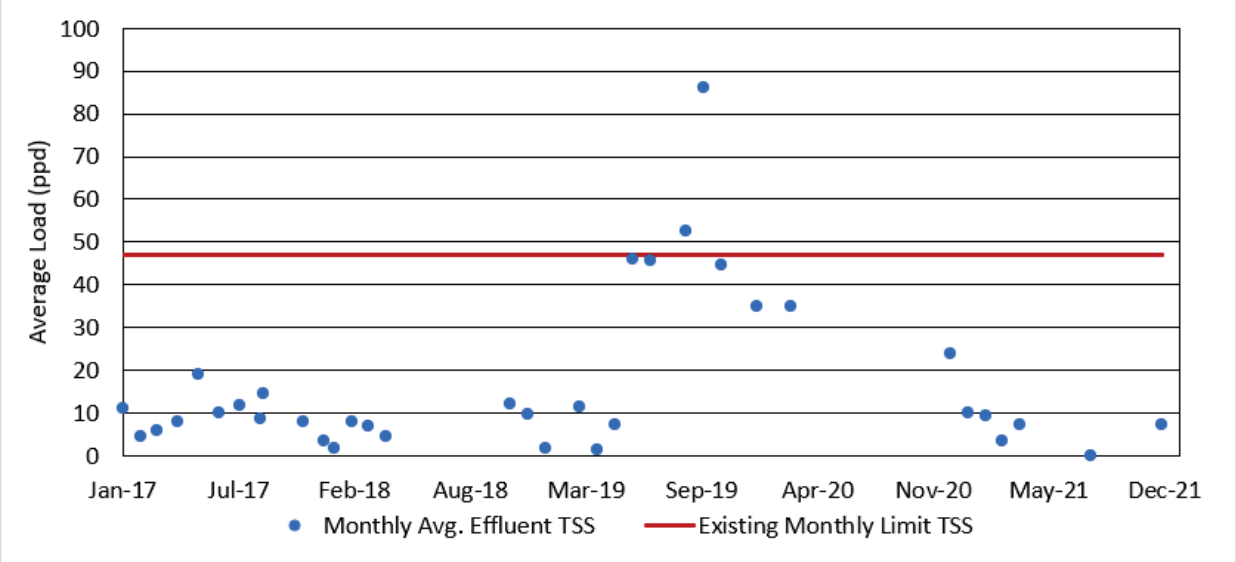

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FIGURE 2-11: WWTP EFFLUENT TSS LOADING (AVERAGE WEEKLY)

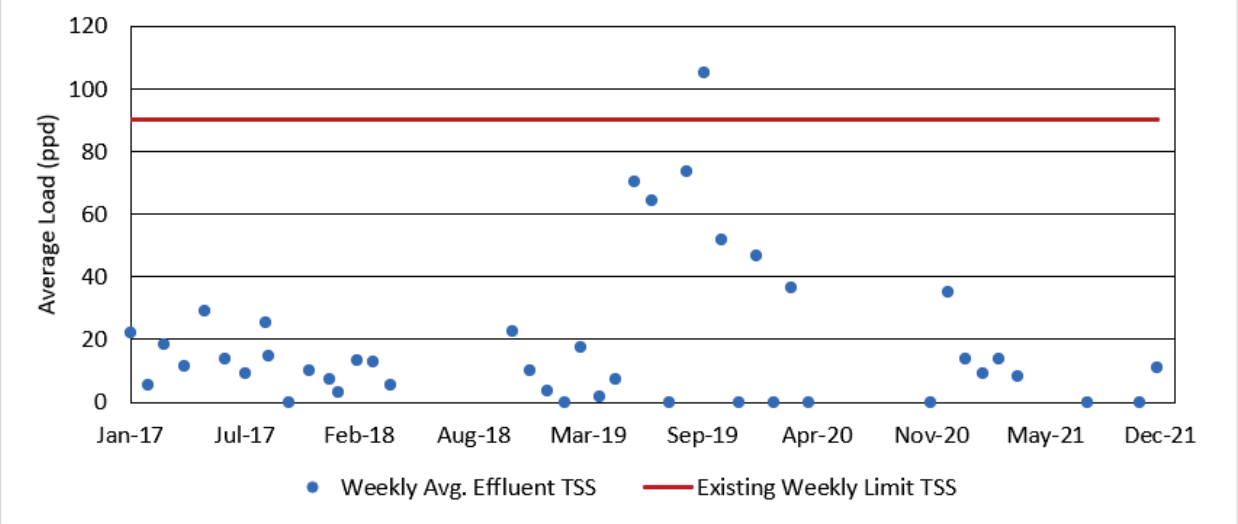
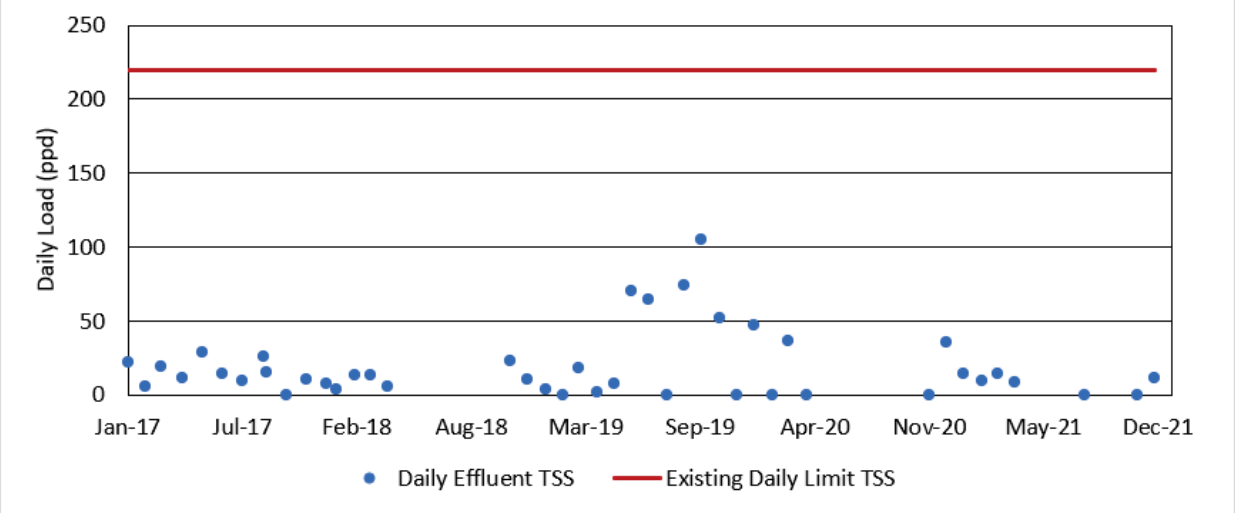


FIGURE 2-12: WWTP EFFLUENT TSS LOADING (DAILY MAXIMUM)



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E. coli Bacteria

E. coli bacteria effluent data from January 2017 to December 2021 are shown in Figures 2-13 and 2-14. No violations were noted during this period.

FIGURE 2-13: WWTP EFFLUENT E. COLI BACTERIA (MONTHLY)

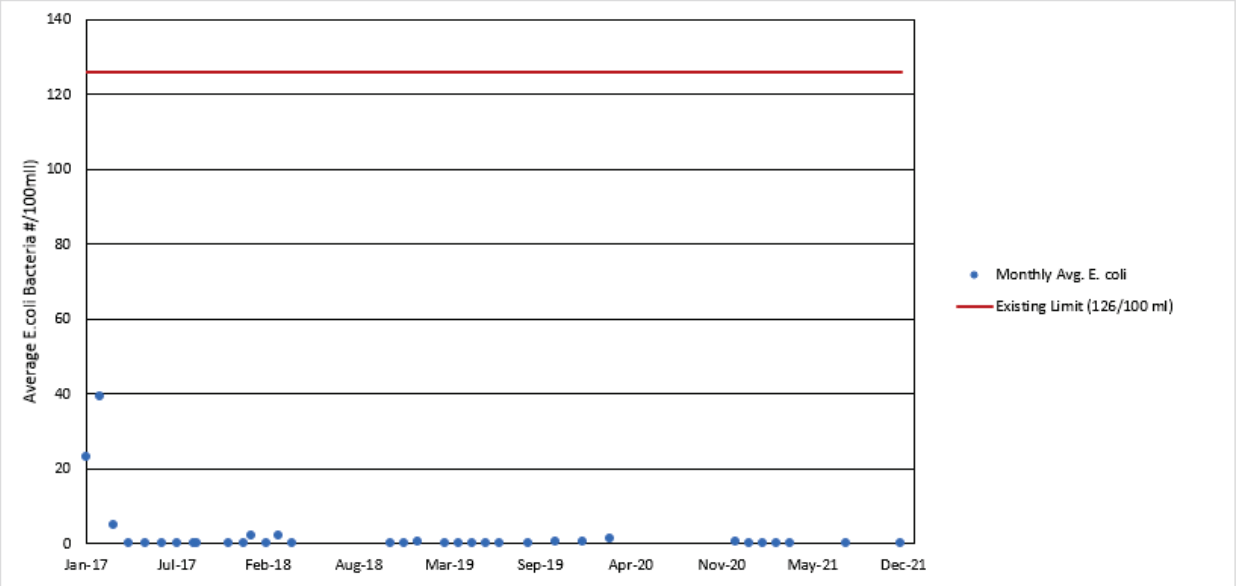
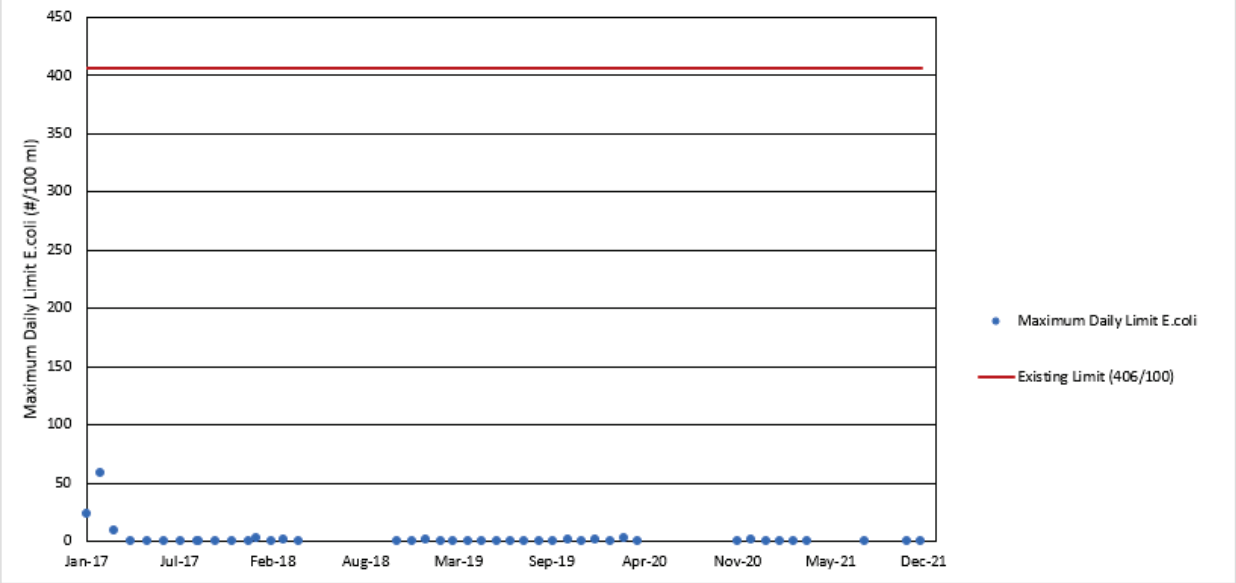


FIGURE 2-14: WWTP EFFLUENT E. COLI BACTERIA (DAILY)



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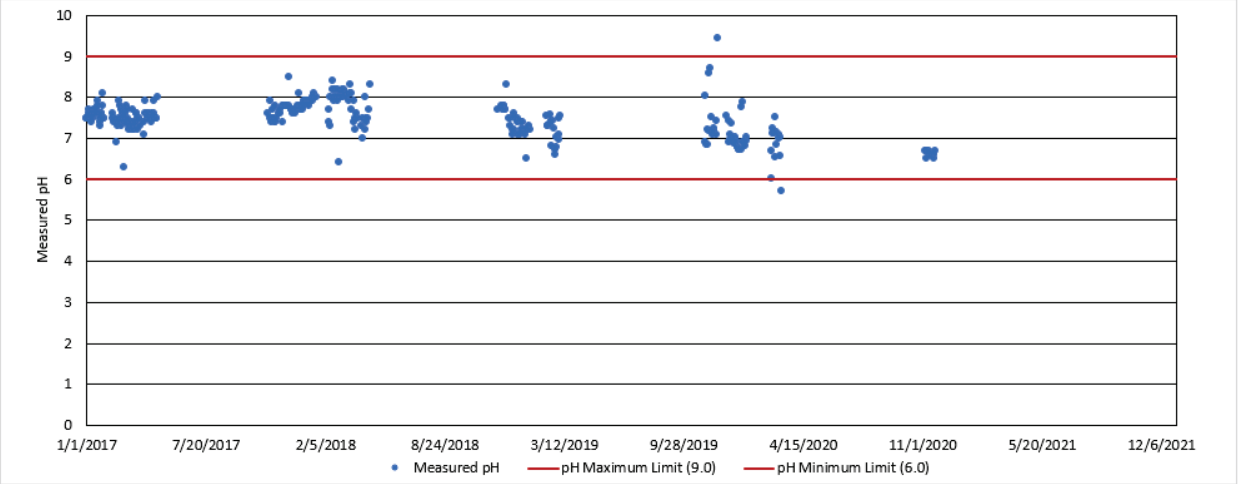
pH

The daily maximum and minimum pH effluent data from January 2017 to December 2021 are shown in Figure 2-15. Limit violations occurred in November 2019 (above limit) and March of 2020 (below limit).

FIGURE 2-15: WWTP EFFLUENT PH (DAILY)



Total Residual Chlorine

Chlorine residual data from January 2017 to December 2021 are shown in Figures 2-16 and 2-17. Data is only shown for time periods when the WWTP is not land applying. Violations occurred periodically during this time, including high spikes not shown in December 2017 (2.9 mg/l max daily limit), January 2018 (3 mg/l max daily limit), and January 2020 (3.8 mg/l monthly avg and 4.4 mg/l max daily limit).

FIGURE 2-16: WWTP EFFLUENT TOTAL CHLORINE (MONTHLY)

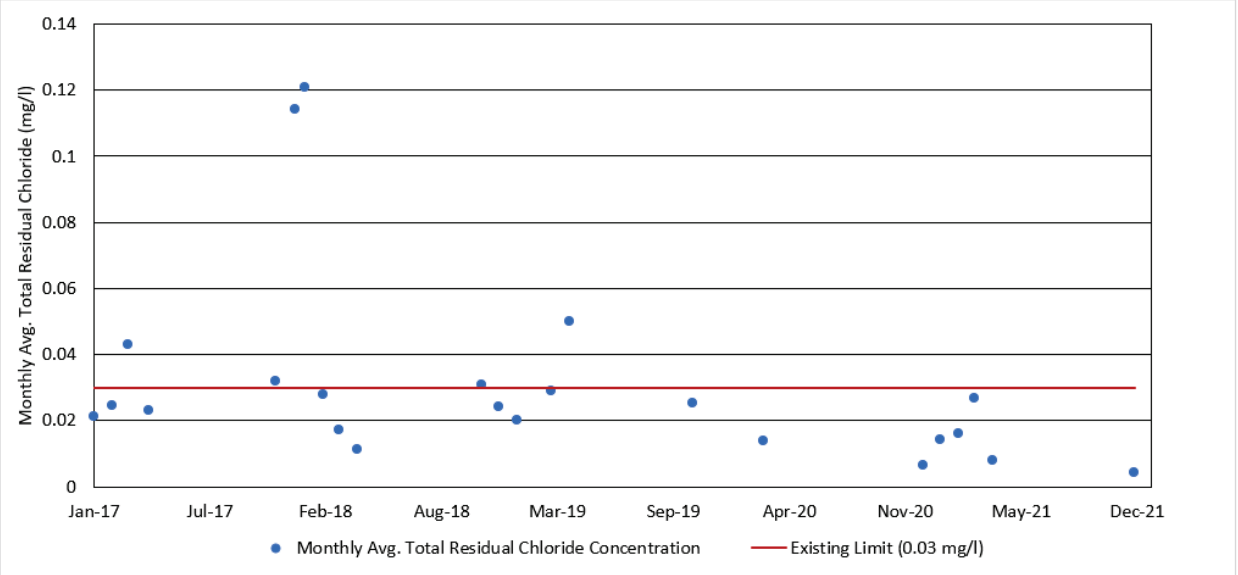


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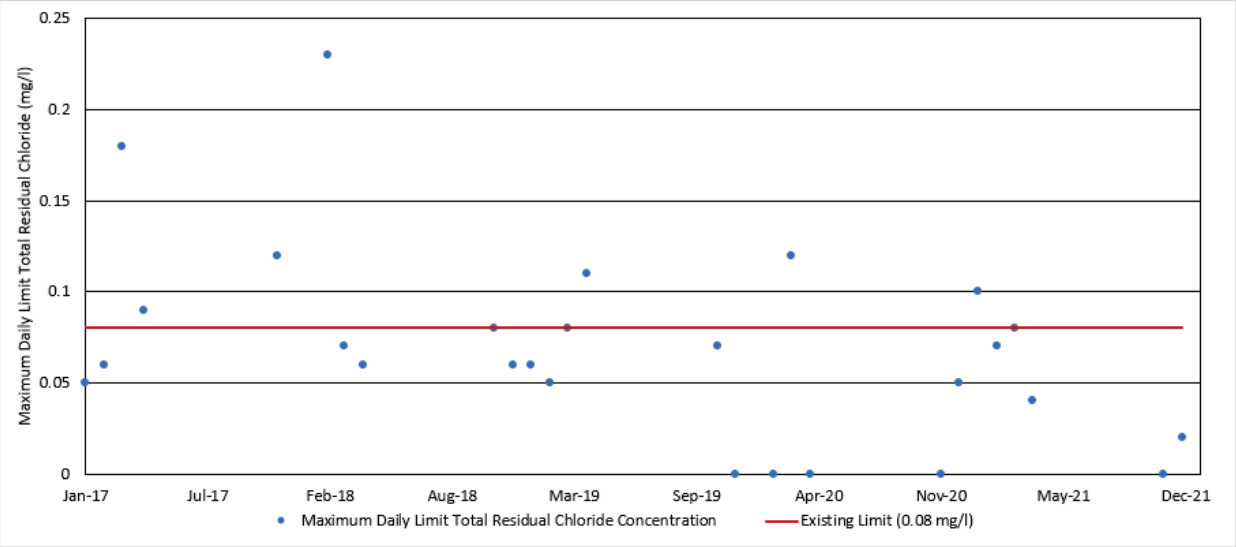
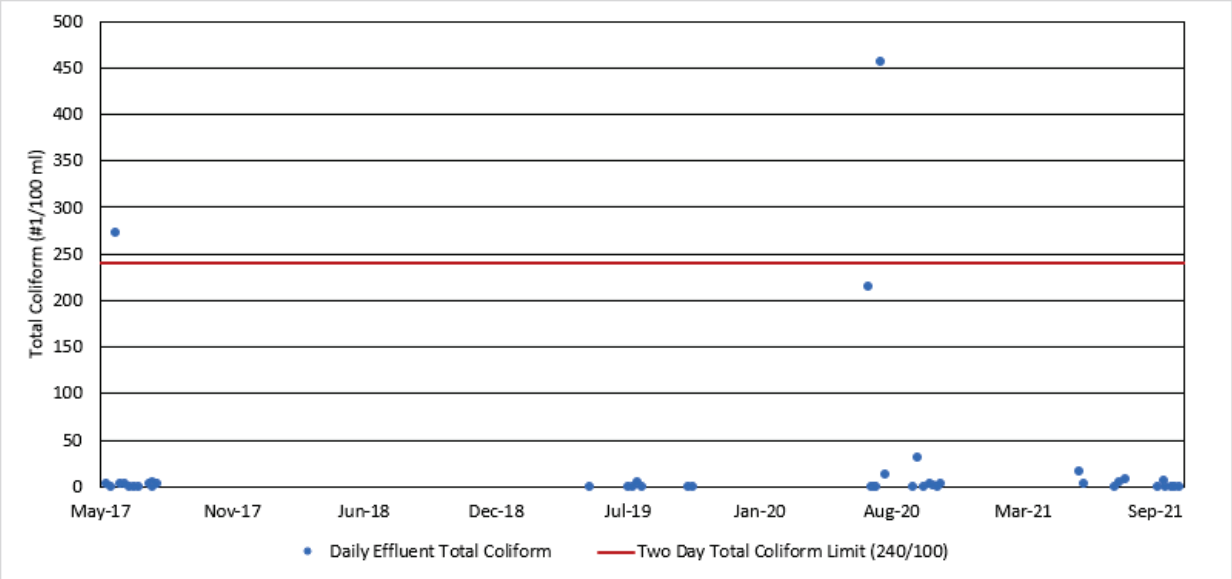
FIGURE 2-17: WWTP EFFLUENT TOTAL CHLORINE (DAILY)



Total Coliform

When the WWTP is land applying, the effluent is analyzed for total coliform. Figure 2-18 shows the total coliform measurements from January 2017 to December 2021. There were a few total coliform violations during this period.

FIGURE 2-18: WWTP EFFLUENT TOTAL COLIFORM (DAILY)



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2.5.2. Reliability Evaluation

A summary of the reliability evaluation completed in 2015 is provided in Table 2-1. This includes ratings for redundancy, criticality, and equipment condition.

TABLE 2-1: UNIT PROCESS RELIABILITY EVALUATION

Equipment	Backup Rating	Criticality Rating	Equipment Condition Rating
Influent Screen	4	S/H, EQ, PF, CC	LN
Aerated Lagoon	4	S/H, EQ, PF, CC	M
Aerated Lagoon Aeration	1	S/H, EQ, PF, CC	W
Effluent Storage Lagoon	4	S/H, EQ, PF	M
Chlorine Feed Pump	1	S/H, EQ, PF	M
Dechlorination Feed Pump	1	S/H, EQ, PF	M
Chlorine Contact Basin	5	EQ, PF	M
River Pump Station/Irrigation Pump Station	1	EQ, PF	M
Return Pump Station	1	EQ, PF	M

Backup Rating	
1	**One level of "in kind" redundancy** (Identical piece of equipment is available to replace primary unit)
2	**Two or more levels of "in kind" redundancy** (More than one piece of equipment is available for replacement)
3	**Equipment alternative** (An alternative piece of equipment is provided)
4	**Procedural alternative** (An alternative operating procedure is required to provide redundancy)
5	**No Backup** (Failure of equipment will shut entire process down)
Criticality Rating	
S/H	**Safety and Health Risk** (Loss would create risk to safety and health of plant personnel and others)
EQ	**Effluent Quality Risk** (Loss would create risk to WWTP effluent quality and could result in NPDES permit violations
PF	**Process Functionality Risk** (Loss would affect the function and/or efficiency of the affected processes)
CC	**Cost Critical** (Loss would have a significant cost impact in short term or long term)
Equipment Condition Rating	
N	**New** (Equipment is new, or replaced in last 12 months)
LN	**Like New** (Equipment is operated very little or recently overhauled to a condition like new)
M	**Used But Maintained** (Equipment showing expected wear, but is adequately maintained and functions well)
W	**Heavily Worn** (Equipment close to end of useful life, needs overhaul, difficulty in performing intended functions)
R	**Needs Replacement** (Equipment does not acceptably perform, beyond cost-effective repair)

2.6. CAPACITY LIMITATIONS

2.6.1. Pump Stations

River Pump Station / Irrigation Pump Station

Each of the two (2) river discharge pumps is designed for a flow rate of 300 gpm (0.43 MGD) at 65 feet total dynamic head (TDH). To be able to remove at least 6 inches of water depth per day from the Effluent Storage Lagoon (Ten States' Standards for a controlled-discharge system), the River Pump Station/Irrigation Pump Station needs to pump at least approximately 195 gpm (0.28 MGD).

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Pumping capacity may be desirable in order to avoid overflows in the event that the Effluent Storage Lagoon is full when sustained peak flows occur (e.g. peak instantaneous design flows of 0.252 MGD, or 175 gpm). The existing pumps are capable of providing this capacity with the largest pump out of service.

The irrigation pump is designed for a flow rate of approximately 175 gpm (0.25 MGD) at 120 feet TDH. This capacity is greater than the 2043 peak week flow (0.132 MGD), so the capacity of the irrigation pump should be adequate when considering the Effluent Storage Lagoon is holding the treated wastewater that is not land applied and the river discharge pumps should be able to discharge the complete volume in the Effluent Storage Lagoon plus the influent flow to the river during the winter.

The capacity of the 4-inch effluent flow meter is approximately 1.6 MGD. The future 2043 peak instantaneous flow rate is 0.252 MGD, so the effluent flow meter should be adequate.

The wastewater is pumped approximately 1,400 ft. in a 6 in. diameter pipe and then travels an additional 850 ft. in an 8 in. gravity line before discharging to the Pudding River through a single-port diffuser. Oregon Standards for Design and Construction of Wastewater Pump Stations specify a maximum force main velocity of 8 feet per second (fps), which for a clean 6-inch pipeline represents a capacity of approximately 700 gpm (1.0 MGD). The 2043 peak instantaneous flow rate is 0.252 MGD, so the effluent pipe should be adequate.

Return Pump Station

The two (2) return pump station pumps are each designed for a flow rate of approximately 34 gpm at 27 feet TDH. Flow into the Return Pump Station is from the sludge handling area, clean out of the chlorine contact tank, and from the WWTP office bathroom. The Return Pump Station would also receive backwash from the irrigation filter if it were operating. The Return Pump Station has a 6-foot diameter wet well with pump on/off set-points of 1.6 feet. The pump discharges through a 2 in. PVC line, which for a clean 2-inch pipeline represents a capacity of approximately 78 gpm. Based on the expected daily return flow rates, the return station pumps and pipeline should be adequate. However, the return flows going to the Return Pump Station should be controlled, so that they do not overwhelm the Return Pump Station wet well, pumps, and discharge line.

2.6.2. Headworks

The capacity of the City's magnetic influent flow meter is 0.43 MGD (300 gpm), which is greater than the future 2043 peak instantaneous flow rate of 0.252 MGD (175 gpm).

The capacity of the influent screen (according to the screen manufacturer) is approximately 0.5 MGD, which is sufficient for the future 2043 peak instantaneous flow rate of 0.252 MGD. There is only one automatic mechanical influent screen. If the influent screen malfunctions, the wastewater will automatically overflow into a bypass with a manual bar rack.

2.6.3. Aerated Lagoon – Aeration Cells

The surface aerator and the blowers/diffusers have a combined firm capacity (with one of the 10 HP blowers out of service) of approximately 370 lbs. oxygen (O2)/day. Assuming influent concentrations of BOD_5 of 456 mg/L and TKN of 60 mg/L, and a peaking factor of 1.25, and aeration requirements of 1.2 lbs. O2/lb. BOD_5 and 4.6 lbs. O2/lb. total Kjeldahl nitrogen (TKN), the existing aeration system has firm capacity to handle a maximum flow of approximately 0.043 MGD, which means that the aeration system is currently under capacity.

Although there are several cells, there is only one aerated lagoon. If maintenance is required on the diffusers or if there is a process upset, then the wastewater will be transferred directly into the Effluent Storage Lagoon and then will likely need to be sent back to the aerated lagoon once the repairs are made.

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2.6.4. Aerated Lagoon – Settling Cells

The combined volume of the settling cells is approximately 60,000 gallons and the combined surface area is approximately 1,160 ft^2. At 2021 maximum month wet weather design flows the detention time is approximately 22 hours, and the detention time is approximately 12 hours at the peak instantaneous flow rate. In addition to the settling capacities in these cells, the water flows to the 7.2-million gallon Effluent Storage Lagoon where solids continue to settle (for an additional 70 days at the 2043 ADWF). The combined capacity of the settling cells and Effluent Storage Lagoon is sufficient for the 20-year planning period; however, this long of a detention time can result in increased algae production.

2.6.5. Effluent Storage Lagoon

A water balance showed that the Effluent Storage Lagoon is at capacity without land application. Approximately 12 million gallons of additional storage capacity is needed to store the 2043 average dry-weather design flow during the non-discharge season without land application. The theoretical irrigated farmland needed to land apply the influent during the growing season, based on the 2043 AADF is approximately 34 acres. Currently the City performs land application on 6 acres. If land application continued to take place on the 6-acre land application site, the amount of additional storage necessary would decrease from 12 million gallons to approximately 9 million gallons.

2.6.6. Chlorination and Dechlorination System

The estimated chlorine contact basin volume is approximately 7,800 gallons. The required contact times by Oregon guidelines are 20 minutes at the peak daily flow, 15 minutes at peak hourly flow, and 1 ppm after 60 minutes at average dry-weather flow. The 2043 peak daily flow rate is 0.198 MGD, the peak instantaneous flow rate is 0.252 MGD, and the average dry-weather flow is 0.103 MGD. At these future design flows, the chlorine contact basin will meet the 20 minute, 15 minute, and 60 minute requirements.

The existing sodium hypochlorite chemical feed pump is rated to a maximum pump rate of approximately 0.71 gph (17 gpd). At a concentration of 2.5%, this would provide a chlorine dose of 5 mg/L to a flow of 0.085 MGD, or a dose of 1 mg/L to a flow of 0.425 MGD. The existing sodium bisulfite chemical feed pump is rated with the same capacity (0.71 gph (17 gpd)).

The flow to the chlorine contact basin is currently controlled to around 100-120 gpm to conserve chemicals and extend the contact time for better disinfection. However, there may be some issues limiting the actual disinfection capacity as the flows increase, which are not currently apparent. Further evaluation of the disinfection capacity is recommended. Baffles and/or mixer modifications may be necessary for future flows.

2.6.7. Sludge Handling

The solids in the settling cells of the aerated lagoon are periodically removed using temporary pumps and piping. The sludge is then put into biodegradable dewatering bags and picked up for disposal. Aerobic digestion could assist the City with disposal options. Another item to consider is mechanical solids dewatering for more consistent dewatered solids.

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2.6.8. Summary

A summary of the existing treatment capacity at the plant is provided in Table 2-2. The aerated lagoon aeration ponds and effluent storage lagoon are undersized for the current and projected loads.

TABLE 2-2: PLANT CAPACITY SUMMARY

Component	Capacity[1] (MGD)	2021 Capacity Needed (MGD)	2043 Capacity Needed (MGD)	Limiting Factor
Influent Screen	0.50	0.153 (PIF)	0.252 (PIF)	Hydraulic
Aerated Lagoon	0.02	0.068 (MM)	0.112 (MM)	Basin Volume
Aerated Lagoon Aeration	0.03	0.068 (MM)	0.112 (MM)	One blower is redundant
Effluent Storage Lagoon	0.060	0.062 (ADWF)	0.103 (ADWF)	Non-Discharge Period
Chlorine Feed Pump	0.43	0.153 (PIF)	0.252 (PIF)	Maximum Dose
Dechlorination Feed Pump	0.43	0.153 (PIF)	0.252 (PIF)	Maximum Dose
Chlorine Contact Basin	0.75	0.153 (PIF)	0.252 (PIF)	Hydraulic Retention Time
River Pump Station/ Irrigation Pump Station	0.43 / 0.25	0.153 (PIF) / 0.08 (PWkF)	0.252 (PIF) / 0.132 (PWkF)	Hydraulic

1 -Capacity flow numbers are used only for comparative purposes. MGD – million gallons per day, PIF – Peak Instantaneous Flow, MM – Max Month Flow, ADWF – Average Dry-Weather Flow, PWkF – Peak Weekly Flow.

2.7. FINANCIAL STATUS OF EXISTING FACILITIES

The financial information for the City of Aurora sewer utility is located in Appendix D. Sewer revenue during the 2021-2022 fiscal year was $376,470. The annual costs to operate and maintain the wastewater system, separated by type of expense, are also shown in Appendix D. In the 2021-2022 fiscal year, the total spent from the sewer fund was $309,403 (excluding transfers).

The City created a bond fund to account for debt service on the construction of their treatment plant. The annual debt service is approximately $364,000 and it is funded by a property tax levy. There are no other existing sewer system debts. Aurora does not have any required reserve accounts; however, they have established a sewer reserve fund for replacement and/or upgrade of the existing wastewater facility.

2.8. WATER/ENERGY/WASTE AUDITS

No water, energy or waste audits have been created at this time.

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CHAPTER 3 - PROJECT NEED

3.1. HEALTH, SANITATION, ENVIRONMENTAL REGULATIONS AND SECURITY

The Clean Water Act of 1972 provides the primary regulations for water quality in the waters of the United States. It requires that point source contributions to surface waters obtain a discharge permit (currently permits are issued from Oregon DEQ as NPDES permits). These permits determine the conditions for discharge into surface waters. Oregon DEQ provided information about other Clean Water Act items, including the status of receiving streams, beneficial uses, and waste load allocations from the TMDL. The NPDES permit can be found in Appendix C.

Compliance with the NPDES permit for Aurora is discussed in Chapter 2 of this report. The City of Aurora's WWTP has been in compliance with the NPDES effluent limits, with a few exceptions, according to the records provided. The City reports that there has not been a lasting compliance issue. Other issues regarding public health, sanitation and security involve events when untreated or undertreated effluent overflows onto the ground or is discharged to surface water. There have not been any recent overflows throughout the collection system, nor at the Aurora WWTP.

The treatment plant lagoons and headworks are secured by a chain link fence with a locked gate, and the controls are located inside the control building. The WWTP does not have intrusion alarms or key card security. There is no fence around the WWTP Office, disinfection buildings, Sludge Transfer Station, or pump stations.

3.1.1. NPDES Permit

The City of Aurora discharges treated effluent under NPDES Permit No. 101772 (Appendix C) into the Pudding River from November 1st through April 30th. The City's permit was recently renewed and went into effect on August 1, 2022, with an expiration date of May 31, 2027. Existing effluent limits are summarized in Table 3-1.

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TABLE 3-1: EXISTING NPDES PERMIT LIMITS

Parameter	Units	Average Monthly	Average Weekly	Daily Maximum
Effluent Flow (May 1 to Oct 31)	MGD	No discharge (Daily max limit = 0 MGD)		
BOD_5 (November 1 – April 30)	mg/L	30	45	-
	lb/day	30	60	140
	% removal	85	-	-
TSS (November 1 – April 30)	mg/L	50	80	-
	lb/day	47	90	220
	% removal	65	-	-
Chlorine, Total Residual (November 1 – April 30) (See note a.)	mg/L	0.03	-	0.08
pH (November 1 – April 30)	SU	Instantaneous limit between a daily minimum of 6.0 and a daily maximum of 9.0		
E. coli (November 1 – April 30) (See note b.)	#/100 mL	Must not exceed a monthly geometric mean of 126, no single sample may exceed 406		

Notes:

a. DEQ has established a Quantitation Limit of 0.05 mg/L for Total Residual Chlorine. Any analysis done for Total Residual Chlorine must have a quantitation limit that is either equal to or less than 0.05 mg/L. In cases where the average monthly or maximum daily limit for Total Residual Chlorine is lower than the Quantitation Limit, DEQ will use the reported Quantitation Limit as the compliance evaluation level.

b. If a single sample exceeds 406 organisms/100 mL, the permittee may take at least 5 consecutive re-samples at 4-hour intervals beginning within 28 hours after the original sample was taken. A geometric mean of the 5 re-samples that is less than or equal to 126 *E. coli* organisms/100 mL demonstrates compliance with the limit.

From May 1st through October 31st the City can land apply the treated wastewater on fields within the WWTP grounds. During this time no discharge to the state waters is permitted. For land application the wastewater must receive at least Class C treatment as defined in OAR 340-055 and the total coliform bacteria/100 ml shall not exceed a 7-day median of 23 organisms/100 ml with no two consecutive samples to exceed 240 organisms/100 ml. DEQ does not anticipate that the land application requirements will change in the near future. If modifications are made by the City to the land application system, a recycled water reuse plan must be filed with DEQ.

Keller Associates has communicated with DEQ regarding future permit conditions and there are a number of items that may be added as future discharge requirements. For example, ammonia is often found in sewage treatment plant effluent at levels that exceed the state of Oregon water quality standards for toxicity. Additionally, iron, manganese, and more stringent TSS limits may also be a part of a future permit. Phosphorus and temperature are not likely to be included in a future NPDES permit since the City does not discharge to the river during the summer. Also, ongoing work on toxic substances, including heavy metals, mercury, polychlorinated biphenyls (PCBs), DDT, feminine products, and pharmaceuticals could have future effects on wastewater treatment plants.

3.2. AGING INFRASTRUCTURE

The majority of the WWTP was constructed in 2000, so aging infrastructure is not a significant problem. Some of the equipment (such as the diffusers and pumps) are nearing the end of their useful life.

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- Infiltration and Inflow (I/I)

I/I is not a significant problem for the Aurora collection system. Visual evidence of this can be seen in Figure 3-1, which shows 2017 through 2021 daily flows and precipitation recordings. The large peaks in rainfall have little effect on peaks in daily flow. I/I can be caused by a variety of sources such as storm sewers connecting into the sanitary sewer, storm inflow into manhole lids, and groundwater infiltration into cracked/broken pipelines and services.

FIGURE 3-1: 2017-2021 DAILY FLOW AND PRECIPITATION

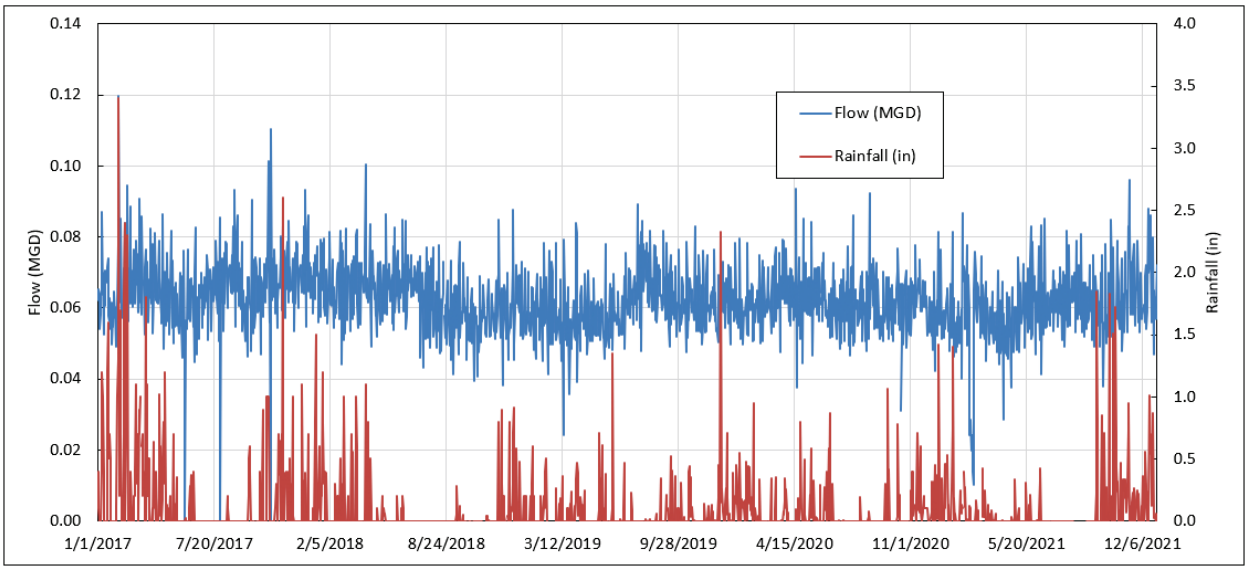

Table 3-2 summarizes annual average base flow and the ratio of peak flow to the base flow for the 2017-2021 data sets. The peak flow compared to the base flow is an indication of I/I influence in the system. In 2017-2021, the peak flow ranges from approximately 1.3 to 1.7 times the base flow. I/I exists in the system but is not excessive. Some communities experience peak flows more than 10 times the base flow.

TABLE 3-2: ANNUAL PEAK DAY FLOW/AVERAGE BASE FLOW

Year	Avg Base Flow (MGD)	Peak Flow/Avg Base Flow	Pk Flow (MGD)
2017	0.071	1.69	0.120
2018	0.071	1.42	0.101
2019	0.070	1.27	0.089
2020	0.066	1.41	0.094
2021	0.066	1.45	0.096

While I/I is evident by the peaking factors represented in Table 3-2, it is not significant enough to warrant a rigorous I/I reduction program. In addition, future new construction should reduce I/I due to newer, more watertight sewer components.

The design flows are summarized in Table 3-3. Details of how each design flow was derived are discussed in the preceding paragraphs.

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TABLE 3-3: PROJECTED FLOWS

	Planning Flow (MGD)	Planning Unit Flow (gpcd)	Projected Planning Flow (MGD)				
Year	--	--	2023	2028	2033	2038	2043
Population	1,133	1,133	1,186	1,328	1,488	1,668	1,869
ADWF	0.062	55	0.065	0.073	0.082	0.092	0.103
$MMDWF_{10}$	0.062	55	0.065	0.073	0.082	0.092	0.103
AADF	0.062	55	0.065	0.073	0.082	0.092	0.103
AWWF	0.068	60	0.071	0.079	0.089	0.100	0.112
$MMWWF_5$	0.068	60	0.071	0.079	0.089	0.100	0.112
PWkF	0.080	70	0.084	0.094	0.105	0.117	0.132
$PDAF_5$	0.120	106	0.126	0.141	0.158	0.177	0.198
PIF_5	0.153	135	0.160	0.179	0.200	0.225	0.252

Notes:
1. Flows calculated based on DEQ methods, with the exception of MMWWF. This flow was increased to equal AWWF.

3.3. SYSTEM DEFICIENCIES

System deficiencies of the WWTP are listed in Chapter 2.

3.4. REASONABLE GROWTH

Wastewater system improvements are needed to stay ahead of growth due to potential increased population and new construction. Chapter 1 of this report discussed population growth projections including customers served, and the wastewater flows associated with this growth.

The SDC percentage was calculated using the capacity that can be utilized for future connections divided by the 2043 capacity. For projects that did not have an increase in flows, the percent SDC eligible is derived from the percent growth in population over the 20-year planning period.

3.4.1. Influent Flow Analysis

The wastewater flow analysis looks at historic wastewater flows and provides flow projections for the planning period. This section summarizes the results of the flow analysis. Keller Associates used the method recommended by DEQ in "Guidelines for Making Wet-Weather and Peak Flow Projections for Sewage Treatment in Western Oregon" for determining design flows in the City's system.

- Average Annual Daily Flow (AADF)

  The average annual daily flow (AADF) is the average daily flow for the entire year. An AADF was calculated for each year of data. The years with a complete data set (2017-2021) were averaged to obtain the design AADF.

- Average Dry-Weather Flow (ADWF)

  The average dry-weather flow (ADWF) is the average daily flow for the period of May through October. An ADWF was calculated for each year of data. The years with a complete data set (2017-2021) were averaged to obtain the design ADWF.

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- Average Wet-Weather Flow (AWWF)

  The average wet-weather flow (AWWF) is the average daily flow for the period of January through April, and November through December for each year. The years with a complete data set (2017-2021) were averaged to obtain the AWWF.

- Max Month Dry-Weather Flow ($MMDWF_{10}$)

  The max month dry-weather flow ($MMDWF_{10}$) represents the rainiest summer month of high groundwater. The DEQ method for calculating $MMDWF_{10}$ is to graph the January-May total monthly flows for each month of the most recent year against total precipitation for the month. A trend line is fit to the data, and the $MMDWF_{10}$ is read from the trend line at a precipitation equal to the May 90% precipitation exceedance value (4.60 in.) extrapolated from the 1991-2020 U.S. Climate Normals[1]. Because Oregon DEQ states that May is typically the maximum month for the dry-weather period of May-October, selecting the May 90% precipitation exceedance most likely corresponds to the maximum month during the dry-weather period for a 10-year event. Data from 2017-2021 was analyzed.

- Max Month Wet-Weather Flow ($MMWWF_5$)

  The $MMWWF_5$ represents the highest monthly average during the winter period of high groundwater. The DEQ method for calculating $MMWWF_5$ is to enter the graph of January-May average daily flows vs. monthly precipitation and read $MMWWF_5$ from the trend line at a precipitation equal to the January 80% precipitation exceedance value (8.40) extrapolated from the 1991-2020 U.S Climate Normals[1]. Because Oregon DEQ states that January is typically the maximum month for the wet-weather period of January-April, selecting the January 80% precipitation exceedance most likely corresponds to the maximum month during the wet-weather period for a 5-year event. Data from 2017-2021 was analyzed. This result is illustrated in Figure 3-2 and broken down in Table 3-4. However, the $MMWWF_5$ should always be higher than the AWWF calculated. In this case, the DEQ method for calculating $MMWWF_5$ yielded a max month flow that was lower that the subsequent average flow for wet weather. As this is impossible, the $MMWWF_5$ was bumped up from 0.066 MGD to 0.068 MGD to better fit in with the remaining DEQ calculated values.

1 - Produced by the National Oceanic and Atmospheric Administration and the U.S. Department of Commerce

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FIGURE 3-2: FLOW VS RAINFALL ($MMDWF_{10}$ AND $MMWWF_5$)

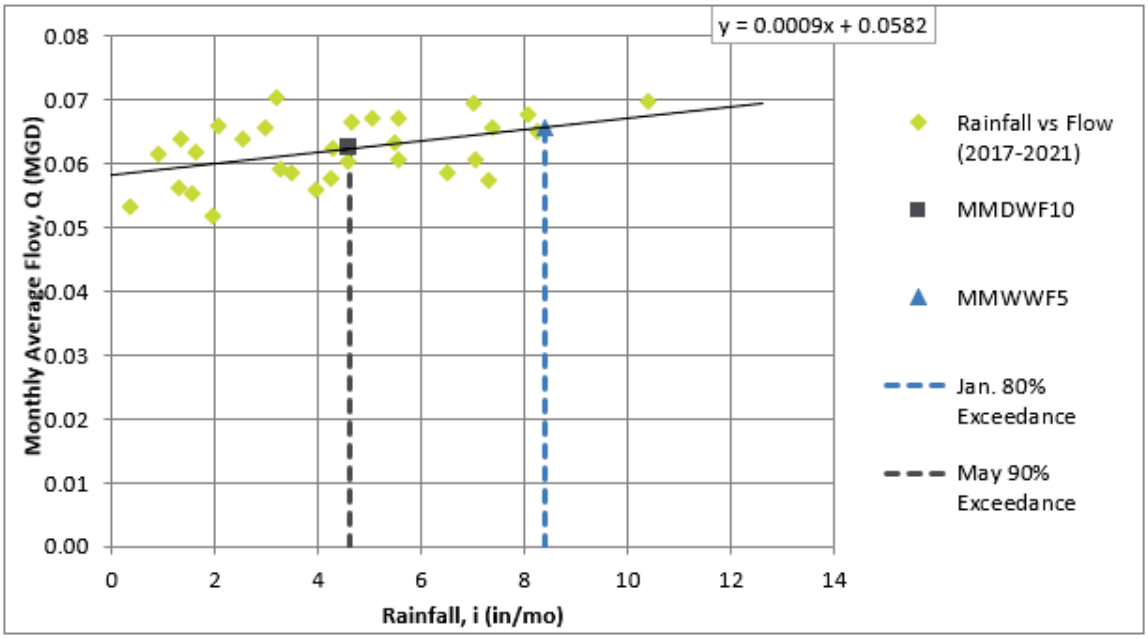

TABLE 3-4: FLOW VS RAINFALL ($MMDWF_{10}$ AND $MMWWF_5$)

Month	Monthly Average Flow (MGD)					Rainfall (in/mo)				
	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
January	0.062	0.067	0.059	0.061	0.057	4.300	5.570	3.490	7.060	7.300
February	0.070	0.066	0.056	0.062	0.052	10.380	2.060	3.970	1.640	1.940
March	0.068	0.066	0.055	0.064	0.056	8.060	2.970	1.540	2.530	1.310
April	0.067	0.067	0.058	0.064	0.053	4.650	5.040	4.240	1.320	0.370
Nov	0.070	0.059	0.062	0.063	0.066	7.000	3.260	0.890	5.470	7.380
Dec	0.070	0.061	0.060	0.059	0.065	3.190	5.560	4.590	6.510	8.260
$MMDWF_{10}$	0.062 MGD					4.600 in/mo				
$MMWWF_5$	0.066 MGD					8.400 in/mo				

- Peak Week Flow (PWkF)

  A 7-day average flow was calculated for every day using the seven previous days of data (rolling average). Peak Week Flow (PWkF) was then calculated as the maximum of all weekly (7-day) rolling averages in a given year. The maximum week was selected as the PWkF. The years with a complete data set (2017-2021) were used to determine the PWkF. Oregon DEQ defines PWkF as the flowrate corresponding to a probability of 1/52 (1.9%) chance of occurrence as shown in Appendix B.

- Peak Daily Average Flow ($PDAF_5$)

  As outlined by Oregon DEQ, the $PDAF_5$ typically corresponds to the 5-year storm event, and therefore, is calculated as the flow resulting from a 5-year storm event during a period of likely high groundwater (January-April). The DEQ method for determining $PDAF_5$ is to plot daily plant flow against daily precipitation for large storm events over several years, only using data during wet-weather seasons when groundwater is high. A trend line is fitted to the data, and then $PDAF_5$ is read from the trend line at the 5-year, 24-hour storm event (2.75 inches per the NOAA isopluvial maps for Oregon).

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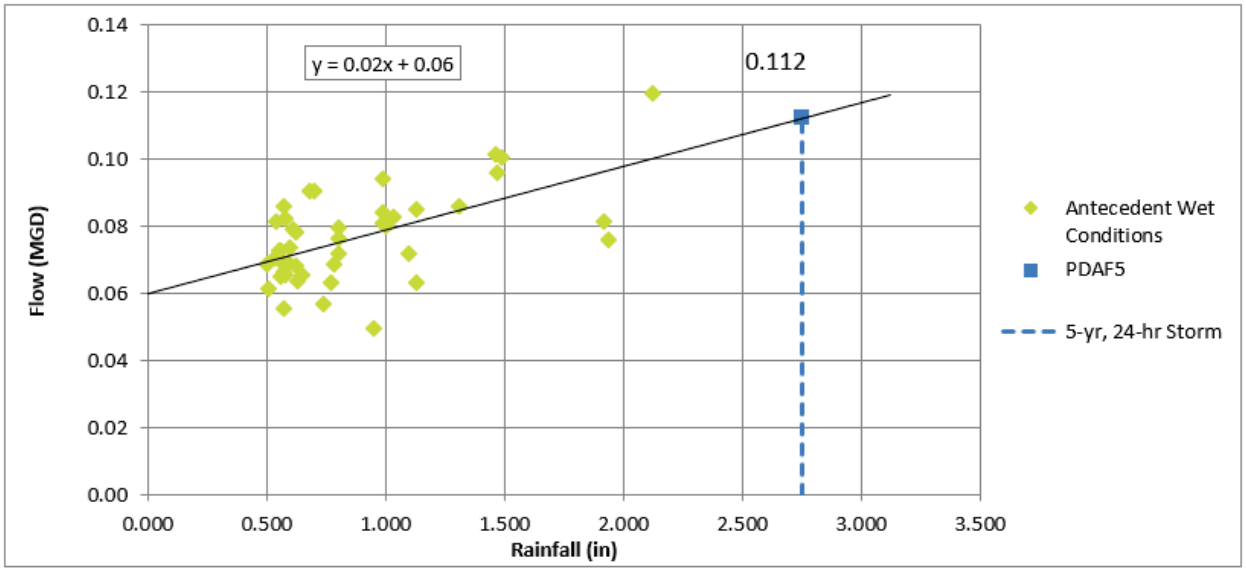
For the purpose of this analysis, a large storm event is considered more than 0.5 inch in 24-hours. Antecedent conditions are considered wet if any day in the preceding four had a storm event of 0.5 inches or larger, as long as there were not two or more days in a row between storm events with no precipitation. The years with a complete data set (2017-2021) were used for analysis. Those events meeting DEQ criteria were analyzed as shown in Figure 3-3.

FIGURE 3-3: FLOW VS RAINFALL ($PDAF_5$)



After analyzing the data, the peak flows for a storm event were determined to occur on the same or following day of the day the event. Rainfall for a specific day was associated with the largest flow within the next day following the rainfall record (including the day of the event). The exception to this is large, multi-day rain events, where more than one day in a two-day period individually met the previously listed conditions for a high rainfall event. In this case, the association was chronological. The first large rainfall event for one day was associated with the chronologically first large daily flows.

- Peak Instantaneous Flow (PIF)

In the absence of hourly flow data, DEQ recommends obtaining the peak instantaneous flow (PIF) by extrapolation from their own chart titled Graph #3. On Graph #3, $PDAF_5$, $MMWWF_5$, PWkF, and AADF are all graphed (on specific log-probability graph paper) vs. their probability of occurrence as shown in Appendix B. Once those known flows are graphed, a line of best fit is drawn between the points. The PIF is located where that best fit line crosses the 0.011% probability.

3.4.2. Influent Quality

- Analysis of Plant Records

The plant influent data taken from the Discharge Monitoring Reports (DMRs) were analyzed from January 2017 to December 2021. The influent constituents monitored by the City included pH, BOD_5 and TSS. The effluent constituents included E. coli, total chlorine residual, quantity of chlorine used, pH, BOD_5 and TSS. The City collected composite samples at least once every two weeks of both the influent and effluent for BOD_5 and TSS. The City collected grab samples of the influent and effluent pH twice per week. The City collected an effluent grab sample for E. Coli once every two weeks. The effluent total chlorine residual grab sample and quantity of chlorine used were measured daily. The City also measured influent and effluent flow daily.

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When the WWTP was land applying, it also measured the daily amount of effluent flow (inches/acre), total chlorine residual by grab sample, and quantity of chlorine used. The City collected grab samples for the effluent pH (twice per week) and effluent total coliform (once per week). Nutrients such as total Kjeldahl nitrogen, nitrite and nitrate, ammonia, and total phosphorus were measured quarterly with a grab sample.

- BOD_5 Loading

The influent BOD_5 concentrations into the WWTP from January 2017 to December 2021 are provided in Figures 3-4. The monthly averages of the influent loads are shown in Figure 3-5. The influent BOD_5 concentrations generally range from 126 to 570 mg/L, which are higher than the range of typical domestic wastewater values. For Aurora, these concentrations equate to BOD_5 loadings of approximately 65 to 256 pounds/day (ppd). The waste strength has been fairly constant during the reporting period.

FIGURE 3-4: WWTP INFLUENT BOD_5 CONCENTRATIONS

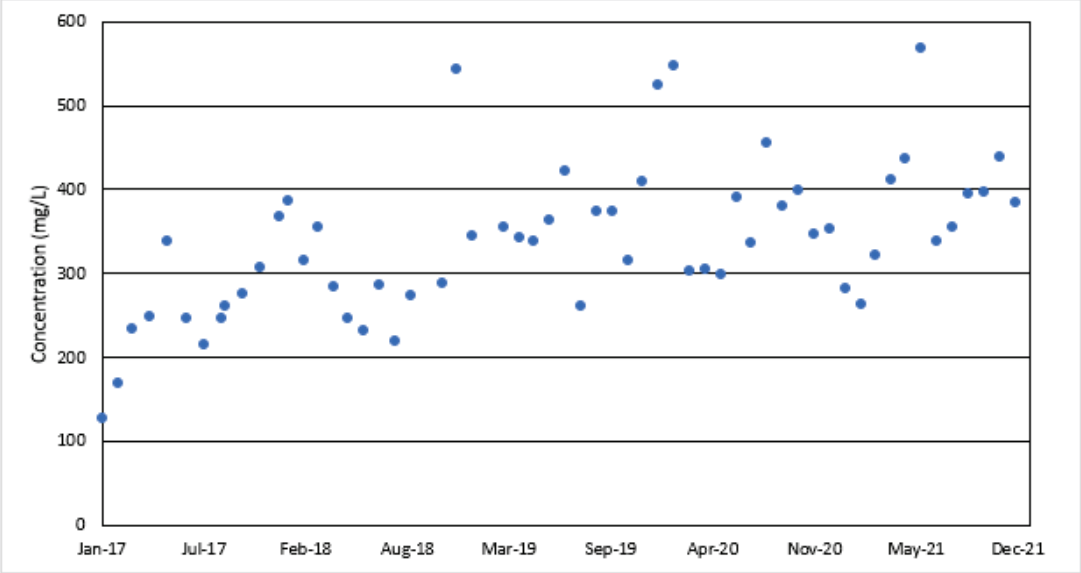
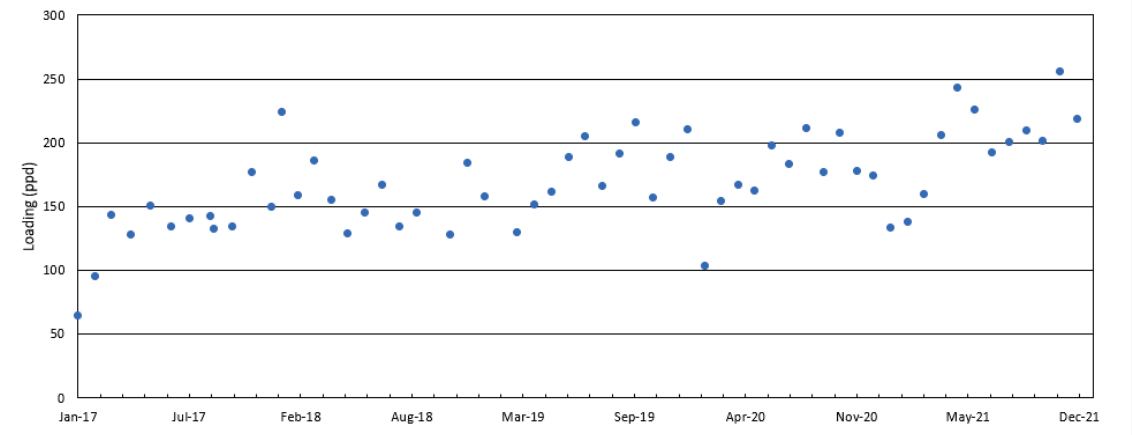


FIGURE 3-5: WWTP INFLUENT BOD_5 LOADING – MONTHLY AVERAGE



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The BOD_5 loading rates are shown in Table 3-5. The BOD_5 loading rates are normalized for the population to provide units of BOD_5 pounds per capita per day (ppcd) using the Table 1-1 population estimates. The typical range for BOD_5 is shown in the table footnote. The planning criteria values for this study are also shown in Table 3-5. Since the loading rates have remained fairly constant, the maximum value for each flow was selected for the design values. An exceedance rate statistical analysis was performed and outliers over the 95% rate and below the 5% rate were removed.

TABLE 3-5: SUMMARY OF INFLUENT BOD_5 DATA

	2017	2018	2019	2020	2021	Avg.	Max.	Planning Criteria
Population	*980*	*985*	*985*	*985*	*1,133*	--	--	*1,133*
BOD_5 (ppd)								
DWADL	139	145	187	189	211	174	211	--
DWMML	151	167	216	211	243	198	243	--
DWMDL	213	245	259	266	304	257	304	--
WWADL	137	171	157	173	186	165	186	--
WWMML	177	224	189	211	256	211	256	--
WWMDL	234	270	243	266	301	263	301	--
BOD_5 (ppcd)								
DWADL (ppcd)	0.142	0.148	0.189	0.192	0.186	0.171	0.192	**0.192**
DWMML (ppcd)	0.154	0.170	0.220	0.214	0.214	0.194	0.220	**0.220**
DWMDL (ppcd)	0.217	0.248	0.263	0.270	0.268	0.253	0.270	**0.270**
WWADL (ppcd)	0.140	0.174	0.159	0.176	0.164	0.163	0.176	**0.176**
WWMML (ppcd)	0.180	0.228	0.192	0.214	0.226	0.208	0.228	**0.228**
WWMDL (ppcd)	0.239	0.274	0.246	0.270	0.266	0.259	0.274	**0.274**

* Industry typical values BOD_5 (Metcalf & Eddy): 0.130 - 0.260 ppcd

** Outliers over 95% and below 5% exceedence rate were removed

Notes.

1. DWADL = Dry weather average daily load
2. DWMML = Dry weather max month load
3. DWMDL = Dry weather max daily load
4. WWADL = Wet weather average daily load
5. WWMML = Wet weather max monthly load
6. WWMDL = Wet weather max daily load

- TSS Loading

Influent TSS concentrations from January 2017 to December 2021 are provided in Figure 3-6. Monthly averages of influent loads from the same time period are shown in Figure 3-7. The TSS concentrations generally range between 43 and 475 mg/L. These concentrations equate to TSS loadings between 40 and 195 ppd.

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FIGURE 3-6: WWTP INFLUENT TSS CONCENTRATIONS

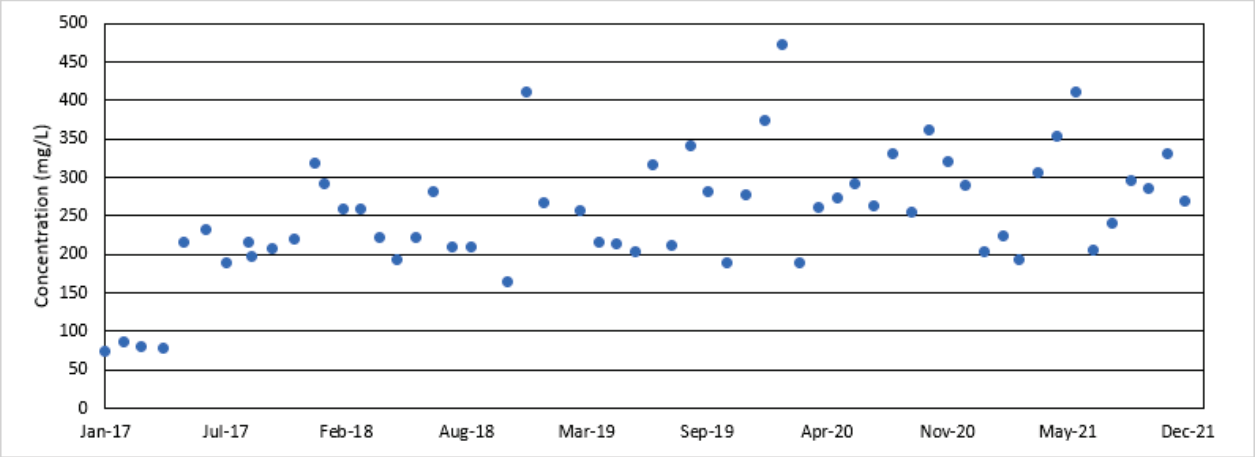

FIGURE 3-7: WWTP INFLUENT TSS LOADING – MONTHLY AVERAGE

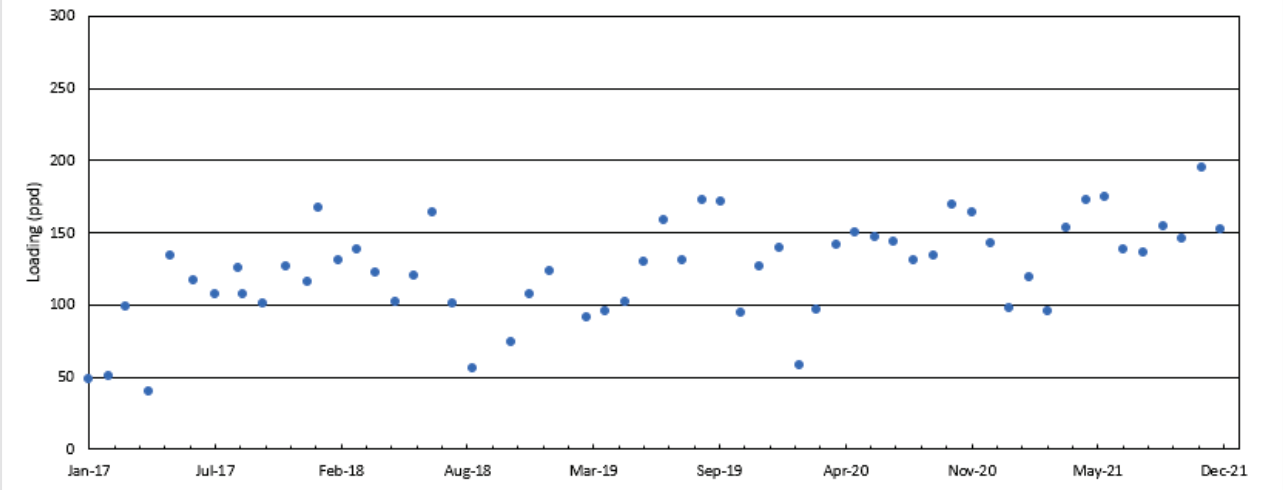

Table 3-6 shows the TSS ppcd summary. The typical range for TSS is shown in the table footnote. The design values (Planning Criteria) for this study are also shown in Table 3-6. Since the loading rates have remained fairly constant, the maximum value was selected for the design values. An exceedance rate statistical analysis was performed and outliers over the 95% rate and below the 5% rate were removed.

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TABLE 3-6: SUMMARY OF INFLUENT TSS DATA

	2017	2018	2019	2020	2021	Avg.	Max.	Planning Criteria
Population	*980*	*985*	*985*	*985*	*1,133*	--	--	*1,133*
TSS (ppd)								
DWADL	115	115	143	146	152	134	152	--
DWMML	134	165	173	169	175	163	175	--
DWMDL	219	211	215	222	207	215	222	--
WWADL	75	122	106	132	134	114	134	--
WWMML	126	167	127	165	195	156	195	--
WWMDL	191	246	205	207	245	219	246	--
TSS (ppcd)								
DWADL (ppcd)	0.117	0.117	0.145	0.149	0.134	0.133	0.149	**0.149**
DWMML (ppcd)	0.136	0.167	0.175	0.172	0.155	0.161	0.175	**0.175**
DWMDL (ppcd)	0.223	0.214	0.219	0.225	0.183	0.213	0.225	**0.225**
WWADL (ppcd)	0.076	0.124	0.107	0.134	0.119	0.112	0.134	**0.134**
WWMML (ppcd)	0.129	0.170	0.129	0.167	0.172	0.153	0.172	**0.172**
WWMDL (ppcd)	0.195	0.250	0.208	0.210	0.216	0.216	0.250	**0.250**

* Industry typical values TSS (Metcalf & Eddy): 0.130 - 0.330 ppcd

** Outliers over 95% and below 5% exceedence rate were removed

The same design ppcd values in Tables 3-5 and 3-6 were also used to estimate the design pounds per day for the years 2023, 2028, 2033, 2038, and 2043 based on the population projections in Table 1-1. Table 3-7 shows the estimated BOD_5 and TSS plant loadings for these design years.

TABLE 3-7: INFLUENT LOADING PROJECTIONS

Parameter	Planning Criteria (ppcd)	Loading Projections (ppd)					
		2021	2023	2028	2033	2038	2043
Est. Population		*1,133*	*1,186*	*1,328*	*1,488*	*1,668*	*1,869*
BOD_5							
DWADL	0.192	217	227	255	285	320	358
DWMML	0.220	249	260	292	327	366	410
DWMDL	0.270	306	320	358	402	450	504
WWADL	0.176	199	209	233	262	293	329
WWMML	0.228	258	270	302	339	380	426
WWMDL	0.274	311	325	364	408	458	513
TSS							
DWADL	0.149	168	176	197	221	248	278
DWMML	0.175	199	208	233	261	292	328
DWMDL	0.225	255	267	299	335	376	421
WWADL	0.134	152	159	178	199	223	250
WWMML	0.172	195	204	229	256	287	322
WWMDL	0.250	283	297	332	372	417	467

- Nitrogen and Phosphorus Loading

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The City did not have a large amount of influent concentration data. Anticipated future influent loadings (pounds per capita per day (ppcd)) were assumed using industry-standard values and are shown in Table 3-8. Similarly, industry standard peaking factors of 1.15 for TKN, and 1.12 for phosphorus were used for the maximum month flows (Metcalf & Eddy/AECOM, 2014). The future loads (pounds per day) during the planning period are shown in Table 3-9.

TABLE 3-8 INFLUENT LOADING ASSUMPTIONS

Criteria	Average Daily Load	Maximum Month Peaking Factor
TKN	0.036	1.15
TP	0.0048	1.12

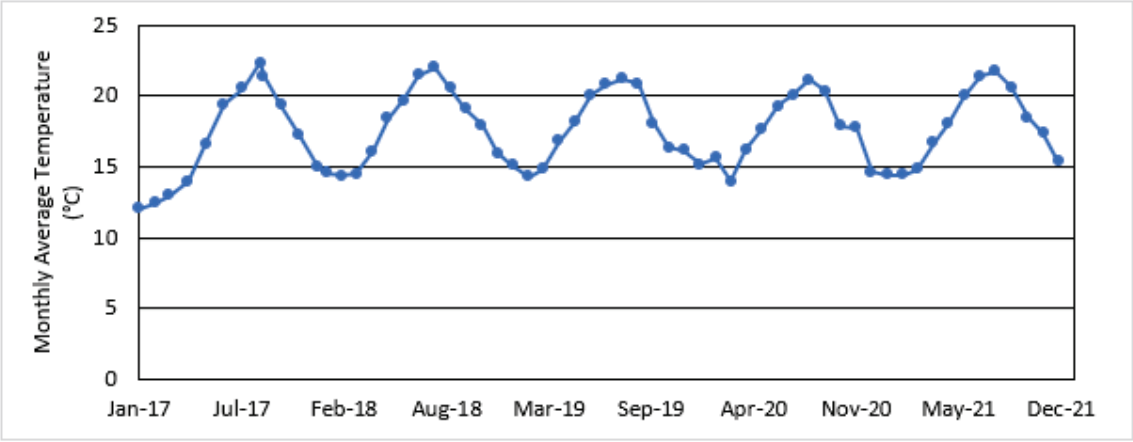
TABLE 3-9 PROJECTED INFLUENT LOADS (PPD)

Year	2021	2023	2028	2033	2038	2043
Population	1,133	1,186	1,328	1,488	1,668	1,869
TKN						
AADF	40.8	42.7	47.8	53.6	60.0	67.3
MMF	46.9	49.1	55.0	61.6	69.1	77.4
TP						
AADF	5.4	5.7	6.4	7.1	8.0	9.0
MMF	6.1	6.4	7.1	8.0	9.0	10.0

- Temperature

The City has also collected influent temperature readings. The monthly average influent temperatures are shown in Figure 3-8. The minimum monthly temperature was approximately 11°C. The maximum monthly temperature was approximately 23°C.

FIGURE 3-8 WWTP INFLUENT TEMPERATURES



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CHAPTER 4 - ALTERNATIVES CONSIDERED

There are many different alternatives to meet the wastewater facility deficiencies discussed in this facility planning study. The alternatives with the highest likelihood of being used by the City were considered for evaluation. The goals of the alternatives were to:

- Find solutions that are practical and cost-effective
- Maximize use of existing facilities
- Select facilities that can be constructed without unacceptably impacting effluent quality
- Identify solutions that could be phased to reduce debt and minimize user rate increases

4.1. DESIGN CRITERIA

The characteristics of the influent and effluent that form the basis for sizing the treatment plant facilities, are summarized in Table 4-1 and in the NPDES permit (Appendix C). Flow criteria that will be used for sizing various potential treatment components are summarized in Table 4-2. For implementation of the alternatives recommended below, the NPDES permit will need to be updated and a biosolids management plan will need to be developed.

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TABLE 4-1: 20-YEAR (2043) WWTP PLANNING CRITERIA

Parameter	Influent	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit
Average Annual Daily Flow (AADF)	0.103			
Max Month Wet-Weather Flow ($MMWWF_5$) (MGD)	0.112			
Peak Instantaneous Flow (PIF_5) (MGD)	0.252			
BOD_5 [1,2] (May 1 – October 31) **(ppd)**	504	-	-	-
TSS [2,3] (May 1 – October 31) **(ppd)**	421	-	-	-
BOD_5 (November 1 – April 30) **(ppd)**	513	30 mg/L 30 ppd 85% removal	45 mg/L 60 ppd -	140 ppd
TSS (November 1 – April 30) **(ppd)**	467	50 mg/L 47 ppd 65% removal	80 mg/L 90 ppd -	220 ppd
pH		Daily minimum between 6.0 and 9.0		
E. coli Bacteria		126/100 mL		406/100 mL
Total Chlorine Residual		0.03 mg/L		0.08 mg/L

[1] BOD_5 = 5-Day Biochemical Oxygen Demand

[2] ppd = pounds per day

[3] TSS = Total Suspended Solids

TABLE 4-2: CRITERIA FOR COMPONENT SIZING

Treatment Component	Sizing Criteria	Flow (MGD)
Headworks	PIF5	0.252
Aerated Lagoon	MMWWF5	0.112
Effluent Storage Lagoon	ADWF	0.103
Chlorination and Dechlorination Systems	PIF5	0.252
River Pump Station / Irrigation Pump Station	PIF5	0.252

If a WWTP deficiency discussed in the previous chapters had one clear preferred solution (such as pump station VFDs, fencing, etc.), then the solution is not discussed here, but is included in the Capital Improvement Plan (Chapter 6).

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4.2. EFFLUENT DISPOSAL ALTERNATIVES

The City of Aurora discharges treated effluent under NPDES Permit No. 101772 (Appendix C) into the Pudding River from November 1st through April 30th. From May 1st through October 31st the City can land apply the treated wastewater on fields within the WWTP grounds. During this time no discharge to state waters is permitted.

4.2.1. Regionalization

Due to the political complexity, physical distance, and pipeline cost between Aurora and a city with larger wastewater facilities, developing a partnership with another community to share wastewater facilities is not of interest to the City at this time.

4.2.2. Summer Farmland Application or Storage and Winter Surface Water Discharge (Status Quo):

This option is to continue to dispose of the water as is currently done. As mentioned in Chapter 2, there are storage volume and/or land application area deficiencies that would need to be addressed with this option. Three sub-options were developed and evaluated to solve the storage volume and/or land application area deficiencies.

The use of a cover was also considered on both the existing and new lagoons to reduce the effects of precipitation. However, factoring in the decrease in evaporation that would result from a cover, the decrease in overall storage volume required was not substantial enough to outweigh the cost of the cover. Therefore, this alternative did not include a lagoon cover.

a. Increase the effluent storage capacity and maintain the existing land application. This sub-option would add approximately 9 million gallons of storage to the existing system to provide the estimated required storage capacity during the summer (non-discharge period) for the 20-year planning flows. It is presumed that this would require the purchase of land for the new storage lagoon and the construction of a new pump station to transfer water between storage lagoons. It also includes upgrading the irrigation system on the 6 acres to a permanent system. It is presumed that the new effluent storage lagoon may be located approximately 0.5 miles from the WWTP.

b. Increase the effluent storage. Water would be stored in effluent storage lagoons during the summer until it can be discharged to surface water in the winter. This sub-option would use the existing land application site for the new storage lagoon, so no land would need to be purchased. The new additional effluent storage lagoon would add approximately 12 million gallons of storage capacity. It is presumed that this would require the addition of a new pump station to transfer water between storage lagoons.

c. Increase land application area. This sub-option would add more land application area to the existing system. There is an additional 3 acres at the WWTP site that has been approved for land application and potentially 5 additional acres that could potentially be approved. For this option, it was assumed that the City would have a total of 14 acres of land at the WWTP site for land application and approximately 20 acres of land would be purchased within one mile of the WWTP for land application. These 34 acres would provide the estimated land application area required during the summer (non-discharge period) for the 20-year planning flows. This sub-option would require the purchase of land and irrigation systems for the existing and new land application areas. The existing Effluent Storage Lagoon would continue to be used, especially when land application and surface water discharge are not possible. It is assumed that the existing irrigation pump station can be used to pump to the different land application areas.

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4.2.3. Year-Round River Discharge (No Farmland Application)

Year-round discharge to the Pudding River would eliminate the need to increase the storage and/or land application area. However, more stringent permit limits would be required to protect the Pudding River during the dry season (currently the non-discharge season). These permit limits would likely include ammonia, phosphorus, and temperature. The cost for the additional treatment facilities to achieve ammonia, phosphorus, and temperature limits would be very significant. In order to meet the required treatment levels consistently, a sophisticated mechanical plant would be needed, including tertiary treatment and cooling. Additionally, changing the discharge flows to the Pudding River would require an antidegradation study, an update to the NPDES permit, and perhaps more treatment than listed above. For these reasons, along with the high capital and operational costs of a more sophisticated mechanical plant, this alternative was determined not to meet the City's goals.

4.2.4. Summer Farmland Application and Winter Storage (No Surface Water Discharge)

The City could look at farmland application for all of the effluent. This could involve the City purchasing additional land or working with farmers to utilize water. The treatment requirements for recycled water may be less stringent than continued discharge to the Pudding River. This alternative would require storage during the winter (non-growing season). Based on the 2043 average wet-weather design flow, 2010 monthly precipitation data from the City's rain gauge, and evaporation data from the Western Regional Climate Center – North Willamette Research and Extension Station, the required total storage volume during the non-growing season is approximately 31 million gallons. The existing Effluent Storage Lagoon has a capacity of only 7.2 million gallons. Thus, an additional approximately 24 million gallons of storage would need to be constructed. As mentioned in Section 4.2.2, the cost of a lagoon cover outweighed the advantages of a smaller required lagoon storage volume, so this alternative did not include a lagoon cover.

Use of treated effluent outside of the WWTP is governed by recycled water regulations, as outlined in Oregon Administrative Rules (OAR) 340-055. The April 2008 revisions to Oregon's Recycled Water Use Rules allow the use of recycled water for beneficial purposes if the use provides a resource value and protects public health and the environment. Replacing another water source that would be used under the same circumstances or supplying nutrients to a growing crop are considered as resource values and beneficial purposes. OAR 340-055 defines five categories of effluent, identifies allowable uses for each category, and provides requirements for treatment, monitoring, public access, and setback distances. Irrigation of fodder, fiber, and seed crops not for human consumption is allowed for any class of effluent. Fewer restrictions are imposed for higher quality effluent, as shown in Table 4-3. Additionally, OAR 340-055 contains an exemption for using the WWTP effluent for landscape irrigation or in plant processes so long as the water is oxidized and disinfected, the irrigation is contained within the WWTP property where it is generated, spray or drift does not occur off the site, and public access is restricted.

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TABLE 4-3: REUSE REQUIREMENTS BY EFFLUENT CATEGORY

	Class A	Class B	Class C	Class D	Non-disinfected
Treatment[1]	O,D,F	O,D	O,D	O,D	O
Total coliform, 7-day median #/100 mL	2.2 [2]	2.2 [2]	23 [3]	- [4]	Per permit
Turbidity, NTU	2	-	-	-	
Public access [5]		Limited	Limited	Controlled	Prevented
Setback to property line [6]		10 feet	70 feet	100 feet	Per permit
Setback to water supply source		50 feet	100 feet	100 feet	150 feet

[1] O = oxidized, D = disinfection, F = filtration, RWUP = Recycle Water Use Permit
[2] Must not exceed 23 total coliform organisms per 100 milliliters (ml) in any single sample
[3] Must not exceed 240 total coliform organisms per 100 ml in any two consecutive samples
[4] Rather than total coliform, Class D Recycled Water is required to sample for E. coli. E. coli is a subgroup of the total coliform organisms, so a total coliform analysis includes the E. coli organisms. For Class D Recycled Water, the 30-day log mean must not exceed 126 E. coli organisms per 100 ml; and must not exceed 406 E. coli organisms per 100 ml in a single sample
[5] Limited public access: no direct contact during irrigation cycle
[6] Sprinkler irrigation assumed

Aurora's effluent meets Class C requirements. Upgrades would be necessary to reliably meet Class A or B requirements. For recycled water use, groundwater must be protected in accordance with the requirements of OAR 340-040. For agricultural use, this typically translates to irrigating at agronomic rates to match the net irrigation requirements of the crops. Water application can take place during the growing season at a rate of approximately 15.5 inches per acre per year on a grass seed crop (Oregon Crop Water Use and Irrigation Requirements, 1992, OSU ext. Pub. 8530). The theoretical irrigated farmland needed to irrigate the entire year's flow during the growing season, based on the 2043 AADF and assuming 75% irrigation efficiency, is approximately 54 acres.

It should be noted that, if the farmland used for effluent disposal is privately owned, the City may have limited control over when the effluent is used. Many farmers in the area grow crops without irrigation. In evaluating this alternative, it was assumed that the City would purchase land for farmland application. The City would need to purchase 40 additional acres to use along with the 14 acres available at the WWTP site. A storage volume of approximately 24 million gallons (in addition to the existing Effluent Storage Lagoon) is included to store the water over the winter. This alternative also includes permanent irrigation systems.

4.3. WASTEWATER TREATMENT ALTERNATIVES

The current aeration lagoon has capacity deficiencies and does not allow for redundancy. Alternatives to address the existing aeration lagoon deficiencies were considered, including the construction of a new lagoon. However, due to the limited space at the WWTP, especially near the existing aerated lagoon, and the treatment efficiency of a lagoon system, a mechanical treatment plant is recommended. A secondary mechanical system can achieve better effluent quality in a smaller footprint that is more conducive to the available space.

Three secondary mechanical treatment alternatives were evaluated in this facility plan to address the TSS and BOD_5 removal and redundancy requirements: 1) Sequencing Batch Reactor (SBR), 2) Membrane Bioreactor (MBR), and 3) Extended Aeration Activated Sludge. Each treatment alternative must produce effluent that meets the requirements for the selected disposal alternative.

The treatment process for each of the alternatives is similar, with some differences that will be spelled out in the following sections. First, solids will pass through an influent screen and grit removal chamber for preliminary treatment. Next, the wastewater will be treated in a secondary mechanical biological treatment process to remove BOD_5 and TSS. Waste Activated Sludge (WAS) will be periodically removed and sent

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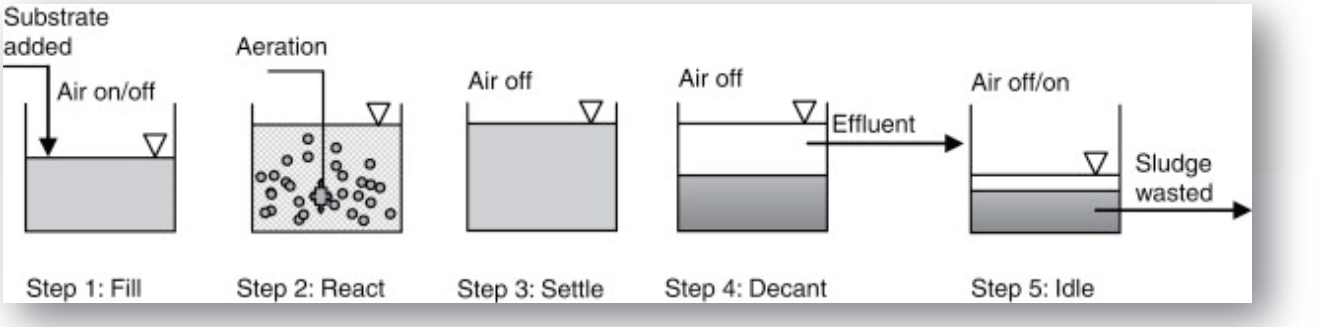
to the sludge storage tanks to optimize treatment. Finally, liquid sodium hypochlorite will be added to the effluent for disinfection and to reduce the opportunity for biological growth in the effluent piping system.

4.3.1. Sequencing Batch Reactor (SBR)

An SBR would treat wastewater in individual batches within the same basin. During a full treatment cycle, the SBR basin would go through a reaction, settlement and decant phase. A typical SBR cycle is illustrated in Figure 4-1. After a cycle has been completed, the SBR basin would fill once again, and the next cycle would begin.

As shown in the process schematic in Figure 4-2, once the treatment cycle is complete, the SBR decant will be pumped to the effluent storage lagoon. Effluent would be stored in the effluent storage lagoon until it can be discharged.

FIGURE 4-1: SBR CYCLE STEPS



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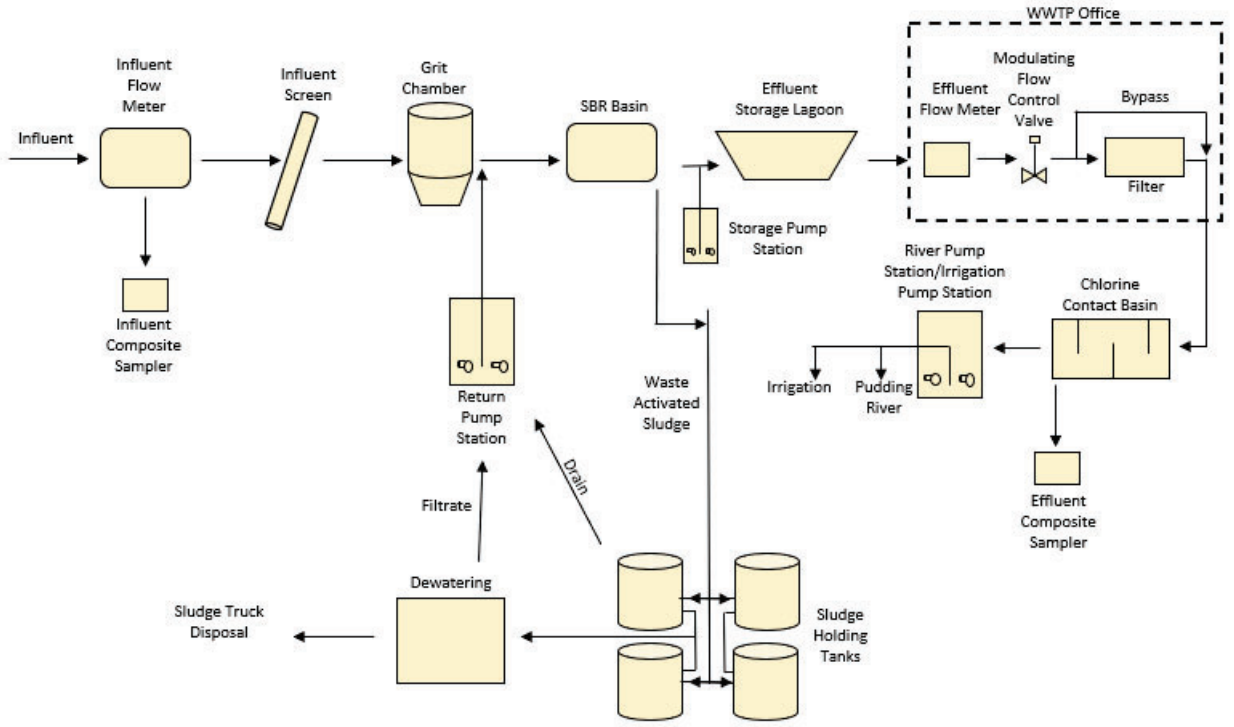
A process flow schematic for the SBR treatment alternative is shown in Figure 4-2.

FIGURE 4-2: SBR PROCESS SCHEMATIC



4.3.2. Membrane Bioreactor (MBR)

The second alternative evaluated was an MBR. An MBR treats wastewater with the same principles as the SBR, but it combines a suspended growth biological reactor with membrane filtration. In this type of system, solids-liquid separation is achieved by passing wastewater through a thin, porous membrane instead of the gravity solids settling in an SBR. This process allows MBRs to operate at a higher mixed liquor suspended solids (MLSS) concentration than a conventional system (such as an SBR), which means a smaller footprint. Solids retained on the membranes are removed by an air scour and recycled back to the front of the treatment train. The water that passes through the membrane typically has low concentrations of bacteria, ammonia, TSS, and BOD_5 and can be readily discharged following disinfection. MBR systems typically have higher capital and operation and maintenance costs than other mechanical systems. The key to a manageable life-cycle cost is maintaining the membrane to prolong its life. A high level of debris removal through preliminary treatment, such as finer screening, is required to prevent fouling and to lengthen the life of the membranes. A process flow schematic of this alternative is shown in Figure 4-3.

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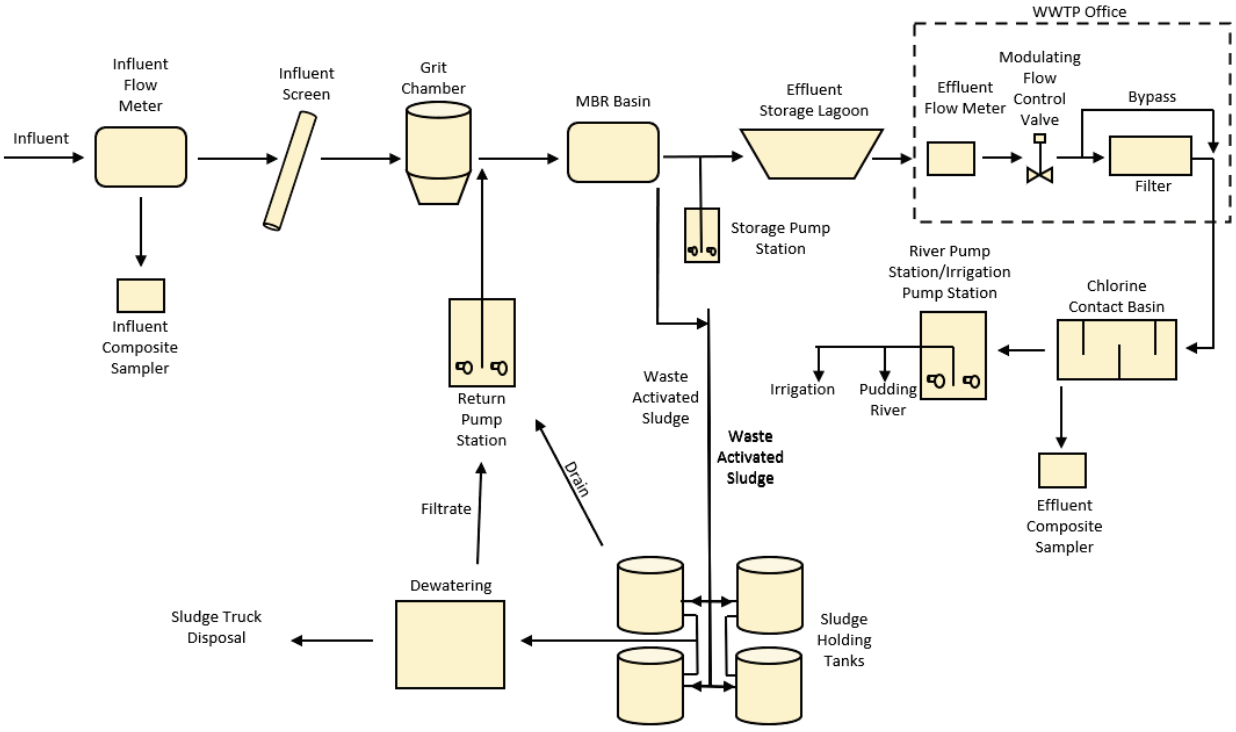
FIGURE 4-3: MBR PROCESS SCHEMATIC



4.3.3. Extended Aeration Activated Sludge

The extended aeration process is similar to an SBR in that it utilizes activated sludge and gravity settling. The extended aeration process includes settling in a separate clarifier and return of activated sludge pumps. A process schematic for the extended aeration activated sludge alternative can be found in Figure 4-4.

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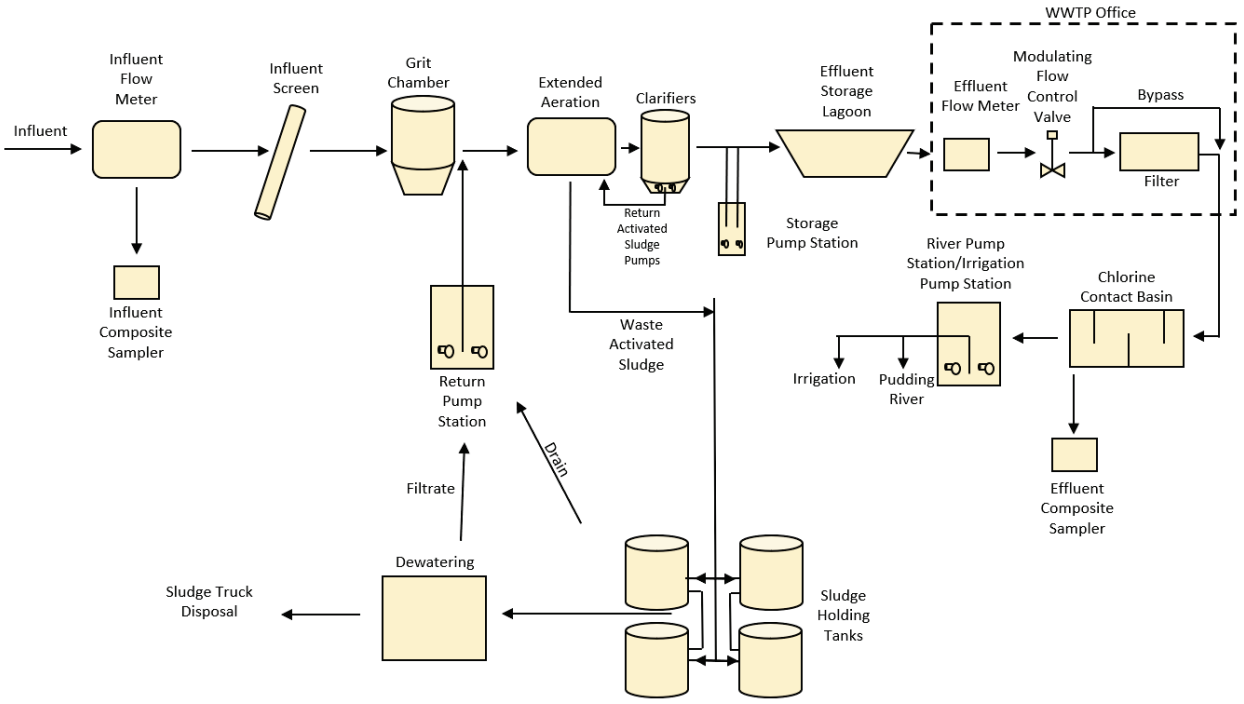
FIGURE 4-4: EXTENDED AERATION ACTIVATED SLUDGE



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4.4. SOLIDS HANDLING ALTERNATIVES

In addition to secondary treatment, the WWTP will require an updated sludge removal and disposal process. Currently, sludge is pumped into dewatering bags that are then taken to a landfill. The weight of the bags and long drying time causes complications with the disposal process. Three solids handling alternatives were considered in this facility plan: 1) sludge dewatering bags (status quo); 2) treating the sludge via aerobic digesters, and 3) screw press dewatering in addition to sludge treatment.

4.4.1. Sludge Dewatering Bags (Status Quo)

Currently, sludge is placed into biodegradable dewatering bags in dumpsters that are picked up and taken to a landfill (Figure 4-5). Dewatering bags are manufactured with high tenacity polypropylene yarns that are woven into a fine mesh, allowing solids to be pumped into the bag and contained, while liquids may pass through the mesh. The geotextile tube material is inert to biological degradation and is resistant to chemicals and UV light. The bags have low dewatering capacity, and it can take weeks or months for them to dry out enough to where the trucks can lift them. The bags are located outside with no cover, and precipitation can lengthen the dewatering process. This system could be heavily improved by a more-efficient dewatering process.

FIGURE 4-5: SLUDGE DEWATERING BAGS

4.4.2. Screw Press Dewatering

In this alternative, the biosolids would be dewatered with a screw press, then hauled to a landfill for disposal. A screw press is a device with a slowly moving screw conveyer that is surrounded by a screen. Two screw presses would be installed inside a building for redundancy. The dewatered solids would then be stored under a cover and land applied by farmers or sent to a landfill for disposal. An example picture of a screw press is in Figure 4-6.

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FIGURE 4-6: SCREW PRESS

4.4.3. Sludge Treatment and Dewatering

This option was to construct an aerobic digester to treat the solids to meet Class B (EPA Part 503;) requirements. Following treatment, the solids would be dewatered with the screw press. The solids could then be land applied by farmers. For the cost estimate provided in Chapter 5, it was assumed that the digester basins would be a concrete structure and diffused aeration would be used.

4.5. MAP

A map of the existing WWTP is provided in Appendix A Figure 5. A map of the selected alternatives is provided in Appendix A Figure 7.

4.6. LAND REQUIREMENTS AND EXPANDABILITY

The selected alternatives can be completed in land that the City owns. A site layout of the alternatives is provided in Appendix A Figure 7. However, the WWTP is limited on space, especially due to the large amount of storage needed. Summer storage or land application outside of the WWTP site may be required beyond the 20-year planning period.

4.7. POTENTIAL CONSTRUCTION PROBLEMS

The depth of the water table and subsurface rock may affect the construction of the alternatives. However, subsurface investigations were not within the scope of this project. The project area's soil is typical for the area and would require construction techniques normally used to effectively manage excavation, dewatering, and sloughing issues that may arise in Marion County. Construction plans for any of the alternatives would also include provisions to control dust and runoff.

4.8. SUSTAINABLE CONSIDERATIONS

Sustainable utility management practices include environmental, social, and economic benefits that aid in creating a resilient utility.

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4.8.1. WATER AND ENERGY EFFICIENCY

A mechanical treatment system is more efficient and has less footprint than the current aerated lagoon system. If biosolids treatment is performed in the future, the farmland disposal, because of the nutrients, would be beneficial to the farmland.

4.8.2. GREEN INFRASTRUCTURE

Any pump station and blowers will be completed with VFDs and energy efficient pumps.

4.8.3. Other

System resiliency and simplicity will be optimized with the updated SCADA required to complete the recommended alternatives.

4.9. COST ESTIMATES

The advantages, disadvantages, and comparative costs of the alternatives are presented in Chapter 5. The cost estimates are a Class 5 cost opinion, as defined by the Association for the Advancement of Cost Engineering. They include estimated construction costs with markups of 10% for general conditions, a contingency of 30%, 15% contractor overhead and profit (OH&P), and engineering services including construction of 25% (based on total construction cost).

In addition to project capital costs, annual O&M costs are compared to arrive at a more complete picture of the alternative costs. A 20-year life-cycle cost analysis is provided for most of the alternatives, based on a real discount rate (inflation removed) of 1.2%. The equipment (unless a short-lived asset) is assumed to have a 20-year useful life so no depreciation or salvage value is included for comparing the alternatives. An average rate of $0.09 per kWh was used for estimating power costs and an average labor cost of $50 per hour was used to estimate maintenance costs.

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CHAPTER 5 - SELECTION OF AN ALTERNATIVE

Alternatives were considered to address the deficiencies noted in the previous chapter. Advantages, disadvantages, and comparative costs (where applicable) are presented for evaluating each process alternative (comparative cost estimates do not include costs common to all alternatives). Annual O&M costs are included in the cost estimates to arrive at a present value for comparison of alternatives.

5.1. EFFLUENT DISPOSAL COMPARATIVE ANALYSIS (COST AND NON-MONETARY FACTORS)

The alternatives for effluent disposal presented in Chapter 4 include winter discharge and summer land application or storage, year-round discharge, and winter storage and summer land application.

5.1.1. Effluent Disposal Alternatives Cost Comparison

Cost estimates for the previously mentioned disposal alternatives are presented below in Table 5-1.

TABLE 5-1: EFFLUENT DISPOSAL ALTERNATIVES COST COMPARISON

Item	Alternative 4.1.2.a Additional Effluent Storage and Maintain Land Application	Alternative 4.1.2.b Additional Effluent Storage	Alternative 4.1.2.c Increase Land Application	Alternative 4.1.4 Summer Farmland Application and Winter Storage
Sitework	$ 20,000	$ 20,000	$ 49,000	$ 150,000
Storage Lagoon	$ 1,000,000	$ 1,320,000	--	$ 3,440,000
Pump Station	$ 230,000	$ 230,000	--	$ 230,000
Piping/Valves and Instrumentation	$ 430,000	$ 430,000	$ 778,000	$ 1,960,000
Electrical/Mechanical/Controls	$ 140,000	$ 132,000	--	$ 60,000
Permanent Irrigation System	$ 100,000	--	$ 445,000	$ 840,000
Subtotal	**$ 1,920,000**	**$ 2,132,000**	**$ 1,272,000**	**$ 6,680,000**
Mobilization (10%)	$ 200,000	$ 214,000	$ 128,000	$ 670,000
Subtotal	**$ 2,120,000**	**$ 2,346,000**	**$ 1,400,000**	**$ 7,350,000**
Contingency (30%)	$ 576,000	$ 640,000	$ 382,000	$ 2,010,000
Subtotal	**$ 2,696,000**	**$ 2,986,000**	**$ 1,782,000**	**$ 9,360,000**
Contractor OH&P (15%)	$ 288,000	$ 320,000	$ 191,000	$ 1,010,000
Total Construction Cost	**$ 2,984,000**	**$ 3,306,000**	**$ 1,973,000**	**$ 10,370,000**
General and Administrative Costs (25%)	$ 746,000	$ 827,000	$ 494,000	$ 2,593,000
Property	$ 360,000	--	$ 1,800,000	$ 3,000,000
Total Project Cost	**$ 4,090,000**	**$ 4,133,000**	**$ 4,267,000**	**$ 15,963,000**
Estimated Annual O&M	$ 26,000	$ 10,000	$ 53,000	$ 76,000
Total Present Value	**$ 4,550,000**	**$ 4,310,000**	**$ 5,205,000**	**$ 17,308,000**

A floating cover was considered; however, the decrease in storage volume was not significant enough to justify the cost of a floating cover.

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5.1.2. Effluent Disposal Alternatives Evaluation

The following Table 5-2 presents an evaluation of the effluent disposal alternatives.

TABLE 5-2: EFFLUENT DISPOSAL ALTERNATIVES EVALUATION

Alternative		Advantages	Disadvantages
4.1.2 Summer Farmland or Storage / Winter Discharge (Status Quo)	4.1.2 a	• Similar to current operator involvement with land application.	• Construction is difficult on the existing WWTP site. • Requires additional land for new storage lagoon. • Can be difficult to purchase additional land close to the WWTP.
	4.1.2 b	• Does not require the purchase of new land. • Less effort for the operator since there is no land application.	• Additional storage would be needed. • Construction is difficult on the existing WWTP site.
	4.1.2 c	• Does not require additional storage.	• Requires additional land for land application. • Can be difficult to purchase additional land close to the WWTP. • Land application increases which requires more operator involvement.
4.1.3 Year-Round Discharge		• Eliminates the need for land application and increasing the effluent storage.	• Requires expensive treatment; treatment likely needed for ammonia, phosphorus, and temperature. • Requires an antidegradation study and possibly more stringent limits.
4.1.4 Summer Farmland Application/Winter Storage		• Permit requirements are less stringent than requirements for discharging to the Pudding River.	• Requires additional land for farmland application and winter storage. • Can be difficult to purchase additional land close to the WWTP.

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5.1.3. Effluent Disposal Alternatives Impacts

The following Table 5-3 presents the impacts of the alternatives listed above.

TABLE 5-3: EFFLUENT DISPOSAL ALTERNATIVES IMPACTS

Environmental Criteria	Alternative 4.1.2			Alternative 4.1.3	Alternative 4.1.4
	Summer Farmland or Storage/Winter Discharge (Status Quo)			Year-Round Discharge	Summer Farmland Application/Winter Storage
	4.1.2. a	4.1.2. b	4.1.2. c		
Climate / Physical Aspects (topography / geology / and soils)	No permanent adverse impacts	No permanent adverse impacts	No permanent adverse impacts	No permanent adverse impacts	No permanent adverse impacts
Land Use	Change in the land use for the new storage lagoon	No change in land use outside of the WWTP	More land would be purchased, but farmed so land use does not change	No impact on land use outside of WWTP	Change in the land use for the new storage lagoon
Floodplain Development	No known impact	No known impact	No known impact	No known impact	No known impact
Wetlands and Water Quality	No known impact	No known impact	No adverse impact	More stringent requirements would be in place	No discharge into the Pudding River
Wild and Scenic Rivers	No adverse impact	No adverse impact	No adverse impact	No adverse impact	No adverse impact
Cultural Resources	No known impact	No known impact	No known impact	No known impact	No known impact
Flora & Fauna	No adverse impact	No adverse impact	No adverse impact	No adverse impact	No adverse impact

5.1.4. Effluent Disposal Alternative Recommendation

The recommended alternative is the construction of new effluent storage lagoon and continued winter discharge to surface water (Option 4.1.2 b) as it has the lowest 20-year life cycle cost and does not require the purchase of additional land.

5.2. WASTEWATER TREATMENT COMPARATIVE ANALYSIS (COST AND NON-MONETARY FACTORS)

The wastewater treatment alternatives presented in Chapter 4 include constructing an SBR, and MBR or an extended aeration activated sludge system.

5.2.1. Wastewater Treatment Alternatives Cost Comparison

A 20-year life cycle cost comparison for the treatment alternatives is provided in Table 5-4.

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TABLE 5-4: WASTEWATER TREATMENT ALTERNATIVES COST COMPARISON

Item	Alternative 4.2.1: SBR	Alternative 4.2.2: MBR	Alternative 4.2.3: Extended Aeration Activated Sludge
Sitework	$ 100,000	$ 100,000	$ 120,000
Treatment Equipment	$ 1,296,000	$ 1,387,000	$ 1,552,000
Basins (including slab, stairs, handrails, grating)	$ 475,000.00	$ 436,000	$ 617,000
Blower Building	$ 806,000.00	$ 806,000	$ 806,000
Piping/Valves/Instrumentation	$ 150,000	$ 150,000	$ 150,000
Electrical/Mechanical/Controls	$ 425,000	$ 432,000	$ 334,000
Subtotal	***$ 3,252,000***	***$ 3,311,000***	***$ 3,579,000***
Mobilization (10%)	$ 326,000	$ 332,000	$ 358,000
Subtotal	***$ 3,578,000***	***$ 3,643,000***	***$ 3,937,000***
Contingency (30%)	$ 976,000	$ 994,000	$ 767,000
Subtotal	***$ 4,554,000***	***$ 4,637,000***	***$ 4,704,000***
Contractor OH&P (15%)	$ 488,000	$ 497,000	$ 384,000
Subtotal	***$ 5,042,000***	***$ 5,134,000***	***$ 5,088,000***
Total Construction Cost	***$ 5,042,000***	***$ 5,134,000***	***$ 5,088,000***
General and Administrative Costs (25%)	$ 1,261,000	$ 1,284,000	$ 1,272,000
Total Project Cost	**$ 6,303,000**	**$ 6,418,000**	**$ 6,360,000**
Estimated Annual O&M	$ 32,000	$ 92,000	$ 34,000
20-Year Life Cycle Cost	**$ 6,930,000**	**$ 8,210,000**	**$ 7,020,000**

5.2.2. Wastewater Treatment Alternatives Evaluation

A summary of the advantages and disadvantages for the wastewater treatment alternatives is shown in Table 5-5.

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TABLE 5-5: WASTEWATER TREATMENT ALTERNATIVES EVALUATION

Alternative	Advantages	Disadvantages
SBR	• No clarifier or RAS pumping required. • Lowest overall energy consumption. • Operator flexibility to make process changes.	• More complex control than extended aeration activated sludge.
MBR	• Highest quality effluent of the alternatives. • Smallest footprint. • Does not require clarifiers.	• Highest O&M costs. • Requires high level of screening (pretreatment). • Requires a large amount of recycle pumping.
Extended Aeration Activated Sludge	• Highest number of equipment manufacturers – most competitive bid prices.	• Limited flexibility to adapt to permit changes. • Higher capital and O&M cost than SBR. • Largest footprint.

5.2.3. Wastewater Treatment Alternatives Impacts

Table 5-6 presents impacts of the alternatives listed above.

TABLE 5-6: WASTEWATER TREATMENT ALTERNATIVES IMPACTS

Environmental Criteria	Alternative 4.2.1	Alternative 4.2.2	Alternative 4.2.3
	Sequencing Batch Reactor	Membrane Bioreactor	Activated Sludge
Climate / Physical Aspects (topography / geology / and soils)	No permanent adverse impacts	No permanent adverse impacts	No permanent adverse impacts
Land Use	Will increase land use opportunities	Will increase land use opportunities	Will increase land use opportunities
Floodplain Development	No impact	No impact	No impact
Wetlands and Water Quality	No adverse impact	No adverse impact	No adverse impact
Wild and Scenic Rivers	No adverse impact	No adverse impact	No adverse impact
Cultural Resources	Impact unlikely because construction will be in previously disturbed land	Impact unlikely because construction will be in previously disturbed land	Impact unlikely because construction will be in previously disturbed land
Flora & Fauna	No adverse impact	No adverse impact	No adverse impact

5.2.4. Wastewater Treatment Alternative Recommendation

SBR is the recommended wastewater treatment alternative due to its smaller footprint and its flexibility to make changes. An SBR has low energy requirements, does not require clarifiers or RAS pumping, and has the lowest 20-year life cycle cost.

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5.3. SOLIDS HANDLING COMPARATIVE ANALYSIS (COST AND NON-MONETARY FACTORS)

In addition to secondary treatment, the WWTP will require an updated sludge removal and disposal process. Currently, sludge is pumped into dewatering bags that are then taken to a landfill. The weight of the bags and long drying time causes complications with the disposal process. Three solids handling alternatives were considered in this facility plan: 1) sludge dewatering bags (status quo); 2) treating the sludge via aerobic digesters, and 3) screw press dewatering in addition to sludge treatment.

5.3.1. Solids Handling Alternatives Cost Comparison

Cost estimates for the previously mentioned solids handling alternatives are presented below in Table 5-7.

TABLE 5-7: SOLIDS HANDLING ALTERNATIVES COST COMPARISON

Item	Alternative 4.3.1: Existing Dewatering Bags	Alternative 4.3.2: Screw Press Dewatering	Alternative 4.3.3: Sludge Treatment and Dewatering
Sitework	$ -	$ 24,000	$ 37,000
Digester Basin (including guardrails, grating)	$ -		$ 130,000
Digester Equipment	$ -		$ 147,000
Digester Blower and Dewatering Building	$ -		$ 481,000
Piping/Valves and Instrumentation	$ -	$ 99,000	$ 209,000
Cover and Concrete Storage	$ -	$ 150,000	$ 150,000
Screw Press	$ -	$ 523,000	$ 523,000
Dewatering Building	$ -	$ 481,000	$ -
Dewatering Bags and Shipping Fees	$ 14,000	$ -	$ -
Electrical/Mechanical/Controls	$ -	$ 281,000	$ 324,000
Subtotal	***$ 14,000***	***$ 1,558,000***	***$ 2,010,000***
Mobilization (10%)	$ 2,000	$ 156,000	$ 210,000
Subtotal	***$ 16,000***	***$ 1,714,000***	***$ 2,220,000***
Contingency (30%)	$ 5,000	$ 468,000	$ 610,000
Subtotal	***$ 21,000***	***$ 2,182,000***	***$ 2,830,000***
Contractor OH&P (15%)	$ 4,000	$ 234,000	$ 310,000
Total Construction Cost	**$ 25,000**	**$ 2,416,000**	**$ 3,140,000**
General and Administrative Costs (25%)	$ 7,000	*$ 604,000*	*$ 785,000*
Total Project Cost	**$ 32,000**	**$ 3,020,000**	**$ 3,925,000**
Estimated Annual O&M	$ 56,000	$ 42,000	$ 54,000
20-Year Life Cycle Cost	**$ 1,118,000**	**$ 3,840,000**	**$ 4,980,000**

5.3.2. Solids Handling Alternatives Evaluation

A summary of the advantages and disadvantages for the solids handling alternatives are shown in Table 5-8.

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TABLE 5-8: SOLIDS HANDLING ALTERNATIVES EVALUATION

Alternative	Advantages	Disadvantages
4.3.1 Sludge Dewatering Bags (Status Quo)	• Process is already in place. • Operator familiarity. • Little power consumption.	• Least effective dewatering – highest hauling costs. • Highest O&M costs. • Freezing concerns. • Potential for odors. • Disposal is labor intensive.
4.3.2 Screw Press Dewatering	• Smallest footprint. • Not impacted by weather. •	• Requires building.
4.3.3 Sludge Treatment and Dewatering	• Not impacted by weather. • Low odors. • Removal of small solids – best dewatering performance. • Low speed equipment. • Provides flexibility for disposal.	• Highest capital costs – requires building. • Highest polymer consumption.

5.3.3. Solids Handling Alternatives Impacts

Table 5-9 presents impacts for the alternatives described above.

TABLE 5-9: SOLIDS HANDLING ALTERNATIVES IMPACTS

Environmental Criteria	Alternative 4.3.1 Sludge Dewatering Bags (Status Quo)	Alternative 4.3.2 Screw Press Dewatering	Alternative 4.3.3 Sludge Treatment and Dewatering
Climate / Physical Aspects (topography / geology / and soils)	No permanent adverse impacts	No permanent adverse impacts	No permanent adverse impacts
Land Use	No impact	Will take up land on treatment site.	Will take up land on treatment site.
Floodplain Development	No impact	No impact	No impact
Wetlands and Water Quality	No adverse impact	No adverse impact	No adverse impact
Wild and Scenic Rivers	No adverse impact	No adverse impact	No adverse impact
Cultural Resources	No impact	Impact unlikely because construction will be in previously disturbed land	Impact unlikely because construction will be in previously disturbed land
Flora & Fauna	No adverse impact	No adverse impact	No adverse impact

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5.3.4. Solids Handling Alternative Recommendation

Based on the advantages, sludge treatment and dewatering was selected as the solids handling recommended method. Although this alternative will require significantly higher capital cost than the existing dewatering bags, it will have lower hauling and O&M costs, and increased efficiency (less water to retreat). The current sludge dewatering bags take a significant amount of time to dry out enough to where they can be transported to a landfill for disposal. Due to the high capital costs of this recommendation, sludge dewatering and sludge treatment are divided into two separate line items in the Capital Improvement Plan (Chapter 6). The screw press and sludge dewatering improvement, which will take place before sludge treatment is added, will include a building sized to accommodate the future aerobic digester.

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CHAPTER 6 - PROPOSED PROJECTS

This section consists of the recommended plan to address the wastewater system deficiencies. A location map showing the changes to the wastewater treatment plant is included in Figure 7 (Appendix A).

6.1. PRELIMINARY PROJECT DESIGN

Detailed project summary sheets for the WWTP improvements are included in Appendix E. Each project summary sheet provides the objective, key issues, cost estimate, and project location map. The recommended improvements are summarized below.

6.1.1 Priority One Improvements

- Sequencing Batch Reactor

  To meet treatment requirements, the plant should include mechanical treatment. A sequencing batch reactor (SBR) should be constructed to replace the existing aerated lagoon system.

- Additional Effluent Storage Lagoon

  An additional storage lagoon and pump station should be constructed to continue to store the effluent during the summer (when the effluent cannot be discharged to the Pudding River). Fall protection around the storage lagoon and an emergency overflow should be installed.

- Influent Screen Relocation

  The influent screen should be relocated closer to the WWTP office to reduce pumping costs.

- SCADA Upgrade

  A SCADA system upgrade will be necessary for new improvements.

- Chlorination/Dechlorination System Upgrade

  The chemical storage should be replaced with a well-ventilated, heated, and corrosion-resistant building. A chlorine monitor and an automatic alarm should be installed if a dosing pump fails or if the chlorine residual rises. Railing should be placed around the chlorine contact basin. Further evaluation of the disinfection capacity is recommended as baffles and/or mixer modifications in the chlorine contact basin may be necessary to disinfect future flows.

6.1.2 Priority Two Improvements

- Screw Press Dewatering

  Add a new screw press to dewater solids. This improvement will avoid complications due to weather and will aid in disposal costs.

- Site Work at WWTP

  The road leading to the WWTP office building should be paved with storm drains installed to collect and disperse the stormwater. In addition, the stormwater detention basin near the WWTP office has been washed out and needs to be repaired.

- Fall Protection

  Fall protection should be added at the headworks, lagoons, chlorine contact basin, and WWTP pump stations.

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- Fencing

  Fencing should be added to the WWTP office, the chlorine contact basin, and the pump stations.

- WWTP Pump Station VFDs

  The pump starters should be replaced with VFDs to increase efficiency.

- Paving Access Road

  The road leading to the WWTP is currently gravel and should be paved.

- Lagoon Overflow, Structural Inspection, and Bank Stabilization

  The existing lagoons should be structurally inspected (costs for any modifications are unknown at this time). An overflow should be added to the lagoons to protect them from overtopping.

- Grit Chamber and Headworks Upgrade

  A grit chamber is needed to protect the SBR from wear and tear. Headworks should also be upgraded to add a cover and freeze protection to the influent screen.

- Aerobic Digester

  Add an aerobic digester to achieve Class B solids (60-day SRT in the winter). This would allow the solids to be land applied by farmers.

6.2. PROJECT SCHEDULE

The specific schedule for each project will be determined at a later date by the City during the predesign phase for each proposed improvement. An estimated schedule for the first six years is shown in the 6-year CIP (Table 6-1). Costs presented here are planning-level estimates and include a planning level contingency of 30%. Actual costs may vary depending on market conditions and shall be updated as projects are further refined in the pre-design and design phases.

TABLE 6-1: 6-YEAR CAPITAL IMPROVEMENT PLAN

ID#	Item	Cost	Opinion of Probable Costs (2022 Dollars)					
			2024	2025	2026	2027	2028	2029
Priority 1 Improvements (0-6 years)								
1.1	Sequencing Batch Reactor	$ 6,303,000		$ 6,303,000				
1.2	Additional Effluent Storage Lagoon	$ 4,133,000			$ 4,133,000			
1.3	Influent Screen Relocation	$ 49,000			$ 9,000	$ 40,000		
1.4	SCADA Upgrade	$ 240,000				$ 60,000	$ 180,000	
1.5	Chlorination/Dechlorination System Upgrade	$ 457,000					$ 228,500	$ 228,500
Total (rounded)		**$ 11,182,000**	**$ -**	**$ 6,303,000**	**$ 4,142,000**	**$ 100,000**	**$ 408,500**	**$ 228,500**

* All costs in 2022 Dollars. Costs include engineering and contingencies (30%).

The cost estimate herein is concept level information only based on our perception of current conditions at the project location and its accuracy is subject to significant variation depending upon project definition and other factors. This estimate reflects our opinion of probable costs at this time and is subject to change as the project design matures. This cost opinion is in 2022 dollars and does not include escalation to time of actual construction. Keller Associates has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Keller Associates cannot and does not warrant or guarantee that proposals, bids, or actual construction costs will not vary from the cost presented herein.

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6.3. PERMIT REQUIREMENTS

The City's NPDES discharge permit was recently renewed (went into effect on August 1st, 2022) without many changes. The recommendations set forth in the CIP are flexible and can be modified to allow the WWTP to deal with future permit requirements. A permit modification to the NPDES permit is anticipated to show the improvements noted in the Capital Improvements Plan and this facility planning study. The services associated with the permit modifications are included in the Priority 1 CIP costs.

The City's NPDES permit, (in addition to the Influent, Effluent, and Recycled Water Monitoring Reports), included details on the following items:

- *Outfall Inspection Report* – In 2025 the City must inspect the integrity of the Pudding River Outfall and submit a written report to DEQ.
- *Quality Assurance and Quality Control (QA/QC) Program* – If not already developed, the City must create a QA/QC program to verify the accuracy of the sample analysis.
- *Wastewater Solids Annual Report* – Describes the quality, quantity and disposal of solids generated at the plant.
- *Hauled Waste Annual Report* - Describes the waste received by the publicly owned treatment works.
- *Recycled Water Use Plan* – Describes how the plant distributes the reuse water.
- *Annual Inflow and Infiltration Report* – Details of activities performed during the past year and activities planned for the coming year.
- *Significant Industrial User Survey* – Determine the presence of any industrial users that are subject to pretreatment.
- *Emergency Response and Public Notification Plan* – Ensures the contact information for the applicable public agencies is accessible and up to date.

Refer to the NPDES Permit for additional information on these items.

6.4. SUSTAINABILITY CONSIDERATIONS

- Water and Energy Efficiency

  Adding VFDs can decrease the pumping energy used at the WWTP. A mechanical treatment system is more efficient and has less footprint than the current aerated lagoon system.

- Green Infrastructure

  Any pump station installation will be completed with VFDs and energy efficient pumps.

- Other

  The proposed alternatives incorporate the use of SCADA into many aspects of the treatment system. This allows for better system resiliency and operation simplicity, as well as improved system optimization.

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6.5. TOTAL PROJECT COST ESTIMATE (ENGINEER'S OPINION OF PROBABLE COST)

The summary of the Aurora wastewater facility improvement costs is in Table 6-2. The percent SDC eligible factored in the existing design flow, existing capacity, and improved capacity. The amount of capacity that can be utilized for future connections is divided by the future capacity in 2043. For projects that did not have an increase in flows, the percent SDC eligible is derived from the percent growth in population over the 20-year planning period. Costs shown are planning-level estimates and can vary depending on market conditions; they shall be updated as the project is further refined in the pre-design and design phases.

TABLE 6-2: 20-YEAR CAPITAL IMPROVEMENT PLAN

ID#	Site	Total Estimated Cost (2022)	SDC Growth Apportionment		City's Estimated Portion
			%	Cost	
Priority 1 Improvements (0-6 years)					
1.1	Sequencing Batch Reactor	$ 6,303,000	73%	$ 4,615,000	$ 1,688,000
1.2	Additional Effluent Storage Lagoon	$ 4,133,000	42%	$ 1,724,000	$ 2,409,000
1.3	Influent Screen Relocation	$ 49,000	39%	$ 19,000	$ 30,000
1.4	SCADA Upgrade	$ 240,000	39%	$ 95,000	$ 145,000
1.5	Chlorination/Dechlorination System Upgrade	$ 457,000	39%	$ 180,000	$ 277,000
	Total Priority 1 Improvements (rounded)	**$ 11,182,000**		**$ 6,633,000**	**$ 4,549,000**
Priority 2 Improvements					
2.1	Screw Press Dewatering	$ 3,020,000	39%	$ 1,189,000	$ 1,831,000
2.2	Site Work At WWTP	$ 212,000	39%	$ 83,000	$ 129,000
2.3	Fall Protection	$ 147,000	39%	$ 58,000	$ 89,000
2.4	Fencing	$ 123,000	39%	$ 48,000	$ 75,000
2.5	WWTP Pump Station VFDs	$ 59,000	39%	$ 23,000	$ 36,000
2.6	Paving Access Road	$ 385,000	39%	$ 152,000	$ 233,000
2.7	Lagoon Overflow, Structural Inspection, and Bank Stabilization	$ 362,000	39%	$ 143,000	$ 219,000
2.8	Grit Chamber and Headworks Upgrade	$ 1,743,000	39%	$ 680,000	$ 1,063,000
2.9	Aerobic Digester	$ 912,000	39%	$ 359,000	$ 553,000
	Total Priority 2 Improvements (rounded)	**$ 6,963,000**		**$ 2,735,000**	**$ 4,228,000**
	TOTAL WASTEWATER PLANT IMPROVEMENTS COSTS (rounded)	**$ 18,145,000**		**$ 9,368,000**	**$ 8,777,000**

All costs in 2022 Dollars. Costs include contractor mobilization (10%), contractor overhead and profit (OH&P; 15%), contingency (30%), and soft costs (e.g. engineering and construction management services, legal, administrative, and permitting services) (25%).
The cost estimate herein is concept level information only based on our perception of current conditions at the project location and its accuracy is subject to variation depending upon project definition and other factors. This estimate reflects our opinion of probable costs at this time and is subject to change as the project design matures. This cost opinion is in 2022 dollars and does not include escalation to time of actual construction.

6.6. ANNUAL OPERATING BUDGET

An itemized annual operating budget for the fiscal year 2020-2021 is provided in Appendix D. Additional information on budget specifics can be found in the following sections.

6.6.1 Revenue

Potential User Rate Impacts

The existing sewer rate schedule consists of a flat rate fee of $137.37 every two months per equivalent dwelling unit (EDU). After reviewing the City's sewer system budget, it appears that the Sewer Operating Fund generates approximately $361,000 in revenue for use to offset short-term asset replacement and O&M costs. The portion of the existing budget that can be used for capital improvement projects varies from year to year. With this in mind, the rate impacts assume that none of the existing revenue/budget can be used annually to offset future capital improvements.

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Table 6-3 shows the existing and potential charges for sewer services every month for one EDU. The user rate impacts can vary depending on the amount of SDC funds available, as shown in the table. Funding for the recommended system improvements may come from any number of sources. This section presents potential user rate impacts if priority improvements are funded only through a low interest loan with debt service payments (20 year, 2.1%) made through a user rate increase. The amounts shown in the table also assume that there is no surplus in the annual budget contributing to the annual debt service payment. Also grant funds, lower interest loans, or principal forgiveness may also be available which could further lessen the user rate impacts shown in Table 6-3. Keller Associates recommends that the City actively pursue these opportunities that would mitigate user rate impacts. A separate user rate study is recommended to complete a more detailed evaluation of potential user rate impacts.

TABLE 6-3: USER RATE IMPACT

	Annual Payment (20 year, 2.1%)	Monthly User Rate without SDCs	Monthly User Rate Including SDCs
Existing User Rates (2021)	-	$68.59	$68.59
Priority 1 Improvements	$690,472	$189.72	$117.86
Priority 2 Improvements	$429,955	$265.15	$163.67

It should be noted that all costs are in 2022 dollars, and that the City should plan on annual increases in user rates of 2-5% to account for cost-of-living adjustments.

System Development Charge

The scope of this study included estimating the SDC eligibility for each identified capital improvement. It is the intent that this information will be utilized by the City's financial consultant to update the City's SDCs. The estimated SDC eligibility for each identified capital improvement is shown in Table 6-2.

6.6.2 Annual O&M Costs

In addition to the capital improvement costs presented in Table 6-2, Keller Associates recommends including additional annual operation and maintenance costs associated with the Capital Improvement Plan (SBR, screw press, etc.) in setting annual budgets. It is anticipated that this cost may be close to twice the current amount by year 2043, most of which is associated with increased power usage.

6.6.3 Debt Repayments

The City financed their existing Wastewater Treatment Plant with a long-term loan. Keller Associates recommends the duration of any new loan be representative of the average life-expectancy of the equipment and facility.

6.6.4 Reserves

Depending on the source(s) of funding for improvements, there may be reserve requirements required.

6.6.5 Short-Lived Asset Reserve

A table of short-lived assets is shown in Table 6-4. This table includes replacement expenses for assets that are anticipated to wear out in the next 10 years.

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TABLE 6-4: SHORT-LIVED ASSETS

Equipment Description	Replacement Items	Unit Cost	Frequency (Yrs)	Annual Cost
Return Pump Station	Pumps	$ 10,000	10	$ 1,000
Sequencing Batch Reactor	Pumps, Motors, Blowers	$ 115,000	10	$ 12,000
Headworks	Motors and Parts	$ 40,000	10	$ 4,000
Grit Removal	Motors and Pumps	$ 30,000	10	$ 3,000
Effluent Storage Lagoons	Miscellaneous	$ 50,000	12	$ 5,000
Chlorination/Dechlorination Systems	Pumps	$ 60,000	10	$ 6,000
Screw Press	Pumps	$ 20,000	10	$ 2,000
Aerobic Digester	Motors and Pumps	$ 40,000	10	$ 4,000
SCADA	Instruments	$ 7,000	8	$ 1,000
		Total Short Lived Assets (rounded)		**$ 38,000**

6.6.6 Financing Options

Financing and incentive options that may assist with offsetting costs associated with implementing the CIP include, but are not limited to: user rate increases, SDCs, DEQ State Revolving Fund Loan Program, Oregon Infrastructure Finance Authority grants and loans, USDA Rural Utilities Services loans and grants, direct state loans or appropriations, revenue bonds, general obligation bonds, US Economic Development Administration grants, and Energy Trust of Oregon.

A “One-Stop” funding meeting is recommended for the City of Aurora where funding packages can be developed using the various funding sources described below:

- Oregon Department of Environmental Quality (Clean Water State Revolving Fund).
- Oregon Economics and Community Development Department (Community Development Block Grant Program). Availability dependent on the median household income and user rates. Priority given to cities with compliance infractions.
- U.S. Department of Agriculture (Rural Development Program). Grant and loans available to communities with less than 10,000 people. Eligibility based on user rates, average household income, and compliance issues.
- U.S. Economic Development Administration. Grant and loan funds available based on economic development potential.
- Oregon Economics and Community Development Department (Water/Wastewater Financing Program). State funded program (Oregon Lottery). Grant and loan funds generally provided on a 50/50 basis. Eligibility based on average household income and compliance issues.
- Oregon Economics and Community Development Department (Special Public Works Program). State funded program (Oregon Lottery). Loan funds only. Eligibility based on average household income and compliance issues.

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CHAPTER 7 - CONCLUSION AND RECOMMENDATIONS

The report serves as an update to the Aurora WWFPS adopted in 2019. Recommended improvements to the WWTP developed as part of this study are presented in Chapter 6. Priority 1 improvements are projected into a six-year schedule in Table 6-1.

7.1. OTHER CONSIDERATIONS

A geotechnical analysis will be required as part of the recommended improvements. In addition, the NPDES permit will need to be updated when the plant utilizes mechanical treatment. A biosolids management plan will need to be developed for the new treatment improvements.

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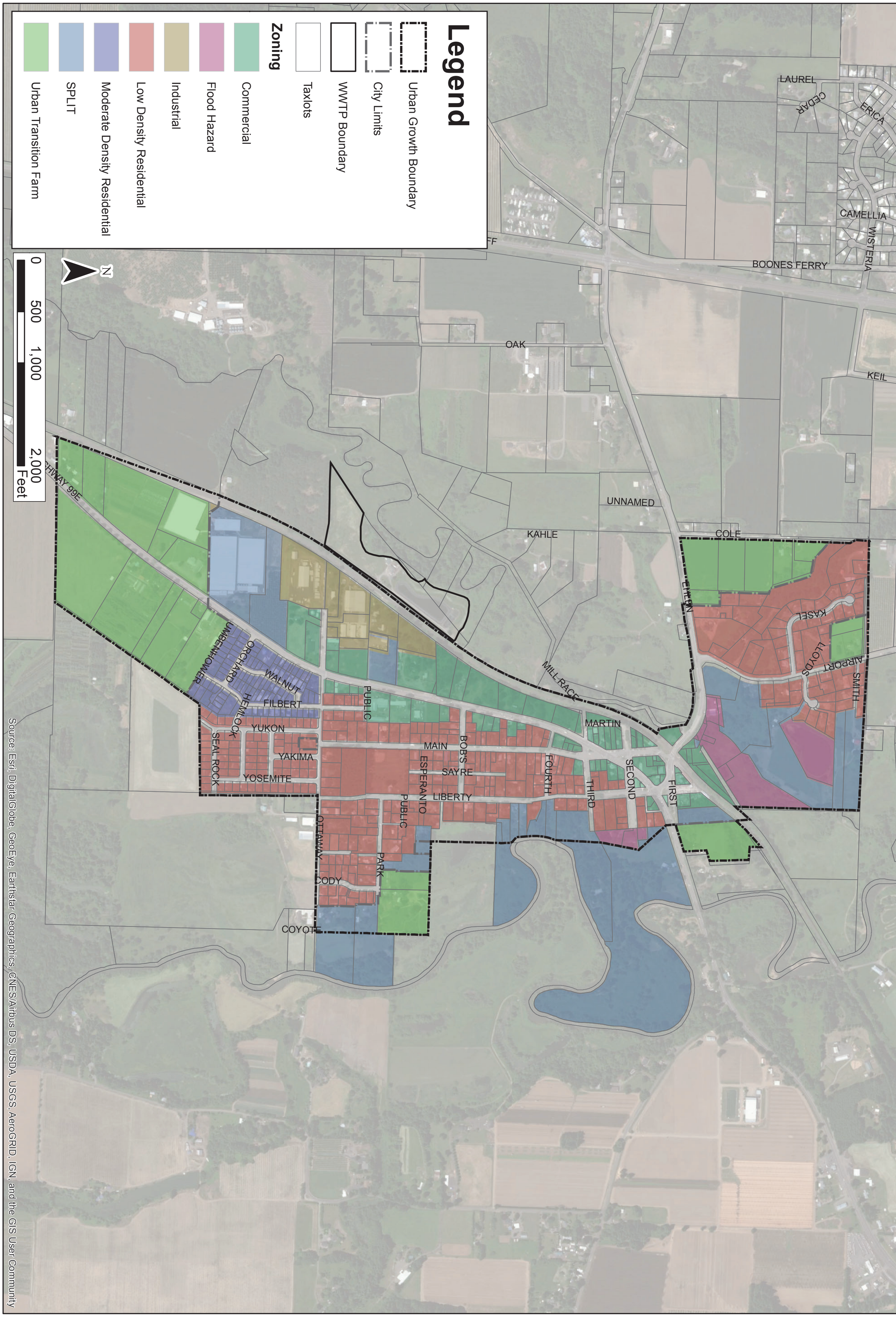
Appendix A:
Figures



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KELLER ASSOCIATES

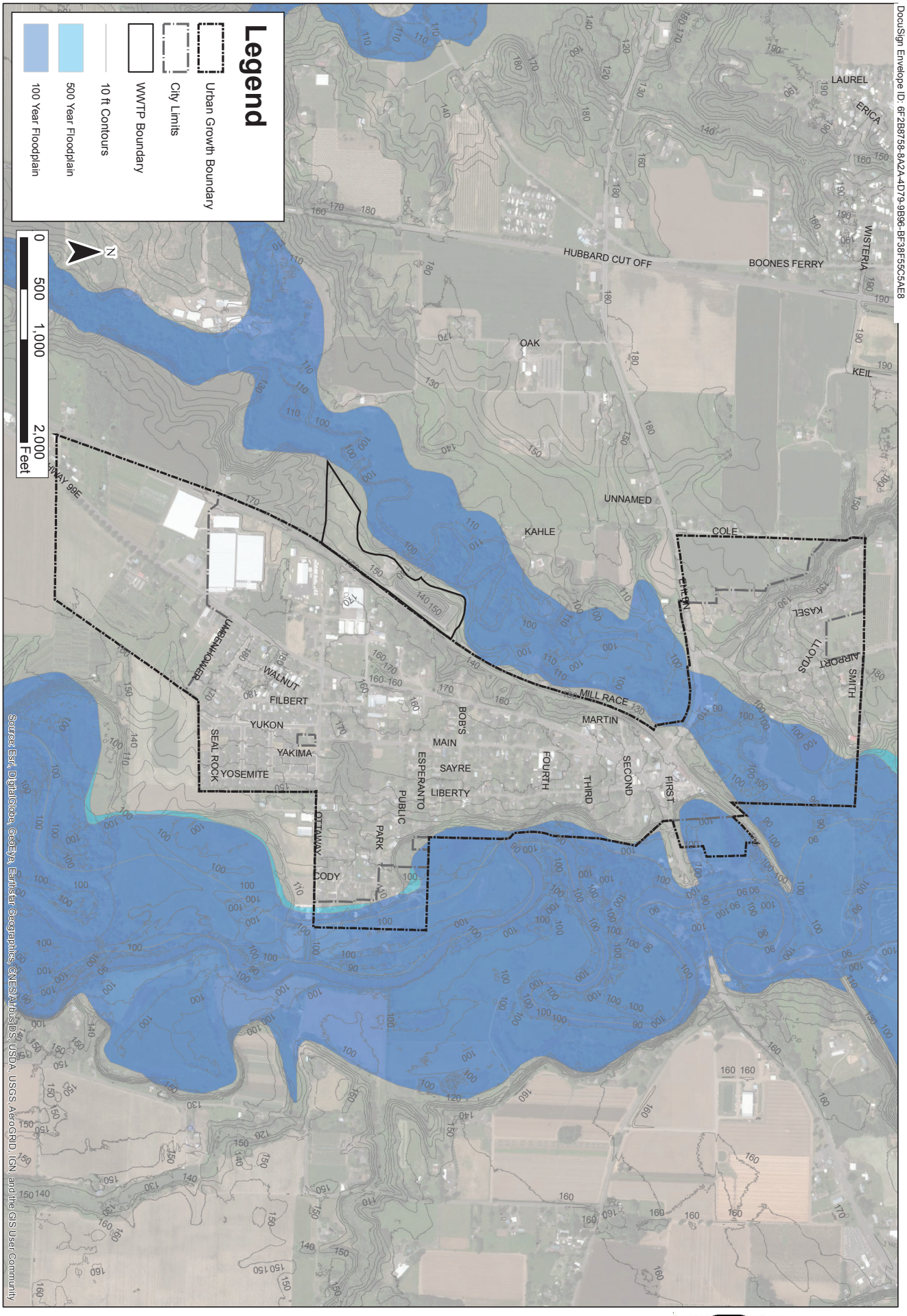
Land Use and Zoning

Wastewater Facilities Planning Study

CITY OF AURORA HISTORIC DISTRICT 1856

Figure 1

City of Aurora, OR
May 2019



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KELLER ASSOCIATES

Floodplains and Topography

Wastewater Facilities Planning Study

CITY OF AURORA HISTORIC DISTRICT 1856

Figure 2

City of Aurora, OR
May 2019

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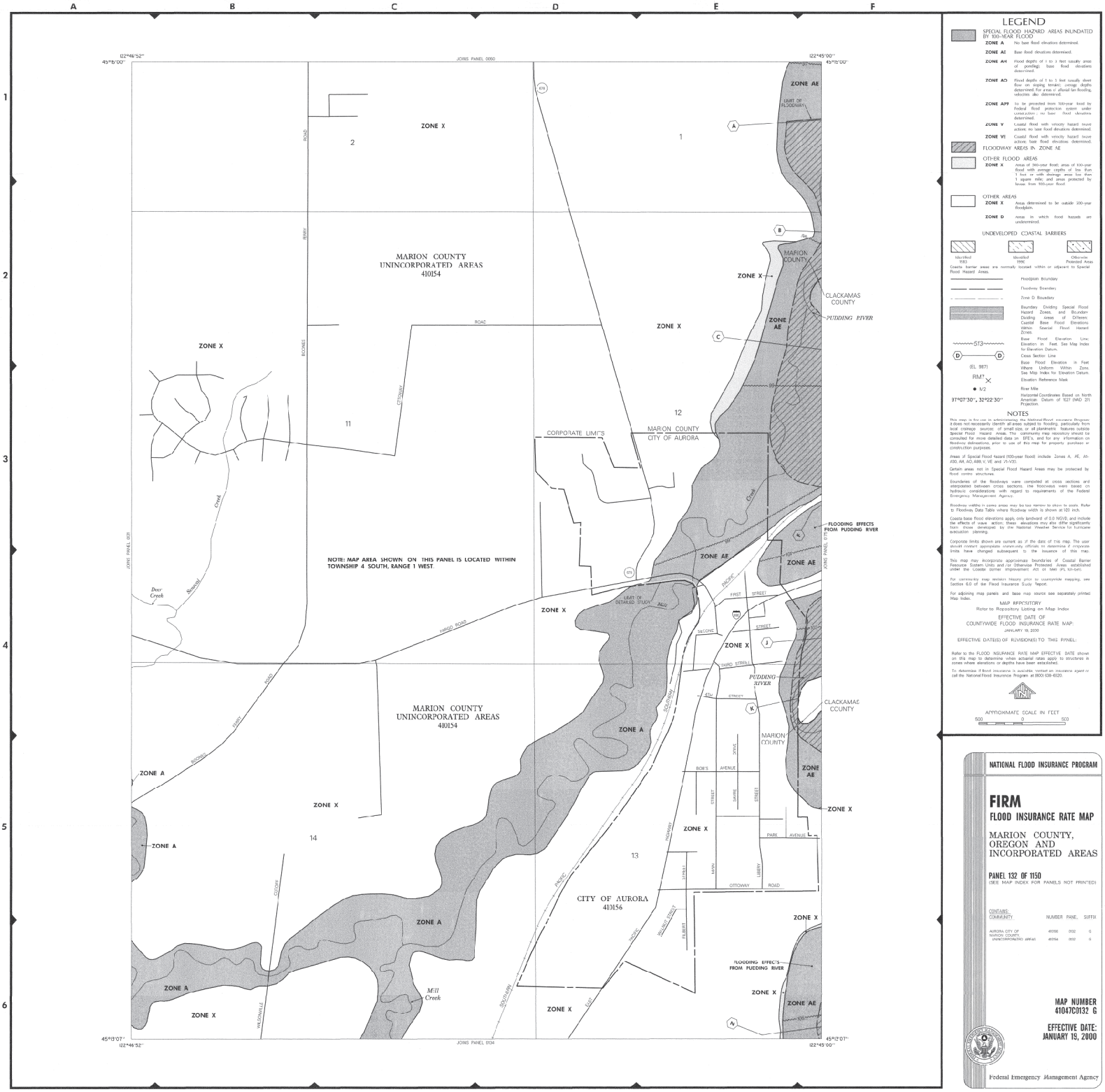

Flood Insurance Rate Map

Wastewater Facilities Planning Study

Figure 2.A

City of Aurora, OR
May 2019

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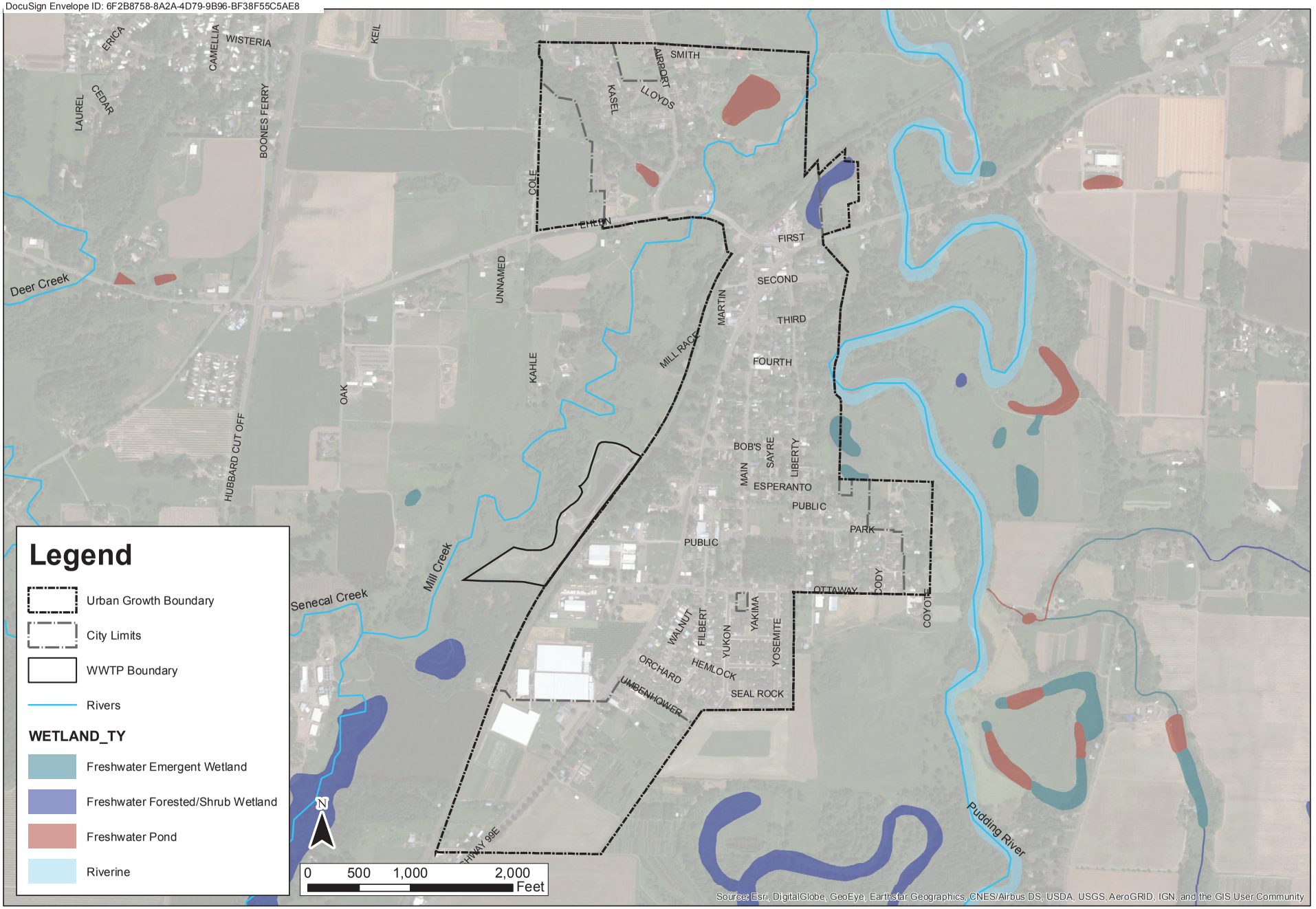

Legend

- Urban Growth Boundary
- City Limits
- WWTP Boundary
- Rivers

WETLAND_TY

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine

Figure 3

City of Aurora, OR
May 2019

Wetlands and Rivers

Wastewater Facilities Planning Study

KELLER ASSOCIATES

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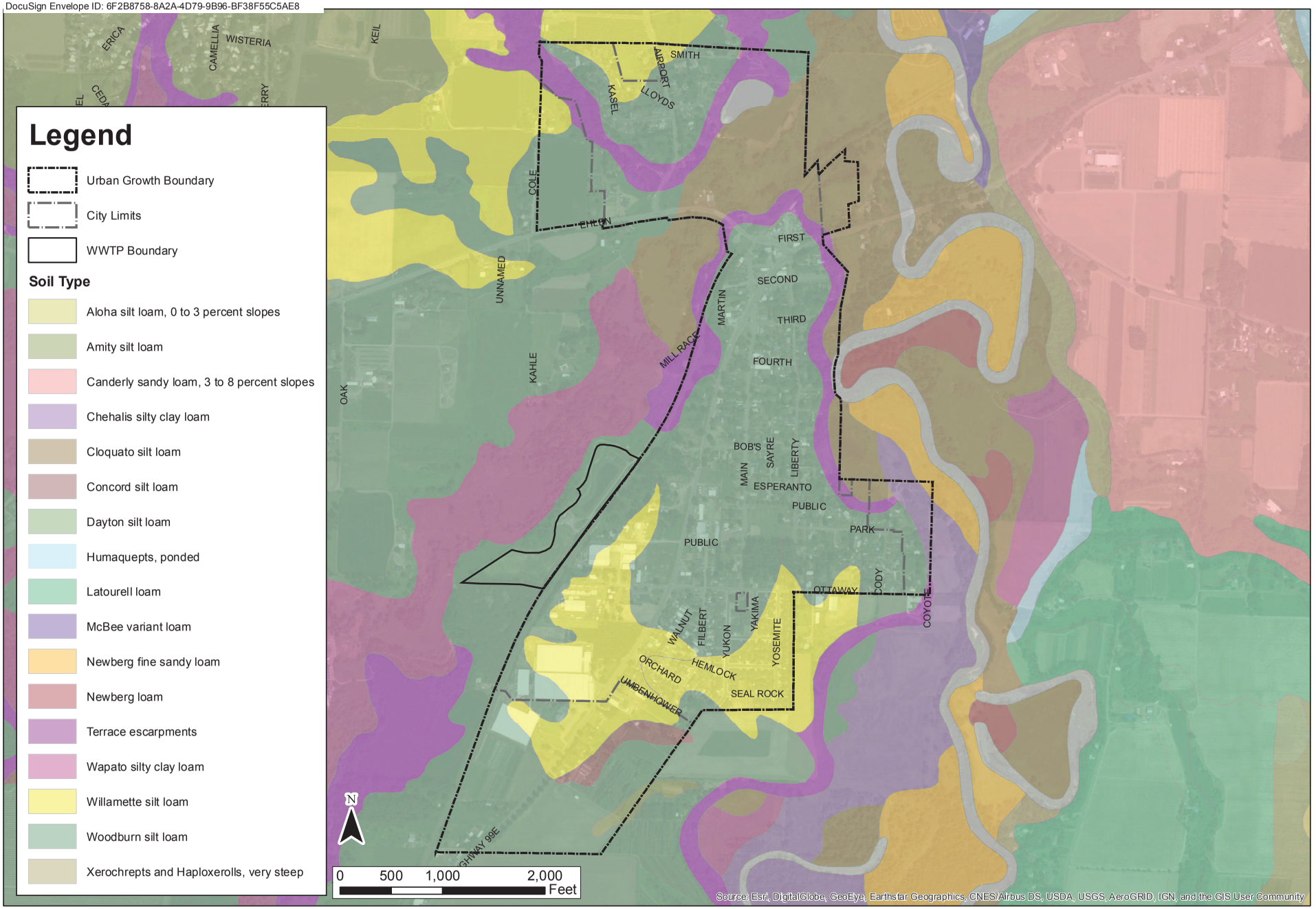

Figure 4

City of Aurora, OR
May 2019

CITY OF AURORA HISTORIC DISTRICT 1856

Soils Classification

Wastewater Facilities Planning Study

KELLER ASSOCIATES

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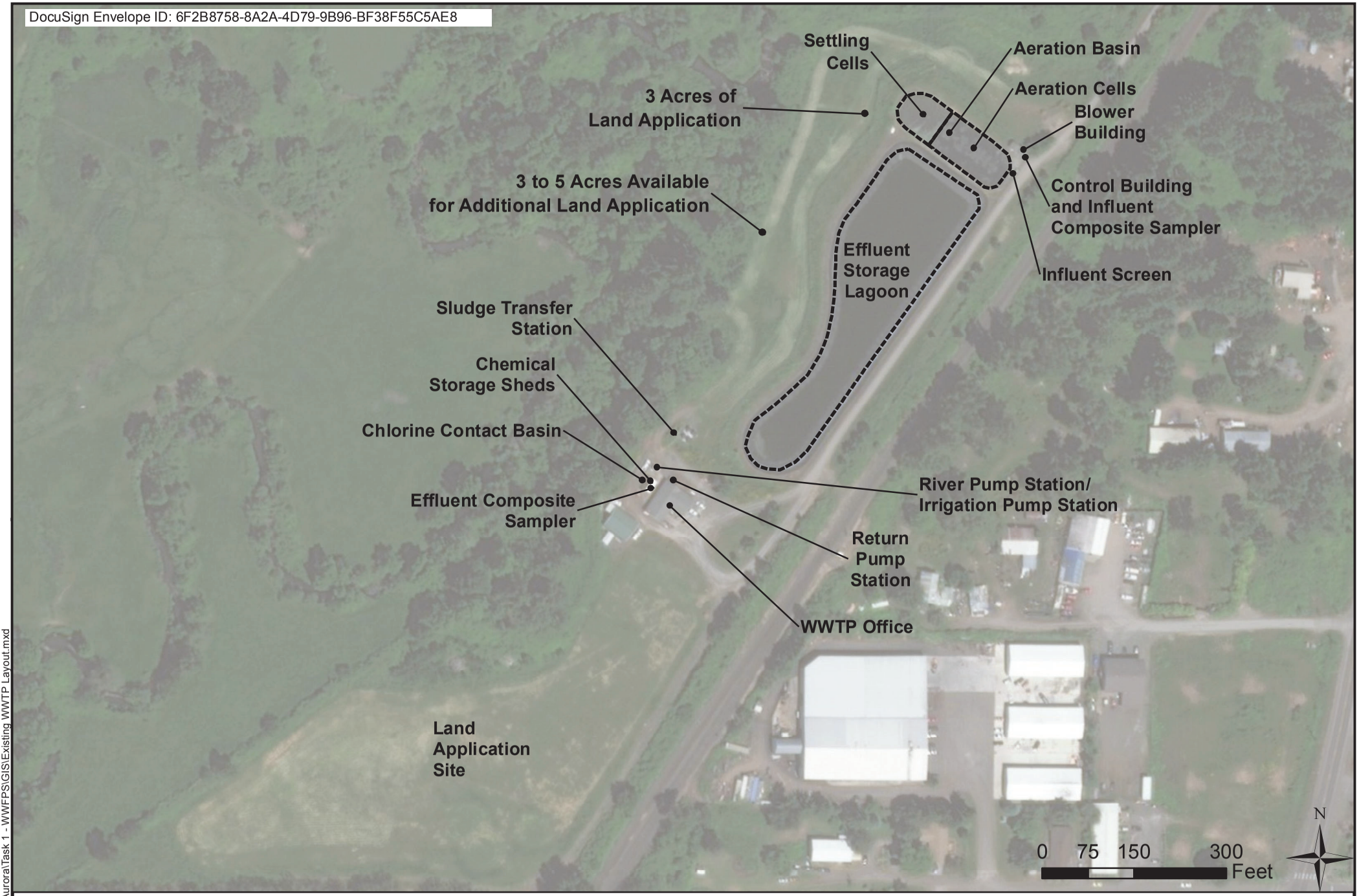

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KELLER ASSOCIATES

Existing WWTP Layout

Wastewater Facilities Planning Study

CITY OF AURORA HISTORIC DISTRICT 1856

Figure 5

City of Aurora, OR
May 2019

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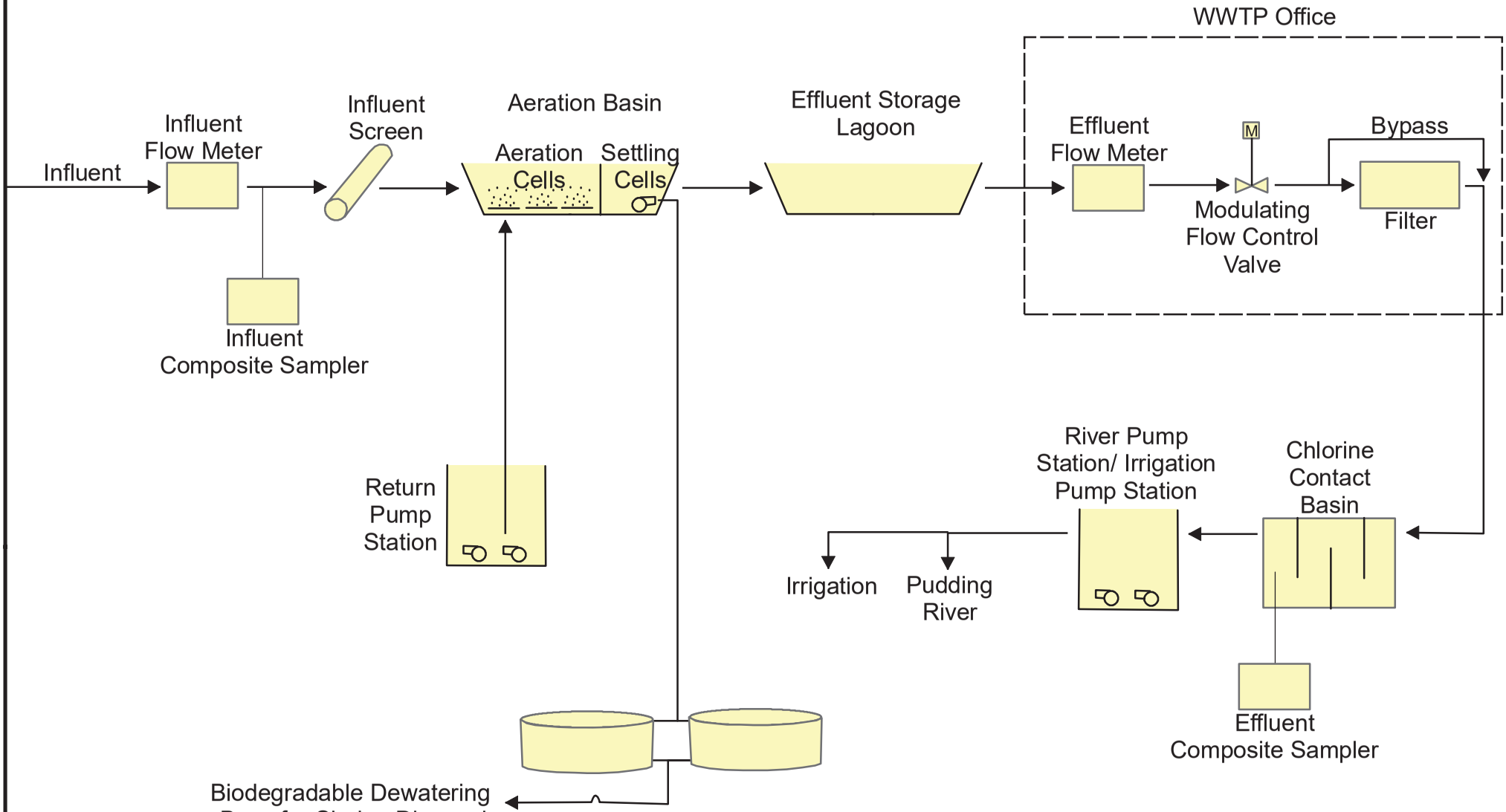

Process Flow Diagram

Wastewater Facilities Planning Study

Figure 6

City of Aurora, OR
October 2022

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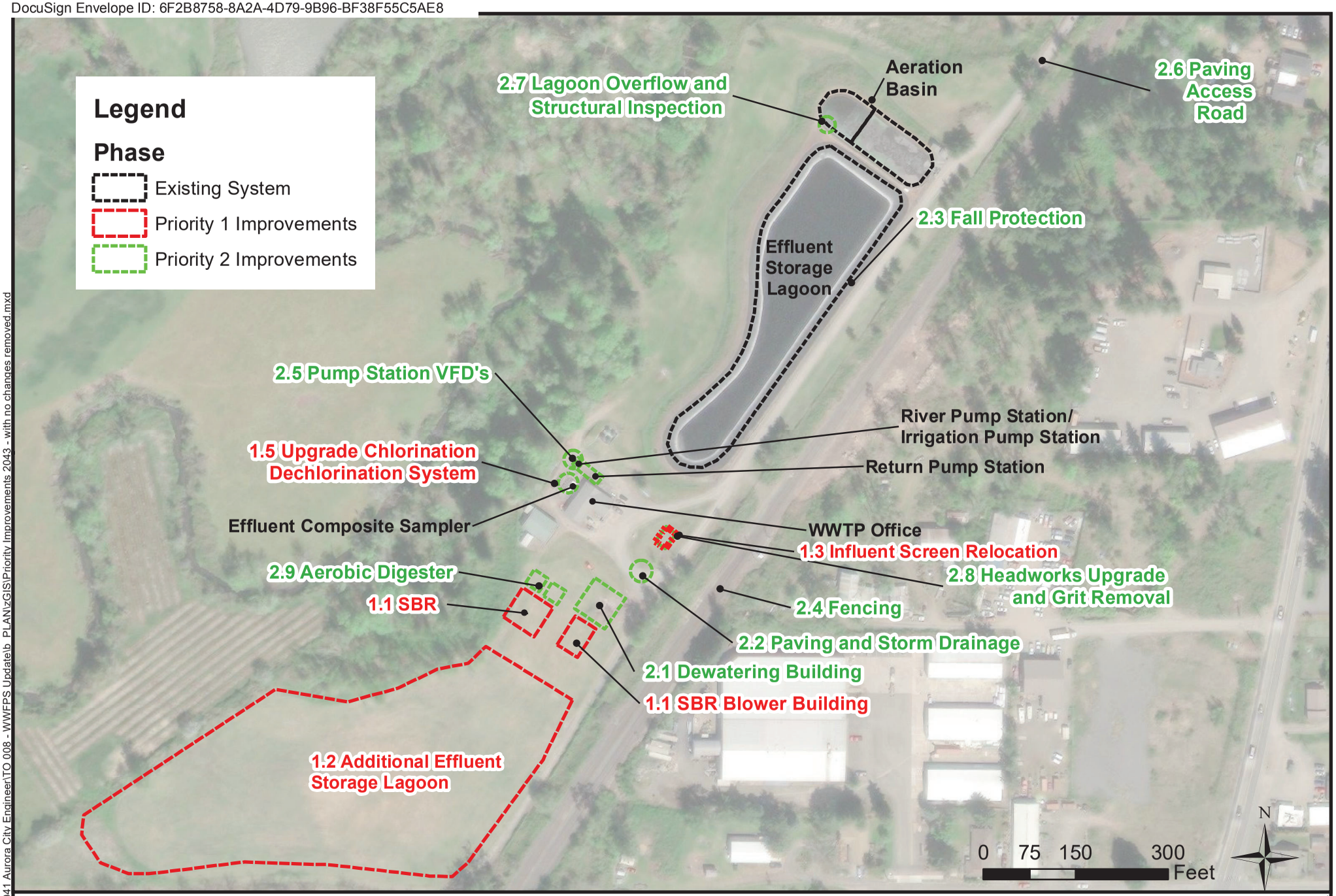

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KELLER ASSOCIATES

Priority Improvements

Wastewater Facilities Planning Study

CITY OF AURORA HISTORIC DISTRICT 1856

Figure 7

City of Aurora, OR

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Appendix B: Calculations

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City of Aurora Water Balance - 2043

Month	Influent WW, gal	Prec./Evap. Gain (Loss), gal	Discharged WW, gal	Net Storage Change, gal	Stored Water, gallons	
Oct	3,260,700	167,065	0	3,427,765	**7,200,000**	*Max. Working Storage Volume (7.2 mg)*
Nov	3,206,000	231,425	4,752,000	(1,314,575)	**5,885,425**	
Dec	3,348,000	405,449	4,910,400	(1,156,951)	**4,728,474**	
Jan	3,192,000	308,675	4,910,400	(1,409,725)	**3,318,749**	
Feb	3,002,000	136,566	4,435,200	(1,296,634)	**2,022,115**	
Mar	3,231,000	146,982	4,910,400	(1,532,418)	**489,697**	
Apr	3,098,000	58,989	4,752,000	(1,595,011)	**(1,105,314)**	
May	3,415,000	44,137	0	3,459,137	**2,353,822**	
Jun	3,090,000	(54,972)	0	3,035,028	**5,388,850**	
Jul	3,251,800	(228,389)	0	3,023,411	**8,412,261**	
Aug	3,363,100	(221,663)	0	3,141,437	**11,553,698**	
Sep	3,027,000	(56,327)	0	2,970,673	**14,524,371**	

2043 AADF, mg	*38,484,600*	*937,936*	
2043 AWWF, mg	*19,077,000*	*1,288,086*	
	11,857,450	Additional Storage Reqd	
	8,520,000	Additional Storage Reqd with 6 acres land app (15.5 in/acre, 6 acres, 75% irrigation efficiency = ~3.3 MG)	
	30,230,000	Total Storage Reqd if no winter discharge and land app only during June-end of August due to precip.	

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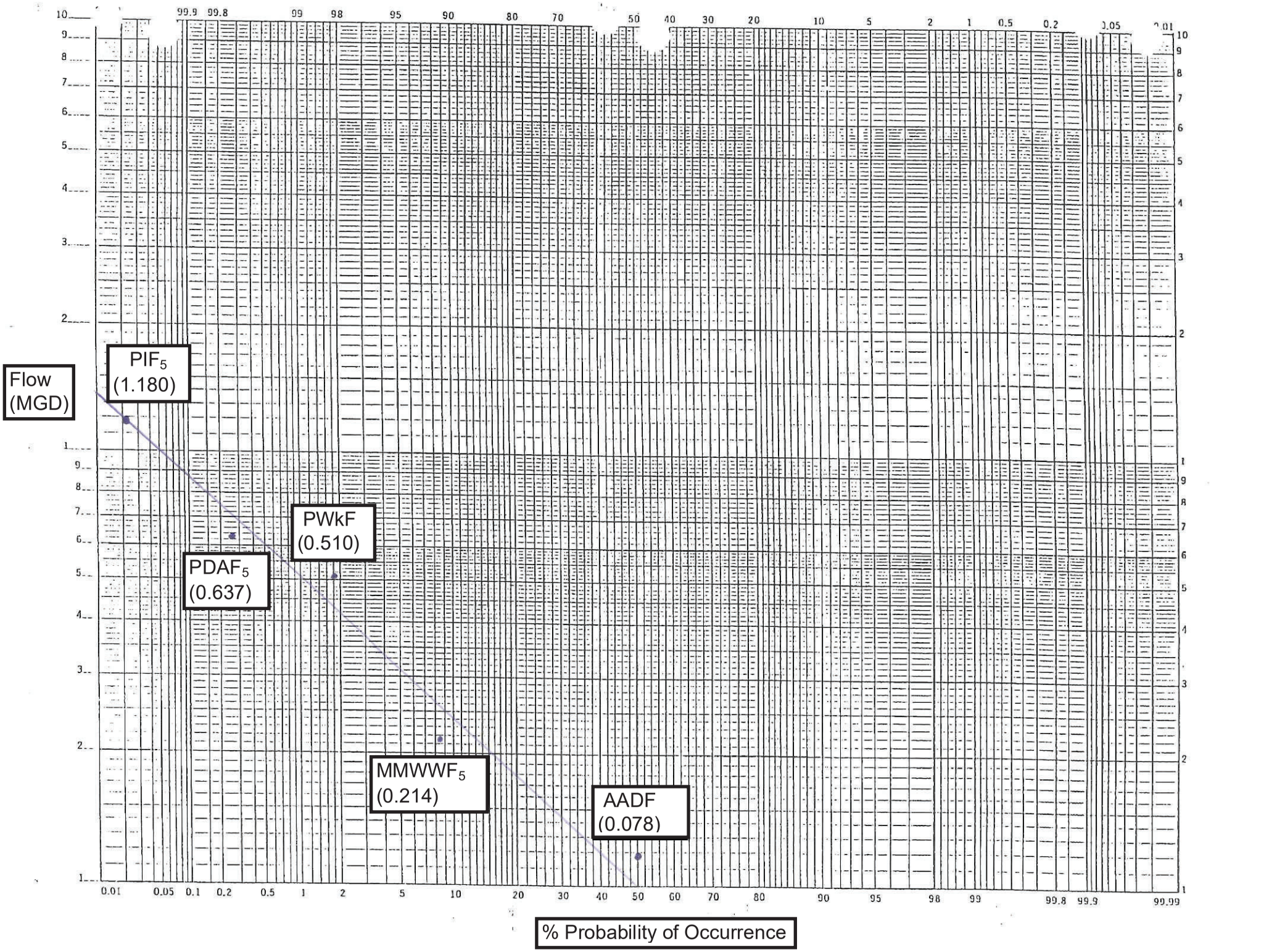
PIF_5 Graphical Calculation



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Appendix C:
Permit

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Oregon
Kate Brown, Governor

Department of Environmental Quality
Western Region Salem Office
4026 Fairview Industrial Drive SE
Salem, OR 97302
(503) 378-8240
FAX (503) 373-7944
TTY 711

June 24, 2022

Mark Gunter
City of Aurora
21420 Main Street NE
Aurora, OR 97002

CERTIFIED MAIL # 7021 1970 0001 7506 2406
RETURN RECEIPT REQUESTED

RE: Issuance of NPDES Permit # 101772
File # 100020
EPA # OR0043991
Facility: Aurora STP, HWY 99 E., Aurora
Marion County

Your National Pollutant Disposal Elimination System Permit has been renewed and is enclosed. This permit is DEQ's final action on permit renewal application #950727. DEQ did not receive any public comments. However, based on internal review, DEQ did make one correction to the renewal permit, which is noted in the Response to Comment memo. Your permit is effective on August 1, 2022.

Please read your permit carefully. Compliance with your permit is required at all times.

If you are dissatisfied with the conditions of this permit, you have 20 days to request a hearing before the Environmental Quality Commission or its authorized representative. A request for a hearing must be made in writing and state the grounds for the request. Any hearing will be conducted as a contested case hearing in accordance with ORS 183.413 through 183.470 and OAR chapter 340, division 011. If a hearing is requested, the existing permit continues in effect until a final order is issued.

Please note that your required operator certification levels are no longer listed on the face page of your permit. Pursuant to OAR chapter 340, division 049 your systems are classified as follows:

- Collection System: Class I
- Treatment System: Class II

If changes are made to your systems or if you have additional questions about operator certification requirements, please contact the DEQ Operator Certification program at opcert@deq.state.or.us or 503-229-5349. Current classifications for all systems requiring certified operators may be found at https://www.oregon.gov/deq/wq/wqpermits/Pages/Wastewater-Operator-Certification.aspx.

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If you are interested in upgrading your wastewater treatment infrastructure or need assistance with treatment system design, DEQ's Clean Water State Revolving Fund offers below-market rate loans for qualified applicants to finance the planning, design and construction of water quality improvement projects. DEQ updates interest rates are updated quarterly and rates vary by loan term, type of loan and community economic conditions. DEQ works with borrowers to ensure access to the best rates available at the time of loan signature. To learn more about eligible water quality projects and application process, please visit the Clean Water State Revolving Fund website at https://www.oregon.gov/deq/wq/cwsrf/Pages/default.aspx or call 503-229-LOAN.

If you have any questions about your permit requirements, please contact Steve Nichols at 541-269-2721 x268 or steve.nichols@deq.oregon.gov.

Sincerely,

Ranei Nomura

Digitally signed by Ranei Nomura
Date: 2022.06.24 10:34:40 -07'00'

Ranei Nomura
Water Quality Manager
Western Region

RN:th
Enclosure: Permit, Permit Fact Sheet, Response to Comments, and Recycled Water Use Plan
ec: Regional File, Salem DEQ
Steve Nichols, Coos Bay Office
WQ Data Crew, DEQ w/permit
EPA, Seattle /permit
ORMS
DEQ Wastewater Operator Certification Program

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State of Oregon Department of Environmental Quality

Summary of Public Notice Review Comments and DEQ Responses

Date: June 23, 2022

Prepared by: Evan R Haas, NPDES Permit Writer

Comment Period: The Public Notice comment period for the City of Aurora's NPDES renewal permit opened on May 12, 2022 and closed at 5 p.m. on June 17, 2022.

Organization of Comments and Responses: This document summarizes specific public comments received; DEQ responses are included, in italics, after each comment.

DEQ did not receive any public comments on the proposed NPDES renewal permit for the City of Aurora (City). However, based on internal review, DEQ did make one correction to the renewal permit.

Iron Monitoring

The renewal permit includes a requirement for the City to collect effluent iron samples. The draft permit listed dissolved iron as the parameter to be measured; however, the permit should have used total iron as the parameter.

DEQ Response

Because DEQ uses total iron for the iron criterion, DEQ updated the iron parameter to be measured from dissolved to total.

Alternative formats

DEQ can provide documents in an alternate format or in a language other than English upon request. Call DEQ at 800-452-4011 or email deqinfo@deq.state.or.us.

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State of Oregon Department of Environmental Quality

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM WASTE DISCHARGE PERMIT

Oregon Department of Environmental Quality
Western Region – Salem Office
4026 Fairview Industrial Dr. SE
Salem, OR 97302
Telephone: 503-378-8240

Issued pursuant to ORS 468B.050 and the federal Clean Water Act

ISSUED TO:

City of Aurora
21420 Main Street NE
Aurora, OR 97002

SOURCES COVERED BY THIS PERMIT:

Type of Waste	Outfall Number	Outfall Location
Treated municipal wastewater	001	45.22944/-122.75278
Recycled Water Reuse	002	Specified in Recycled Water Use Plan

FACILITY LOCATION:

Aurora STP
21494 Mill Race Road
Aurora, OR 97002
County: Marion

EPA Permit Type: Minor

RECEIVING STREAM INFORMATION:

WRD Basin: Willamette

USGS Sub-Basin: Molalla-Pudding
Receiving Stream name: Pudding River
NHD Reach Code: 17090009000039 (40.52%)
LLID: 1227161452842

Issued in response to Application No. 950727 received November 16, 2020. This permit is issued based on the land use findings in the permit record.

Ranei Nomura Digitally signed by Ranei Nomura Date: 2022.06.24 10:32:13 -07'00'

Ranei Nomura, Water Quality Manager, Western Region	June 24, 2022 Issuance Date	August 1, 2022 Effective Date

PERMITTED ACTIVITIES

Until this permit expires or is modified or revoked, the permittee is authorized to: 1) operate a wastewater collection, treatment, control and disposal system; and 2) discharge treated wastewater to waters of the state only from the authorized discharge point or points in Schedule A in conformance with the requirements, limits, and conditions set forth in this permit.

Unless specifically authorized by this permit, by another NPDES or Water Pollution Control Facility permit, or by Oregon statute or administrative rule, any other direct or indirect discharge of pollutants to waters of the state is prohibited.

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TABLE OF CONTENTS

Note: Schedule C: Compliance Schedule and Schedule E: Pretreatment Activities are not a part of this permit.

LIST OF TABLES

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SCHEDULE A: WASTE DISCHARGE LIMITS

1. Outfall 001 – Permit Limits

During the term of this permit, the permittee must comply with the limits in the following table:

Table A1: Permit Limits

Parameter	Units	Average Monthly	Average Weekly	Daily Maximum
Effluent Flow (May 1 to Oct 31)	MGD	No discharge (Daily max limit = 0 MGD)		
BOD_5 (November 1 – April 30)	mg/L	30	45	-
	lb/day	30	60	140
	% removal	85	-	-
TSS (November 1 – April 30)	mg/L	50	80	-
	lb/day	47	90	220
	% removal	65	-	-
Chlorine, Total Residual (November 1 – April 30) (See note a.)	mg/L	0.03	-	0.08
pH (November 1 – April 30)	SU	Instantaneous limit between a daily minimum of 6.0 and a daily maximum of 9.0		
E. coli (November 1 – April 30) (See note b.)	#/100 mL	Must not exceed a monthly geometric mean of 126, no single sample may exceed 406		

Notes:

a. DEQ has established a Quantitation Limit of 0.05 mg/L for Total Residual Chlorine. Any analysis done for Total Residual Chlorine must have a quantitation limit that is either equal to or less than 0.05 mg/L. In cases where the average monthly or maximum daily limit for Total Residual Chlorine is lower than the Quantitation Limit, DEQ will use the reported Quantitation Limit as the compliance evaluation level.

b. If a single sample exceeds 406 organisms/100 mL, the permittee may take at least 5 consecutive re-samples at 4-hour intervals beginning within 28 hours after the original sample was taken. A geometric mean of the 5 re-samples that is less than or equal to 126 *E. coli* organisms/100 mL demonstrates compliance with the limit.

2. Regulatory Mixing Zone

Pursuant to OAR 340-041-0053, the permittee is granted a regulatory mixing zone as described below:

The allowable mixing zone for the Aurora facility is that portion of the Pudding River, extending from a point 10 feet upstream of the outfall, to a point 25 feet from the east bank of the river, and to a point 108 feet downstream from the outfall. The zone of immediate dilution (ZID) is defined as that portion of the allowable mixing zone that is within 10 feet of the outfall discharge port.

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3. Use of Recycled Water

The permittee is authorized to distribute recycled water if it is:

a. Treated and used according to the criteria listed in Table A2.

b. Managed in accordance with its DEQ-approved Recycled Water Use Plan unless exempt as provided in Schedule D.

c. Used in a manner and applied at a rate that does not adversely affect groundwater quality.

d. Applied at a rate and in accordance with site management practices that ensure continued agricultural, horticultural, or silvicultural production and does not reduce the productivity of the site.

e. Irrigated using sound irrigation practices to prevent:

i. Offsite surface runoff or subsurface drainage through drainage tile;

ii. Creation of odors, fly and mosquito breeding, or other nuisance conditions; and

iii. Overloading of land with nutrients, organics, or other pollutants.

Table A2: Recycled Water Limits

Class	Level of Treatment (after disinfection unless otherwise specified)	Beneficial Uses
C.	Class C recycled water must be oxidized and disinfected. Total coliform may not exceed: • A median of 23 total coliform organisms per 100 mL, based on results of the last 7 days that analyses have been completed. • 240 total coliform organisms per 100 mL in any two consecutive samples.	Class C recycled water may be used for: • Class D and non-disinfected uses. • Irrigation of processed food crops; irrigation of orchards or vineyards if an irrigation method is used to apply recycled water directly to the soil. • Landscape irrigation of golf courses, cemeteries, highway medians, or industrial or business campuses. • Industrial, commercial, or construction uses limited to: industrial cooling, rock crushing, aggregate washing, mixing concrete, dust control, nonstructural firefighting using aircraft, street sweeping, or sanitary sewer flushing.
D.	Class D recycled water must be oxidized and disinfected. *E. coli* may not exceed: • A 30-day geometric mean of 126 organisms per 100 mL. • 406 organisms per 100 mL in any single sample.	Class D recycled water may be used for: • Non-disinfected uses. • Irrigation of firewood, ornamental nursery stock, Christmas trees, sod, or pasture for animals.

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SCHEDULE B: MINIMUM MONITORING AND REPORTING REQUIREMENTS

1. Reporting Requirements

The permittee must submit to DEQ monitoring results and reports as listed below.

Table B1: Reporting Requirements and Due Dates

Reporting Requirement	Frequency	Due Date (See note a.)	Report Form (See note b.)	Submit To:
Tables B2 and B3 Influent Monitoring and Effluent Monitoring	Monthly	By the 15th of the following month	Specified in Schedule B. Section 2 of this permit	Electronic reporting as directed by DEQ
Inflow and infiltration report (see Schedule D)	Annually	February 15	Electronic copy in a DEQ-approved format	Attached via electronic reporting as directed by DEQ
Recycled Water Annual Report (see Schedule D)	Annually	January 15	Electronic copy in the DEQ-approved format	Attached via electronic reporting as directed by DEQ Electronic copy to DEQ Water Reuse Program Coordinator
Wastewater solids annual report (see Schedule D)	Annually	By February 19 of the following year	Electronic copy in the DEQ-approved format	Attached via electronic reporting as directed by DEQ Electronic copy to DEQ Biosolids Program Coordinator
Hauled Waste Annual Report (see Schedule D)	Annually, once hauled waste is accepted	January 15	Electronic copy in the DEQ-approved format	Attached via electronic reporting as directed by DEQ
Sludge Depth Survey Report (See Schedule D – Lagoon Solids)	One Time	Submit by 03/15/2024	Electronic copy in a DEQ-approved format	Attached via electronic reporting as directed by DEQ
Industrial User Survey (see Schedule D)	Every 5 years	Submit by no later than 24 months after permit effective date	1 electronic copy and 1 hard copy in a DEQ-approved format	• 1 Hard copy to DEQ Pretreatment Coordinator • 1 Electronic copy to Compliance Officer

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Reporting Requirement	Frequency	Due Date (See note a.)	Report Form (See note b.)	Submit To:
Outfall Inspection Report (see Schedule D)	Once per permit cycle	Submit by 11/15/2025	Electronic copy in a DEQ-approved format	Attached via electronic reporting as directed by DEQ

Notes:
a. For submittals that are provided to DEQ by mail, the postmarked date must not be later than the due date.
b. All reporting requirements are to be submitted in a DEQ-approved format, unless otherwise specified in writing.

2. Monitoring and Reporting Protocols

a. **Electronic Submissions**

The permittee must submit to DEQ the results of monitoring indicated in Schedule B in an electronic format as specified below.

i. The permittee must submit monitoring results required by this permit via DEQ-approved web-based Discharge Monitoring Report (DMR) forms to DEQ via electronic reporting. Any data used to calculate summary statistics must be submitted as a separate attachment approved by DEQ via electronic reporting.

ii. The reporting period is the calendar month.

iii. The permittee must submit monitoring data and other information required by this permit for all compliance points by the 15th day of the month following the reporting period unless specified otherwise in this permit or as specified in writing by DEQ.

b. **Test Methods**

The permittee must conduct monitoring according to test procedures in 40 CFR part 136 and 40 CFR part 503 for biosolids or other approved procedures as per Schedule F.

c. **Detection and Quantitation Limits**

i. Detection Level (DL) – The DL is defined as the minimum measured concentration of a substance that can be distinguished from method blank results with 99% confidence. The DL is derived using the procedure in 40 CFR 136 Appendix B and evaluated for reasonableness relative to method blank concentrations to ensure results reported above the DL are not a result of routine background contamination. The DL is also known as the Method Detection Limit (MDL) or Limit of Detection (LOD).

ii. Quantitation Limits (QLs) – The QL is the minimum level, concentration or quantity of a target analyte that can be reported with a specified degree of confidence. It is the lowest level at which the entire analytical system gives a recognizable signal and acceptable calibration for the analyte. It is normally equivalent to the concentration of the lowest calibration standard adjusted for sample weights, volumes, preparation and cleanup procedures employed. The QL as reported by a laboratory is also sometimes referred to as the Method Reporting Limit (MRL) or Limit of Quantitation (LOQ).

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d. **Sufficient Sensitivity of Quantitation Limits**

i. The Laboratory QLs (adjusted for any dilutions) for analyses performed to demonstrate compliance with permit limits or as part of effluent characterization, must meet at least one of the requirements below:

(A) The QL is at or below the level of the water quality criterion for the measured parameter

(B) The QL is above the water quality criterion but the amount of the pollutant in a facility's discharge is high enough that the method detects and quantifies the level of the parameter in the discharge

(C) The QL has the lowest sensitivity of the analytical methods procedure specified in 40 CFR 136

(D) The QL is at or below those defined in Oregon DEQ list of quantitation limits posted online at the DEQ permitting website

ii. Matrix effects are present that prevent the attainment of QLs and these matrix effects are demonstrated according to procedures described in EPA's "*Solutions to Analytical Chemistry Problems with Clean Water Act Methods*", March 2007. If using alternative methods and taking appropriate steps to eliminate matrix effects does not eliminate the matrix problems, DEQ may authorize in writing re-sampling or allow a higher QL to be reported.

e. **Quality Assurance and Quality Control**

i. Quality Assurance Plan – The permittee must develop and implement a written Quality Assurance Plan that details the facility sampling procedures, equipment calibration and maintenance, analytical methods, quality control activities and laboratory data handling and reporting. The QA/QC program must conform to the requirements of 40 CFR 136.7.

ii. If QA/QC requirements are not met for any analysis, the permittee must re-analyze the sample. If the sample cannot be re-analyzed, the permittee must re-sample and analyze at the earliest opportunity. If the permittee is unable to collect a sample that meets QA/QC requirements, then the permittee must include the result in the discharge monitoring report (DMR) along with a notation (data qualifier). In addition, the permittee must explain how the sample does not meet QA/QC requirements. The permittee may not use the result that failed the QA/QC requirements in any calculation required by the permit unless authorized in writing by DEQ. This condition does not apply to the minimum DO residual and DO depletion BOD method criteria. If these method criteria are not met, the permittee must: 1) report the daily BOD_5 values with data qualifiers; 2) include these values in the summary statistic calculations (e.g., weekly averages, monthly averages, % removal); and 3) report the summary statistics with data qualifiers.

iii. Flow measurement, field measurement, and continuous monitoring devices - The permittee must:

(A) Establish verification and calibration frequency for each device or instrument in the quality assurance plan that conforms to the frequencies recommended by the manufacturer.

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(B) Verify at least once per year that flow-monitoring devices are functioning properly according to manufacturer's recommendation. Calibrate as needed according to manufacturer's recommendations.

(C) Verify at least weekly that the continuous monitoring instruments are functioning properly according to manufacturer's recommendation unless the permittee demonstrates a longer period is sufficient and such longer period is approved by DEQ in writing.

iv. The permittee must develop a receiving water sampling and analysis plan that incorporates QA/QC prior to sampling. This plan must be kept at the facility and made available to DEQ upon request.

f. **Reporting Sample Results**

i. The permittee must report the same number of significant digits as the permit limit for a given parameter.

ii. The permittee must report the same number of significant digits as the permit limit for a given parameter.

iii. Chemical Abstracts Service (CAS) Numbers. CAS numbers (where available) must be reported along with monitoring results.

iv. (For Discharge Monitoring Reports) If a sample result is above the DL but below the QL, the permittee must report the result as the DL preceded by DEQ's data code "e". For example, if the DL is 1.0 µg/l, the QL is 3.0 µg/L and the result is estimated to be between the DL and QL, the permittee must report "e1.0 µg/L" on the DMR. This requirement does not apply in the case of parameters for which the DL does not have to be reported.

v. (For Discharge Monitoring Reports) If the sample result is below the DL, the permittee must report the result as less than the specified DL. For example, if the DL is 1.0 µg/L and the result is ND, report "<1.0" on the discharge monitoring report (DMR). This requirement does not apply in the case of parameters for which the DL does not have to be reported.

g. **Calculating and Reporting Mass Loads**

The permittee must calculate mass loads on each day the parameter is monitored using the following equation:

Flow (in MGD) X Concentration (in mg/L) X 8.34 = Pounds per day

i. Mass load limits all have two significant figures unless otherwise noted.

ii. When concentration data are below the DL: To calculate the mass load from this result, use the DL. Report the mass load as less than the calculated mass load. For example, if flow is 2 MGD and the reported sample result is <1.0 µg/L, report "<0.02 lb/day" for mass load on the DMR (1.0 µg/L x 2 MGD x conversion factor = 0.017 lb/day, round off to 0.02 lb/day).

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3. Monitoring and Reporting Requirements

a. The permittee must monitor influent at the headworks, prior to it entering the treatment lagoons, and report results in accordance with the table below.

Table B2: Influent Monitoring Requirements

Item or Parameter	Units	Time Period	Minimum Frequency	Sample Type / Required Action (See note a.)	Report Statistic (See note b.)
Flow (50050)	MGD	Year-round	Daily	Metered	1. Monthly Average 2. Daily Maximum
BOD_5 (00310)	mg/L	Year-round	1/month	24-hour composite	1. Monthly Average
TSS (00530)	mg/L	Year-round	1/month	24-hour composite	1. Monthly Average
pH (00400)	SU	Year-round	3/week	Grab	1. Monthly Maximum 2. Monthly Minimum

Notes:

a. In the event of equipment failure or loss, the permittee must notify DEQ and deploy new equipment to minimize interruption of data collection. If new equipment cannot be immediately deployed, the permittee must perform grab measurements.

b. When submitting DMRs electronically, the permittee must submit all data used to determine summary statistics in a DEQ-approved format as a spreadsheet via electronic reporting unless otherwise directed by DEQ.

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b. The permittee must monitor effluent flow for Outfall 001, after the storage lagoon outlet and prior to the chlorine contact chamber, and report results in accordance with Table B1 and the table below. The permittee must monitor all other parameters for Outfall 001, after the chlorine contact chamber and prior to the effluent pump station, and report results in accordance with Table B1 and the table below.

Table B3: Effluent Monitoring Requirements

Item or Parameter	Units	Time Period	Minimum Frequency	Sample Type/ Required Action (See note a.)	Report Statistic (See note b.)
Flow (50050)	MGD	Year-round	Daily	Metered	1. Monthly Average 2. Daily Maximum
BOD_5 (00310)	mg/L	November 1 – April 30	1/month	24-hour composite	1. Monthly Average 2. Maximum Weekly Average
BOD_5 (00310)	lb/day	November 1 – April 30	1/month	Calculation	1. Daily Maximum 2. Monthly Average 3. Maximum Weekly Average
BOD_5 percent removal (See note c.) (81010)	%	November 1 – April 30	1/month	Calculation based on monthly average BOD_5 concentration values	1. Monthly Average
TSS (00530)	mg/L	November 1 – April 30	1/month	24-hour composite	1. Monthly Average 2. Maximum Weekly Average
TSS (00530)	lb/day	November 1 – April 30	1/month	Calculation	1. Daily Maximum 2. Monthly Average 3. Maximum Weekly Average
TSS percent removal (81011) (See note c.)	%	November 1 – April 30	1/month	Calculation based on monthly average TSS concentration values	1. Monthly Average
pH (00400)	SU	November 1 – April 30	3/week	Grab	1. Daily Maximum 2. Daily Minimum
Chlorine, Total Residual (50060)	mg/L	November 1 – April 30	Daily	Grab	1. Daily Maximum 2. Monthly Average
E. coli (51040)	#/100 mL	November 1 – April 30	2/month	Grab	1. Daily Maximum 2. Monthly Geometric Mean

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Item or Parameter	Units	Time Period	Minimum Frequency	Sample Type/ Required Action (See note a.)	Report Statistic (See note b.)
Temperature (00010)	ºC	November 1 – April 30	3/week	Grab	1. Daily Maximum 2. Monthly Average 3. 7-day Rolling Average of Daily Maximum
Alkalinity as $CaCO_3$ (00410)	mg/L	November 1 – April 30	Quarterly	Grab	1. Monthly Maximum
Chlorine used (81400)	lb/day	November 1 – April 30	Daily	Scale reading	1. Monthly Average
Chlorine, Total Residual prior to dechlorination	mg/L	November 1 – April 30	Daily	Grab	Maintain records on-site
Iron, total (01045) (See note d.)	µg/L	November 1 – April 30	Quarterly	24-hour composite	1. Daily Maximum

Notes:

a. In the event of equipment failure or loss, the permittee must notify DEQ and deploy new equipment to minimize interruption of data collection. If new equipment cannot be immediately deployed, the permittee must perform grab measurements. If the failure or loss is for continuous temperature monitoring equipment, the permittee must perform grab measurements daily between 2 PM and 4 PM until continuous monitoring equipment is redeployed.

b. When submitting DMRs electronically, all data used to determine summary statistics must be submitted in a DEQ-approved format as a spreadsheet via electronic reporting unless otherwise directed by DEQ.

c. Percent Removal must be calculated on a monthly basis using the following formula:

$$Percent\ Removal = \frac{[Influent\ Concentration] - [Effluent\ Concentration]}{[Influent\ Concentration]} \times 100$$

Where:

Influent Concentration = Corresponding Monthly average influent concentration based on the analytical results of the reporting period.

Effluent Concentration = Corresponding Monthly average effluent concentration based on the analytical results of the reporting period.

d. The permittee must monitor for total iron, quarterly, for a total of eight quarters. After completing the required monitoring, the monitoring may be discontinued unless otherwise notified in writing by DEQ.

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4. Recycled Water Monitoring Requirements: Outfall 002

The permittee must monitor recycled water for Outfall 002 as listed below. The samples must be representative of the recycled water delivered for beneficial reuse at a location identified in the Recycled Water Use Plan.

Table B4: Recycled Water Monitoring

Item or Parameter	Time Period	Minimum Frequency	Sample Type/ Required Action	Report
Quantity Irrigated (inches/acre)	May 1 – October 31	Daily	Measurement	Annual Report
Quantity chlorine used (lbs)	May 1 – October 31	Daily	Measurement	Annual Report
Chlorine, Total Residual (mg/L)	May 1 – October 31	Daily	Grab	Annual Report
pH	May 1 – October 31	2/Week	Grab	Annual Report
Total coliform See note a.	May 1 – October 31	Weekly (Class C)	Grab	1. Weekly median 2. Annual Report
E. coli	May 1 – October 31	Weekly (Class D)	Grab	Annual Report
Nitrogen Loading Rate (lbs/acre-year)	May 1 – October 31	Annually	Calculation	Annual Report
Nutrients (TKN, NO2+NO3-N, Total Ammonia (as N), Total Phosphorus) (mg/L)	May 1 – October 31	Quarterly	Grab	Annual Report

Note:

a. Calculations of the median total coliform levels in Classes A – C are based on the results of the last seven days that the analyses have been completed.

b. All data records along with summary calculations, including quarterly irrigation rates and nutrient loading rates must be maintained, and made available to DEQ upon request.

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SCHEDULE C: COMPLIANCE SCHEDULE

A compliance schedule is not part of this permit.

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SCHEDULE D: SPECIAL CONDITIONS

1. Inflow and Infiltration

The permittee must submit to DEQ an annual inflow and infiltration report on a DEQ-approved form as directed in Table B1. The report must include the following:

a. An assessment of the facility's I/I issues based on a comparison of summer and winter flows to the plant.

c. Details of activities performed in the previous year to identify and reduce inflow and infiltration.

d. Details of activities planned for the following year to identify and reduce inflow and infiltration.

e. A summary of sanitary sewer overflows that occurred during the previous year. This should include the following: date of the SSO, location, estimated volume, cause, follow-up actions and if performed, the results of receiving stream monitoring.

2. Emergency Response and Public Notification Plan

The permittee must develop an Emergency Response and Public Notification Plan ("plan"), or ensure the facility's existing plan is current and accurate, per Schedule F, Section B, and Condition 8 within 6 months of permit effective date. The permittee must update the plan annually to ensure all information contained in the plan, including telephone and email contact information for applicable public agencies, is current and accurate. An updated copy of the plan must be kept on file at the facility for DEQ review. The latest plan revision date must be listed on the plan cover along with the reviewer's initials or signature.

3. Recycled Water Use Plan

The permittee must maintain a DEQ-approved Recycled Water Use Plan meeting the requirements in OAR 340-055-0025. The permittee must submit any significant modifications to DEQ for review and approval with sufficient time to clear DEQ review and a public notice period prior to implementing changes to the recycled water program. The permittee must keep the plan updated. All plan revisions require written authorization from DEQ and are effective upon permittee's receipt of DEQ written approval. No significant modifications can be made to a plan for an administratively extended permit (after the permit expiration date). Conditions in the plan are enforceable requirements under this permit. DEQ will provide an opportunity for public review and comment on any significant plan modifications prior to approving or denying. Public review is not required for minor modifications, changes to utilization dates or changes in use within the recycled water class.

a. Recycled Water Annual Report – The permittee must submit a recycled water annual report by the date specified in Table B1: Reporting Requirements and Due Dates. The permittee must use the DEQ-approved recycled water annual report form. This report must include the monitoring data and analytical laboratory reports for the previous year's monitoring required under Schedule B.

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4. Exempt Wastewater Reuse at the Treatment System

Recycled water used for landscape irrigation within the property boundary or in-plant processes at the wastewater treatment system is exempt from the requirements of OAR 340-055 if all of the following conditions are met:

a. The recycled water is an oxidized and disinfected wastewater.

b. The recycled water is used at the wastewater treatment system site where it is generated or at an auxiliary wastewater or sludge treatment facility that is subject to the same NPDES or WPCF permit as the wastewater treatment system.

c. Spray and/or drift from the use does not migrate off the site.

d. Public access to the site is restricted.

5. Wastewater Solids Annual Report

The permittee must submit a Wastewater Solids Annual Report by February 19 each year documenting removal of wastewater solids from the facility during the previous calendar year. The permittee must use the DEQ-approved wastewater solids annual report form. This report must include the volume of material removed and the name of the permitted facility that received the solids.

6. Wastewater Solids Transfers

a. *Within state.* The permittee may transfer wastewater solids including Class A and Class B biosolids, to another facility permitted to process or dispose of wastewater solids, including but not limited to: another wastewater treatment facility, landfill, or incinerator. The permittee must satisfy the requirements of the receiving facility. The permittee must report the name of the receiving facility and the quantity of material transferred in the wastewater solids annual report identified in Schedule B.

b. *Out of state.* If wastewater solids, including Class A and Class B biosolids, are transferred out of state for use or disposal, the permittee must obtain written authorization from DEQ, meet Oregon requirements for the use or disposal of wastewater solids, notify in writing the receiving state of the proposed use or disposal of wastewater solids, and satisfy the requirements of the receiving state.

7. Hauled Waste Control Plan

The permittee may accept hauled wastes at discharge points designated by the POTW after receiving written DEQ approval of a Hauled Waste Control Plan. Hauled wastes may include wastewater solids from another wastewater treatment facility, septage, grease trap wastes, portable and chemical toilet wastes, landfill leachate, groundwater remediation wastewaters and commercial/industrial wastewaters. A Hauled Waste Control Plan is not required in the event biological seed must be added to the process at the POTW to facilitate effective wastewater treatment.

8. Hauled Waste Annual Report

If the permittee has a Hauled Waste Control Plan, or otherwise accepts hauled waste, the permittee must submit an annual report of hauled waste received by the POTW. This report, if required, must be submitted as described in Table B1. This report must include the date, time, type, and amount received each time the POTW accepts hauled waste. Hauled waste must be described in the permittee's Hauled Waste Control Plan.

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9. Lagoon Solids

By the date listed in Table B1, the permittee must submit to DEQ a sludge depth survey and report. The report must include the sludge depths throughout the lagoons and an evaluation of the impact of sludge on treatment efficiency and odors. If the evaluation finds that the sludge is impacting the treatment efficiency and causing odors, the permittee must submit a plan to reduce or remove the sludge. See Schedule F, conditions 5 and 6 for sludge removal requirements.

10. Operator Certification

a. Definitions

i. "Supervise" means to have full and active responsibility for the daily on site technical operation of a wastewater treatment system or wastewater collection system.

ii. "Supervisor" or "designated operator", means the operator delegated authority by the permittee for establishing and executing the specific practice and procedures for operating the wastewater treatment system or wastewater collection system in accordance with the policies of the owner of the system and any permit requirements.

iii. "Shift Supervisor" means the operator delegated authority by the permittee for executing the specific practice and procedures for operating the wastewater treatment system or wastewater collection system when the system is operated on more than one daily shift.

iv. "System" includes both the collection system and the treatment systems.

b. The permittee must comply with OAR Chapter 340, Division 49, "Regulations Pertaining to Certification of Wastewater System Operator Personnel" and designate a supervisor whose certification corresponds with the classification of the collection and/or treatment system as specified in the DEQ Supervisory Wastewater Operator Status Report. DEQ may revise the permittee's classification in writing at any time to reflect changes in the collection or treatment system. This reclassification is not considered a permit modification and may be made after the permit expiration date provided the permit has been administratively extended by DEQ. If a facility is re-classified, a certified letter will be mailed to the system owner from the DEQ Operator Certification Program. Current system classifications are publicized on the DEQ Supervisory Wastewater Operator Status Report found on the DEQ Wastewater Operator Certification Homepage.

c. The permittee must have its system supervised full-time by one or more operators who hold a valid certificate for the type of wastewater treatment or wastewater collection system, and at a grade equal to or greater than the wastewater system's classification.

d. The permittee's wastewater system may be without the designated supervisor for up to 30 consecutive days if another person supervises the system, who is certified at no more than one grade lower than the classification of the wastewater system. The permittee must delegate authority to this operator to supervise the operation of the system.

e. If the wastewater system has more than one daily shift, the permittee must have another properly certified operator available to supervise operation of the system. Each shift supervisor must be certified at no more than one grade lower than the system classification.

f. The permittee is not required to have a supervisor on site at all times; however, the supervisor must be available to the permittee and operator at all times.

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g. The permittee must notify DEQ in writing of the name of the system supervisor by completing and submitting the Supervisory Wastewater System Operator Designation Form. The most recent version of this form may be found on the DEQ Wastewater Operator Certification homepage *NOTE: This form is different from the Delegated Authority form. The permittee may replace or re-designate the system supervisor with another properly certified operator at any time and must notify DEQ in writing within 30 days of replacement or re-designation of the operator in charge. As of this writing, the notice of replacement or re-designation must be sent to Water Quality Division, Operator Certification Program, 700 NE Multnomah St, Suite 600, Portland, OR 97232-4100. This address may be updated in writing by DEQ during the term of this permit.

h. When compliance with item (d) of this section is not possible or practicable because the system supervisor is not available or the position is vacated unexpectedly, and another certified operator is not qualified to assume supervisory responsibility, the Director may grant a time extension for compliance with the requirements in response to a written request from the system owner. The Director will not grant an extension longer than 120 days unless the system owner documents the existence of extraordinary circumstances.

11. Industrial User Survey

Industrial User Survey

a. By the date listed in Table B1, the permittee must conduct an industrial user survey as described in 40CFR 403.8(f)(2)(i-iii) to determine the presence of any industrial users discharging wastewaters subject to pretreatment and submit a report on the findings to DEQ. The purpose of the survey is to identify whether there are any industrial users discharging to the POTW, and ensure regulatory oversight of these discharges to state waters.

b. Should the DEQ determine that a pretreatment program is required, the permit must be reopened and modified in accordance with 40 CFR 403.8(e)(1) to incorporate a compliance schedule for development of a pretreatment program. The compliance schedule must be developed in accordance with the provisions of 40 CFR 403.12(k), and must not exceed twelve (12) months.

12. Outfall Inspection

The permittee must inspect Outfall 001 including the submerged portion of the outfall line and diffuser to document its integrity and to determine whether it is functioning as designed. The inspection must determine whether diffuser ports are intact, clear and fully functional. The inspection must verify the latitude and longitude of the diffuser. The permittee must submit a written report to DEQ regarding the results of the outfall inspection by the date in Table B1. The report must include a description of the outfall as originally constructed, the condition of the current outfall and identify any repairs needed to return the outfall to satisfactory condition.

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SCHEDULE E: PRETREATMENT ACTIVITIES

A pretreatment program is not part of this permit.

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SCHEDULE F: NPDES GENERAL CONDITIONS

October 1, 2015 Version

SECTION A. STANDARD CONDITIONS

A1. Duty to Comply with Permit

The permittee must comply with all conditions of this permit. Failure to comply with any permit condition is a violation of Oregon Revised Statutes (ORS) 468B.025 and the federal Clean Water Act and is grounds for an enforcement action. Failure to comply is also grounds for DEQ to terminate, modify and reissue, revoke, or deny renewal of a permit.

A2. Penalties for Water Pollution and Permit Condition Violations

The permit is enforceable by DEQ or EPA, and in some circumstances also by third-parties under the citizen suit provisions of 33 USC § 1365. DEQ enforcement is generally based on provisions of state statutes and Environmental Quality Commission (EQC) rules, and EPA enforcement is generally based on provisions of federal statutes and EPA regulations.

ORS 468.140 allows DEQ to impose civil penalties up to $25,000 per day for violation of a term, condition, or requirement of a permit.

Under ORS 468.943, unlawful water pollution in the second degree, is a Class A misdemeanor and is punishable by a fine of up to $25,000, imprisonment for not more than one year, or both. Each day on which a violation occurs or continues is a separately punishable offense.

Under ORS 468.946, unlawful water pollution in the first degree is a Class B felony and is punishable by a fine of up to $250,000, imprisonment for not more than 10 years, or both.

The Clean Water Act provides that any person who violates permit condition, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed $25,000 per day for each violation.

The Clean Water Act provides that any person who negligently violates any condition, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both.

In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both.

Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both.

In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both.

Any person who knowingly violates section any permit condition, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both.

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In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both.

An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

Any person may be assessed an administrative penalty by the Administrator for violating any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act.

Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000.

Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.

A3. Duty to Mitigate

The permittee must take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit. In addition, upon request of DEQ, the permittee must correct any adverse impact on the environment or human health resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

A4. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and have the permit renewed. The application must be submitted at least 180 days before the expiration date of this permit.

DEQ may grant permission to submit an application less than 180 days in advance but no later than the permit expiration date.

A5. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause including, but not limited to, the following:

a. Violation of any term, condition, or requirement of this permit, a rule, or a statute.
b. Obtaining this permit by misrepresentation or failure to disclose fully all material facts.
c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.
d. The permittee is identified as a Designated Management Agency or allocated a wasteload under a total maximum daily load (TMDL).
e. New information or regulations.
f. Modification of compliance schedules.
g. Requirements of permit reopener conditions
h. Correction of technical mistakes made in determining permit conditions.
i. Determination that the permitted activity endangers human health or the environment.
j. Other causes as specified in 40 CFR §§ 122.62, 122.64, and 124.5.
k. For communities with combined sewer overflows (CSOs):
    (1) To comply with any state or federal law regulation for CSOs that is adopted or promulgated subsequent to the effective date of this permit.

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(2) If new information that was not available at the time of permit issuance indicates that CSO controls imposed under this permit have failed to ensure attainment of water quality standards, including protection of designated uses.
(3) Resulting from implementation of the permittee's long-term control plan and/or permit conditions related to CSOs.

The filing of a request by the permittee for a permit modification, revocation or reissuance, termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

A6. Toxic Pollutants
The permittee must comply with any applicable effluent standards or prohibitions established under Oregon Administrative Rule (OAR) 340-041-0033 and section 307(a) of the federal Clean Water Act for toxic pollutants, and with standards for sewage sludge use or disposal established under section 405(d) of the federal Clean Water Act, within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

A7. Property Rights and Other Legal Requirements
The issuance of this permit does not convey any property rights of any sort, or any exclusive privilege, or authorize any injury to persons or property or invasion of any other private rights, or any infringement of federal, tribal, state, or local laws or regulations.

A8. Permit References
Except for effluent standards or prohibitions established under section 307(a) of the federal Clean Water Act and OAR 340-041-0033 for toxic pollutants, and standards for sewage sludge use or disposal established under section 405(d) of the federal Clean Water Act, all rules and statutes referred to in this permit are those in effect on the date this permit is issued.

A9. Permit Fees
The permittee must pay the fees required by OAR.

SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

B1. Proper Operation and Maintenance
The permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that 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 appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems that are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

B2. Need to Halt or Reduce Activity Not a Defense
For industrial or commercial facilities, upon reduction, loss, or failure of the treatment facility, the permittee must, to the extent necessary to maintain compliance with its permit, control production or all discharges or both until the facility is restored or an alternative method of treatment is provided. This requirement applies, for example, when the primary source of power of the treatment facility fails or is reduced or lost. It is not 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.

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B3. Bypass of Treatment Facilities

a. Definitions

(1) "Bypass" means intentional diversion of waste streams from any portion of the treatment facility. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, provided the diversion is to allow essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs b and c of this section.

(2) "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 that 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.

b. Prohibition of bypass.

(1) Bypass is prohibited and DEQ may take enforcement action against a permittee for bypass unless:

i. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

ii. There were no feasible alternatives to the 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 judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventative maintenance; and

iii. The permittee submitted notices and requests as required under General Condition B3.c.

(2) DEQ may approve an anticipated bypass, after considering its adverse effects and any alternatives to bypassing, if DEQ determines that it will meet the three conditions listed above in General Condition B3.b.(1).

c. Notice and request for bypass.

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, a written notice must be submitted to DEQ at least ten days before the date of the bypass.

(2) Unanticipated bypass. The permittee must submit notice of an unanticipated bypass as required in General Condition D5.

B4. Upset

a. Definition. "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 operation error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

b. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of General Condition B4.c are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the causes(s) of the upset;

(2) The permitted facility was at the time being properly operated;

(3) The permittee submitted notice of the upset as required in General Condition D5, hereof (24-hour notice); and

(4) The permittee complied with any remedial measures required under General Condition A3 hereof.

d. Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

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B5. Treatment of Single Operational Upset

For purposes of this permit, a single operational upset that leads to simultaneous violations of more than one pollutant parameter will be treated as a single violation. A single operational upset is an exceptional incident that causes simultaneous, unintentional, unknowing (not the result of a knowing act or omission), temporary noncompliance with more than one federal Clean Water Act effluent discharge pollutant parameter. A single operational upset does not include federal Clean Water Act violations involving discharge without a NPDES permit or noncompliance to the extent caused by improperly designed or inadequate treatment facilities. Each day of a single operational upset is a violation.

B6. Overflows from Wastewater Conveyance Systems and Associated Pump Stations

a. Definition. "Overflow" means any spill, release or diversion of sewage including:
   (1) An overflow that results in a discharge to waters of the United States; and
   (2) An overflow of wastewater, including a wastewater backup into a building (other than a backup caused solely by a blockage or other malfunction in a privately owned sewer or building lateral), even if that overflow does not reach waters of the United States.

b. Reporting required. All overflows must be reported orally to DEQ within 24 hours from the time the permittee becomes aware of the overflow. Reporting procedures are described in more detail in General Condition D5.

B7. Public Notification of Effluent Violation or Overflow

If effluent limitations specified in this permit are exceeded or an overflow occurs that threatens public health, the permittee must take such steps as are necessary to alert the public, health agencies and other affected entities (for example, public water systems) about the extent and nature of the discharge in accordance with the notification procedures developed under General Condition B8. Such steps may include, but are not limited to, posting of the river at access points and other places, news releases, and paid announcements on radio and television.

B8. Emergency Response and Public Notification Plan

The permittee must develop and implement an emergency response and public notification plan that identifies measures to protect public health from overflows, bypasses, or upsets that may endanger public health. At a minimum the plan must include mechanisms to:

a. Ensure that the permittee is aware (to the greatest extent possible) of such events;
b. Ensure notification of appropriate personnel and ensure that they are immediately dispatched for investigation and response;
c. Ensure immediate notification to the public, health agencies, and other affected public entities (including public water systems). The overflow response plan must identify the public health and other officials who will receive immediate notification;
d. Ensure that appropriate personnel are aware of and follow the plan and are appropriately trained;
e. Provide emergency operations; and
f. Ensure that DEQ is notified of the public notification steps taken.

B9. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters must be disposed of in such a manner as to prevent any pollutant from such materials from entering waters of the state, causing nuisance conditions, or creating a public health hazard.

SECTION C. MONITORING AND RECORDS

C1. Representative Sampling

Sampling and measurements taken as required herein must be representative of the volume and nature of the monitored discharge. All samples must be taken at the monitoring points specified in this permit, and must be taken, unless otherwise specified, before the effluent joins or is diluted by any other waste stream,

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body of water, or substance. Monitoring points must not be changed without notification to and the approval of DEQ. Samples must be collected in accordance with requirements in 40 CFR part 122.21 and 40 CFR part 403 Appendix E.

C2. Flow Measurements
Appropriate flow measurement devices and methods consistent with accepted scientific practices must be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices must be installed, calibrated and maintained to insure that the accuracy of the measurements is consistent with the accepted capability of that type of device. Devices selected must be capable of measuring flows with a maximum deviation of less than ± 10 percent from true discharge rates throughout the range of expected discharge volumes.

C3. Monitoring Procedures
Monitoring must be conducted according to test procedures approved under 40 CFR part 136 or, in the case of sludge (biosolids) use and disposal, approved under 40 CFR part 503 unless other test procedures have been specified in this permit.

For monitoring of recycled water with no discharge to waters of the state, monitoring must be conducted according to test procedures approved under 40 CFR part 136 or as specified in the most recent edition of Standard Methods for the Examination of Water and Wastewater unless other test procedures have been specified in this permit or approved in writing by DEQ.

C4. Penalties for Tampering
The federal Clean Water 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 may, upon conviction, be punished by a fine of not more than $10,000 per violation, imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person, punishment is a fine not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both.

C5. Reporting of Monitoring Results
Monitoring results must be summarized each month on a discharge monitoring report form approved by DEQ. The reports must be submitted monthly and are to be mailed, delivered or otherwise transmitted by the 15th day of the following month unless specifically approved otherwise in Schedule B of this permit.

C6. Additional Monitoring by the Permittee
If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR part 136 or, in the case of sludge (biosolids) use and disposal, approved under 40 CFR part 503, or as specified in this permit, the results of this monitoring must be included in the calculation and reporting of the data submitted in the discharge monitoring report. Such increased frequency must also be indicated. For a pollutant parameter that may be sampled more than once per day (for example, total residual chlorine), only the average daily value must be recorded unless otherwise specified in this permit.

C7. Averaging of Measurements
Calculations for all limitations that require averaging of measurements must utilize an arithmetic mean, except for bacteria which must be averaged as specified in this permit.

C8. Retention of Records
Records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities must be retained for a period of at least 5 years (or longer as required by 40 CFR part

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503). Records of all monitoring information including all calibration and maintenance records, 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 must be retained for a period of at least 3 years from the date of the sample, measurement, report, or application. This period may be extended by request of DEQ at any time.

C9. Records Contents

Records of monitoring information must include:

a. The date, exact place, time, and methods of sampling or measurements;
b. The individual(s) who performed the sampling or measurements;
c. The date(s) analyses were performed;
d. The individual(s) who performed the analyses;
e. The analytical techniques or methods used; and
f. The results of such analyses.

C10. Inspection and Entry

The permittee must allow DEQ or EPA upon the presentation of credentials to:

a. 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 this permit;
b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
d. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by state law, any substances or parameters at any location.

C11. Confidentiality of Information

Any information relating to this permit that is submitted to or obtained by DEQ is available to the public unless classified as confidential by the Director of DEQ under ORS 468.095. The permittee may request that information be classified as confidential if it is a trade secret as defined by that statute. The name and address of the permittee, permit applications, permits, effluent data, and information required by NPDES application forms under 40 CFR § 122.21 are not classified as confidential [40 CFR § 122.7(b)].

SECTION D. REPORTING REQUIREMENTS

D1. Planned Changes

The permittee must comply with OAR 340-052, “Review of Plans and Specifications” and 40 CFR § 122.41(l)(1). Except where exempted under OAR 340-052, no construction, installation, or modification involving disposal systems, treatment works, sewerage systems, or common sewers may be commenced until the plans and specifications are submitted to and approved by DEQ. The permittee must give notice to DEQ as soon as possible of any planned physical alternations or additions to the permitted facility.

D2. Anticipated Noncompliance

The permittee must give advance notice to DEQ of any planned changes in the permitted facility or activity that may result in noncompliance with permit requirements.

D3. Transfers

This permit may be transferred to a new permittee provided the transferee acquires a property interest in the permitted activity and agrees in writing to fully comply with all the terms and conditions of the permit and EQC rules. No permit may be transferred to a third party without prior written approval from DEQ. DEQ may require modification, revocation, and reissuance of the permit to change the name of the permittee and

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incorporate such other requirements as may be necessary under 40 CFR § 122.61. The permittee must notify DEQ when a transfer of property interest takes place.

D4. Compliance Schedule

Reports of compliance or noncompliance with, or any progress reports on interim and final requirements contained in any compliance schedule of this permit must be submitted no later than 14 days following each schedule date. Any reports of noncompliance must include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirements.

D5. Twenty-Four Hour Reporting

The permittee must report any noncompliance that may endanger health or the environment. Any information must be provided orally (by telephone) to the DEQ regional office or Oregon Emergency Response System (1-800-452-0311) as specified below within 24 hours from the time the permittee becomes aware of the circumstances.

a. Overflows.
   (1) Oral Reporting within 24 hours.
      i. For overflows other than basement backups, the following information must be reported to the Oregon Emergency Response System (OERS) at 1-800-452-0311. For basement backups, this information should be reported directly to the DEQ regional office.
         (a) The location of the overflow;
         (b) The receiving water (if there is one);
         (c) An estimate of the volume of the overflow;
         (d) A description of the sewer system component from which the release occurred (for example, manhole, constructed overflow pipe, crack in pipe); and
         (e) The estimated date and time when the overflow began and stopped or will be stopped.
      ii. The following information must be reported to the DEQ regional office within 24 hours, or during normal business hours, whichever is earlier:
         (a) The OERS incident number (if applicable); and
         (b) A brief description of the event.
   (2) Written reporting postmarked within 5 days.
      i. The following information must be provided in writing to the DEQ regional office within 5 days of the time the permittee becomes aware of the overflow:
         (a) The OERS incident number (if applicable);
         (b) The cause or suspected cause of the overflow;
         (c) Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the overflow and a schedule of major milestones for those steps;
         (d) Steps taken or planned to mitigate the impact(s) of the overflow and a schedule of major milestones for those steps; and
         (e) For storm-related overflows, the rainfall intensity (inches/hour) and duration of the storm associated with the overflow.

      DEQ may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

b. Other instances of noncompliance.
   (1) The following instances of noncompliance must be reported:
      i. Any unanticipated bypass that exceeds any effluent limitation in this permit;
      ii. Any upset that exceeds any effluent limitation in this permit;
      iii. Violation of maximum daily discharge limitation for any of the pollutants listed by DEQ in this permit; and
      iv. Any noncompliance that may endanger human health or the environment.

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(2) During normal business hours, the DEQ regional office must be called. Outside of normal business hours, DEQ must be contacted at 1-800-452-0311 (Oregon Emergency Response System).
(3) A written submission must be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission must contain:
  i. A description of the noncompliance and its cause;
  ii. The period of noncompliance, including exact dates and times;
  iii. The estimated time noncompliance is expected to continue if it has not been corrected;
  iv. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance; and
  v. Public notification steps taken, pursuant to General Condition B**7.**
(4) DEQ may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

D6. Other Noncompliance
The permittee must report all instances of noncompliance not reported under General Condition D4 or D5 at the time monitoring reports are submitted. The reports must 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; and
d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

D7. Duty to Provide Information
The permittee must furnish to DEQ within a reasonable time any information that DEQ may request to determine compliance with the permit or to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit. The permittee must also furnish to DEQ, upon request, copies of records required to be kept by this permit.

Other Information: When the permittee becomes aware that it has failed to submit any relevant facts or has submitted incorrect information in a permit application or any report to DEQ, it must promptly submit such facts or information.

D8. Signatory Requirements
All applications, reports or information submitted to DEQ must be signed and certified in accordance with 40 CFR § 122.22.

D9. Falsification of Information
Under ORS 468.953, 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, is subject to a Class C felony punishable by a fine not to exceed $125,000 per violation and up to 5 years in prison per ORS chapter 161. Additionally, according to 40 CFR § 122.41(k)(2), 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 non-compliance will, upon conviction, be punished by a federal civil penalty not to exceed $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

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D10. Changes to Indirect Dischargers

The permittee must provide adequate notice to DEQ of the following:

a. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of the federal Clean Water Act if it were directly discharging those pollutants and;
b. Any substantial change in the volume or character of pollutants being introduced into the POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
c. For the purposes of this paragraph, adequate notice must include information on (i) the quality and quantity of effluent introduced into the POTW, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

SECTION E. DEFINITIONS

E1. *BOD* or BOD_5 means five-day biochemical oxygen demand.
E2. *CBOD* or $CBOD_5$ means five-day carbonaceous biochemical oxygen demand.
E3. *TSS* means total suspended solids.
E4. *Bacteria* means but is not limited to fecal coliform bacteria, total coliform bacteria, *Escherichia coli* (*E. coli*) bacteria, and *Enterococcus* bacteria.
E5. *FC* means fecal coliform bacteria.
E6. *Total residual chlorine* means combined chlorine forms plus free residual chlorine
E7. *Technology based permit effluent limitations* means technology-based treatment requirements as defined in 40 CFR § 125.3, and concentration and mass load effluent limitations that are based on minimum design criteria specified in OAR 340-041.
E8. *mg/l* means milligrams per liter.
E9. *µg/l* means microgram per liter.
E10. *kg* means kilograms.
E11. m^3/d means cubic meters per day.
E12. *MGD* means million gallons per day.
E13. *Average monthly effluent limitation* as defined at 40 CFR § 122.2 means the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.
E14. *Average weekly effluent limitation* as defined at 40 CFR § 122.2 means the highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.
E15. *Daily discharge* as defined at 40 CFR § 122.2 means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the daily discharge must be calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge must be calculated as the average measurement of the pollutant over the day.
E16. *24-hour composite sample* means a sample formed by collecting and mixing discrete samples taken periodically and based on time or flow.
E17. *Grab sample* means an individual discrete sample collected over a period of time not to exceed 15 minutes.
E18. *Quarter* means January through March, April through June, July through September, or October through December.
E19. *Month* means calendar month.
E20. *Week* means a calendar week of Sunday through Saturday.
E21. *POTW* means a publicly-owned treatment works.

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State of Oregon
Department of
Environmental
Quality

National Pollutant Discharge Elimination System
Permit Renewal Fact Sheet
City of Aurora
Final – June 29, 2022

Permittee	City of Aurora 21420 Main Street NE Aurora, OR 97002
Existing Permit Information	File Number: 100020 Permit Number: 101772 EPA Reference Number: OR0043991 Category: Minor - Domestic Expiration Date: July 31, 2021
Permittee Contact	Mark Gunter Public Works Superintendent 971-930-3597 21420 Main Street NE Aurora, OR 97002
Receiving Water Information	Water Body Name: Pudding River River Mile: 8.4 Assessment Unit ID: OR_SR_1709000905_02_104088 Sub Basin Name: Molalla-Pudding Basin Name: Willamette
Proposed Action	Renew permit Application Number: 950727 Date Application Received: Nov 16, 2020
Permit Writer	Evan Haas 503-229-5294 Date Prepared: June 23, 2022

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NPDES Permit Renewal Fact Sheet
City of Aurora

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NPDES Permit Renewal Fact Sheet
City of Aurora

1. Introduction

As required by Oregon Administrative Rule 340-045-0035, this fact sheet describes the basis and methodology used in developing the permit. The permit is divided into several sections:

Schedule A – Waste discharge limitations
Schedule B – Minimum monitoring and report requirements
Schedule C – Compliance conditions and schedules
Schedule D – Special conditions
Schedule E – Pretreatment activities
Schedule F – General conditions

A summary of the major changes to the permit are listed below:

- The monthly average concentration limit for total residual chlorine decreased; the new limit is 0.03 mg/L.
- The daily maximum concentration limit for total residual chlorine decreased; the new limit is 0.08 mg/L.
- A requirement to collect effluent total iron samples quarterly, for eight quarters, is included in the permit.

2. Facility Description

2.1 Wastewater Facility

The City of Aurora operates a wastewater treatment plant, located at 21494 Mill Race Road, Aurora, OR, in Marion County (Figure 2-1). The City initated plant operations in 2001. The treatment plant collects domestic sewage from the City of Aurora, and treats it before discharging to the Pudding River. The treatment plant is an aerated lagoon system and utilizes an activated sludge process for treatment (Figure 2-2).

Influent is pumped to the headworks, which includes a flow meter, screen, and a grit removal system. After screening, the influent enters a six cell, 500,000 gallon aerated lagoon system where treatment occurs. The treated influent is then discharged to an approximately 7,000,000 gallon storage lagoon. The City is permitted to discharge effluent to the Pudding River from November 1 through April 30; during this time period, wastewater in the storage lagoon is chlorinated and dechlorinated prior to discharge. Treated effluent is pumped and discharged through a single-port submerged diffuser into the Pudding River at River Mile 8.4. Between May 1 and October 31, the City land applies wastewater on approximately 7 acres of City owned property adjacent to the treatment facility. The City's outfalls are listed in Table 2-1.

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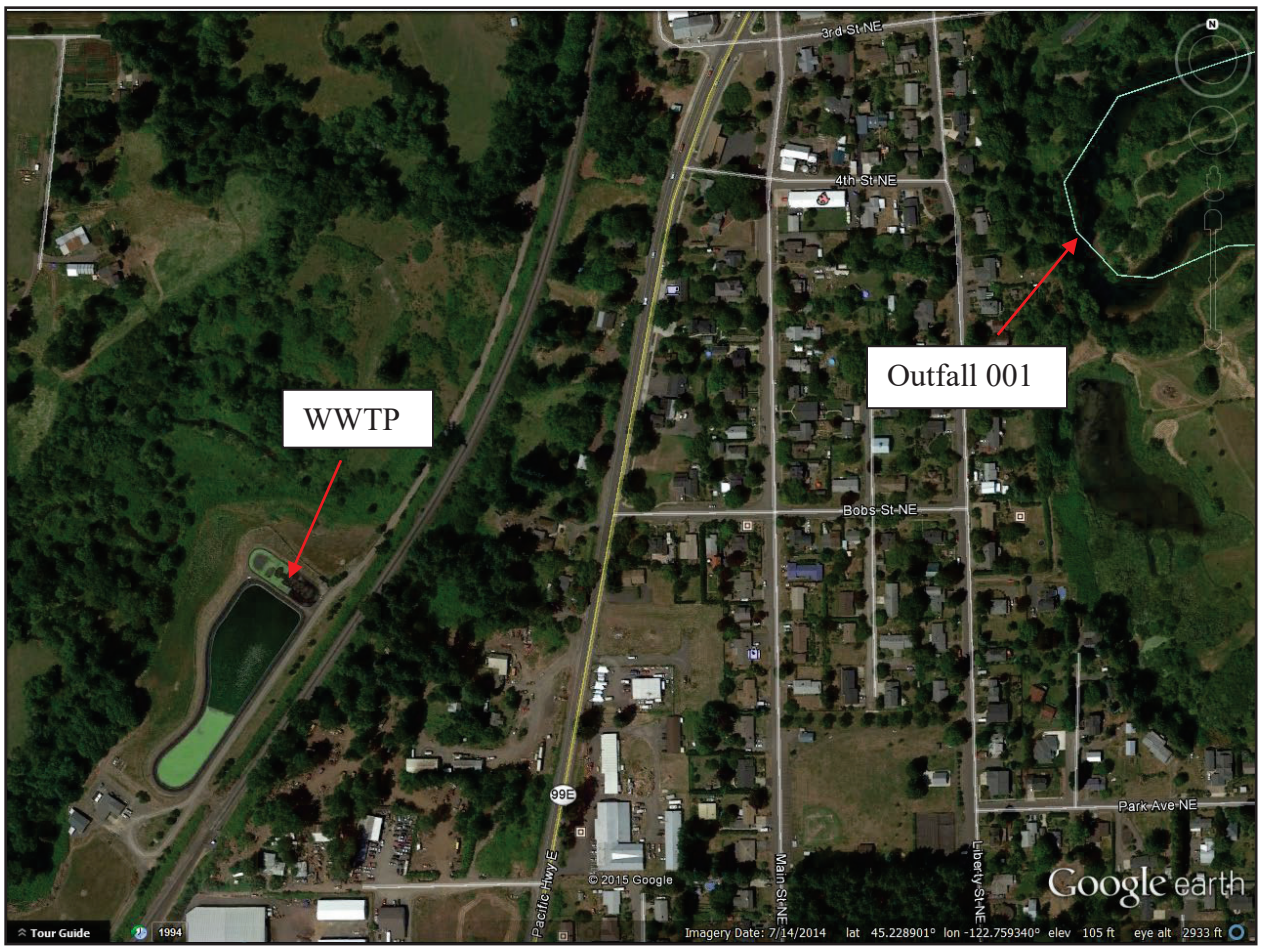

Figure 2-1: Wastewater Treatment Plant Location (Google Earth)

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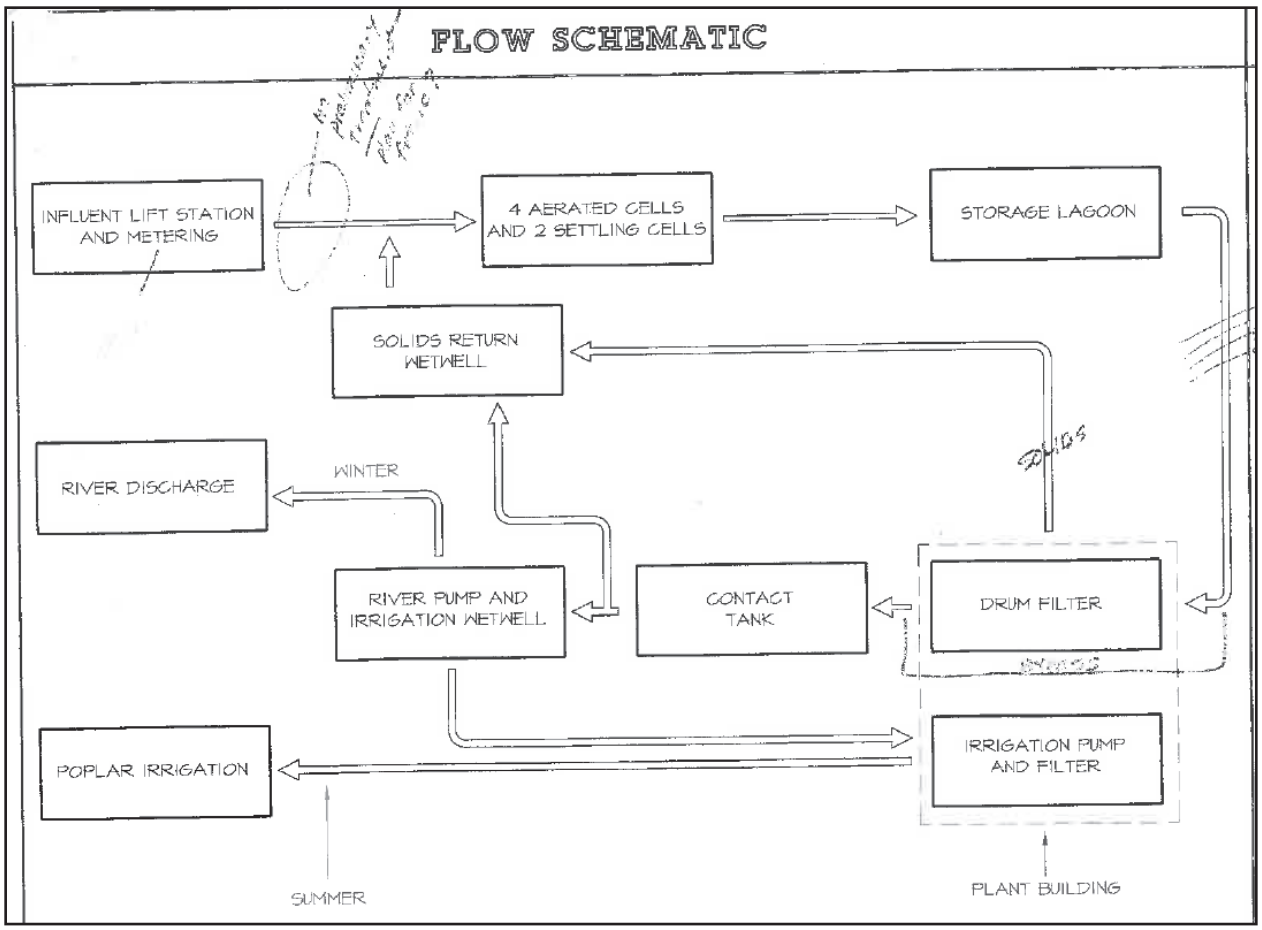

Figure 2-3: Wastewater Treatment Diagram

Table 2-1: List of Outfalls

Outfall Number	Type of Waste	Lat/Long	Design Flow[1] (mgd)	Existing Flow[2] (mgd)
001	Treated Wastewater	45.22944/-122.75278	0.087	0.061
002	Recycled Water	Specified in Recycled Water Use Plan	N/A	N/A

1. Design Flow = average dry weather design flow
2. Existing Flow = approximate annual average flow (2019-2020)

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2.2 Compliance History

During the current permit cycle, the City was issued a warning letter with opportunity to correct on November 2, 2018 for exceeding the permit limit for total residual chlorine and for failing to submit complete reports. The City met with DEQ to discuss the violations and implemented corrective actions. The facility was last inspected on February 12, 2020. During the inspection, DEQ identified minor issues, and issued the City a warning letter with opportunity to correct, requiring the City to address the issues.

2.3 Stormwater

Stormwater is not addressed in this permit. General NPDES permits for stormwater are not required for facilities with a design flow of less than 1 MGD.

2.4 Industrial Pretreatment

The permittee does not have a DEQ-approved industrial pretreatment program. Based on current information, no industrial pretreatment program is needed.

2.5 Biosolids

The permit holder does not currently land apply biosolids or produce biosolids for sale or distribution, and does not intend to do so during the term of this permit.

2.6 Recycled Water

The permit holder currently operates a recycled water program to produce a Class (A, B, C, D, or Non-disinfected) recycled water for (irrigation, industrial, other) uses and anticipates continuing to do so. A recycled water use plan was submitted to DEQ for review and is available for public comment with the permit. Once approved after public comment, conditions in the recycled water use plan become permit conditions.

2.7 Wastewater Classification

OAR 340-049 requires all permitted municipal wastewater collection and treatment facilities receive a classification based on the size and complexity of the systems. DEQ evaluated the classifications for the treatment and collection system, which are publicly available at: https://www.deq.state.or.us/wq/opcert/Docs/OpcertReport.pdf.

3. Schedule A: Effluent Limit Development

Effluent limits serve as the primary mechanism in NPDES permits for controlling discharges of pollutants to receiving waters. Effluent limitations can be based on either the technology available to control the pollutants or limits that are protective of the water quality standards for the receiving water. DEQ refers to these two types of permit limits as technology-based effluent limitations (TBELs) and water quality-based effluent limits (WQBELs) respectively. When a TBEL is not restrictive enough to protect the receiving stream, DEQ must include a WQBEL in the permit.

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3.1 Existing Effluent Limits

The table below shows the limits contained in the existing permit.

Table 3-1: Existing Effluent Limits

Parameter	Units	Average Monthly	Average Weekly	Daily Maximum
Effluent Flow (May 1 – October 31)	MGD	No discharge (Daily max limit = 0 MGD)		
BOD_5 (November 1 – April 30)	mg/L	30	45	-
	lb/day	30	60	140
	% removal	85	-	-
TSS (November 1 – April 30)	mg/L	50	80	-
	lb/day	47	90	220
	% removal	65	-	-
pH	SU	Must be within the range of 6.0 to 9.0 S.U.		
E. coli	#/100 mL	Monthly geometric mean must not exceed 126 organisms per 100 mL Any single sample must not exceed 406 organisms per 100 mL		
Total Residual Chlorine	mg/L	Monthly average concentration must not exceed 0.07. Daily maximum concentration must not exceed 0.19.		

3.2 Technology-Based Effluent Limit Development

40 CFR 122.44(a)(1) requires publically owned treatment works (POTW) to meet technology-based effluent limits, for five-day biochemical oxygen demand (BOD_5), total suspended solids (TSS) and pH (i.e., federal secondary treatment standards). Substitution of 5-day carbonaceous oxygen demand ($CBOD_5$) for BOD_5 is allowed. The numeric standards for these pollutants are contained in 40 CFR 133.102. In addition, DEQ has developed minimum design criteria for BOD_5 and TSS that apply to specific watershed basins in Oregon. These are listed in the basin-specific criteria sections under OAR 340-041-0101 to 0350. During the summer low flow months as defined by OAR, these design criteria are more stringent than the federal secondary treatment standards. The basin-specific criteria are not effluent limits, but are implemented as design criteria for new or expanded wastewater treatment plants. The table below shows a comparison of the federal secondary treatment standards and the basin-specific design criteria for the Willamette Basin.

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Table 3-2: Comparison of TBELs for Federal Secondary Treatment Standards and Oregon Basin-Specific Design Criteria

Parameter	Federal Secondary Treatment Standards		Willamette Basin-Specific Design Criteria (OAR 340-041-0345)
	30-Day Average	7-Day Average	Monthly Average
BOD_5 (mg/L)	30	45	10 mg/L from May 1 – October 31; 30 mg/L from November 1 – April 30
TSS (mg/L)	30	45	10 mg/L from May 1 – October 31; 30 mg/L from November 1 – April 30
pH (S.U.)	6.0 – 9.0. (instantaneous)		Not applicable because pH in basin is water quality-based
BOD_5 and TSS % Removal	85%		Not applicable

In addition to the standards in 40 CFR 133.102, 40 CFR 133.105 allows less stringent effluent limits for POTWs, such as this facility, using waste stabilization ponds or trickling filters as their method of treatment. These facilities are required to achieve a monthly average BOD_5 and TSS concentrations of 45 mg/L, a weekly average limits of 65 mg/L and a removal efficiency of 65%.

To be eligible for discharge limitations based on equivalent to secondary standards, a POTW must meet all three of the following criteria:

1. The effluent must consistently exceed secondary treatment standards;
2. The principal treatment process must be a trickling filter or a waste stabilization pond; and
3. The POTW must provide significant biological treatment of the wastewater.

DEQ has evaluated these criteria and has determined that the facility meets all three.

Additional special considerations for TSS limits from waste stabilization ponds are described in (40 CFR 133.103(c)). These allow less stringent TSS limits for waste stabilization ponds. In the early 1980s, DEQ determined that waste stabilization ponds west of the Cascade Mountains are capable of achieving a monthly average concentration of 50 mg/L and east of the Cascade Mountains a monthly average of 85 mg/L. EPA published these approved alternate TSS requirements in 49 Federal Register (FR) 37005, September 20, 1984. DEQ used the criteria applicable to this facility to determine the effluent concentration limits for BOD_5 and TSS included in the facility's initial (2000) permit. These limits have been maintained in subsequent permits.

For BOD_5, DEQ is proposing to maintain the monthly average limit of 30 mg/L, the weekly limit of 45 mg/L, and a removal efficiency of 85%.

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For TSS, DEQ is proposing to maintain the monthly average limit of 50 mg/L, the weekly limit of 80mg/L, and a removal efficiency of 65%.

The limits for BOD_5 and TSS shown in the table above are concentration-based limits. Mass-based limits are also required per OAR 340-041-0061(9). For treatment facilities (such as this facility) that were upgraded after June 30, 1992, this rule requires that the mass load limits must be calculated based on the treatment facility capabilities. DEQ previously calculated winter mass load limits for this facility.. These limits were included in the 2000 permit and have been maintained in subsequent permits.

DEQ calculated winter mass load limits based on the maximum flows at the plant with a two year recurrence, and the capability of the plant at those flows. The estimated maximum daily discharge from the plant is 0.432 MGD, the highest weekly average discharge flow with a two year recurrence is 0.180 MGD, and the highest monthly average winter discharge flow with a two year recurrence is 0.142 MGD. BST, Inc., on behalf of the permittee determined at those flows the facility can reasonably achieve 40 mg/L BOD_5 and 60 mg/L TSS for a daily maximum, 40 mg/L BOD_5 and 60 mg/L TSS as a weekly average, and 25 mg/L BOD_5 and 40 mg/L TSS as a monthly average. The flows and concentrations used to develop the mass-based limits are included in the table below.

The following equations are used to calculate the mass-based limits for BOD_5 and TSS:

Monthly Average Mass Load = Wet Weather Monthly Design Flow x Monthly Concentration Design Value x Unit Conversion factor

Weekly Average Mass Load = Wet Weather Weekly Design Flow x Weekly Concentration Design Value x Unit Conversion factor

Daily Maximum Mass Load = Wet Weather Daily Design Flow x Daily Concentration Design Value x Unit Conversion factor

The following table lists the effluent flows and concentration limits used for the calculations.

Table 3-3: Design Flows and Concentrations

Season	Design Flow (mgd)	TSS Concentration Design Value (mg/L)	BOD_5 Concentration Design Value (mg/L)
Wet Weather (Monthly)	0.142	40	25
Wet Weather (Weekly)	0.180	60	40
Wet Weather (Daily)	0.432	60	40
Design flow comments: Flows are based on expected treatment plant capabilities. Permittee only discharges during the wet weather period.			

BOD_5 calculations:

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Monthly Average: 0.142 mgd x 25 mg/L x 8.34 = 30 lbs/day (Two significant figures)

Weekly Average: 0.180 mgd x 40 mg/L x 8.34 = 60 lbs/day

Daily Maximum: 0.432 mgd x 40 mg/L x 8.34 = 140 lbs/day

TSS calculations:

Monthly Average: 0.142 mgd x 40 mg/L x 8.34 = 47 lbs/day (Two significant figures)

Weekly Average: 0.180 mgd x 60 mg/L x 8.34 = 90 lbs/day

Daily Maximum: 0.432 mgd x 60 mg/L x 8.34 = 220 lbs/day

The proposed BOD_5 and TSS limits are listed in the following table.

Table 3-4: Technology-Based Effluent Limits

Parameter	Units	Average Monthly	Average Weekly	Daily Maximum
BOD_5 (November 1 – April 30)	mg/L	30	45	NA
	lbs/day	30	60	140
	% removal	85	NA	NA
TSS (November 1 – April 30)	mg/L	50	80	NA
	lbs/day	47	90	220
	% removal	65	NA	NA

3.3 Water Quality-Based Effluent Limit Development

40 CFR 122.44(d) requires that permits include limitations more stringent than technology-based requirements where necessary to meet water quality standards. Water quality-based effluent limits may be in the form of a wasteload allocation required as part of a Total Maximum Daily Load (TMDL). They may also be required if a site specific analysis indicates the discharge has the reasonable potential to cause or contribute to an exceedance of a water quality criterion. DEQ establishes effluent limits for pollutants that have a reasonable potential to exceed a criterion. The analyses are discussed below.

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3.3.1 Designated Beneficial Uses

NPDES permits issued by DEQ must protect the following designated beneficial uses of the Pudding River. These uses are listed in OAR-340-041-0340 for the Willamette basin:

- Public and private domestic water supply
- Industrial water supply
- Irrigation and livestock watering
- Fish and aquatic life (including salmonid rearing, migration and spawning)
- Wildlife and hunting
- Fishing
- Boating
- Water contact recreation
- Aesthetic quality
- Hydro power
- Commercial navigation and transportation

3.3.2 Water Quality-Limited Parameters and Total Maximum Daily Loads

The following table lists the parameters in the 2018 303(d) list for which the receiving stream is water quality-limited (Category 5) within the discharge's stream reach. The table also lists any parameters covered by a TMDL.

Table 3-5: WQ-Limited and TMDL Parameters

Water Quality Limited Parameters
AU ID: OR_SR_1709000905_02_104088 **AU Name:** Pudding River **AU Description:** Rock Creek to confluence with Molalla River **Year Last Assessed:** 2018 **AU Status:** **Impaired Uses:** Fish and Aquatic Life; Fishing; Private Domestic Water Supply; Public Domestic Water Supply **Year Listed:** 2010 ***Category 5:*** Guthion- Aquatic Life; Dieldrin- Human Health; Temperature- Year Round ***Category 4(B,C):*** , **Active TMDLs:** WILLAMETTE BASIN TMDL; MOLALLA-PUDDING SUBBASIN TMDL ; PUDDING RIVER, MOLALLA-PUDDING ***Category 4A:*** DDT 4,4'- Aquatic Life; Iron (total)- Aquatic Life; DDT 4,4'- Human Health; Dissolved Oxygen- Spawning
TMDL Parameters
Bacteria, Temperature, Pesticides, Iron

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3.3.3 TMDL Wasteload Allocations

DEQ issued a TMDL for the Molalla-Pudding Subbasin in 2008. WLAs from this TMDL that are applicable to the permittee are listed in the following table.

Table 3-6: Applicable WLAs

Parameter	WLA	Time Period
E. coli	1.76×10^9	November 1 – April 30
DDT/Dieldrin	Current conditions	November 1 – April 30

The TMDL based the *E. coli* wasteload allocation on an average wet weather flow and the numeric bacteria criteria the permittee is required to meet at the end of the discharge pipe. The value shown in the table above is expressed as the number of organisms/day the permittee could discharge to the Pudding River. The permit limit for *E. coli* is discussed in Section 3.3.8. Because the permittee treats domestic wastewater that could contain legacy pesticides, the TMDL assigned the permittee a wasteload allocation for DDT and dieldrin meeting the current conditions of its discharge.

The TMDL did not assign explicit wasteload allocations to Aurora for temperature or iron. Temperature is further discussed in Section 3.3.7. Though the TMDL did not assign a wasteload allocation for iron, it did require the permittee to sample its effluent for iron. The renewal permit includes a requirement for the permittee to monitor for total iron, quarterly, for a total of eight quarters. Once this is completed, the monitoring may be discontinued unless otherwise notified in writing by DEQ.

3.3.4 Pollutants of Concern

To ensure that a permit is protective of water quality, DEQ must identify pollutants of concern. These are pollutants that are expected to be present in the effluent at concentrations that could adversely impact water quality. DEQ uses the following information to identify pollutants of concern:

- Effluent monitoring data.
- Knowledge about the permittee's processes.
- Knowledge about the receiving stream water quality.
- Pollutants identified by applicable federal effluent limitation guidelines.

Based on EPA's NPDES permit application requirements, toxic pollutants of concern for domestic facilities are listed in the following table.

Table 3-7: Domestic Toxic Pollutants of Concern

Flow Rate	Pollutants
< 0.1 mgd	Total Residual Chlorine

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DEQ identified the following pollutants of concern for this facility listed in the following table.

Table 3-8: Pollutants of Concern

Pollutant	How was pollutant identified?
pH	Effluent Monitoring
Temperature	Effluent Monitoring
E. coli	Effluent Monitoring
Total Residual Chlorine	Effluent Monitoring

The sections below discuss the analyses that were conducted for the pollutants of concern to determine if water quality based effluent limits are needed to meet water quality standards.

3.3.5 Regulatory Mixing Zone

The proposed permit contains a mixing zone as allowed per OAR 340-041-0053. The proposed mixing zone remains unchanged from the existing permit and is described as follows:

> *The allowable mixing zone for the Aurora facility is that portion of the Pudding River, extending from a point 10 feet upstream of the outfall, to a point 25 feet from the east bank of the river, and to a point 108 feet downstream from the outfall. The zone of immediate dilution (ZID) is defined as that portion of the allowable mixing zone that is within 10 feet of the outfall discharge port.*

The dilutions at the edge of the zone of initial dilution and mixing zone are shown in the table below. These dilutions are based on a 2021 mixing zone analysis conducted by DEQ. The analysis is summarized in a July 2021 internal memo. DEQ used field study data collected by DEQ and mixing zone modeling software to estimate dilution values under worst-case low flow conditions that occur during the discharge period.

Dilution Summary - Wet Weather						
Water Quality Standard	Stream Flow (cfs)		Effluent Flow (mgd)		Dilution	Location
	Statistic	Flow	Statistic	Flow		
Aquatic Life, Acute	1Q10	84	☐ ADWDF x PF ☒ Max Daily Avg ☐ Other	0.266	4	ZID
Aquatic Life, Chronic	7Q10	108	☐ ADWDF ☒ Max Monthly Avg ☐ Other	0.135	77	MZ

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Dilution Summary - Wet Weather						
Human Health, Non-Carcinogen	30Q5	357	☐ ADWDF ☒ Max Monthly Avg ☐ Other	0.135	233	MZ
ADWDF = Average dry weather design flow *PF = Peaking factor*						
Comments: Effluent flow is based on 2019-2020 data. Streamflow statistics are based on USGS flow gage Pudding R at Aurora(14202000)						

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3.3.6 pH

The pH criterion for this basin is 6.5 – 8.5 per OAR 340-041-0345. DEQ determined there is no reasonable potential for the discharge to exceed the pH criterion at the edge of the mixing zone. The proposed pH limit is 6.0 – 9.0 and is considered to be a TBEL. The following provides a summary of the data used for the analysis.

Table 3-9: pH Reasonable Potential Analysis

INPUT	Lower pH Criteria	Upper pH Criteria
1. Dilution at mixing zone boundary	77	77
2. Upstream characteristics		
a. Temperature (deg C)	7.2	21.8
b. pH	7.1	7.7
c. Alkalinity (mg CaCO3/L)	17.0	78.0
3. Effluent characteristics		
a. Temperature (° C)	12.4	14.7
b. pH (S.U.)	6.0	9.0
c. Alkalinity (mg CaCO3/L)	64.0	134.6
4. Applicable pH criteria	6.5	8.5
pH at mixing zone boundary	**6.9**	**7.7**
Is there reasonable potential?	**No**	**No**
Proposed effluent limits	**6.0**	**9.0**
Effluent data source: DMR data; alkalinity defaults		
Ambient data source: Stations 10640 and 10917		

3.3.7 Temperature

3.3.7.1 Temperature Criteria OAR 340-041-0028

The following table summarizes the temperature criteria that apply at the discharge location along with whether the receiving stream is water quality-limited for temperature and whether a TMDL wasteload allocation has been assigned. Using this information, DEQ performed several analyses to determine if effluent limits were needed to comply with the temperature criteria.

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Table 3-10: Temperature Criteria Information

Applicable Temperature Criterion	Rearing/Migration 18 C (OAR 340-041-0028(4)(c)
Applicable dates: Nov 1 – April 30	
Salmon/Steelhead Spawning 13°C? *OAR 340-041-0028(4)(a)*	☐Yes ☒No
Applicable dates:	
WQ-limited?	☒Yes ☐No
TMDL wasteload allocation assigned?	☐Yes ☒No
Applicable dates: N/A	
TMDL based on natural conditions criterion?	☐Yes ☒No
Cold water summer protection criterion applies?	☐Yes ☒No
Cold water spawning protection applies?	☐Yes ☒No
Comments: The permittee does not discharge during the critical period evaluated in the TMDL (June 1 – September 30), and was not assigned a wasteload allocation.	

DEQ issued a TMDL for the Molalla-Pudding Subbasin in 2008. TMDL analyses based on the natural conditions criteria (NCC) portion of Oregon's temperature standard have been invalidated by a court order. Though a portion of the Molalla-Pudding TMDL was based on the NCC, the discharge period during which the permittee discharges was based on Oregon's biologically based numeric criteria. The data analyzed during TMDL development indicated there was no reasonable potential for temperature criteria to be exceeded outside of the critical discharge period evaluated in the TMDL (June 1 – September 30). Because the permittee discharges outside of the critical period, the permittee was not assigned a wasteload allocation, and was instead given an implicit heat load allocation sufficient to cover their discharge. Because the discharge period was based on biologically based numeric criteria, and analysis indicated the permittee did not require a wasteload allocation, no further temperature analysis is necessary, and the permittee does not require a temperature effluent limit.

Table 3-11: Temperature Criterion Effluent Limits

Effluent limit needed? ☐Yes ☒No
TMDL WLA Limit: N/A
Applicable time period: Dates ☒NA
Temperature Criterion Limit: N/A
Applicable time period: Dates ☒NA
Comments: TMDL showed no reasonable potential that temperature criteria would be exceeded during the permittee's discharge period.

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3.3.7.2 Thermal Plume OAR 340-041-0053(2)(d)

In addition to compliance with the temperature criteria, OAR 340-041-0053(2)(d) contains thermal plume limitation provisions designed to prevent or minimize adverse effects to salmonids that may result from thermal plumes. The discharge was evaluated for compliance with these provisions as follows:

- OAR 340-041-0053(2)(d)(A): Impairment of an active salmonid spawning area where spawning redds are located or likely to be located.

  Because the Pudding River downstream of the permittee's outfall is not designated as salmonid spawning habitat, there is no reasonable potential of impairment of an active spawning area.

- OAR 340-041-0053(2)(d)(B): Acute impairment or instantaneous lethality is prevented or minimized by limiting potential fish exposure to temperatures of 32 ºC or more to less than 2 seconds.

  The maximum effluent temperature during the period analyzed was 15 ºC. There is no reasonable potential of acute impairment or instantaneous lethality.

- OAR 340-041-0053(2)(d)(C): Thermal shock caused by a sudden increase in water temperature is prevented or minimized by limiting potential fish exposure to temperatures of 25 ºC or more to less than 5% of the cross-section of 100% of the 7Q10 flow of the water body.

  The maximum temperature of effluent discharges during the period analyzed was 15 ºC. There is no reasonable potential of thermal shock to salmonids.

3. OAR 340-041-0053(2)(d)(D): Unless ambient temperature is 21 ºC or greater, migration blockage is prevented or minimized by limiting potential fish exposure to temperatures of 21 ºC or more to less than 25% of the cross-section of 100% of the 7Q10 flow of the water body.

   The maximum temperature of effluent discharges during the period analyzed was 15 ºC. There is no reasonable potential of migration blockage to salmonids.

Effluent limits needed to comply with the thermal plume requirements are shown in the following table.

Table 3-12: Thermal Plume Effluent Limit

Effluent limit needed? ☐Yes ☒No
Calculated limit: N/A
Applicable timeframe: N/A
Comments:

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3.3.8 Bacteria

OAR 340-041-0009(6)(b) requires discharges of bacteria into freshwaters meet a monthly geometric mean of 126 *E. coli* per 100 mL, with no single sample exceeding 406 *E. coli* per 100 mL. If a single sample exceeds 406 *E. coli* per 100 mL, then the permittee may take five consecutive re-samples. If the log mean of the five re-samples is less than or equal to 126, a violation is not triggered. The re-sampling must be taken at four-hour intervals beginning within 28 hours after the original sample was taken. The following table includes the proposed permit limits and apply year round.

Table 3-13: Proposed *E. coli* Limits

E. coli **(#/100 ml)**	**Geomean**	**Maximum**
Existing Limit	126	406
Proposed Limit	126	406

3.3.9 Toxic Pollutants

DEQ typically performs the reasonable potential analysis for toxics according to EPA guidance provided in the Technical Support Document for Water Quality-Based Toxics Control (TSD) (Office of Water Enforcement and Permits, U.S. EPA, March 1991). The factors incorporated into this analysis include:

4. Effluent concentrations and variability
5. Water quality criteria for aquatic life and human health
6. Receiving water concentrations
7. Receiving water dilution (if applicable)

DEQ performs these analyses using spreadsheets that incorporate EPA's statistical methodology. The following sections describe the analyses for various toxic pollutants below.

3.3.9.1 Total Residual Chlorine

The existing permit contains chlorine limits. New chlorine limits were calculated based on updated information. The newly calculated limits are more stringent than the existing limits so the new limits are being proposed. Proposed limits are listed in the following table.

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Table 3-13: Proposed Chlorine Limits

	Chronic (ug/L)	Acute (ug/L)
Chlorine Criteria	11.0	19.0
	AML	**MDL**
Existing Limit	0.07 mg/L ☐ NA	0.19 mg/L ☐ NA
Calculated Limit	0.03 mg/L	0.08 mg/L
Proposed Limit	0.03 mg/L	0.08 mg/L
Effluent data source: DMR data (Nov 2019 – April 2021)		
Receiving water data source: Assumed to be zero		

3.3.9.2 Priority Pollutant Toxics

This section is not applicable to the Aurora renewal permit. DEQ conducted a reasonable potential analysis for the group of toxics listed in the following table. A complete list of the pollutants is located in the reasonable potential spreadsheet located in the appendix.

3.3.9.3 Mercury – Human Health Criterion

Oregon's water quality criterion for mercury is expressed in terms of a fish tissue concentration rather than a water column concentration. The Willamette River Basin is currently impaired for mercury and listed on the 303(d) list. EPA issued a final TMDL for mercury in the Willamette Basin on December 30, 2019. According to the EPA TMDL and the State of Oregon Water Quality Management Plan, minor sewage treatment plants are not expected to cause or contribute to the total mercury load in the Willamette Basin. Therefore, no additional controls or monitoring for mercury will be required in the proposed permit.

3.4 Antibacksliding

The proposed permit complies with the antibacksliding provisions of CWA sections 402(o) and 303(d)(4) and 40 CFR 122.44(l). The proposed limits are the same or more stringent than the existing permit so the antibacksliding provision is satisfied.

3.5 Antidegradation

DEQ must ensure the permit complies with Oregon's antidegradation policy found in OAR 340-041-0004. This policy is designed to protect water quality by limiting unnecessary degradation from new or increased sources of pollution.

DEQ has performed an antidegradation review for this discharge. The proposed permit contains the same, or lower, discharge loadings as the existing permit. Permit renewals with the same discharge loadings as the previous permit are not considered to lower water quality from the existing condition. DEQ is not aware of any information that existing limits are not protective of the receiving stream's designated beneficial uses. DEQ is also not aware of any existing uses present within the water body that are not currently protected by standards developed to protect the designated uses. Therefore, DEQ has determined that the proposed discharge complies with

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DEQ's antidegradation policy. DEQ's antidegradation worksheet for this permit renewal is available upon request.

3.6 Whole Effluent Toxicity

DEQ does not require whole effluent toxicity testing (WET) for minor domestic facilities because concentrations of toxics are typically very low and WET testing is not warranted.

3.7 Groundwater

The facility is not located within a designated groundwater management area and no potential impacts to groundwater have been identified. The facility's lagoon cells are lined with HDPE liners. DEQ completed a groundwater prioritization worksheet for the facility, documenting the facility has no potential to adversely affect groundwater resources (Appendix A: Groundwater Prioritization Worksheet).

4. Schedule A: Other Limitations

4.1 Mixing Zone

Schedule A describes the regulatory mixing zone as discussed above in section 3.

4.2 Biosolids

This section is not applicable to the Aurora renewal permit.

4.3 Recycled Water or Irrigation of Industrial Wastewater

Schedule A of the permit requires the permittee to apply recycled water according to their recycled water use plan. Schedule A also restricts the application of recycled water to prevent the following:

- Irrigating above agronomic rates,
- Adverse impact to groundwater,
- Offsite surface runoff or subsurface drainage through drainage tile,
- Creation of odors, fly and mosquito breeding, or other nuisance conditions

5. Schedule B: Monitoring and Reporting Requirements

Schedule B of the permit describes the minimum monitoring and reporting necessary to demonstrate compliance with the proposed effluent limits. In addition, monitoring for other parameters is required to better characterize the effluent quality and the receiving stream. This data will be used during the next permit renewal. Detailed monitoring frequency and reporting requirements are in Schedule B of the proposed permit. The required monitoring, reporting and

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frequency for many of the parameters are based on DEQ's monitoring and reporting matrix guidelines, permit writer judgment, and to ensure the needed data is available for the next permit renewal.

6. Schedule C: Compliance Schedules and Conditions

The permittee is expected to meet all effluent limits and therefore a compliance schedule is not needed.

7. Schedule D: Special Conditions

The proposed permit contains the following special conditions. The conditions include the following:

7.1 Inflow and Infiltration

A requirement to submit an updated inflow and infiltration plan in order to reduce groundwater and stormwater from entering the collection system.

7.2 Emergency Response and Public Notification Plan

A requirement to develop and submit an emergency and spill response plan or ensure the current one is current per General Condition B.8 in Schedule F.

7.3 Recycled Water Use Plan

A condition requiring the permit holder to develop and maintain a recycled water use plan that meet the requirements in OAR 340-055-0025. The plan must also include location-specific information describing where and how recycled water is managed to protect public health and the environment.

7.4 Exempt Wastewater Reuse at the Treatment System

A condition that exempts the permit holder from the recycled water requirements in OAR 340-055, when recycled water is used for landscape irrigation at the treatment facility or for in-plant processes, such as in plant maintenance activities.

7.5 Wastewater Solids Annual Report

This condition requires the permittee to submit a Wastewater Solids Annual Report each year documenting removal of wastewater solids from the facility during the previous calendar year.

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7.6 Wastewater Solids Transfers

A condition that allows the facility to transfer treated or untreated wastewater solids to other in-state or out-of-state facilities that are permitted to accept the wastewater solids.

7.7 Hauled Waste Control Plan

A condition that allows the acceptance of hauled waste according to a DEQ-approved hauled waste plan. The hauled waste plan ensures waste is not accepted that could negatively impact the treatment capabilities of the facility.

7.8 Hauled Waste Annual Report

A condition requiring submittal of an annual hauled waste report that summarizes hauled waste accepted at the facility during the previous year.

7.9 Lagoon Solids

A condition requiring the permittee to submit a sludge depth survey report to ensure lagoon solids are maintained within design standards and accumulations do not negatively affect treatment capabilities.

7.10 Operator Certification

The permit holder is required to have a certified operator consistent with the size and type of treatment plant covered by the permit per OAR 340-049-0005. This special condition describes the requirements relating to operator certification.

7.11 Industrial User Survey

This condition requires the permittee to conduct or update an industrial user survey. The purpose of the survey is to identify whether there are any categorical industrial users discharging to the POTW, and ensure regulatory oversight of these discharges.

7.12 Outfall Inspection

A condition that requires the permittee to inspect the outfall and submit a report regarding its condition.

8. Schedule F: NPDES General Conditions

Schedule F contains the following general conditions that apply to all NPDES permittees. These conditions are reviewed by EPA on a regular basis.

- Section A. Standard Conditions
- Section B. Operation and Maintenance of Pollution Controls
- Section C. Monitoring and Records
- Section D. Reporting Requirements
- Section E. Definitions

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9. Next Steps

The proposed NPDES permit will be made available for public comment for a minimum of 35 days as required by OAR 340-045-0027. Public notice and links to the proposed permit will be posted on DEQ's website and sent to subscribers of DEQ's pertinent public notice e-mail lists. DEQ will schedule a public hearing scheduled if requested by 10 or more people, or by an authorized person representing an organization of at least 10 people. DEQ will provide a minimum of 30 days' notice for a hearing if one is scheduled.

DEQ will respond to comments received during the comment period. All those providing comment will receive a copy of DEQ's response. Interested parties may also request a copy of DEQ's response. Once comments are received and evaluated, DEQ will decide whether to issue the permit as proposed, to make changes to the permit, or to deny the permit. DEQ will notify the permittee of DEQ's decision. If substantive changes are made to the permit, then an additional public notice period may occur. DEQ may also revise this fact sheet or update the fact sheet through memorandum.

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Appendix A: Groundwater Prioritization Worksheet

***EXISTING* Wastewater and Sludge/Biosolids Impoundment Systems (confirm all statements given as true or false):**		
1. System (any or all of its individual impoundment components) does not leak excessively. (An **"excessively"** leaking lagoon system or cell may be defined as one that has been designed for subsurface infiltration, rarely or never needs to discharge, dries up in the summer, or contains rooted vegetation.)	◉ True	○ False
2. System is not located in a Groundwater Management Area where an identified contaminant of concern may be associated with domestic wastewater or sludge.	◉ True	○ False
3. System is not located within 1000 ft. of an existing public or private drinking water supply well, is not located within a designated Wellhead Protection Area, and all land within 1000 ft. of the system is zoned such that no drinking water wells are likely to be installed in the future.	◉ True	○ False
4. There are no **exceptional situations** under which the impoundment system may require further groundwater review to determine the likelihood of an adverse impact.	◉ True	○ False

New **and** *Existing* **Wastewater and Sludge/Biosolids Land Application (confirm all statements given as true or false):**		
1. Application is in compliance with the "reuse" rules (or municipal sewage sludge application rules) and application rates are at or less than agronomic rates. (Note: Nominal leaching fractions may be considered to be in compliance with the "reuse" rules in some areas of the state such as parts of eastern Oregon where climatic conditions indicate the need.)	◉ True	○ False
2. There are no **exceptional situations** under which the impoundment system may require further groundwater review to determine the likelihood of an adverse impact.	◉ True	○ False

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APPROVED

CITY OF AURORA RECYCLED WATER USE PLAN

October 2021

I. City of Aurora Facility Information

File Number #110020
Permit Number #101772
EPA Reference No. OR0043991

Contact: Mark Gunter, Public Works Superintendent
21420 Main Street NE
Aurora, Oregon 97002

Aerated Lagoon STP
21494 Mill Race Rd.
Aurora, Oregon
Marion County

Treatment System Class: Level II
Collection System Class: Level I

Class C & Class D Recycled Water

Basin: Willamette
Subbasin: Molalla-Pudding
Receiving Stream: Pudding
LLID: 12271611452842-9.2-D

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Introduction

City of Aurora prepared this plan in accordance with Oregon Administrative Rules pertaining to the use of Recycled Water (treated effluent) from sewage treatment plants (OAR Chapter 340, Division 55). This Recycled Water Use plan supersedes any previous plans written by or for the City of Aurora, Oregon.

The Wastewater Treatment Plant was built in 2001and is an Aerated Lagoon system with a storage polishing lagoon, followed by filtration and chlorine disinfection.

The City of Aurora treats its wastewater on-site to Class C Standards and land applies the effluent from May 1st through October 31st. The treated effluent will be pumped to an onsite sprinkler system where it will be applied to native Willamette Valley grasses. Treated effluent will be applied at such a rate that it soaks into the soil where it can be used by the crop grown during the growing season. The Wastewater Treatment Plant was built in 2001 and is an Aerated Lagoon system with a storage polishing lagoon followed by filtration and chlorine disinfection.

The recycled water's macronutrients (Nitrogen, Phosphorus, and Potassium) are land applied and taken up by the crop during the normal irrigation process. Supplemental sources of macronutrients are not expected to be needed to meet the crops' nutrient requirements.

To meet the criteria as outlined in (OAR) 340-55-012 (5), (b) and (c), the City of Aurora will treat the effluent to a Class C quality. The following table describes the beneficial purpose, Class of water, quantity, and irrigation frequency.

Beneficial Purpose	Class of Water	Quantity	Frequency
Pasture Grass	C	10-15 MG/YR	May 1 – October 31

II. Facility Wastewater Processing

A. Liquids Flow Stream

1. Collection System – The influent sewage is transported via gravity and pressurized mains to an Influent Pump Station where it collects until a pre-set level is reached. The lead Influent Pump Station pump turns on and lifts the wastewater into the associated pressure main and transports the collection system influent to the screening process.

2. Screening – The City of Aurora uses a CleanFlo, spiral screen to remove rags, plastics, grit and debris, upstream of the aeration lagoon. The bar screen is automated with a ¼-inch screen and 35-degree inclination. Maximum flow is 0.2 MGD.

3. Biological Treatment – The Aurora facility uses and aerated lagoon, where the wastewater moves through a series of aerated and quiescent ‘cells”. Polypropylene baffle curtains separate each cell. The flow is conveyed through small square “windows” located in each of the baffles. Aerators are installed in the first four cells to mix and provide oxygen for aerobic treatment of the wastewater. In the final two cells of the aerated lagoon the solids previously in suspension in the aerated cells are settled before the treated wastewater moves on to the effluent storage lagoon.

   The capacity of the biological treatment is approximately 500,000 gallons, and the system dry weather influent design flow is 0.079 MGD. The system is designed to oxidize and meet removal efficiency not less than 85% for BOD monthly, and at least 65% for TSS.

4. Effluent Storage Lagoon – The effluent storage lagoon system consists of polypropylene-lined, earth-bermed open lagoon with a capacity of 7.2 Million Gallons. The storage lagoon stores treated effluent when the irrigation system is not being used, and the effluent is not being discharged to the Pudding River. The storage lagoon provides a treated effluent hydraulic balance between effluent production and effluent discharge or irrigation.

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The lagoon is also available for emergency storage if the treatment or discharge system temporarily fails. It will fill and draw at various times during the year, depending on the availability of the Pudding River for discharge, and the ability of the crop to uptake treated effluent.

5. Disinfection - The chlorination system consists of a metered pump which injects a sodium hypochlorite solution into the treated effluent stream coming from the Storage Lagoon. The mixed hypochlorite and storage lagoon effluent enters the chlorine contact chamber, where it is given adequate time and contact mixing to provide disinfection before discharge.

   The chlorine contact chamber has a volume of approximately 9,300 gallons, with a serpentine flow. The chamber has an average of approximately 1.0 hours detention time, based on a flow of 150 gallons per minute.

6. Recycled Water Reuse System - The sprinkler irrigation system is the primary discharge for treated effluent from the wastewater treatment facility during the irrigation season from May 1st through October 31st. It is to be maintained and available for treated wastewater disposal at all times when the irrigation fields are capable of up-taking effluent.

   The disinfected effluent is pumped through an irrigation filter which consists of a single auto-backwash, 90-180 GPM, 80-micron, 3 inch in-line, Amiad 3- 305 filter. Filter backwash flows by gravity to the solids return pump located adjacent to the river discharge pump station. The solids return pump then discharges the backwash flow prior to the influent headwork's screen.

   Once disinfected and filtered, a 10 hp pump, producing approximately 100 gal/min, discharges the effluent from the effluent wet well. The effluent flows through an instantaneous flow meter that records the flow in gpm and totalizes the daily flow in MGD. The land application sites consist of approximately 9 acres of irrigation field. One field is approximately 6 acres, and the other is 3 acres. The irrigation main is 4" schedule 40 pvc pipe that has 6 connection points, 5 on the 6-acre field, and 1 on the 3-acre field. The system uses flex pipe to adjust coverage on the irrigation fields. The system has 3 portable sprinkler stands; one is equipped with a *1/2"* orifice, and the other two with 5/8" orifices.

B. Solids Accumulation

1. Aerated Lagoon - Because of the size of the aerated lagoon, and the low hydraulic and biological loading, wasting of solids will not need to be dealt with for several years. It is important that operators track the solids inventory in the aeration system, so that anticipated solids removal can be planned for at least two years in advance.

2. Solids Removals – The City of Aurora currently does not intend to apply biosolids or invest in the equipment necessary to process solids into an approved biosolids product. Therefore, solids and debris will be removed from the aeration lagoon, based on the operator's best professional judgment. A contractor will remove and dewater the solids and disposed to a landfill or centralized waste treatment facility.

III. RECYCLED WATER REUSE SYSTEM

The City of Aurora owns and operates an effluent recycled water use system, located on a 22.55-acre property located West of Hwy. 99E and North of Ottaway Rd, as shown in Appendix A. The physical address is 21494 Mill Race Rd., Aurora, Oregon. There are currently two fields in use. The larger site is approximately 6 acres, referred to as the Southwest Irrigation area, and the smaller site is 3 acres, noted as the Northeast Irrigation area B.

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Before the City built the Wastewater Treatment facility, the site was used for agricultural purposes. The site was cut, excavated and a small amount of native soils were used to level the site, with a slight grade of 3 to 10 percent, running east to west in the area of the land application site. The recycled water use site consists of grasses, a spray irrigation system, and monitoring and control instrumentation to provide information and tools to support proper operation.

A. Effluent Quality

The City of Aurora's effluent is relatively clean. The treatment facility is designed to oxidize and remove a minimum of 85% of BOD and 65% of the TSS. The treatment facility over the past five years has easily accomplished these minimum requirements for BOD and TSS removal.

Although the facility's permit does not require nutrient removal of nitrogen compounds such as ammonia, nitrate and nitrogen, this type of aerated lagoon system is capable of removing small amounts of these nutrients during the summer months. The pH, salinity and nutrient levels are consistent with other treatment facilities of this type in the area. The Aurora treatment facility should not create a problem concerning water quality issues during crop irrigation.

B. Effluent Nutrient Levels

Facility personnel have actively monitored the nutrient levels and average daily discharge of effluent to the poplar plantation for the past seven years. Table 1 represents the nutrient concentrations for the years 2006-2008, and Table 2 defines the average monthly and daily discharge of recycled water to the irrigation field.

Table 1

Macro-Nutrients				
DATE	TKN mg/L	Phosphorous mg/L	Nitrate/Nitrite mg/L	Ammonia mg/L
5/2019	38.1	ND	2.65	34.2
5/2020	7.6	6.1	0.699	4.1
9/2020	13.4	4.88	ND	7.6
Average	**19.7**	**5.49**	**1.67**	**15.3**

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Table 2

Monthly and Daily Recycled Water Irrigation Volumes				
Month	**2019 Net Irrigation Application (MG)**	**2020 Net Irrigation Application (MG)**	**2021 Net Irrigation Application (MG)**	**Average Irrigation Volume (MG)**
May	1.70	3.20	2.30	2.40
June	2.30	0.00	0.52	1.41
July	2.70	4.00	2.80	3.17
August	0.00	0.80	0.48	0.64
September	2.90	2.10	1.89	2.30
October	1.30	3.10	3.00	2.47
Total Irrigation Volume	10.9	13.2	10.99	12.39

Using the TKN nutrient concentration as the available nitrogen would lead to an excessive estimate for nitrogen as a fertilizer source. The ammonia and nitrate/nitrite fractions of the TKN value are diminished through recovery fractions and mineralization rates in the application process. The true organic nitrogen available for plant growth as a fertilizer is a portion of the TKN value. To determine the total available nitrogen, the following calculation was used to accommodate for mineralization rates and recovery fractions for nutrients in the surface application of biosolids for soils in the Northwest.

Example:

TKN - NH^4 N = Organic Nitrogen
Mineralization Rate = 0.3
Recovery Fraction = 0.5
Total Acreage = 6.0

TKN mg/I = 19.7
$N0^3$-N mg/I = 1.67
NH^4-N mg/I = 15.3
Flow MGD = 12.39

STEP I

TKN - NH^4 N = Organic Nitrogen
19.7 mg/I – 15.3 mg/I = 4.4 mg/I

STEP 2

Organic N = 4.4 x 8.34 x 12.39 = 454.6 lbs
NH4-N = 15.3 x 8.34 x 12.39 = 36.0 lbs
N03-N = 1.67 x 8.34 x 12.39 = 172.6 lbs

STEP 3

Organic N 454.6 lbs x 0.30 = 136.4 lbs
NH4-N 36 lbs x 0.50 = 18.0 lbs
N03-N = 172.6 lbs
TOTAL AVAILABLE NITROGEN 327.0 lbs

STEP 4

Nutrient Loading in lbs/acre
Available Nitrogen / Acres Applied
327.0 lbs / 6.0 acres = 54.5 lbs/acre

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Using the data as provided above for total available nitrogen, the treatment facility will apply approximately 54.5 lbs/acre/year of Nitrogen and 94.5 lbs/acre/year of Phosphorous. The City's former NPDES permit does not require potassium sampling, a macronutrient typically accounted for optimum crop yields. However, the pasture grass of the irrigation field does not get harvested; only mowed and mulched.

C. Grass Nutrient Requirements

To obtain proper growth, health and optimum crop yield, nutrients such as available nitrogen, phosphorous, and potassium are required. Nitrogen uptake for grass is considered maximum estimates of net nitrogen uptake in the grass in one growing season. Nitrogen uptake is peaked during grass vegetative growth typically in April, and slows down during plant flowering and seeding; while phosphorus uptake peaks after grass vegetative growth typically in June.

Table 3 and 4 summarize the fertilizer requirements used for pasture grass typically grown in the Willamette Valley. The estimated annual amount of nitrogen uptake was determined from literature established in the Managing Nitrogen from Biosolids Washington State Department of Ecology April 1999. The fertilizer rates as established for pasture grasses, was derived from the Oregon State University Fertilizer Guides and information supplied by the City of Woodburn Water Reuse Plan 1999.

Table 3

Nitrogen Rates for Pasture Grass (lb/acre)		
Year	**Pasture Grass N Required (lb/acre)**	**Net N Requirement (lb/acre)**
1	100	100
2	100	100
3	100	100
4	100	100
5-10	100	100

Note:
For simplicity, the following assumptions were made:

- The plant-available N from recycled water application was the same throughout the five years.
- All available soil N based on OSU fertilizer guide is used during the year (no residual N03-N).

Table 4

Nutrient Rates for Pasture Grass (lb/acre)	
Nutrient	**Pasture Grass**
Phosphorus	50-75
Potassium	240-290

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When potential loading rates for nutrients are examined at the Aurora site, the effluent is capable of providing the necessary nutrient requirements without the addition of commercial fertilizers. Current loading from the effluent is 54.5 lbs/acre for nitrogen and 94.5 lbs/acre for phosphorous, as described on page 5 in the available nitrogen example.

Comparing Willamette Valley grass nutrient requirements with effluent irrigation nutrient content shows that current application loading does not exceed grass nutrient uptake. Nitrogen loading onto the field from irrigation shows to be less than optimum for typical Willamette valley grass, and therefore, should not cause any nitrogen overload or overabundance of salts allowing for healthy soil activity.

The City will sample the irrigation effluent quarterly for nutrients and use the results to adjust the nutrient loading rates during the growing season.

D. Description of Class C and D Effluent Requirements

Currently, City of Aurora meets and discharges Class C & D effluent requirements. The City of Aurora's wastewater facility removes debris such as rags, sticks, rocks and grit in the screening process. The sewage then flows into the aerated lagoon where the BOD and TSS and some nutrients are oxidized and removed to a minimum of 85% for BOD and 65% for TSS. Next the treated effluent gravity flows to the 7.2-million-gallon storage lagoon. When the permit allows, treated effluent is then pumped into the chlorine contact chamber where it is injected with sodium hypochlorite. The city will declare the level of disinfection (Class C or D) at the beginning of the irrigation season prior to irrigation.

Disinfection occurs during the 1.0 hours of contact time as the water flows through the serpentine chambers. For Class C recycled water, the sampling frequency is once per week; where no two consecutive samples exceed 240 total coliform organisms per 100 mL; and the 7-day median is less than 23 organisms per 100 mL. After the disinfection process, the treated effluent is pumped through an 80-micron filter before being discharged through the sprinkler irrigation system. For a more detailed description please refer to Section II.

Setback distances are based on the class of recycled water being applied through a sprinkler system.

Table 5

Class C Recycled Water Use			
Restriction	**Spray Irrigation system**	**Sprinkler system**	**Cannon irrigation system**
Property Line	70 feet	70 feet	300 feet
Private road	100 feet	100 feet	300 feet
Public road	100 feet	100 feet	300 feet
Food preparation area	70 feet	70 feet	300 feet
Drinking water fountain	70 feet	70 feet	300 feet

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Disinfection occurs during the 1.0 hours of contact time as the water flows through the serpentine chambers. For Class D recycled water, the sampling frequency is once per week; must not exceed a log mean of 126 *E. coli* organisms per 100 mL; and no sample to exceed 406 *E. coli* organisms per 100 mL before being discharged through the irrigation system. For a more detailed description please refer to Section II.

Table 6

Class D Recycled Water Use			
Restriction	**Spray Irrigation system**	**Sprinkler system**	**Cannon irrigation system**
Property Line	70 feet	70 feet	300 feet
Private road	100 feet	100 feet	300 feet
Public road	100 feet	100 feet	300 feet
Food preparation area	70 feet	70 feet	300 feet
Drinking water fountain	70 feet	70 feet	300 feet

The City of Aurora maintains a minimum buffer from the irrigation site to the property line, and there are no areas of food preparation or drinking fountains near the land application area. Please refer to Appendix A, for setback distances at the City of Aurora's irrigation filed.

IV. MONITORING AND ANALYTICAL METHODS

A. Class C Recycled Water

Facility personnel sample the treated effluent for Total Coliform once per week, during times of land application. The sampled effluent must not exceed a median of 23 total coliform organisms per 100 milliliters, based on results of the last seven days that analyses have been completed, and 240 total coliform organisms per 100 milliliters in any two consecutive samples.

B. Class D Recycled Water

Facility personnel sample the treated effluent for *E. coli* once per week, during times of Land application. The sampled effluent must not exceed a 30-day log mean of 126 *E. coli* organisms per 100 milliliters and 406 *E. coli* organisms per 100 milliliters in any single sample.

C. Total Coliform and *E. coli*

Facility personnel will conduct bacteria monitoring, according to one of the approved tests methods, as specified in *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, or according to any test procedure that DEQ has authorized and approved in writing.

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Method	Reference	Method Number
Most Probably Number (MPN)	Standard Method, 20th edition	92
Coliform using Colitag water test system, Corning coliform test containers, and Idexx Quantitrays. After 24 hours, Quantitray results either show coliform with golden yellow, or *E. coli* results with black light luminescence. MPN results are compared with an Idexx result comparator. The sampling and analytical analysis will follow the methods as outlined in 40 CFR Part 136.		

D. Nutrients

Aurora's permit requires sampling for nutrients (TKN, N02, N03-N, NH3, and Phosphorous) quarterly during months that the City land applies. The City will also include potassium in the quarterly sampling for nutrients. Additionally, the City will sample before the irrigation season and quarterly as required in the NPDES permit. Facility personnel will use the nutrient sampling results to adjust agronomic loading rates for the crop growth throughout the irrigation season. The following is a list of analysis methods and procedures for nutrients.

Method	Reference	Method Number
Ammonia	Standard Methods	EPA 350.3
Nitrate	Standard Methods	SM4500-N03 D
Nitrite	Standard Methods	SM4500-N02 B
Total Phosphorous	Standard Methods	EPA 365.3
Total Kjeldahl Nitrogen	Standard Methods	EPA 351.3
Potassium	Standard Methods	EPA 200 Series

The City of Aurora contracts the laboratory analysis for nutrients with Water Lab in Salem, Oregon. The sample containers and protocols are followed as referred to in the above Section, IV (B).

E. Sampling Location

Effluent nutrient sampling is performed as 24-hour composite samples using a model 3700FR ISCO sampler machine located between the sodium hypochlorite building, and the sodium bisulphite building. Total Coliform and *E. coli* testing are pulled as grab samples from the effluent wet well and are performed in house using MPN test guidelines following standard methods 9221.

V. IRRIGATION CONVEYANCE & DISTRIBUTION

A. Effluent Distribution System

The wastewater facility has two developed land application sites, the larger being 6 acres and the smaller site are approximately 3 acres. The irrigation system irrigation system consisting of piping, control valves and control wiring to irrigate specific areas of the land application site at different times, or to provide overall irrigation simultaneously.

Once disinfected and filtered, a 10 hp pump, producing approximately 100 gal/min, discharges the effluent from the effluent wet well. The effluent flows through an instantaneous flow meter that records the flow in gpm and totalizes the daily flow in MGD. The land application sites consist of approximately 9 acres of irrigation field. One field is approximately 6 acres, and the other is 3 acres. The irrigation main is 4" schedule 40 pvc pipe that has 4 connection points, 3 on the 6-acre field, and 1

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on the 3-acre field. The system uses flex pipe to adjust coverage on the irrigation fields. The system has 2 portable sprinkler stands, equipped with a 1/2" orifice, and the other with a 5/8" orifice.

The main irrigation piping header consists of 4" schedule 40 PVC, and each irrigation sub-area is fed by a 2" PVC pipe controlled by a 2" Rainbird PEBS Series electric control valve. A two inch Rainbird LSP-MC Series manual isolation valve has been installed between each control valve and the main header to provide for service of the electrical control valve and branching system.

The main pumping station for the irrigation system is a single 100 gpm, 50 psi, 10 hp pump located in the River Discharge Pump Station housing. This pump station is operated and controlled by the same control system as the irrigation system. Valve adjustments isolate the systems from each other, and the pump will either discharge for land application or the receiving stream.

Complete automatic control of the irrigation system is available within the treatment plant control building. Manual operation can be controlled by opening or closing the isolation valves at each branch, and by energizing/de-energizing the irrigation pump system.

B. Sprinkler System

Before the initial start-up of recycled water irrigation sites at the Aurora facility, the staff will use catch cans or pressure readings to evaluate the sprinkler system for even water distribution. Varying orifice sizes for the sprinkler heads will be used to adjust the sprinkler volume from the top to the toe of the site. Staff will also record the volume delivered per minute at the site, and use the empirical data whenever possible to adjust the irrigation loading at the site.

C. Filtration

The filtration system is located near the existing control building and reuse pump station. The disinfected effluent is pumped through an irrigation filter which consists of a single auto-backwash, 90-180 gpm, 80-micron, 3 inch in-line, Amiad 3-305 filter.
Filter backwash flows by gravity to the solids return pump located next to the River Discharge pump station. The solids return pump then discharges the backwash before the influent headwork's. Facility personnel collect samples for nutrients, chlorine and bacteria after filtration, as described in Section IV (D).

D. Irrigation Scheduling

The current NPDES permit only allows irrigation system use during the months of May through October. The scheduling of the irrigation days is based on an operator evaluation of the soil; using USDA's Estimating Soil Moisture by Feel and Appearance [(1998) Appendix B]. Before each irrigation application, operators shall take a hand-feel sample of the land to be irrigated and make determination based on touch. Soil which aggregates easily and leaves no dirt staining or moisture droplets on the hand is determined to have a low enough percent-available moisture. If, during hand sampling, dirt drips water; leaves staining on fingers; can be squeezed through a fist like a ribbon; or fingerprints imprint in dirt without pressure; then sprinkler irrigation will be moved up to the next available irrigation port. All determinations of soil moisture estimations must be recorded on log.

Because the treatment facility has a large storage lagoon, the operator has the ability to irrigate when conditions are favorable. During times of heavy rainfall, where infiltration and soil water capacity is limited, the operator will schedule the irrigation cycles to take into account periods of heavy rainfall, so as not to exceed the available water capacity of the soil and limit infiltration outside of the root zone.

The operator will adjust the irrigation cycles to coincide with the Gross Irrigation Requirements (GIR) referred to in Section VII (B). Daily and weekly scheduling will be consistent with the system design

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calculations as mentioned in the following section. At the beginning of each irrigation month, and during periodic precipitation events, the operator will need to adjust the irrigation zone timing to accommodate for the monthly and daily GIR.

The City of Aurora has the ability to adjust the hydraulic loading rates, based on climatic variances throughout the growing season. The operator will adjust the monthly GIR, based on recorded empirical data, such as precipitation, temperature, evaporation rates or soil moisture content. The operator should periodically take soil core samples to determine % moisture during irrigation, and verify the site is receiving the correct amount of hydraulic loading throughout the growing season.

E. System Design Calculations

At the time of design, the City of Aurora used the criteria from the City of Woodburn's Water Reuse Plan. Both sites are now in grass and have similar soils based on the Woodburn Series, with variations in sprinkler systems, elevations, and nutrient loading.

During initial start-up of any new irrigation site, facility staff will assure that in a sloped area the irrigation volume is evenly distributed from the top to the toe of the slope. Facility staff will use catch can sampling data to determine appropriate hydraulic loading in the calculations established below.

The system is capable of irrigating more or less, depending on the monthly site irrigation needs. The operator will adjust the irrigation system to meet the GIR on a monthly basis, as described in Section V (D). The following calculation is an example of the highest GIR, and the appropriate irrigation schedule for the month

Example:

August (GIR) = 12.0 in/acre/month

12in/acre x 27,154 gallon/acre/inch x 6 acres = 1,955,088 gallons

$\frac{1{,}955{,}088 \text{ gallons}}{661 \text{ gal/min}} = 2{,}958 \text{ min}$ $\qquad$ $2{,}958 \text{ min} = 49.3 \text{ hours/month}$ $\frac{}{60 \text{ min/hour}}$

The irrigation settings per zone will based on an average of 5 working days per week for a 4 week month.

$\frac{49.3 \text{ hours/mo}}{4 \text{ wks/mo}} = \frac{12.3 \text{hrs/wk}}{5 \text{ days/wk}}$ $\qquad$ $\frac{12.3 \text{hrs/wk}}{} = 2.5 \text{ hrs/day}$

The timing of the zones can be automatically set to accommodate the 2.5 hours per zone per day. At the beginning of each irrigation month, the operator will need to adjust the irrigation zone timing to accommodate for the monthly GIR.

VI. WATER REUSE SITE CHARACTERISTICS

A. Soils and Land Characteristics

The land is located in Marion County, Aurora Oregon. The site's prior use was for agricultural purposes, mainly Christmas trees and nursery stock. Before treatment facility construction, the site had varying slopes, ranging from 3% to 15%. During site construction the land was leveled, a large storage pond was constructed, and native soils from the excavation process were used to level the site to some degree.

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There was no confirmation in the engineering records to determine the amount of soil disturbed in the irrigation site. However, the Public Works Director said there was a very small amount of native soil distributed over the Southeast section of the poplar plantation. The City believes that the soils in the irrigation area would be considered native and representative of the information supplied by the USDA Natural Resources Conservative Services. For more information concerning these soils, please refer to Section (C) below.

B. USDA Soil Survey Map

Please refer to Appendix C, for soil survey maps and soil classifications.

C. Soils Description

Woodburn Series soils consist of moderately well drained soils that have formed in silty alluvium and loess of mixed mineralogy. These soils are on broad valley terraces. They have slopes of 0 to 20 percent. Elevations range from 150 to 350 feet. The average precipitation is 40 to 45 inches, the average annual air temperature is 52° to 54°F, and the length of the frost-free season is 200 to 210 days. In areas that are not cultivated, the vegetation is mainly grass and Douglas-fir.

In a typical profile the surface layer is about 17 inches thick and is very dark brown silt loam in the upper part and dark-brown silt loam in the lower part. The sub soil is about 37 inches thick. It is dark yellowish-brown silty clay loam in the upper part; mottled dark-brown silty clay loam in the middle part; and mottled, dark-brown silt loam in the lower part. The substratum is dark-brown silt loam that extends to a depth of 68 inches or more.

During the growing season the depth to ground water for these Woodburn series soils is normally >200 centimeters. The pH of this type of soil is generally in the range of 5.6 to 6.5.

- WuC- Woodburn silt loam, 3 to 12 percent slopes

  This soil has slopes of 3 to 5 percent in about 60 percent of the acreage. Runoff is slow to medium, and the hazard of erosion is slight to moderate. Included with these soils are small areas that have a thin surface layer and that have distinct mottling within 12 inches of the surface. This Woodburn soil is used for many of the same crops as the Woodburn silt loam, 0 to 3 percent slopes, which include small grains, field com, orchards, pasture, hay caneberries, and vegetables. Areas with good drainage are used for all the crops commonly grown in the survey area.

- WuD-Woodburn silt loam, 12 to 20 percent slopes

  Where this soil occurs along creeks, intermittent drainage ways, and terrace fronts, its slopes are short and abrupt. Runoff is rapid, and the hazard of erosion is moderate.
  Included with this soil in mapping areas, were small areas that have a thin surface layer and that have distinct mottling within 12 inches of the surface. This Woodburn soil is used mainly for pasture, hay, and small grains, although some small areas are used for row crops and orchards.

D. Soil Infiltration, Permeability and Water Holding Rates

The City of Aurora has no data or testing of the site for infiltration, permeability or water holding rates. Information regarding these parameters was derived from the (USDA Natural Resources Conservation Services Web Soil Survey for Woodburn Series Soils). Please refer to Appendix C for a detailed assessment of the physical properties for the Woodburn soils.

The Bulk density as published by the (USDA NRCS Web Soil Survey) for the Woodburn Series soils has a range of 1.20 to a high of 1.5 depending on the depth of soil, and the available water capacity for these silt loam soils is 0.19 to 0.21 in/in. Also defined by the USDA, the Woodburn silt loam soils at

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this location have a saturated hydraulic conductivity of 4.0-14.00 micro rn/sec.

The field capacity, as published in the (EPA Process Design Manual for Land Treatment of Municipal Wastewater Effluents), estimates silt loams to have a field capacity of 0.7 to 1.6 in/ft at a moisture content of 12-18 percent.

In conclusion, the soils at the Aurora site appear to be suitable for land application of treated wastewater from the City of Aurora wastewater treatment facility. In the location of the land application sites there are only two types of soils, of which both Woodburn Series soils have physical and chemical properties that would be considered excellent for the health and growth of crops.

E. Climatic Information

Marion County has a modified marine climate influenced by the Pacific Ocean, the Coast Range and the Cascade Mountains. The Coast Range acts as a buffer that protects Marion County from severe storms originating in the ocean. The air mass normally moves from west to east crossing the Willamette Valley. The air mass warms because of heat from the land mass, and then cools as it rises against the Cascade Mountains. This cooling causes the air to become over saturated and it sheds its moisture as rain or snow. More than 70 percent of the annual precipitation in Marion County falls as rain in November through March. The months of June, July, August, and September are relatively dry with approximately 10 percent of the total annual precipitation falling during this time.

Irrigation is required for most crops growing during the months of June, July, August and September during the dryer summer months. Rainfall occurs on an average of 150 to 175 days each year with the greater amount falling at higher elevations. Winters are cool and wet, with frequent rains in the late fall and winter. Snow and freezing temperatures are rare.

Prevailing winds typically blow from the north or northwest in summer and from the south over the rest of the year. During the growing season from April to September the daily wind speed increases gradually from a low of about 4 to 6 mph at daybreak, to a high of about 10 to 11 mph between the hours of 4 and 6 in the afternoon. Stronger winds in the afternoon are caused mainly by convection. The following table summarizes the historical climatic data for the City of Aurora.

Table 7

Historical Climate Data for Salem, Oregon 1971-2000 Nation Weather Service, Portland				
Month	**Average Maximum Temp. (F)**	**Average Maximum Temp (F)**	**Average Temp (F)**	**Mean Precipitation (Inches)**
January	47.0	33.4	40.2	5.83
February	51.2	34.7	43.0	5.09
March	56.2	36.6	46.4	4.17
April	61.1	38.8	50.0	2.76
May	67.5	43.6	55.5	2.13

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Historical Climate Data for Salem, Oregon 1971-2000 Nation Weather Service, Portland				
June	74.0	48.4	61.2	1.45
July	81.5	52.0	66.8	0.57
August	81.9	52.1	67.0	0.68
September	76.6	47.7	62.2	1.43
October	64.5	41.3	52.9	3.03
November	52.4	37.9	45.1	6.39
December	46.4	33.9	40.1	6.46
Total				39.99

Information for local climate concerning Marion County was supplied by the National Weather Services web site, and the USDA September 1972 Soil Survey of Marion County Area, Oregon.

VII. ANNUAL WATER REUSE APPLICATION RATES

A. Consumptive use of Crop

For consumptive water use of the grass, the City of Aurora will use data from the City of Woodburn Water Reuse Plan. Variations of the system design will be based on sprinkler system efficiency ratings that differed between the Woodburn and Aurora sites. The GIR is the total crop water demand, adjusted for effective precipitation and irrigation efficiency. Aurora's system would be closest represented by the efficiency values, as compared to a solid set sprinkler system. For that reason the City chose the conservative assumption of 75%, based on the high wind design for solid set sprinkler efficiency.

The City of Aurora will use 75 percent efficiency to determine the gross irrigation amount used, by dividing the net irrigation by 75% as a decimal. The Oregon State University (OSU) report, "Oregon Crop Water Use and Irrigation Requirements, October 1992", Reprinted March 1999, provided the net irrigation requirement for grass.

B. Net and Gross Acreage Available

The total acreage at the facility is 22.55 acres, 9 of which the facility can irrigate on, and out of those 6 are currently used for the grass.

VIII. IRRIGATION SITE BUFFERS

A. Buffers and Site Restrictions

The City of Aurora is irrigating under the Class C requirements, as outlined in Division 55, OAR 340-055-0012. The setback distances are based on an irrigation system that applies recycled water directly to soil. The City of Aurora maintains a minimum of ten (-10) feet from all property lines, 100 feet from any water supply used for human consumption, and there is no food preparation or drinking water fountains located near the site.

For a more detailed assessment of buffer areas and setbacks, please refer to Appendix A.

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B. Public Notification and Restrictions

The City of Aurora follows the requirements, as outlined in the Class C or Class D Recycled Water Use rules, under Division 55. Five-foot-high field fencing, encompassing the entire property line, restricts public access to the site. A ten-foot-high cyclone fence, blocking the main access road, and surrounding the treatment facility's storage and aerated lagoons, provides further access restrictions.

The City of Aurora 's irrigation has no connection to any type of potable water. This eliminates any chance for cross connection. The treated effluent from the facility will provide 100% of the water requirements for crops grown on site.

The City will mark all visible piping valves and connections where recycled water is being used, to protect the workers and public from cross connection. The markings will read "NON-POTABLE WATER ", either stenciled on the piping, or with a plastic wrap. The color of the markings will either be in red or yellow lettering.

Control signs are posted every 150 ft on the perimeter of the recycled water reuse site, and any other locations where recycled water is used. The signs read as follows:

ATTENTION: RECYCLED WATER USED FOR IRRIGATION-AVOID CONTACT-DO NOT DRINK.

ATENCION: RECLAMADO DEPERDICIO DE AGUA USADO PARA LA IRRIGACION-EVITE EL CONTACTO-NO BEBA EL AGUA.

IX. MANAGEMENT, OPERATIONS AND MAINTENANCE

Site management and operations are critical to the success of operating a water reuse site. Information gathered through proper monitoring will be needed to evaluate the performance of the system over time and assist in developing improved operating protocols. The following section describes the management and operations that facility staff will follow, to implement the Aurora Recycled Water Use Plan.

A. Hydraulic and Nutrient Management

- Water Monitoring: The City of Aurora will monitor the effluent being discharged to the reuse site, as outlined in the City NPDES permit, and as required by the OAR Division 55 rules for Recycled Water Use. Sample location, methodology and protocols are referred to in Section IV (Monitoring and Analytical Methods).

  In addition to the required monitoring, the City will now sample for potassium in the quarterly nutrient sampling regime. Facility staff will use nutrient sample results to adjust the loading rates on a quarterly basis during the irrigation season. Although not a permit requirement, DEQ advises the City routinely to monitor for BOD and TSS during the irrigation season to track the efficiency of the lagoon system, and to assure that the treatment facility is oxidizing organic loads to an acceptable level.

- Flow Measurements: The City will monitor and record flow measurements, according to the NPDES permit for daily and monthly flows to the irrigation site. Routine maintenance and annual calibration of the flow devices will be adhered to, according to the NPDES permit. The City will also develop records and track the ambient daily temperature, precipitation and water levels of the storage lagoon.

- Soil Monitoring: The permit does not require soil nutrient evaluation. DEQ recommends that facility staff collect soil samples before planting, and after harvest, to evaluate the nutrient requirements and crop uptake. However, the City will begin to sample soils at least twice during each irrigation season. It is recommended that soil samples be collected before irrigation and

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following irrigation to evaluate the nutrient requirements of Willamette Valley grass compared to mass load of nutrients applied.

- Soil Monitoring Annual: It is recommended, and the City agrees that it will sample soils for nitrate at each irrigation site prior to the application season. Nitrate levels will be used to determine if there is residual nitrate in the soil and if so, will adjust the loading rate appropriately.
- Ground Water Monitoring: Although it is recommended, the City is not required by the NPDES permit to monitor ground water. The costs associated with the establishment of a groundwater program are considered prohibitive for this size of treatment facility. If at such time the DEQ requires the City to install monitoring wells, then the City will develop a monitoring program and begin to record and gather data as established in the NPDES permit.

  At a minimum the City will sample for pH, EC, Organic Matter, TKN, N03- N, NH3-N, P04, Na, Ca, Mg, HC03, Available K, Available P, and S04.

  Due to the cost associated with supplemental fertilizers, and the fact that the City effluent is high in macronutrients, the City does not plan to apply supplemental fertilizers.
  Facility staff will develop appropriate reporting forms to track the above-mentioned activities.
- Crop Management and Biomass Removal: The facility staff will routinely monitor and record the dates of cropping activities. Such monitoring activities must include the date of planting, date of harvest, dates of primary tillage, soil aeration, fertilizer application (if needed), mowing frequencies, and any observations of crop health.

  Facility staff will develop appropriate reporting forms to track the above-mentioned activities.

B. Operation and Maintenance

Components of the irrigation system are described in Sections II (A), and Section V (A), (B), and (C) of this document. For a topographical layout of the treatment facility and reuse application sites, refer to Appendix A. Treatment plant staff will follow the maintenance and operation procedures, as described in the City Wastewater Collection and Treatment System O&M Manual, Chapter 9. In addition to the Start-up and Shut-down procedures, outlined in Chapter 9, facility staff will also implement the following maintenance procedures, record keeping and observation techniques to assure the irrigation system is functioning properly.

- Annual Start-Up Procedure

  Before turning on the pump system, staff will walk the individual irrigation zones to make sure the area is void of debris and grass that could block the sprinkler flow patterns. Facility staff should remove weeds and grass before the irrigation season. During this initial walk through, staff will evaluate the system, checking for any equipment damage. Staff will record the inspection results on the daily irrigation check list form, noting that it is the annual Start- up walk through. Facility staff will repair or replace any recorded equipment damage before pressurizing the irrigation system.

  Upon energizing any zone during the initial Start-up, staff will again walk the individual irrigation zones to assure there are no leaks, broken piping, plugged sprinkler heads or excessive differences in distribution. If staff determines the irrigation system is functioning properly, then staff will check the computerized timer and the individual automated valves on and off cycles to assure the individual zones are operating correctly.

  In the initial Start-up of any new irrigation site, facility staff will use catch cans or pressure readings to quantify that the volume and pattern of the sprinkler system has an even distribution. Staff will assure that in a sloped area the irrigation volume is evenly distributed from the top to the toe of the slope. Facility staff can use recorded catch can data to determine appropriate

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hydraulic loading in the calculations established in Section V (E).

- Annual Shut-Down Procedures

  In addition to the Shut-down procedures outlined in Chapter 9 of the City's O&M Manual, staff will also drain the system properly to reduce the likelihood of damage due to freezing, algae build up or debris in the distribution system.

  After the system pump has been turned off for the dry season, staff will open the main line drains located at the distal end of each irrigation site.

  Because the irrigation sites are designed on a slope with the end of the sprinkler systems located at the toe of the slope, the sprinkler piping will naturally drain to the lowest sprinkler. The irrigation system main lines will either drain through the drain valves located at the far end of each header, or the water in the mains will naturally drain downhill to the irrigation pump and drain through the pump volute into the pump wet well.

- Chemical Treatment to Prevent Plugging

  Chemical water treatment is a common practice that should be considered during the annual Start-up procedure or before the annual Shut-down procedure. Chemical treatment is used to prevent and dissolve organic matter (algae and bacterial slime), and mineral deposits which can form in lateral lines and emission devices. Chlorine and acids are most commonly used for chemical treatment. Hydrogen peroxide can be substituted for chlorine when high concentrations of oxidants are needed to restore system capacity.

  For primary or secondary effluent, the most effective strategy is to inject sufficient chlorine to bring the concentration of free chlorine at the ends of

  the laterals to 10 mg/ L during the last 20 minutes of the irrigation cycle, or to at least 2 mg/L during the last hour of an irrigation cycle. Liquid sodium hypochlorite is generally the preferred form of chlorine because of safety and handling considerations.

- Daily Log and Record Keeping

  Facility staff will develop a daily irrigation log and document all irrigation management changes on their daily log, along with daily flow (inch/acre) or (gal/acre). At the end of each day that recycled water is used, the operator will sign and date the daily log. Facility staff must monitor all recycled water use approved irrigation sites on a daily basis to assure that no surface runoff comes from the sprinkler system. If facility staff observes surface runoff, facility staff must discontinue effluent application, and determine the cause of the problem.

  In addition to the maintenance activities outlined in the City O&M manual, facility staff will develop and maintain a daily inspection check list for the land application site. DEQ will consider the daily irrigation site check list the daily log for regulatory purposes.

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To comply with the DEQ IMD for Recycled Water Use plans, facility staff must maintain records, and have on site during inspections, the following records:

- Effluent Quality Monitoring
- Maintenance Records
- Daily Inspection Reports
- Quantity of Recycled Water Generated
- Final Use of Recycled Water Generated
- Site and Crop Monitoring Records
- Irrigation Records
- Annual DEQ Recycled Water Use Report

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-APPENDIX A: AERIAL VIEW OF TREATMENT PLANT IRRIGATION AREA (SHOWN IN RED)

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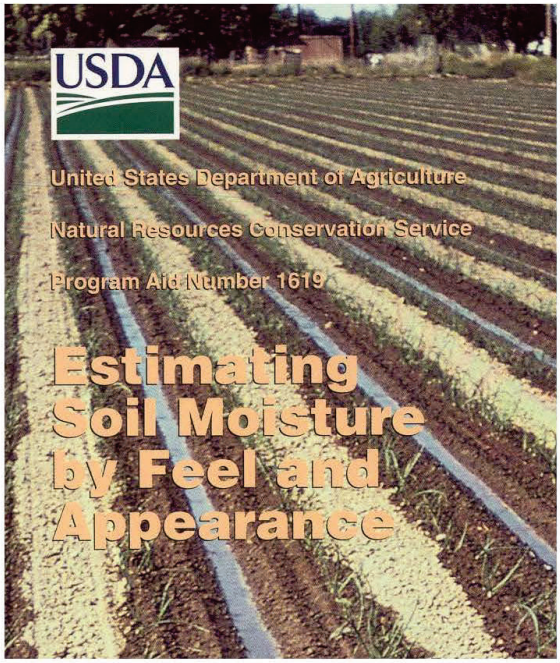
Estimating Soil Moisture by Feel and Appearance

Irrigation Water Management (IWM) is applying water according to crop needs in an amount that can be stored in the plant root zone of the soil.



The "feel and appearance method" is one of several irrigation scheduling methods used in IWM. It is a way of monitoring soil moisture to determine when to irrigate and how much water to apply. Applying too much water causes excessive runoff and/or deep percolation. As a result, valuable water is lost along with nutrients and chemicals, which may leach into the ground water.

The feel and appearance of soil vary with texture and moisture content. Soil moisture conditions can be estimated, with experience, to an accuracy of about 5 percent. Soil moisture is typically sampled in I-foot increments to the root depth of the crop at three or more sites per field. It is best to vary the number of sample sites and depths according to crop, field size, soil texture, and soil stratification. For each sample the "feel and appearance method" involves:

1. Obtaining a soil sample at the selected depth using a probe, auger, or shovel;
2. Squeezing the soil sample firmly in your hand several times to form an irregularly shaped "ball";
3. Squeezing the soil sample out of your hand between thumb and forefinger to form a ribbon;
4. Observing soil texture, ability to ribbon, firmness and surface roughness of ball, water glistening, loose soil particles, soil/water staining on fingers, and soil color. [Note: A very weak ball will disintegrate with one bounce of the hand. A weak ball disintegrates with two to three bounces;
5. Comparing observations with photographs and/or charts to estimate percent water available and the inches depleted below field capacity.

Example:

Sample Depth	Zone	USDA Texture	AWC*for Zone	Soil Moisture Delpetion**	Percent Depletion
6"	0-12"	sandy loam	1.4"	1.0"	70
18"	12-24"	sandy loam	1.4"	.8"	55
30"	24-36"	loam	2.0"	.8"	40
42"	36-48"	loam	2.0"	.5"	25
			6.8"	3.1"	

Result: A 3.1" net irrigation will refill the root zone.
** Available Water Capacity*
*** Determined by "feel and appearance method"*

Available Water Capacity (AWC) is the portion of water in a soil that can be readily absorbed by plant roots of most crops.

Soil Moisture Deficit (SMD) or Depletion is the amount of water required to raise the soil-water content of the crop root zone to field capacity.

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Appearance of fine sand and loamy fine sand soils at various soil moisture conditions.

Available Water Capacity 0.6-1.2 inches/foot

Percent Available: Currently available soil moisture as a percent of available water capacity.

In/ft. Depleted: Inches of water currently needed to refill a foot of soil to field capacity.

0-25 percent available
1.2-0.5 in./ft. depleted

Dry, loose, will hold together if not disturbed, loose sand grains on fingers with applied pressure. (Not pictured)

25-50 percent available
0.9-0.3 in./ft. depleted

Slightly moist, forms a very weak ball with well-defined finger mark

50-75 percent available
0.6-0.2 in./ft. depleted

Moist, forms a weak ball with loose and aggregated sand grains on fingers, darkened color, moderate water staining on fingers, will not ribbon.

75-100 percent available
0.3-0.0 in./ft. depleted

Wet, forms a weak ball, loose and aggregated sand grains remain on fingers, darkened color, heavy water staining on fingers, will not ribbon

100 percent available
0.0 in./ft. depleted (field capacity)

Wet, forms a weak ball, moderate to heavy soil/water coating on fingers, wet outline of soft ball remains on hand. (Not pictured)

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Appearance of sandy loam and fine sandy loam soils at various soil moisture conditions.

Available WaterCapacity 1.3-1.7 inches/foot

Percent Available: Currently available soil moisture as a percent of available water capacity.

In/ft. Depleted: Inches of water currently needed to refill a foot of soil to field capacity.

0-25 percent available 1 7-1.0 in/ft. depleted

Dry, forms a very weak ball, aggregated soil grains break away easily from ball. (Not pictured)

25-50 percent available 1.3-0.7 in/ft. depleted

Slightly moist, forms a weak ball with defined finger marks, darkened color, no water staining on fingers, grains break away.

50-75 percent available 0.9-0.3 in./ft. depleted

Moist, forms a ball with defined finger marks, very light soil/water staining on fmgers, darkened color, will not slick.

75-100 percent available 0.4-0.0 in./ft. depleted

Wet, forms a ball with wet outline left on hand, light to medium staining on fingers, makes a weak ribbon between the thumb and forefinger.

100 percent available 0.0 in./ft. depleted (field capacity)

Wet, forms a soft ball, free water appears briefly on soil surface after squeezing or shaking, medium to heavy soil/water coating on fingers. (Not pictured)

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Appearance of sandy clay loam, loam, and silt loam soils at various soil moisture conditions.

Available WaterCapacity 1.5-2.1 inches/foot

Percent Available: Currently available soil moisture as a percent of available water capacity.

In/ft. Depleted: Inches of water currently needed to refill a foot of soil to field capacity.

0-25 percent available 2.1-1.1 in./ft. depleted

Dry, soil aggregations break away easily, no staining on fingers, clods crumble with applied pressure. (Not pictured)

25-50 percent available 1.6-0.8 in./ft. depleted

Slightly moist, forms a weak ball with rough surfaces, no water staining on fingers, few aggregated soil grains break away.

50-75 percent available 1.1-0.4 in./ft. depleted

Moist, forms a ball, very light staining on fingers, darkened color, pliable, forms a weak ribbon between the thumb and forefinger.

75-100 percent available 0.5-0.0 in/ft. depleted

Wet, forms a ball with well-defined finger marks, light to heavy soil/water coating on fingers, ribbons between thumb and forefinger.

100 percent available 0.0 in/ft. depleted (field capacity)

Wet, forms a soft ball, free water appears briefly on soil surface after squeezing or shaking, medium to heavy soil/water coating on fingers. (Not pictured)

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Appearance of clay, clay loam, and silt clay loam soils at various soil moisture conditions.

Available WaterCapacity 1.6-2.4 inches/foot

Percent Available: Currently available soil moisture as a percent of available water capacity.

In/ft. Depleted: Inches of water currently needed to refill a foot of soil to field capacity.

0-25 percent available 2.4-1.2 in/ft. depleted

Dry, soil aggregations separate easily, clods are hard to crumble with applied pressure. (Not pictured)

25-50 percent available 1.8-0.8 in/ft. depleted

Slightly moist, forms a weak ball, very few soil aggregations break away, no water stains, clods flatten with applied pressure.

50 - 75 percent available 1.2-0.4 in./ft. depleted

Moist, forms a smooth ball with defined finger marks, light soil/water staining on fingers, ribbons between thumb and forefinger.

75-100 percent available 0.6-0.0 in./ft. depleted

Wet, forms a ball, uneven medium to heavy soil/water coating on fingers, ribbons easily between thumb and forefinger.

100 percent available 0.0 in./ft. depleted (field capacity)

Wet, forms a soft ball, free water appears on soil surface after squeezing or shaking, thick soil/water coating on fingers, slick and sticky. (Not pictured)

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Guidelines for Estimating Soil Moisture Conditions

	Coarse Texture- Fine Sand and Loamy Fine Sand	Moderately Coarse Texture Sandy Loam and Fine Sandy Loam	Medium Texture - Sandy Clay Loam, Loam, and Silt Loam	Fine Texture- Clay, Clay Loam, or Silty Clay Loam
	Available Water Capacity (Inches/Foot)			
	0.6-1.2	1.3-1.7	1.5-2.1	1.6 -2.4
Available Soil Moisturre Percent	Soil Moisture Deficit (SMD) in inches per foot when the feel and appearance of the soil are as described.			
0-25	Dry, loose, will hold together if not disturbed, loose sand grains on fingers with applied pressure. SMD 1.2-0.5	Dry, forms a very weak ball, aggregated soil grains break away easily from ball. SMD 1.7 -1.0	Dry. Soil aggregations break away easily. no moisture staining on fingers, clods crumble with applied pressure. SMD 2.1-1.1	Dry, soil aggregations easily separate, clods are hard to crumble with applied pressure SMD 2.4-1.2
25-50	Slightly moist, forms a very weak ball with well-defined finger marks, light coating of loose and aggregated sand grains remain on fingers. SMD O.9-0.3	Slightly moist, forms a weak ball with defined finger marks, darkened color, no water staining on fingers, grains break away. SMD 1.3-0.7	Slightly moist, forms a weak ball with rough surfaces, no water staining on fingers, few aggregated soil grains break away. SMD1.6-0.8	Slightly moist, forms a weak ball, very few soil aggrega- tions break away, no water stains, clods flatten with applied pressure SMD 1.8-0.8
50-75	Moist, forms a weak ball with loose and aggregated sand grains on fingers, darkened color, moderate water staining on fingers, will not ribbon. SMD O.6-0.2	Moist, forms a ball with defined finger marks. very light soil/water staining on fingers. darkened color, will not slick. SMD O.9-0.3	Moist, forms a ball, very light water staining on fingers, darkened color, pliable, forms a weak ribbon between thumb and forefinger. SMD 1.1- 0.4	Moist. forms a smooth ball with defined finger marks, light soil/water staining on fingers, ribbons between thumb and forefinger. SMD I.2-0.4
75-100	Wet, forms a weak ball, loose and aggregated sand grains remain on fingers, darkened color, heavy water staining on fingers, will not ribbon. SMD O.3-0.0	Wet, forms a ball with wet outline left on hand, light to medium water staining on fingers, makes a weak ribbon between thumb and forefinger. SMD O.4-0.0	Wet, forms a ball with well defined finger marks, light to heavy soil/water coating on fingers, ribbons between , thumb and forefinger. SMD O.5 -0.0	Wet, forms a ball, uneven medium to heavy soil/water coating on fingers, ribbons easily between thumb and forefinger. SMD O.6-0.0
Field Capacity (100 %)	Wet, forms a weak ball, moderate to heavy soil/ water coating on fingers, wet outline of soft ball remains on hand. SMD 0.0	Wet, forms a soft ball, free water appears briefly on soil surface after squeezing or shaking,medium to heavy soil/water coating on fingers. SMD 0.0	Wet, forms a soft ball, free water appears briefly on soil surface after squeezing or shaking, medium to heavy soil/water coating on fingers. SMD 0.0	Wet, forms a soft ball, free water appears on soil surface after squeezing or shaking, thick soil/water coating on fingers, slick and sticky. SMD 0.0

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To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC, 20250-9410 or call 202-720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

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Appendix C – Soil Survey Maps and Soil Classifications

Marion County Area, Oregon (OR643)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
WuC	Woodburn silt loam, 3 to 12 percent slopes	1.2	16.9%
WuD	Woodburn silt loam, 12 to 20 percent slopes	5.9	83.1%
Total		7.2	100.0%

Marion County Area, Oregon

WuC – Woodburn silt loam, 3-12 percent slopes Map Unit Setting

- National map unit symbol: 24s4
- Elevation: 150 to 350 feet
- Mean annual precipitation: 40 to 45 inches
- Mean annual air temperature: 52 to 54 degrees F
- Frost-free period: 200 to 210 days
- Farmland classification: Farmland of statewide importance

Map Unit Composition

- Woodburn and similar soils: 95 percent
- Minor components: 5 percent
- Estimates are based on observations, descriptions, and transects of the map unit.

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Description of Woodburn Setting

- Landform: Terraces
- Landform position (three-dimensional): Tread, riser
- Down-slope shape: Linear
- Across-slope shape: Linear
- Parent material: Silty alluvium and mixed mineralogy loess

Typical Profile

- Hl - 0 to 17 inches: silt loam
- H2 - 17 to 32 inches: silty clay loam
- H3 - 32 to 68 inches: silt loam

Properties and Qualities

- Slope: 3 to 12 percent
- Depth to restrictive feature: More than 80 inches
- Natural drainage class: Moderately well drained
- Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
- Depth to water table: About 25 to 32 inches
- Frequency of flooding: None
- Frequency of ponding: None
- Available water storage in profile: High (about 12.0 inches)

Interpretive Groups

- Land capability classification (irrigated): 2e
- Land capability classification (non-irrigated): 2e
- Hydrologic Soil Group: C
- Other vegetative classification: Moderately Well Drained < 15% Slopes (G002XY0040R)

Minor Components Aquolls Poorly Drained

- Percent of map unit: 5 percent
- Landform: Terraces

Marion County Area, Oregon

WuD – Woodburn silt loam, 12 to 20 percent slopes Map Unit Setting

- National map unit symbol: 24s5
- Elevation: 150 to 350 feet
- Mean annual precipitation: 40 to 45 inches
- Mean annual air temperature: 52 to 54 degrees F
- Frost-free period: 200 to 210 days
- Farmland classification: Farmland of statewide importance

Map Unit Composition

- Woodburn and similar soils: 95 percent
- Minor components: 5 percent
- Estimates are based on observations, descriptions, and transects of the map unit.

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Description of Woodburn Setting

- Landform: Terraces
- Landform position (three-dimensional): Riser
- Down-slope shape: Linear
- Across-slope shape: Linear
- Parent material: Silty alluvium and mixed mineralogy loess

Typical Profile

- Hl - 0 to 17 inches: silt loam
- H2 - 17 to 32 inches: silty clay loam
- H3 - 32 to 68 inches: silt loam

Properties and Qualities

- Slope: 12 to 20 percent
- Depth to restrictive feature: More than 80 inches
- Natural drainage class: Moderately well drained
- Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
- Depth to water table: About 25 to 32 inches
- Frequency of flooding: None
- Frequency of ponding: None
- Available water storage in profile: High (about 12.0 inches)

Interpretive Groups

- Land capability classification (irrigated): 3e
- Land capability classification (non-irrigated): 3e
- Hydrologic Soil Group: C
- Other vegetative classification: Moderately Well Drained > 15% Slopes (G002XY0030R)

Minor Components Aquolls, Poorly Drained

- Percent of map unit: 5 percent
- Landform: Terraces

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– Disp osal of Wastewater by Irrig ation —Summary By Map Unit

Summary by Map Unit – Marion County Area, Oregon (OR643)

Map Unit Symbol	Map Unit Name	Rating	Component Name (percent)	Rating Reasons (numeric values)	Acres in AOI	Percent of AOI
				Slow water movement (1.00)		
WuC	Woodburn silt loam, 3 to 12 percent slopes	Very limited	Woodburn (95%)	Too steep for surface application (1.00)	1.2	16.9%
				Dept to saturated zone (0.99)		
				Too acid (0.14)		
				Too steep for sprinkler application (0.10)		
				Too steep for surface application (1.00)		
				Slow water		
				Movement (1.00)		

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Map Unit Symbol	Map Unit Name	Rating	Component Name (percent)	Rating Reasons (numeric values)	Acres in AOI	Percent of AOI
WuD	Woodburn silt loam, 12 to 20 percent slopes	Very limited	Woodburn (95%)	Too steep for sprinkler application (1.00)	5.9	83.1%
				Dept to saturated zone (0.99)		
				Too acid (0.14)		
Total for Area of Interest					7.2	100.0%

Table

Disposal of Wastewater by Irrigation Summary by Rating Value		
Rating	**Acres in AOI**	**Percent of AOI**
Very limited	7.2	100.0%
Total for Area of Interest	7.2	100.0%

Description – Disposal of Wastewater by Irrigation

Wastewater includes municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption.

In places it is high in content of sodium and chloride. The effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

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Disposal of wastewater by irrigation not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also can improve crop production by increasing the amount of water available to crops. The ratings are based on the soil properties that affect the design, construction, management, and performance of the irrigation system. The properties that affect design and management include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, saturated hydraulic conductivity (Ksat), slope, and flooding. The properties that affect construction include stones, cobbles, depth to bedrock or a cemented pan, depth to a water table, and ponding. The properties that affect performance include depth to bedrock or a cemented pan, bulk density, the sodium adsorption ratio, salinity, reaction, and the cation-exchange capacity, which is used to estimate the capacity of a soil to adsorb heavy metals. Permanently frozen soils are not suitable for disposal of wastewater by irrigation.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer is determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Rating Options – Disposal of Wastewater by Irrigation

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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Appendix D:
Financial Report

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CITY OF AURORA, OREGON
ANNUAL FINANCIAL REPORT
Year Ended June 30, 2021

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CITY OF AURORA, OREGON
CITY OFFICIALS
JUNE 30, 2021

Name	***MAYOR***	***Term***
Brian Asher		January 2023

CITY COUNCIL MEMBERS

Tara Weidman	January 2023
John Berard	January 2023
Mercedes Rhoden-Feely	January 2025
Wendy Veliz	January 2025

CITY ADMINISTRATION

Mary Lambert, Finance Officer

Stuart A. Rodgers, City Recorder

Officials and City Staff can be contacted at:

21420 Main Street NE
Aurora, Oregon 97002

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CITY OF AURORA, OREGON
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GROVE, MUELLER & SWANK, P.C.
CERTIFIED PUBLIC ACCOUNTANTS AND CONSULTANTS
www.gmscpa.com
(503) 581-7788 • FAX (503) 581-0152
475 Cottage Street NE, Suite 200 • Salem, Oregon 97301-3814

Honorable Mayor and Council Members
City of Aurora
21420 Main Street NE
Aurora, Oregon 97002

Report on the Financial Statements

We have audited the accompanying modified cash basis financial statements of the governmental activities, the business-type activities, each major fund, and the aggregate remaining fund information of the City of Aurora, as of and for the year ended June 30, 2021, and the related notes to the financial statements, which collectively comprise the City's basic financial statements as listed in the table of contents.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with the modified cash basis of accounting described in the notes to the financial statements. This includes determining that the modified cash basis of accounting is an acceptable basis for the preparation of the financial statements in the circumstances. Management is also responsible for the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express opinions on these modified cash basis financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the City's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the City's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions.

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Opinions

In our opinion, the modified cash basis financial statements referred to above present fairly, in all material respects, the respective modified cash basis financial position of the governmental activities, the business-type activities, each major fund, and the aggregate remaining fund information of the City of Aurora, as of June 30, 2021, and the respective changes in modified cash basis financial position and, where applicable, cash flows thereof for the year then ended in accordance with the basis of accounting described in the notes to the financial statements.

Basis of Accounting

We draw attention to the notes of the financial statements that describes the basis of accounting. The financial statements are prepared on the modified cash basis of accounting, which is a basis of accounting other than accounting principles generally accepted in the United States of America. Our opinions are not modified with respect to this matter.

Other Matters

Report on Supplemental and Other Information

Our audit was conducted for the purpose of forming opinions on the financial statements that collectively comprise the City's basic financial statements. Management's discussion and analysis, budgetary comparison information and combining nonmajor fund financial statements are presented for purposes of additional analysis and are not required parts of the basic financial statements.

The supplemental information as listed in the table of contents is the responsibility of management and was derived from, and relates directly to, the underlying accounting and other records used to prepare the basic financial statements. The information has been subjected to the auditing procedures applied in the audit of the basic financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the basic financial statements or to the basic financial statements themselves, and other additional procedures in accordance with auditing standards generally accepted in the United States of America. In our opinion, the information is fairly stated in all material respects in relation to the basic financial statements as a whole on the basis of accounting described in notes to the financial statements.

Management's discussion and analysis has not been subjected to the auditing procedures applied in the audit of the basic financial statements, and accordingly, we do not express an opinion or provide any assurance on it.

Other Legal and Regulatory Requirements

In accordance with Minimum Standards for Audits of Oregon Municipal Corporations, we have issued our report dated November 10, 2021, on our consideration of the City's compliance with certain provisions of laws and regulations, including the provisions of Oregon Revised Statutes as specified in Oregon Administrative Rules. The purpose of that report is to describe the scope of our testing of compliance and the results of that testing and not to provide an opinion on compliance.

GROVE, MUELLER & SWANK, P.C.
CERTIFIED PUBLIC ACCOUNTANTS

By: 

Devan W. Esch, A Shareholder
November 10, 2021

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CITY OF AURORA, OREGON

Management's Discussion and Analysis
June 30, 2021

As management of the City of Aurora, we offer readers of the financial statements this narrative overview and analysis of the financial activities for the fiscal year ended June 30, 2021.

Financial Highlights

	June 30, 2021	June 30, 2020	change
Net position	$ 2,634,601	$ 2,704,526	$ (69,925)
Change in net position	(69,925)	337,523	(407,448)
Governmental net position	1,430,230	1,421,353	8,877
Proprietary net position	1,204,371	1,283,173	(78,802)
Change in governmental net position	8,877	109,196	(100,319)
Change in proprietary net position	(78,802)	228,327	(307,129)

Overview of the Financial Statements

This discussion and analysis is intended to serve as an introduction to the City of Aurora's basic financial statements. The City's basic financial statements consist of three components: 1) government-wide financial statements, 2) fund financial statements, and 3) notes to the financial statements. This report also contains supplementary and other information in addition to the basic financial statements themselves.

Government-wide financial statements. The government-wide financial statements are designed to provide readers with a broad overview of the City's finances, in a manner similar to a private-sector business. These statements include:

The Statement of Net Position (Modified Cash Basis). This presents information on the assets and liabilities of the City as of the date on the statement. Net position is what remains after the liabilities have been paid or otherwise satisfied. Over time, increases or decreases in net position may serve as a useful indicator of whether the financial position of the City is improving or deteriorating.

The Statement of Activities (Modified Cash Basis). The *statement of activities* presents information showing how the net position of the City changed over the most recent fiscal year by tracking revenues, expenditures and other transactions that increase or reduce net position.

In the government-wide financial statements, the City's activities are shown as governmental and business-type activities. Governmental activities include all basic city government functions, such as general government, public safety, highway and streets, and community development. These activities are primarily financed through property taxes and other intergovernmental activities. Business-type activities are those which are primarily financed through charges to customers and include water and sewer operations.

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Fund financial statements. The *fund financial statements* provide more detailed information about the City's funds, focusing on its most significant or "major" funds – not the City as a whole. A fund is a grouping of related accounts that is used to maintain control over resources that have been segregated for specific activities or objectives. The City, like state and other local governments, uses fund accounting to ensure and demonstrate compliance with finance-related legal requirements. All of the funds of the City can be divided into two categories: governmental funds and proprietary (business-type) funds.

Governmental funds. The *governmental funds* are used to account for essentially the same functions reported as *governmental activities* in the government-wide financial statements. Because the focus of governmental funds is narrower than that of the government-wide financial statements, it is useful in obtaining an understanding of each fund's activity.

Proprietary funds. Proprietary funds are used to account for funds which are intended to recover all or a significant portion of their costs through user fees and charges (business-type activities). Proprietary funds whose primary user is the public are known as enterprise funds.

Notes to the financial statements. The notes provide additional information that is essential to a full understanding of the data provided in the government-wide and fund financial statements.

Other information. In addition to the basic financial statements and accompanying notes, this report also presents certain *supplemental information*, including the budgetary comparison schedules and the combining non-major fund financial statements.

Government-wide Financial Analysis

Statements of Net Position (modified cash basis)

June 30,

	2021			2020		
	Governmental Activities	Business-type Activities	Total	Governmental Activities	Business-type Activities	Total
Cash and cash equivalents	$ 1,430,230	$ 1,204,371	$ 2,634,601	$ 1,421,353	$ 1,283,173	$ 2,704,526
Liabilities	-	-	-	-	-	-
Net Position:						
Restricted	483,269	145,023	628,292	491,057	279,277	$ 770,334
Unrestricted	946,961	1,059,348	2,006,309	930,296	1,003,896	$ 1,934,192
Total Net Position	$ 1,430,230	$ 1,204,371	$ 2,634,601	$ 1,421,353	$ 1,283,173	$ 2,704,526

Statement of Net Position (modified cash basis). The *statement of net position* (modified cash basis) is provided on a comparative basis. As noted earlier, net position may serve over time as a useful indicator of a government's financial position. In the case of the City of Aurora, assets exceeded liabilities by $2,634,601 as of June 30, 2021.

Restricted net position represents sources that are subject to external restrictions on their use, such as debt service or capital projects.

Unrestricted net position is available for general operations of the City.

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Statements of Activities (modified cash basis)
Year ended June 30,

	2021			2020		
	Governmental Activities	Business-type Activities	Total	Governmental Activities	Business-type Activities	Total
Revenues						
Program revenues						
Charges for service	$ 175,141	$ 748,647	$ 923,788	$ 142,395	$ 721,663	$ 864,058
Operating grants	128,314	-	128,314	70,765	-	70,765
Capital grants	22,785	30,300	53,085	61,404	18,847	80,251
General revenues						
Taxes and assessments	324,537	363,189	687,726	312,594	350,674	663,268
Franchise taxes	71,364	-	71,364	71,433	-	71,433
Intergovernmental	40,543	-	40,543	35,274	-	35,274
Miscellaneous	55,683	16,619	72,302	91,634	29,224	120,858
Total revenues	818,367	1,158,755	1,977,122	785,499	1,120,408	1,905,907
Expenses						
General government	199,952	-	199,952	171,836	-	171,836
Public safety	203,097	-	203,097	198,404	-	198,404
Highways and streets	141,295	-	141,295	132,829	-	132,829
Community development	265,146	-	265,146	173,234	-	173,234
Water	-	560,779	560,779	-	286,032	286,032
Sewer	-	676,778	676,778	-	606,049	606,049
Total expenses	809,490	1,237,557	2,047,047	676,303	892,081	1,568,384
Change in net position	8,877	(78,802)	(69,925)	109,196	228,327	337,523
Net position, beginning of year	1,421,353	1,283,173	2,704,526	1,312,157	1,054,846	2,367,003
Net position, end of year	$ 1,430,230	$ 1,204,371	$ 2,634,601	$ 1,421,353	$ 1,283,173	$ 2,704,526

Statement of Activities (modified cash basis). During the current fiscal year, the City's total net position decreased by $69,925 to $2,634,601 from $2,704,526 at the beginning of the year. The key elements of the change in the City's net position for the year ended June 30, 2021 are as follows:

Governmental activities - The City's net position increased by $8,877 from governmental activities. The increase was primarily due to the increase in charges for services and miscellaneous revenue within the current year.

Business type activities - The City's net position decreased by $78,802 from business type activities. Revenues increased by approximately $40,000 compared to the prior year, and expenses increased by approximately $345,000 compared to the prior year.

Financial Analysis of the City of Aurora's Funds

As noted earlier, the City uses fund accounting to ensure and demonstrate compliance with finance-related legal requirements.

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Governmental funds. The focus of the City's governmental funds is to provide information on relatively short-term cash flow and funding for future basic services. Such information is useful in assessing the City's financing requirements. In particular, *fund balance* may serve as a useful measure of a government's net resources available for spending at the end of a fiscal year. As of June 30, 2021, the City's governmental funds reported combined ending fund balances of $1,430,230, an increase of $8,877 over the prior year.

Business-type funds. The business-type funds account for the City's water and sewer operations. Expenses exceeded revenues by $78,802 for the year ended June 30, 2021.

General Fund Budgetary Highlights

The governing body made one change to the General Fund budget for the fiscal year ended June 30, 2021. Revenues, ending fund balance, and Community Development expenditures increased by $50,000 due to an unanticipated Coronavirus Relief Funds Grant.

Significant Fund Transactions

Major Governmental Funds:

General Fund. The General Funds is the primary operating funds of the City. The fund balance was $547,774 as of June 30, 2021. The fund balance decreased $95,635 during the current fiscal year. As a measure of the liquidity, it may be useful to compare total fund balances to total fund expenditures. Fund balance represents 83% of total expenditures.

Street/Storm Operating Fund. The Street/Storm Operating Fund accounts for street maintenance and improvements. The fund balance decreased by $49,685. This decrease was due to increases in both materials and services and capital outlay in the current year.

City Hall Building Fund – The fund balance increased by $112,290 due primarily to transfers in of $105,000 and no expenditures.

Major Proprietary Operations:

Water Operations – Water operations revenues are from charges for services and expenses are for personal services, materials and services, capital acquisition, and debt payments. Net position decreased $157,509 during the year due to capital acquisitions.

Sewer Operations –Sewer operations revenues are from charges for services and expenses are for personal services, materials and services, capital acquisition, and debt payments. Net position increased by $78,707 during the year mainly due to a decrease in materials and services expenditures within the current year. Net nonoperating revenue and expenses were $3,449.

Debt Administration

The City had total debt outstanding of $1,158,305 at the end of the current fiscal year.

During the current fiscal year, the City's total debt decreased by $324,653 (28%).

State statutes limit the amount of general obligation debt a governmental entity may issue to 3 percent of its total assessed valuation. The City had no general obligation debt subject to the limitation at June 30, 2021.

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City of Aurora
Outstanding Debt

	Business-type Activities	
	2021	2020
General obligation bonds	$ 965,000	$ 1,275,000
Loans	193,305	207,958
Total	$ 1,158,305	$ 1,482,958

Additional information on the City's long-term debt can be found in the notes to the basic financial statements of this report.

Economic Factors and the Next Year's Budget

The City's Budget Committee considered all the following factors while preparing the City budget for the 2021-22 fiscal year:

a. Prior history of revenues and expenditures
b. Capital projects in the water and sewer funds
c. Expected property tax revenues

Requests for Information

This financial report is designed to present the user (citizens, taxpayers, investors and creditors) with a general overview of the City's finances and to demonstrate the City's accountability. Questions concerning any of the information provided in this report or requests for additional information should be addressed to:

City Recorder
City of Aurora
21420 Main Street NE
Aurora, Oregon 97002

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BASIC FINANCIAL STATEMENTS

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CITY OF AURORA, OREGON

STATEMENT OF FUND NET POSITION (MODIFIED CASH BASIS)

JUNE 30, 2021

	Governmental Activities	*Business-type Activities*	*Totals*
ASSETS			
Cash and cash equivalents	$ 1,430,230	$ 1,204,371	$ 2,634,601
LIABILITIES	-	-	-
NET POSITION			
Restricted for:			
Debt service	-	16,544	16,544
Capital acquisitions	209,304	128,479	337,783
Community development	12,412	-	12,412
Streets	261,553	-	261,553
Unrestricted	946,961	1,059,348	2,006,309
Total Net Position	$ 1,430,230	$ 1,204,371	$ 2,634,601

The accompanying notes are an integral part of the financial statements.

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CITY OF AURORA, OREGON

STATEMENT OF ACTIVITIES (MODIFIED CASH BASIS)

YEAR ENDED JUNE 30, 2021

		Program Revenues			Net (Expenses) Revenues and Changes in Net Position		
	Expenses	Fees, Fines and Charges for Services	Operating Grants and Contributions	Capital Grants and Contributions	Governmental Activities	Business-type Activities	Total
FUNCTIONS/PROGRAMS							
Governmental activities:							
General government	$ 199,952	$ 17,343	$ 57,449	$ -	$ (125,160)	$ -	$ (125,160)
Public safety	203,097	53,808	-	-	(149,289)	-	(149,289)
Highways and streets	141,295	32,872	70,865	11,760	(25,798)	-	(25,798)
Community development	265,146	71,118	-	11,025	(183,003)	-	(183,003)
Total Governmental activities	809,490	175,141	128,314	22,785	(483,250)	-	(483,250)
Business-type activities:							
Water	560,779	372,177	-	22,172	-	(166,430)	(166,430)
Sewer	676,778	376,470	-	8,128	-	(292,180)	(292,180)
Total Business-type activities	1,237,557	748,647	-	30,300	-	(458,610)	(458,610)
Total Activities	$ 2,047,047	$ 923,788	$ 128,314	$ 53,085	(483,250)	(458,610)	(941,860)
General Revenues:							
Property taxes					324,537	363,189	687,726
Franchise taxes					71,364	-	71,364
Intergovernmental					40,543	-	40,543
Miscellaneous					55,683	16,619	72,302
Total General Revenues					492,127	379,808	871,935
Change in net position					8,877	(78,802)	(69,925)
Net Position - beginning of year					1,421,353	1,283,173	2,704,526
Net Position - end of year					$ 1,430,230	$ 1,204,371	$ 2,634,601

The accompanying notes are an integral part of the financial statements.

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CITY OF AURORA, OREGON

BALANCE SHEET (MODIFIED CASH BASIS) - GOVERNMENTAL FUNDS

JUNE 30, 2021

		Special Revenue	***Capital Projects***		
	General	***Street / Storm Operating***	***City Hall Building***	***Other Governmental Funds***	***Total***
ASSETS					
Cash and cash equivalents	$ 547,774	$ 166,118	$ 397,940	$ 318,398	$ 1,430,230
LIABILITIES AND FUND BALANCE					
Liabilities	$ -	$ -	$ -	$ -	$ -
Fund Balance					
Restricted for:					
Capital acquisitions	-	-	-	209,304	209,304
Community development	-	-	-	12,412	12,412
Streets	-	166,118	-	95,435	261,553
Committed to:					
Capital acquisitions	-	-	397,940	1,247	399,187
Unassigned	547,774	-	-	-	547,774
Total Fund Balance	547,774	166,118	397,940	318,398	1,430,230
Total Liabilities and Fund Balance	$ 547,774	$ 166,118	$ 397,940	$ 318,398	$ 1,430,230

The accompanying notes are an integral part of the financial statements.

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CITY OF AURORA, OREGON

STATEMENT OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCES
(MODIFIED CASH BASIS) - GOVERNMENTAL FUNDS
YEAR ENDED JUNE 30, 2021

		Special Revenue	Capital Projects		
	General	Street / Storm Operating	City Hall Building	Other Governmental Funds	Total
REVENUES					
Taxes and assessments	$ 324,537	$ -	$ -	$ -	$ 324,537
Fines and forfeitures	53,810	-	-	-	53,810
Licenses and permits	155,582	-	4,242	22,785	182,609
Charges for services	-	18,574	-	14,298	32,872
Intergovernmental	81,811	70,865	-	-	152,676
Miscellaneous	59,917	651	-	-	60,568
Interest earnings	4,369	1,519	3,048	2,359	11,295
Total Revenues	680,026	91,609	7,290	39,442	818,367
EXPENDITURES					
Current					
General government	199,952	-	-	-	199,952
Public safety	203,097	-	-	-	203,097
Highways and streets	-	88,794	-	-	88,794
Community development	158,791	-	-	4,535	163,326
Park services	62,273	-	-	-	62,273
Capital outlay	39,548	52,500	-	-	92,048
Total Expenditures	663,661	141,294	-	4,535	809,490
REVENUES OVER (UNDER) EXPENDITURES	16,365	(49,685)	7,290	34,907	8,877
OTHER FINANCING SOURCES (USES)					
Transfers in	-	-	105,000	7,000	112,000
Transfers out	(112,000)	-	-	-	(112,000)
Total Other Financing Sources (Uses)	(112,000)	-	105,000	7,000	-
NET CHANGE IN FUND BALANCE	(95,635)	(49,685)	112,290	41,907	8,877
FUND BALANCE, beginning of year	643,409	215,803	285,650	276,491	1,421,353
FUND BALANCE, end of year	$ 547,774	$ 166,118	$ 397,940	$ 318,398	$ 1,430,230

The accompanying notes are an integral part of the financial statements.

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CITY OF AURORA, OREGON

STATEMENT OF FUND NET POSITION (MODIFIED CASH BASIS) - ENTERPRISE FUNDS
JUNE 30, 2021

	Water Operations	*Sewer Operations*	*Total*
ASSETS			
Cash and cash equivalents	$ 536,580	$ 667,791	$ 1,204,371
LIABILITIES	-	-	-
FUND NET POSITION			
Restricted for:			
Debt service	-	16,544	16,544
Capital acquisions	51,898	76,581	128,479
Unrestricted	484,682	574,666	1,059,348
Total Fund Net Position	$ 536,580	$ 667,791	$ 1,204,371

The accompanying notes are an integral part of the financial statements.

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CITY OF AURORA, OREGON

STATEMENT OF REVENUES, EXPENSES AND CHANGES IN FUND NET POSITON
(MODIFIED CASH BASIS) - ENTERPRISE FUNDS
YEAR ENDED JUNE 30, 2021

	Water Operations	*Sewer Operations*	*Total*
OPERATING REVENUES			
Charges for services	$ 372,177	$ 376,470	$ 748,647
Miscellaneous	3,575	1,741	5,316
Total Operating Revenues	375,752	378,211	753,963
OPERATING EXPENSES			
Personal services	112,878	125,936	238,814
Materials and services	144,666	178,247	322,913
Total Operating Expenses	257,544	304,183	561,727
OPERATING INCOME	118,208	74,028	192,236
NONOPERATING REVENUES/EXPENSES			
Taxes and assessments	-	363,189	363,189
Interest revenue	5,346	5,957	11,303
Capital acquisitions	(282,343)	(5,220)	(287,563)
Debt payments			
Principal	(14,653)	(310,000)	(324,653)
Interest	(6,239)	(57,375)	(63,614)
Total Nonoperating Revenues/Expenses	(297,889)	(3,449)	(301,338)
NET INCOME BEFORE CONTRIBUTIONS AND TRANSFERS	(179,681)	70,579	(109,102)
CONTRIBUTIONS AND TRANSFERS			
Capital contributions	22,172	8,128	30,300
CHANGE IN FUND NET POSITION	(157,509)	78,707	(78,802)
FUND NET POSITION, beginning of year	694,089	589,084	1,283,173
FUND NET POSITION, end of year	$ 536,580	$ 667,791	$ 1,204,371

The accompanying notes are an integral part of the financial statements.

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CITY OF AURORA, OREGON

STATEMENT OF CASH FLOWS (MODIFIED CASH BASIS) - ENTERPRISE FUNDS

YEAR ENDED JUNE 30, 2021

	Water Operations	Sewer Operations	Total
CASH FLOWS FROM OPERATING ACTIVITIES			
Cash received from customers	$ 375,752	$ 378,211	$ 753,963
Cash paid to employees and others for salaries and benefits	(112,878)	(125,936)	(238,814)
Cash paid to suppliers and others	(144,666)	(178,247)	(322,913)
Net Cash Provided by Operating Activities	118,208	74,028	192,236
CASH FLOWS FROM NON-CAPITAL FINANCING ACTIVITIES			
Taxes and assessments	-	363,189	363,189
CASH FLOWS FROM CAPITAL AND RELATED FINANCING ACTIVITIES			
Purchase of capital assets	(282,343)	(5,220)	(287,563)
Principal paid on debt	(14,653)	(310,000)	(324,653)
Interest paid on debt	(6,239)	(57,375)	(63,614)
Capital contributions	22,172	8,128	30,300
Net Cash Used for Capital and Related Financing Activities	(281,063)	(364,467)	(645,530)
CASH FLOWS FROM INVESTING ACTIVITIES			
Interest received	5,346	5,957	11,303
Increase (Decrease) in Cash and Cash Equivalents	(157,509)	78,707	(78,802)
CASH AND CASH EQUIVALENTS, Beginning of year	694,089	589,084	1,283,173
CASH AND CASH EQUIVALENTS, End of year	$ 536,580	$ 667,791	$ 1,204,371
RECONCILIATION OF OPERATING INCOME TO NET CASH PROVIDED BY OPERATING ACTIVITIES			
Operating income	$ 118,208	$ 74,028	$ 192,236

The accompanying notes are an integral part of the financial statements.

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SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

The City of Aurora, Oregon is governed by an elected mayor and four council members who comprise the City Council. The City Council exercises supervisory responsibilities over City operations, but day-to-day management control is the responsibility of a city recorder. All significant activities and organizations for which the City is financially accountable are included in the basic financial statements.

There are certain governmental agencies and various service districts which provide services within the City. These agencies have independently elected governing boards and the City is not financially accountable for these organizations. Therefore, financial information for these agencies is not included in the accompanying basic financial statements.

As discussed further under *Measurement Focus and Basis of Accounting*, these financial statements are presented on a modified cash basis of accounting, which is a basis of accounting other than accounting principles generally accepted in the United States of America (GAAP) established by the Governmental Accounting Standards Board (GASB). These modified cash basis financial statements generally meet the presentation and disclosure requirements applicable to GAAP, in substance, but are limited to the elements presented in the financial statements and the constraints of the measurement and recognition criteria of the modified cash basis of accounting.

Basic Financial Statements

Basic financial statements are presented at both the government-wide and fund financial level. Both levels of statements categorize primary activities as either governmental or business-type. Governmental activities, which are normally supported by taxes and intergovernmental revenues, are reported separately from business-type activities, which rely to a significant extent on fees and charges for support.

Government-wide financial statements display information about the City as a whole. For the most part, the effect of interfund activity has been removed from these statements. These statements focus on the sustainability of the City as an entity and the change in aggregate financial position resulting from the activities of the fiscal period. These aggregated statements consist of the Statement of Net Position (modified cash basis) and the Statement of Activities (modified cash basis).

The Statement of Net Position (modified cash basis) presents the assets and liabilities of the City. Net position, representing assets less liabilities, is shown in two components: restricted for special purposes, amounts which must be spent in accordance with legal restrictions; and unrestricted, the amount available for ongoing City activities.

The Statement of Activities (modified cash basis) demonstrates the degree to which the direct expenses of a given function or segment are offset by program revenues. *Direct expenses* are those that are clearly identifiable with a specific function or segment. *Program revenues* include (1) charges to customers or applicants who purchase, use or directly benefit from goods, services or privileges provided by a given function or segment, and (2) grants and contributions that are restricted to meeting the operational or capital requirements of a particular function or segment. Taxes and other items not properly included among program revenues are reported instead as *general revenues*.

Fund financial statements display information at the individual fund level. Each fund is considered to be a separate accounting entity. Funds are classified and summarized as governmental, proprietary or fiduciary. Currently, the City has governmental funds (general, special revenue, and capital projects) and proprietary type funds (enterprise). Major individual governmental funds and proprietary operations are reported as separate columns in the fund financial statements.

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SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES *(Continued)*

Basis of Presentation

The financial transactions of the City are recorded in individual funds. Each fund is accounted for by providing a separate set of self-balancing accounts that comprise its assets, liabilities, fund equity, revenues and expenditures / expenses. The various funds are reported by generic classification within the financial statements.

Accounting principles generally accepted in the United States of America set forth minimum criteria (percentage of the assets, liabilities, revenues or expenditures / expenses of either fund category or the government and enterprise combined) for the determination of major funds.

The City reports the following governmental funds as major funds:

General Fund

This fund accounts for the basic governmental financial operations of the City. Principal sources of revenues are property taxes, licenses and permits, fines and forfeitures and State shared revenues. Primary expenditures are for administration, park service, community development, public facilities and municipal court.

Street/Storm Operating Fund

Gas tax apportionments received from the State are recorded in this fund. Expenditures are for road construction and maintenance.

City Hall Building Fund

This fund accounts for monies set aside by the City for the replacement of the City Hall building.

The City reports each of its proprietary operations. They are used to account for the acquisition, operation, and maintenance of the sewer and water systems. These operations are entirely or predominantly self-supported through user charges to customers. The City reports the following major proprietary activities:

Sewer Operations

Accounts for the operations, maintenance, and capital construction projects for wastewater system, which is funded through utility fees, systems development charges, and property taxes.

Water Operations

Accounts for the operations, maintenance, debt service, and capital construction projects for water system, which is funded through utility fees and systems development charges.

Fund Balance

Fund balance is reported as non-spendable when the resources cannot be spent because they are either in a legally or contractually required to be maintained intact or non-spendable form. Resources in non-spendable form include inventories, prepaids and deposits, and assets held for resale.

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SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES *(Continued)*

Fund Balance (Continued)

Fund balance is reported as restricted when the constraints placed on the use of resources are either: (a) externally imposed by creditors (such as through debt covenants), grantors, contributors, or laws or regulations of other governments; or (b) imposed by law through constitutional provisions or enabling legislation.

Fund balance is reported as committed when the City Council takes formal action that places specific constraints on how the resources may be used. The City Council can modify or rescind the commitment at any time through taking a similar formal action.

Resources that are constrained by the City's intent to use them for a specific purpose, but are neither restricted nor committed, are reported as assigned fund balance. Intent is expressed when the City Council approves which resources should be "reserved" during the adoption of the annual budget. The City's Finance Officer uses that information to determine whether those resources should be classified as assigned or unassigned for presentation in the City's Annual Financial Report.

Unassigned fund balance is the residual classification for the General Fund. This classification represents fund balance that has not been restricted, committed, or assigned within the General Fund. This classification is also used to report any negative fund balance amounts in other governmental funds.

When both restricted and unrestricted resources are available for use, it is the City's policy to use restricted resources first, then unrestricted resources as they are needed.

Definitions of Governmental Fund Types

The General Fund is used to account for the basic operations of the City, which include general government, public safety, highways and streets, and community development.

Special Revenue Funds are used to account for and report the proceeds of specific revenue sources that are restricted or committed to expenditure for specified purposes other than debt service or capital projects. The term "proceeds of specific revenues sources" means that the revenue sources for the fund must be from restricted or committed sources, specifically that a substantial portion of the revenue must be from these sources and be expended in accordance with those requirements.

Capital Projects Funds are utilized to account for financial resources to be used for the acquisition or construction of capital equipment and facilities.

Measurement Focus and Basis of Accounting

Measurement focus is a term used to describe what transactions or events are recorded within the various financial statements. Basis of accounting refers to when and how transactions or events are recorded, regardless of the measurement focus applied.

In the government-wide Statement of Net Position (Modified Cash Basis) and Statement of Activities (Modified Cash Basis), both governmental and business-type activities are presented using the economic resource measurement focus, within the limitations of the modified cash basis of accounting, as defined below.

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SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES *(Continued)*

Measurement Focus and Basis of Accounting (Continued)

In the fund financial statements, the current financial resources measurement focus or the economic resources measurement focus is applied to the modified cash basis of accounting, is used as appropriate:

a. All governmental funds utilize a current financial resources measurement focus within the limitations of the modified cash basis of accounting. Only current financial assets and liabilities are generally included on their balance sheets. Their operating statements present sources and uses of available spendable financial resources during a given period. These funds use fund balance as their measure of available spendable financial resources at the end of the period.
b. The proprietary funds utilize an economic resource measurement focus within the limitations of the modified cash basis of accounting. The accounting objectives of this measurement focus are the determination of operating income, change in net position (or cost recovery), net financial position, and cash flows. All assets, deferred outflows, liabilities, and deferred inflows (whether current or noncurrent or financial or nonfinancial) associated with their activities are generally reported within the limitations of the modified cash basis of accounting.

The financial statements are presented on a modified cash basis of accounting, which is a basis of accounting other than GAAP as established by GASB. This basis of accounting involves modifications to the cash basis of accounting to report in the statements of net position or balance sheets cash transactions or events that provide a benefit or result in an obligation that covers a period greater than the period in which the cash transaction or event occurred. Such reported balances include:

1. Interfund receivables and payables that are temporary borrowing and result from transactions involving cash or cash equivalents are recognized.
2. Assets that normally convert to cash or cash equivalents (e.g., certificates of deposit, external cash pools, and marketable investments) that arise from transactions and events involving cash or cash equivalents are recognized.
3. Liabilities for cash (or cash equivalents) held on behalf of others or held in escrow are recognized.

The modified cash basis of accounting differs from GAAP primarily because certain assets and their related revenues (such as accounts receivable and revenue for billed or provided services not yet collected and other accrued revenue and receivables) and certain liabilities and their related expenses or expenditures (such as accounts payable and expenses for goods and services received but not yet paid and other accrued expenses and liabilities) are not recorded in these financial statements. In addition, other economic assets, deferred outflows, liabilities, and deferred inflows that do not arise from a cash transaction or event are not reported, and the measurement of reported assets and liabilities does not involve adjustment to fair value. Additionally, long-term liabilities such as debt are only reported in the notes to the financial statements.

If the City utilized the basis of accounting recognized as generally accepted in the United States of America, the fund financial statements for the governmental funds would use the modified accrual basis of accounting, and the fund financial statements for the enterprise funds would use the accrual basis of accounting. All government-wide financial statements would be presented on the accrual basis of accounting.

The City's policy, although not in accordance with accounting principles generally accepted in the United States of America, is acceptable under Oregon Law (ORS 294.333), which leaves the selection of the method of accounting to the discretion of the municipal corporation.

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SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES *(Continued)*

Measurement Focus and Basis of Accounting (Continued)

Enterprise funds distinguish between operating and non-operating revenues and expenses. Operating revenues and expenses result from providing services to customers in connection with ongoing utility operations. The principal operating revenues are charges to customers for service. Operating expenses include payroll and related costs, materials and supplies, and capital outlay. All revenues not considered operating are reported as non-operating revenues.

Cash and Cash Equivalents

The City maintains cash and cash equivalents in a common pool that is available for use by all funds. Each fund type's portion of this pool is displayed as cash and cash equivalents. The City considers cash on hand, demand deposits and savings accounts, and short-term investments with an original maturity of three months or less from the date of acquisition to be cash and cash equivalents.

Oregon Revised Statutes authorize the City to invest in certificates of deposit, savings accounts, bank repurchase agreements, bankers' acceptances, general obligations of U.S. Government and its agencies, certain bonded obligations of Oregon municipalities, and the State Treasurer's Local Government Investment Pool, among others.

Investments in the Local Government Investment Pool are stated at cost, which approximates fair value.

Property Taxes

Property taxes are levied by the County Assessor and collected by the County Tax Collector. The taxes are levied and become a lien as of July 1. They may be paid in three installments payable in equal payments due November 15, February 15 and May 15. The City's property tax collection records show that most of the property taxes due are collected during the year of levy and delinquent taxes are collected in the next few years.

Capital Assets

The City does not maintain historical cost or depreciation records for capital assets. Therefore, capital assets are not reported on the government-wide Statement of Net Position or the proprietary funds statements of Fund Net Position or in the notes to the financial statements.

Long-Term Debt

Long-term debt is presented only in the notes to the financial statements. Payments of principal and interest are recorded as expenditures / expenses when paid.

Accrued Compensated Absences

Accumulated unpaid vacation pay is not accrued. Earned but unpaid sick pay is recorded as an expenditure / expense when paid.

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SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (Continued)

Budget and Budgetary Accounting

The City adopts the budget on an object basis; therefore, expenditures of a specific object within a fund may not legally exceed that object's appropriations. The City Council may amend the budget to expend unforeseen revenues by supplemental appropriations. All supplemental appropriations are included in the budget comparison statements. Appropriations lapse at year end and may not be carried over. The City does not use encumbrance accounting.

Use of Estimates

The preparation of basic financial statements in conformity with the modified cash basis of accounting requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the basic financial statements and reported amounts of revenues and expenditures during the reporting period. Actual results may differ from those estimates.

CASH AND CASH EQUIVALENTS

Cash and cash equivalents are comprised of the following at June 30, 2021:

Cash		
Cash on hand	$	400
Deposits with financial institutions		108,284
Investments		
Local Government Investment Pool		2,525,917
	$	2,634,601

Deposits

The City's deposits with various financial institutions had a book value of $108,284 and a bank balance of $156,269 as of June 30, 2021. The difference is due to transactions in process. Bank deposits are secured to legal limits by federal deposit insurance. The remaining amount is secured in accordance with ORS 295 under a collateral program administered by the Oregon State Treasurer.

Custodial Credit Risk - Deposits

This is the risk that in the event of a bank failure, the City's deposits may not be returned. The Federal Depository Insurance Corporation (FDIC) provides insurance for the City's deposits with financial institutions for up to $250,000 for the aggregate of all demand deposits and the aggregate of all time deposit and savings accounts at each institution. Deposits in excess of FDIC coverage are with institutions participating in the Oregon Public Funds Collateralization Program (PFCP). The PFCP is a shared liability structure for participating bank depositories, better protecting public funds though still not guaranteeing that all funds are 100% protected.

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***CASH AND CASH EQUIVALENTS** (Continued)*

Custodial Credit Risk – Deposits (Continued)

Barring any exceptions, a bank depository is required to pledge collateral valued at least 10% of their quarter-end public fund deposits if they are well capitalized, 25% of their quarter-end public fund deposits if they are adequately capitalized, or 110% of their quarter-end public fund deposits if they are undercapitalized or assigned to pledge 110% by the Office of the State Treasurer. In the event of a bank failure, the entire pool of collateral pledged by all qualified Oregon public funds bank depositories is available to repay deposits of public funds of government entities. As of June 30, 2021, all of the City's bank balances were covered by FDIC insurance.

Local Government Investment Pool

The State Treasurer of the State of Oregon maintains the Oregon Short Term Fund, of which the Local Government Investment Pool is part. Participation by local governments is voluntary. The State of Oregon investment policies are governed by statute and the Oregon Investment Council. In accordance with Oregon Statutes, the investment funds are invested as a prudent investor would do, exercising reasonable care, skill and caution. The Oregon Short Term Fund is the LGIP for local governments and was established by the State Treasurer. It was created to meet the financial and administrative responsibilities of federal arbitrage regulations. The investments are regulated by the Oregon Short Term Fund Board and approved by the Oregon Investment Council (ORS 294.805 to 294.895). At June 30, 2021, the fair value of the position in the Oregon State Treasurer's Short Term Investment Pool was approximately equal to the value of the pool shares. The investment in the Oregon Short Term Fund is not subject to risk evaluation. The LGIP is not rated for credit quality. Separate financial statements for the Oregon Short Term Fund are available from the Oregon State Treasurer.

Interest Rate Risk

In accordance with its investment policy, the City manages its exposure to declines in fair value of its investments by limiting its investments to the LGIP.

Custodial Credit Risk - Investments

For an investment, this is the risk that, in the event of a failure of the counterparty, the City will not be able to recover the value of its investments or collateralized securities that are in the possession of an outside party. The City's investment policy limits the types of investments that may be held and does not allow securities to be held by the counterparty.

The LGIP is administered by the Oregon State Treasury with the advice of other state agencies and is not registered with the U.S. Securities and Exchange Commission. The LGIP is an open-ended no-load diversified portfolio offered to any agency, political subdivision, or public corporation of the state that by law is made the custodian of or has control of any fund. The LGIP is commingled with the State's short-term funds. In seeking to best serve local governments of Oregon, the Oregon Legislature established the Oregon Short Term Fund Board, which has established diversification percentages and specifies the types and maturities of the investments.

The purpose of the Board is to advise the Oregon State Treasury in the management and investment of the LGIP. These investments within the LGIP must be invested and managed as a prudent investor would, exercising reasonable care, skill and caution. Professional standards indicate that the investments in external investment pools are not subject to custodial risk because they are not evidenced by securities that exist in physical or book entry form. Nevertheless, management does not believe that there is any substantial custodial risk related to investments in the LGIP.

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LONG-TERM DEBT

As a result of the use of the modified cash basis of accounting in this report, obligations related to long-term debt and other obligations are not reported as liabilities in the financial statements. Long-term debt transactions for the year were as follows:

	Outstanding July 1, 2020	***Issued***	***Matured/ Redeemed During Year***	***Outstanding June 30, 2021***	***Due Within One Year***
Business-type activities - direct borrowings					
2009 General Obligation Bonds	$ 1,275,000	$ -	$ (310,000)	$ 965,000	$ 335,000
Safe Drinking Water Loan	207,958	-	(14,653)	193,305	15,093
	$ 1,482,958	$ -	$ (324,653)	$ 1,158,305	$ 350,093

Debt payments on the general obligation bonds are made from the G.O. Waste Water Bond Fund.

Direct Borrowings – Business-type Activities

2009 G. O. Bonds: On May 28, 2009 the City issued $3,530,000 of general obligation bonds for sewer system capital improvements. The bonds call for annual payments ranging from $287,374 to $383,350 including interest at rates ranging from 2.5% to 4,5%. The bonds mature on June 1, 2024. The loan is secured by tax increment revenues, and, in the event of default, the bonds are not subject to acceleration.

Safe Drinking Water Loan: On July 31, 2009 the City entered into a loan agreement with the Oregon Economic and Community Development Division (subsequently renamed Oregon Business Development Division) in the amount of $330,812 with annual payments of $20,892 which include interest at 3% through December 1, 2030. The purpose of the loan was for water system capital improvements. In the event of default, the lender may declare all amounts immediately due and payable and may exercise any remedy available at law or in equity.

Future debt service requirements are as follows:

Fiscal Year Ending June 30,	***Principal***	***Interest***	***Total***
2022	$ 350,093	$ 49,224	$ 399,317
2023	370,546	33,696	404,242
2024	291,012	17,254	308,266
2025	16,492	4,400	20,892
2026	16,987	3,905	20,892
2027-2031	92,892	11,567	104,459
2032	20,283	607	20,890
	$ 1,158,305	$ 120,653	$ 1,278,958

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PENSION PLAN

Plan Description - City employees are provided pension benefits through the Oregon Public Employees Retirement System (PERS). PERS is a cost-sharing multiple-employer defined benefit pension plan for units of state and local government in Oregon, containing multiple actuarial pools. Benefits are established and amended by the Oregon State Legislature pursuant to ORS Chapters 238 and 238A. The legislature has delegated the authority to administer and manage PERS to the Public Employees Retirement Board. PERS issues a publicly available financial report that can be found at: https://www.oregon.gov/pers/Pages/Financials/Actuarial-Financial-Information.aspx

Benefits Provided - PERS provides retirement, disability, and death benefits which vary based on a qualified employee's hiring date and employment class (general service or police/fire). All City employees are eligible to participate after six months of covered employment. Details applicable to police/fire employees are noted in [square brackets] where different.

The Tier One/Tier Two Retirement Plan applies to qualifying employees hired before August 29, 2003 and is closed to new members.

Monthly retirement benefits are based on final 3-year average salary multiplied by years of service and a factor of 1.67% [2.00%]. Benefits may also be based on a money match computation, or formula plus annuity (for members contributing before August 21, 1981), if a greater benefit results. Employees are fully vested after making contributions in each of five calendar years, and are eligible to retire at age 55 [50]. Tier One benefits are reduced if retirement occurs prior to age 58 [55] with less than 30 [25] years of service; Tier Two benefits are reduced for retirement prior to age 60.

Employees are eligible for service-related disability benefits regardless of length of service; 10 years of service is required for nonservice-related benefits. Disability benefits are determined in the same manner as retirement benefits with service time computed to age 58 [55].

Upon the death of a non-retired member, the beneficiary receives a lump-sum refund of the member's account balance. The beneficiary may also receive a matching lump-sum payment from employer funds if the member was in covered employment at the time of death, or if the member died less than 120 days after termination, while on official leave of absence, or as a result of a job-related injury.

Monthly benefits are subject to annual cost-of-living adjustments (COLA). For benefits earned after the relevant effective dates, the COLA is subject to a cap of 1.25% on the first $60,000 of annual benefits and 0.15% thereafter (ORS 238.360).

The Oregon Public Service Retirement Plan (OPSRP) applies to qualifying employees hired on or after August 29, 2003.

Monthly retirement benefits are based on final 3-year average salary multiplied by years of service and a factor of 1.50% [1.80%]. Employees are fully vested after completing 600 hours of service in each of five calendar years and are eligible to retire at age 58 [53] with 30 [25] years of service, or at age 65 [60] otherwise.

Employees are eligible for service-related disability benefits regardless of length of service; 10 years of service is required for nonservice-related benefits. The benefit is 45% of the employee's salary during the last full month of employment before the disability occurred.

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***PENSION PLAN** (Continued)*

Upon the death of a non-retired member, the beneficiary receives a monthly benefit equal to 50% of the retirement benefit that would have been paid to the member.

Monthly benefits are subject to annual cost-of-living adjustments (COLA). For benefits earned after the relevant effective dates, the COLA is subject to a cap of 1.25% on the first $60,000 of annual benefits and 0.15% thereafter (ORS 238A.210).

Contribution Requirements – As a participating employer, the City is required to make monthly contributions to PERS based on actuarially determined percentages of covered payroll. Rates in effect for fiscal year 2021 were 10.35% for Tier One/Tier Two employees, 2.86% for OPSRP general service employees, and 7.49% for OPSRP police/fire employees. The City's total contributions to PERS were $8,134 for fiscal year ended June 30, 2021.

Contribution requirements are established by Oregon statute and may be amended by an act of the Oregon State Legislature. Employer contribution rates for fiscal year 2021 were based on the December 31, 2017 actuarial valuation using the entry age normal actuarial cost method. It is important to note that the actuarial valuations used for rate setting are based on different methods and assumptions than those used for financial reporting which are described later in this note.

Employee contributions are set by statute at 6% of salary and are remitted by participating employers, who may agree to make employee contributions on the employee's behalf. Prior to January 1, 2004, employee contributions were credited to the defined benefit pension plan. Beginning January 1, 2004, all employee contributions were placed in the OPSRP Individual Account Program (IAP), a defined contribution pension plan described further at the end of this note.

Pension Assets/Liabilities, Pension Expense, and Pension-Related Deferrals – At June 30, 2021, the City reported a net pension liability of $401,492 as its proportionate share of the collective net pension liability for PERS, measured as of June 30, 2020. The total pension liability used to calculate the net pension liability was based on a December 31, 2018 actuarial valuation, rolled forward to the measurement date.

The City's proportion of the net pension liability was based on a projection of the City's long-term share of contributions to PERS relative to the projected contributions of all participating employers, as actuarially determined. The City's proportion was 0.00184% as of the June 30, 2020 measurement date, compared to 0.00098% as of June 30, 2019.

Actuarial Methods and Assumptions – The total pension liability in the December 31, 2018 actuarial valuation was determined using the entry age normal method and the following actuarial assumptions, applied to all periods included in the measurement: inflation rate of 2.50%, projected salary increases of 3.50%, investment rate of return of 7.20%, and mortality rates based on the Pub-2010 Healthy Retiree, sex distinct, generational with Unisex, Social Security Data Scale, with job category adjustments and set-backs. These assumptions were based on the results of the December 31, 2018 actuarial experience study.

The long-term expected rate of return on pension plan investments was developed by combining estimated rates of return for each major asset class weighted by target asset allocation percentages and adjusting for inflation.

Target allocations and estimated geometric rates of return for each major asset class are available in the PERS publicly available financial report previously mentioned.

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***PENSION PLAN** (Continued)*

The discount rate used to measure the total pension liability was 7.20%. The projection of cash flows used to determine the discount rate assumed that contributions from plan members and those of the contributing employers are made at the contractually required rates, as actuarially determined. Based on those assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

The following chart shows the sensitivity of the net pension liability (asset) to changes in the discount rate, based on calculations using the discount rates of 6.20%, 7.20%, and 8.20%.

	1% Decrease (6.20%)	Discount Rate (7.20%)	1% Increase (8.20%)
Proportionate share of the net pension liability	$ 596,183	$ 401,492	$ 238,235

Pension Plan Fiduciary Net Position – Detailed information about PERS' net position is available in its separately issued financial report.

TRANSFERS (BUDGETARY BASIS)

Fund	*Transfers In*	*Transfers Out*
General	$ -	$ 112,000
City Hall Building	105,000	-
Aurora Colony Days	7,000	-
	$ 112,000	$ 112,000

Transfers are used to (1) move resources from the fund that statute or budget requires to collect them to the fund that statute or budget requires to expend them, (2) move revenues restricted to debt service from the funds collecting the revenues to the debt service fund as debt service payments become due, and (3) use unrestricted revenues collected in the general fund to finance various programs accounted for in other funds in accordance with budgetary authorizations.

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CONTINGENCIES

The City purchases commercial insurance to cover all commonly insurable risks, which includes property damage, liability and employee bonds. Most policies carry a small deductible amount. No insurance claims settled in each of the prior three years have exceeded policy coverage.

RISKS OF UNCERTAINTIES

As a result of the recent coronavirus pandemic (COVID-19), numerous sectors of the economy are suffering damage and long-term economic and business consequences of this remain unknown. The extent to which this will impact the District is uncertain.

SUBSEQUENT EVENTS

Management has evaluated subsequent events through November 10, 2021, the date on which the financial statements were available to be issued. Management is not aware of any subsequent events that require recognition or disclosure in the financial statements.

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SUPPLEMENTAL INFORMATION

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CITY OF AURORA, OREGON

COMBINING BALANCE SHEET (BUDGETARY BASIS) - NONMAJOR GOVERNMENTAL FUNDS

JUNE 30, 2021

	Special Revenue	Capital Projects				
	Aurora Colony Days	Park SDC	Park Reserve	Street / Storm SDC	Street / Storm Reserve	Total
ASSETS						
Cash and cash equivalents	$ 12,412	$ 73,621	$ 1,247	$ 95,435	$ 135,683	$ 318,398
LIABILITIES AND FUND BALANCE						
Liabilities	$ -	$ -	$ -	$ -	$ -	$ -
Fund Balance:						
Restricted for:						
Capital acquisitions	-	73,621	-	-	135,683	209,304
Streets	-	-	-	95,435	-	95,435
Community development	12,412	-	-	-	-	12,412
Committed to:						
Capital acquisitions	-	-	1,247	-	-	1,247
Total Fund Balance	12,412	73,621	1,247	95,435	135,683	318,398
Total Liabilities and Fund Balance	$ 12,412	$ 73,621	$ 1,247	$ 95,435	$ 135,683	$ 318,398

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CITY OF AURORA, OREGON

COMBINING STATEMENT OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE (BUDGETARY BASIS) - NONMAJOR GOVERNMENTAL FUNDS

YEAR ENDED JUNE 30, 2021

	Special Revenue	Capital Projects				
	Aurora Colony Days	Park SDC	Park Reserve	Street / Storm SDC	Street / Storm Reserve	Total
REVENUES						
Licenses and permits	$ -	$ 11,025	$ -	$ 11,760	$ -	$ 22,785
Charges for services	-	-	-	-	14,298	14,298
Interest earnings	116	545	10	705	983	2,359
Total Revenues	116	11,570	10	12,465	15,281	39,442
EXPENDITURES						
Community development	4,535	-	-	-	-	4,535
REVENUES OVER (UNDER) EXPENDITURES	(4,419)	11,570	10	12,465	15,281	34,907
OTHER FINANCING SOURCES (USES)						
Transfers in	7,000	-	-	-	-	7,000
NET CHANGE IN FUND BALANCE	2,581	11,570	10	12,465	15,281	41,907
FUND BALANCE, beginning of year	9,831	62,051	1,237	82,970	120,402	276,491
FUND BALANCE, end of year	$ 12,412	$ 73,621	$ 1,247	$ 95,435	$ 135,683	$ 318,398

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CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(BUDGETARY BASIS) - BUDGET AND ACTUAL - GENERAL FUND
YEAR ENDED JUNE 30, 2021

	Budget Amounts			
	Original	Final	Actual	Variance
REVENUES				
Taxes and assessments	$ 316,536	$ 316,536	$ 324,537	$ 8,001
Fines and forfeitures	23,200	23,200	53,810	30,610
Licenses and permits	120,000	120,000	155,582	35,582
Intergovernmental	60,000	110,000	81,811	(28,189)
Miscellaneous	83,100	83,100	59,917	(23,183)
Interest earnings	8,000	8,000	4,369	(3,631)
Total Revenues	610,836	660,836	680,026	19,190
EXPENDITURES				
Administration	420,629	420,629	199,952	220,677
Community development	195,280	245,280	158,791	86,489
Municipal court	12,100	12,100	203,097	(190,997)
Public facilities	59,900	59,900	39,548	20,352
Parks	88,115	88,115	62,273	25,842
Contigency	349,312	349,312	-	349,312
Total Expenditures	1,125,336	1,175,336	663,661	511,675
REVENUES OVER (UNDER) EXPENDITURES	(514,500)	(514,500)	16,365	530,865
OTHER FINANCING SOURCES (USES)				
Transfers out	(112,000)	(112,000)	(112,000)	-
NET CHANGE IN FUND BALANCE	(626,500)	(626,500)	(95,635)	530,865
FUND BALANCE, beginning of year	626,500	626,500	643,409	16,909
FUND BALANCE, end of year	$ -	$ -	$ 547,774	$ 547,774

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CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE (BUDGETARY BASIS) - BUDGET AND ACTUAL - STREET/STORM OPERATING FUND YEAR ENDED JUNE 30, 2021

	Budget Amounts			
	Original	Final	Actual	Variance
REVENUES				
Charges for services	$ 17,280	$ 17,280	$ 18,574	$ 1,294
Intergovernmental	170,000	170,000	70,865	(99,135)
Miscellaneous	100	100	651	551
Interest earnings	2,500	2,500	1,519	(981)
Total Revenues	189,880	189,880	91,609	(98,271)
EXPENDITURES				
Street/Storm				
Personal services	31,899	31,899	27,490	4,409
Materials and services	74,000	74,000	61,304	12,696
Capital outlay	162,500	162,500	52,500	110,000
Contingency	128,481	128,481	-	128,481
Total Expenditures	396,880	396,880	141,294	255,586
NET CHANGE IN FUND BALANCE	(207,000)	(207,000)	(49,685)	157,315
FUND BALANCE, beginning of year	207,000	207,000	215,803	8,803
FUND BALANCE, end of year	$ -	$ -	$ 166,118	$ 166,118

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CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE (BUDGETARY BASIS) - BUDGET AND ACTUAL - CITY HALL BUILDING FUND YEAR ENDED JUNE 30, 2021

	Budget Amounts			
	Original	Final	Actual	Variance
REVENUES				
Licenses and permits	$ 4,000	$ 4,000	$ 4,242	$ 242
Miscellaneous	100	100	-	(100)
Interest earnings	300	300	3,048	2,748
Total Revenues	4,400	4,400	7,290	2,890
EXPENDITURES				
Public Facilities				
Capital outlay	394,950	394,950	-	394,950
REVENUES OVER (UNDER) EXPENDITURES	(390,550)	(390,550)	7,290	397,840
OTHER FINANCING SOURCES (USES)				
Transfers in	105,000	105,000	105,000	-
NET CHANGE IN FUND BALANCE	(285,550)	(285,550)	112,290	397,840
FUND BALANCE, beginning of year	285,550	285,550	285,650	100
FUND BALANCE, end of year	$ -	$ -	$ 397,940	$ 397,940

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CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE (BUDGETARY BASIS) - BUDGET AND ACTUAL - AURORA COLONY DAYS FUND YEAR ENDED JUNE 30, 2021

	Budget Amounts			
	Original	Final	Actual	Variance
REVENUES				
Licenses and permits	$ 2,825	$ 2,825	$ -	$ (2,825)
Miscellaneous	8,175	8,175	-	(8,175)
Interest earnings	125	125	116	(9)
Total Revenues	11,125	11,125	116	(11,009)
EXPENDITURES				
Aurora Colony Days				
Personal services	3,443	3,443	2,805	638
Materials and services	16,700	16,700	1,730	14,970
Contingency	7,782	7,782	-	7,782
Total Expenditures	27,925	27,925	4,535	23,390
REVENUES OVER (UNDER) EXPENDITURES	(16,800)	(16,800)	(4,419)	12,381
OTHER FINANCING SOURCES (USES)				
Transfers in	7,000	7,000	7,000	-
NET CHANGE IN FUND BALANCE	(9,800)	(9,800)	2,581	12,381
FUND BALANCE, beginning of year	9,800	9,800	9,831	31
FUND BALANCE, end of year	$ -	$ -	$ 12,412	$ 12,412

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CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(BUDGETARY BASIS) - BUDGET AND ACTUAL - PARK SDC FUND
YEAR ENDED JUNE 30, 2021

	Budget Amounts			
	Original	Final	Actual	Variance
REVENUES				
Licenses and permits	$ 22,050	$ 22,050	$ 11,025	$ (11,025)
Interest earnings	800	800	545	(255)
Total Revenues	22,850	22,850	11,570	(11,280)
EXPENDITURES				
Parks				
Capital outlay	84,832	84,832	-	84,832
NET CHANGE IN FUND BALANCE	(61,982)	(61,982)	11,570	73,552
FUND BALANCE, beginning of year	61,982	61,982	62,051	69
FUND BALANCE, end of year	$ -	$ -	$ 73,621	$ 73,621

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CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(BUDGETARY BASIS) - BUDGET AND ACTUAL - PARK RESERVE FUND
YEAR ENDED JUNE 30, 2021

	Budget Amounts			
	Original	Final	Actual	Variance
REVENUES				
Interest earnings	$ 13	$ 13	$ 10	$ (3)
EXPENDITURES				
Parks				
Capital outlay	1,249	1,249	-	1,249
NET CHANGE IN FUND BALANCE	(1,236)	(1,236)	10	1,246
FUND BALANCE, beginning of year	1,236	1,236	1,237	1
FUND BALANCE, end of year	$ -	$ -	$ 1,247	$ 1,247

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CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE (BUDGETARY BASIS) - BUDGET AND ACTUAL - STREET/STORM SDC FUND YEAR ENDED JUNE 30, 2021

	Budget Amounts			
	Original	Final	Actual	Variance
REVENUES				
Licenses and permits	$ 37,700	$ 37,700	$ 11,760	$ (25,940)
Interest earnings	1,300	1,300	705	(595)
Total Revenues	39,000	39,000	12,465	(26,535)
EXPENDITURES				
Street/Storm				
Capital outlay	121,874	121,874	-	121,874
NET CHANGE IN FUND BALANCE	(82,874)	(82,874)	12,465	95,339
FUND BALANCE, beginning of year	82,874	82,874	82,970	96
FUND BALANCE, end of year	$ -	$ -	$ 95,435	$ 95,435

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CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE (BUDGETARY BASIS) - BUDGET AND ACTUAL - STREET/STORM RESERVE FUND YEAR ENDED JUNE 30, 2021

	Budget Amounts			
	Original	Final	Actual	Variance
REVENUES				
Charges for services	$ 14,400	$ 14,400	$ 14,298	$ (102)
Interest earnings	1,200	1,200	983	(217)
Total Revenues	15,600	15,600	15,281	(319)
EXPENDITURES				
Streets/Storm				
Capital outlay	135,945	135,945	-	135,945
NET CHANGE IN FUND BALANCE	(120,345)	(120,345)	15,281	135,626
FUND BALANCE, beginning of year	120,345	120,345	120,402	57
FUND BALANCE, end of year	$ -	$ -	$ 135,683	$ 135,683

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CITY OF AURORA, OREGON

COMBINING SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE (BUDGETARY BASIS) - WATER OPERATIONS FUNDS

YEAR ENDED JUNE 30, 2021

	Water	*Water Reserve*	*Water SDC*	*Total*
REVENUES				
Licenses and permits	$ -	$ -	$ 22,172	$ 22,172
Charges for services	372,177	-	-	372,177
Miscellaneous	3,575	-	-	3,575
Interest earnings	3,123	776	1,447	5,346
Total Revenues	378,875	776	23,619	403,270
EXPENDITURES				
Personal services	112,878	-	-	112,878
Materials and services	144,666	-	-	144,666
Debt service				
Principal	14,653	-	-	14,653
Interest	6,239	-	-	6,239
Capital outlay	55,357	72,286	154,700	282,343
Total Expenditures	333,793	72,286	154,700	560,779
CHANGE IN FUND BALANCE	45,082	(71,510)	(131,081)	(157,509)
FUND BALANCE, beginning of year	406,783	104,327	182,979	694,089
FUND BALANCE, end of year	$ 451,865	$ 32,817	$ 51,898	$ 536,580

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CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(BUDGETARY BASIS) - BUDGET AND ACTUAL - WATER OPERATING FUND
YEAR ENDED JUNE 30, 2021

	Budget Amounts			
	Original	Final	Actual	Variance
REVENUES				
Charges for services	$ 382,000	$ 382,000	$ 372,177	$ (9,823)
Miscellaneous	1,875	1,875	3,575	1,700
Interest earnings	4,000	4,000	3,123	(877)
Total Revenues	387,875	387,875	378,875	(9,000)
EXPENDITURES				
Water Operating				
Personal services	137,029	137,029	112,878	24,151
Materials and services	187,475	187,475	144,666	42,809
Capital outlay	80,000	80,000	55,357	24,643
Debt service				
Principal	14,653	14,653	14,653	-
Interest	6,239	6,239	6,239	-
Contingency	163,979	163,979	-	163,979
Total Expenditures	589,375	589,375	333,793	255,582
CHANGE IN FUND BALANCE	(201,500)	(201,500)	45,082	246,582
FUND BALANCE, beginning of year	401,500	401,500	406,783	5,283
FUND BALANCE, end of year	$ 200,000	$ 200,000	$ 451,865	$ 251,865

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CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(BUDGETARY BASIS) - BUDGET AND ACTUAL - WATER RESERVE FUND
YEAR ENDED JUNE 30, 2021

	Budget Amounts			
	Original	Final	Actual	Variance
REVENUES				
Interest earnings	$ 1,200	$ 1,200	$ 776	$ (424)
EXPENDITURES				
Water				
Capital outlay	105,500	105,500	72,286	33,214
CHANGE IN FUND BALANCE	(104,300)	(104,300)	(71,510)	32,790
FUND BALANCE, beginning of year	104,300	104,300	104,327	27
FUND BALANCE, end of year	$ -	$ -	$ 32,817	$ 32,817

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CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(BUDGETARY BASIS) - BUDGET AND ACTUAL - WATER SDC FUND
YEAR ENDED JUNE 30, 2021

	Budget Amounts			
	Original	Final	Actual	Variance
REVENUES				
Licenses and permits	$ 72,059	$ 72,059	$ 22,172	$ (49,887)
Interest earnings	500	500	1,447	947
Total Revenues	72,559	72,559	23,619	(48,940)
EXPENDITURES				
Water				
Capital outlay	255,446	255,446	154,700	100,746
CHANGE IN FUND BALANCE	(182,887)	(182,887)	(131,081)	51,806
FUND BALANCE, beginning of year	182,887	182,887	182,979	92
FUND BALANCE, end of year	$ -	$ -	$ 51,898	$ 51,898

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CITY OF AURORA, OREGON

COMBINING SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE (BUDGETARY BASIS) - SEWER OPERATIONS FUNDS

YEAR ENDED JUNE 30, 2021

	Sewer	*Sewer Reserve*	*Sewer SDC*	*General Obligation Wastewater Bond*	*Total*
REVENUES					
Taxes and assessments	$ -	$ -	$ -	$ 363,189	$ 363,189
Licenses and permits	-	-	8,128	-	8,128
Charges for services	376,470	-	-	-	376,470
Miscellaneous	1,741	-	-	-	1,741
Interest earnings	3,760	267	568	1,362	5,957
Total Revenues	381,971	267	8,696	364,551	755,485
EXPENDITURES					
Personal services	125,936	-	-	-	125,936
Materials and services	178,247	-	-	-	178,247
Debt service					
Principal	-	-	-	310,000	310,000
Interest	-	-	-	57,375	57,375
Capital outlay	5,220	-	-	-	5,220
Total Expenditures	309,403	-	-	367,375	676,778
CHANGE IN FUND BALANCE	72,568	267	8,696	(2,824)	78,707
FUND BALANCE, beginning of year	467,353	34,478	67,885	19,368	589,084
FUND BALANCE, end of year	$ 539,921	$ 34,745	$ 76,581	$ 16,544	$ 667,791

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CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(BUDGETARY BASIS) - BUDGET AND ACTUAL - SEWER OPERATING FUND
YEAR ENDED JUNE 30, 2021

	Budget Amounts			
	Original	Final	Actual	Variance
REVENUES				
Charges for services	$ 361,000	$ 361,000	$ 376,470	$ 15,470
Miscellaneous	250	250	1,741	1,491
Interest earnings	3,000	3,000	3,760	760
Total Revenues	364,250	364,250	381,971	17,721
EXPENDITURES				
Sewer Operations				
Personal services	152,237	152,237	125,936	26,301
Materials and services	205,750	205,750	178,247	27,503
Capital outlay	240,000	240,000	5,220	234,780
Contingency	229,263	229,263	-	229,263
Total Expenditures	827,250	827,250	309,403	517,847
CHANGE IN FUND BALANCE	(463,000)	(463,000)	72,568	535,568
FUND BALANCE, beginning of year	463,000	463,000	467,353	4,353
FUND BALANCE, end of year	$ -	$ -	$ 539,921	$ 539,921

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CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(BUDGETARY BASIS) - BUDGET AND ACTUAL - SEWER RESERVE FUND
YEAR ENDED JUNE 30, 2021

	Budget Amounts			
	Original	Final	Actual	Variance
REVENUES				
Interest earnings	$ 350	$ 350	$ 267	$ (83)
EXPENDITURES				
Sewer				
Capital outlay	34,802	34,802	-	34,802
CHANGE IN FUND BALANCE	(34,452)	(34,452)	267	34,719
FUND BALANCE, beginning of year	34,452	34,452	34,478	26
FUND BALANCE, end of year	$ -	$ -	$ 34,745	$ 34,745

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CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(BUDGETARY BASIS) - BUDGET AND ACTUAL - SEWER SDC FUND
YEAR ENDED JUNE 30, 2021

	Budget Amounts			
	Original	Final	Actual	Variance
REVENUES				
Licenses and permits	$ 26,416	$ 26,416	$ 8,128	$ (18,288)
Interest earnings	1,100	1,100	568	(532)
Total Revenues	27,516	27,516	8,696	(18,820)
EXPENDITURES				
Sewer				
Capital outlay	95,506	95,506	-	95,506
CHANGE IN FUND BALANCE	(67,990)	(67,990)	8,696	76,686
FUND BALANCE, beginning of year	67,990	67,990	67,885	(105)
FUND BALANCE, end of year	$ -	$ -	$ 76,581	$ 76,581

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CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE (BUDGETARY BASIS) - BUDGET AND ACTUAL - G.O. WASTE WATER BOND FUND YEAR ENDED JUNE 30, 2021

	Budget Amounts			
	Original	Final	Actual	Variance
REVENUES				
Taxes and assessments	$ 355,375	$ 355,375	$ 363,189	$ 7,814
Interest earnings	2,000	2,000	1,362	(638)
Total Revenues	357,375	357,375	364,551	7,176
EXPENDITURES				
Debt service				
Principal	310,000	310,000	310,000	-
Interest	57,375	57,375	57,375	-
Total Expenditures	367,375	367,375	367,375	-
CHANGE IN FUND BALANCE	(10,000)	(10,000)	(2,824)	7,176
FUND BALANCE, beginning of year	20,000	20,000	19,368	(632)
FUND BALANCE, end of year	$ 10,000	$ 10,000	$ 16,544	$ 6,544

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COMPLIANCE SECTION

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GROVE, MUELLER & SWANK, P.C.
CERTIFIED PUBLIC ACCOUNTANTS AND CONSULTANTS
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475 Cottage Street NE, Suite 200 • Salem, Oregon 97301-3814

INDEPENDENT AUDITOR'S REPORT REQUIRED BY OREGON STATE REGULATIONS

City of Aurora
21420 Main Street NE
Aurora, Oregon 97002

We have audited, in accordance with auditing standards generally accepted in the United States of America, the basic financial statements of the City of Aurora, Oregon as of and for the year ended June 30, 2021, and have issued our report thereon dated November 20, 2021.

Compliance and Other Matters

As part of obtaining reasonable assurance about whether the City's financial statements are free of material misstatement, we performed tests of its compliance with certain provisions of laws, regulations, contracts, and grants, including the provisions of Oregon Revised Statutes as specified in Oregon Administrative Rules 162-10-000 through 162-10-320 of the Minimum Standards for Audits of Oregon Municipal Corporations, noncompliance with which could have a direct and material effect on the determination of financial statements amounts. However, providing an opinion on compliance with those provisions was not an objective of our audit, and accordingly, we do not express such an opinion.

We performed procedures to the extent we considered necessary to address the required comments and disclosures which included, but were not limited to the following:

- **Deposit of public funds with financial institutions (ORS Chapter 295).**
- **Indebtedness limitations, restrictions and repayment.**
- **Budgets legally required (ORS Chapter 294).**
- **Insurance and fidelity bonds in force or required by law.**
- **Programs funded from outside sources.**
- **Highway revenues used for public highways, roads, and streets.**
- **Authorized investment of surplus funds (ORS Chapter 294).**
- **Public contracts and purchasing (ORS Chapters 279A, 279B, 279C).**
- **Accountability for collecting or receiving money by elected officials - no money was collected or received by elected officials.**

In connection with our testing nothing came to our attention that caused us to believe the City was not in substantial compliance with certain provisions of laws, regulations, contracts, and grants, including the provisions of Oregon Revised Statutes as specified in Oregon Administrative Rules 162-10-000 through 162-10-320 of the Minimum Standards for Audits of Oregon Municipal Corporations.

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Internal Control Over Financial Reporting

In planning and performing our audit of the financial statements, we considered the City's internal control over financial reporting to determine the audit procedures that are appropriate in the circumstances for the purpose of expressing our opinion on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of the City's internal control. Accordingly, we do not express an opinion on the effectiveness of the City's internal control.

Restriction on Use

This report is intended solely for the information and use of the City Council and management of the City of Aurora, Oregon and the Oregon Secretary of State and is not intended to be and should not be used by anyone other than these parties.

GROVE, MUELLER & SWANK, P.C.
CERTIFIED PUBLIC ACCOUNTANTS

By: 

Devan W. Esch, A Shareholder
November 10, 2021

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Appendix E:
CIP Project Sheets

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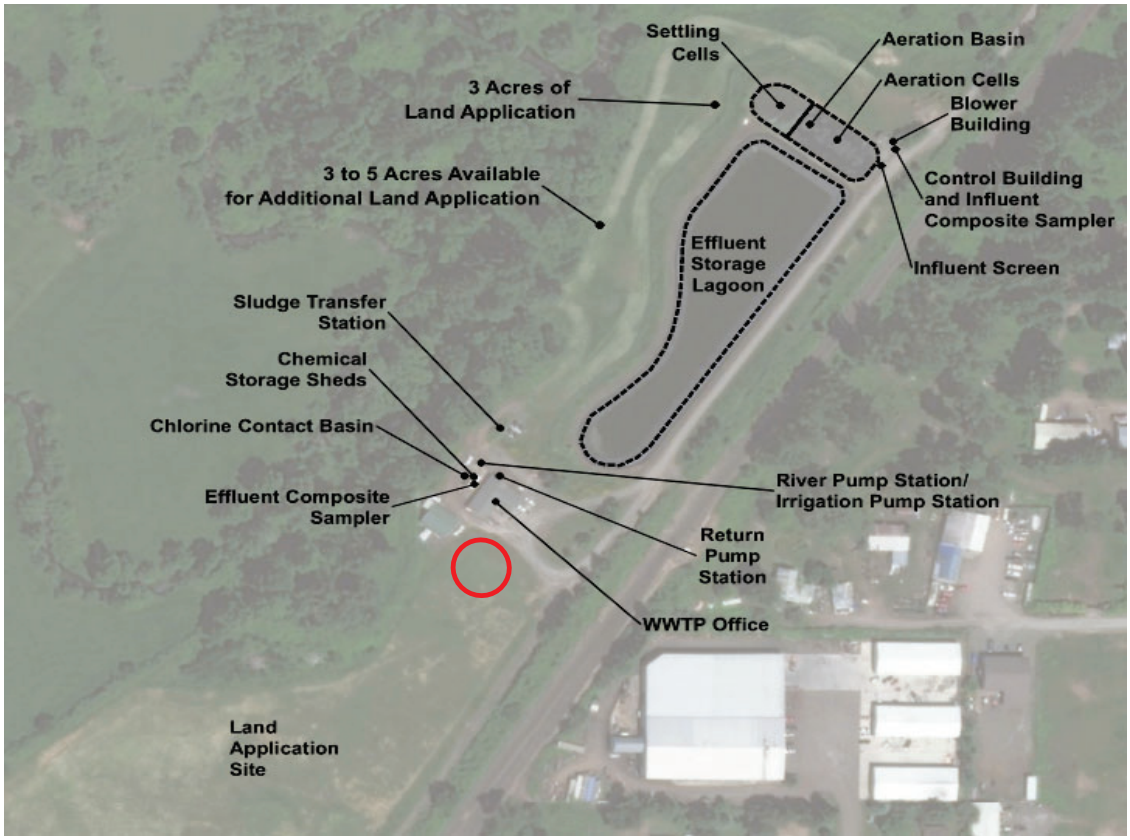
Wastewater Facilities Project: Sequencing Batch Reactor

Project Identifier: 1.1

Objective: Construct a sequencing batch reactor for mechanical treatment.



General Line Item	Cost (2022)	
Sitework	$	100,000
Treatment Equipment	$	1,296,000
Concrete Basins	$	267,000
Concrete for Slab	$	188,000
Metal Stairs	$	15,000
Aluminum Handrail	$	3,000
3" FRP Grating	$	2,000
Blower Building	$	806,000
Piping/Valves and Instrumentation	$	150,000
Electrical/Mechanical/Controls	$	425,000
Mobilization (10%)	$	326,000
Contingency (30%)	$	976,000
Overhead and Profit (15%)	$	488,000
Construction Subtotal	**$**	**5,042,000**
Soft Costs (25%)	$	1,261,000
Total Project Cost	**$**	**6,303,000**

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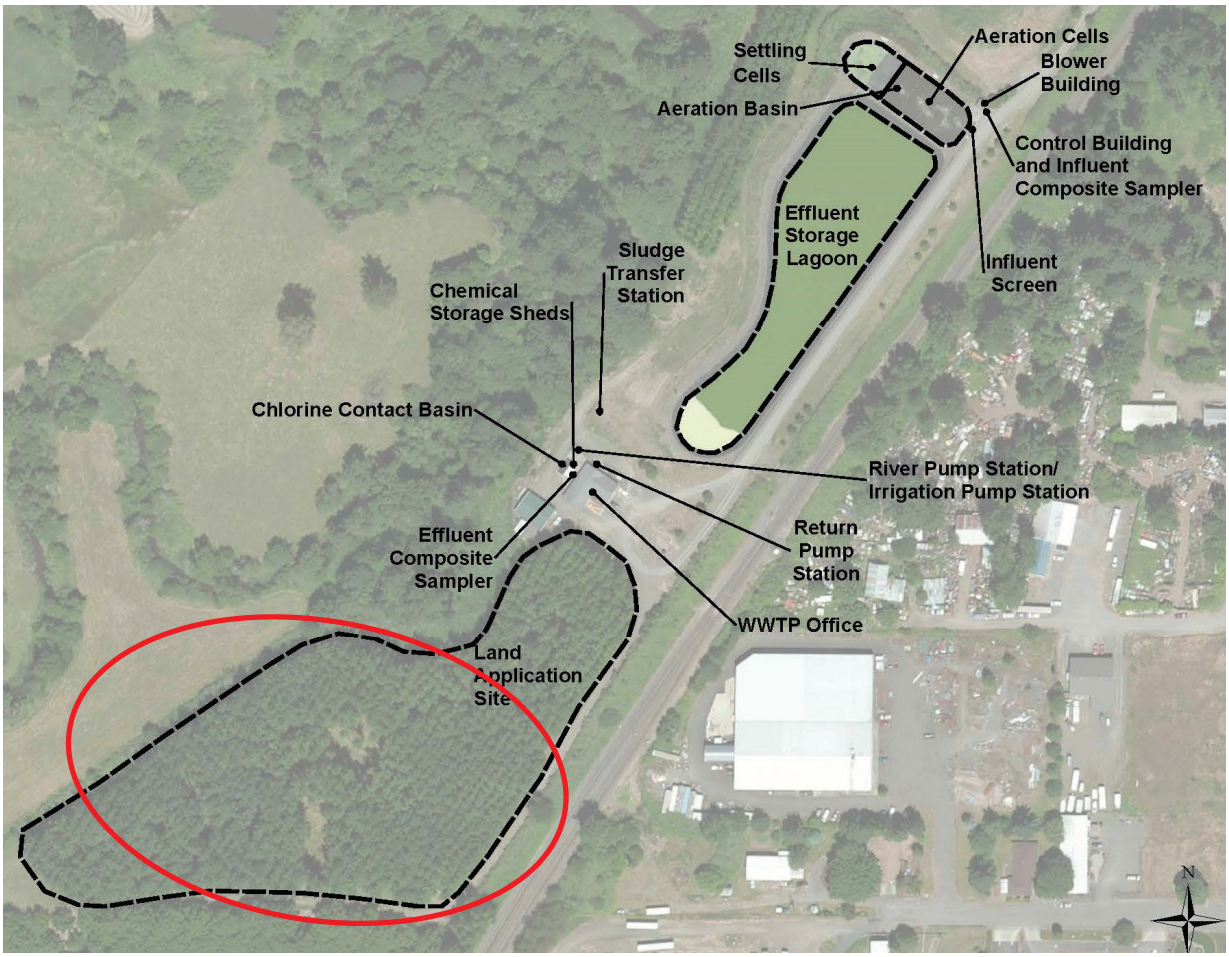
Wastewater Facilities Project: Additional Effluent Storage Lagoon

Project Identifier: 1.2

Objective: An additional effluent storage lagoon and pump station to store the water during the summer.



Item	Cost (2022)
Site Work	$ 20,000
Storage Lagoon	$ 1,320,000
Pump Station	$ 230,000
Piping/Valves and Instrumentation	$ 430,000
Electrical/Mechanical/Controls	$ 132,000
Mobilization (10%)	$ 214,000
Contingency (30%)	$ 640,000
Overhead and Profit (15%)	$ 320,000
Construction Subtotal	**$ 3,306,000**
Soft Costs (25%)	$ 827,000
Total Project Cost	**$ 4,133,000**

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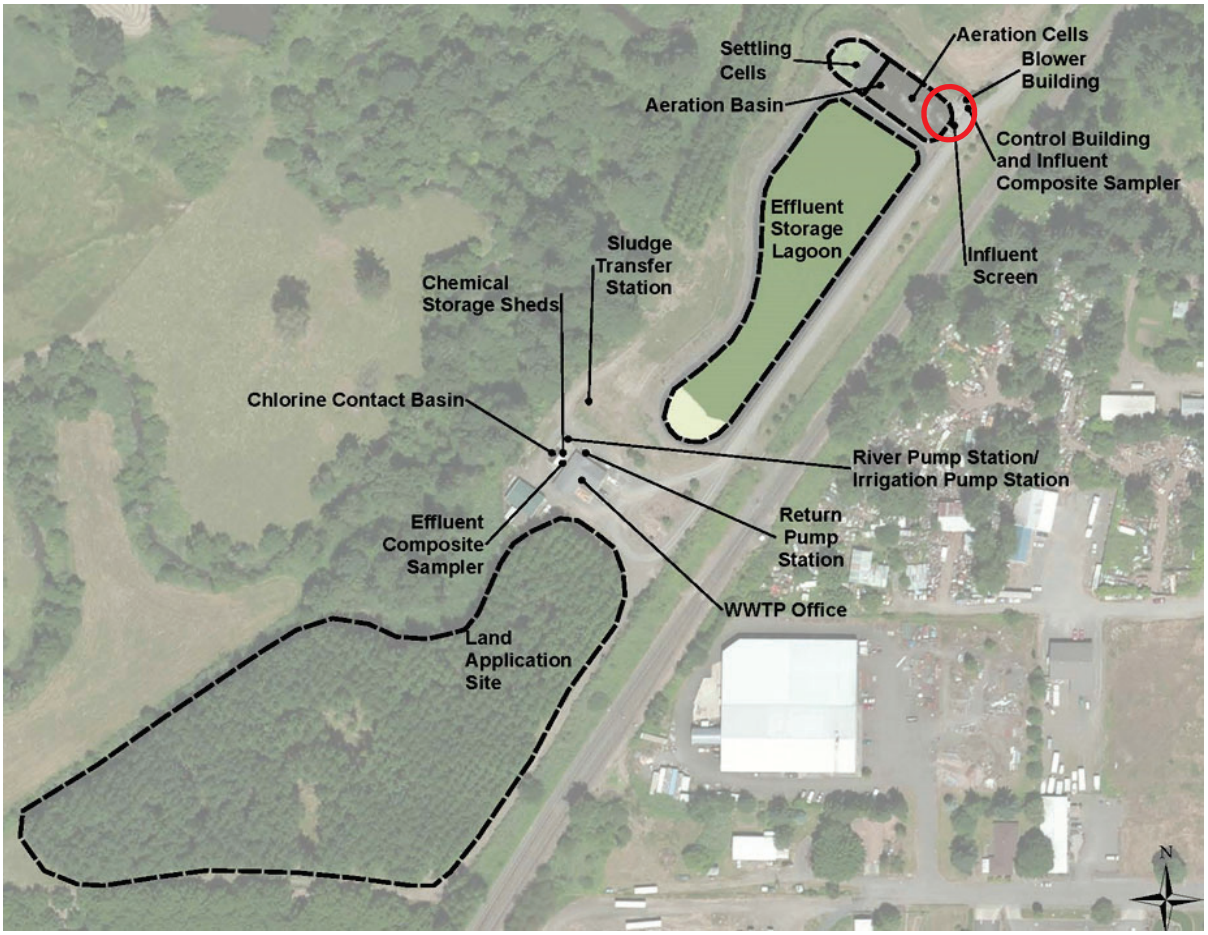
Wastewater Facilities Project: Influent Screen Relocation

Project Identifier: 1.3

Objective: Relocate the influent screen closer to the WWTP office.



Item	Cost (2022)	
Influent Screen Relocation	$	20,000
Electrical/Mechanical/Controls	$	4,000
Mobilization (10%)	$	3,000
Contingency (30%)	$	8,000
Overhead and Profit (15%)	$	4,000
Construction Subtotal	**$**	**39,000**
Soft Costs (25%)	$	10,000
Total Project Cost	**$**	**49,000**

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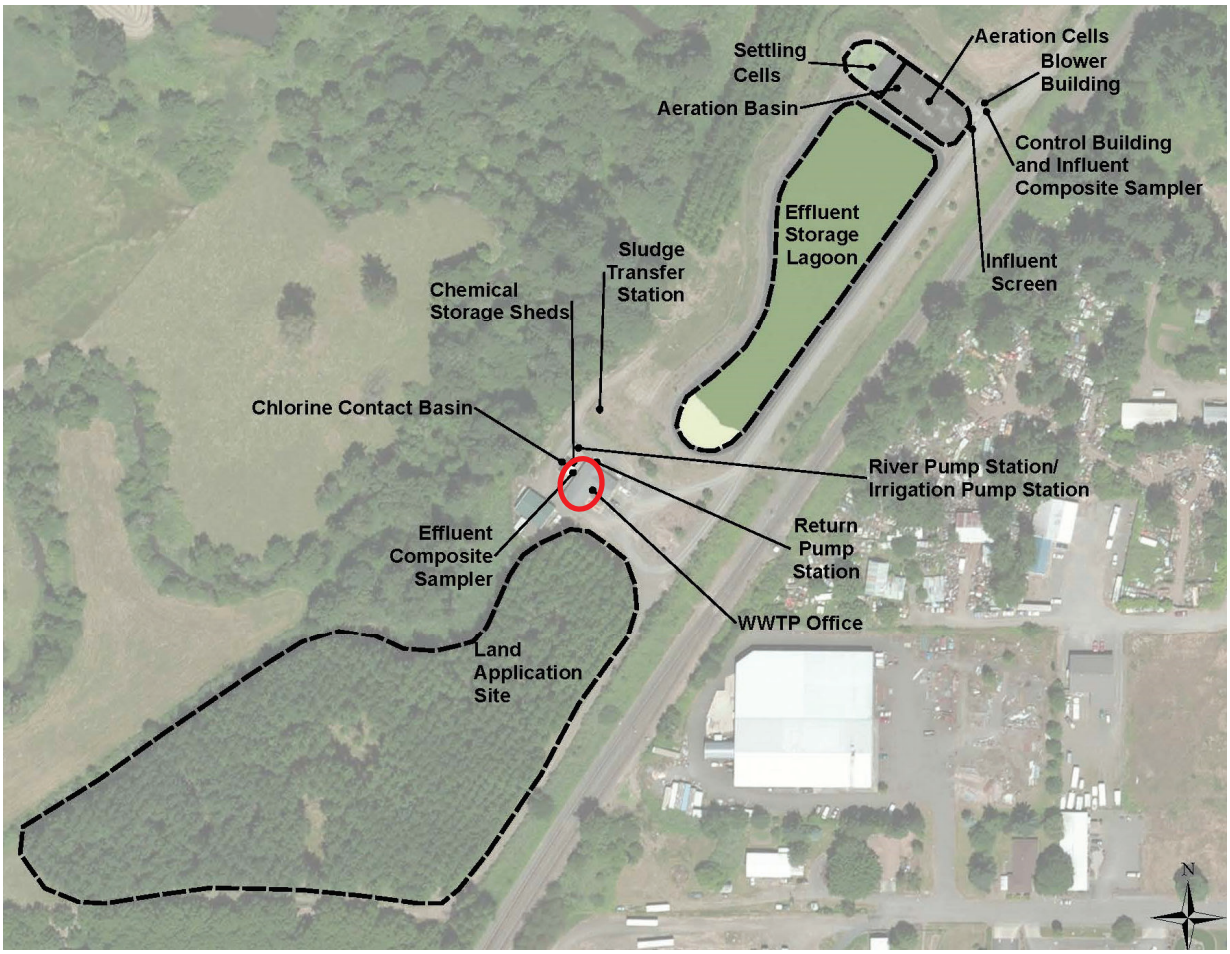
Wastewater Facilities Project: SCADA Upgrade

Project Identifier: 1.4

Objective: A new SCADA system to include the improvements and provide essential alarms.



Item	Cost (2022)	
SCADA System	$	123,000
Mobilization (10%)	$	13,000
Contingency (30%)	$	37,000
Overhead and Profit (15%)	$	19,000
Construction Subtotal	**$**	**192,000**
Soft Costs (25%)	$	48,000
Total Project Cost	**$**	**240,000**

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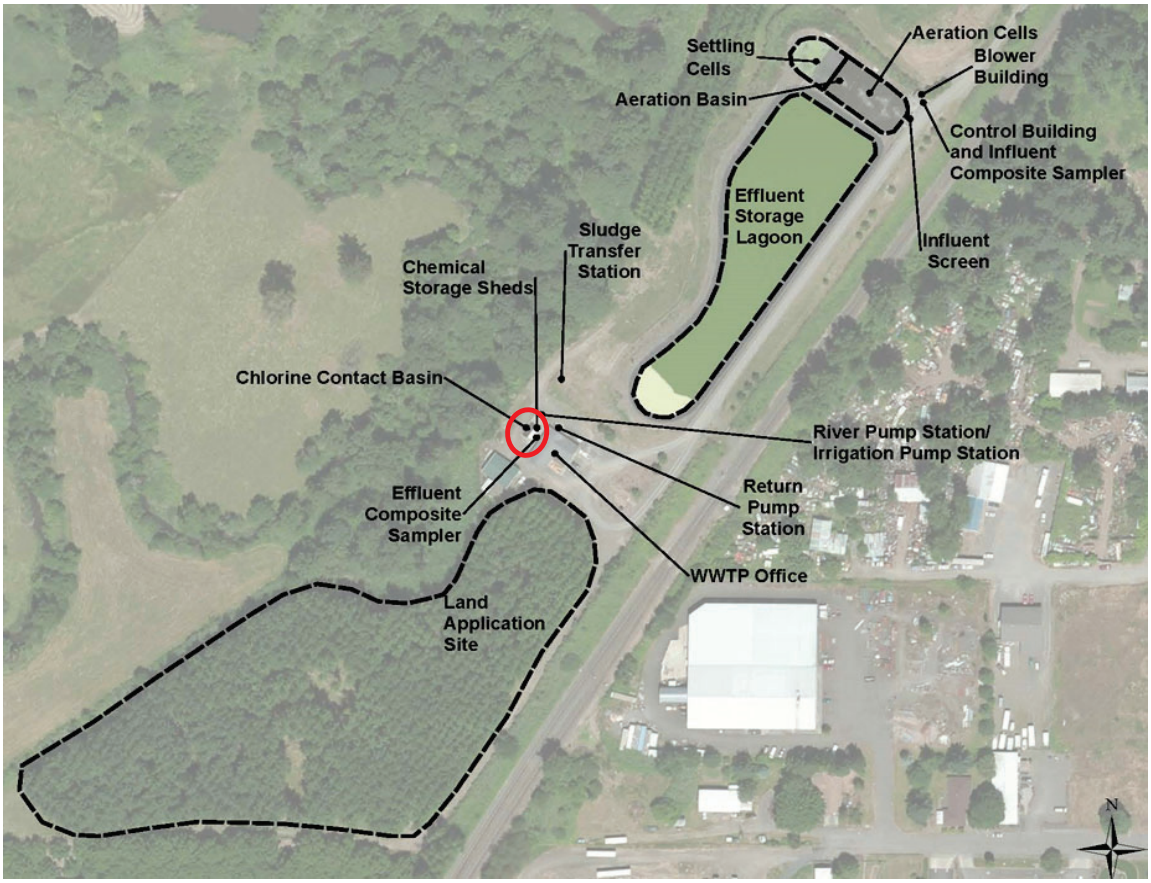
Wastewater Facilities Project: Chlorination/Dechlorination System Upgrade

Project Identifier: 1.5

Objective: Replace the chemical storage with a well-ventilated, heated, and corrosion-resistant building. A chlorine monitor and an automatic alarm should be installed if a dosing pump fails or if the chlorine residual rises.



Item	Cost (2022)	
Storage Buildings	$	99,000
Chlorine Monitoring Equipment	$	25,000
Evaluation and Baffles/Mixer Modifications	$	25,000
Electrical/Mechanical/Controls	$	85,000
Mobilization (10%)	$	24,000
Contingency (30%)	$	71,000
Overhead and Profit (15%)	$	36,000
Construction Subtotal	**$**	**365,000**
Soft Costs (25%)	$	92,000
Total Project Cost	**$**	**457,000**

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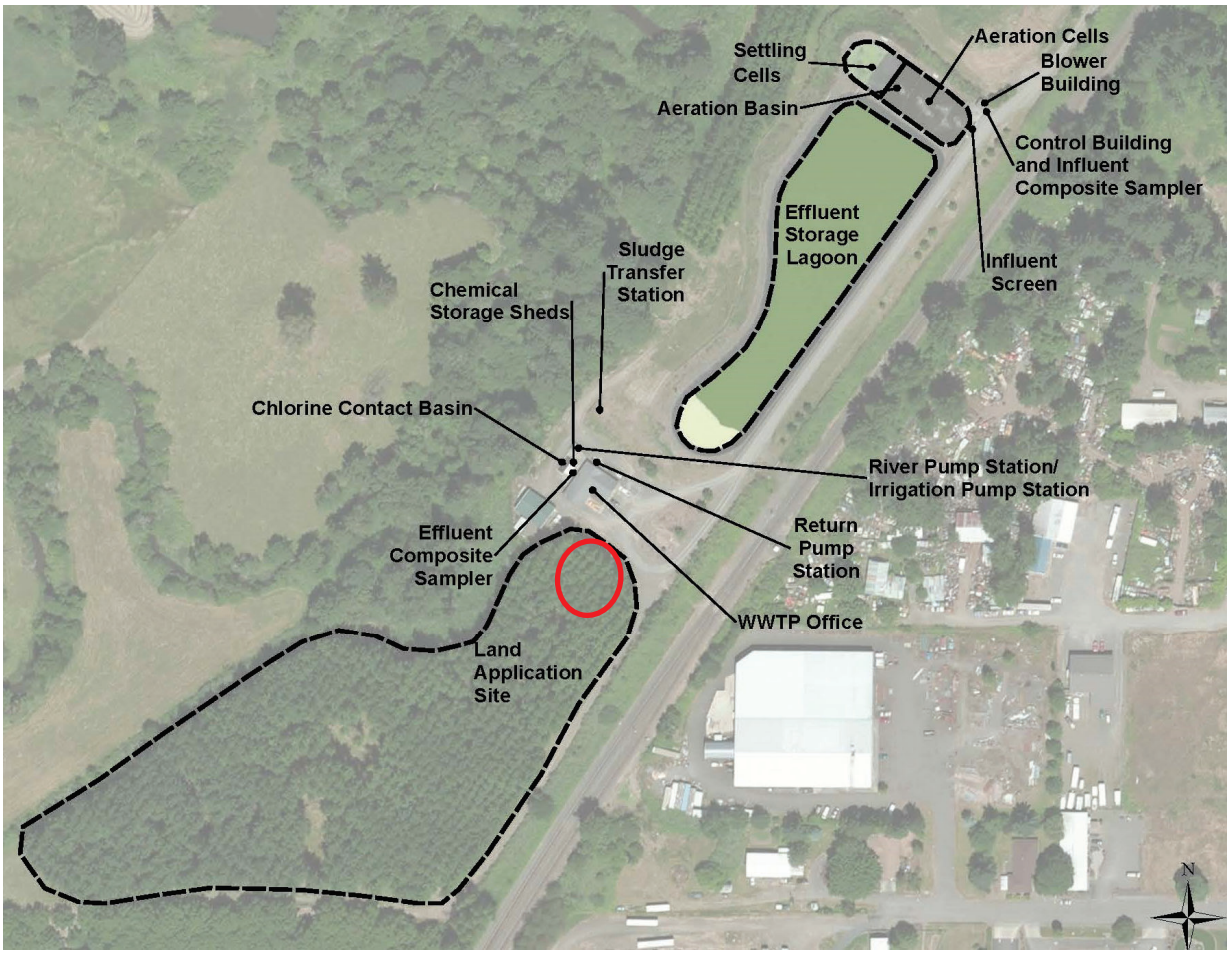
Wastewater Facilities Project: Screw Press Dewatering

Project Identifier: 2.1

Objective: A screw press would dewater solids for less expensive solids disposal.



Item	Cost (2022)	
Site Work	$	24,000
Building	$	481,000
Screw Press	$	523,000
Cover and Concrete Storage	$	150,000
Piping/Valves and Instrumentation	$	99,000
Electrical/Mechanical/Controls	$	281,000
Mobilization (10%)	$	156,000
Contingency (30%)	$	468,000
Overhead and Profit (15%)	$	234,000
Construction Subtotal	**$**	**2,416,000**
Soft Costs (25%)	$	604,000
Total Project Cost	**$**	**3,020,000**

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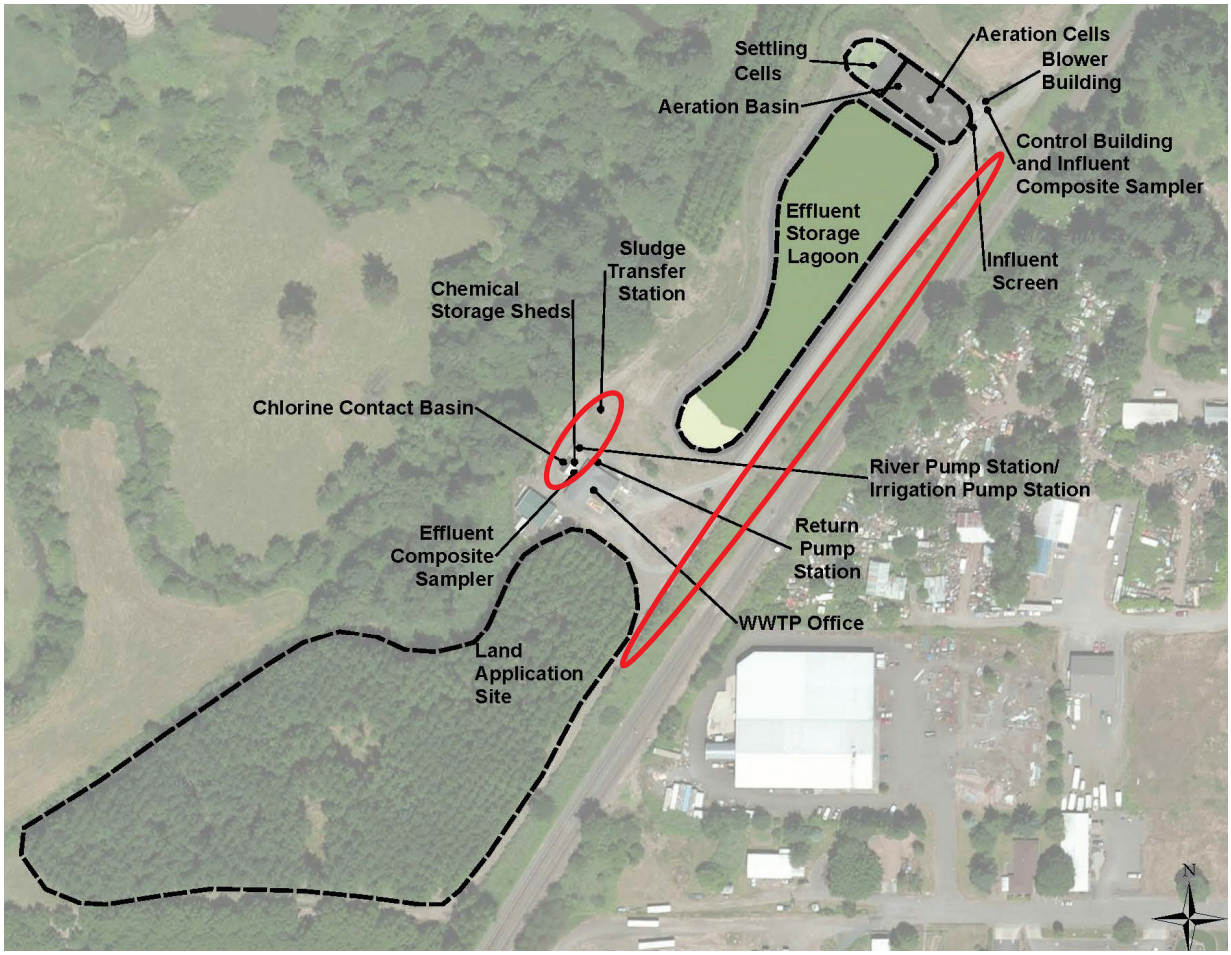
Wastewater Facilities Project: Site Work At WWTP

Project Identifier: 2.2

Objective: Pave the road at the WWTP Office and add storm water drainage.



Item	Cost (2022)	
Asphalt Pavement	$	95,000
Culverts	$	13,000
Mobilization (10%)	$	11,000
Contingency (30%)	$	33,000
Overhead and Profit (15%)	$	17,000
Construction Subtotal	**$**	**169,000**
Soft Costs (25%)	$	43,000
Total Project Cost	**$**	**212,000**

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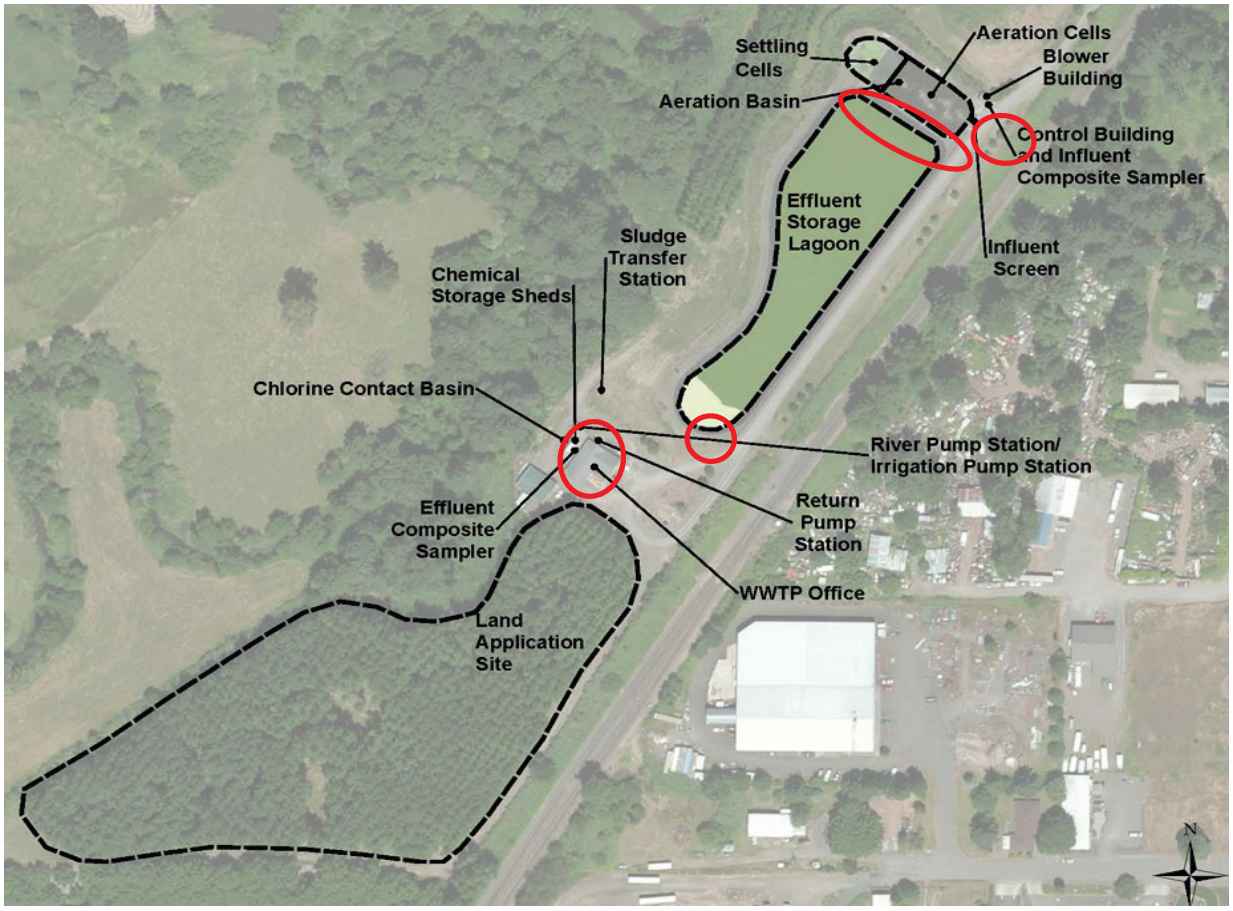
Wastewater Facilities Project: Fall Protection

Project Identifier: 2.3

Objective: Add fall protection to the Headworks, Lagoons, Chlorine Contact Basin, and WWTP Pump Stations.



Item	Cost (2022)	
Hookup Lifelines and Chlorine Contact Basin Railing	$	74,000
Mobilization (10%)	$	8,000
Contingency (30%)	$	23,000
Overhead and Profit (15%)	$	12,000
Construction Subtotal	**$**	**117,000**
Soft Costs (25%)	$	30,000
Total Project Cost	**$**	**147,000**

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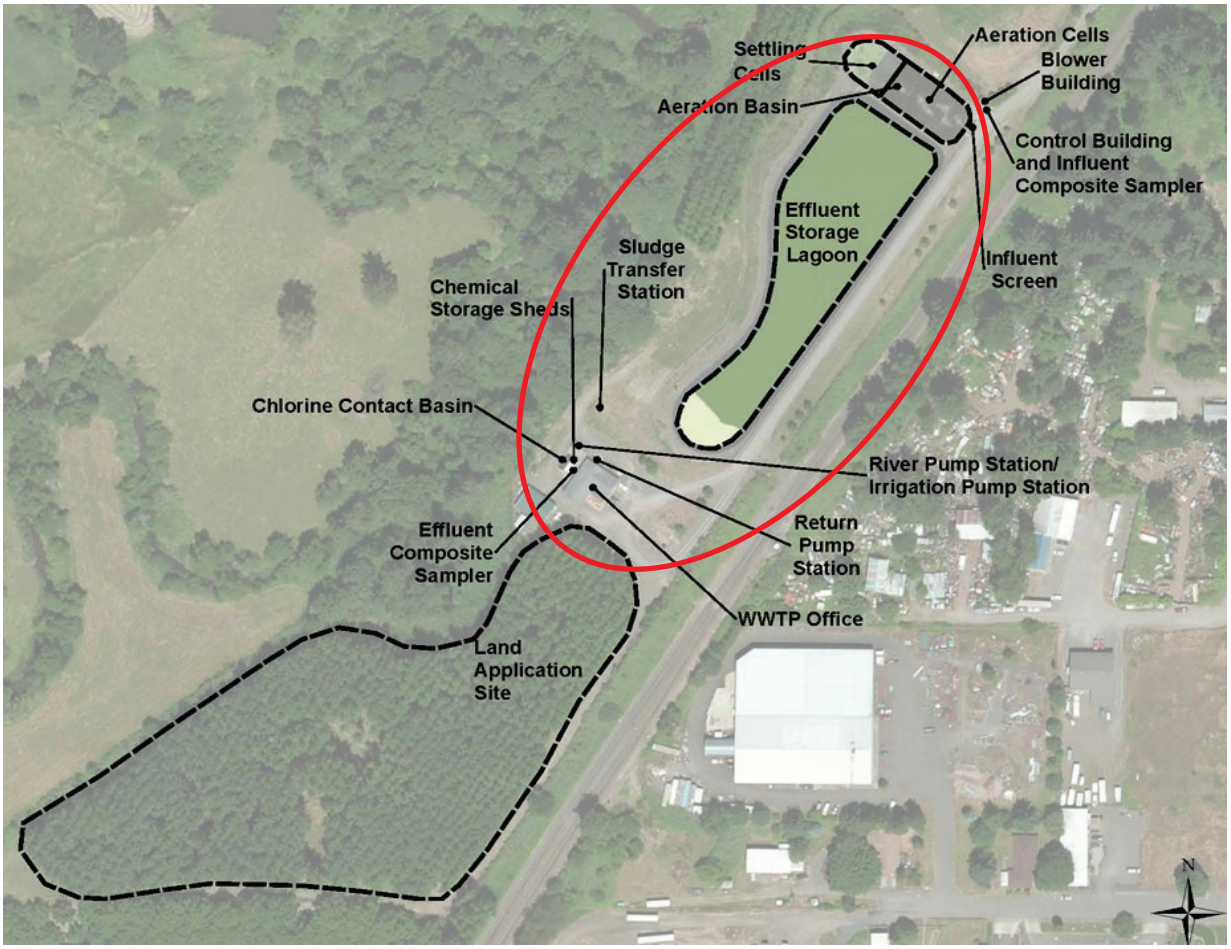
Wastewater Facilities Project: Fencing

Project Identifier: 2.4

Objective: Add fencing around the WWTP (add to existing; does not include fence around land application).



Item	Cost (2022)	
Fencing and Gates	$	62,000
Mobilization (10%)	$	7,000
Contingency (30%)	$	19,000
Overhead and Profit (15%)	$	10,000
Construction Subtotal	**$**	**98,000**
Soft Costs (25%)	$	25,000
Total Project Cost	**$**	**123,000**

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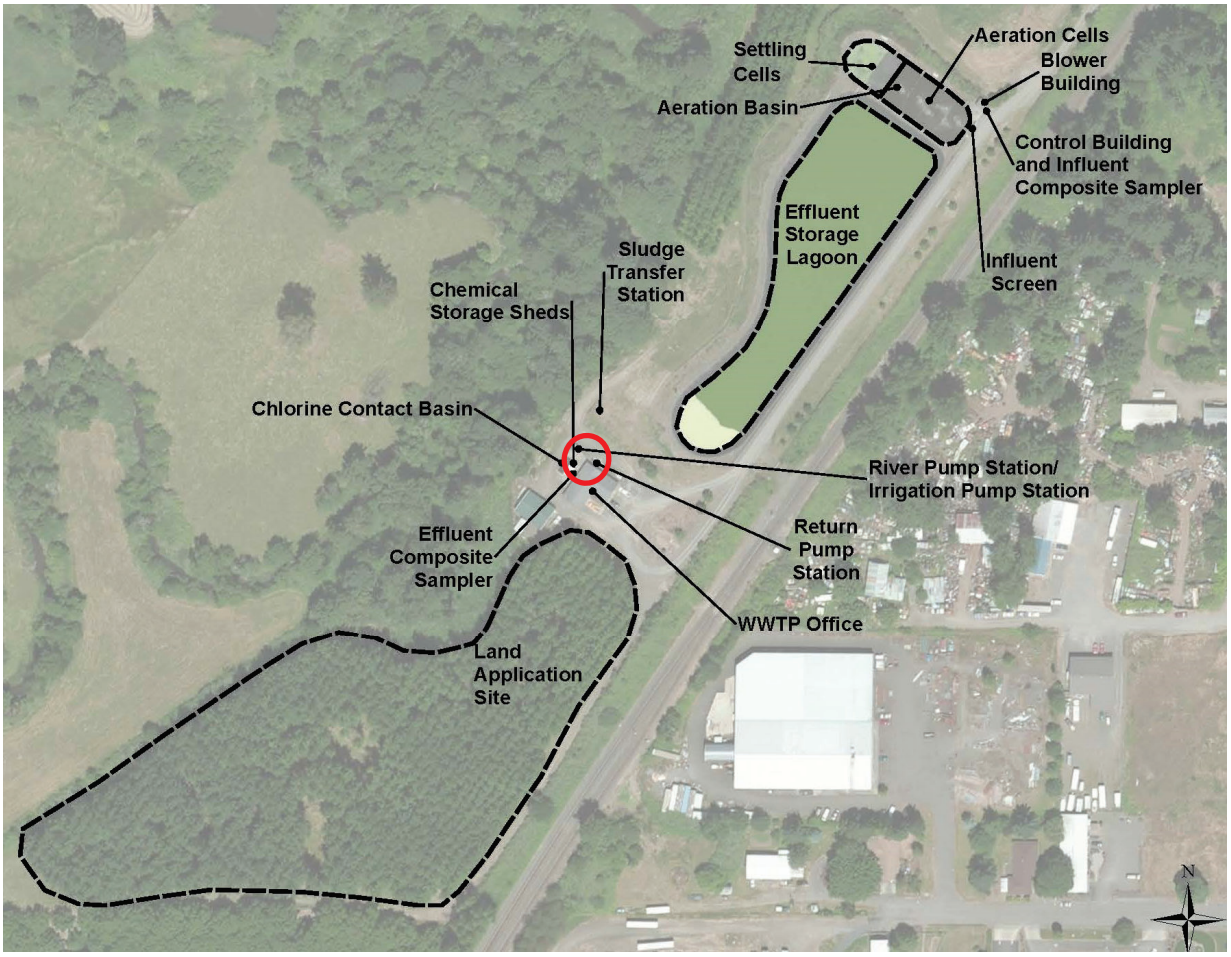
Wastewater Facilities Project: WWTP Pump Station VFDs

Project Identifier: 2.5

Objective: Replace the pump starters with VFDs to improve operation and reduce energy usage.



Item	Cost (2022)	
WWTP Pump VFDs	$	30,000
Mobilization (10%)	$	3,000
Contingency (30%)	$	9,000
Overhead and Profit (15%)	$	5,000
Construction Subtotal	**$**	**47,000**
Soft Costs (25%)	$	12,000
Total Project Cost	**$**	**59,000**

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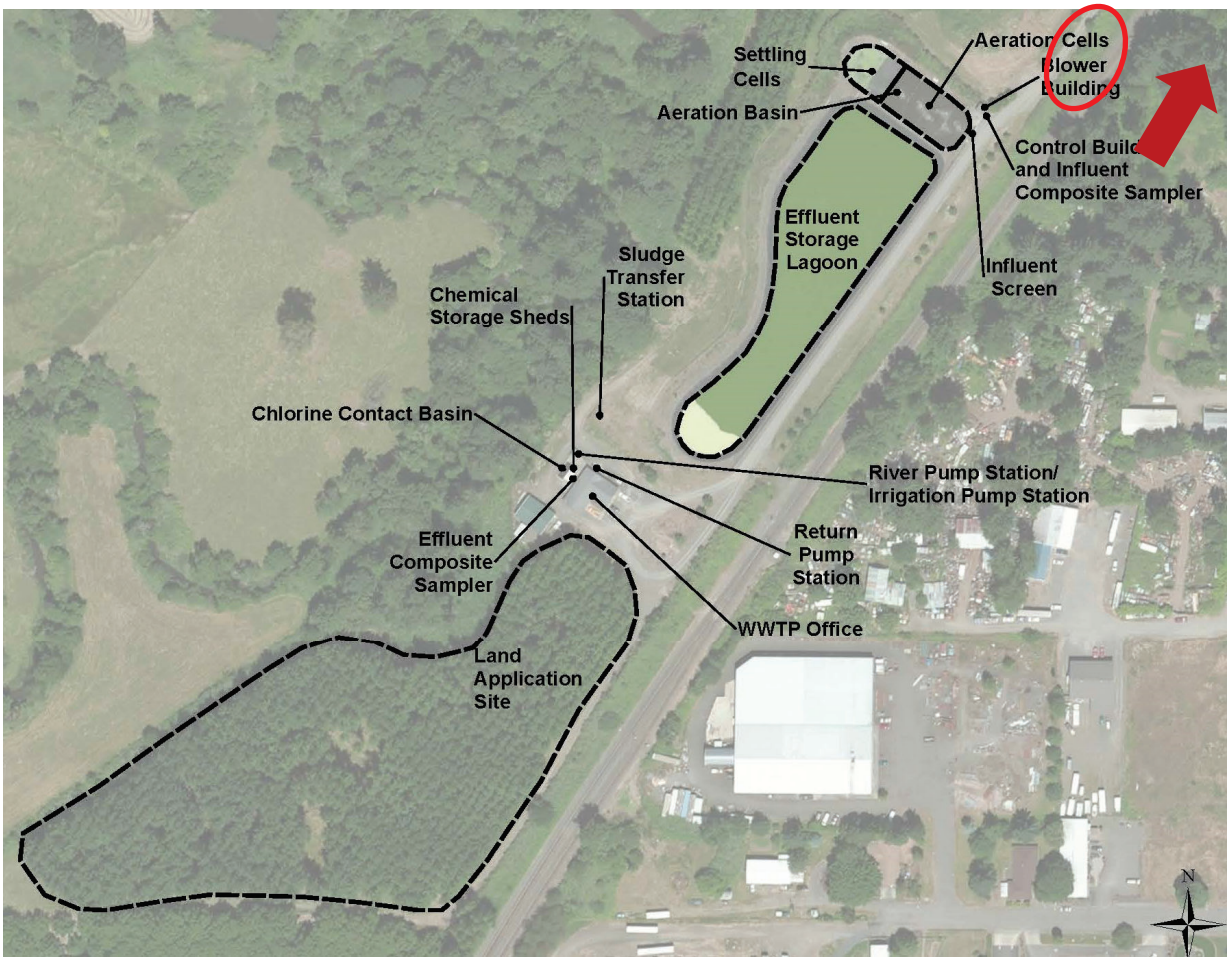
Wastewater Facilities Project: Paving Access Road

Project Identifier: 2.6

Objective: Pave the access road from the WWTP to Ehlen Road.



Item	Cost (2022)	
Asphalt Pavement	$	198,000
Mobilization (10%)	$	20,000
Contingency (30%)	$	60,000
Overhead and Profit (15%)	$	30,000
Construction Subtotal	**$**	**308,000**
Soft Costs (25%)	$	77,000
Total Project Cost	**$**	**385,000**

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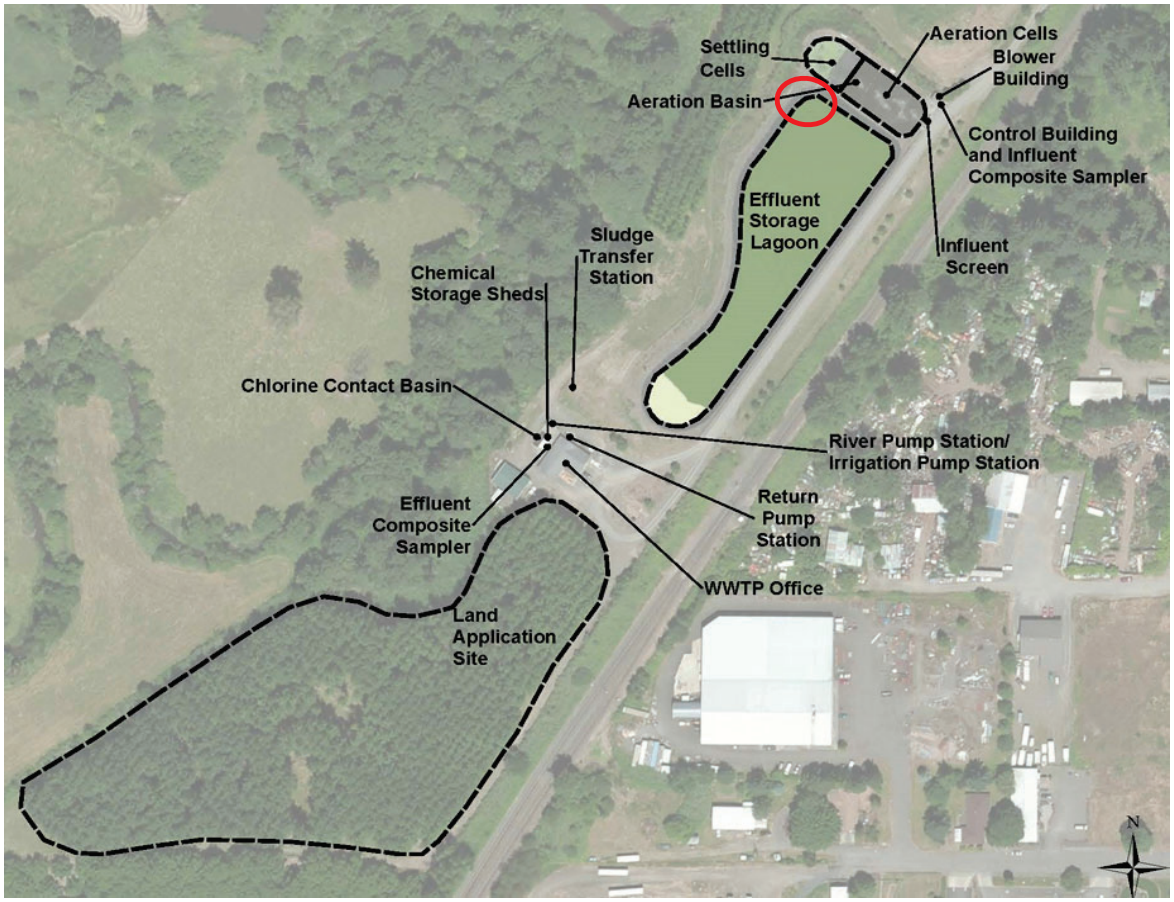
Wastewater Facilities Project: Lagoon Overflow, Structural Inspection, and Bank Stabilization

Project Identifier: 2.7

Objective: Add an overflow to the lagoons to protect the lagoons from overtopping. Perform a structural inspection of the lagoons. Add bank stabilization near the chlorine contact basin.



General Line Item	Cost (2022)	
Structural Inspection	$	25,000
Overflows	$	99,000
Bank Stabilization	$	62,000
Mobilization (10%)	$	19,000
Contingency (30%)	$	56,000
Overhead and Profit (15%)	$	28,000
Construction Subtotal	**$**	**289,000**
Soft Costs (25%)	$	73,000
Total Project Cost	**$**	**362,000**

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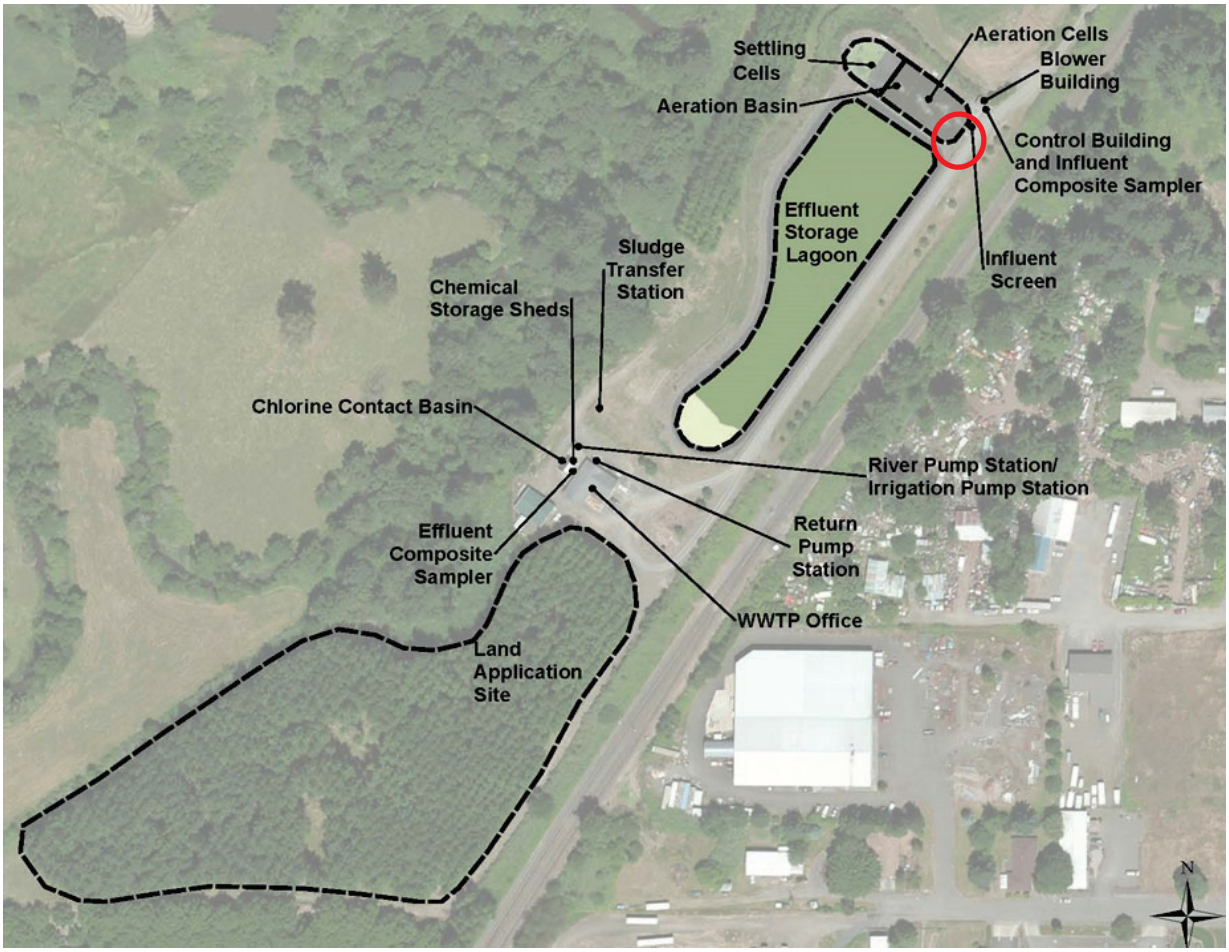
Wastewater Facilities Project: Grit Chamber and Headworks Upgrade

Project Identifier: 2.8

Objective: Upgrade the headworks to include grit removal.



Item	Cost (2022)	
Grit Chamber and Classifier	$	612,000
Heat Tape Influent Screen	$	37,000
Cover Influent Screen and Composite Sampler	$	37,000
Electrical/Mechanical/Controls	$	213,000
Mobilization (10%)	$	90,000
Contingency (30%)	$	270,000
Overhead and Profit (15%)	$	135,000
Construction Subtotal	**$**	**1,394,000**
Soft Costs (25%)	$	349,000
Total Project Cost	**$**	**1,743,000**

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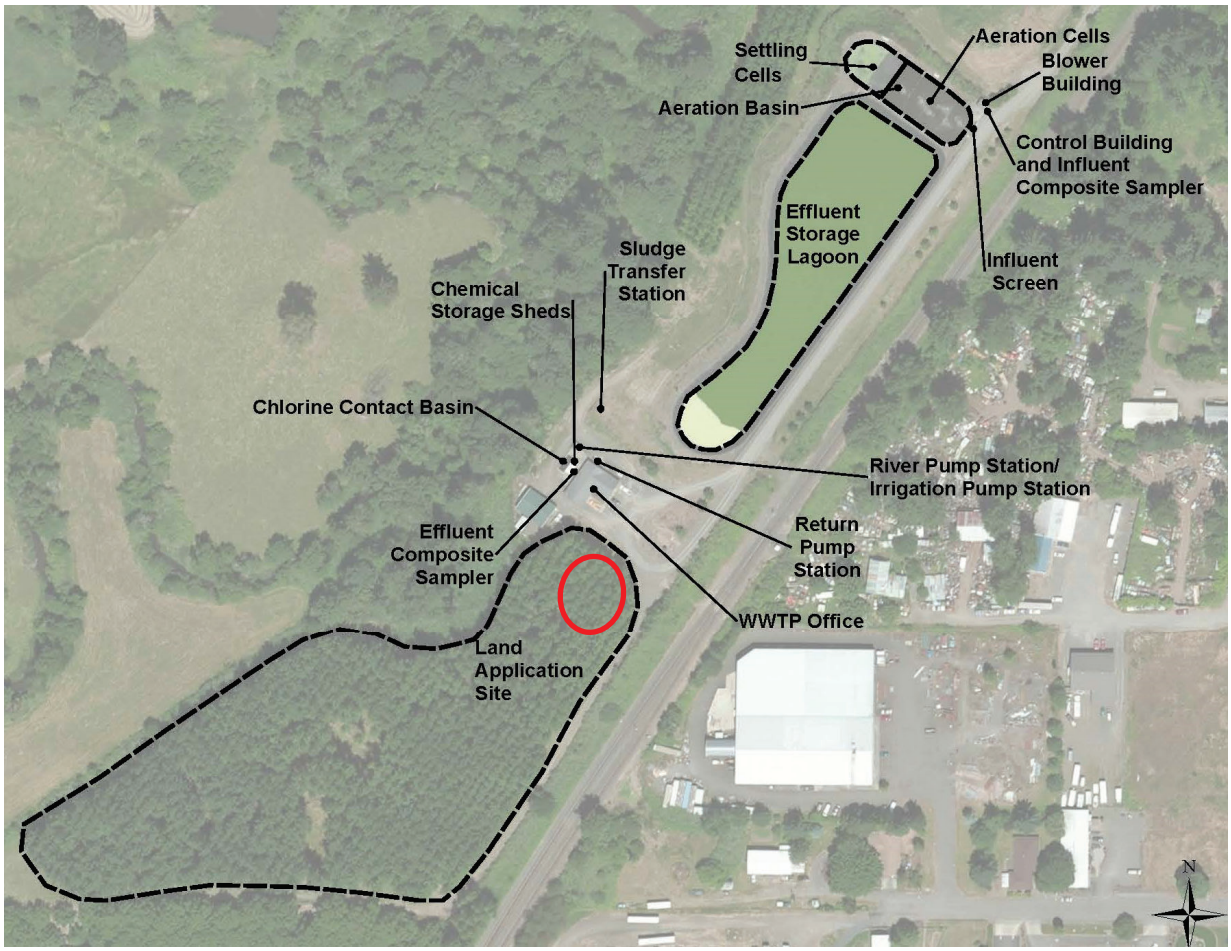
Wastewater Facilities Project: Aerobic Digester

Project Identifier: 2.9

Objective: An aerobic digester would help the WWTP achieve Class B biosolids (60-day SRT in the winter). This would allow the City the flexibility to either be land applied by farmers or to continue to be sent to the City of Salem.



Item	Cost (2022)	
Site Work	$	13,000
Digester Basin (including guardrails, grating)	$	130,000
Digester Equipment	$	147,000
Digester Blower Building	$	50,000
Piping/Valves and Instrumentation	$	50,000
Electrical/Mechanical/Controls	$	80,000
Mobilization (10%)	$	47,000
Contingency (30%)	$	141,000
Overhead and Profit (15%)	$	71,000
Construction Subtotal	**$**	**729,000**
Soft Costs (25%)	$	183,000
Total Project Cost	**$**	**912,000**