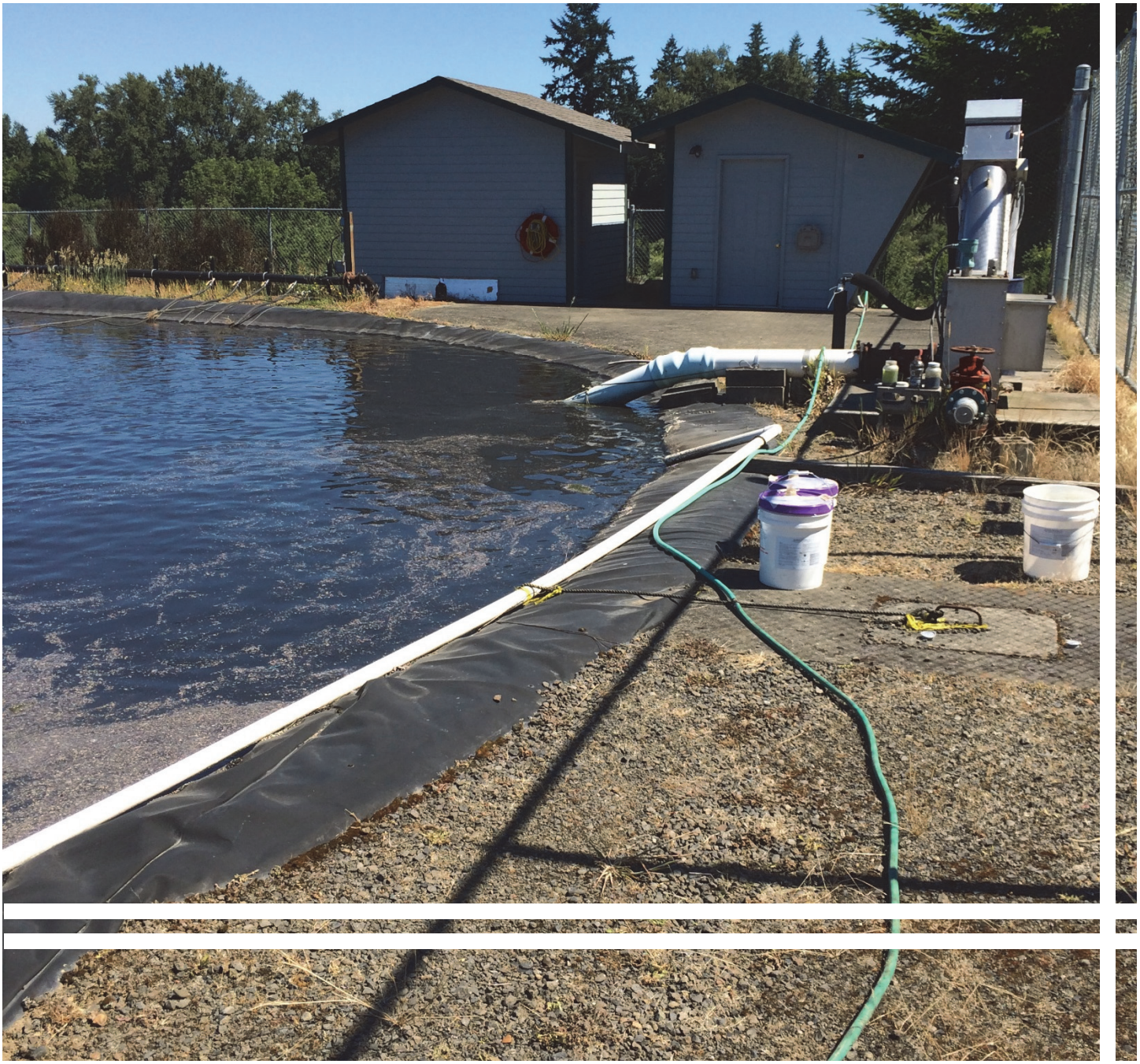


City of Aurora

Wastewater Facilities Planning Study

July 2017

Get there!

KELLER associates

July 2017

City of Aurora, Oregon
Wastewater Facilities Planning Study

KELLER associates

KELLER associates

Keller Associates
707 13th St. SE. Suite 280
Salem, OR 97301

215120/b/S16-008

REGISTERED PROFESSIONAL ENGINEER
83510PE
OREGON
NOV. 10, 2009
PETER OLSEN
EXPIRES: 12/31/18

Signed by:
Peter Olsen, P.E.
Project Manager

TABLE OF CONTENTS

LIST OF TABLES:

LIST OF CHARTS:

APPENDIX A: FIGURES

APPENDIX B: CALCULATIONS

APPENDIX C: CLEAN WATER ACT DATA

APPENDIX D: FINANCIAL

APPENDIX E: PROJECT SUMMARIES

Acronyms, Abbreviations, and Selected Definitions

AADF	average annual daily flow
AAF	annual average flow
ADWF	average dry weather flow
AWWF	average wet weather flow
BLM	Bureau of Land Management
BOD	biochemical oxygen demand
cfs	cubic feet per second
CIP	Capital Improvement Plan
DDT	dichlorodiphenyltrichloroethane
DEQ	Oregon Department of Environmental Quality
DMR	discharge monitoring report
DO	dissolved oxygen
EDU	equivalent dwelling unit
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
fps	feet per second
ft	feet (or) foot
HDPE	high density polyethylene
hp	horsepower
GIS	geographic information system
gpcd	gallons per capita per day
gpd	gallons per day
gph	gallons per hour
gpm	gallons per minute
hrs	hours
I/I	inflow and infiltration
IFA	Infrastructure Finance Authority
in	inch
KW	kilowatt
kwh	kilowatt hour
MBBR	Moving Bed Biofilm Reactor
MG	million gallons
MGD	million gallons per day
mg/L	milligrams per liter
mL	milliliter
MMDWF	maximum monthly average dry-weather flow
MMWWF	maximum monthly average wet-weather flows
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollution Discharge Elimination System
NTU	Nephelometric turbidity units
OAR	Oregon Administrative Rules
ODF&W	Oregon Department of Fish and Wildlife

ODSL	Oregon Department of State Lands
O&M	operation and maintenance
OH&P	overhead and profit
PAA	peracetic acid
PCB	polychlorinated biphenyl
PDAF	peak daily average flow
PIF	peak instantaneous flow
pH	Hydrogen ion concentration (measure of the acidity or basicity)
ppcd	pounds per capita per day
ppd	pounds per day
PSU	Portland State University
PWkF	peak week flow
RWUP	recycled water use plan
SBR	sequence batch reactor
SCADA	supervisory control and data acquisition
SDC	system development charge
sf	square feet
SHPO	State Historic Preservation Office
SRF	state revolving loan fund
SRT	sludge retention time
TDH	total dynamic head
TKN	total Kjeldahl nitrogen
TMDL	total maximum daily load
TSS	total suspended solids
UGB	urban growth boundary
US	United States
USGS	U.S. Geological Survey
USDA	U.S. Department of Agriculture
USDA-RUS	U.S. Department of Agriculture, Rural Utilities Services
UV	ultraviolet radiation
VFD	variable frequency drive
WWTP	wastewater treatment plant

ES. EXECUTIVE SUMMARY

The City of Aurora, Oregon contracted with both Ashley Engineering Design, P.C. and Keller Associates, Inc. to complete a wastewater facilities plan for the City's sanitary sewer wastewater treatment plant. This section 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 (Figure 2). 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. Historic populations were obtained from the U.S. Census and Marion County in cooperation with Portland State University (PSU). PSU analyzes historic trends, and anticipates growth patterns to develop growth rates for 5-year increments. The most current population estimate provided by PSU was 950 in 2015. The overall estimated population growth rate from 2016 to 2036 is 2.8% (from 975 to 1,697). Using this growth rate, the population projection for 2038 is 1,793. These growth rates were reviewed and approved by the technical advisory committee for this planning study. Details about growth calculations can be found in Section 1.3.

ES.2.3 Wastewater flows

Data on daily and monthly treatment plant flows from January 2010 to December 2015 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 Oregon DEQ (see Section 1.4 for further details).

TABLE ES-1: Summary of Projected City Sewer Flows

	Design Flow (MGD)	Projected Unit Flow (gpcd)	Projected Design Flow (MGD)	Projected Flows (MGD)			
Year	2015	2015	2018	2023	2028	2033	2038
Population	950	950	1,032	1,185	1,360	1,562	1,793
ADWF	**0.058**	61	0.063	0.073	0.083	0.096	0.110
$MMDWF_{10}$	**0.061**	64	0.066	0.076	0.087	0.100	0.115
AADF	**0.059**	62	0.064	0.074	0.085	0.098	0.112
AWWF	**0.060**	64	0.066	0.075	0.086	0.099	0.114
$MMWWF_5$	**0.065**	68	0.070	0.081	0.093	0.106	0.122
PWkF	**0.075**	79	0.081	0.093	0.107	0.123	0.141
$PDAF_5$	**0.139**	147	0.151	0.174	0.199	0.229	0.263
PIF_5	**0.180**	189	0.196	0.225	0.258	0.296	0.340

* MGD – million gallons per day, gpcd – gallons per capita per day, ADWF – Average Dry-Weather Flow, MMDWF – Max Month Dry-Weather Flow, AADF – Average Annual Daily Flow, AWWF – Average Wet-Weather Flow, MMWWF – Max Month Wet-Weather Flow, PWkF – Peak Week Flow, PDAF – Peak Daily Average Flow, PIF – Peak Instantaneous Flow.

ES.2.4 Wastewater Composition

The influent BOD_5 and TSS data for the time period of January 2010 to December 2015 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 2038 loadings using the 2038 population of 1,793. A summary of the BOD_5 and TSS data and projections are provided in Tables 2-1 through 2-3.

ES.3 EFFLUENT DISPOSAL

ES.3.1 Effluent Disposal Options

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.3.2 Effluent Disposal Recommendation

The recommendation is to keep with the current disposal plan of discharging to the river in the wet season (November 1st to April 30th) and increase the storage volume for the non-discharge season.

ES.4 WASTEWATER TREATMENT

ES.4.1 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. 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 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.

Solids generated in the aerated lagoon are pumped out of the settling cells to the Sludge Holding Tanks in the Sludge Transfer Station area of the treatment plant. Solids are held in these tanks, periodically removed using a vacuum truck, and hauled to the City of Salem for treatment. Some solids consolidation will take place as the solids are held in the holding tanks. The solids consolidation allows some of the water to be removed and drained to the Return Pump Station, where it can be recycled 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.

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 is currently at 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 is 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. Additionally, the TSS and BOD_5 removal percent has recently become 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. Also 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". The pumps cycle on/off rather than being continuously controlled via VFDs for energy savings. Also 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* – The Sludge Transfer Station is not covered, which can lead to rain water being collected, pumped, and treated in the WWTP. The walls in the Sludge Transfer Station are only on three sides, so it is possible for solids to escape the station. There is also 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. Also 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.

ES.4.2 Treatment Alternatives

Process alternatives were considered to address WWTP deficiencies. Alternatives considered for the aerated lagoon included surface aerators, expanding the existing diffused aeration system, and replacing the system with a new diffused aeration system. The treatment options considered to improve TSS and BOD_5 removal percentages included adding filtration or a moving bed biofilm reactor downstream of the lagoons, or adding aeration, baffles, covers, and chlorination to the effluent storage lagoon(s). The disinfection options that were evaluated included modifications to the existing chlorination/dechlorination system, or converting to a peracetic acid (PAA) or ultraviolet (UV) disinfection system. The options considered for the solids handling included upgrading the existing sludge holding, adding sludge treatment, or adding sludge treatment and dewatering.

ES.4.3 Recommended Treatment Improvements

The recommended treatment processes include:

- *Aeration Capacity* – Replacing the existing aeration system with new diffusers and blowers that are more easily removable for inspection and maintenance and sized to increase the aeration capacity through the planning period.
- *Tertiary Treatment* – Either of two options - aeration, baffle walls, floating cover, and chlorine piping added to the Effluent Storage Lagoons, or a downstream filter - would be installed to improve the tertiary removal of TSS and BOD_5.
- *Disinfection* – Continue using liquid sodium hypochlorite (chlorination) and sodium bisulfite (dechlorination), but upgrade the storage building, install a chlorine residual analyzer, and add alarms. It is also recommended to further evaluate the disinfection capacity as baffles and/or mixer modifications may be necessary to disinfect future flows.
- *Solids Handling* – Add solids treatment using an aerobic digester to provide disposal flexibility.

A proposed layout of treatment plant improvements is shown in Figure 7 (Appendix A).

ES.4.4 Additional NPDES Permit Items

In addition to the Influent, Effluent, and Recycled Water Monitoring Reports, the City's NPDES permit also included details on the following items:

- *Outfall Inspection Report* – In 2019 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.
- *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.

ES.5 CAPITAL IMPROVEMENT PLAN AND FINANCING

ES.5.1 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 six years. Priority 2 improvements are items targeted as funds become available.

TABLE ES-2: 20-Year Capital Improvement Plan

ID#	Item	Total Estimated Cost (2017)	SDC Growth Apportionment		City's Estimated Portion
			%	Cost	
Priority 1 Improvements (0-6 years)					
1.1	Lagoon Overflow and Structural Inspection	$ 194,000	47%	$ 90,000	$ 104,000
1.2	Aerated Lagoon Aeration	$ 192,000	52%	$ 101,000	$ 91,000
1.3	Additional Effluent Storage Lagoon	$ 3,480,000	45%	$ 1,581,000	$ 1,899,000
1.4	Tertiary Treatment	$ 1,120,000	47%	$ 522,000	$ 598,000
1.5	Chlorination/Dechlorination System Upgrade	$ 272,000	47%	$ 128,000	$ 144,000
1.6	Headworks Upgrade	$ 117,000	47%	$ 55,000	$ 62,000
1.7	Aerobic Digester	$ 590,000	47%	$ 275,000	$ 315,000
1.8	Site Work At WWTP	$ 388,000	47%	$ 181,000	$ 207,000
1.9	SCADA Upgrade	$ 194,000	47%	$ 90,000	$ 104,000
	Total Priority 1 Improvements (rounded)	**$ 6,550,000**		**$ 3,030,000**	**$ 3,530,000**
Priority 2 Improvements					
2.1	Fall Protection	$ 117,000	47%	$ 55,000	$ 62,000
2.2	Fencing	$ 98,000	47%	$ 46,000	$ 52,000
2.3	WWTP Pump Station VFDs	$ 167,000	47%	$ 79,000	$ 88,000
2.4	Aerated Lagoon Sludge Pumps	$ 133,000	47%	$ 63,000	$ 70,000
2.5	Permanent Irrigation System	$ 59,000	47%	$ 28,000	$ 31,000
2.6	Headworks Grit Removal	$ 950,000	47%	$ 447,000	$ 503,000
2.7	Paving Access Road	$ 343,000	47%	$ 160,000	$ 183,000
	Total Priority 2 Improvements (rounded)	**$ 1,870,000**		**$ 880,000**	**$ 990,000**
TOTAL WASTEWATER PLANT IMPROVEMENTS COSTS (rounded)		**$ 8,420,000**		**$ 3,910,000**	**$ 4,520,000**

All costs in 2017 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 2017 dollars and does not include escalation to time of actual construction.

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 (2017 Dollars)					
			2017	2018	2019	2020	2021	2022
Priority 1 Improvements (0-6 years)								
1.1	Lagoon Overflow and Structural Inspection	$ 194,000					$ 194,000	
1.2	Aerated Lagoon Aeration	$ 192,000	$ 192,000					
1.3	Additional Effluent Storage Lagoon	$ 3,480,000		$ 627,000	$ 2,853,000			
1.4	Tertiary Treatment	$ 1,120,000		$ 202,000	$ 918,000			
1.5	Chlorination/Dechlorination System Upgrade	$ 272,000				$ 272,000		
1.6	Headworks Upgrade	$ 117,000				$ 117,000		
1.7	Aerobic Digester	$ 590,000					$ 590,000	
1.8	Site Work At WWTP	$ 388,000						$ 388,000
1.9	SCADA Upgrade	$ 194,000						$ 194,000
Total (rounded)		**$ 6,550,000**	**$ 200,000**	**$ 830,000**	**$ 3,780,000**	**$ 390,000**	**$ 790,000**	**$ 590,000**

ES.5.2 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, 1.6%) 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.

TABLE ES-4: Potential Monthly User Rate Impact to Fund Priority Improvements

	Annual Payment (20 year, 1.6%)	User Rate without SDCs	User Rate including SDCs
Existing User Rates (2016)	-	$102.00	$102.00
Priority 1 Improvements	$385,281	$237.19	$174.65
Priority 2 Improvements	$109,996	$256.48	$195.08

ES.5.3 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 2038, most of which is associated with increased power usage.

ES.5.4 SDCs

The City's current SDC for the sewer system is $2,032. 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 2038. 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.5.5 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, revenue bonds, general obligation bonds, US Economic Development Administration grants, and Energy Trust of Oregon. Additional financing options are discussed in Section 6.

1. PROJECT PLANNING

The City of Aurora owns and operates a municipal sewage collection system and wastewater treatment plant (WWTP). The purpose of this study is to determine the needs of the City for wastewater treatment, evaluate if the existing WWTP can meet those needs, and provide a long-term plan to implement improvements to the WWTP so the needs of the City can be met. This facilities plan describes the conditions, flows, and problems in the existing system; analyzes the hydraulic and biologic flow data; and provides recommendations for improvements to the WWTP.

1.1 LOCATION

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). The study area sits between Mill Creek and the Pudding River. The east side of town slopes to the east, and drains into the Pudding River; while the west side of town slopes west, and drains into Mill Creek. Low areas collect in flood plains surrounding 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 PRESENT

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 residential, with some scattered split zoning. There is one industrial area at the west end of Ottaway RD, and commercial zoning along Hwy 99E. The areas between the City Limits and Urban Growth Boundary 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, 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

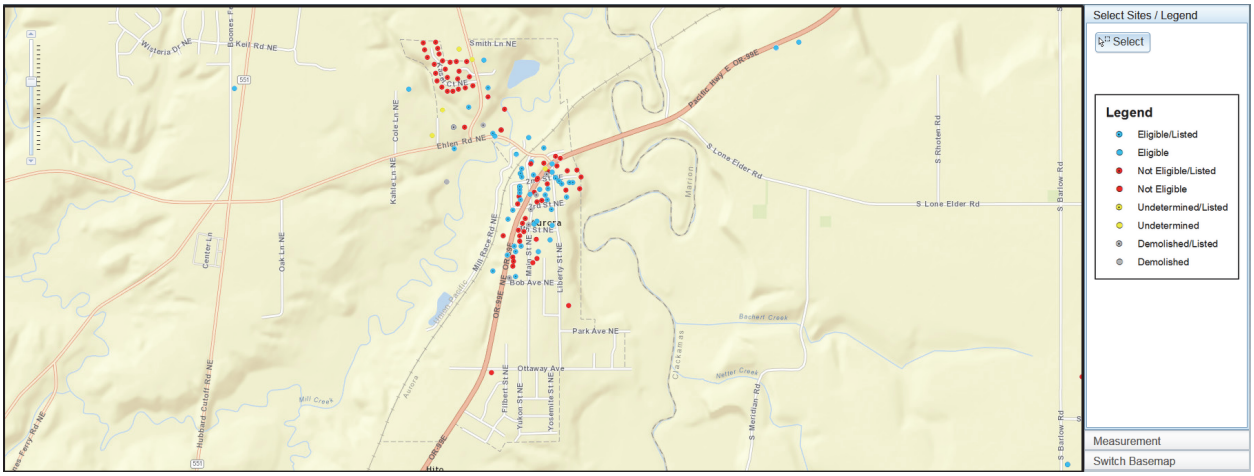
The Oregon Department of State Lands (ODSL) keeps an inventory of the local wetland areas in Oregon. Wetland delineation was not within the scope of this project, so the U.S. Fish and Wildlife National Wetlands Inventory was used to determine the wetland areas that could potentially be impacted. The map of delineated wetlands from the National Wetlands Inventory is shown in Figure 4 (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 99 is designated as a freshwater forested/shrub wetland. The fourth is a freshwater emergent wetland on the Eastern border of the city limits.

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 Chart 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.

Chart 1-1: Above-Ground Cultural Resources



1.2.5 Biological Resources

The 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

Mill Creek flows through the study area and outfalls into the Pudding River north of the City. As of the most recent listing in 2012, the Pudding River is 303(d) listed by DEQ for biological criteria, dissolved oxygen, Guthion, and lead. The Pudding River is classified (OAR 690-502-0120) for domestic, livestock, irrigation, municipal, industrial, agricultural, commercial, power, mining, fish life, wildlife, recreation, pollution abatement, wetland enhancement and public instream uses from October 1 through April 30 and only for domestic, commercial use for customarily domestic purposes not to exceed 0.01 cfs, livestock and public instream uses from May 1 through September 30. There are no wild or scenic rivers in the study area.

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, the median household income is $72,656, 10.3% of people are in poverty, 10.9% are without health insurance, and 93% of people attained a high school diploma or higher. The median male income is $40,568, and the median female income is $30,673.

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 wastewater facilities plan addresses deficiencies and makes recommendations for the wastewater treatment plant. The wastewater treatment plant does not impact one area of town more or less, therefore recommended improvements will benefit/impact all residents equally. City Council holds a public meeting to review and adopt the wastewater facilities planning study.

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 3 (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 the County and Portland State University (PSU). The collaborating agencies published a document in 2008 establishing the official coordinated population projection rates for all the cities in Marion County. The document is titled "Population Forecasts for Marion County, its Cities and Unincorporated Area 2010-2030", and 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. The population shown for 2015 in Table 1-1 is the most recent certified population at the time of these projections. This population was 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. Growth rates are not anticipated to be consistent for the entire planning period, and decrease toward the end of the planning period. The overall estimated population growth rate from 2016 to 2036 is 2.8% (from 975 to 1,697). This growth rate was used in the 2009 Comprehensive Plan for the City of Aurora and was adopted by City Council.

Table 1-1: Population History and Projections

Year	Population	Source
1970	306	2001 Comprehensive Plan
1980	523	2001 Comprehensive Plan
1990	597	U.S. Census
2000	664	U.S. Census
2010	918	U.S. Census
2015	950	PSU Certified population
2018	1032	Calculated using coordinated growth rate (2.8%)
2023	1185	Calculated using coordinated growth rate (2.8%)
2028	1360	Calculated using coordinated growth rate (2.8%)
2033	1562	Calculated using coordinated growth rate (2.8%)
2038	1793	Calculated using coordinated growth rate (2.8%)

The Coordinated Population Forecast for 2017 to 2067 that includes Marion County and the City of Aurora was published on June 30, 2017, just prior to finalizing this report. Table 1-2 presents the population forecast using the coordinated population forecast growth rates. The City acknowledges the difference in the two population forecasts, but has chosen to use the higher population forecast that is consistent with the current adopted comprehensive plan and was utilized for the water master plan. Some of the implications of a higher population forecast include higher flow rates which then translate to higher capital improvement costs. Phasing of the capital improvements should be considered as the City implements the resulting facilities plan.

Table 1-2: Population History and Projections (2017 PSU)

Year	Population	Source
1970	306	2001 Comprehensive Plan
1980	523	2001 Comprehensive Plan
1990	597	U.S. Census
2000	664	U.S. Census
2010	918	U.S. Census
2017	1028	2017 Coordinated Population Forecast
2018	1042	Calculated using coordinated growth rate (1.4%)
2023	1126	Calculated using coordinated growth rate (1.4%)
2028	1218	Calculated using coordinated growth rate (1.4%)
2033	1301	Calculated using coordinated growth rate (1.4%)
2038	1345	Calculated using coordinated growth rate (1.4 and 0.6%)

1.4 FLOWS

The wastewater flow analysis looks at historic wastewater flows, develops design 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 (2010-2015) 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 (2010-2015) were averaged to obtain the design ADWF.

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 (2010-2015) 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 (3.46 in.) extrapolated from the 1981-2010 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.

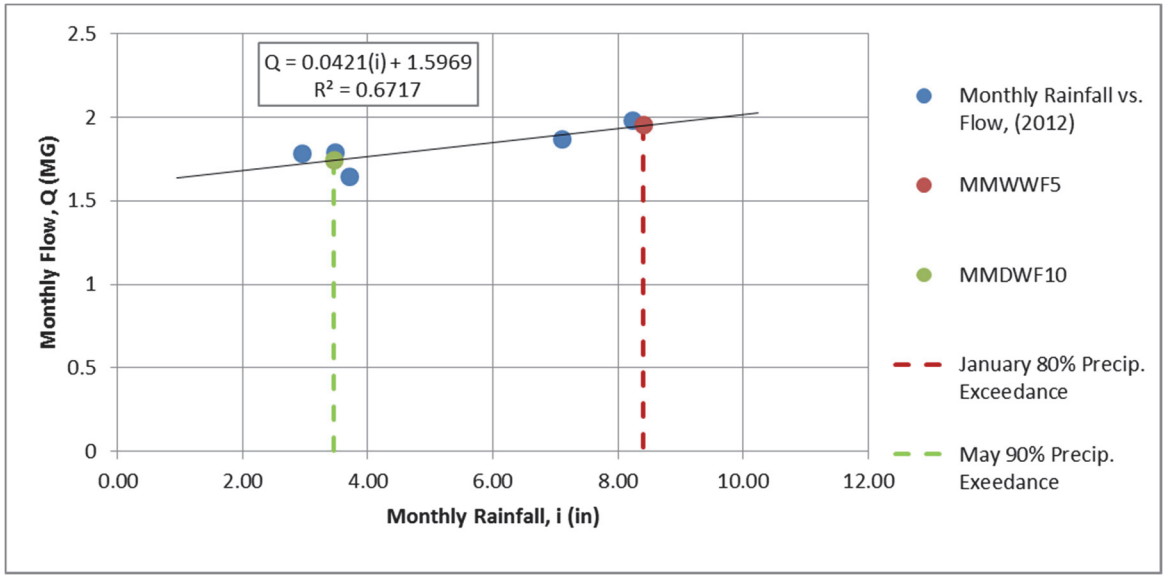
The DEQ method for calculating $MMDWF_{10}$ yielded a max month flow that was lower than the subsequent average flow for dry weather. As this is impossible, the $MMDWF_{10}$ was bumped up from 0.057 MGD to 0.061 MGD to better fit in with the remaining DEQ calculated values.

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 1981-2010 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. This result is illustrated in Chart 1-2 and broken down in Table 1-3.

Data from 2012 showed the highest correlation between rainfall and flow, showed greater influence of rainfall on flow, and was therefore used to provide a more accurate and conservative estimate of $MMWWF_5$ than data from more recent years. Chart 1-2 shows the graph from the DEQ guidance for calculation of the $MMWWF_5$. Table 1-3 summarizes the data points illustrated in Chart 1-2.

Chart 1-2: Flow vs Rainfall ($MMDWF_{10}$ and $MMWWF_5$)



[1] Produced by NOAA and the U.S. Department of Commerce

Table 1-3: Flow vs Rainfall ($MMDWF_{10}$ and $MMWWF_5$)

Month	Flow	Rainfall
	MG/month	(in. /month)
January	1.9	7.1
February	1.6	3.7
March	2.0	8.2
April	1.8	3.5
May	1.8	3.0
$MMDWF_{10}$	1.7	3.46
$MMWWF_5$	2.0	8.40

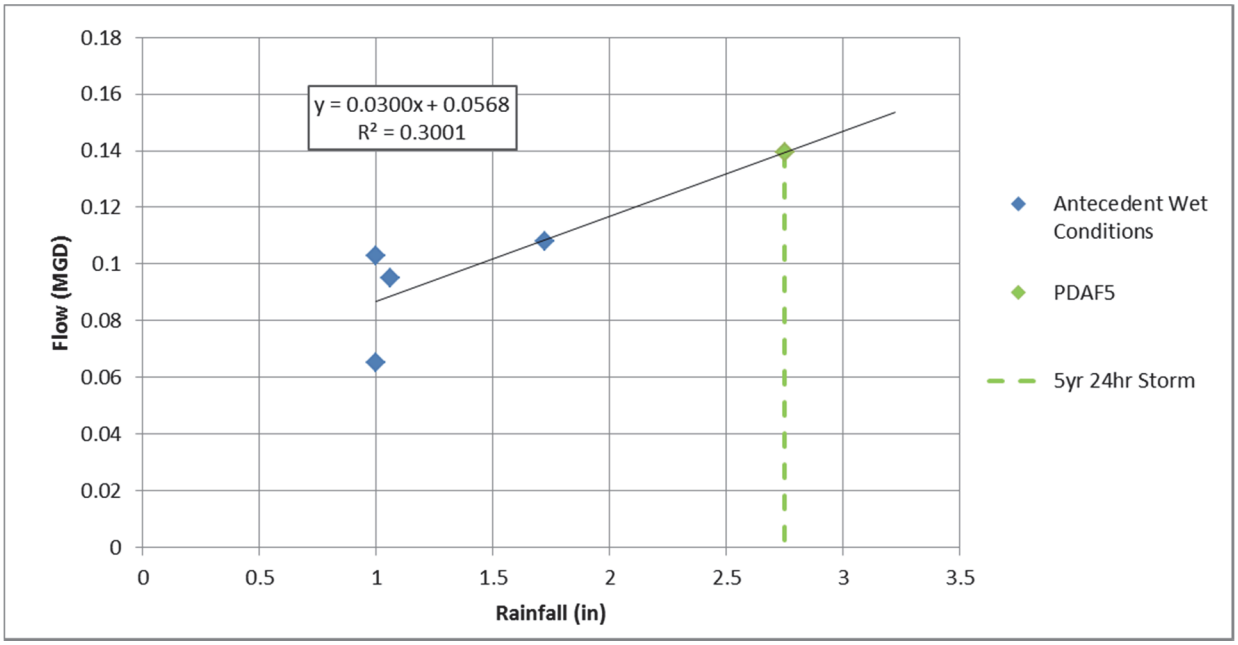
Peak Week Flow (PWkF)

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. 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). For the purpose of this analysis, a large storm event is considered more than 1 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. Those events meeting DEQ criteria were analyzed as shown in Chart 1-3.

Chart 1-3: 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 I 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.

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 Chart 1-4, which shows October 2014 through October 2015 daily flows and precipitation recordings. These flows are representative of previous years which follow the same patterns. The large peaks in rainfall have little effect on peaks in daily flow. The largest peak in Chart 1-4 below corresponds to an increase in flow that is less than double. 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.

Chart 1-4: 2013 Daily Flow and Precipitation

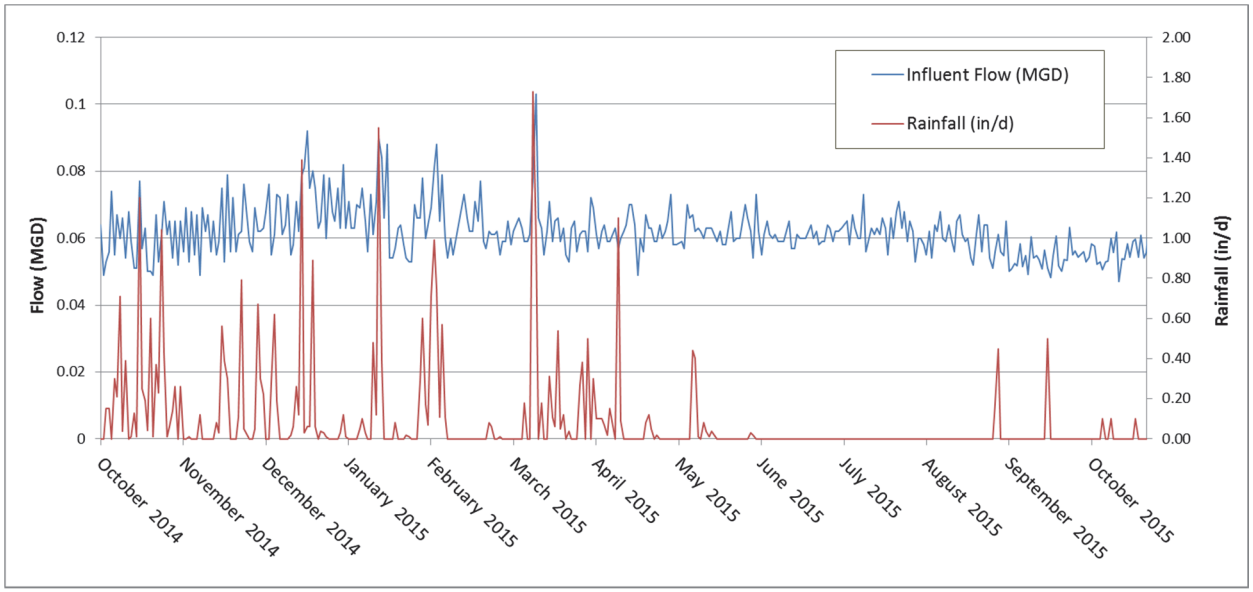


Table 1-4 summarizes annual average base flow and the ratio of peak flow to the base flow for the last five years. The peak flow compared to the base flow is an indication of I/I influence in the system. In the last six years, the peak flow ranges from 1.4 to 2.4 times the base flow. I/I exists in the system, but is not excessive. Some communities experience peak flows in excess of 10 times the base flow.

Table 1-4: Annual Peak Day Flow/Average Base Flow

Year	Avg Base Flow (MGD)	Peak Flow/Avg Base Flow	Pk flow (MGD)
2010	0.060	2.01	0.120
2011	0.055	1.43	0.079
2012	0.059	1.83	0.108
2013	0.057	1.39	0.079
2014	0.057	2.40	0.137
2015	0.062	1.90	0.118

While I/I is evident by the peaking factors represented in Table 1-4, 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 flow projections in Table 1-4 conservatively assume that flows from the existing system will remain the same. While the flows may increase over time as a result of continued deterioration, a modest I/I reduction and sewer rehabilitation and replacement program could result in declines in wastewater flows. For this purpose, Keller Associates recommends that the system flows be evaluated on an annual basis against ongoing efforts to reduce I/I.

The design flows are summarized in Table 1-5. Details of how each design flow was derived are discussed in the preceding paragraphs.

Table 1-5: Projected Flows

	Design Flow (MGD)	Projected Unit Flow (gpcd)	Projected Design Flow (MGD)	Projected Flows (MGD)			
Year	2015	2015	2018	2023	2028	2033	2038
Population	950	950	1,032	1,185	1,360	1,562	1,793
ADWF	**0.058**	61	0.063	0.073	0.083	0.096	0.110
$MMDWF_{10}$	**0.061**	64	0.066	0.076	0.087	0.100	0.115
AADF	**0.059**	62	0.064	0.074	0.085	0.098	0.112
AWWF	**0.060**	64	0.066	0.075	0.086	0.099	0.114
$MMWWF_5$	**0.065**	68	0.070	0.081	0.093	0.106	0.122
PWkF	**0.075**	79	0.081	0.093	0.107	0.123	0.141
$PDAF_5$	**0.139**	147	0.151	0.174	0.199	0.229	0.263
PIF_5	**0.180**	189	0.196	0.225	0.258	0.296	0.340

1.5 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. Existing effluent limits are summarized in Table 1-6. The City's permit was recently renewed and went into effect on August 22, 2016, with an expiration date of July 31, 2021.

The Pudding River is a tributary of the Willamette River, and has the following designated beneficial uses:

- *Water Supply* – Domestic (public and private), industrial, irrigation, and livestock watering.
- *Aquatic Life* – Including salmon and steelhead rearing and migration.
- *Recreational* – Including fishing, boating, and water contact recreation.
- *Commercial* – Hydro-power, navigation, and transportation.
- *Other* – Wildlife, hunting, and aesthetic quality.

The Pudding River in the vicinity of the Aurora WWTP outfall was on the 2012 list of water quality limited streams for biological criteria, dissolved oxygen, Guthion, and lead.

Table 1-6: Existing NPDES Permit Limits

Parameter	Average Monthly	Average Weekly	Maximum Daily
Biochemical Oxygen Demand (BOD_5)	30 mg/L 30 ppd 85% removal	45 mg/L 60 ppd	140 ppd
TSS	50 mg/L 47 ppd[1] 65% removal	80 mg/L 90 ppd	220 ppd
pH	Daily minimum and maximum between 6.0 and 9.0		
E. coli Bacteria	126/100 mL	--	406/100 mL
Total Chlorine Residual	0.07 mg/L	--	0.19 mg/L

ppd = pounds per day

From May 1st through October 31st the City land applies 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 Level II (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 also have future effects on wastewater treatment plants.

1.6 COMMUNITY ENGAGEMENT

The community had the opportunity to engage in the planning process by participating in a City Council meeting.

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

The 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.

Solids generated in the aerated lagoon are pumped out of the settling cells to the new Sludge Holding Tanks in the Sludge Transfer Station area of the treatment plant. Solids are held in these tanks, periodically removed using a vacuum truck, and hauled to the City of Salem for treatment. As the solids are held in the tanks some additional consolidation of the solids will take place. Some of the water can be removed from these tanks and drained to the Return Pump Station, where it can be recycled 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.

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.

2.4 CONDITION 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

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 also be used for irrigation.

In order to discharge to the Pudding River the wastewater is pumped approximately 1,400 ft. in a 6 in. diameter pipe and then it travels an additional 850 ft. in an 8 in. 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, but it is being bypassed as it is not working properly. The City has not noticed an increase in solids plugging of the irrigation lines with the filter being bypassed.

The submersible pumps are controlled by the pressure transducer level sensor using a lead on, lag on, and pump off operational strategy. The City recently 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 recently 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.

Deficiencies

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

Recommendations

- Add to the fence around the plant to include the pump station.
- Provide a fall protection system to prevent falls when the cover is open.
- Add warning signs stating that it is a confined space and a permit is required to enter.
- A cost-benefit analysis for adding VFDs should be completed prior to replacing the pump starters with VFDs. If verified by the analysis to have a greater benefit, replace the pump starters with VFDs.
- Install a permanent irrigation system.

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 the 6 ft. diameter wet well, a pressure level sensor, the 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. It is believed that this line may connect with the influent line upstream of

Return Pump Station

the influent screen and also be sampled with the WWTP influent. The City is currently investigating and DEQ has provided approval to modify the return piping so that it enters directly into the aerated lagoon since it could impact the influent sample results.

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 recently tested the level sensor. The pumps are being throttled to prevent the pumps from cycling too frequently. However, replacing the existing starters with VFDs may be more energy efficient.

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.

Deficiencies

- 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.
- There is no way to measure the amount of water being pumped from this station into the treatment process.

Recommendations

- Add to the fence around the plant to include the pump station.
- Provide a fall protection system to prevent falls when the cover is open.
- Add warning signs stating that it is a confined space and a permit is required to enter.
- A cost-benefit analysis for adding VFDs should be completed prior to replacing the pump starters with VFDs. If verified by the analysis to have a greater benefit, replace the pump starters with VFDs.
- Evaluate vent system and make sure it avoids gases escaping into the control panel so that electrical equipment meets NFPA 820.
- Add a flow meter to this line to measure the amount of return flow.

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 fence of the WWTP. 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.

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.

Recommendations

- Add grit removal downstream of the influent screen.
- Add a cover over the influent screen and also freeze protection.
- Install fall protection between the screen and lagoon.

2.4.3 Aerated Lagoon – Aeration Cells

The lagoon was constructed in 2000 and is an HDPE-lined lagoon basin. 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 to provide mixing. Two (2) HACH LDO™ dissolved oxygen (DO) probes monitor the

DO concentrations in the aeration cells. The DO measurements are sent to the SCADA system in the WWTP Office. 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.

The aerated lagoon, based on the 2018 design maximum month wet weather flow, has an average hydraulic retention time in the aerated portion of the lagoon of approximately 4.5 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 276 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 0.058 MGD, which means that the aeration system is currently at 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. 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 at capacity.
- With only one aeration lagoon, maintenance can be difficult.
- There is no fall protection around the aerated lagoon.

Recommendations

- Increase the aeration capacity by either adding aerators or blowers/diffusers.
- Place fall protection around the aerated lagoon.

- Add permanent pumps, piping, and valves to recycle the aerated lagoon water for scum control.

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 allows 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 pumped to the Sludge Holding Tanks.

Deficiencies

- The sludge pumps and piping are temporary and require manual operation.
- There is no measurement on the amount of solids being wasted to the Sludge Holding Tanks; 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.

Recommendations

- Permanent sludge pumps, piping, and flow monitoring should be installed for wasting to the Sludge Holding Tanks.
- An emergency overflow should be installed.

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 allows 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-inch pipe to the WWTP Building. Solids and scum that accumulate in the lagoon are periodically removed using portable submersible pumps. Also 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 effluent 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 2038 theoretical

irrigated farmland needed to land apply the influent during the growing season, (based on the 2038 ADWF and assuming 75% irrigation efficiency), is approximately 36 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 2038 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 14 million gallons of additional storage capacity is needed to store the 2038 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 11 million gallons.

Deficiencies

- 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.
- Recently, (although not clearly shown in the 2010-2015 data in Section 2.6), the TSS and BOD_5 percent removal has become a challenge at certain times during the year. This has been speculated to be due to algae.

Recommendations

- Increase the storage volume and/or land application area to provide for the future design flows.
- Place fall protection around the Effluent Storage Lagoon.
- An emergency overflow should be installed.
- The Effluent Storage Lagoon basin integrity (liner and walls) should be investigated, especially since the lagoon is reaching capacity.
- Tertiary treatment should be investigated to achieve greater TSS and BOD_5 percent removal.

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. A 1/2 HP Dayton Model 5KH36NN8054A mechanical 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. Both buildings do not have adequate ventilation and also 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.
- There is no railing around the chlorine contact basin.
- There is currently no alarm sent to the SCADA system if the dosing pump fails.

Recommendations

- Replace the existing chemical storage buildings and install exhaust fans and heaters.
- Install railing around the chlorine contact basin.
- Add alarms if a dosing pump fails.
- Add a chlorine monitor and connect it to an alarm if the chlorine residual increases.

2.4.7 Solids Handling

The solids in the settling cells of the aerated lagoon are periodically removed using temporary pumps and piping. The solids are pumped to four (4) new 3,000 gallon, polypropylene, Sludge Holding Tanks in the Sludge Transfer Station. Water in the sludge is periodically removed and drained to a Return Pump Station. The solids in the Sludge Holding Tanks are pumped by a vacuum truck periodically and hauled to the City of Salem for treatment. The Return Pump Station pumps to the aerated lagoon.

The Sludge Transfer Station drain is connected to the Return Pump Station, so any precipitation in the area drains to the Return Pump Station. There is also a small wall on three sides of the Sludge Transfer Station that helps collect and funnel the storm and wash water.

There is limited solids treatment occurring prior to disposal. If the City of Salem no longer accepts the solids, treatment for land application may be desired by the City. Also there is currently no solids dewatering capabilities at the plant, and hauling costs for wetter solids can be higher than dewatered solids.

Deficiencies

- The Sludge Transfer Station is uncovered and the drain is connected to the Return Pump Station, so rain water will also be pumped to the aerated lagoon.
- The walls are only on three sides, so it is possible for solids to flow out of the Sludge Transfer Station and onto the ground.
- 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 to decrease hauling costs.

Recommendations

- If the Sludge Transfer Station continues to be used, a cost-benefit analysis for adding a cover versus treating rainwater should be completed prior to adding a cover to avoid pumping and treating rain water.
- If the Sludge Transfer Station continues to be used, add walls around all sides to avoid solids flowing onto the ground, and install a float sensor to notify the operators of high water in the Sludge Transfer Station.
- Add solids treatment and investigate dewatering options.

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 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.

2.5 INFLUENT QUALITY

2.5.1 Analysis of Plant Records

The plant influent data taken from the Discharge Monitoring Reports (DMRs) were analyzed from January 2010 to December 2015. 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.

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.

2.5.2 BOD_5 Loading

The influent BOD_5 concentrations and loads into the WWTP from January 2010 to December 2015 are provided in Charts 2-1 and 2-2. The influent BOD_5 concentrations generally range from 100 to 300 mg/L, which are within the range of typical domestic wastewater values. For Aurora, these concentrations equate to BOD_5 loadings of approximately 50 to 150 pounds/day (ppd). The waste strength has been fairly constant during the reporting period.

Chart 2-1: WWTP Influent BOD_5 Concentrations

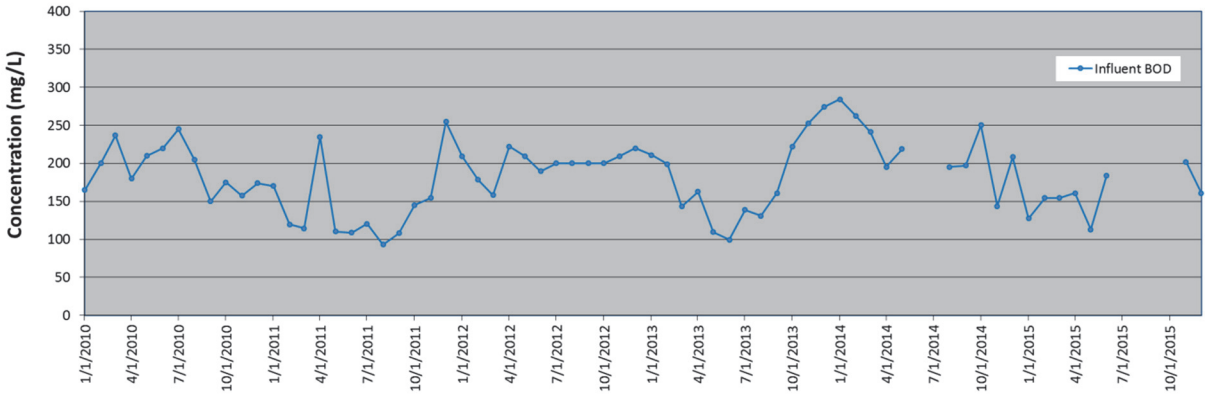
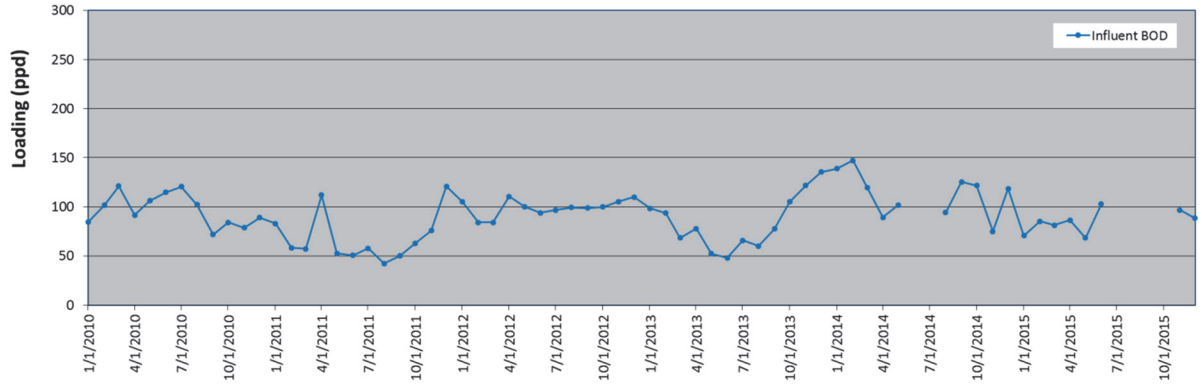


Chart 2-2: WWTP Influent BOD_5 Loading



The BOD_5 loading rates are shown in Table 2-1. 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 design values for this study are also shown in Table 2-1. Since the loading rates have remained fairly constant, the maximum value for each flow was selected for the design values.

Table 2-1: Summary of Influent BOD_5 Data

	2010	2011	2012	2013	2014	2015	Avg.	Max.	Design
Population	918	925	931	937	944	950	950	950	
AADF (PPD)	93	66	98	82	111	84	89	111	
ADWF (PPD)	92	53	97	68	106	79	83	106	
MMDWF (PPD)	121	63	100	105	126	103	103	126	
AWWF (PPD)	94	79	98	95	114	85	94	114	
MMWWF (PPD)	121	121	111	135	147	97	122	147	
AADF (ppcd)	0.101	0.071	0.105	0.087	0.117	0.088	0.095	0.117	**0.117**
ADWF (ppcd)	0.101	0.057	0.105	0.073	0.112	0.083	0.088	0.112	**0.112**
MMDWF (ppcd)	0.131	0.068	0.108	0.112	0.133	0.108	0.110	0.133	**0.133**
AWWF (ppcd)	0.102	0.086	0.105	0.101	0.120	0.090	0.101	0.120	**0.120**
MMWWF (ppcd)	0.132	0.131	0.119	0.145	0.156	0.102	0.131	0.156	**0.156**

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

2.5.3 TSS Loading

Influent TSS concentrations from January 2010 to December 2015 are provided in Charts 2-3 and 2-4. The TSS concentrations generally range between 100 and 350 mg/L, which are within the range of typical domestic wastewater values. These concentrations equate to TSS loadings between 50 and 180 ppd.

Chart 2-3: WWTP Influent TSS Concentrations

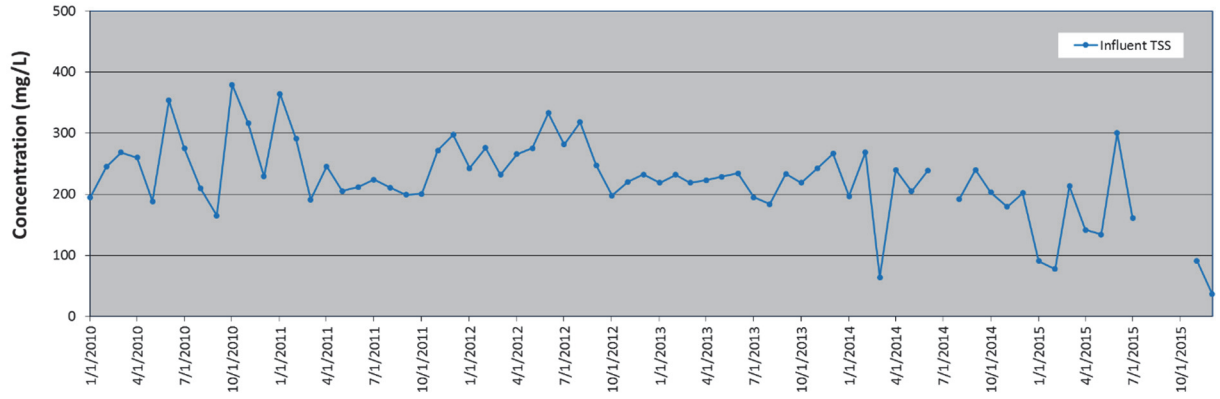


Chart 2-4: WWTP Influent TSS Loading

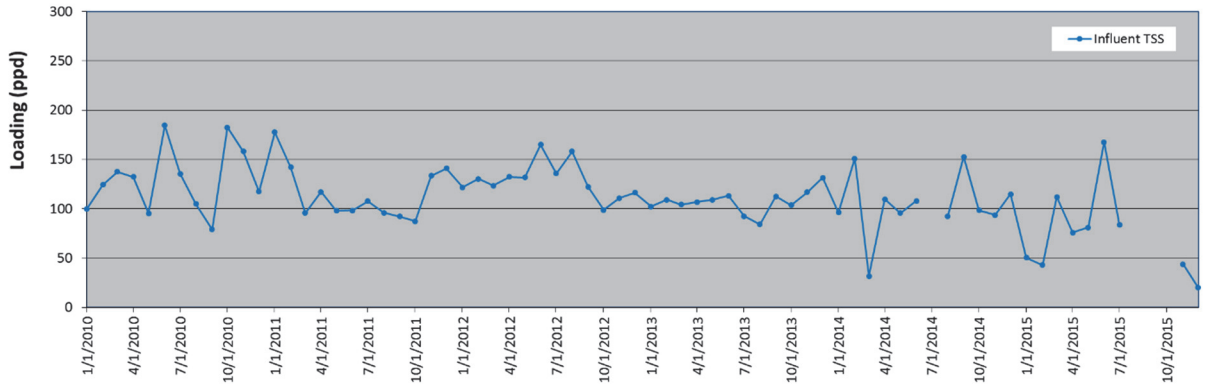


Table 2-2 shows the TSS ppcd summary. The typical range for TSS is shown in the table footnote. The design values for this study are also shown in Table 2-2. Since the loading rates have remained fairly constant, the maximum value (with one exception) was selected for the design values. The maximum month dry weather flow had an exceptionally high value in 2010, which appears to be an outlier as normally TSS and BOD_5 have a more consistent correlation. The second highest monthly value was used instead (0.177 ppcd from 2012).

Table 2-2: Summary of Influent TSS Data

	2010	2011	2012	2013	2014	2015	Avg.	Max.	Design
Population	918	925	931	937	944	950	950	950	
AADF (PPD)	131	111	126	104	99	67	106	131	
ADWF (PPD)	130	97	133	100	104	103	111	133	
MMDWF (PPD)	185	108	165	113	153	168	148	185	
AWWF (PPD)	132	126	119	107	96	51	105	132	
MMWWF (PPD)	158	178	132	132	151	112	144	178	
AADF (ppcd)	0.142	0.121	0.136	0.111	0.105	0.071	0.114	0.142	**0.142**
ADWF (ppcd)	0.141	0.104	0.143	0.107	0.110	0.108	0.119	0.143	**0.143**
MMDWF (ppcd)	0.201	0.116	0.177	0.121	0.162	0.176	0.159	0.201	**0.177**
AWWF (ppcd)	0.144	0.137	0.128	0.115	0.102	0.053	0.113	0.144	**0.144**
MMWWF (ppcd)	0.172	0.192	0.142	0.140	0.160	0.118	0.154	0.192	**0.192**

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

The same design ppcd values in Tables 2-1 and 2-2 were also used to estimate the design pounds per day for the years 2018, 2023, 2028, 2033, and 2038 based on the population projections in Table 2-3. Table 2-3 shows the estimated BOD_5 and TSS plant loadings for these design years.

Table 2-3: Influent Loading Projections

	Planning Criteria (ppcd*)	Loading Projections (PPD)				
	Year	2018	2023	2028	2033	2038
	Est. Population	1,032	1,185	1,360	1,562	1,793
BOD_5						
AADF	0.117	121	139	159	183	210
ADWF	0.112	116	133	152	175	201
MMDWF	0.133	137	158	181	208	238
AWWF	0.120	124	143	164	188	216
MMWWF	0.156	161	185	212	243	279
TSS						
AADF	0.142	147	169	194	223	255
ADWF	0.143	148	170	195	224	257
MMDWF	0.177	183	210	241	276	317
AWWF	0.144	148	170	195	224	258
MMWWF	0.192	198	228	261	300	345

2.6 WWTP OPERATIONS

2.6.1 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 2010 to December 2015 are shown in Charts 2-5 and 2-6, along with discharge limits per the current permit. Three exceedances were noted during this period (March 2010, November 2015 and December 2015). The March 2010 event was brought on by warm weather and an increase in algae in the Effluent Storage Lagoon. The November and December 2015 results were caused by drawing water from the bottom of the Effluent Storage Storage. Once this was corrected, (switched to a higher pipe in the spring of 2016), the BOD has been within discharge limits. As shown in Chart 2-7, the plant met the current 85% BOD_5 removal requirement for all but November 2015 and December 2015 during the reporting period. As shown in Chart 2-8, the maximum average monthly load was higher than the permitted limit in March 2010 and November 2015. The effluent BOD_5 load was consistently lower than the permitted average weekly and daily maximum loads, as shown in Charts 2-9 and 2-10.

Chart 2-5: WWTP Effluent BOD_5 Concentrations (Monthly)

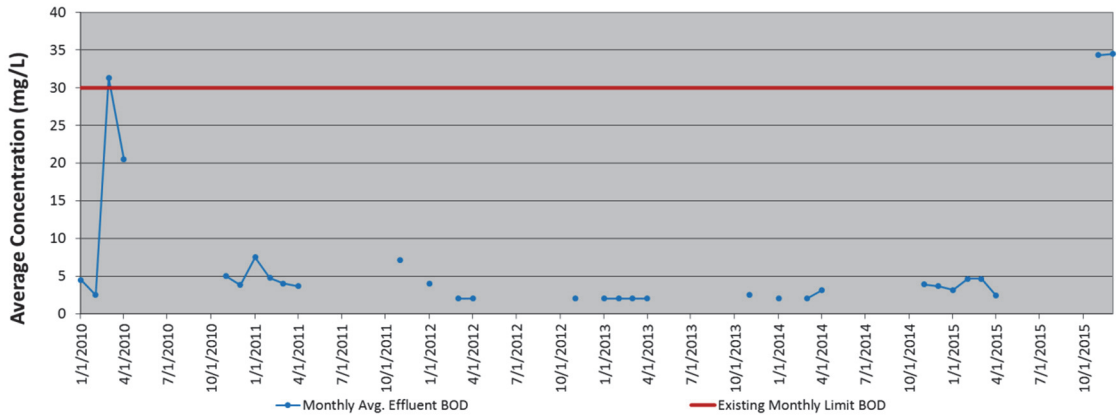


Chart 2-6: WWTP Effluent BOD_5 Concentrations (Weekly)

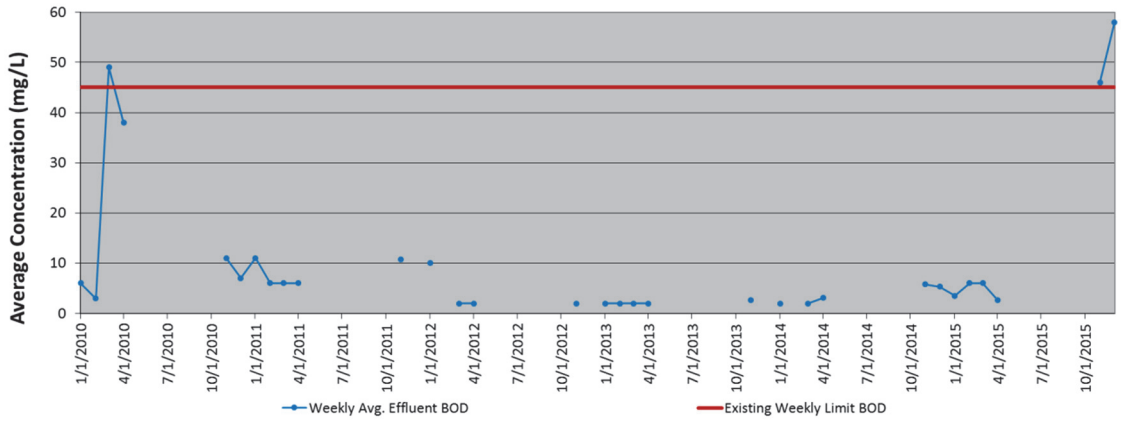


Chart 2-7: WWTP Effluent BOD_5 Percent Removal (Monthly)

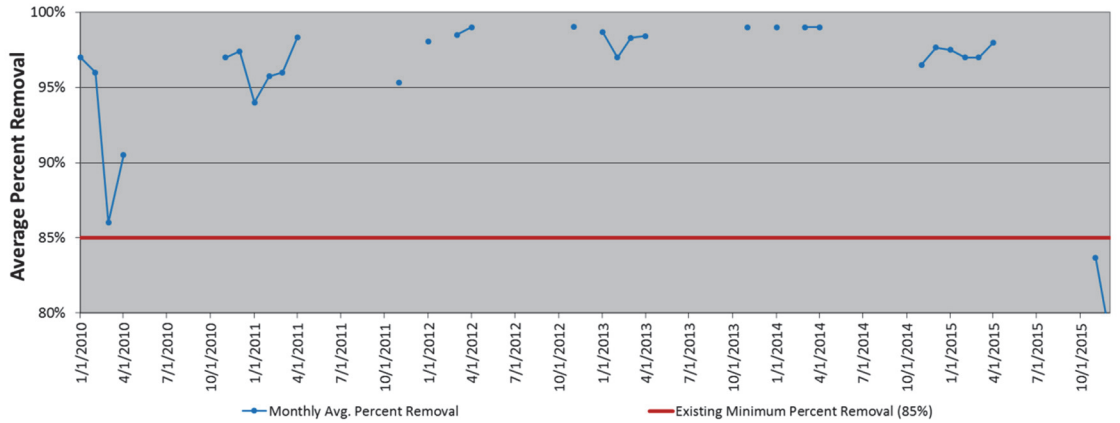


Chart 2-8: WWTP Effluent BOD_5 Loading (Average Monthly)

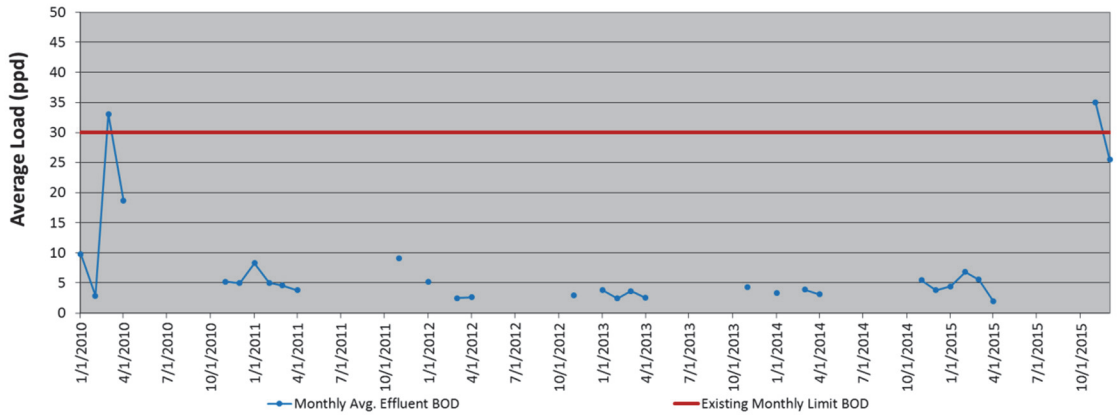


Chart 2-9: WWTP Effluent BOD_5 Loading (Average Weekly)

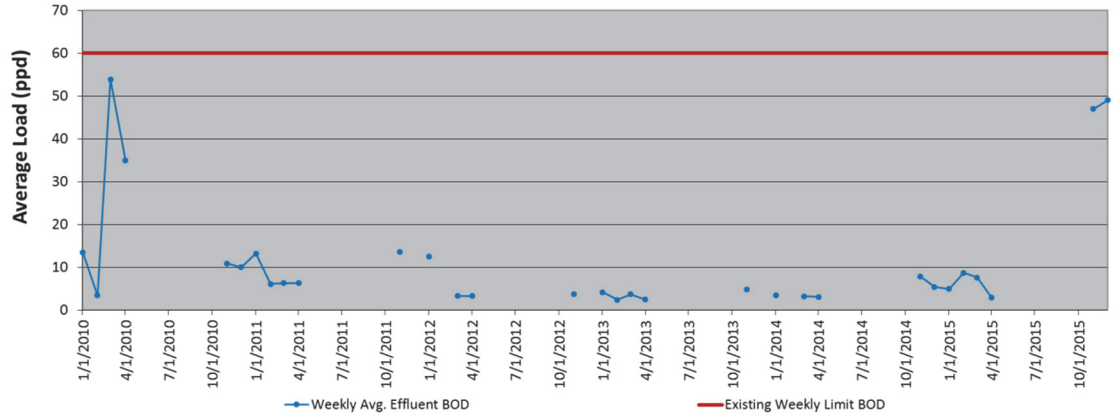
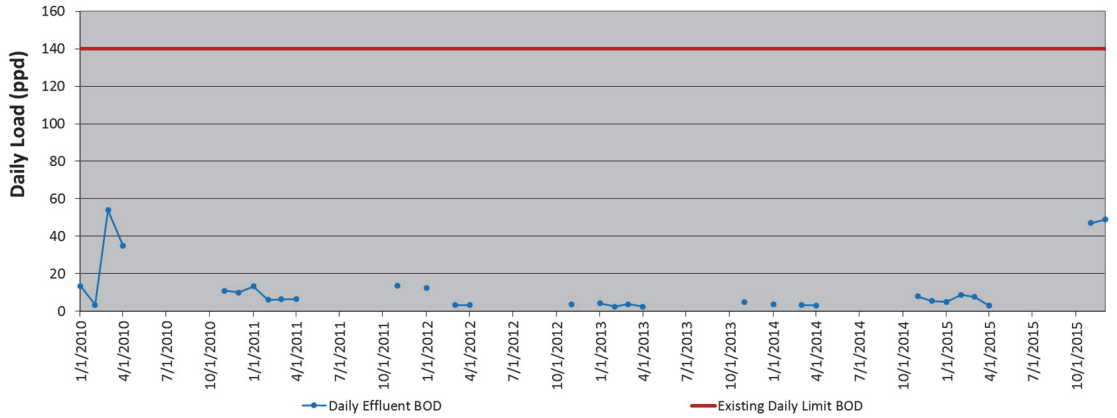


Chart 2-10: WWTP Effluent BOD_5 Loading (Daily Maximum)



TSS

Monthly and weekly effluent TSS data from January 2010 to December 2015 are shown in Charts 2-11 and 2-12 with discharge limits per the current permit. The wastewater treatment plant has not experienced TSS permit violations during the period analyzed. Additionally TSS removals have consistently been above the anticipated permit requirement of 65% (Chart 2-13). Also the effluent TSS loads have been consistently lower than the permitted maximum average monthly and average weekly loads as shown in Charts 2-14, 2-15 and 2-16. Recently in November and December 2016 however, TSS removals have been less than 65%. The City believes this was partially due to longer sampling tubing (the sample tube was recently shortened) and also to algae in the effluent.

Chart 2-11: WWTP Effluent TSS Concentrations (Monthly)

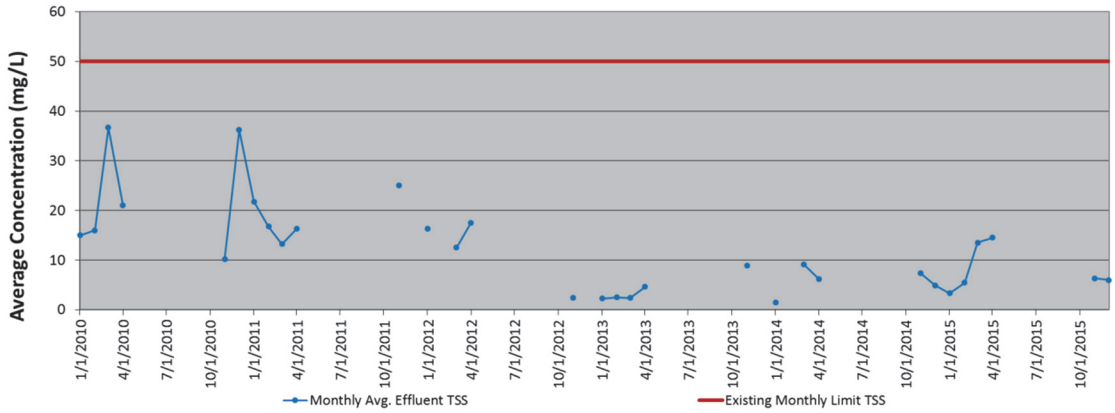


Chart 2-12: WWTP Effluent TSS Concentrations (Weekly)

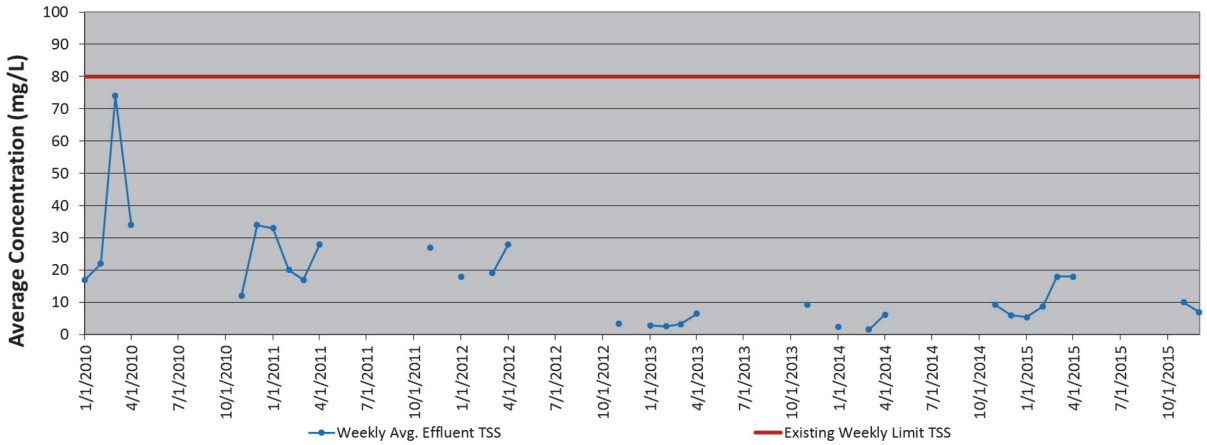


Chart 2-13: WWTP Effluent TSS Percent Removal (Monthly)

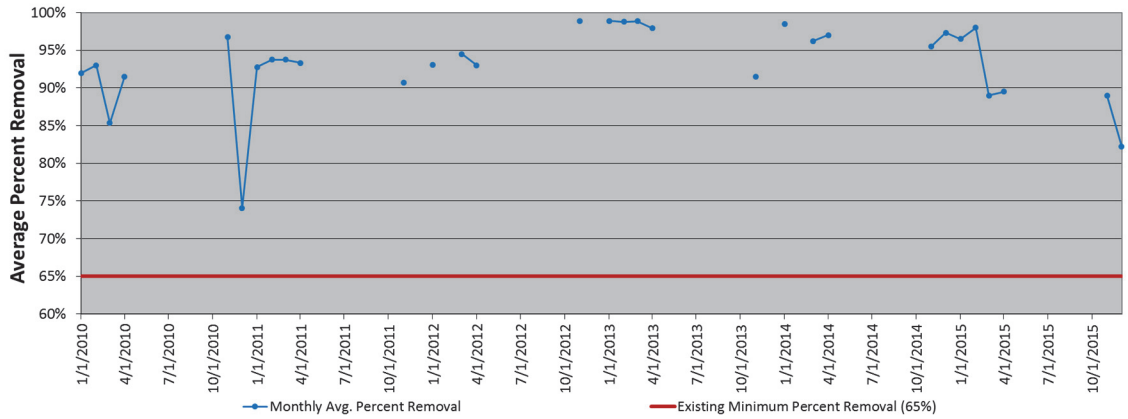


Chart 2-14: WWTP Effluent TSS Loading (Average Monthly)

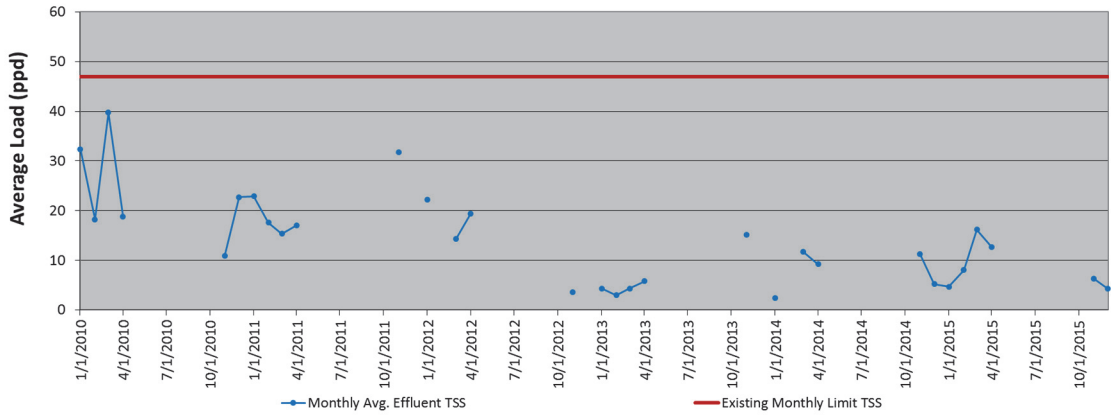


Chart 2-15: WWTP Effluent TSS Loading (Average Weekly)

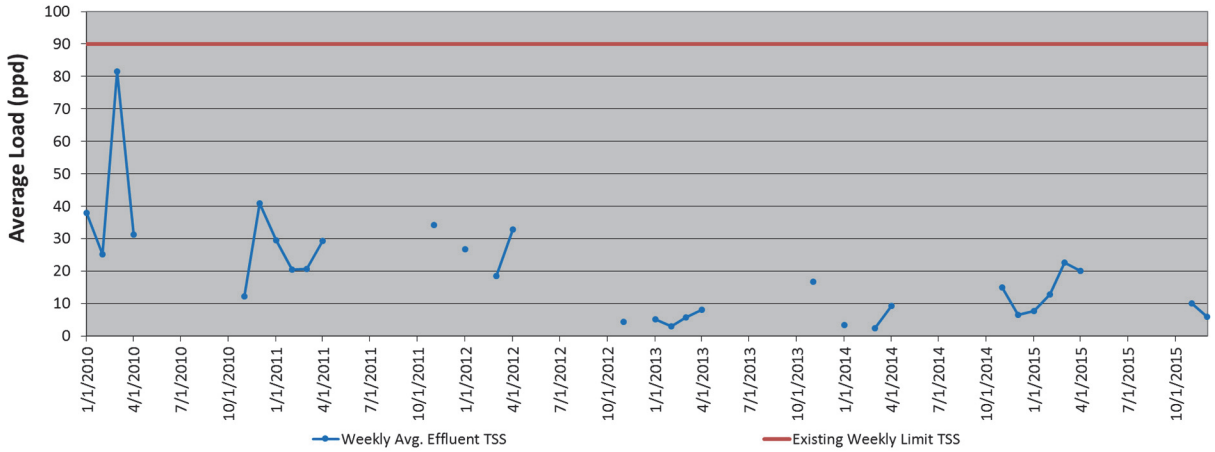
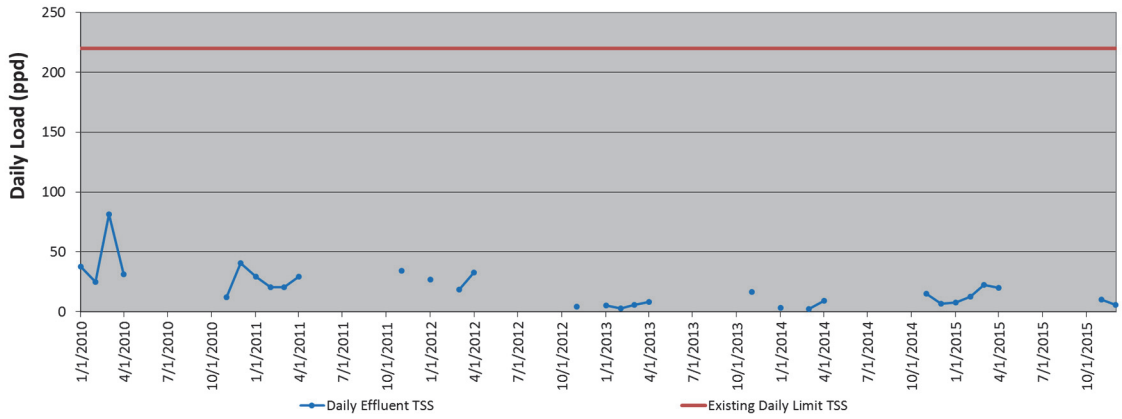


Chart 2-16: WWTP Effluent TSS Loading (Daily Maximum)



E. coli Bacteria

E. coli bacteria effluent data from January 2010 to December 2015 are shown in Charts 2-17 and 2-18. No violations were noted during this period.

Chart 2-17: WWTP Effluent E. coli Bacteria (Monthly)

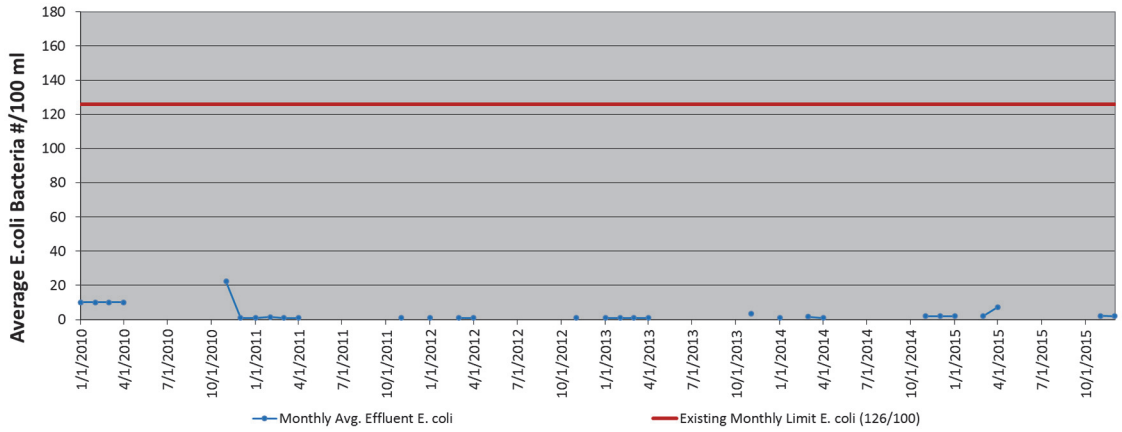
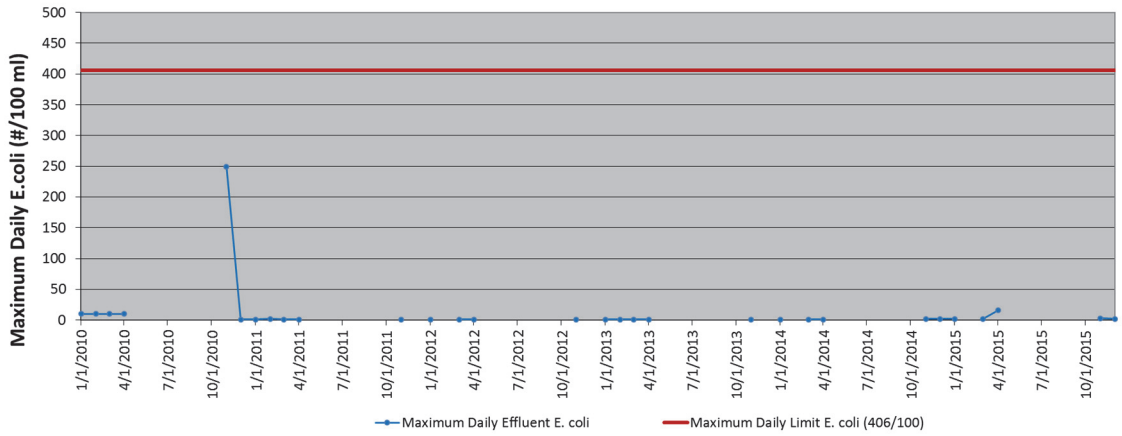


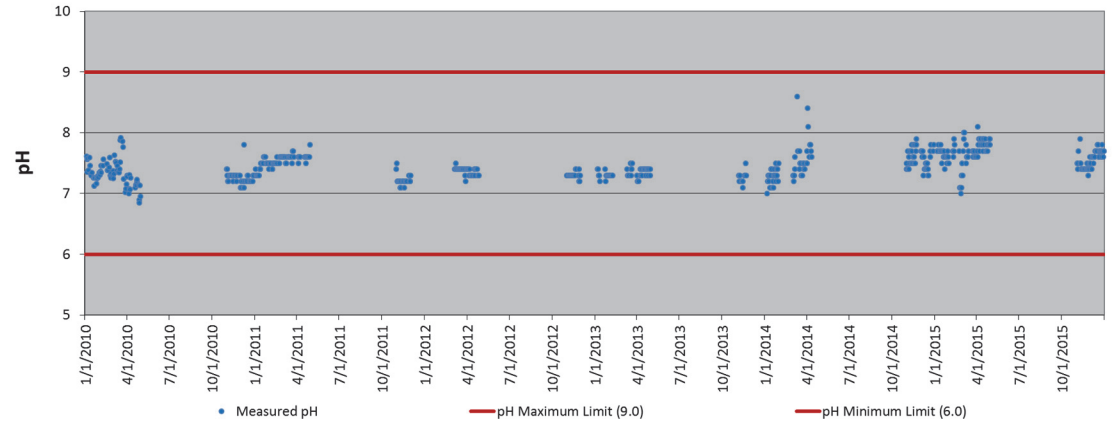
Chart 2-18: WWTP Effluent E. coli Bacteria (Daily)



pH

The daily maximum and minimum pH effluent data from January 2010 to December 2015 are shown in Chart 2-19. No pH limit violations were noted during this period.

Chart 2-19: WWTP Effluent pH (Daily)



Total Residual Chlorine

Chlorine residual data from January 2010 to December 2015 are shown in Charts 2-20 and 2-21. One violation in April 2014 was noted during this period; however, the City provided DEQ with a letter and identified that this result was a typographical error (the daily result was actually 0.10 mg/L rather than 1.0 mg/L, which means both the daily and monthly average results were less than the limits).

Chart 2-20: WWTP Effluent Total Chlorine (Monthly)

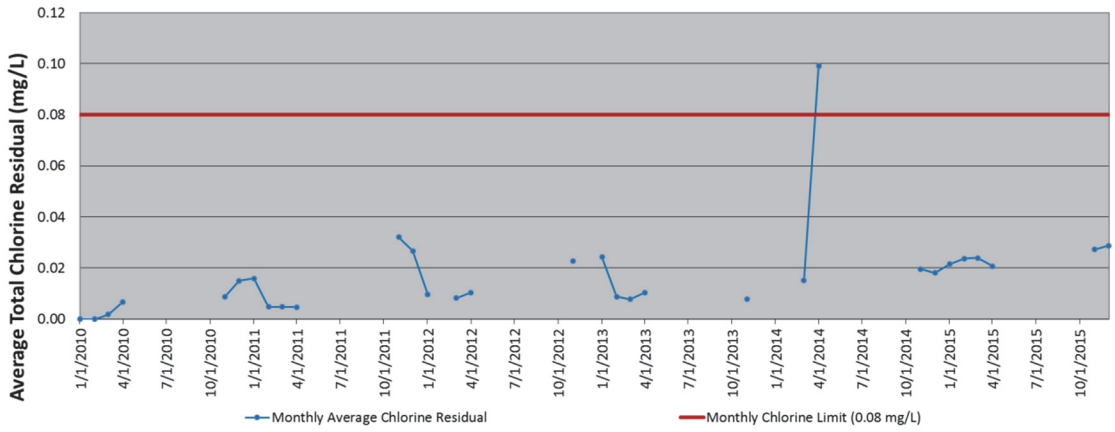
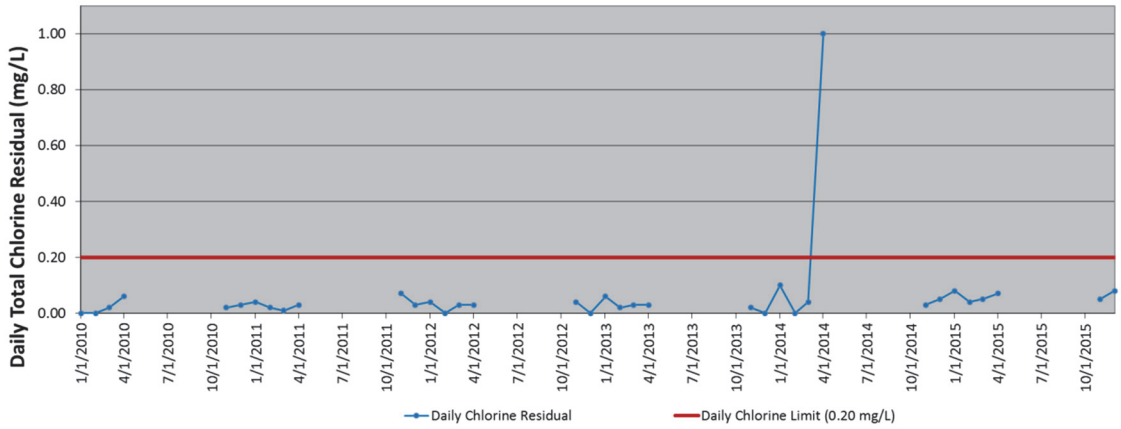


Chart 2-21: WWTP Effluent Total Chlorine (Daily)



Total Coliform

When the WWTP is land applying, the effluent is analyzed for total coliform. Charts 2-22 and 2-23 show the total coliform measurements from January 2010 to December 2015. There were a few total coliform violations during this period; however, the City provided a letter to DEQ that these were due to laboratory errors.

Chart 2-22: WWTP Effluent Daily Total Coliform

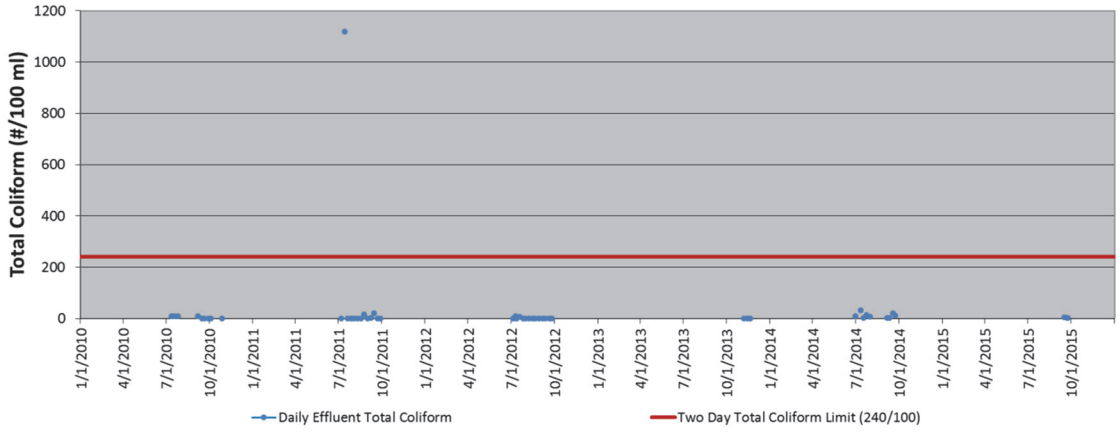
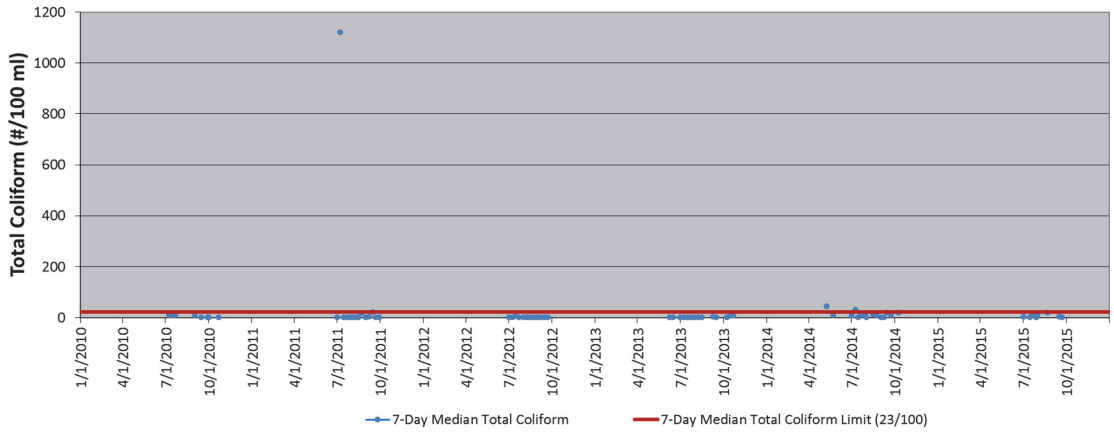


Chart 2-23: WWTP Effluent 7-Day Median Total Coliform



2.6.2 Reliability Evaluation

A summary of the reliability evaluation is provided in Table 2-4. This includes ratings for redundancy, criticality, and equipment condition.

Table 2-4: 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)

2.7 CAPACITY LIMITATIONS

2.7.1 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); however, additional 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 0.34 MGD, or 236 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 2038 peak week flow (0.141 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 2038 peak instantaneous flow rate is 0.34 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 2038 peak instantaneous flow rate is 0.34 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 a bathroom in the WWTP office. 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.

2.7.2 Headworks

The capacity of the City's magnetic influent flow meter is 0.43 MGD (300 gpm), which is greater than the future 2038 peak instantaneous flow rate of 0.34 MGD (236 gpm).

The capacity of the influent screen (according to the screen manufacturer) is approximately 0.5 MGD, which is sufficient for the future 2038 peak instantaneous flow rate of 0.34 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.

2.7.3 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 276 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 0.058 MGD, which means that the aeration system is currently at 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.

2.7.4 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 2018 maximum month wet weather design flows the detention time is approximately 28 hours, and the detention time is approximately 7 hours at the peak instantaneous flow rate. In addition to the settling capacities in these cells, the water flows to a 7.2 million gallon Effluent Storage Lagoon where solids continue to settle (for an additional 64 days at the 2038 AADF). 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.

2.7.5 Effluent Storage Lagoon

A water balance showed that the Effluent Storage Lagoon is at capacity without land application. Approximately 14 million gallons of additional storage capacity is needed to store the 2038 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 2038 ADWF is approximately 36 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 14 million gallons to approximately 11 million gallons.

2.7.6 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 2038 peak daily flow rate is 0.263 MGD (182 gpm), the peak instantaneous flow rate is 0.34 MGD (236 gpm), and the average dry-weather flow is 0.110 MGD (76 gpm). 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.

2.7.7 Sludge Handling

The solids in the settling cells of the aerated lagoon are periodically removed using temporary pumps and piping. The solids are pumped to four (4) new 3,000 gallon, polypropylene, Sludge Holding Tanks in the Sludge Transfer Station. As the solids settle in the tanks, water in the tanks is periodically decanted and drained to the Return Pump Station. The solids in the Sludge Holding Tanks are pumped by a vacuum truck periodically and hauled to the City of Salem for treatment. The Return Pump Station pumps to the head of the WWTP. Based on future anticipated solids production, the Sludge Holding Tanks may not be large enough (require multiple disposals each week). This could be reduced if aerobic digestion (solids treatment) were incorporated at the plant. Aerobic digestion could also assist the City with disposal options, for example if the City of Salem no longer accepts the sludge. Another item to consider is solids dewatering. Hauling costs for wetter solids are typically higher than dewatered solids.

2.7.8 Summary

A summary of the existing treatment capacity at the plant is provided in Table 2-5.

Table 2-5: Plant Capacity Summary

Component	Capacity[1] (MGD)	2015 Capacity Needed (MGD)	2038 Capacity Needed (MGD)	Limiting Factor
Influent Screen	0.50	0.18 (PIF)	0.34 (PIF)	Hydraulic
Aerated Lagoon	0.20	0.065 (MM)	0.122 (MM)	Basin Integrity
Aerated Lagoon Aeration	0.058	0.065 (MM)	0.122 (MM)	One blower is redundant
Effluent Storage Lagoon	0.060	0.058 (ADWF)	0.110 (ADWF)	Non-Discharge Period
Chlorine Feed Pump	0.43	0.18 (PIF)	0.34 (PIF)	Maximum Dose
Dechlorination Feed Pump	0.43	0.18 (PIF)	0.34 (PIF)	Maximum Dose
Chlorine Contact Basin	0.75	0.18 (PIF)	0.34 (PIF)	Hydraulic Retention Time
River Pump Station/ Irrigation Pump Station	0.43 / 0.25	0.18 (PIF) / 0.075 (PWkF)	0.34 (PIF) / 0.141 (PWkF)	Hydraulic
Return Pump Station	0.05	0.02	0.04	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.

2.8 FINANCIAL STATUS OF EXISTING FACILITIES

The financial information for the City of Aurora sewer utility is located in Appendix D. Sewer revenue during the 2015-2016 fiscal year was $284,709. The annual costs to operate and maintain the wastewater system, separated by type of expense, are also shown in Appendix D. In the 2015-2016 fiscal year, the total spent from the sewer fund was $270,927 (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 $323,000 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.

2.9 WATER/ENERGY/WASTE AUDITS

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

3. NEED FOR PROJECT

3.1 HEALTH, SANITATION, 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.

Compliance with the NPDES permit for Aurora was discussed in Section 2.6 of this report. The City of Aurora's WWTP has been in compliance with the NPDES effluent limits, with a few exceptions, since at least 2010 according to the records provided. The City reports that there has not been a lasting compliance issue.

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 in the NPDES Permit Evaluation Report for Aurora. The Permit Evaluation Report can be found in Appendix C.

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 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.

3.2 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.

3.3 SYSTEM DEFICIENCIES

River Pump Station / Irrigation Pump Station

There is 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. Also there is no permanent irrigation system, which means that the operators need to spend time manually moving the system.

Return Pump Station

This pump station also needs fall protection and a sign reading "confined space, entry by authorized personnel only". The pumps cycle on/off rather than being continuously controlled via VFDs for energy savings. Also 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 some modifications.

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 or composite sampler and there is limited room around the screen for maintenance.

Aerated Lagoon

The lagoon aeration system is currently at 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 is also no permanent pumps/piping for solids removal.

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 is also limited space around the lagoon, which makes maintenance difficult. There is no emergency overflow if the effluent pipe plugs. The Effluent Storage Lagoon has not been structurally inspected recently. Also recently the TSS and BOD_5 percent removal has become a challenge.

Chlorination and Dechlorination Systems

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. There may be some issues limiting the disinfection capacity as the flows increase. 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.

Solids Handling

The Sludge Transfer Station is not covered, which can lead to rain water being collected, pumped, and treated in the WWTP. The walls in the Sludge Transfer Station are only on three sides, so it is possible for solids to escape the station. There is also no solids treatment or 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. City water, rather than WWTP effluent, is used for wash water. 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. Also 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 is periodically washed out.

3.4 REASONABLE GROWTH

Wastewater facility improvements are needed to stay ahead of growth due to potential increased population and new construction. Section 1 of this report discussed population growth projections including customers served, and the wastewater flows associated with this growth. The collection system will have to be expanded to accommodate the potential growth in the planning period. These improvements, where possible, will be proportionately funded by the new growth through the use of system development charges (SDCs).

The SDC percentage was calculated using the capacity that can be utilized for future connections divided by the future capacity in 2038. 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.

4. ALTERNATIVES CONSIDERED

This section describes the alternatives considered to meet the wastewater facility deficiencies. It also includes design criteria and environmental and constructability considerations.

4.1 PLANNING CRITERIA

The characteristics of the influent and effluent that form the basis for sizing the treatment plant facilities are summarized in Table 4-1. Flow criteria that will be used for sizing various potential treatment components are summarized in Table 4-2.

Table 4-1: 20-Year (2038) WWTP Planning Criteria

Parameter	Influent	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit
Average Annual Daily Flow (AADF)	0.112 MGD			
Max Month Wet-Weather Flow ($MMWWF_5$)	0.122 MGD			
Peak Instantaneous Flow (PIF_5)	0.340 MGD			
BOD_5 [1,2] (May 1 – October 31)	248 mg/L 238 ppd -	-	-	-
TSS [2,3] (May 1 – October 31)	331 mg/L 317 ppd -	-	-	-
BOD_5 (November 1 – April 30)	274 mg/L 279 ppd -	30 mg/L 30 ppd 85% removal	45 mg/L 60 ppd -	140 ppd
TSS (November 1 – April 30)	339 mg/L 345 ppd -	50 mg/L 47 ppd 65% removal	80 mg/L 90 ppd -	220 ppd
pH		Daily minimum and maximum between 6.0 and 9.0		
E. coli Bacteria		126/100 mL	-	406/100 mL
Total Chlorine Residual		0.07 mg/L	-	0.19 mg/L
Total Kjeldahl Nitrogen	60 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	PIF_5	0.340
Aerated Lagoon	$MMWWF_5$	0.122
Effluent Storage Lagoon	ADWF	0.110
Chlorination and Dechlorination Systems	PIF_5	0.340
River Pump Station / Irrigation Pump Station	PIF_5	0.340

4.2 DESCRIPTION

The alternatives considered were based on the following goals:

- Provide facilities capable of reliably meeting current permit limits into the future.
- Maximize use of existing facilities.
- Find solutions that are practical and cost-effective.
- Utilize equipment and materials that are readily available.
- Select facilities that can be constructed without unacceptably impacting effluent quality.

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 cost-effective and of interest to the City at this time.

WWTP Disposal Alternatives

The requirements for agricultural recycling of effluent may be more or less stringent than for discharge to the Pudding River.

There are three main alternatives for disposal:

1. Summer Farmland Application and Winter Surface Water Discharge (No Action): This option is to continue to dispose of the water as is currently done. It is possible that future discharge limits may become more stringent than current requirements, requiring upgrades to the WWTP. As mentioned in Sections 2 and 3, there are storage volume and/or land application area deficiencies that would need to be addressed with this option. Three sub-options were developed:

    a. Increase the effluent storage capacity and maintain the existing land application. This sub-option would include using the existing Effluent Storage Lagoon and 6 acre land application site, and adding approximately 11 million gallons of additional storage 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 also the construction of a new pump station.

b. Increase the effluent storage and minimize land application. 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 14 million gallons of storage capacity. It is presumed that this would require the addition of a new pump station.

c. Increase land application area. This sub-option would use the existing Effluent Storage Lagoon and 6 acre land application site and add more land application area. There is an additional 3 acres at the WWTP 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 for land application and approximately 22 acres of land would be purchased (total of 36 acres). This 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 an irrigation system for the existing and new land application areas. The existing Effluent Storage Lagoon would continue to be used during shoulder periods where 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.

2. Year-round River Discharge: 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 likely be significant. In order to meet the required treatment levels consistently, a sophisticated mechanical plant would be needed, including tertiary treatment and cooling.

3. 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 reuse 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 2038 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 34 million gallons. The existing Effluent Storage Lagoon has a capacity of only 7.2 million gallons. Thus an additional approximately 27 million gallons of storage would need to be constructed.

Use of treated wastewater 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.

Table 4-3: Requirements for Reuse of Effluent by 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 RWUP[1]
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 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 2038 AADF and assuming 75% irrigation efficiency, is approximately 73 acres.

With typical effluent total nitrogen and total phosphorus concentrations of 15 mg/L and 3 mg/L, respectively, the nutrients applied would amount to approximately 70 pounds per acre nitrogen and 14 pounds per acre phosphorus. Oregon State University fertilizer recommendations for typical Willamette Valley grass seed crops are 180-230 pounds per acre of nitrogen and 30 pounds per acre P_2O_5 (about 13 pounds per acre of

phosphorus). Thus, application on 73 acres would provide approximately 30-40% of the nitrogen and 100% of the phosphorus recommended for grass seed crops.

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 order to have control over the irrigation, the City may need to own the land.

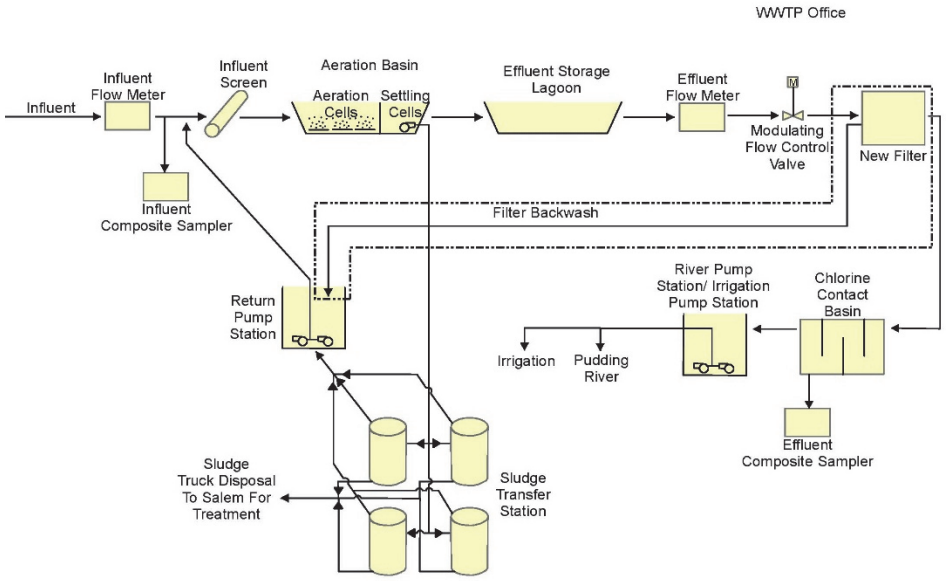
WWTP Treatment Alternatives

Options for addressing certain deficiencies of the existing wastewater treatment are shown below. If a WWTP deficiency had only a single solution (such as fencing, railing, VFDs, etc.), then the solution is discussed in individual project summary sheets found in Appendix E.

1. Aerated Lagoon: The aeration system (surface aerator and the blowers/diffusers) is currently at capacity. There are three main options to address this deficiency.
    a. Surface aerators. This option would include adding two (2) new 7.5 HP surface aerators to the aerated lagoon to provide the estimated oxygen required for the 20 year planning period. The existing aeration equipment (aerator and blowers/diffusers) would remain in service.
    b. Expand diffused aeration. This option would remove the existing surface aerator and replace it with 128 diffusers and two (2) 15 HP blowers to provide the estimated oxygen for the 20 year planning period. The existing diffusers and blowers would continue to be used and the new blowers and diffusers would be a similar type as the existing.
    c. Replace aeration system. This option would include removing the existing aeration equipment and replacing it with new diffusers and blowers. The new diffusers would be more easily removable for inspection and maintenance. The aeration system would be sized for the 20 year planning period.
2. Land Application and Effluent Storage Lagoon: There is insufficient land application area and/or storage volume for the 20 year design flow. The options for these deficiencies were discussed previously in the WWTP Disposal Alternatives. Regardless of which disposal option is selected, the WWTP will need to treat the influent flow during the design period.
3. Tertiary Treatment: TSS and BOD_5 percent removal has become a challenge at certain times during the year. There are three main options to address this deficiency.
    a. Filtration. This option would add filtration downstream of the Effluent Storage Lagoon to provide additional TSS and BOD_5 removal. This option assumed a cloth filter would be used. The filter consists of cloth-covered disks mounted in a fabricated steel tank. Solids are removed by filtering through the individual cloth-covered disks. As solids build up on the disks, a vacuum-assisted shoe or spray moves over the disks, cleaning the disks while filtration continues. This option should be pilot

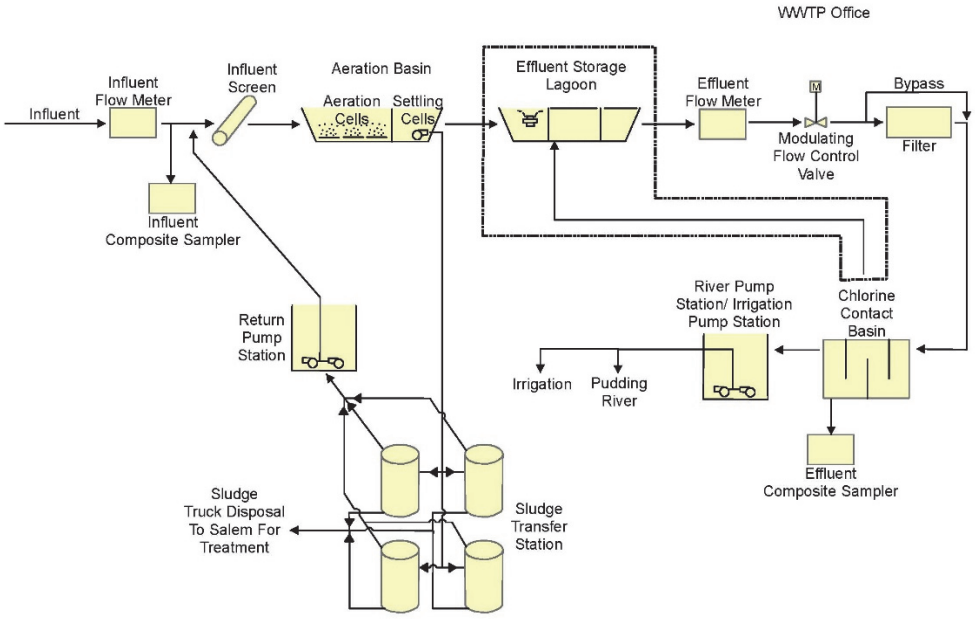
tested prior to investing to ensure it can achieve algae removal (algae can increase the TSS and BOD_5 in the effluent). A schematic for this option (inside the dashed lines) is shown in Schematic 4-1.

Schematic 4-1: Filtration



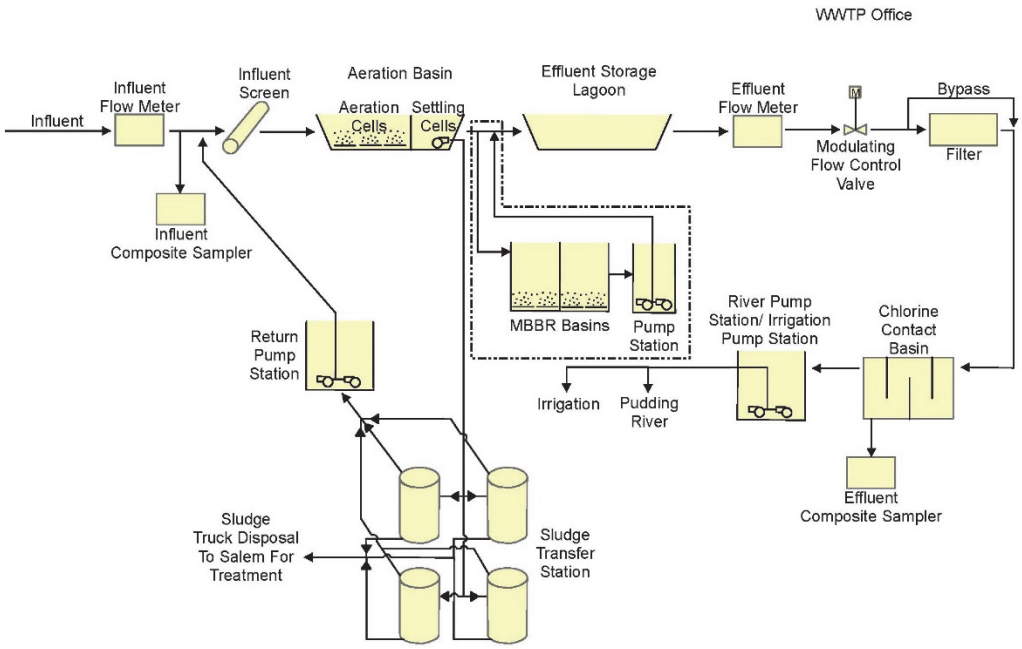
b. Aeration, Baffles, Cover and Chlorine. This option would add aeration in the Effluent Storage Lagoons to add dissolved oxygen and mixing, which can increase the BOD_5 removal and also reduce the likelihood of algae formation. (For this comparison it was assumed that two Effluent Storage Lagoons would be used). A couple of baffles would also be installed in the Effluent Storage Lagoon to create 3 zones. The first zone would have aeration, the second zone would include a floating cover, and the third zone would also have a floating cover, but the baffle would be located around the outlet structure to help the solids to settle prior to being discharged. Piping from the chlorine disinfection system would also be laid to allow seasonal chlorine addition to prevent algae blooms. A schematic for this option (inside the dashed lines) is shown in Schematic 4-2.

Schematic 4-2: Aeration, Baffles, Cover and Chlorine



c. Moving Bed Biofilm Reactor (MBBR). This option would add an MBBR downstream of the Aerated Lagoon to provide additional TSS and BOD_5 removal. An MBBR uses attached growth media to provide additional removal primarily for BOD_5 and ammonia, (which can reduce algae formation), as well as some TSS removal. The MBBR is typically aerated and mixed with blowers and coarse bubble diffusers. Effluent from the MBBR would be pumped to the Effluent Storage Lagoon. Solids that slough off of the MBBR media would settle out in the Effluent Storage Lagoon and would need to be removed periodically. A schematic for this option (inside the dashed lines) is shown in Schematic 4-3.

Schematic 4-3: MBBR



4. Chlorination and Dechlorination Systems: Several deficiencies were noted in Section 2 for the existing disinfection system. There are three (3) main alternatives to address the disinfection deficiencies.
    a. Upgrade the chlorination and dechlorination systems to address deficiencies.
    b. Convert the systems to peracetic acid (PAA) disinfection. Although PAA has been approved for use by the environmental protection agency (EPA), it is still a fairly new technology and would require pilot testing.
    c. Switch to ultraviolet (UV) disinfection. It should be noted that algae can interfere with UV light, so a filter may be required prior to UV disinfection.
5. Solids Handling: The WWTP currently hauls their liquid sludge (solids) to the City of Salem for treatment and disposal. Three (3) main alternatives were developed concerning solids handling.
    a. Sludge Holding. Continue to hold the solids in the polypropylene tanks and make the recommended improvements outlined in Section 2. The solids would continue to be sent to the City of Salem for disposal.
    b. Sludge Treatment. Construct an aerobic digester to treat the solids to meet Class B (EPA Part 503) requirements. The solids would then be land applied by farmers or sent to the City of Salem for disposal.
    c. Sludge Treatment and Dewatering. Construct an aerobic digester to treat the solids to meet Class B (EPA Part 503) requirements and add mechanical dewatering. The dewatered solids would then be stored under a cover and be land applied by farmers or could be sent to a landfill for disposal.

4.3 MAP

A flow schematic of the existing WWTP is in Figure 6 in Appendix A.

4.4 ENVIRONMENTAL IMPACTS

A comparison of potential environmental impacts of the alternatives is summarized in Table 4-4.

4.4.1 Land Use / Prime Farmland / Formally Classified Lands

It is not anticipated that a project will disrupt prime farmland.

4.4.2 Floodplains

As shown in Figure 2, some portions of the study area are located inside the 100-year and 500-year floodplains. None of the alternatives would create new obstructions to the flood plain.

4.4.3 Wetlands

None of the alternatives are located in wetland areas (Figure 4 in Appendix A).

4.4.4 Cultural Resources

It is not anticipated that any of the alternatives will interfere with cultural resources. None of the projects will interfere with above ground resources identified by the State Historic Preservation Office.

4.4.5 Biological Resources

Several fish in Marion County are listed as sensitive or threatened; however, no in-stream work is anticipated with any of the alternatives, so no fish species will be disturbed. Endangered species include Bradshaw's desert parsley and the Willamette Valley daisy. It is not likely that any of the plants exist on the proposed project sites because the areas have previously been disturbed. If the species is found, further investigation would be undertaken to determine the necessary measures.

4.4.6 Water Resources

Modifications to the WWTP to improve treatment reliability should have a beneficial impact on the Pudding River. There are no alternatives that involve stream crossings.

4.4.7 Socio-Economic Conditions

None of the alternatives would have a disproportionate effect on any segment of the population. Equitable wastewater facilities would be provided to all people within the City, limited only by physical geography and overall City budget - not by economic, social, or cultural status of any individual or neighborhood.

TABLE 4-4: Affected Environment / Environmental Consequences Summary for Alternatives

Environmental Criteria	WWTP Alternatives							
	WWTP Disposal					Aerated Lagoon		
	Summer Farm/Winter Discharge - Increase Storage	Summer Storage/ Winter Discharge	Summer Farm/Winter Discharge - Increase Land	Year-Round River	Summer Farm/ Winter Storage	Surface Aerators	Expand Diffused Aeration	Replace Aeration System
Land Use/ Important Farmland/Formally Classified Lands	City purchase and construct storage. Likely undeveloped land.	Construct storage at WWTP.	City purchase and irrigate prime farmland.	No Impact	City purchase and construct storage. Likely undeveloped land.	No Impact	No Impact	No Impact
Floodplains	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Wetlands	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Cultural Resources	None Known	None Known	None Known	No Impact	None Known	No Impact	No Impact	No Impact
Biological Resources	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Water Quality Issues	No Impact	No Impact	No Impact	More Loading	No Loading	Improved effluent quality	Improved effluent quality	Improved effluent quality
Coastal Resources	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Socio-Economic/ Environmental Justice Issues	No Impact	No Impact	No Impact	More Loading	No Loading	No Impact	No Impact	No Impact
Miscellaneous Issues	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	Easier O&M

TABLE 4-4: Affected Environment / Environmental Consequences Summary for Alternatives (cont'd)

Environmental Criteria	WWTP Alternatives Cont'd.								
	Tertiary Treatment			WWTP Disinfection			Sludge Handling		
	Filtration	Aeration, Baffle, and Chlorine	MBBR	Chlorine/ Dechlorination	PAA	UV	Sludge Holding	Sludge Treatment	Sludge Treatment and Dewatering
Land Use/ Important Farmland/Formally Classified Lands	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Floodplains	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Wetlands	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Cultural Resources	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Biological Resources	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Water Quality Issues	Improved effluent quality	Improved effluent quality	Improved effluent quality	None Known	None Known	None Known	None known	None known	None known
Coastal Resources	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Socio-Economic/ Environmental Justice Issues	More energy used	More energy used	More energy used	More chemicals used	More chemical used	More energy used	More energy used	More energy used	More energy used
Miscellaneous Issues	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact

4.5 LAND REQUIREMENTS

The City would purchase land during the 20 year planning period for additional storage and/or land application.

4.6 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.

4.7 SUSTAINABILITY CONSIDERATIONS

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

4.7.1 Water and Energy Efficiency

The farmland disposal, because of the nutrients, would be beneficial to the farmland and would reuse the treated wastewater.

The further treatment options such as UV disinfection, would require additional energy but reduce disinfection byproducts in the effluent. Upgrading the chlorination/dechlorination systems or adding a PAA disinfection system would continue or increase the use of chemicals.

4.7.2 Green Infrastructure

Using WWTP effluent for farmland irrigation helps protect the Pudding River and uses the nutrients for crop growth.

4.7.3 Other

Replacement of diffusers will facilitate improved maintenance.

4.8 COST ESTIMATES

Cost estimates for this report were prepared using estimated construction costs with 15% contractor overhead and profit, plus a contingency of 30%, and engineering services including construction of 20% (based on total construction cost). Legal, administrative, and permitting costs of 2% are included for the selected alternatives. Present worth analyses are based on a real discount rate of 1.2% and a 20-year time period. An average rate of $0.085 per kWh was used for estimating power costs and a price of $40,000 per acre was used for estimating land costs. Cost estimates for each alternative are presented in Section 5.

5. SELECTION OF AN ALTERNATIVE

Alternatives were considered to address the deficiencies noted in the previous chapters. 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. The present value analysis was conducted using a real discount rate of 1.2% and a 20-year time period. The equipment (unless a short-lived asset) is assumed to have a 20-year useful life, so no salvage value is included for comparing the alternatives.

5.1 COMPARATIVE ANALYSIS (COSTS AND NON-MONETARY FACTORS)

5.1.1 WWTP Disposal Alternatives

1. Summer Farmland Application and Winter Surface Water Discharge (No Action): Three sub-options were developed and evaluated to solve the storage volume and/or land application area deficiencies.

    a. Increase the effluent storage and maintain the existing land application. The City primarily land applies on approximately 6 acres. Using the 6 acres and applying the recycled water at agronomic rates, the total storage volume required during the summer is approximately 18 million gallons. The Effluent Storage Lagoon has a capacity of 7.2 million gallons, so this sub-option would add approximately 11 million gallons of storage capacity. This sub-option also includes land for the additional storage lagoon and a pump station. It also includes upgrading the irrigation system on the 6 acres to a permanent system. It is presumed that the new effluent storage lagoon would be located approximately 0.5 miles from the WWTP. A preliminary cost estimate is shown in Table 5-1.

TABLE 5-1: Additional Effluent Storage / Maintain Land Application

Item	Cost (2017)
Site Work	$ 20,000
Property	$ 320,000
Storage Lagoon	$ 1,010,000
Pump Station	$ 180,000
Piping/Valves and Instrumentation*	$ 350,000
Electrical/Controls	$ 50,000
Permanent Irrigation System	$ 80,000
Mobilization (10%)	$ 210,000
Overhead and Profit (15%)	$ 310,000
Contingency (30%)	$ 610,000
Construction Subtotal	**$ 3,140,000**
Soft Costs (25%)	$ 790,000
Total Project Cost	**$ 3,930,000**
Estimated Annual O&M	$ 21,000
Total Present Value	**$ 4,310,000**

* Assumes new storage lagoon would be located 0.5 miles from the WWTP.

b. Increase effluent storage and minimize land application. 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 area for the new storage lagoon, so no land would need to be purchased. The land application area that is not used for the storage lagoon could still be used for land application in case of emergency. The total storage volume required during the summer (without land application) is approximately 21 million gallons. This sub-option would add approximately 14 million gallons of storage capacity to the 7.2 million gallon capacity of the existing Effluent Storage Lagoon. This sub-option also includes a pump station and an upgrade of the remaining irrigation system to a permanent system (approximately 2 acres). A preliminary cost estimate is shown in Table 5-2.

TABLE 5-2: Additional Effluent Storage / Limited Land Application

Item	Cost (2017)
Site Work	$ 20,000
Storage Lagoon	$ 1,190,000
Pump Station	$ 180,000
Piping/Valves and Instrumentation*	$ 350,000
Electrical/Controls	$ 50,000
Permanent Irrigation System	$ 30,000
Mobilization (10%)	$ 190,000
Overhead and Profit (15%)	$ 280,000
Contingency (30%)	$ 550,000
Construction Subtotal	**$ 2,840,000**
Soft Costs (25%)	$ 710,000
Total Project Cost	**$ 3,550,000**
Estimated Annual O&M	$ 8,000
Total Present Value	**$ 3,700,000**

* Assumes new storage lagoon would be located in the existing land application area.

c. Increase land application. This sub-option would use the existing 7.2 million gallon Effluent Storage Lagoon and 14 acres of potential land at the WWTP, and purchase approximately 22 acres of land in order to provide the estimated land application during the summer (non-discharge period) for the 20-year planning flows. This sub-option also includes a permanent irrigation system for the existing and new land. It is presumed that the land for this sub-option can be purchased within one mile of the WWTP. A preliminary cost estimate is shown in Table 5-3. The O&M estimate is for the additional costs of this sub-option (additional irrigation).

TABLE 5-3: Additional Land Application

Item	Cost (2017)
Site Work	$ 60,000
Property	$ 880,000
Piping/Valves*	$ 530,000
Permanent Irrigation System	$ 470,000
Mobilization (10%)	$ 200,000
Overhead and Profit (15%)	$ 300,000
Contingency (30%)	$ 590,000
Construction Subtotal	**$ 3,030,000**
Soft Costs (25%)	$ 760,000
Total Project Cost	**$ 3,790,000**
Estimated Annual O&M	$ 53,000
Total Present Value	**$ 4,730,000**

* Assumes new land would be located 1 mile from the existing Irrigation Pump Station.

2. Year-Round River Discharge:

   In order to meet the required treatment levels needed for year-round river discharge (including ammonia, phosphorus, and temperature), a mechanical plant would be needed. It was assumed that the mechanical plant would be constructed in the vicinity of the 6 acre land application area. A preliminary cost estimate for this option is summarized in Table 5-4. The O&M estimate is for the additional costs of using the new treatment system. In addition to the costs shown, the required operator classification would also be increased with this option.

TABLE 5-4: Mechanical Plant

Item	Cost (2017)
Site Work	$ 60,000
Headworks and Influent Pump Station	$ 340,000
SBR Equipment and Basins	$ 780,000
Filter Equipment	$ 570,000
Cooling/Chilling Equipment	$ 310,000
UV Equipment	$ 260,000
Control Building	$ 600,000
Piping/Valves and Instrumentation	$ 100,000
Electrical/Controls	$ 460,000
Mobilization (10%)	$ 350,000
Overhead and Profit (15%)	$ 530,000
Contingency (30%)	$ 1,050,000
Construction Subtotal	**$ 5,410,000**
Soft Costs (25%)	$ 1,360,000
Total Project Cost	**$ 6,770,000**
Estimated Annual O&M	$ 117,000
Total Present Value	**$ 8,840,000**

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

   The permit requirements for farmland application are less stringent than for discharge to the Pudding River. This is likely to be a trend that will continue into the future, so farmland application can help ensure continued compliance with permit requirements.

   In evaluating this alternative, it was assumed that the City would purchase land for farmland application, in order to control the land application. Approximately 73 total acres of land are needed for a complete year of wastewater based on the 2038 AADF. For this evaluation it was assumed that 14 acres of land would be available at the WWTP, and an additional 59 acres would be purchased. A storage volume of approximately 27 million gallons (in addition to the existing Effluent Storage Lagoon) is included to store the water over the winter. This

alternative also includes a permanent irrigation system. A preliminary cost estimate for this option is summarized in Table 5-5. The O&M estimate is for the additional costs of this sub-option (maintenance of the new pump station, storage lagoon, and irrigation).

Table 5-5: Summer Farmland Application and Winter Storage

Item	Cost (2017)
Site Work	$ 160,000
Property	$ 2,760,000
Storage Pond	$ 2,100,000
Pump Station	$ 180,000
Piping/Valves and Instrumentation*	$ 1,600,000
Electrical/Controls	$ 50,000
Permanent Irrigation System	$ 940,000
Mobilization (10%)	$ 780,000
Overhead and Profit (15%)	$ 1,170,000
Contingency (30%)	$ 2,340,000
Construction Subtotal	**$ 12,080,000**
Soft Costs (25%)	$ 3,020,000
Total Project Cost	**$ 15,100,000**
Estimated Annual O&M	$ 82,000
Total Present Value	**$ 16,560,000**

* Assumes new land is located 2 miles from existing Irrigation Pump Station.

Disposal Recommendation

The recommended alternative is the construction of new effluent storage lagoon and continued winter discharge to surface water (Option 5.1.1.1.b; see Table 5-2), as it has the lowest present value.

5.1.2 Aerated Lagoon

Three options were evaluated to address the insufficient aeration system capacity.

1. Surface Aerators:

   This option would include adding two (2) new 7.5 HP surface aerators to the aerated lagoon to provide the estimated oxygen required for the 20 year planning period. The existing aeration equipment (surface aerator and blowers/diffusers) would remain in service. A preliminary cost estimate for this option is summarized in Table 5-6. The estimated annual O&M costs include the existing aeration equipment. In order to maintain the efficiency of the existing diffusers, it is assumed that the Aerated Lagoon would be taken down once a year and the contents of the basin pumped to the Effluent Storage Lagoon and then transferred back to the Aerated Lagoon.

Table 5-6: Surface Aerators

Item	Cost (2017)
Surface Aerators	$ 20,000
Electrical/Controls	$ 5,000
Mobilization (10%)	$ 3,000
Overhead and Profit (15%)	$ 4,000
Contingency (30%)	$ 8,000
Construction Subtotal	**$ 40,000**
Soft Costs (25%)	$ 10,000
Total Project Cost	**$ 50,000**
Estimated Annual O&M	$ 33,000
Total Present Value	**$ 640,000**

2. Expand Diffused Aeration:

This option would remove the existing surface aerator and replace it with 128 diffusers and two (2) 15 HP blowers to provide the estimated oxygen for the 20 year planning period. The existing blowers and diffusers would remain in use. The new blowers and diffusers would be a similar type to the existing. The diffusers have a higher oxygen transfer efficiency than surface aerators, which reduces power usage. A preliminary cost estimate to expand the diffused aeration system is summarized in Table 5-7. In order to maintain the efficiency of the diffusers, it is assumed that the Aerated Lagoon would be taken down once a year and the contents of the basin pumped to the Effluent Storage Lagoon and then transferred back to the Aerated Lagoon.

Table 5-7: Expand Diffused Aeration

Item	Cost (2017)
Diffusers and Blowers	$ 60,000
Blower Shed	$ 10,000
Electrical/Controls	$ 11,000
Mobilization (10%)	$ 9,000
Overhead and Profit (15%)	$ 13,000
Contingency (30%)	$ 25,000
Construction Subtotal	**$ 128,000**
Soft Costs (25%)	$ 32,000
Total Project Cost	**$ 160,000**
Estimated Annual O&M	$ 27,000
Total Present Value	**$ 640,000**

3. Replace Aeration System:

This option would include removing the existing aeration equipment (surface aerator and diffusers) and replacing it with new diffusers and blowers. The new

diffusers would be more easily removable for inspection and maintenance than the existing diffusers, such that the Aerated Lagoon would not need to be taken down once a year. The diffusers have a higher oxygen transfer efficiency than surface aerators, which reduces power usage. The aeration system would be sized for the 20 year planning period. A preliminary cost estimate for the new aeration system is summarized in Table 5-8.

Table 5-8: Replace Aeration System

Item	Cost (2017)
Diffusers and Blowers	$ 75,000
Blower Shed	$ 10,000
Electrical/Controls	$ 13,000
Mobilization (10%)	$ 10,000
Overhead and Profit (15%)	$ 15,000
Contingency (30%)	$ 30,000
Construction Subtotal	**$ 153,000**
Soft Costs (25%)	$ 39,000
Total Project Cost	**$ 192,000**
Estimated Annual O&M	$ 25,000
Total Present Value	**$ 640,000**

Aerated Lagoon Recommendation

All of the three options have similar present values over a 20-year period. The City prefers to replace the aeration system with new diffusers (Option 5.1.2.3; see Table 5-8) since this option has the lowest estimated annual O&M of the three options.

5.1.3 Effluent Storage Lagoon

There is insufficient storage volume and/or land application area for the 20 year design flow. The options for this deficiency are discussed in Section 5.1.1 (WWTP Disposal Alternatives). The recommendation is to construct an additional effluent storage lagoon ((Option 5.1.1.1.b; see Table 5-2); approximately 14 million gallon capacity) and continue surface water discharge in the winter.

5.1.4 Tertiary Treatment

TSS and BOD_5 percent removal has become a challenge at certain times during the year. Three main options were evaluated to address this deficiency.

1. Filtration:

   This option would add filtration downstream of the Effluent Storage Lagoon. Filtration would provide additional TSS and BOD_5 removal. For this option it was assumed a cloth filter would be used. The advantages of cloth filters are a low backwash volume (which is sent to the return pump station), small footprint, ease of maintenance, and low power usage. The size of the filter units depends on the

flow rate. For this evaluation it was assumed the filters would handle the higher flows associated with holding through the summer and discharging during the winter. Two filters were assumed, with one filter designed as a backup. The filters would be covered. A preliminary cost estimate for this option is shown in Table 5-9.

Table 5-9: Filtration

Item	Cost (2017)
Site Work	$ 20,000
Filters	$ 450,000
Cover	$ 10,000
Electrical/Controls	$ 100,000
Mobilization (10%)	$ 60,000
Overhead and Profit (15%)	$ 90,000
Contingency (30%)	$ 180,000
Construction Subtotal	**$ 890,000**
Soft Costs (25%)	$ 230,000
Total Project Cost	**$ 1,120,000**
Estimated Annual O&M	$ 5,000
Total Present Value	**$ 1,210,000**

2. Aeration, Baffles, Cover and Chlorine:

This option would include adding the following to the Effluent Storage Lagoons an aerator, two (2) baffle walls, floating covers in the last 2 cells, and chlorine piping. (For this comparison it was assumed that two Effluent Storage Lagoons would be used). The aeration would be used to add dissolved oxygen and mixing, which can improve the biological removal of the TSS and BOD_5 in the lagoon and also reduce the likelihood of algae formation. The baffles would help the solids to settle prior to being discharged. The floating covers would help block the sunlight, which inhibits algae growth. Evaporation would be decreased by the floating covers in the last 2 cells; however, the required Effluent Storage Lagoon capacity would remain as described in Section 2.4.5. Solids would still need to periodically be removed from the Effluent Storage Lagoon. The chlorine piping would allow for seasonal chlorine doses to be added to prevent algae blooms from occurring. A preliminary cost estimate for this option is shown in Table 5-10.

Table 5-10: Aeration, Baffles, Cover and Chlorine

Item	Cost (2017)
Surface Aerators	$ 20,000
Baffles	$ 20,000
Floating Covers	$ 270,000
Chlorine Dosing Pipes	$ 30,000
Electrical/Controls	$ 40,000
Mobilization (10%)	$ 40,000
Overhead and Profit (15%)	$ 60,000
Contingency (30%)	$ 120,000
Construction Subtotal	**$ 580,000**
Soft Costs (25%)	$ 150,000
Total Project Cost	**$ 730,000**
Estimated Annual O&M	$ 11,000
Total Present Value	**$ 930,000**

3. Moving Bed Biofilm Reactor (MBBR):

This option would add an MBBR downstream of the Aerated Lagoon to provide additional treatment, primarily for BOD_5 and ammonia, (which can reduce algae formation), as well as some TSS removal. Solids that slough off of the MBBR media would settle out in the Effluent Storage Lagoon and would need to be removed periodically. A preliminary cost estimate for this option is shown in Table 5-11.

Table 5-11: MBBR

Item	Cost (2017)
MBBR Equipment	$ 420,000
Concrete Basins	$ 90,000
Pump Station	$ 150,000
Piping and Valves	$ 200,000
Electrical/Controls	$ 130,000
Mobilization (10%)	$ 100,000
Overhead and Profit (15%)	$ 150,000
Contingency (30%)	$ 300,000
Construction Subtotal	**$ 1,540,000**
Soft Costs (25%)	$ 390,000
Total Project Cost	**$ 1,930,000**
Estimated Annual O&M	$ 37,000
Total Present Value	**$ 2,590,000**

Removal Percentages Recommendation

The City would prefer to further investigate two options in the predesign (filtration and aeration, baffles, cover and chlorination; Options 5.1.4.1 and 5.1.4.2), prior to selecting a preferred tertiary treatment option.

5.1.5 WWTP Disinfection

Three (3) main alternatives were evaluated.

1. Upgrade Chlorination and Dechlorination Systems:

   This alternative was to upgrade the existing chlorination and dechlorination systems to address the deficiencies described in Section 2. A preliminary cost estimate, including O&M, is summarized in Table 5-12.

TABLE 5-12: Chlorination/Dechlorination Systems Upgrade

Item	Cost (2017)
Storage Buildings	$ 80,000
Chlorine Monitoring Equipment	$ 20,000
Evaluation; Baffles/Mixer Modifications	$ 20,000
Electrical/Controls	$ 20,000
Mobilization (10%)	$ 14,000
Overhead and Profit (15%)	$ 21,000
Contingency (30%)	$ 42,000
Construction Subtotal	**$ 217,000**
Soft Costs (25%)	$ 55,000
Total Project Cost	**$ 272,000**
Estimated Annual O&M	$ 10,000
Total Present Value	**$ 450,000**

2. Convert to Peracetic Acid (PAA):

   This alternative would include reusing the old chlorine contact basin. Although PAA has been approved for use by the Environmental Protection Agency (EPA), it is still a fairly new technology and may not have full approval by the DEQ. Pilot testing would be required. A preliminary cost estimate for converting the disinfection systems to PAA is shown in Table 5-13.

TABLE 5-13: Peracetic Acid (PAA)

Item	Cost (2017)
Storage Buildings	$ 80,000
PAA Equipment	$ 90,000
Evaluation; Baffles/Mixer Modifications	$ 20,000
Electrical/Controls	$ 40,000
Mobilization (10%)	$ 23,000
Overhead and Profit (15%)	$ 35,000
Contingency (30%)	$ 69,000
Construction Subtotal	**$ 357,000**
Soft Costs (25%)	$ 90,000
Total Project Cost	**$ 447,000**
Estimated Annual O&M	$ 11,000
Total Present Value	**$ 650,000**

3. Switch to UV Disinfection:

Ultraviolet light at the proper wavelength alters the genetic material (DNA) in cells so that bacteria, viruses, molds, algae and other micro-organisms can no longer reproduce. This inactivation of the micro-organisms achieves the required disinfection to satisfy environmental requirements as well as protect the river habitat. The equipment could be in stainless steel reactors and housed to provide better working conditions for cleaning or could be installed in the existing contact channels and be outside. It should be noted that DEQ has not approved the use of UV downstream of lagoons and that DEQ approval would be required prior to this alternative being selected. The interference caused by the algae on the UV light has so far made the technology unreliable. A filter might be required prior to the UV disinfection. A preliminary cost estimate for the UV system, installed in steel reactors in the WWTP Office, is summarized in Table 5-14.

TABLE 5-14: UV System

Item	Cost (2017)
UV Equipment	$ 230,000
Electrical/Controls	$ 40,000
Mobilization (10%)	$ 27,000
Overhead and Profit (15%)	$ 41,000
Contingency (30%)	$ 81,000
Construction Subtotal	**$ 419,000**
Soft Costs (25%)	$ 105,000
Total Project Cost	**$ 524,000**
Estimated Annual O&M	$ 19,000
Total Present Value	**$ 870,000**

The following table is a summary of the advantages and disadvantages of each disinfection technology:

TABLE 5-15: Summary of Disinfection Advantages and Disadvantages

Technology	Advantages	Disadvantages
Chlorination/Dechlorination	• Same technology as used currently at WWTP • Can be more cost-effective than UV disinfection (dechlorination and fire code requirements can make it cost more than UV disinfection). • Chlorine residual remaining in the effluent can prolong disinfection even after initial treatment, and can be measured to evaluate effectiveness. • Reliable and effective against a wide spectrum of pathogenic organisms. • Effective in oxidizing certain organic and inorganic compounds. • Beneficial for recycled water to have a chlorine residual for pipeline maintenance. • Flexible dosing control. • Can eliminate certain noxious odors during disinfection.	• Chlorine residual, even at low concentrations, is toxic to aquatic life and will require a well-controlled de-chlorination system. • All forms of chlorine are highly corrosive and toxic, so storage, shipping, and handling pose a risk, requiring increased safety regulations. • Oxidizes some organic matter in wastewater to create more hazardous compounds (disinfection byproducts such as trihalomethanes [THMs] are regulated and would require additional treatment). • Level of total dissolved solids is increased in the treated effluent. • Chlorine residual is unstable in the presence of high concentrations of chlorine-demanding materials, thus requiring higher doses to effect adequate disinfection. • Some parasitic species have shown resistance to low doses of chlorine. • Long-term effect of discharging de-chlorinated compounds into the environment is unknown.
Peracetic Acid (PAA)	• Newer technology for wastewater disinfection in the US. • Lower dose and less contact time is needed for PAA when compared to chlorination/dechlorination. • Not as prone to freezing and more stable than chlorine. • Enhances UV effectiveness and reduces cleaning frequency when combined with UV.	• Less corrosive and toxic than chlorine, so storage, shipping, and handling are less hazardous. • Less likely to form hazardous byproducts than chlorine. • Although it has been approved by EPA, it may not have full approval by the DEQ. • Does not maintain a residual in the effluent. • Increases effluent BOD concentration. • Piloting is recommended.
Ultraviolet (UV)	• Well-established technology. • Eliminates the need to generate, handle, transport, or store toxic/hazardous or corrosive chemicals. • No residual effect that can be harmful to humans or aquatic life. • Requires shorter contact time compared to other disinfectants (approximately 20 to 30 seconds with low-pressure lamps). • Requires less space than other methods.	• Low dosage may not effectively inactivate some viruses, spores, and cysts. • Organisms can sometimes repair and reverse the destructive effects of UV. • A preventive maintenance program is necessary to control fouling of tubes. • Algae, turbidity and total suspended solids (TSS) in the wastewater can render UV disinfection ineffective. Low-pressure lamps are not as effective for secondary effluent with TSS levels above 30 mg/L. • Not as cost-effective as chlorination, but costs are competitive when chlorination and de-chlorination is used and fire codes are met.

Disinfection Recommendation

Upgrading the existing chlorination and dechlorination systems is the recommended option (Option 5.1.5.1; see Table 5-12) as it has the lowest total present value. It is also beneficial for the land application system to have chlorine to keep the system clean.

5.1.6 Solids Handling

The WWTP currently hauls their solids to the City of Salem for treatment and disposal. Three main options were evaluated concerning solids handling.

1. Sludge Holding (No Action):

   Continue to hold the solids in the polypropylene tanks and make the recommended improvements outlined in Section 2. The solids would continue to be sent to the City of Salem for disposal. A preliminary cost estimate for this option is shown in Table 5-16. This option has a higher risk and does not provide the WWTP with flexibility if the City of Salem chose to not accept the untreated solids.

Table 5-16: Sludge Holding (Current)

Item	Cost (2017)
Cover and Walls	$ 15,000
Electrical/Controls	$ 3,000
Mobilization (10%)	$ 2,000
Overhead and Profit (15%)	$ 3,000
Contingency (30%)	$ 6,000
Construction Subtotal	**$ 29,000**
Soft Costs (25%)	$ 8,000
Total Project Cost	**$ 37,000**
Estimated Annual O&M	$ 40,000
Total Present Value	**$ 750,000**

2. Sludge Treatment:

   This option was to construct an aerobic digester to treat the solids to meet Class B (EPA Part 503; 60 day SRT in winter) requirements. The solids could then be land applied by farmers or continued to be sent to the City of Salem for disposal. For the cost estimate, it was assumed that the digester basin would be a concrete structure and diffused aeration would be used. The assumed size of the digester was 24 ft. square with an 18 ft. water level. It was also assumed that the solids would continue to be sent to Salem, which is likely more expensive than land application. A preliminary cost estimate for this option is shown in Table 5-17.

Table 5-17: Sludge Treatment (Class B)

Item	Cost (2017)
Site Work	$ 10,000
Digester Basin (including guardrails, grating)	$ 100,000
Digester Equipment	$ 70,000
Digester Blower Building	$ 40,000
Piping/Valves and Instrumentation	$ 40,000
Electrical/Controls	$ 40,000
Mobilization (10%)	$ 30,000
Overhead and Profit (15%)	$ 50,000
Contingency (30%)	$ 90,000
Construction Subtotal	**$ 470,000**
Soft Costs (25%)	$ 120,000
Total Project Cost	**$ 590,000**
Estimated Annual O&M	$ 56,000
Total Present Value	**$ 1,590,000**

3. Sludge Treatment and Dewatering:

   This option was to add mechanical dewatering to the above option (solids treatment with an aerobic digester (24 ft. square concrete basin with 18 ft. water level) to meet Class B requirements (EPA Part 503; 60 day SRT in winter)). The dewatered solids would then be stored under a cover and land applied by farmers or sent to a landfill for disposal. The hauling costs were assumed to be lower since the volume of the dewatered solids is less than the wetter solids. A preliminary cost estimate for this option is shown in Table 5-18.

Table 5-18: Sludge Treatment and Dewatering

Item	Cost (2017)
Site Work	$ 10,000
Digester Basin (including guardrails, grating)	$ 55,000
Digester Equipment	$ 65,000
Digester Blower Building	$ 40,000
Piping/Valves and Instrumentation	$ 40,000
Screw Press	$ 325,000
Cover and Concrete Storage	$ 60,000
Electrical/Controls	$ 90,000
Mobilization (10%)	$ 70,000
Overhead and Profit (15%)	$ 110,000
Contingency (30%)	$ 210,000
Construction Subtotal	**$ 865,000**
Soft Costs (25%)	$ 220,000
Total Project Cost	**$ 1,085,000**
Estimated Annual O&M	$ 50,000
Total Present Value	**$ 1,970,000**

Solids Handling Recommendation

The City prefers to add solids treatment using an aerobic digester to meet Class B requirements (Option 5.1.6.2; see Table 5-17), which would provide flexibility for future disposal options. Dewatering could then be phased into future plans if liquid sludge hauling costs become excessive.

6. PROPOSED PROJECT (RECOMMENDED ALTERNATIVES)

This section consists of the recommended plan to address the wastewater system deficiencies. A location map showing the changes to the wastewater treatment plant are shown 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.

- *Headworks* – The headworks should be upgraded to add a cover and freeze protection to the influent screen, add a shelter around the composite sampler and move it closer to the sample location, add grit removal to protect downstream equipment from wear, and add fall protection between the Headworks and the Aerated Lagoon.
- *Aerated Lagoon* – The aeration capacity should be increased. This would be done by replacing the aeration system with new diffusers and blowers that are also more easily removable for inspection and maintenance. Permanent pumps, flow meters, piping, and valves should be installed for sludge wasting, scum removal, and recycling. Fall protection around the lagoon and an emergency overflow should be installed.
- *Effluent Storage Lagoon* – An additional storage lagoon and pump station should be constructed to continue to store the water during the summer (when the effluent cannot be discharged to the Pudding River). An aerator, baffles, cover and chlorine pipelines should either be installed in the Effluent Storage Lagoons or a downstream filter should be added to promote additional BOD_5 and TSS removal. Fall protection around the lagoon and an emergency overflow should be installed.
- *Disinfection* – 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.
- *River Pump Station/Irrigation Pump Station* – The pump station should be secured with a fence. Warning signs and fall protection should be added. The pump starters should be replaced with VFDs.
- *Return Pump Station* – The pump station should be secured with a fence (can be combined with the River Pump Station/Irrigation Pump Station. Warning signs and fall protection should be added. The pump starters should be replaced with VFDs, the electrical conduit modified to prevent the control panel from being

exposed to gases, and a flow meter added to measure the amount of pumped return flow.

- *Solids Treatment* – Add a new aerobic digester to achieve Class B solids (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.
- *Other* – A new SCADA system should incorporate the improvements above and provide essential alarms and information to the City staff. A permanent irrigation system should be added to the existing 6 acres. Also the existing lagoons should be structurally inspected (costs for any modifications are unknown at this time). Bank stabilization, site drainage, paving, and a fence around the unfenced part of the plant are also needed improvements.

6.2 PROJECT SCHEDULE

The project 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 CIP

ID#	Item	Cost	Opinion of Probable Costs (2017 Dollars)					
			2017	2018	2019	2020	2021	2022
Priority 1 Improvements (0-6 years)								
1.1	Lagoon Overflow and Structural Inspection	$ 194,000					$ 194,000	
1.2	Aerated Lagoon Aeration	$ 192,000	$ 192,000					
1.3	Additional Effluent Storage Lagoon	$ 3,480,000		$ 627,000	$ 2,853,000			
1.4	Tertiary Treatment	$ 1,120,000		$ 202,000	$ 918,000			
1.5	Chlorination/Dechlorination System Upgrade	$ 272,000				$ 272,000		
1.6	Headworks Upgrade	$ 117,000				$ 117,000		
1.7	Aerobic Digester	$ 590,000					$ 590,000	
1.8	Site Work At WWTP	$ 388,000						$ 388,000
1.9	SCADA Upgrade	$ 194,000						$ 194,000
Total (rounded)		**$ 6,550,000**	**$ 200,000**	**$ 830,000**	**$ 3,780,000**	**$ 390,000**	**$ 790,000**	**$ 590,000**

* All costs in 2017 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 2017 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.

6.3 PERMIT REQUIREMENTS

The City's NPDES discharge permit was recently renewed (went into effect on August 22, 2016) 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.

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 2019 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.
- *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

6.4.1 Water and Energy Efficiency

Adding VFDs can decrease the pumping energy used at the WWTP.

6.4.2 Green Infrastructure

Recommendations of this report include a permanent irrigation system and modifications to the plant drainage. The irrigation system would improve the efficiency of the land application process and increase crop usage. Improving the drainage would decrease the sediment in the runoff and increase the use of stormwater by the vegetation at the WWTP.

6.4.3 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.

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

The summary of the Aurora wastewater facility improvement costs are in Table 6-2 (Capital Improvement Plan). 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 2038. 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. As it is unclear which tertiary treatment upgrade will be made, the cost for the filtration project is shown as it has a higher cost than the aeration, baffles, cover, and chlorine cost alternative. 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#	Item	Total Estimated Cost (2017)	SDC Growth Apportionment		City's Estimated Portion
			%	Cost	
Priority 1 Improvements (0-6 years)					
1.1	Lagoon Overflow and Structural Inspection	$ 194,000	47%	$ 90,000	$ 104,000
1.2	Aerated Lagoon Aeration	$ 192,000	52%	$ 101,000	$ 91,000
1.3	Additional Effluent Storage Lagoon	$ 3,480,000	45%	$ 1,581,000	$ 1,899,000
1.4	Tertiary Treatment	$ 1,120,000	47%	$ 522,000	$ 598,000
1.5	Chlorination/Dechlorination System Upgrade	$ 272,000	47%	$ 128,000	$ 144,000
1.6	Headworks Upgrade	$ 117,000	47%	$ 55,000	$ 62,000
1.7	Aerobic Digester	$ 590,000	47%	$ 275,000	$ 315,000
1.8	Site Work At WWTP	$ 388,000	47%	$ 181,000	$ 207,000
1.9	SCADA Upgrade	$ 194,000	47%	$ 90,000	$ 104,000
	Total Priority 1 Improvements (rounded)	**$ 6,550,000**		**$ 3,030,000**	**$ 3,530,000**
Priority 2 Improvements					
2.1	Fall Protection	$ 117,000	47%	$ 55,000	$ 62,000
2.2	Fencing	$ 98,000	47%	$ 46,000	$ 52,000
2.3	WWTP Pump Station VFDs	$ 167,000	47%	$ 79,000	$ 88,000
2.4	Aerated Lagoon Sludge Pumps	$ 133,000	47%	$ 63,000	$ 70,000
2.5	Permanent Irrigation System	$ 59,000	47%	$ 28,000	$ 31,000
2.6	Headworks Grit Removal	$ 950,000	47%	$ 447,000	$ 503,000
2.7	Paving Access Road	$ 343,000	47%	$ 160,000	$ 183,000
	Total Priority 2 Improvements (rounded)	**$ 1,870,000**		**$ 880,000**	**$ 990,000**
TOTAL WASTEWATER PLANT IMPROVEMENTS COSTS (rounded)		**$ 8,420,000**		**$ 3,910,000**	**$ 4,520,000**

All costs in 2017 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 2017 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 2015-2016 is provided in Appendix D. Additional information on budget specifics can be found in the following sections.

6.6.1 Income

Potential User Rate Impacts

The existing sewer rate schedule consists of a flat rate fee of $102 every two months per equivalent dwelling unit (EDU). After reviewing the City's sewer system budget with City staff, it appears that the Sewer Operating Fund generates approximately $275,400 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.

Table 6-3 shows the existing and potential charges for sewer services every two months 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, 1.6%) 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, 1.6%)	User Rate without SDCs	User Rate including SDCs
Existing User Rates (2016)	-	$102.00	$102.00
Priority 1 Improvements	$385,281	$237.19	$174.65
Priority 2 Improvements	$109,996	$256.48	$195.08

It should be noted that all costs are in 2017 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 City's current sewer System Development Charge (SDC) for a single family home is $2,032. 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 (Capital Improvement Plan), 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 2038, most of which is associated with increased power usage.

6.6.3 Debt Repayments

The City financed their 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.

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.

TABLE 6-4: Short-Lived Assets

Equipment Description	Replacement Items	Unit Cost	Frequency (Yrs)	Annual Cost
River Pump Station / Irrigation Pump Station	Pumps	$ 30,000	10	$ 3,000
Return Pump Station	Pumps	$ 8,000	10	$ 800
Headworks	Motors and Parts	$ 30,000	10	$ 3,000
Aerated Lagoon	Motors and Pumps	$ 70,000	10	$ 7,000
Effluent Storage Lagoons	Miscellaneous	$ 35,000	10	$ 3,500
Chlorination/Dechlorination Systems	Pumps	$ 45,000	10	$ 4,500
Aerobic Digester	Motors and Pumps	$ 32,000	10	$ 3,200
SCADA	Instruments	$ 5,000	1	$ 5,000
Irrigation System	Miscellaneous	$ 5,000	1	$ 5,000
			Total Short Lived Assets (rounded)	**$ 35,000**

6.6.6 Financing Options

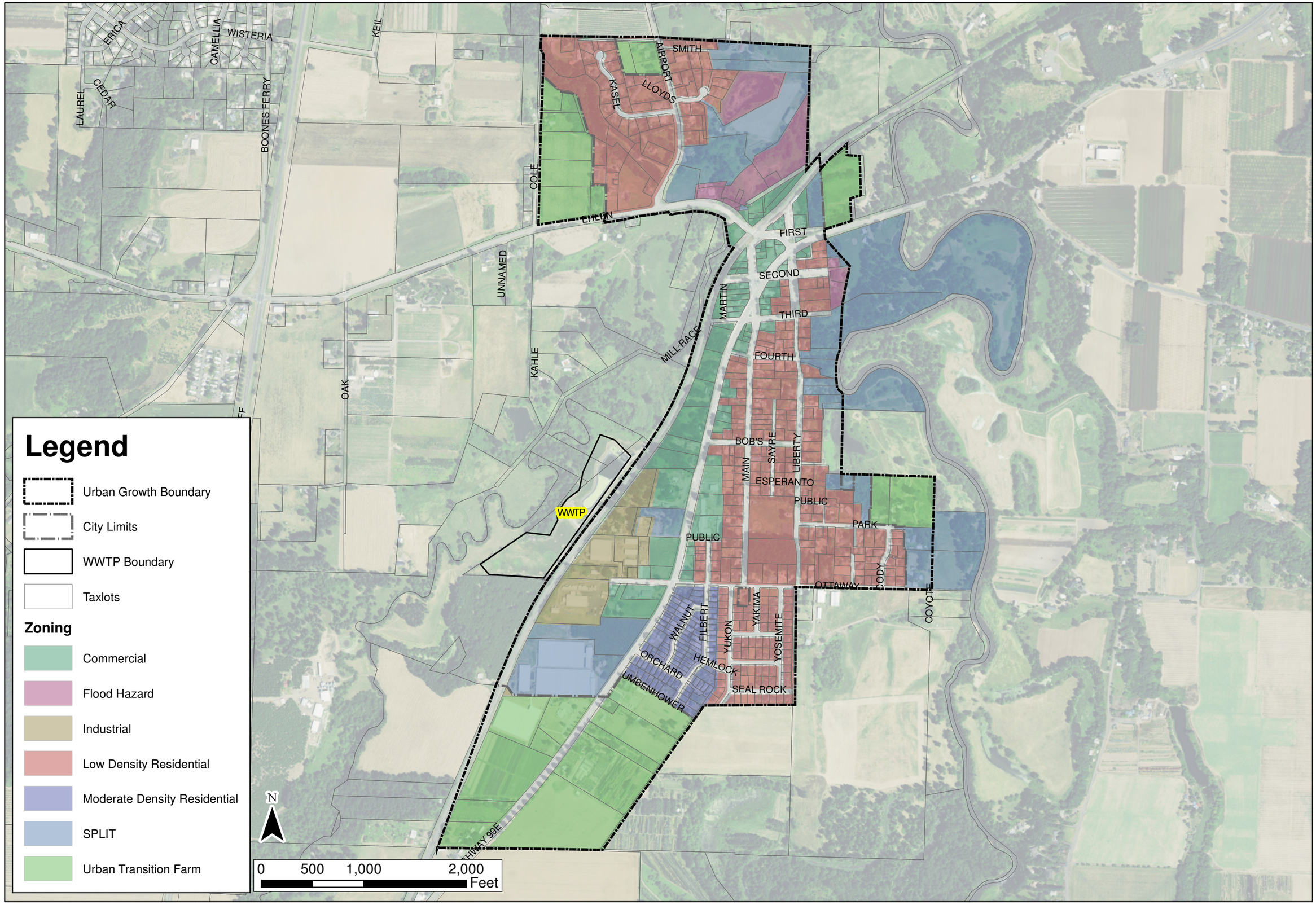
Financing and incentive options that may assist with offsetting costs associated with implementing the CIP include, but are not limited to: user rate increases, SDCs, DEQ State Revolving Fund Loan Program, Oregon Infrastructure Finance Authority grants and loans, USDA Rural Utilities Services loans and grants, direct state loans, 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.

Appendix A
Figures



Legend

- Urban Growth Boundary
- City Limits
- WWTP Boundary
- Taxlots

Zoning

- Commercial
- Flood Hazard
- Industrial
- Low Density Residential
- Moderate Density Residential
- SPLIT
- Urban Transition Farm

KELLER associates

City of Aurora

Prepared for: **The City of Aurora**

Wastewater Facilities Planning Study

Title: **Land Use and Zoning**

Figure: **1**

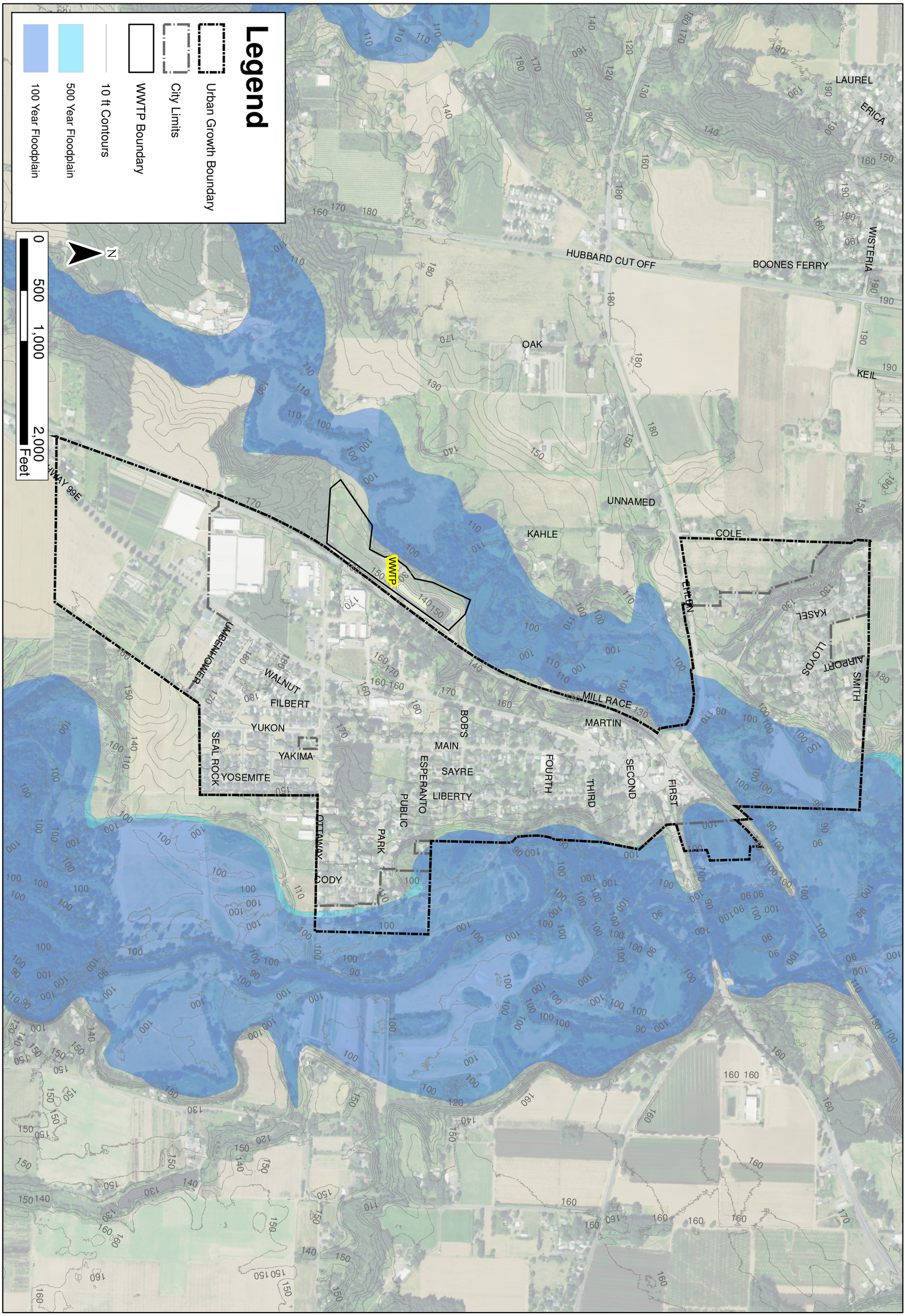


Figure:	Title:		Prepared for:		
2	Flood Pains and Topography	Wastewater Facilities Planning Study	The City of Aurora	City of Aurora	KELLER associates

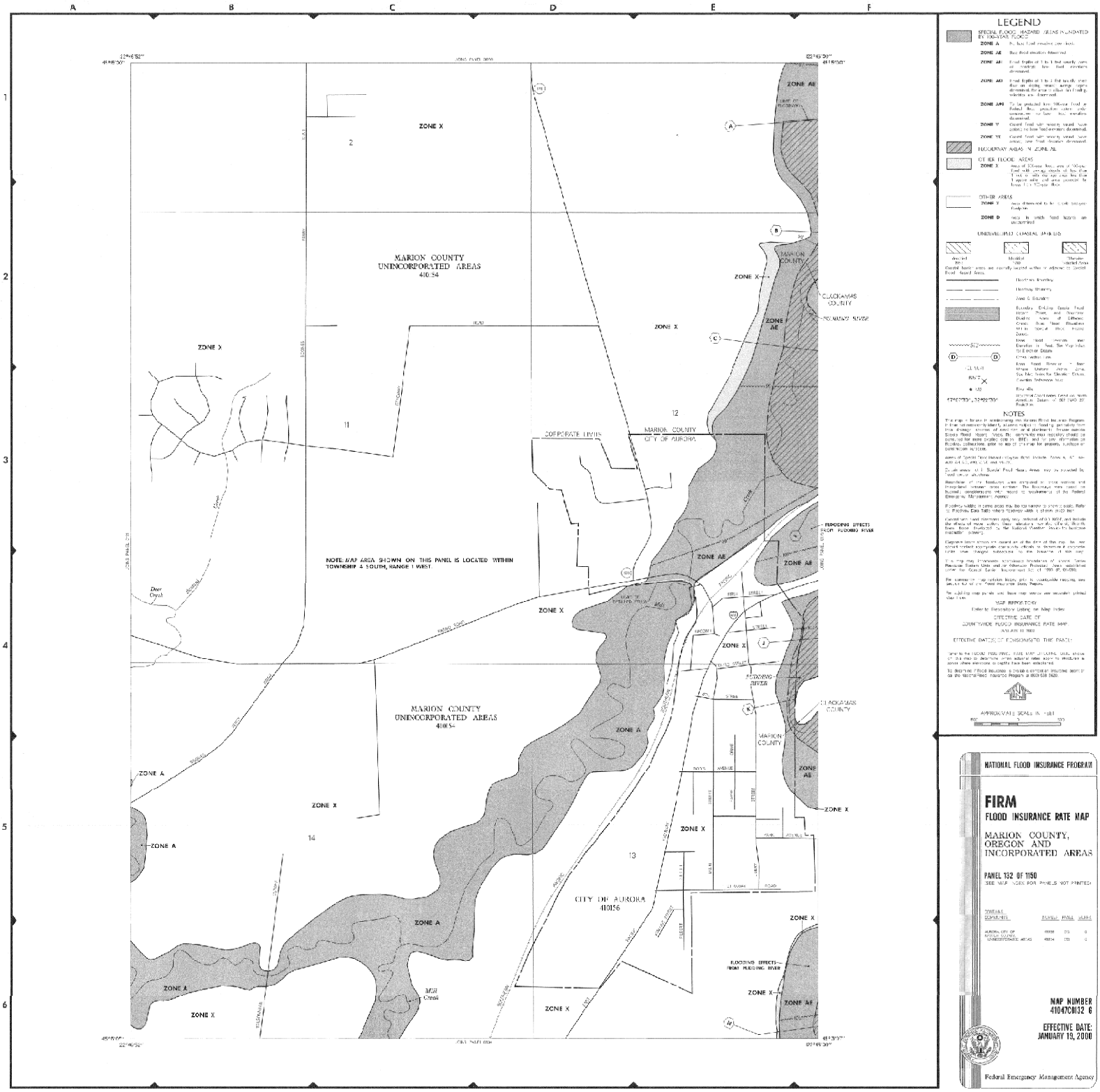
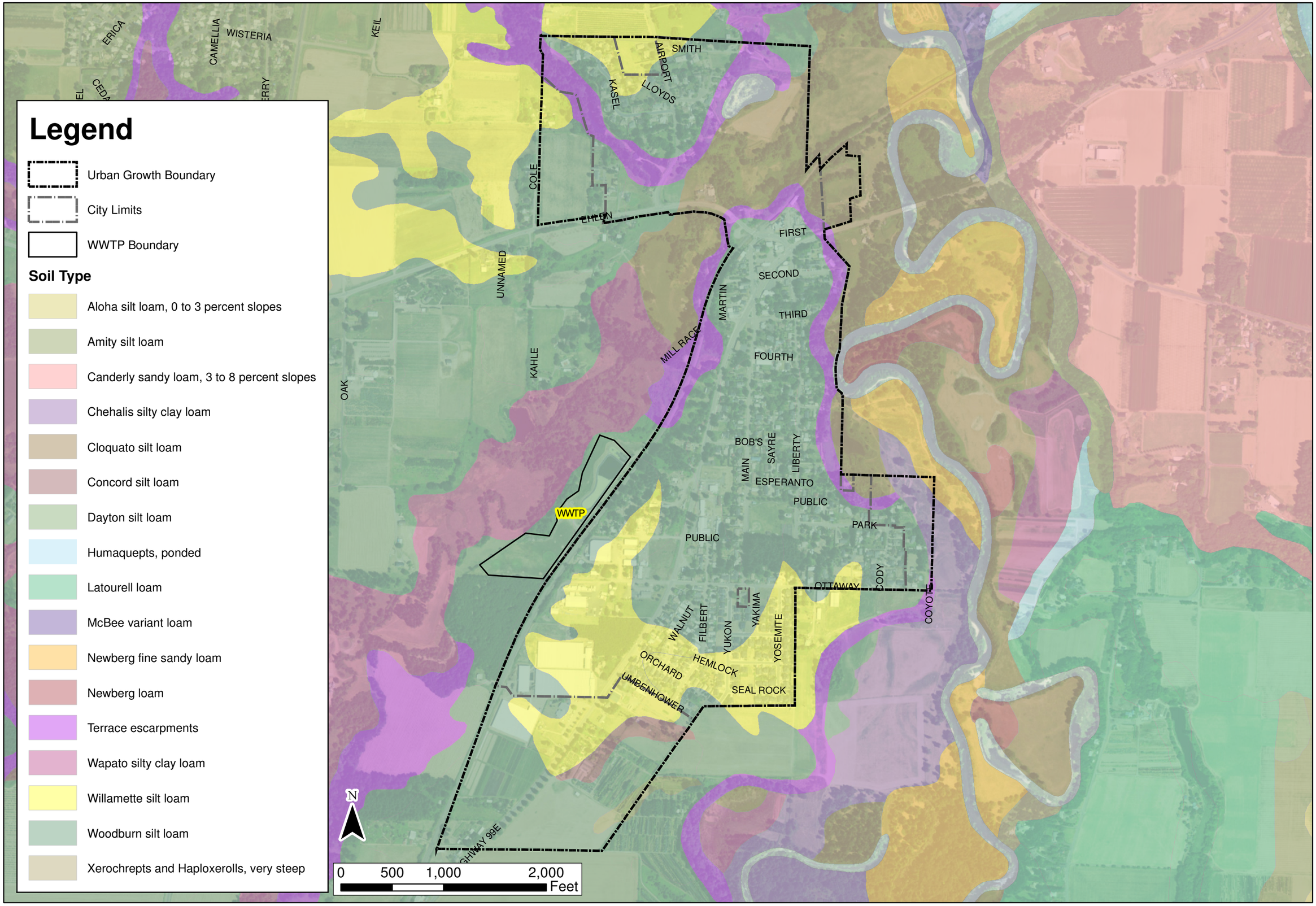


Figure:	Title:	Project:	Prepared for:		
2.A	**Flood Insurance Rate Map**	**Wastewater Facilities Planning Study**	**The City of Aurora**	City of Aurora	KELLER associates



Legend

- Urban Growth Boundary
- City Limits
- WWTP Boundary

Soil Type

- Aloha silt loam, 0 to 3 percent slopes
- Amity silt loam
- Canderly sandy loam, 3 to 8 percent slopes
- Chehalis silty clay loam
- Cloquato silt loam
- Concord silt loam
- Dayton silt loam
- Humaquepts, ponded
- Latourell loam
- McBee variant loam
- Newberg fine sandy loam
- Newberg loam
- Terrace escarpments
- Wapato silty clay loam
- Willamette silt loam
- Woodburn silt loam
- Xerochrepts and Haploxerolls, very steep

KELLER associates

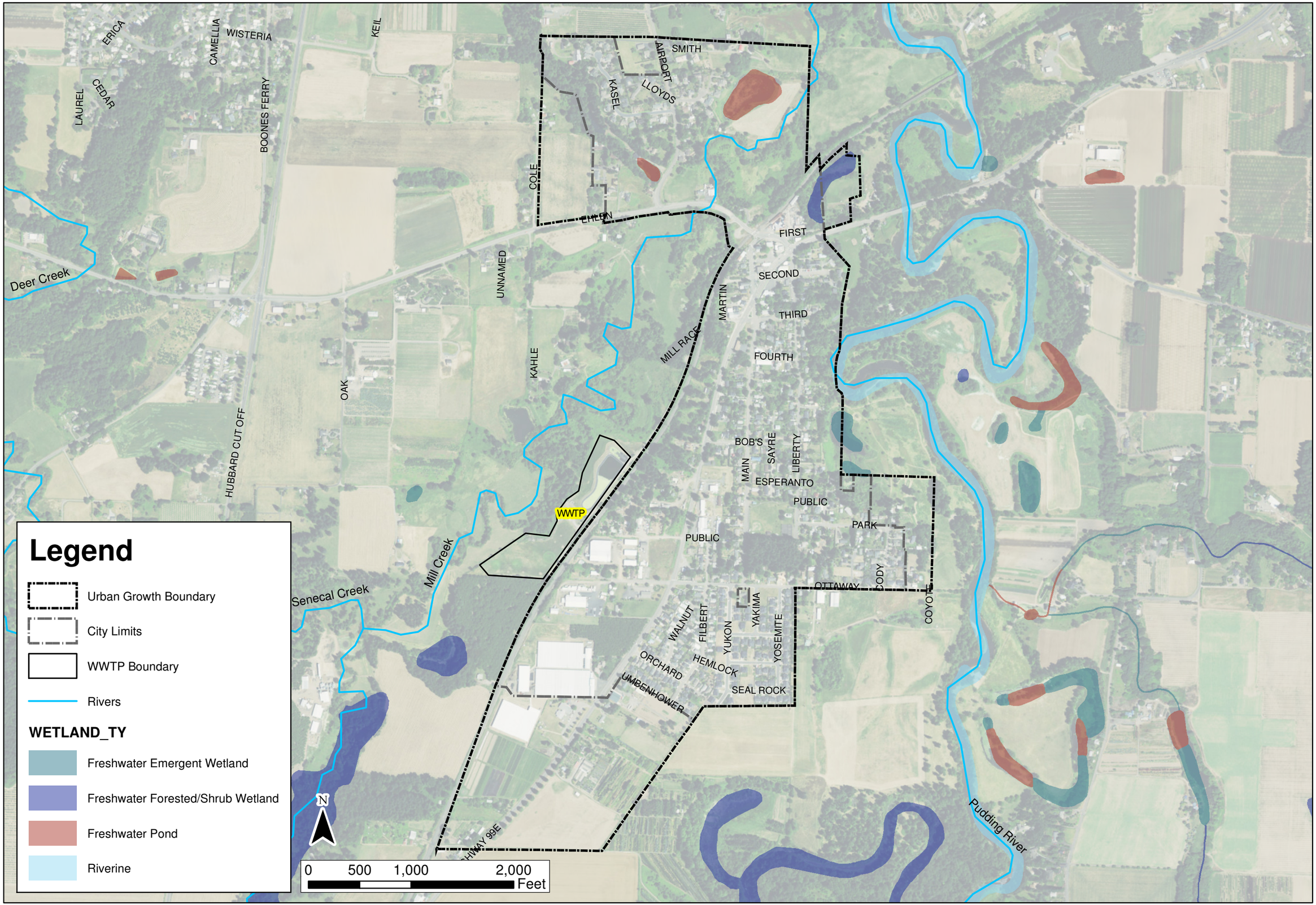
City of Aurora

Prepared for: The City of Aurora

Wastewater Facilities Planning Study

Title: Soils Classification

Figure: 3



KELLER associates

City of Aurora

Prepared for:
The City of Aurora

Wastewater Facilities Planning Study

Title:
Wetlands and Rivers

Figure:
4

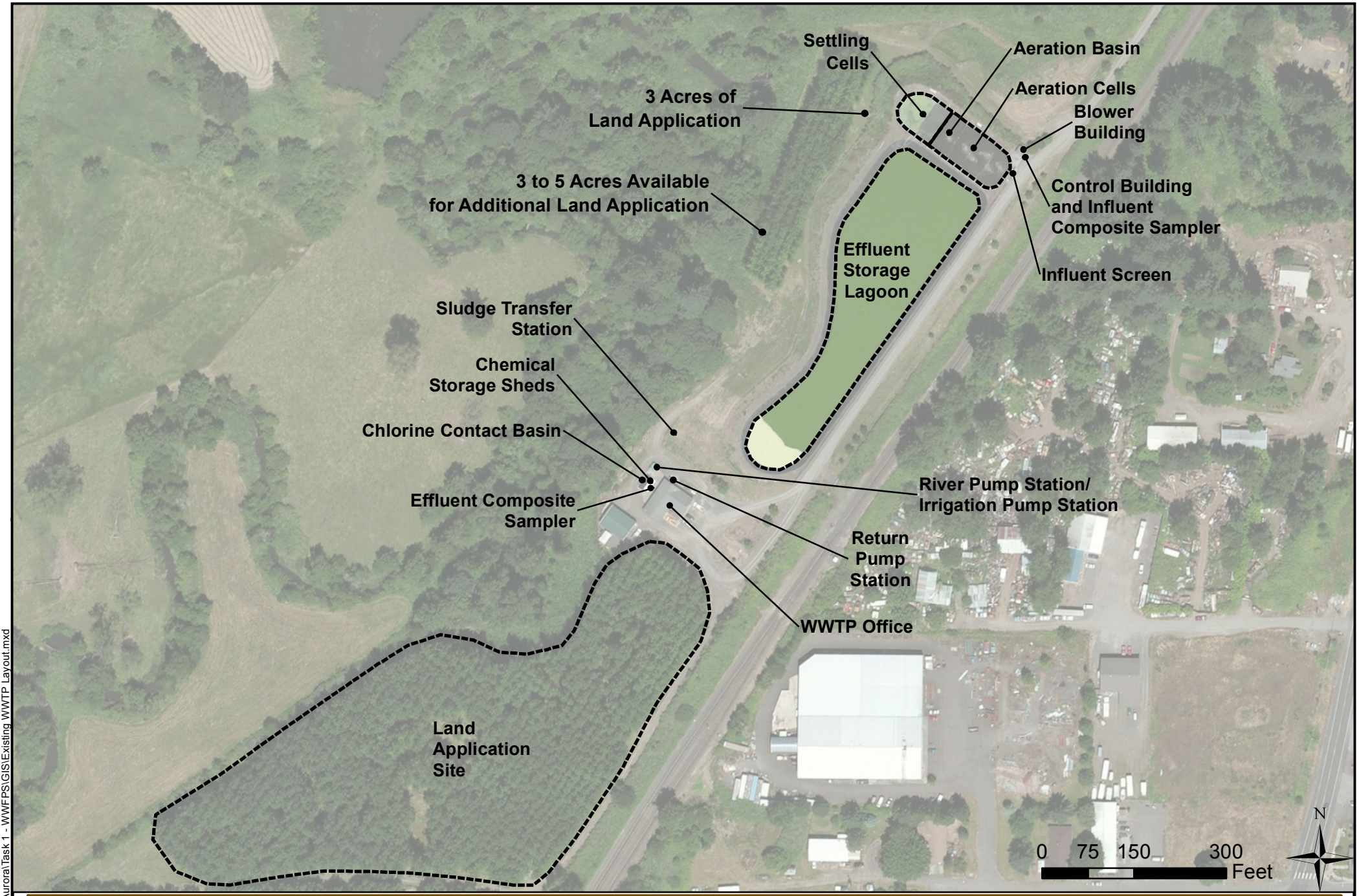


Figure:	Title:	Project:	Prepared for:		
5	EXISTING WWTP LAYOUT	WWFPS	CITY OF AURORA, OR	City of Aurora	KELLER associates

Document Path: J:\215120 Aurora\Task 1 - WWFPS\GIS\Existing WWTP Layout.mxd

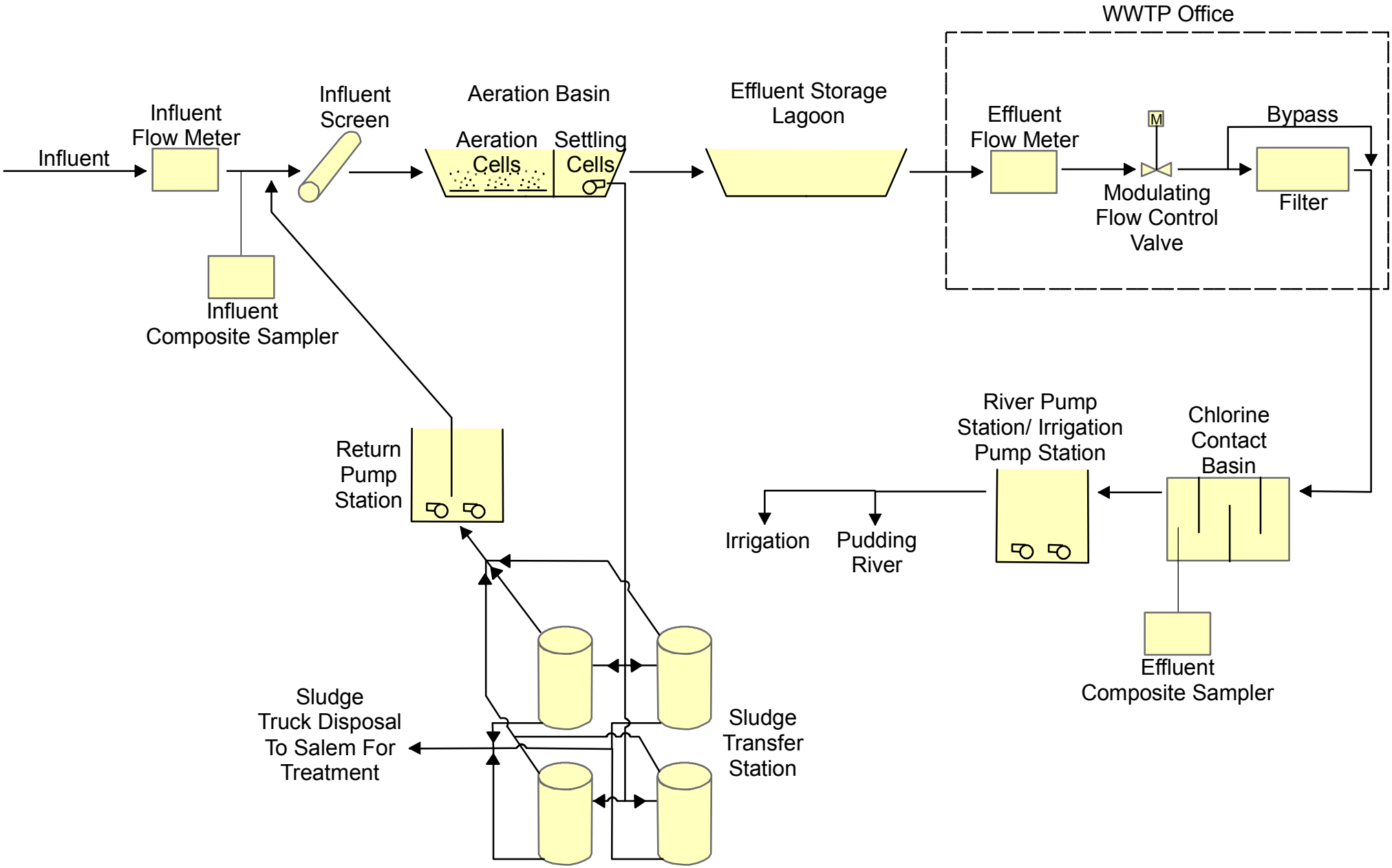


Figure:	Title:	Project:	Prepared for:		
6	PROCESS FLOW DIAGRAM	WWFPS	CITY OF AURORA, OR	City of Aurora	KELLER associates

Document Path: J:\215120 Aurora\Task 1 - WWFPS\GIS\Process Flow Diagram.mxd

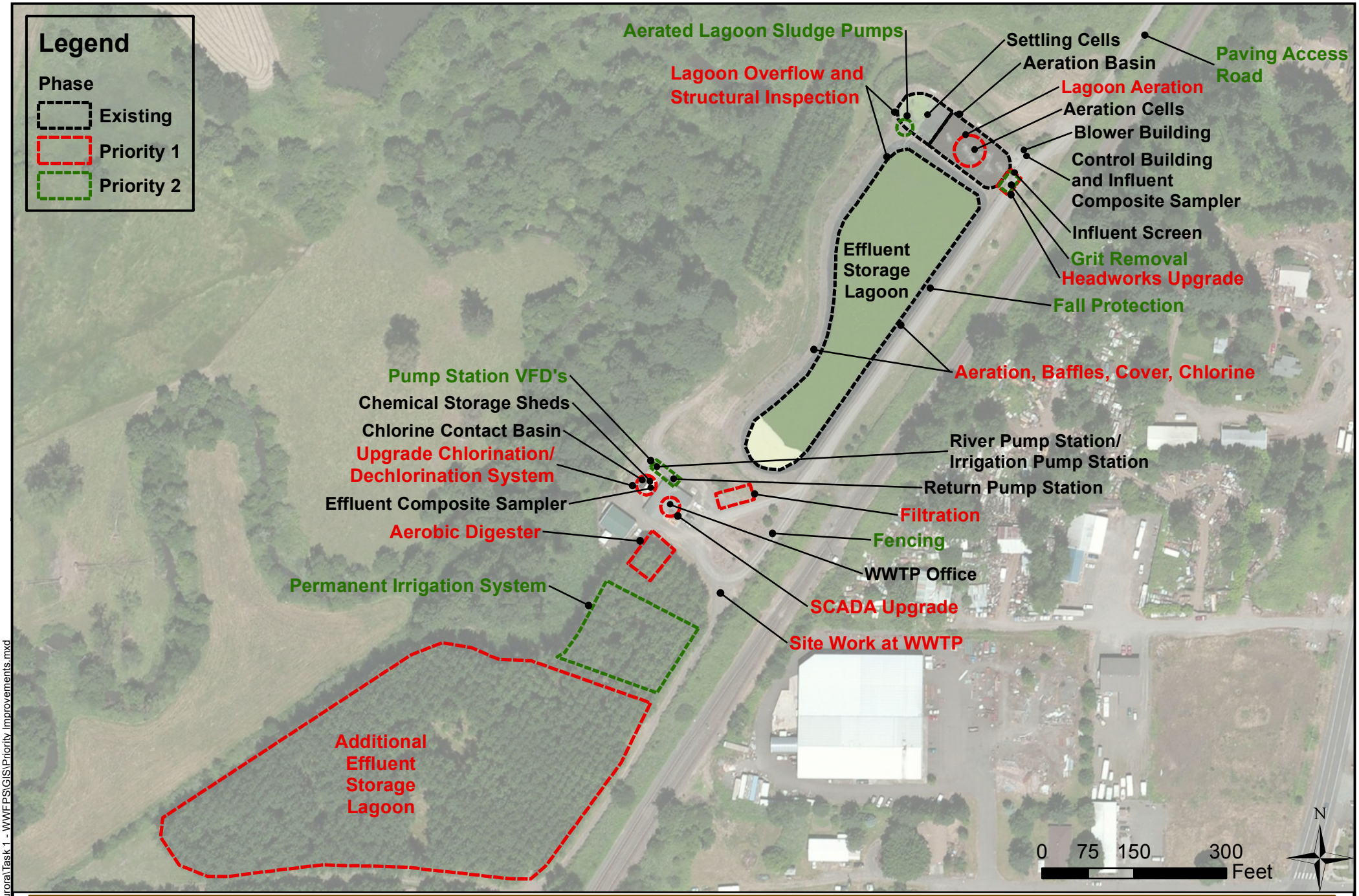
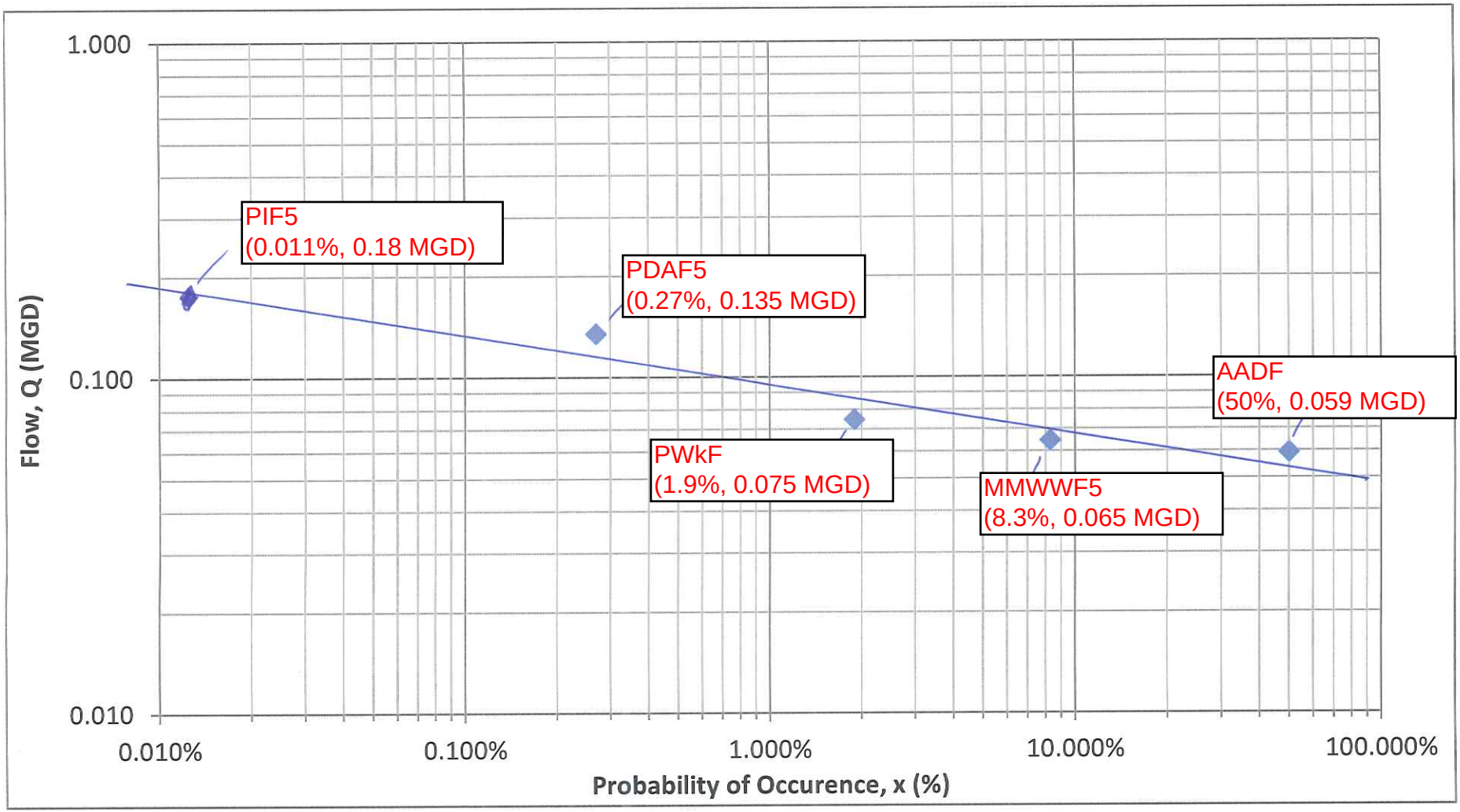


Figure:	Title:	Project:	Prepared for:		
7	PRIORITY IMPROVEMENTS	WWFPS	CITY OF AURORA, OR	City of Aurora	KELLER associates

Document Path: J:\21\120 Aurora\Task 1 - WWFPS\GIS\Priority Improvements.mxd

Appendix B
Calculations


1.000
0.100
0.010
Flow, Q (MGD)
0.010%
0.100%
1.000%
10.000%
100.000%
Probability of Occurence, x (%)
PIF5
(0.011%, 0.18 MGD)
PDAF5
(0.27%, 0.135 MGD)
PWkF
(1.9%, 0.075 MGD)
MMWWF5
(8.3%, 0.065 MGD)
AADF
(50%, 0.059 MGD)

City of Aurora Water Balance - 2038

Month	Influent WW, gal	Prec./Evap. Gain (Loss), gal	Discharged WW, gal	Net Storage Change, gal	Stored Water, gallons	
Oct	3,190,000	170,000	0	3,360,000	**7,200,000**	*Max. Working Storage Volume (7.2 mg)*
Nov	3,350,000	230,000	4,750,000	(1,170,000)	**6,030,000**	
Dec	3,780,000	410,000	4,910,000	(720,000)	**5,310,000**	
Jan	3,680,000	310,000	4,910,000	(920,000)	**4,390,000**	
Feb	3,370,000	140,000	4,440,000	(930,000)	**3,460,000**	
Mar	3,540,000	150,000	4,450,000	(760,000)	**2,700,000**	
Apr	3,450,000	60,000	3,510,000	0	**2,700,000**	
May	3,860,000	40,000	0	3,900,000	**6,600,000**	
Jun	3,450,000	(50,000)	0	3,400,000	**10,000,000**	
Jul	3,330,000	(230,000)	0	3,100,000	**13,100,000**	
Aug	3,190,000	(220,000)	0	2,970,000	**16,070,000**	
Sep	3,930,000	(60,000)	0	3,870,000	**19,940,000**	

2038 AADF, mg	*42,120,000*	*950,000*	
2038 AWWF, mg	*21,170,000*	*1,300,000*	
	13,400,000	Additional Storage Reqd	
	10,070,000	Additional Storage Reqd with 6 acres land app (15.5 in/acre, 6 acres, 75% irrigation efficiency = ~3.3 MG)	
	33,600,000	Total Storage Reqd if no winter discharge and land app only during June-end of August due to precip.	

Appendix C
Clean Water Act Data

C-1:
Permit

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT

Oregon Department of Environmental Quality
Western Region – Salem Office
4026 Fairview Industrial Drive
Telephone: 503-378-8240

Issued pursuant to ORS 468B.050 and The Federal Clean Water Act (The Clean Water Act)

ISSUED TO:

Aurora, City of
21420 Main Street
Aurora, Oregon, 97002

SOURCES COVERED BY THIS PERMIT:

Type of Waste	Outfall Number	Outfall Location
Treated Wastewater	001	Pudding River 45.229121/122.752586 R.M. 8.4
Recycled Water Reuse	002	Land Application
Biosolids	N/A	

FACILITY LOCATION:

21494 Millrace Road
Aurora, Oregon 97002

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

RECEIVING STREAM INFORMATION:

WRD Basin: Willamette
USGS Sub-Basin: Molalla-Pudding
Receiving Stream name: Pudding River
LLID: 1227161452842-8.4-D

County: Marion

EPA REFERENCE NO.: OR004-3991

Issued in response to Application No. 971466 received June 30, 2009. This permit is issued based on the land use findings in the permit record.

Ranei Nomura, Water Quality Manager
Western Region

8/1/2016
Signature Date

8/22/2016
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 permit, or by Oregon statute or administrative rule, any other direct or indirect discharge of pollutants to waters of the state is prohibited.

TABLE OF CONTENTS

SCHEDULE A: WASTE DISCHARGE LIMITS

1. Outfall 001 – Treated effluent from outfall 001 must meet the following limits:

a. BOD_5 and TSS

i. May 1 – October 31. During this time period the permittee must not discharge to waters of the state.

ii. November 1 – April 30: During this time period the permittee must comply with the limits in the following table:

Table A1: BOD_5 and TSS Limits

Parameter	Average Effluent Concentrations, mg/L		Monthly Average lbs/day	Weekly Average lbs/day	Daily Maximum Lbs
	Monthly	Weekly			
BOD_5	30	45	30	60	140
TSS	50	80	47	90	220

iii. Additional information for the limits in Table A1 above.

(A) Average dry weather design flow to the facility equals 0.087 MGD. Mass load limits are based on 0.087 MGD.

b. Additional Parameters.

The permittee must comply with the limits of the following table:

Table A2: Limits for Additional Parameters

Nov. 1 – Apr. 30	Limits
E. coli Bacteria (see Note a.)	Monthly geometric mean must not exceed 126 organisms per 100 ml. Any single sample must not exceed 406 organisms per 100 ml.
pH	Must be within the range of 6.0 to 9.0 S.U.
BOD5 and TSS Removal Efficiency	Must not be less than 85% monthly average for BOD5, and 65% monthly average for TSS.
Total Residual Chlorine (see Note b.)	Monthly average concentration must not exceed 0.07 mg/L. Daily maximum concentration must not exceed 0.19 mg/L

Notes:

a. Any single *E. coli* sample must not exceed 406 organisms per 100 mL; however, DEQ will not cite a violation of this limit if the permittee takes at least 5 consecutive re-samples at 4 hour intervals, beginning within 28 hours after the original sample was taken, and the geometric mean of the 5 re-samples is less than or equal to 126 *E. coli* organisms/100 mL.

b. When the total residual chlorine limitation is lower than 0.10 mg/l, the Department will use 0.10 mg/l as the compliance evaluation concentration (i.e. daily maximum concentrations below 0.10 mg/l will be considered in compliance with the limitations).

2. Outfall 002 – Reclaimed Wastewater

a. November 1 – April 30: No land application is permitted, unless DEQ approves, in writing.

b. May 1 – October 31: No discharge to state waters is permitted. Facility personnel must distribute all reclaimed water on land, for dissipation by evapotranspiration and controlled seepage, by following sound irrigation practices so as to prevent:

i. Prolonged ponding of treated reclaimed water on the ground surface;

ii. Surface runoff or subsurface drainage through drainage tile;

iii. The creation of odors, fly and mosquito breeding or other nuisance conditions;

iv. Overloading the land with nutrients, organics, or other pollutant parameters; and

v. Impairing existing or potential beneficial groundwater uses.

c. Before land applying the reclaimed water, it must receive at least level II treatment, as defined in OAR 340-055, to reduce Total Coliform to 240 organisms per 100 ml in two consecutive samples, and a seven-day median of 23 organisms per 100 ml.

d. Irrigation must conform to the DEQ-approved reclaimed water use plan.

3. 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.

4. Outfall Inspection

During the year 2019, the permittee must inspect outfall 001 and submit a written report to DEQ within the same year regarding the outfall's integrity. The report should include a description of the outfall as originally constructed, the condition of the current outfall, and a discussion of any repairs that would be needed to return the outfall to its originally designed condition.

5. Groundwater Protection

The permittee may not conduct any activities that could cause an adverse impact on existing or potential beneficial uses of groundwater. All wastewater and process related residuals must be managed and disposed of in a manner that will prevent a violation of the Groundwater Quality Protection Rules (OAR Chapter 340, Division 40).

6. 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 A3.

b. Managed in accordance with its DEQ-approved Recycled Water Use Plan unless exempt as provided in Schedule D, condition 4.

c. Used in a manner and applied at a rate that does not have the potential to adversely impact groundwater quality.

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

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 A3: 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 nondisinfected 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 fire fighting using aircraft, street sweeping, or sanitary sewer flushing.

7. Septage Requirements

The permittee must not accept septage at this facility for treatment or processing without written approval from DEQ.

8. Re-opener

Upon EPA approval of a Total Maximum Daily Load (TMDL) addressing any pollutants during the discharge period, this permit may be re-opened to include any waste load allocation (WLA), best management practice or any other condition that the TMDL requires.

SCHEDULE B: MINIMUM MONITORING AND REPORTING REQUIREMENTS

1. Monitoring and Reporting Protocols

a. Quality Assurance and Quality Control (QA/QC)

The permittee must develop and implement a written QA/QC programme to verify the accuracy of sample analysis as specified in 40 CFR Part 136. The QA/QC program must conform to the requirements of 40 CFR Part 136.7. For additional requirements on proper sampling techniques, test methods and QA/QC procedures, see Schedule F, Sections B.1 and C.

b. Re-analysis, Re-sampling and Reporting of Data if QA/QC Requirements Not Met

If QA/QC requirements are not met for any analysis, the permittee must re-analyze the sample. If the sample cannot be re-analysed, the permittee must re-sample as soon as possible. If a sample result does not meet QA/QC requirements, the result must be included in the DMR along with a notation explaining how it does not meet QA/QC requirements, but must not be used in any calculation required by the permit.

c. Reporting Procedures

i. Significant Figures

Mass load limits all have two significant figures unless otherwise noted. The permittee must report the same number of significant digits as the permit limit for a given parameter. Regardless of the rounding conventions used by the permittee (such as rounding 5 up for the calculated results or, in the case of measured values, rounding 5 to the nearest even number), the permittee must use the convention consistently, and must ensure that laboratories employed by the permittee use the same convention.

ii. Calculating Mass Loads

The permittee must calculate mass loads on a daily basis as follows:

Mass Load = Design Flow (in MGD) x Concentration (in mg/L) x 8.34 lbs/gal = Pounds per day.

2. Influent Monitoring and Reporting Requirements

The permittee must monitor influent at the headworks and report results as listed in Table B1 below.

Table B1: Influent Monitoring

Item or Parameter	Time Period	Minimum Frequency	Sample Type/Required Action	Report
Total Flow (MGD)	Year-round	Daily	Measurement	Daily Total Monthly Max. Monthly Avg. Monthly Min.
Flow Meter Calibration	Annually	1/year	Verification (see Note a)	January 15
BOD_5 and TSS (mg/L)	Year-round	1 per two weeks	24-hr composite	Daily values Monthly Avg. Monthly Max. Weekly Avg. Max. Weekly Avg.
pH (S.U.)	Year-round	2 per week	Grab	Daily values Monthly Max. Min. daily value

3. Effluent Monitoring and Reporting Requirements

The permittee must monitor effluent flow measurements at the storage pond outlet, upstream of the chlorine contact chamber. The permittee must collect composite samples, bacteria samples, final chlorine residual samples, and all samples for toxics, just after the dechlorination tank, and before the effluent pump station, before discharge to the river or the irrigation site. The permittee must report results as listed in Table B2 below.

Table B2: Effluent Monitoring, Outfall 001

Item or Parameter	Time Period	Minimum Frequency	Sample Type/Required Action	Report
Total Flow (MGD)	Nov. – Apr.	Daily	Measurement	Daily Total Monthly Max. Monthly Avg. Monthly Min.
Flow Meter Calibration	Nov. – Apr.	Annually	Verification	January 15
BOD_5 and TSS (mg/L)	Nov. – Apr.	1 per two weeks	Composite	Daily values Monthly Avg. Monthly Max. Weekly Avg. Max. Weekly Avg.
BOD_5 and TSS Mass Load (lb/day)	Nov. – Apr.	1 per two weeks	Calculation	Daily values Monthly Avg. Weekly Avg. Max. Weekly Avg. Monthly Max.
BOD_5 and TSS Percent Removal	Nov. - Apr.	Monthly	Calculation	Monthly Avg.

Item or Parameter	Time Period	Minimum Frequency	Sample Type/Required Action	Report
pH (S.U.)	Nov. - Apr.	2 per week	Grab	Daily values Monthly Max. Min. Daily value
Temperature (°C)	Nov. – Apr.	2 per week	Grab	Max. Daily value
E. coli (#/100 mL)	Nov. – Apr.	1 per two weeks	Grab	Daily values Monthly Max. Monthly Geo. Mean Geo. Mean of re-samples
Chlorine Used (lbs/day)	Nov. – Apr.	Daily	Grab	Daily values Monthly Avg.
Chlorine, Total Residual (mg/L)	Nov. – Apr.	Daily	Grab	Daily values Monthly Max. Monthly Avg.
Storage Lagoon Depth (feet)	Nov. – Apr.	Daily	Record	Daily values

4. Recycled Water Monitoring Requirements: Outfall 002

The permittee must monitor recycled water as listed in Table B3 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 B3: Recycled Water Monitoring

Item or Parameter	Time Period	Minimum Frequency	Sample Type/Required Action	Report
Quantity Irrigated (inches/acre)	May - Oct.	Daily	Measurement	Daily values
Flow Meter Calibration	May – Oct.	Annually	Verification	January 15
Quantity Chlorine Used (lbs)	May – Oct.	Daily	Grab	Daily values Monthly Avg.
Chlorine, Total Residual (mg/L)	May – Oct.	Daily	Grab	Daily values Monthly Max. Monthly Avg.
pH	May - Oct.	2/Week	Grab	Daily values Monthly Max. Min. Daily value
E. coli (#/100 mL)	May - Oct.	Weekly	Grab	Daily values Monthly Max. Monthly Geo. Mean Geo. Mean of re-samples
Nutrients (TKN,	May - Oct.	Quarterly	Grab	Quarterly values

Item or Parameter	Time Period	Minimum Frequency	Sample Type/Required Action	Report
NO_2+NO_3-N, NH_3, Total Phosphorus)				Quarterly Avg. Quarterly Max.

5. Permit Application Monitoring Requirements

The permittee must monitor their final effluent for the pollutants listed in Table B4 in November, January, March and May, 2019. The results must be submitted with the applicable DMR.

Table B4: Effluent Monitoring Required for NPDES Permit Application

(a minimum of 3 scans required)

Parameter
Ammonia (as N)
Dissolved Oxygen
Total Kjeldahl Nitrogen (TKN)
Nitrate Plus Nitrite Nitrogen
Oil and Grease

6. Minimum Reporting Requirements

The permittee must report monitoring results as listed in Table B5 below.

Table B5: Reporting Requirements and Due Dates

Reporting Requirement	Frequency	Due Date (see note a.)	Report Form (unless otherwise specified in writing)	Submit To:
1. Table B1: Influent Monitoring 2. Table B2: Effluent Monitoring	Monthly	15th day of the month following data collection	DEQ-approved discharge monitoring report (DMR) form, electronic and hardcopy. (See Notes b. and c.)	DEQ Regional Office
1. Recycled water annual report describing effectiveness of recycled water system in complying with the DEQ-approved recycled water use plan, OAR 340-055, and this permit. See Schedule D for more detail. 2. Table B3: Recycled Water Monitoring	Annually	January 15	2 hard copies, electronic copy	One each to: • DEQ Regional Office • DEQ Water Reuse Program Coordinator
Wastewater solids annual report describing quality, quantity, and use or disposal of wastewater solids generated at the facility.	Annually	February 19	2 hard copies, electronic hardcopy	One each to: • DEQ Regional Office • DEQ Biosolids Program Coordinator
Inflow and infiltration report (see Schedule D, Section 1	Annually	February 1	1 hard copy, electronic copy	DEQ Regional Office
Significant Industrial User Survey	Every 5 years		1 hard copy, electronic copy	DEQ Regional Office

Reporting Requirement	Frequency	Due Date (see note a.)	Report Form (unless otherwise specified in writing)	Submit To:
Outfall Inspection Report	Every 5 years	3rd year of permit term	1 hard copy, electronic copy	DEQ Regional Office

Notes:

a. For submittals that are provided to DEQ by mail, the postmarked date must not be later than the due date.

b. Name, certificate classification, and grade level of each responsible principal operator as well as identification of each system classification must be included on DMRs. Font size must not be less than 10 pt.

c. Equipment breakdowns and bypass events must be noted on DMRs.

SCHEDULE D: SPECIAL CONDITIONS

1. Inflow and Infiltration

An annual inflow and infiltration report must be submitted to DEQ as directed in Schedule B. The report must include the following:

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

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

c. A summary of sanitary sewer overflows that occurred during the previous year.

2. Emergency Response and Public Notification Plan

The permittee must develop and maintain an Emergency Response and Public Notification Plan (the Plan) per Schedule F, Section B, and Conditions 7 & 8. The permit holder must develop the plan within six months of permit issuance and update the Plan annually to ensure that telephone and email contact information for applicable public agencies (permit writer should include specific contacts here as needed) are current and accurate. An updated copy of the plan must be kept on file at the wastewater treatment facility for Department 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

a. To distribute recycled water for reuse, the permittee must have and maintain a DEQ-approved Recycled Water Use Plan meeting the requirements in OAR 340-055-0025. The permittee must submit substantial modifications to an existing plan to DEQ for approval at least 60 days before making the proposed changes. Conditions in the plan are enforceable requirements under this permit.

b. Recycled Water Annual Report – The permittee must submit a recycled water annual report by the date specified in Table B.5.: Reporting Requirements and Due Dates. This report must describe the effectiveness of the system to comply with the approved recycled water use plan, the rules included in OAR 340-055, and the permit limits and conditions for recycled water contained in Schedule A, Condition 5. The plan must also include the monitoring data for the previous year required under Schedule B, Condition 6.

4. Exempt Wastewater Reuse at the Treatment System

The permittee is exempt from the recycled water use requirements in OAR 340-055 when recycled water is used at the wastewater treatment system for landscape irrigation or for in-plant processes at a wastewater treatment system, and 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. Contiguous property to the parcel of land upon which the treatment system is located is considered the wastewater treatment system site if under the same ownership.

c. Spray or drift or both from the use does not occur off the site.

d. Public access to the site is restricted.

5. 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 monitor, report, and dispose of solids as required under the permit of the receiving facility.

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.

6. 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 on p. 1 of this permit.

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 as specified on p. 1 one of this permit.

d. The permittee's wastewater system may not be without the designated supervisor for more than 30 days. During this period, there must be another person available to supervise 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, if any, 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.

g. The permittee must notify DEQ in writing of the name of the system supervisor. 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 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 Street, Suite 600, Portland, OR 97232. This address may be updated in writing by DEQ during the term of this permit.

h. When compliance with item (e) 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.

7. Industrial User Survey

The permittee must conduct an industrial user survey to determine the presence of any industrial users discharging wastewaters subject to pretreatment and submit a report on the findings to DEQ within 24 months of permit issuance. The purpose of the survey is to identify if there are any categorical industrial users discharging to the POTW, and assure regulatory oversight of these discharges to state waters. If the permittee has already completed a baseline IU Survey, the permittee must provide the survey results to DEQ within two months of permit re-issuance.

Guidance on conducting IU Surveys can be found at

http://www.deq.state.or.us/wq/pretreatment/docs/guidance/IUSurveyGuidance.pdf

After the permittee conducts an initial baseline IU Survey, the permittee must maintain the survey results and make them available for DEQ inspection. Every 5 years from permit renewal, the permittee must submit an updated IU survey.

SCHEDULE F
NPDES GENERAL CONDITIONS – DOMESTIC FACILITIES
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. The federal Clean Water Act provides for civil penalties not to exceed $37,500 and administrative penalties not to exceed $16,000 per day for each violation of any condition or limitation of this 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. The federal Clean Water Act provides for criminal penalties of not more than $50,000 per day of violation, or imprisonment of not more than 2 years, or both for second or subsequent negligent violations of this permit.

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 federal Clean Water Act provides for criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment of not more than 3 years, or both for knowing violations of the permit. In the case of a second or subsequent conviction for knowing violation, a person is subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both.

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.
   (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.

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.

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, 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 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 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.

(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 B7.

(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.

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.

C-2:
Permit Modification

MODIFICATION #1
This modification is attached to and a part of permit #101772

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT
Oregon Department of Environmental Quality
Western Region – Salem Office
4026 Fairview Industrial Dr., Salem OR 97302
Telephone: 503-378-8240

Issued pursuant to ORS 468B.050 and The Federal Clean Water Act

ISSUED TO:
Aurora, City of
21420 Main Street
Aurora, Oregon, 97002

SOURCES COVERED BY THIS PERMIT:

Type of Waste	Outfall Number	Outfall Location
Treated Wastewater	001	Pudding River 45.229121/122.752586 R.M. 8.4
Recycled Water Reuse	002	Land Application
Biosolids	N/A	

FACILITY LOCATION:

21494 Millrace Road
Aurora, Oregon 97002

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

RECEIVING STREAM INFORMATION:
WRD Basin: Willamette
USGS Sub-Basin: Molalla-Pudding
Receiving Stream name: Pudding River
LLID: 1227161452842-8.4-D

County: Marion

EPA REFERENCE NO.: OR0043991

This is a DEQ-initiated modification issued in accordance with Oregon Administrative Rules 340-045-0055. The permit was originally issued on 8/1/2016 in response to application #971466 received 6/30/2009 and is based on the land use findings in the permit record.

Ranei Nomura, Water Quality Manager
Western Region

8/24/2016
Signature Date

9/13/2016
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 permit, or by Oregon statute or administrative rule, any other direct or indirect discharge of pollutants to waters of the state is prohibited.

MODIFICATIONS TO SCHEDULE B: MINIMUM MONITORING AND REPORTING REQUIREMENTS

This minor permit modification is to correct two typographical errors in Schedule B. The first correction is to Table B3 below. The text to be deleted is in strikeout font, and the correct text is in regular font, directly below.

Table B3: Recycled Water Monitoring

Item or Parameter	Time Period	Minimum Frequency	Sample Type/Required Action	Report
Quantity Irrigated (inches/acre)	May - Oct.	Daily	Measurement	Daily values
Flow Meter Calibration	May – Oct.	Annually	Verification	January 15
Quantity Chlorine Used (lbs)	May – Oct.	Daily	Grab	Daily values Monthly Avg.
Chlorine, Total Residual (mg/L)	May – Oct.	Daily	Grab	Daily values Monthly Max. Monthly Avg.
pH	May - Oct.	2/Week	Grab	Daily values Monthly Max. Min. Daily value
~~*E. coli* (#/100 mL)~~ Total coliform	May - Oct.	Weekly	Grab	Daily values Monthly Max. Monthly Geo. Mean Geo. Mean of re-samples
Nutrients (TKN, NO_2+NO_3-N, NH_3, Total Phosphorus)	May - Oct.	Quarterly	Grab	Quarterly values Quarterly Avg. Quarterly Max.

The second correction is to condition 5. The text to be deleted is in strikeout font.

5. Permit Application Monitoring Requirements

The permittee must monitor their final effluent for the pollutants listed in Table B4 in January, March, May and November, 2019. The results must be submitted with the applicable DMR.

Table B4: Effluent Monitoring Required for NPDES Permit Application

~~(a minimum of 3 seans required)~~

Parameter
Ammonia (as N)
Dissolved Oxygen
Total Kjeldahl Nitrogen (TKN)
Nitrate Plus Nitrite Nitrogen
Oil and Grease

This correction eliminates confusion about the requirement to monitor in January, March, May and November, 2019.

C-3:
Permit Evaluation Report

Permit Evaluation Report

Oregon Department of Environmental Quality
Northwest Region Office
700 NE Multnomah Street, Suite 600
Portland OR 97232

State of Oregon Department of Environmental Quality

Contact: David Cole

Permittee:	City of Aurora 21420 Main Street Aurora, Oregon, 97002
Existing Permit Information:	File Number: 100020 Permit Number: 101772 Expiration Date: 12/31/2009 EPA Reference Number: OR004-3991
Source Contact:	Darrel Lockard, 541-222-9997 Wastewater Treatment Plant Operator
Facility Location:	21494 Millrace Road Aurora, Oregon Marion County
LLID:	1227161452842-8.4-D
Receiving Stream/Basin:	Pudding River Willamette Basin Molalla-Pudding Sub-Basin
Proposed Action:	Renew Permit Application Number: 971466 Date Received: June 30, 2009
Source Category:	NPDES Minor – Domestic
Sources Covered:	Treated Wastewater
Permit Type:	NPDES Domestic
Permit Writer:	David Cole Water Quality Specialist/Western Region/Water Quality Section Date Prepared: 6/1/2016

City of Aurora
NPDES Permit Renewal

Table of Contents

Figures

Tables

City of Aurora
NPDES Permit Renewal

1.0 Introduction

The Department of Environmental Quality (DEQ) proposes to renew the National Pollutant Discharge Elimination System (NPDES) wastewater permit for the city of Aurora, located at 21420 Main Street NE, Aurora, Oregon, 97002. This permit allows and regulates the discharge of treated wastewater to the Pudding River. The permit also authorizes the city of Aurora to recycle the treated effluent as irrigation water for city owned property immediately adjacent to the facility from May 1st through October 31st.

The purpose of this permit evaluation report is to explain and provide justification for the permit.

The Federal Water Pollution Control Act of 1972 (also known as the Clean Water Act) and its subsequent amendments, as well as Oregon Revised Statutes (ORS 468B.050), require a NPDES permit for the discharge of wastewater to surface waters. This proposed permit action by DEQ complies with both federal and state requirements.

2.0 Permit History

2.1 Issuance, Renewal and Modifications

The current NPDES Permit expired on December 31, 2009. DEQ received renewal application number 971466 from the city of Aurora on June 30, 2009. Because the permittee submitted a renewal application to DEQ in a timely manner, the current permit will not expire until DEQ takes final action on the renewal application as per OAR 340-045-0040.

2.2 Compliance History

DEQ reviewed the facility's compliance history for the time period including the current permit cycle, through the present. During this time period DEQ issued two warning letters for BOD, TSS and chlorine residual permit violations. None of these resulted in any enforcement action.

On June 9, 2014, DEQ conducted the most recent facility inspection. The DEQ inspectors noted the following violations:

- No QA/QC plan for in-house testing.
- No annual reports submitted for I&I, recycled water reuse and flow meter calibration.

On July 1, 2014, the facility operator submitted information to DEQ that resolved these issues to DEQ's satisfaction.

During the current permit cycle the facility has satisfactorily addressed all of the conditions of the permit's Schedule C Compliance Schedule.

Proposed Revisions to Permit

The proposed permit contains the following substantive changes from the 2005 permit:

- Schedule A:

1. The average dry weather design flow is 0.087 MGD.
2. The monthly average concentration limit for total residual chlorine is 0.07 mg/L.
3. The daily maximum concentration limit for total residual chlorine is 0.19 mg/L.
4. During the year 2019, the permittee must inspect outfall 001 and submit a written report to DEQ within the same year regarding the outfall's integrity.

- Schedule B:
  1. Table B4, Effluent Monitoring Required for NPDES Permit Application (minimum of 3 scans).
  2. Table B5, Reporting Requirements and Due Dates. Added a requirement to conduct a Significant Industrial User Survey once every five years.
- Schedule C – The permittee has complied with all Schedule C requirements. The proposed renewal permit has no Schedule C requirements.
- Schedule D – Added a section on conducting an Industrial User Survey.

3.0 Facility Description

3.1 Wastewater Facility Description

The facility is located at 21494 Millrace Road, about ½ mile south of the intersection of Millrace Road with Ehlen Road (see Figure 1). The facility consists of a conventional gravity sewer collection system with three lift stations equipped with alarms and telemetry, 4" force mains, a six cell lagoon (consisting of four aerated cells and two settling basin cells), a final storage lagoon, and chlorination for disinfection with de-chlorination to meet toxicity requirements (see Appendix A for the facility's flow diagram schematic).

Treated effluent is pumped and discharged through a single-port submerged diffuser into the Pudding River at River Mile (RM) 8.4 during the winter discharge season from November 1 through April 30. Previous permits and evaluation reports have listed the outfall location at RM 9.2. In 2008 DEQ collected latitude and longitude coordinates for many outfalls around the state, including Aurora's. Based on this information and DEQ's LLID tool, the correct RM for the outfall is 8.4.

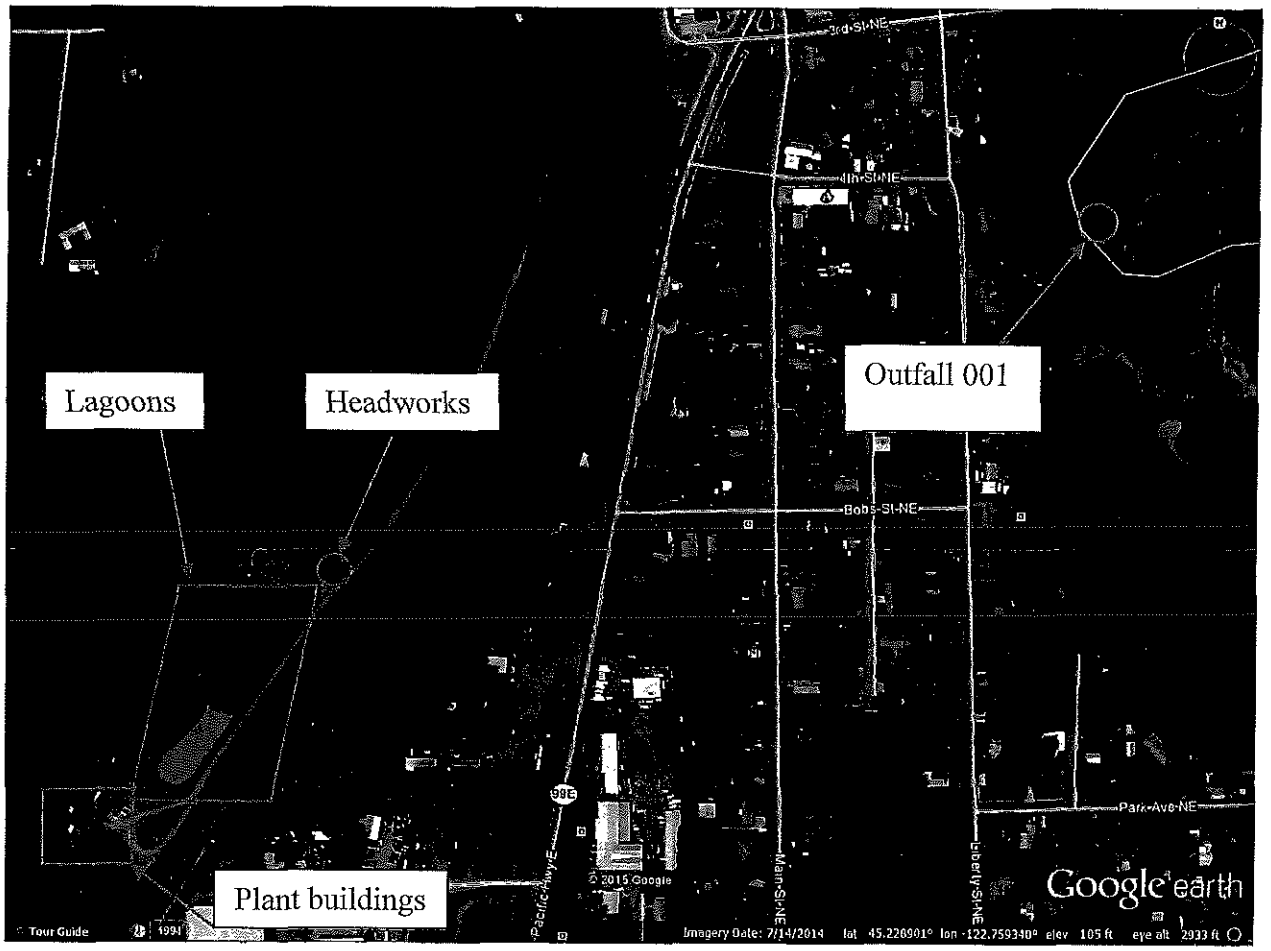


Figure 1: Facility Location

During the summer season from May 1 through October 31, the permittee land applies wastewater on approximately 8 acres of city owned property immediately adjacent to the facility. The facility's average dry weather design flow is 0.087 million gallons a day (MGD).

3.2 *Outfalls*

The current NPDES permit allows the treatment facility to discharge treated effluent through Outfall 001 to the Pudding River at RM 9.2 from November 1 through April 30 each year. The permit prohibits discharge to surface water from May 1 through October 31 each year. The proposed renewal permit will update the outfall location to RM 8.4, as discussed above in section 3.1.

Permit requirements for Outfall 002 requires the permittee to distribute all reclaimed water on land through dissipation by evapotranspiration, following sound irrigation practices so as to prevent:

- Prolonged ponding of treated wastewater on the ground surface;
- Surface runoff or subsurface drainage through drainage tile;
- The creation of odors, fly and mosquito breeding or other nuisance conditions;
- The overloading of land with nutrients, organics, or other pollutant parameters; and,
- Impairment of existing or reasonably probable beneficial uses of groundwater.

Schedule D, condition 3 requires the permittee to comply with the requirements for using reclaimed water under Division 55, and that the permittee must manage all reclaimed water according to a DEQ-approved Recycled Water Use Plan before land applying the wastewater.

3.3 Sewage Collection System

The City of Aurora has a collection system that consists of 20,600 feet of 8-inch diameter gravity sewer main pipe (type 3034), 5,060 feet of 6-inch gravity sewer main pipe (type 3034), 2,950 feet of 6-inch force main pipe (type 3034), and 6,680 feet of 4-inch force main pipe (type 3034). The system's three lift stations are about 15 feet to 20 feet deep, and are equipped with 20 HP Hydromatic submersible pumps, with 1 spare at the facility shop. The 20 foot deep lift station is equipped with two 5 HP Flyte pumps. All lift stations have level controls for operations, and alarms for high and low levels. All lift stations have high temperature and seal alarms. The wastewater treatment plant's SCADA system monitors the levels and alarms.

The ratio of wet weather to dry weather flows measured at the treatment plant is an indication of how much Infiltration and Inflow (I & I) is occurring in the collection system. Table 1 summarizes this information.

Table 1: Average and Peak Flow Statistics for City of Aurora

Flow Statistic	Millions of Gallons/Day (MGD)	Ratio to Average Dry Weather Design Flow (ADWDF)
Average Dry Weather Design Flow (ADWDF)[1]	0.087	1
Average Wet Weather Flow over last 3 years	0.303	3.8
Highest Monthly Average over last 3 years (December 2014)	0.200	2.5
Peak Daily Flow over last 3 years (12/13)	0.108	1.4

1. The average dry weather design flow of 0.087 MGD is from the permittee's renewal application. Facility personnel compiled the flow statistics, using discharge monitoring report data from the last three complete years (2012 – 2014).

The table's statistics indicate that the facility does not exhibit high levels of I & I.

DEQ recognizes that it is not practical to attempt to build and operate treatment plants and collection systems to eliminate any and all bypasses or overflows, and that at some point, attempts to do so represent a poor investment of public funds. Therefore, DEQ is interested in encouraging communities to reduce the rate at which SSOs and bypasses occur. To this end, the permit requires the following:

- The municipality must develop a program to reduce I & I and submit a progress report on an annual basis (see Schedule D, Condition 1).
- The municipality must develop and maintain an emergency response and public notification plan to cover bypass and SSO events (Schedule F, section B.8).

The municipality must report all bypasses and overflows (Schedule F, sections B.3, B.6, respectively).

3.4 Recycled Water

The permit holder currently operates a recycled water use program and plans to continue this operation during the next permit cycle. The permittee submitted a Recycled Water Use Plan (RWUP) to DEQ, and the plan is available for public comment with the proposed permit. The permittee's RWUP allows the facility to land apply their Class B treated wastewater on approximately 8 acres of city-owned property, immediately adjacent to the facility, from May 1st through October 31st of each year.

3.5 Wastewater Solids

The purpose of this section is to describe and document how the facility handles wastewater solids at the treatment plant. The term wastewater solid includes sewage sludge and biosolids. Sewage sludge refers to solids from primary, secondary, or advanced treatment of domestic wastewater that have not been treated or determined to be suitable for land application as fertilizer or soil amendment. The term biosolids refers to domestic wastewater treatment facility solids that have undergone adequate treatment, suitable for land application as a fertilizer or soil amendment.

3.5.1 Storage, Transfer and Disposal of Sewage Sludge

The facility currently has a concrete pad with short concrete walls surrounding three sides. This pad encloses four 3,000 gallon holding tanks. When these tanks are full, facility personnel contract with a licensed hauler to come pump the sludge into a tank truck, and haul it for disposal at the City of Salem's wastewater treatment plant, or other facility permitted to accept such waste.

3.5.2 Land Application

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

3.5.3 Other Beneficial Reuse

The permit holder does not currently practice other types of beneficial reuse, such as energy recovery.

3.6 Storm Water

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.

3.7 Groundwater

When the facility was constructed, the wastewater lagoon cells were lined with HDPE liners. Facility personnel leak tested each cell to assure that all seams, surfaces and protrusions were water tight. The operator has reported no evidence of lagoon leakage. Accordingly, this facility has little potential for adversely impacting groundwater quality. Schedule A, condition 4 of the proposed permit includes a provision prohibiting any adverse impact on groundwater quality.

3.8 Industrial Pretreatment

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

4.0 Receiving Water

4.1 Flows

The flow gage nearest to the city of Aurora's outfall is located next to the bridge over highway 99E in Aurora. This is USGS gage station number 14202000. This gage is currently active, and information from this station dates back to 1928. For the purposes of this evaluation report, DEQ used the last 30 years of flow data, and the EPA program, DFLOW, to compute the statistics in Table 2, below.

Aurora discharges to the Pudding River from November through April. The discharge's impact is likely to be greatest in late summer or early fall when stream flows are typically the lowest of their discharge period. This period is sometimes referred to as the critical period.

The impact of a discharge on the receiving stream is evaluated with respect to the flows likely to occur during the critical period. To standardize this analysis, DEQ makes use of four different flow statistics. Each statistic is designed to work with a different type of water quality impact and associated water quality criteria. Table 2 summarizes these flow statistics and their application. DEQ used flow data from the USGS gage at Aurora (site number 14202000), and the EPA DFLOW program, to calculate the statistics. The period of record is from 1993 through 2014.

Table 2: Summary of Flow Statistics

Streamflow Statistic	What It Is	Potential Impacts[1] Statistic is Used to Analyze	Value for Pudding River (cfs)
1Q10	The lowest one day average flow with a recurrence frequency of once in 10 years.	Acute toxicity to aquatic life	81
7Q10	The lowest seven day average flow with a recurrence frequency of once in 10 years.	Chronic toxicity to aquatic life	111
30Q5	The lowest 30 day average flow with a recurrence frequency of once in 5 years.	Impacts to human health from toxics classified as non-carcinogens	391
Harmonic mean	Long term mean flow value calculated by dividing the number of daily flows by the sum of the reciprocals of those daily flows. The equation is: $\frac{n}{\sum 1/Q_{i-n}}$ where n = number of daily flows and Q = flow	Impacts to human health from toxics classified as carcinogens	126

[1]Impacts are evaluated with respect to pollutants for which DEQ has developed water quality criteria. More information may be found at http://www.deq.state.or.us/wq/standards/toxics.htm#

4.2 Designated Uses

Under the Clean Water Act, DEQ is required to identify the beneficial uses of every waterbody in Oregon. The intent of this requirement is to insure that the water quality standards DEQ develops are consistent with how the waterbody is used. DEQ-issued permits must in turn reflect the water quality standards that apply to the basin in which DEQ issues permits.

The Aurora STP discharges to the Pudding River, for which the following beneficial uses have been identified:

- 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, and
- hydro power

The water quality standards for the Willamette Basin, developed to protect these beneficial uses, can be found in Oregon Administrative Rules 340-041-0340.

4.3 Receiving Stream Water Quality

In the vicinity of the facility's outfall, the Pudding River is included on the DEQ's 303(d) List as water quality limited for numerous parameters (see Table 3). In December of 2008 DEQ issued a Total Maximum Daily Load (TMDL) addressing these parameters. The TMDL assigned a Waste Load Allocation (WLA) to the Aurora facility for bacteria. The current permit has the following bacteria limits: a monthly logarithmic mean (*E. coli* counts/100 mL) of 126, and a single sample limit (*E. Coli* counts/100 mL) of 406.

Table 3. 303(d) Parameters Applicable at Outfall 001

Parameter	Season – Criteria
DDT	Year Around
Dieldrin	Year Around
E. Coli	Fall/Winter/Spring
Fecal Coliform	Summer
Iron	Year Around
Manganese	Year Around
Temperature	Year Around (Non-spawning) Salmon and trout rearing and migration: 18.0° C

4.4 Mixing Zone Analysis

DEQ-issued permits sometimes specify mixing zones, also known as "regulatory mixing zones" or "allocated impact zones". State and federal regulations allow mixing zones. They are areas in the vicinity of outfalls in which all or some of Oregon's water quality standards can be suspended. DEQ allows mixing zones when the overall impact, evaluated with respect to Oregon's Mixing Zone Rule (OAR 340-041-0053), appears to be negligible.

Two mixing zones can be developed for each discharge: (1) The acute mixing zone, also known as the "zone of initial dilution" (ZID), and (2) the chronic mixing zone, usually referred to as "the mixing zone." The ZID is a small area where acute criteria can be exceeded as long as it does not cause acute toxicity to organisms drifting through it. The mixing zone is an area where acute criteria must be met but chronic criteria can be exceeded. The mixing zone's design must protect the integrity of the entire water body.

On October 13, 2009, the DEQ lab performed the field work for the mixing zone study that they released in May 2010. The allowable mixing zone for the Aurora facility is that portion of the Pudding River, extending from a point ten 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 ten feet of the outfall discharge port. DEQ believes that the discharge and mixing zone do not adversely affect the receiving stream's beneficial uses. DEQ also believes that the defined mixing zone meets the rule criteria.

The facility's discharge flow rate during the study was 0.061 MGD. The outfall was visible below the water's surface. Since the DEQ staff performed conductivity mapping at the outfall, a dye study was not necessary during the survey. The DEQ staff used conductivity to delineate wastewater mixing in the receiving stream. The Pudding River is designated as salmon and trout rearing and migration corridors, based on the ODFW fish habitat maps and Division 41, Water Quality Standards, Figure 340A.

There are public access sites to this portion of the river. Upstream of the outfall is an area used for contact recreation. The outfall is located in a part of the river that is upstream of a bridge over the river. No drinking water intakes are located within ½ mile downstream of the outfall. No other NPDES-permitted discharges are located within ½ mile upstream or downstream of the outfall. The outfall consists of a single port, eight-inch diameter steel pipe. The pipe is horizontal to the stream bottom, and enters the stream at mid channel.

DEQ used the conductivity data measured during the field study to determine the dilutions at the edge of the mixing zone and zone of initial dilution. DEQ then used the EPA-supported mixing zone software, CORMIX, to simulate the discharge during critical flow conditions. The resulting dilutions to be used for permitting purposes are 10 for the ZID, and 134 for the MZ.

5.0 Overview of permit development

5.1 Types of Permit Limits

Effluent limitations serve as the primary mechanism in NPDES permits for controlling pollutant discharges to receiving waters. Effluent limitations can be based on either the technology available to control the pollutants, or limits that protect the water quality standards for the receiving water. These two types of permit limits are referred to 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, a WQBEL must be placed in the permit. More explanation of each is provided below.

- TBELs:
  - The intent of TBELs is to require a minimum level of pollutant treatment, based on available treatment technologies, while allowing the discharger to use any available control technique to meet the limits.
  - TBELs for municipal treatment plants, also known as federal secondary treatment standards, have been developed for the following parameters: biochemical oxygen demand measured over 5 days (BOD_5), total suspended solids (TSS), and pH. These are found in the Code of Federal of Federal Regulations (CFR), and are known as secondary treatment standards. The CFR also allows special considerations and exceptions to these standards for certain circumstances and types of treatment facilities, such as lagoons.
- WQBELs:
  - The intent of WQBELs is to assure the water quality standards of a receiving stream are met. The water quality standards are developed to protect the beneficial uses of the receiving stream, such as swimming and fishing. In many cases TBELs are not restrictive enough to assure the receiving stream meets water quality standards. In these cases, DEQ needs to establish WQBELs to protect the receiving stream.
  - Oregon is unique in that it has minimum design criteria for BOD and TSS that are only applicable to sewage treatment plants. These design criteria vary by watershed basin. DEQ developed them to protect water quality in their respective basins. These are often more stringent than the federal secondary treatment standards. When this is the case, the basin standards supersede the federal standards.

TBELs are likely to be the most stringent if the receiving stream is large relative to the discharge, while WQBELs are likely to be the most stringent when the receiving stream is small or does not meet water quality standards.

In some cases, DEQ will develop both a TBEL and a WQBEL for a particular parameter. Permit writers must include the more stringent of the two in the permit.

Permit limits for bacteria are WQBELs when they are derived from the water quality standards found in OAR 340-041-0009 for freshwater. Bacteria limits are designed to protect human health when swimming or eating shellfish.

When DEQ renews a permit, the permit writer evaluates the existing limits to see if they need to be modified as a result of changes to technology based standards or water quality standards that may have occurred during the permit term. Anti-backsliding provisions (described in CFR 122.44(l)) generally do not allow DEQ to relax effluent limits in renewed/reissued permits. The more stringent of the existing or new limits must be included in the renewal permit.

5.2 *Existing Permit Limits*

The existing permit limits are as follows:

6. May 1 – October 31: No discharge to waters of the State (unless DEQ approves in writing)

(2) November 1 – April 30:

Parameter	Average Effluent Concentrations		Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
	Monthly	Weekly			
BOD_5	30 mg/L	45 mg/L	30	60	140
TSS	50 mg/L	80 mg/L	47	90	220

* Average dry weather design flow to the facility is 0.087 MGD. DEQ calculated mass load limits based on the maximum flows with a two year recurrence interval and the capability of the treatment works at those flows.

(3)

Other parameters (year-round)	Limitations
E. coli Bacteria	Must not exceed 126 organisms per 100 mL monthly geometric mean. No single sample shall exceed 406 organisms per 100 mL. (See Note 1)
pH	Must not be outside the range of 6.0 – 9.0 S.U.
BOD_5 and TSS Removal Efficiency	Must not be less than 85% monthly average for BOD_5 and 65% monthly for TSS.
Total Residual Chlorine	Must not exceed a monthly average concentration of 0.08 mg/l and a daily maximum concentration of 0.20 mg/l (See Note 2).

Notes:

1. No single *E. coli* sample may exceed 406 organisms per 100 mL; however, DEQ will not cite a violation of this limit if the permittee takes at least 5 consecutive re-samples at 4 hour intervals beginning within 28 hours after the original sample was taken and the geometric mean of the 5 re-samples is less than or equal to 126 *E. coli* organisms/100 mL.
2. When the total residual chlorine limitation is lower than 0.10 mg/L, DEQ will use 0.10 mg/L as the compliance evaluation level (i.e., DEQ will consider daily maximum concentrations below 0.10 mg/L in compliance with the limitation).

5.3 *Recycled Water*

Historically, the treatment facility has produced 10 MG of recycled water annually for use, as summarized in Table 4.

Table 4: Annual Recycled Water Use (2014)

Use and Location	Recycled Water Class	Volume (gallons)
Grass, pasture, hybrid poplar trees	C	10 million

The permit holder maintains a Recycled Water Use Plan that describes how the facility will comply with permit requirements. The RWUP also includes specific locations where recycled water use occurs. DEQ updated the permit holder's RWUP on October 30, 2015. The RWUP is available for public review and comment with the permit.

5.4 *Anti-degradation*

Oregon's Anti-Degradation Policy for Surface Waters, found in OAR 340-041-0004, requires DEQ to demonstrate that the discharge does not lower water quality from existing conditions.

DEQ performed an antidegradation review for this discharge see Appendix E). The proposed permit contains the same discharge loadings as the existing permit. DEQ does not consider permit renewals with the same discharge loadings as the previous permit to lower water quality from the existing condition. DEQ is not aware of any information that existing limits do not protect the designated beneficial uses listed in Section 5.2. DEQ is also not aware of any existing uses present within the waterbody that are not currently protected by standards developed to protect the designated uses. Therefore, DEQ has determined that the proposed discharge complies with DEQ's antidegradation policy.

6.0 Permit Draft Discussion

6.1 *Face Page*

The face page provides information about the permittee, description of the wastewater, outfall locations, receiving stream information, permit approval authority, and a description of permitted activities. The

permit allows discharge to the Pudding River within the Schedule A limits, and the following schedules. It prohibits all other discharges.

In accordance with state and federal law, NPDES permits will be effective for a fixed term not to exceed 5 years. Upon issuance, this permit will be effective for no more than 5 years.

DEQ evaluated the classifications for the treatment and collection systems (see Attachment D). DEQ's evaluation determined that the facility's treatment system is Class 2, and the collection system is Class 1. DEQ is not proposing any changes to the system classifications.

6.2 Permit Limit Derivation

6.2.1 Technology-Based Effluent Limits (TBELs)

TBELs must be met at the outfall. The applicable TBELs for this facility are the most stringent of the federal secondary treatment standards and the Oregon basin standards, adjusted as necessary for the type of treatment system.

Table 5 shows a comparison of the federal secondary treatment standards and Oregon basin standards, and also lists bacteria standards. Basin standards and bacteria standards are not strictly speaking TBELs; however they function as such when they have to be met at the end of the pipe.

Table 5: Comparison of Federal Secondary Treatment and Basin Standards

Parameter	Federal Secondary Treatment Standards		Applicable Willamette Basin Standards (OAR 340-041-0345)
	30-Day Average	7-Day Average	30-Day Average
5-Day BOD	30 mg/L	45 mg/L	10 mg/L BOD & TSS (May 1 – Oct. 31). 30 mg/L BOD (Nov. 1 – Apr. 30).
TSS	30 mg/L	45 mg/L	45 mg/L TSS (Nov. 1 – Apr. 30).
pH	6.0 – 9.0 (instantaneous)		6.5 – 8.5 Note: basin standards for pH do not have to be met at the outfall and can instead be met at the edge of the mixing zone.
% Removal	85% BOD5 and TSS		Not specified.

The above TBELs may be adjusted for particular types of treatment systems and conditions described in 40 CFR Part 133. The adjustments that apply to Aurora are as follows:

- Facilities such as lagoons, trickling filters and waste stabilization ponds. These are often employed in smaller communities, such as Aurora, and though they are capable of achieving significant reductions in BOD and TSS, they may not be able to consistently achieve the secondary treatment standards listed above. Under 40 CFR 133.105, states are allowed to set special BOD and TSS limits for lagoon and trickling filter facilities. The monthly average concentration limits can be as high as 45 mg/L, while weekly average limits can be as high as 65 mg/L. The removal efficiency limits can be as low as 65%.

- There are additional, special considerations for TSS discharges from lagoon facilities (40 CFR 133.103(c). Monthly average concentration limits can be as high as 50 mg/L west of the Cascade Mountains, and 85 mg/L east of the Cascade Mountains.

Table 6 summarizes the TBELs and applicable basin standards for Aurora.

Table 6: Summary of Permit Limits* for Aurora

Effluent Parameter	Concentration		Percent Removal	Comments
	Monthly	Weekly		
BOD_5*	30 mg/L	45 mg/L	85	These are equal to the basin standards.
TSS*	50 mg/L	80 mg/L	65	These are equal to the basin standards, adjusted for the fact that the facility treatment uses lagoons.
pH	Must not be outside the range of 6.0 to 9.0			Basin standards are 6.5 – 8.5. Note: basin standards don't have to be met at the outfall and can instead be met at the edge of the mixing zone.
Bacteria	Must not exceed 126 organisms per 100 ml monthly geometric mean. Any single sample must not exceed 406 organisms per 100 ml.			
Total Residual Chlorine	0.19 mg/L Daily Maximum 0.07 mg/L Monthly Average			When the total residual chlorine limitation is lower than 0.10 mg/L, DEQ will use 0.10 mg/L as the compliance evaluation level (i.e. monthly average concentrations below 0.10 mg/L will be considered in compliance with the limitation).

*The limits for BOD_5 and TSS shown in this table are concentration-based limits.

The average dry weather design flow to the facility is 0.087 MGD. DEQ calculated the winter mass load limits for the facility, based on the maximum flows with a two-year recurrence, and the capability of the treatment works at those flows per OAR 340-041-061(9)(b). The facility's equipment pumps effluent to the Pudding River, using a constant speed pump at 300 gallons per minute (gpm), or 0.432 MGD. Therefore, the flow rate for a daily maximum discharge is 0.432 MGD. The 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., the city's consultant, determined that the facility can reasonably achieve 40 mg/L BOD_5 and 60 mg/L TSS on a daily maximum, 40 mg/L BOD_5 and 60 mg/L TSS on a weekly average, and 25 mg/L BOD_5 and 40 mg/L TSS on a monthly average.

DEQ uses the following equation to develop mass loads:

- Mass Load = Design flow (MGD) x Concentration-based limit (mg/L) x Conversion factor (lbs/gal).

The weekly average and maximum daily mass loads are equal to the monthly average, times 1.5 and 2 respectively.

The facility's winter mass limits calculations for BOD5 are as follows:

- 0.142 MGD x 25 mg/L monthly average x 8.34 lbs/gal = 29.6 lbs/day rounded off to 30 lbs/day.
- 0.180 MGD x 40 mg/L weekly average x 8.34 lbs/gal = 60 lbs/day.
- 0.432 MGD x 40 mg/L daily maximum x 8.34 lbs/gal = 144 lbs/day rounded off to 140 lbs/day.

The facility's winter mass limits calculations for TSS are as follows:

- 0.142 MGD x 40 mg/L monthly average x 8.34 lbs/gal = 47.3 lbs/day rounded off to 47 lbs/day.
- 0.180 MGD x 60 mg/L weekly average x 8.34 lbs/gal = 90 lbs/day.
- 0.432 MGD x 60 mg/L daily maximum x 8.34 lbs/gal = 216 lbs/day rounded off to 220 lbs/day.

DEQ rounds all mass load limitations to two significant figures. This is consistent with the number of significant figures associated with the facility's flow measurements, and with the accuracy of BOD measurements of 10 or greater.

6.2.2 Water Quality-Based Effluent Limits

After DEQ establishes TBELs and applicable basin standards for the facility, DEQ then develops WQBELs.

In August 1993, DEQ established a TMDL to bring the river into compliance with the dissolved oxygen standard. The TMDL contains a WLA for the summer discharge season; however, the Aurora facility only discharges during the winter season and therefore does not have a WLA for any these pollutants in their permit.

6.2.2.1 General Discussion of Reasonable Potential Analysis

EPA has developed a methodology called Reasonable Potential Analysis (RPA) for determining if there is a reasonable potential for a discharge to cause or contribute to violations of water quality standards for a particular parameter. RPA accounts for effluent variability, available dilution (if applicable), receiving stream water quality, and water quality standards to protect aquatic life and human health. If the RPA results indicate that there is a potential for the discharge to cause or contribute to exceedances of water quality standards, then the methodology establishes permit limits that will not cause or contribute to violations of water quality standards.

DEQ has adopted EPA's methodology for RPA, and has developed spreadsheets that incorporate this analysis.

The parameters for which a RPA must be performed will vary with the size and type of discharge. The NPDES Permit Testing Requirements for Publicly Owned Treatment Works, contained in Appendix J of 40 CFR Part 122, lists these parameters. Table 7 summarizes the relevant section for the Aurora facility.

Table 7: Testing Requirements for Publicly-Owned Treatment Works

Pollutant List	Parameters for which RPA Needed
Table 1A – Effluent Parameters for All POTWs	pH, Temperature

The following sections discuss the parameters of concern for the Aurora facility, including the RPA results for each of these parameters.

6.2.2.2 Reasonable Potential Analysis for pH

The pH of water is a measure of how acidic or basic a solution is. At a pH of 7.0, the solution is considered neutral. Most aquatic organisms can tolerate only a narrow range around 7.0.

As indicated in the section 6.2.1, the applicable basin standard for Aurora's discharge to the Pudding River is 6.5 to 8.5. Aurora's current pH limits assure that the standard is met at the edge of the mixing zone. The proposed limits are the same as the existing limits (6.0 to 9.0 S.U.). See Appendix B for the pH RPA worksheet.

6.2.2.3 Reasonable Potential Analysis for Temperature

Water temperatures affect the life cycles of aquatic species and are a critical factor in maintaining and restoring healthy salmonid populations. The purpose of the temperature criteria in OAR 340-041-0028 is to protect designated, temperature-sensitive beneficial uses (including salmonid life cycle stages) from adverse anthropogenic warming activities.

On December 31, 2008, EPA approved the TMDL for the Pudding River. Because the facility does not discharge during the critical summer months, the TMDL did not assign a temperature waste load allocation to the facility.

DEQ reviewed the facility's effluent temperature data over the last two years. This review showed that during the discharge season (November 1 – April 30), the facility's maximum discharge temperature was less than 21.0°C. Therefore a thermal plume analysis is not required.

Based on the fish use maps, the receiving stream in the vicinity of the facility's outfall is not spawning habitat. Since the facility discharges only in the winter months (November 1st through April 30th), DEQ completed the Winter, No Spawning, RPA worksheet, to run the temperature RPA applicable to the facility. For the ambient temperature value of the receiving stream portion of the worksheet, DEQ used the maximum of the values over the last two years that DEQ collected at its ambient site from the bridge over the Pudding River in Aurora, during the discharge season. For the effluent flow rate portion of the worksheet, DEQ used the facility's ADWF value. This is a conservative approach since the actual dry weather flows are significantly lower than the design flow rate. The results of the RPA worksheet show that the facility has no reasonable potential to adversely affect the receiving stream's temperature (see Appendix C).

6.2.2.4 Reasonable Potential Analysis for Chlorine

DEQ used the fresh water criteria for chlorine to calculate permit limits. According to OAR 340-041, Table 33A, chlorine concentrations of 11 µg/L can result in chronic toxicity in fresh water, while 19 µg/L can result in acute chlorine toxicity in fresh water. DEQ requires compliance with acute toxicity criteria at the edge of the ZID, and compliance with chronic toxicity criteria at the edge of the MZ.

DEQ re-calculated the chlorine limits for the facility, based on the most recent two years' worth of data from the facility's DMRs. The results of the re-calculation show that the limits have changed very

slightly. The current limits are 0.08 mg/L (monthly average), and 0.20 mg/L (daily maximum). The new limits are 0.07 mg/L (monthly average), and 0.19 mg/L (daily maximum, see Appendix D).

6.3 *Schedule A. Waste Discharge Limits*

The proposed permit limits for Aurora are included in Schedule A of the permit. The numeric limits in Schedule A are reproduced below. These limits are the result of the analyses described in Section 6.2.1. Schedule A of the permit also contains conditions relating to recycled water and chlorine.

Schedule A – Waste Discharge Limits

The proposed effluent limits for Outfall 001 are as follows:

1. **Outfall 001 - Treated Effluent**
   a. BOD_5,and TSS
      i. May 1 – October 31: No discharge to waters of the state (unless DEQ gives written approval to do so).

      ii. November 1 – April 30: During this time period the permittee must comply with the limits in the following table:

Table A1: BOD_5 and TSS Limits

Parameter	Average Effluent Concentrations, mg/L		Monthly Average lbs/day	Weekly Average lbs/day	Daily Maximum Lbs
	Monthly	Weekly			
BOD_5	30 mg/L	45 mg/L	30	60	140
TSS	50 mg/L	80 mg/L	47	90	220

   b. Additional Parameters. The permittee must comply with the limits in the following table (year round except as noted):

Table A2: Limits for Additional Parameters

Year-round (except as noted)	Limits
BOD_5 and TSS Removal Efficiency	Must not be less than 85% monthly average for BOD_5 and 65% monthly for TSS.
E. coli Bacteria (see Note a.)	Monthly log mean must not exceed 126 organisms per 100 ml. Any single sample must not exceed 406 organisms per 100 ml.
pH	Must not be outside the range of 6.0 to 9.0 S.U.
Total Residual Chlorine	Monthly average concentration must not exceed 0.07 mg/L. Daily maximum concentration must not exceed 0.19 mg/L
Notes a. Any single *E. coli* sample must not exceed 406 organisms per 100 mL; however, DEQ	

Year-round (except as noted)	Limits
will not cite a violation of this limit if the permittee takes at least 5 consecutive re-samples at 4 hour intervals, beginning within 28 hours after the original sample was taken, and the log mean of the 5 re-samples is ≤ 126 *E. coli* organisms/100 mL.	

6.3.1 Discussion of Permit Limits in Tables A1 and A2

The limits in Tables A1 and A2 are discussed in detail below, in the following order:

a. BOD_5, TSS, Mass Load and Percent Removal Efficiency
b. Bacteria
c. pH
d. Total Residual Chlorine

a. BOD_5 and TSS Concentration, Mass Load and Percent Removal Limits
BOD_5 and TSS are effluent "strength" indicators. Section 6.2.1 describes the development of concentration and mass limits for BOD_5 and TSS. These indicators are TBELs. The permit requires a removal efficiency of 85% for BOD, and 65% for TSS. Section 6.2.1 describes the derivation of this removal efficiency, and is consistent with the Code of Federal Regulations (40 CFR part 133.105) when there is a trickling filter or lagoon system.

b. Bacteria
Federal and state rules consider bacteria limits WQBELs. Since Aurora discharges to freshwater , the proposed permit limits are based on the *E. coli* standard contained in OAR 340-041-0009(5). The proposed limits are 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 must 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 permittee must conduct the re-sampling at four hour intervals, beginning within 28 hours after the permittee collected the original sample.

c. pH
Section 6.2.1 describes the derivation of pH limits. DEQ developed these limits with respect to the basin standards, adjusted for dilution at edge of the mixing zone, and are therefore WQBELs. Appendix B shows that the facility has no reasonable potential to adversely affect the receiving stream's pH criterion.

d. Total Residual Chlorine
Aurora uses chlorine to disinfect the effluent before discharging to the Pudding River. While chlorine is an effective disinfectant, it is toxic to many aquatic organisms. To assure that the potential for toxicity is minimized, Aurora uses dechlorination equipment to reduce the presence of chlorine in the discharge. The current permit contains a chlorine discharge limit, where it is referred to as Total Residual Chlorine.

DEQ performed a chlorine RPA analysis for the current permit cycle. This analysis established total residual chlorine discharge limits of 0.08 mg/L as a monthly average, and 0.20 mg/L as a daily

maximum. DEQ recently re-calculated the chlorine limits for the facility, based on the most recent two years' worth of data from the facility's DMRs. The results of the re-calculation show that the limits have changed very slightly. The new limits are 0.07 mg/L (monthly average), and 0.19 mg/L (daily maximum, see Appendix D).

6.3.2 Discussion of Other Schedule A Requirements

In addition to permit limits for specific parameters, Schedule A also contains requirements pertaining to the use of recycled water, and chlorine usage. These are discussed in more detail below, in the following order:

a. Reclaimed Wastewater Outfall 002
b. Total Residual Chlorine

a. Reclaimed Wastewater Outfall 002
November 1 – April 30: The permit prohibits land application, unless DEQ gives written approval.

b. Total Residual Chlorine
When the total residual chlorine limitation is lower than 0.10 mg/l, DEQ will use 0.10 mg/l as the compliance evaluation concentration (i.e. DEQ will consider monthly average concentrations below 0.10 mg/l to comply with the limitations).

6.4 Schedule B - Minimum Monitoring and Reporting Requirements

Section 1 of Schedule B describes monitoring and reporting protocols for the permit and includes the following:

- Quality Assurance and Quality Control (QA/QC)
- Re-analysis and Re-sampling if QA/QC Requirements Not Met
- Reporting Procedures, including the following:
  - The correct use of significant figures.
  - Reporting detection levels and quantitation limits.
  - Calculating and reporting mass loads.

Schedule B also describes the minimum monitoring and reporting necessary to demonstrate compliance with permit conditions. ORS 468.065(5) requires permittees to perform periodic reporting. Self-monitoring requirements are the primary means of assuring that the permittee meets permit limits. The permittee may also need to monitor other parameters when insufficient data exist to establish a limit, but where there is a potential for a water quality concern.

DEQ has developed monitoring and reporting matrices that establish monitoring and reporting frequencies, based on the facility's size and complexity. The following links direct the reader to these matrices:

http://www.deq.state.or.us/wq/wqpermit/docs/TemplateGuidance/MonMatrix.pdf
http://www.deq.state.or.us/wq/wqpermit/docs/ReportingMatrix.pdf

DEQ used these matrices to establish the facility's monitoring and reporting requirements.

The following tables summarize the various monitoring requirements:

- Table B1: Influent Monitoring
- Table B2: Effluent Monitoring
- Table B3: Recycled Water Monitoring
- Table B4: Effluent Monitoring Required for NPDES Permit Application
- Table B5: Reporting Requirements and Due Dates

Each of these tables is discussed in more detail below.

Tables B1 and B2: Influent and Effluent Monitoring
These tables specify the parameters the permittee must monitor on a regular basis in the influent and effluent, along with associated monitoring frequencies, sample types and related reporting requirements.

Table B1: Influent Monitoring

Item or Parameter	Time Period	Minimum Frequency	Sample Type/Required Action	Report
Total Flow (MGD)	Year-round	Daily	Measurement	Daily values
Flow Meter Calibration	Year-round	Annual	Verification (see Note a)	Annual Certification
BOD_5 and TSS (mg/L)	Year-round	1 per two weeks	24-hr composite	Daily values
pH (S.U.)	Year-round	2 per week	Grab	Daily values

Table B2: Effluent Monitoring, Outfall 001

Item or Parameter	Time Period	Minimum Frequency	Sample Type/Required Action	Report
Total Flow (MGD)	Year-round	Daily	Measurement	Daily values
BOD_5 and TSS (mg/L)	Nov.–Apr.	1 per two weeks	Composite	Daily values Monthly average
BOD_5 and TSS Mass Load (lb/day)	Nov.–Apr.	1 per two weeks	Calculation	Daily values Monthly average Max. Daily values
BOD_5 and TSS Percent Removal	Nov.-Apr.	Monthly	Calculation	Monthly average
pH (S.U.)	Nov.-Apr.	2 per week	Grab	Daily values Max. Daily values Min. Daily values
Temperature (°C)	Nov.–May	2 per week	Grab	Max. Daily values
E. coli (#/100 mL)	Nov.–May	1 per two weeks	Grab	Daily values
Chlorine Used (lbs/day)	Year-round	Daily	Grab	Daily values
Chlorine, Total Residual (mg/L)	Year-round	Daily	Grab	Daily values
Storage Lagoon Depth	Year-round	Daily	Record	Daily values

Table B3: Recycled Water Monitoring Requirements
OAR 340-055-0012 requires the permittee to monitor and demonstrate compliance with the treatment criteria for a specific Class of recycled water. Table B3 lists the monitoring requirements consistent with OAR 340-055-0012. The RWUP describes specific monitoring and sampling procedures.

Table B3: Recycled Water Monitoring

Item or Parameter	Time Period	Minimum Frequency	Sample Type/Required Action	Report
Quantity Irrigated (inches/acre)	May 1-Oct. 31	Daily	Measurement	Daily values
Flow Meter Calibration	Year-round	Annually	Verification	Certification
Quantity Chlorine Used (lbs)	Year-round	Daily	Grab	Daily values
Chlorine, Total Residual (mg/L)	Year-round	Daily	Grab	Daily values
pH	May-Oct.	2/Week	Grab	Daily values
Total coliform	May-Oct.	Weekly	Grab	Weekly values
Nutrients (TKN, NO_2+NO_3-N, NH_3, Total Phosphorus)	May-Oct.	Quarterly	Grab	Quarterly values

Table B4: Effluent Monitoring Required for NPDES Permit Application
The renewal application for this permit requires three scans for the parameters listed in Table B4. The permittee may collect this data 4.5 years before submitting the renewal application. DEQ recognizes that it may be difficult for some facilities to collect three scans that represent the seasonal variation in the discharge from each outfall within the permit renewal timeframe. DEQ therefore requires that the permittee complete this monitoring as part of permit compliance.

Table B4: Effluent Monitoring Required for NPDES Permit Application

(a minimum of 3 scans required)

Parameter
Ammonia (as N)
Dissolved Oxygen
Total Kjeldahl Nitrogen (TKN)
Nitrate Plus Nitrite Nitrogen
Oil and Grease

Table B5: Reporting Requirements and Due Dates
For the convenience of the permit holder, this table summarizes the information contained in the previously-listed tables.

Table B5: Reporting Requirements and Due Dates

Reporting Requirement	Frequency	Due Date (see note a.)	Report Form (unless otherwise specified in writing)	Submit To:
1. Table B1: Influent Monitoring 2. Table B2: Effluent Monitoring	Monthly	15th day of the month following data collection	DEQ-approved discharge monitoring report (DMR) form, electronic and hardcopy. (See Notes b. and c.)	DEQ Regional Office
1. Recycled water annual report describing effectiveness of recycled water system in complying with the DEQ-approved recycled water use plan, OAR 340-055, and this permit. See Schedule D for more detail. 2. Table B3: Recycled Water Monitoring	Annually	January 15	2 hard copies, electronic copy	One each to: • DEQ Regional Office • DEQ Water Reuse Program Coordinator
Wastewater solids annual report describing quality, quantity, and use or disposal of wastewater solids generated at the facility.	Annually	February 19	2 hard copies, electronic hardcopy	One each to: • DEQ Regional Office • DEQ Biosolids Program Coordinator
Inflow and infiltration report (see Schedule D, Section 1	Annually	February 1	1 hard copy, electronic copy	DEQ Regional Office
Significant Industrial User Survey	Every 5 years		1 hard copy, electronic copy	DEQ Regional Office
Outfall Inspection Report	Every 5 years	3rd year of permit term	1 hard copy, electronic copy	DEQ Regional Office

Reporting Requirement	Frequency	Due Date (see note a.)	Report Form (unless otherwise specified in writing)	Submit To:
Notes: a. For submittals that are provided to DEQ by mail, the postmarked date must not be later than the due date. b. Name, certificate classification, and grade level of each responsible principal operator as well as identification of each system classification must be included on DMRs. Font size must not be less than 10 pt. c. Equipment breakdowns and bypass events must be noted on DMRs.				

6.5 Schedule C - Compliance Schedules and Conditions

During the current permit cycle the permittee met all Schedule C compliance schedule requirements. Therefore, the proposed renewal permit has no Schedule C requirements.

6.6 Schedule D - Special Conditions

6.6.1 Inflow and Infiltration

As described in Section 3.3 (sewage collection system), it is important for the permit holder to assess and take steps to reduce the rate of inflow and infiltration of stormwater and groundwater into the sewer system. Consistent with this, Schedule D of the permit requires the permit holder to undertake activities to track and reduce Inflow and Infiltration in the sewer system.

6.6.2 Emergency Response and Public Notification Plan

Schedule F (General Conditions), Condition B.8. requires municipal wastewater treatment facilities to have an Emergency Response and Public Notification Plan.

6.6.3 Recycled Water Use Plan

Schedule D contains conditions requiring the permit holder to develop and maintain a Recycled Water Use Plan. The RWUP must meet the requirements in OAR 340-055-0025 and include location-specific information describing where and how the permittee manages recycled water to protect public health and the environment. The permittee last updated the RWUP on October 30, 2015. The permittee's RWUP sites are registered with the Oregon Water Resources Department. The RWUP also addresses comments from the Oregon Health Authority's review.

6.6.4 Exempt Wastewater Reuse at the Treatment System

Schedule D exempts the permit holder from the recycled water requirements in OAR 340-055, when facility personnel use recycled water for landscape irrigation at the treatment facility, or for in-plant processes, such as in-plant maintenance activities. Landscape irrigation includes water applied to small-

scale irrigation such as supplying supplemental irrigation to turf grass, shrubs, and ornamental trees. Landscape irrigation may include irrigating native vegetation along dikes, banks, and earthen impounds around wastewater lagoons - especially as needed to reduce erosion and maintain structural integrity. Landscape irrigation does not include large-scale irrigation of pasture, hayfields, or native vegetation adjacent to the wastewater treatment facility (i.e., these activities are subject to OAR 340-055 and require facility personnel to develop a RWUP). All of the conditions listed in (6)(i) through (6)(iv), of the permit's Schedule D must be satisfied for an exempt use to be valid.

6.6.5 Wastewater Solids Transfers

The permit 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. The permittee is required to monitor, report, and dispose of solids according to the receiving facility's permit requirements. Wastewater solids that the permittee transfers out-of-state must meet all of the disposal or wastewater use requirements of both Oregon and the receiving state.

6.6.6 Operator Certification

State and federal rules require the permit holder to have an operator whose certifications are consistent with the size and type of treatment plant. The language in this section of the permit describes the requirements relating to operator certification. Appendix F is an updated copy of the Operator Certification Classification Worksheet for the facility.

6.6.7 Industrial User Survey

DEQ requires the permittee to conduct an industrial user survey every five years. The purpose of the survey is to identify whether there are any categorical industrial users discharging to the POTW, and to assure regulatory oversight of these discharges to state waters.

6.7 Schedule E - Pretreatment

The permittee does not have a DEQ-approved industrial pretreatment program. Based on current information, the permittee does not need an industrial pretreatment program.

6.8 Schedule F - NPDES General Conditions

These conditions are standard to all domestic NPDES permits and include language regarding operation and maintenance of facilities, monitoring and record keeping, and reporting requirements. In August 2009 DEQ substantially revised the General Conditions for all individual permits that DEQ issues. DEQ has made minor modifications since then. The following summarizes these changes:

- There are additional citations to the federal Clean Water Act and CFR, including references to standards for sewage sludge use or disposal.
- There is additional language regarding federal penalties.
- Bypass language has been made consistent with the Code of Federal Regulations and with other EPA Region 10 states.
- Reporting requirements regarding overflows are more explicit.

- Requirements regarding emergency response and public notification plans are more explicit.
- Language pertaining to duty to provide information is more explicit.
- Confidentiality of information is addressed.

7.0 Next Steps

7.1 Public Comment Period

DEQ will make the proposed NPDES permit available for public comment for 35 days. DEQ will post public notice and links to the proposed permit on DEQ's website, and send to subscribers to DEQ's pertinent public notice e-mail lists. DEQ will schedule a public hearing if 10 or more people request one, or if an authorized person representing an organization of at least 10 people requests one. If DEQ holds a public hearing, then DEQ will publish an additional public notice advertisement.

7.2 Response to Comments

DEQ will respond to comments received during the comment period. All those providing comments will receive a copy of DEQ's responses. Interested parties may also request a copy of DEQ's responses. After DEQ receives and evaluates the comments, DEQ will decide whether to issue the permit as proposed, make changes to the permit, or deny the permit. DEQ will notify the permittee of DEQ's decision.

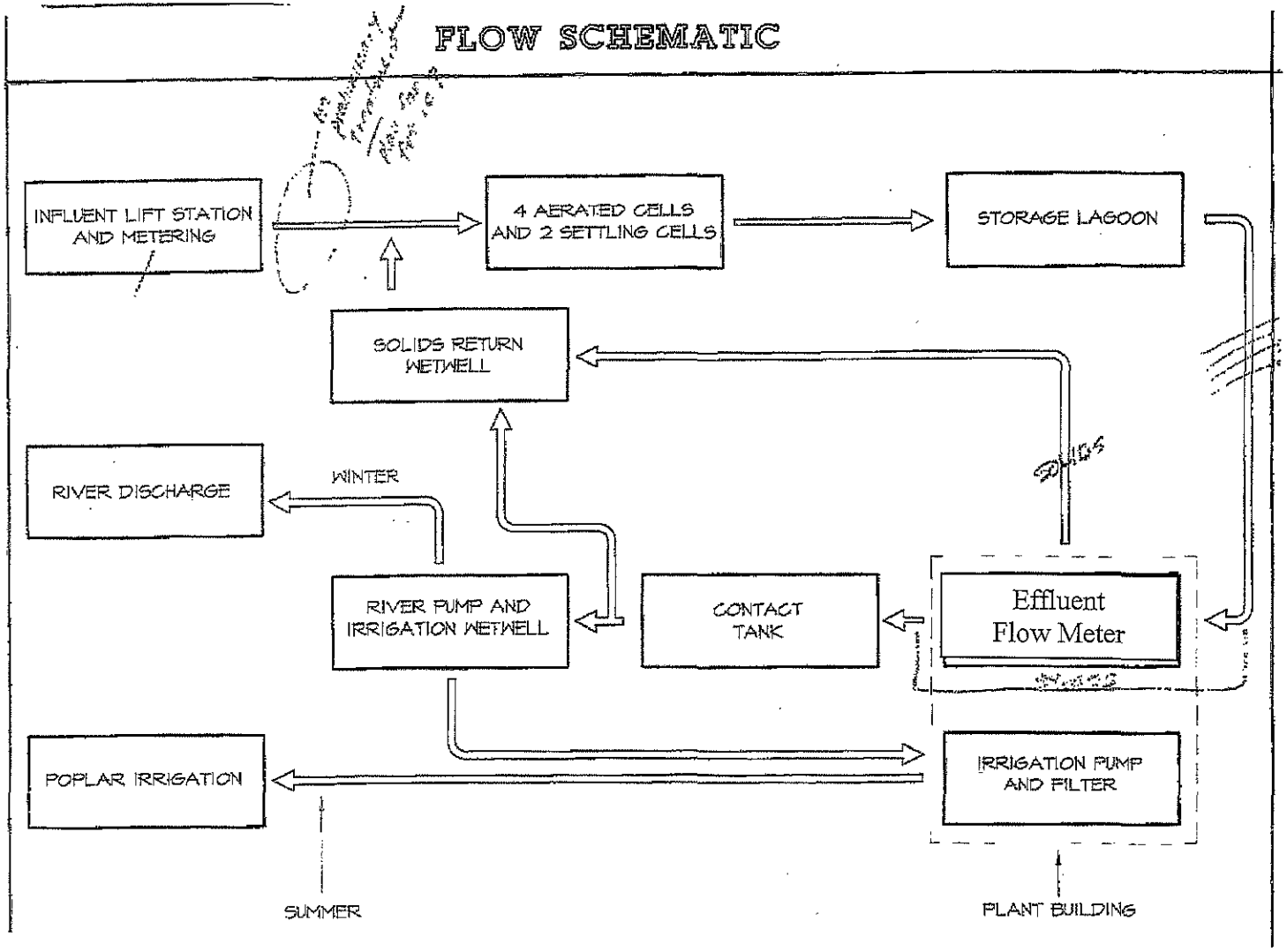
7.3 Modifications to Permit Evaluation Report and Fact Sheet

Depending on the nature of the comments and any changes made to the permit as result of comments, DEQ may modify this permit evaluation report. DEQ may also choose to update the permit evaluation report through memorandum or addendum. If DEQ makes substantive changes to the permit, then an additional round of public comment may occur.

7.4 Issuance

The DEQ mails the finalized, signed permit to the permittee. The permit is effective 20 days from the mailing date.

APPENDIX A: Wastewater Treatment Flow Diagram



APPENDIX B: Reasonable Potential Analysis for pH

	RPA for pH	
INPUT	Lower pH Criteria	Upper pH Criteria
1. DILUTION FACTOR AT MZ BOUNDARY - (Qe+Qr)/Qe	134	134
2. UPSTREAM/BACKGROUND CHARACTERISTICS		
Temperature (deg C):	22.8	22.8
pH:	7.3	7.9
Alkalinity (mg CaCO3/L):	21.0	21.0
3. EFFLUENT CHARACTERISTICS		
Temperature (deg C):	21.3	21.3
pH:	6.0	9.0
Alkalinity (mg CaCO3/L):	191.0	191.0
4. APPLICABLE PH CRITERIA	6.5	8.5
OUTPUT		
1. IONIZATION CONSTANTS		
Upstream/Background pKa:	6.36	6.36
Effluent pKa:	6.37	6.37
2. IONIZATION FRACTIONS		
Upstream/Background Ionization Fraction:	0.90	0.97
Effluent Ionization Fraction:	0.30	1.00
3. TOTAL INORGANIC CARBON		
Upstream/Background Total Inorganic Carbon (mg CaC	23.43	21.61
Effluent Total Inorganic Carbon (mg CaCO3/L):	641.96	191.45
4. CONDITIONS AT MIXING ZONE BOUNDARY		
Temperature (deg C):	22.79	22.79
Alkalinity (mg CaCO3/L):	22.27	22.27
Total Inorganic Carbon (mg CaCO3/L):	28.05	22.88
pKa:	6.36	6.36
pH at Mixing Zone Boundary:	**6.9**	**7.9**
Is there Reasonable Potential?	**No**	**No**

APPENDIX C: TEMPERATURE WORKSHEET

Meets Criteria, Winter, No Spawning
Analysis at Edge of Mixing Zone

Facility Name: Aurora **Date:** 2/3/2016

Enter data into white cells below:

Mixing Zone Dilution =	**134**	
Ambient Temperature =	**12.3**	°C
Effluent Temperature =	**16.5**	°C
Applicable Temperature Criterion =	**18**	°C
Effluent Flow =	**0.087**	mgd

Allowable increase =	5.70	°C

ΔT at MZ edge=	**0.03**	**°C**	**No Reasonable Potential**

Thermal Load Limit =	**N/A**	**Million Kcals**

Equation used to calculate ΔT at edge of MZ

$$\Delta T_{mz} = \frac{T_e + (S-1)T_a}{S} - T_a$$

Equation used to calculate thermal load limit

$$TLL = 3.7854 Q_e S \Delta T_{all} C_p \rho$$

Where:

Qe = Effluent Flow in mgd
S = Dilution
ΔT_{all} = Allowable temperature increase at edge of MZ (°C)
Cp = Specific Heat of Water (1 cal/g °C)
ρ = Density of Water (1 g/cm^3)
3785.41 = Flow conversion from mgd to m^3/day

APPENDIX D: CHLORINE LIMITS CALCULATION WORKSHEET

Facility Name: Aurora STP **Date:** 12/15/2015

Dilution Values? (Y/N)	y	calculated
Rearing Dilution @ ZID (1Q10)	10	*
Rearing Dilution @ MZ (7Q10)	134	*
pawning Dilution @ ZID (1Q10)	*	*
Spawning Dilution @ MZ (7Q10)	*	*
If no dilution values		
Enter flow rates here	Summer	Winter
Effluent Flow (MGD)	*	*
1Q10 (CFS)	*	*
7Q10 (CFS)	*	*
% dilution at MZ	*	*
% dilution at ZID	*	*
probability basis	99%	
(WLA multipliers)		

Rearing data	Effluent	Stream	Mixed ZID 1Q10	Mixed MZ 7Q10		
pH * =	7	7	7.0	7.0		(6.5-9)
Temp * =	22	22	22.0	22.0		° C
Alkalinity =	75	25				
Salmonids Present? (Y/N)	n/a	y				
Salmonid Spawning? (Y/N)	n/a	N				
Fresh Water ? (Y/N)	n/a	y				
Salinity	*	*	*	*		
Spawning data						
pH * =	*	*	*	*		(6.5-9)
Temp * =	*	*	*	*		° C
Alkalinity =	*	*				
Salmonids Present? (Y/N)	n/a	Y				
Salmonid Sapwning (Y/N)	n/a	Y				
Fresh Water ? (Y/N)	n/a	*				
Salinity	*	*	*	*		

	WATER QUALITY CRITERIA			Allocations					#	Acute	4 day	30 day	Min	Concentration Limits		Mass	
	1 Hour	4 Day	30 Day	Back-										95%	99%		
PARAMETER	(CMC)	(CCC)	(CCC)	ground	Acute	4 Day	30 Day		Samples	LTA	LTA	LTA	LTA	Monthly	Daily		
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/L	CV	/Mo	mg/l	mg/l	mg/L	mg/l	mg/l	mg/l		
Rearing Season																	
CHLORINE	0.019	0.011	n/a	0.00	0.19	1.47	n/a	0.7	30	0.05	0.71	n/a	0.05	**0.07**	**0.19**		

NOTES : Temperature must be between 0 and 30 ° C
pH must be between 6.5 and 9
Ammonia is mg/l ammonia as N.

APPENDIX E: ANTIDEGRADATION REVIEW SHEET

Applicant: City of Aurora.

1. What is the name of the surface water that receives the discharge? North Fork of Deep Creek.
Briefly describe the proposed activity: Domestic sewage treatment.
This review is for a: ☐ Renewal ☐ New
Go to Step 2.

2. Are there any existing uses associated with the water body that are not included in the list of designated uses? Example: DEQ's Fish Use Designation Maps identify the waterbody as supporting salmonid migration; however ODFW has determined that it also supports salmonid spawning.
☐ Yes. Identify additional use(s), the basis for conclusion, and the applicable criteria: Go to Step 3.
☐ No. Go to Step 3.

3.Was the analysis of the impact of the proposed activity performed relative to criteria applicable to the most sensitive beneficial use?
☐ Yes. Go to Step 4.
☐ No. Re-do analysis to develop permit limits using correct criteria, and modify permit as necessary. Go to Step 4.

4.Is this surface water an **Outstanding Resource Water** or **upstream** from an **Outstanding Resource Water**? Note: No waters in Oregon have been designated as Outstanding Resource Waters. OAR 340-041-0004(8)(a) contains criteria for designating such waters. Example: they are found in State or National parks.
☐ Yes. Go to Step 7. ☐ No. Go to Step 5.

5.Is this surface water a **High Quality Water**? A High Quality Water is one for which none of the pollutants are Water Quality Limited. To determine, go to the database at http://www.deq.state.or.us/wq/assessment/rpt2010/search.asp and under Listing Status, select "Water Quality Limited – All (Categories 4 and 5)".
☐ Yes. Go to Step 10. ☐ No. Go to Step 6.

6.Is this surface water a **Water Quality Limited Water**? To determine, use the same database query as Step 5.
☐ Yes. Go to Step 16. ☐ No. Go to Step 4 (you must answer "yes" to either question 4, 5, or 6)
Note: The surface water must fall into one of 3 categories: Outstanding Resource Water (Step 4), High Quality Water (Step 5), or Water Quality Limited Water (Step 6).

16.Will the proposed activity result in a lowering water quality in the **Water Quality Limited Water**? [see OAR 340-041-0004(3)-(5) for a description in rule of discharges that do not result in lowering of water quality or do not constitute a new and/or increased discharge or are otherwise exempt from anti-degradation review; otherwise see "Is an Activity Likely to Lower Water Quality?" in *Anti-degradation Policy Implementation Internal Management Directive for NPDES Permits and Section 401 Water Quality Certifications.*]
☐ Yes, go to Step 17.
☐ No, proceed with Permit Application. Permit writer should provide basis for determination in permit evaluation report: Go to Step 23.
23.The basis for conclusion should include a discussion of whether the lowering of water quality is necessary and important. "Necessary" means that the same social and economic benefits cannot be achieved with some

other approach. "Important" means that the value of the social and economic benefits due to lowering water quality is greater than the environmental costs of lowering water quality.
Benefits can be created from measures such as:

- Creating or expanding employment (provide current/expected number of employees, type & relative amount of each type.
- Increasing median family income.
- Increasing community tax base (provide current/expected annual sales, tax info).
- Providing necessary social services.
- Enhancing environmental attributes.

Environmental Costs can include:

- Losing assimilative capacity otherwise used for other industries/development.
- Impacting fishing, recreation, and tourism industries negatively.
- Impacting health protection negatively.
- Impacting societal value for environmental quality negatively.

On the basis of the Anti-degradation Review, DEQ recommends the following:
☐ Proceed with Application to Interagency Coordination and Public Comment Phase.
☐ Deny Application; return to applicant and provide public notice.

Action Approved
Review prepared by ☐ DEQ, go to DEQ info ☐ Other, go to Other info

DEQ info
Name: David Cole
Phone: 503-229-5011
Date Prepared: June 19, 2015
Please provide the following information and submit with the completed application form to:
Department of Environmental Quality
Water Quality Division—Surface Water Management
811 SW Sixth Avenue
Portland, Oregon 97204-1390

Name: Darrel Lockard, Wastewater Treatment Plant Operator
Name of Company: City of Aurora
Address: 21420 Main Street, Aurora, Oregon, 97002
Phone: 503-222-9997
Email: bmcm5@aol.com
Date prepared: September 8, 2015

APPENDIX F: Operator Certification Classification Worksheet

Oregon Department of Environmental Quality

Wastewater System Classification Worksheet for Operator Certification

STEP 1: Criteria for Classifying Wastewater Treatment Systems (OAR 340-049-0025)					
Wastewater System Common Name:	City of Aurora				
Location:	21494 Mill Race Rd			Region:	Western
County:	Marion			Date:	2/17/2015
Facility ID:	110020			Classified by:	David Cole
Design ADWF (Influent MDG):		0.087		WWC Class:	I
Design Population*:		1129		WWT Class:	II
Design BOD (Influent lbs/day):		250		Total Points:	40
Is this a change from a prior classification?		NO			

1. Design Population	1129	or Population Equivalent	250mg/l		
Based on:	Flow (gallons/person/day)	80	BOD (pounds/person/day)		
751 to 2,000				1.0	1.0
2. Average Dry Weather Flow (Design Capacity)					
Greater than 0.075 MGD to 0.1 MGD				1.0	1.0
3. Unit Processes					
Preliminary Treatment and Plant Hydraulics					
Screen(s) (in-situ or mechanical, coarse solids only)				1.0	1.0
Pump/Lift Station(s) (pumping of main flow)				2.0	2.0
Secondary, Advanced, and Tertiary Treatment					
Stabilization Lagoons (2 or more cells with full aeration)				9.0	9.0
Solids Handling (excludes long-term storage in treatment lagoons above)					
Non-Beneficial Sludge Disposal (landfill or burial) send to Salem WWTP				1.0	1.0
Disinfection					
Liquid Chlorine Disinfection				2.0	2.0
Dechlorination System				4.0	4.0
4. Effluent Permit Requirements					
Minimum of Secondary Effluent Limitation for BOD and/or TSS 30/50				2.0	2.0
6. Sampling and Laboratory Testing					
Sample for BOD, (performed by outside lab)				2.0	2.0
Total Suspended Solids analysis (performed at treatment plant)				4.0	4.0
Bacteriological analysis (performed at wastewater treatment plant lab)				2.0	2.0
Nutrient, Heavy Metals, or Organic analysis (performed by outside lab)				*3.0	3.0
** ≤ 1 per month = 1 point*					
STEP 2: Complexity Reflected in OAR 340-049 0020(4)					
Note: This step may justify a higher classification. Points shown are given as guidance.					
SCADA or similar instrumentation providing data/w process op.				2.0 - 4.0	2.0
Class B, C, D and Non-disinfected Recycle (surface & subsurface)				3.0	3.0
Sludge dewatering using bag or tube system (TANK)				1.0	
Standby power				1.0 - 3.0	1.0
				Total	40.0

Appendix D
Financial

CITY OF AURORA, OREGON
ANNUAL FINANCIAL REPORT
Year Ended June 30, 2016

CITY OF AURORA, OREGON
CITY OFFICIALS
JUNE 30, 2016

MAYOR

Bill Graupp	14629 Ehlen Road NE Aurora, Oregon 97002

CITY COUNCIL MEMBERS

Jason Sahlin	21011 Main Street NE Aurora, Oregon 97002
Kris Sallee	21311 Main Street NE Aurora, Oregon 97002
Bob Southard	21187 Highway 99E Aurora, Oregon 97002
Tom Heitmanek	21354 Liberty Street NE Aurora, Oregon 97002

CITY ADMINISTRATION

Kelly Richardson, City Recorder
35296 S. Sawtelle Road
Molalla, Oregon 97038

Mary Lambert, Finance Officer
11280 S Riggs Damm Road
Canby, Oregon 97013

MAILING ADDRESS

21420 Main Street NE
Aurora, Oregon 97002

CITY OF AURORA, OREGON
TABLE OF CONTENTS

GROVE, MUELLER & SWANK, P.C.
CERTIFIED PUBLIC ACCOUNTANTS AND CONSULTANTS
475 Cottage Street NE, Suite 200, Salem, Oregon 97301
(503) 581-7788

INDEPENDENT AUDITOR'S REPORT

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, 2016, 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.

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, 2016, and the respective changes in modified cash basis financial position 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 as a whole 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.

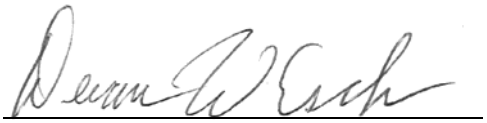
The supplemental information as listed in the table of contents is the responsibility of management and was derived from, and relates directly to, the underlying accounting and other records used to prepare the basic financial statements. The information has been subjected to the auditing procedures 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 such information.

Other Legal and Regulatory Requirements

In accordance with Minimum Standards for Audits of Oregon Municipal Corporations, we have issued our report dated December 1, 2016, 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
December 1, 2016

CITY OF AURORA, OREGON

Management's Discussion and Analysis
June 30, 2016

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, 2016.

Financial Highlights

	June 30, 2016	June 30, 2015	change
Net position	$ 1,794,290	$ 1,547,836	$ 246,454
Change in net position	246,454	248,153	(1,699)
Governmental net position	927,100	850,185	76,915
Proprietary net position	867,190	697,651	169,539
Change in governmental net position	76,915	124,575	(47,660)
Change in proprietary net position	169,539	123,578	45,961

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 administration, city hall, legal, parks, streets and police. 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.

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 of Aurora 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 of Aurora, 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 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 *other 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,

	2016			2015		
	Governmental Activities	Business-type Activities	Total	Governmental Activities	Business-type Activities	Total
Cash and cash equivalents	$ 927,100	$ 867,190	$ 1,794,290	$ 850,185	$ 697,651	$ 1,547,836
Liabilities	-	-	-	-	-	-
Net Position:						
Restricted	339,256	187,367	526,623	288,118	116,842	404,960
Unrestricted	587,844	679,823	1,267,667	562,067	580,809	1,142,876
Total Net Position	$ 927,100	$ 867,190	$ 1,794,290	$ 850,185	$ 697,651	$ 1,547,836

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 $1,794,290 as of June 30, 2016.

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.

Statements of Activities (modified cash basis)

Year ended June 30,

	2016			2015		
	Governmental Activities	Business-type Activities	Total	Governmental Activities	Business-type Activities	Total
Revenues						
Program revenues						
Charges for service	$ 152,245	$ 583,868	$ 736,113	$ 84,654	$ 560,611	$ 645,265
Operating grants	57,323	15,752	73,075	53,596	-	53,596
Capital grants	37,125	68,175	105,300	10,905	22,725	33,630
General revenues						
Taxes and assessments	251,730	322,393	574,123	240,785	297,706	538,491
Franchise taxes	63,799	-	63,799	63,723	-	63,723
Intergovernmental	21,593	-	21,593	23,918	-	23,918
Miscellaneous	78,484	5,955	84,439	30,207	5,902	36,109
Total revenues	662,299	996,143	1,658,442	507,788	886,944	1,394,732
Expenses						
General government	130,568	-	130,568	98,545	-	98,545
Public safety	166,400	-	166,400	156,996	-	156,996
Highways and streets	92,707	-	92,707	53,934	-	53,934
Community development	155,999	-	155,999	81,738	-	81,738
Water	-	256,660	256,660	-	247,033	247,033
Sewer	-	609,654	609,654	-	508,333	508,333
Total expenses	545,674	866,314	1,411,988	391,213	755,366	1,146,579
Transfers	(39,710)	39,710	-	8,000	(8,000)	-
Change in net position	76,915	169,539	246,454	124,575	123,578	248,153
Net position, beginning of year	850,185	697,651	1,547,836	725,610	574,073	1,299,683
Net position, end of year	$ 927,100	$ 867,190	$ 1,794,290	$ 850,185	$ 697,651	$ 1,547,836

Statement of Activities (modified cash basis). During the current fiscal year, the City's total net position increased by $246,454 to $1,794,290 from $1,547,836 at the beginning of the year. The key elements of the change in the City's net position for the year ended June 30, 2016 are as follows:

Governmental activities - The City's net position increased by $76,915 from governmental activities. Revenues and expenses were both more than in the prior year.

Business type activities - The City's net position increased by $169,539 from business type activities. This increase is comparable to the increase in 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.

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, 2016, the City's governmental funds reported combined ending fund balances of $927,100 an increase of $76,915 over the prior year.

Business-type funds. The business-type funds account for the City's water and sewer operations. Operating revenues exceeded operating expenses by $169,539 for the year ended June 30, 2016.

General Fund Budgetary Highlights

The governing body made no changes to the General Fund budget for the fiscal year ended June 30, 2016.

Significant Fund Transactions

As noted earlier, the City uses fund accounting to ensure and demonstrate compliance with finance-related legal requirements. The following information details significant fund transactions during the year.

Major Governmental Funds:

General Fund. The General Funds is the primary operating funds of the City. The fund balance was $453,388 as of June 30, 2016. The fund balance increased $52,654 during the current fiscal year. The increase was due primarily to revenues in excess of expenditures in the amount of $72,654 offset by net transfers out of $20,000. As a measure of the liquidity, it may be useful to compare total fund balances to total fund expenditures. Fund balance represents of 103% total expenditures.

Street/Storm Operating Fund. The Street/Storm Operating Fund accounts for street maintenance and improvements. The fund balance decreased by $28,232 during the year due primarily to transfers out in the amount of $20,000.

City Hall Building Fund – The fund balance increased by $12,826 due to transfers in of $10,000 and no expenditures.

Major Proprietary Funds:

Water Fund – The Water fund revenues are from charges for services and expenses are for personal services, materials and services, capital outlay, and debt service. The fund's net position increased $24,063 during the year due to operating income of $114,274 which was substantially used for capital acquisitions, transfers out, and debt payments.

Sewer Fund – The Sewer fund revenues are from charges for services and expenses are for personal services, materials and services, and capital outlay. The fund's net position decreased by $24,807 during the year due to operating income of $44,233 which was used for transfers out and capital acquisitions.

G. O. Wastewater Bond Fund – This fund is used to make payments on the 2009 Sewer bonds. Revenues are primarily property taxes and expenditures are for debt payments. The fund balance increased by $502 during the current year.

Debt Administration

The City had total debt outstanding of $2,587,425 at the end of the current fiscal year.

During the current fiscal year, the City's total debt decreased by $227,640 (9%).

State statutes limit the amount of general obligation debt a governmental entity may issue to 3 percent of its total assessed valuation. The assessed valuation of the City of Aurora is $139,777,108 for the current year; therefore, the current debt limitation is $4,193,313 for the City of Aurora. The City had $2,325,000 general obligation debt subject to the limitation at June 30, 2016.

City of Aurora
Outstanding Debt

	Business-type Activities	
	2016	2015
General obligation bonds	$2,325,000	$2,540,000
Loans	262,425	275,065
Total	$2,587,425	$2,815,065

Additional information on the City of Aurora'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 of Aurora's Budget Committee considered all the following factors while preparing the City budget for the 2016-17 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

BASIC FINANCIAL STATEMENTS

CITY OF AURORA, OREGON
STATEMENT OF NET POSITION (MODIFIED CASH BASIS)
JUNE 30, 2016

	Governmental Activities	*Business-type Activities*	*Totals*
ASSETS			
Cash and cash equivalents	$ 927,100	$ 867,190	$ 1,794,290
LIABILITIES	-	-	-
NET POSITION			
Restricted for:			
Customer deposits	-	8,910	8,910
Debt service	-	22,292	22,292
Capital outlay	136,635	156,165	292,800
Streets	202,621	-	202,621
Unrestricted	587,844	679,823	1,267,667
Total Net Position	$ 927,100	$ 867,190	$ 1,794,290

The accompanying notes are an integral part of the financial statements.

CITY OF AURORA, OREGON
STATEMENT OF ACTIVITIES (MODIFIED CASH BASIS)
YEAR ENDED JUNE 30, 2016

FUNCTIONS/PROGRAMS	***Expenses***	***Program Revenues***		
		Fees, Fines and Charges for Services	***Operating Grants and Contributions***	***Capital Grants and Contributions***
Governmental activities:				
General government	$ 130,568	$ 8,389	$ -	$ -
Public safety	166,400	19,415	-	-
Highways and streets	92,707	37,034	56,323	26,100
Community development	155,999	87,407	1,000	11,025
Total Governmental activities	545,674	152,245	57,323	37,125
Business-type activities:				
Water	256,660	299,159	-	49,887
Sewer	609,654	284,709	15,752	18,288
Total Business-type activities	866,314	583,868	15,752	68,175
Total Activities	$ 1,411,988	$ 736,113	$ 73,075	$ 105,300
General Revenues:				
Property taxes				
Franchise taxes				
Intergovernmental				
Miscellaneous				
Total General Revenues				
Transfers				
Change in net position				
Net Position - beginning of year				
Net Position - end of year				

Net (Expenses) Revenues and Changes in Net Position		
Governmental Activities	*Business-type Activities*	*Total*
$ (122,179)	$ -	$ (122,179)
(146,985)	-	(146,985)
26,750	-	26,750
(56,567)	-	(56,567)
(298,981)	-	(298,981)
-	92,386	92,386
-	(290,905)	(290,905)
-	(198,519)	(198,519)
(298,981)	(198,519)	(497,500)
251,730	322,393	574,123
63,799	-	63,799
21,593	-	21,593
78,484	5,955	84,439
415,606	328,348	743,954
(39,710)	39,710	-
76,915	169,539	246,454
850,185	697,651	1,547,836
$ 927,100	$ 867,190	$ 1,794,290

The accompanying notes are an integral part of the financial statements.

CITY OF AURORA, OREGON
BALANCE SHEET (MODIFIED CASH BASIS) - GOVERNMENTAL FUNDS
JUNE 30, 2016

		Special Revenue	***Capital Projects***
	General	***Street / Storm Operating***	***City Hall Building***
ASSETS			
Cash and cash equivalents	$ 453,388	$ 153,660	$ 133,306
LIABILITIES AND FUND BALANCE			
Liabilities:	$ -	$ -	$ -
Fund Balance:			
Restricted for:			
Capital outlay	-	-	-
Community development	-	-	-
Streets	-	153,660	-
Committed to:			
Capital outlay	-	-	133,306
Unassigned	453,388	-	-
Total Fund Balance	453,388	153,660	133,306
Total Liabilities and Fund Balance	$ 453,388	$ 153,660	$ 133,306

Other Governmental Funds	*Total*
$ 186,746	$ 927,100
$ -	$ -
125,223	125,223
-	-
48,961	202,621
12,562	145,868
-	453,388
186,746	927,100
$ 186,746	$ 927,100

The accompanying notes are an integral part of the financial statements.

CITY OF AURORA, OREGON
STATEMENT OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCES – (MODIFIED CASH BASIS) – GOVERNMENTAL FUNDS
YEAR ENDED JUNE 30, 2016

`

		Special Revenue	***Capital Projects***
	General	***Street / Storm Operating***	***City Hall Building***
REVENUES			
Taxes and assessments	$ 251,730	$ -	$ -
Fines and forfeitures	19,415	-	-
Licenses and permits	157,553	-	2,041
Charges for services	-	23,338	-
Intergovernmental	22,593	56,323	-
Miscellaneous	60,623	1,062	785
Total Revenues	511,914	80,723	2,826
EXPENDITURES			
General government	118,009	-	-
Public safety	166,400	-	-
Highways and streets	-	72,597	-
Community development	101,880	-	-
Parks	40,414	-	-
Capital outlay	12,557	16,358	-
Total Expenditures	439,260	88,955	-
REVENUES OVER (UNDER) EXPENDITURES	72,654	(8,232)	2,826
OTHER FINANCING SOURCES (USES)			
Transfers in	39,710	-	10,000
Transfers out	(59,710)	(20,000)	-
Total Other Financing Sources (Uses)	(20,000)	(20,000)	10,000
NET CHANGE IN FUND BALANCE	52,654	(28,232)	12,826
FUND BALANCE, beginning of year	400,734	181,892	120,480
FUND BALANCE, end of year	$ 453,388	$ 153,660	$ 133,306

Other Governmental Funds	*Total*
$ -	$ 251,730
-	19,415
41,993	201,587
13,695	37,033
-	78,916
11,148	73,618
66,836	662,299
13,706	131,715
-	166,400
-	72,597
-	101,880
-	40,414
3,753	32,668
17,459	545,674
49,377	116,625
30,000	79,710
(39,710)	(119,420)
(9,710)	(39,710)
39,667	76,915
147,079	850,185
$ 186,746	$ 927,100

The accompanying notes are an integral part of the financial statements.

CITY OF AURORA, OREGON
STATEMENT OF FUND NET POSITION (MODIFIED CASH BASIS) - ENTERPRISE FUNDS
JUNE 30, 2016

	Water	***Sewer***	***G.O. Wastewater Bond Fund***
ASSETS			
Cash and cash equivalents	$ 253,678	$ 231,723	$ 22,292
LIABILITIES	-	-	-
NET POSITION			
Restricted for:			
Customer deposits	8,910	-	-
Debt service	-	-	22,292
Construction	-	-	-
Unrestricted	244,768	231,723	-
Total Net Position	$ 253,678	$ 231,723	$ 22,292

Other Business-type Funds	*Total*
$ 359,497	$ 867,190
-	-
-	8,910
-	22,292
156,165	156,165
203,332	679,823
$ 359,497	$ 867,190

The accompanying notes are an integral part of the financial statements.

CITY OF AURORA, OREGON
STATEMENT OF REVENUES, EXPENSES AND CHANGES IN FUND NET POSITION
(MODIFIED CASH BASIS) - ENTERPRISE FUNDS
YEAR ENDED JUNE 30, 2016

	Water	***Sewer***
OPERATING REVENUES		
Charges for services	$ 299,160	$ 284,709
Miscellaneous	70	-
Total Operating Revenues	299,230	284,709
OPERATING EXPENSES		
Personal services	79,367	66,996
Materials and services	105,589	173,480
Total Operating Expenses	184,956	240,476
OPERATING INCOME	114,274	44,233
NONOPERATING ITEMS		
Taxes and assessments	-	-
Intergovernmental	-	-
Interest revenue	1,493	1,411
Capital acquisitions	(50,812)	(30,451)
Debt payments		
Principal	(12,640)	-
Interest	(8,252)	-
Total Nonoperating Items	(70,211)	(29,040)
NET INCOME BEFORE CONTRIBUTIONS AND TRANSFERS	44,063	15,193
Capital contributions	-	-
Transfers in	-	-
Transfers out	(20,000)	(40,000)
CHANGE IN NET POSITION	24,063	(24,807)
NET POSITION, beginning of year	229,615	256,530
NET POSITION, end of year	$ 253,678	$ 231,723

G.O. Wastewater Bond Fund	*Other Business-type Funds*	*Total*
$ -	$ -	$ 583,869
-	-	70
-	-	583,939
-	-	146,363
-	-	279,069
-	-	425,432
-	-	158,507
322,394	-	322,394
-	15,752	15,752
1,083	1,896	5,883
-	(15,752)	(97,015)
(215,000)	-	(227,640)
(107,975)	-	(116,227)
502	1,896	(96,853)
502	1,896	61,654
-	68,175	68,175
-	99,710	99,710
-	-	(60,000)
502	169,781	169,539
21,790	189,716	697,651
$ 22,292	$ 359,497	$ 867,190

The accompanying notes are an integral part of the financial statements.

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 funds are reported as separate columns in the fund financial statements.

***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, franchise taxes and State shared revenues. Primary expenditures are for administration, police protection, parks, community development 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 renovation of the City Hall building.

The following governmental funds are considered non-major:

Park SDC Fund

This fund was established to account for revenues from park system development charges and to provide for future parks capital improvement projects.

Park Reserve Fund

This fund accounts for monies set aside by the City Council and designated for park projects.

Street/Storm SDC Fund

This fund was established to account for revenues from street/storm system development charges and to provide for future capital improvements to the street and storm system.

Street/Storm Reserve Fund

This fund was established to account for revenues set aside to provide for future street/storm capital improvement projects.

***SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES** (Continued)*

Basis of Presentation (continued)

SPWF Project Maintenance Fund

This fund was established to account for monies to be used for future payments of the local improvement district loan. The fund was closed in the current year and the residual cash transferred to the General Fund.

Aurora Colony Days

This fund accounts for revenues and expenditures related to the annual Colony Days events.

Proprietary funds are used to account for the acquisition, operation, maintenance and debt service of the sewer and water systems. These funds are entirely or predominantly self-supported through user charges to customers.

The City reports the following proprietary funds as major funds:

Water Fund

Financial activities of the City's water utility are recorded in this fund. Revenues consist primarily of user charges. Expenditures are primarily for operation of the utility and for acquisition of property, plant and equipment.

Sewer Fund

Financial activities of the City's sewer utility are recorded in this fund. Revenues consist primarily of user charges. Expenses are primarily for operation of the utility and for acquisition of property, plant and equipment.

General Obligation Wastewater Bond Fund

This fund was established to account for revenues set aside for debt service on the general obligation bond and loan repayments. Taxes and interfund transfers are the primary revenues. Payments are for debt service.

The following proprietary funds are considered non-major:

Water SDC Fund

This fund was established to account for revenues from water system development charges and to provide for future capital improvements to the water system.

Water Reserve Fund

This fund is used to accumulate resources for major repairs and improvements to the water system through transfers from other funds.

***SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES** (Continued)*

Basis of Presentation (continued)

Sewer SDC Fund

This fund was established to account for revenues from sewer system development charges and to provide for future capital improvements to the sewer system.

Sewer Reserve Fund

This fund accumulates resources for major repairs and improvements to the sewer system through transfers from other funds.

Fund Balance

In governmental funds, the City's policy is to first apply the expenditure toward restricted fund balance and then to other less-restrictive classifications - committed and then assigned fund balances before using unassigned fund balances.

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.

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.

***SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES** (Continued)*

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.

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:

***SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES** (Continued)*

Measurement Focus and Basis of Accounting (Continued)

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, capital assets such as property and equipment, and 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.

Enterprise funds distinguish between operating revenues and expenses and non-operating items. 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 items.

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.

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.

***SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES** (Continued)*

Cash and Cash Equivalents (Continued)

For the purpose of financial reporting, cash and cash equivalents includes all demand and savings accounts and certificates of deposit or short-term investments with an original maturity of three months or less.

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 enterprise funds statements of Fund Net Position.

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.

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, 2016:

	Carrying Value	*Fair Value*
Cash		
Cash on hand	$ 400	$ 400
Deposits with financial institutions	43,019	43,019
Local Government Investment Pool	1,750,871	1,750,871
	$ 1,794,290	$ 1,794,290

Deposits

The City's deposits with various financial institutions had a book value of $43,019 a bank value of $114,961 as of June 30, 2016. 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. 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, 2016 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, 2016, 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.

***CASH AND CASH EQUIVALENTS** (Continued)*

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 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.

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:

	Original Issue	***Outstanding July 1, 2015***	***Issued***	***Matured/ Redeemed During Year***	***Outstanding June 30, 2016***	***Due Within One Year***
Business-type activities						
General Obligation Bonds issued May 2009, semi-annual payments through 2024 with interest from 2.5% to 4.5%	$ 3,530,000	$ 2,540,000	$ -	$ (215,000)	$ 2,325,000	$ 235,000
Safe Drinking Water Revolving Loan Fund Award Contract Loan issued through OECDD issued 2011 with interest and principal payments of $20,892 through 2031 with interest at 3.0%	310,818	275,065	-	(12,640)	262,425	13,019
	$ 3,840,818	$ 2,815,065	$ -	$ (227,640)	$ 2,587,425	$ 248,019

Debt payments on the general obligation bonds are made from the G.O. Wastewater Bond Fund.

***LONG-TERM DEBT** (Continued)*

Future debt service requirements are as follows:

Fiscal Year Ending June 30,	***Principal***	***Interest***	***Total***
2017	$ 248,019	$ 107,248	$ 355,267
2018	263,410	97,457	360,867
2019	283,812	87,055	370,867
2020	309,226	75,841	385,067
2021	324,653	63,614	388,267
2022-2026	1,045,130	108,479	1,153,609
2027-2031	92,892	11,567	104,459
2032	20,283	607	20,890
	$ 2,587,425	$ 551,868	$ 3,139,293

PENSION PLAN

The Oregon Public Employees Retirement System (OPERS) is a cost-sharing multiple employer defined benefit plan. Qualified employees of the City are provided with pensions through OPERS. Employees hired before August 29, 2003 belong to the Tier One/Tier Two Retirement Benefit Program (established pursuant to ORS Chapter 238), while employees hired on or after August 29, 2003 belong to the OPSRP Pension Program (established pursuant to ORS Chapter 238A). OPERS issues a publicly available financial report that can be obtained at

http://www.oregon.gov/pers/pages/section/financial_reports/financials.aspx.

Benefits provided under ORS Chapter 238 – Tier One/ Tier Two

Pension Benefits: The PERS retirement allowance is payable monthly for life. It may be selected from 13 retirement benefit options. These options include survivorship benefits and lump-sum refunds. The basic benefit is based on years of service and final average salary. A percentage (2.0 percent for police and fire employees, 1.67 percent for general service employees) is multiplied by the number of years of service and the final average salary. Benefits may also be calculated under a formula plus annuity (for members who were contributing before August 21, 1981) or a money match computation if a greater benefit results.

A member is considered vested and will be eligible at minimum retirement age for a service retirement allowance if he or she has had a contribution in each of five calendar years or has reached at least 50 years of age before ceasing employment with a participating employer (age 45 for police and fire members). General service employees may retire after reaching age 55. Police and fire members are eligible after reaching age 50. Tier One general service employee benefits are reduced if retirement occurs prior to age 58 with fewer than 30 years of service. Police and fire member benefits are reduced if retirement occurs prior to age 55 with fewer than 25 years of service. Tier Two members are eligible for full benefits at age 60. The ORS Chapter 238 Defined Benefit Pension Plan is closed to new members hired on or after August 29, 2003.

***PENSION PLAN** (Continued)*

Death Benefits: Upon the death of a non-retired member, the beneficiary receives a lump-sum refund of the member's account balance (accumulated contributions and interest). In addition, the beneficiary will receive a lump-sum payment from employer funds equal to the account balance, provided one or more of the following conditions are met: the member was employed by a PERS employer at the time of death; the member died within 120 days after termination of PERS-covered employment; the member died as a result of injury sustained while employed in a PERS-covered job, or; the member was on an official leave of absence from a PERS-covered job at the time of death.

Disability Benefits: A member with 10 or more years of creditable service who becomes disabled from other than duty connected causes may receive a non-duty disability benefit. A disability resulting from a job-incurred injury or illness qualifies a member (including PERS judge members) for disability benefits regardless of the length of PERS-covered service. Upon qualifying for either a non-duty or duty disability, service time is computed to age 58 when determining the monthly benefit.

Benefit Changes After Retirement: Members may choose to continue participation in a variable equities investment account after retiring and may experience annual benefit fluctuations due to changes in the market value of equity investments. Under ORS 238.360 monthly benefits are adjusted annually through cost-of-living changes. Under current law, the cap on the COLA in fiscal year 2015 and beyond will vary based on 1.25 percent on the first $60,000 of annual benefit and 0.15 percent on annual benefits above $60,000.

Benefits provided under Chapter 238A - OPSRP Pension Program (OPSRP DB)
This portion of OPSRP provides a life pension funded by employer contributions. Benefits are calculated with the following formula for members who attain normal retirement age: General service: 1.5 percent is multiplied by the number of years of service and the final average salary. Normal retirement age for general service members is age 65, or age 58 with 30 years of retirement credit.

Police and Fire: 1.8 percent is multiplied by the number of years of service and the final average salary. Normal retirement age for police and fire members is age 60 or age 53 with 25 years of retirement credit. To be classified as a police and fire member, the individual must have been employed continuously as a police and fire member for at least five years immediately preceding retirement.

General Service: 1.5 percent is multiplied by the number of years of service and the final average salary. Normal retirement age for general service members is age 65, or age 58 with 30 years of retirement credit.

A member of the OPSRP Pension Program becomes vested on the earliest of the following dates: the date the member completes 600 hours of service in each of five calendar years, the date the member reaches normal retirement age, and, if the pension program is terminated, the date on which termination becomes effective.

Death Benefits: Upon the death of a non-retired member, the spouse or other person who is constitutionally required to be treated in the same manner as the spouse receives for life 50 percent of the pension that would otherwise have been paid to the deceased member.

Disability Benefits: A member who has accrued 10 or more years of retirement credits before the member becomes disabled or a member who becomes disabled due to job-related injury shall receive a disability benefit of 45 percent of the member's salary determined as of the last full month of employment before the disability occurred.

Benefit Changes After Retirement: Under ORS 238A.210 monthly benefits are adjusted annually through cost-of-living changes. Under current law, the cap on the COLA in fiscal year 2016 and beyond will vary based on 1.25 percent on the first $60,000 of annual benefit and 0.15 percent on annual benefits above $60,000.

***PENSION PLAN** (Continued)*

Contributions

PERS funding policy provides for monthly employer contributions at actuarially determined rates. These contributions, expressed as a percentage of covered payroll, are intended to accumulate sufficient assets to pay benefits when due. This funding policy applies to the PERS Defined Benefit Plan and the Other Postemployment Benefit Plans.

Employer contribution rates during the period were based on the December 31, 2013 actuarial valuation. The City's contribution rates in effect for the fiscal year ended June 30, 2016 were 0.53 percent for Tier One/Two members, 0.45 percent for OPSRP general service members, and 0.45 percent for OPSRP uniformed members. The City's contributions for the year ended June 30, 2016 were $854, excluding amounts to fund employer specific liabilities.

Members of PERS are required to contribute 6% of their salary covered under the plan, which is invested in the OPSRP Individual Account Program. The total contributed by the City on behalf of employees for the year ended December 31, 2015 was $854.

Actuarial Methods and Assumptions:

The employer contribution rates effective July 1, 2015, through June 30, 2017, were set by OPERS using the projected unit credit actuarial cost method. For the Tier One/Tier Two component of the PERS Defined Benefit Plan, this method produced an employer contribution rate consisting of (1) an amount for normal cost (the estimated amount necessary to finance benefits earned by the employees during the current service year), (2) an amount for the amortization of unfunded actuarial accrued liabilities, which are being amortized over a fixed period with new unfunded actuarial accrued liabilities being amortized over 20 years. For the OPSRP Pension Program component of the PERS Defined Benefit Plan, this method produced an employer contribution rate consisting of (a) an amount for normal cost (the estimated amount necessary to finance benefits earned by the employees during the current service year), (b) an amount for the amortization of unfunded actuarial accrued liabilities, which are being amortized over a fixed period with new unfunded actuarial accrued liabilities being amortized over 16 years.

Valuation Date	December 31, 2013 rolled forward to June 30, 2015
Experience Study Report	2014, published September 2015
Actuarial cost method	Entry Age Normal
Amortization method	Amortized as a level percentage of payroll as layered amortization bases over a closed period; Tier One/Tier Two UAL is amortized over 20 years and OPSRP pension UAL is amortized over 16 years.
Asset valuation method	Market value of assets
Actuarial assumptions:	
Inflation rate	2.75 percent
Investment rate of return	7.75 percent
Projected salary increases	3.75 percent overall payroll growth
Cost of living adjustments (COLA)	Blend of 2.00% COLA and graded COLA (1.25%/0.15%) in accordance with *Moro* decision; blend based on service

***PENSION PLAN** (Continued)*

Actuarial Methods and Assumptions: (Continued)

Mortality	Healthy retirees and beneficiaries: RP-2000 Sex-distinct, generational per Scale AA, with collar adjustments and set-backs as described in the valuation. Active members: Mortality rates are a percentage of healthy retiree rates that vary by group, as described in the valuation. Disabled retirees: Mortality rates are a percentage (65% for males, 90% for females) of the RP-2000 static combined disabled mortality sex-distinct table.

Actuarial valuations of an ongoing plan involve estimates of the value of projected benefits and assumptions about the probability of events far into the future. Actuarially determined amounts are subject to continual revision as actual results are compared to past expectations and new estimates are made about the future. Experience studies are performed as of December 31 of even numbered years. The methods and assumptions shown above are based on the 2014 Experience Study which reviewed experience for the four-year period ending on December 31, 2014.

Discount Rate

The discount rate used to measure the total pension liability was 7.75 percent for the Defined Benefit Pension Plan. 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 for the Defined Benefit Pension Plan was applied to all periods of projected benefit payments to determine the total pension liability.

Long-Term Expected Rate of Return

To develop an analytical basis for the selection of the long-term expected rate of return assumption, in July 2015 the PERS Board reviewed long-term assumptions developed by both Milliman's capital market assumptions team and the Oregon Investment Council's (OIC) investment advisors. The table below shows Milliman's assumptions for each of the asset classes in which the plan was invested at that time based on the OIC long-term target asset allocation. The OIC's description of each asset class was used to map the target allocation to the asset classes shown below. Each asset class assumption is based on a consistent set of underlying assumptions, and includes adjustment for the inflation assumption. These assumptions are not based on historical returns, but instead are based on a forward-looking capital market economic model.

***PENSION PLAN** (Continued)*

Long-Term Expected Rate of Return (Continued)

Asset Class	Target	Compound Annual Return (Geometric)
Core Fixed Income	8.00 %	4.10 %
Short-Term Bonds	8.00	3.65
Bank/Leveraged Loans	3.00	5.69
High Yield Bonds	1.00	6.67
Large/Mid Cap US Equities	15.75	7.96
Small Cap US Equities	1.31	8.93
Micro Cap US Equities	1.31	9.37
Developed Foreign Equities	13.13	8.34
Emerging Market Equities	4.13	10.56
Non-US Small Cap Equities	1.88	9.01
Private Equity	17.50	11.60
Real Estate (Property)	10.00	6.48
Real Estate (REITS)	2.50	8.74
Hedge Fund of Funds - Diversified	2.50	4.94
Hedge Fund - Event-driven	0.63	7.07
Timber	1.88	6.60
Farmland	1.88	7.11
Infrastructure	3.75	8.31
Commodities	1.88	6.07
Assumed Inflation - Mean		2.50

Sensitivity of the City's proportionate share of the net pension liability to changes in the discount rate
The following presents the City's proportionate share of the net pension liability calculated using the discount rate of 7.75, as well as what City's proportionate share of the net pension liability (asset) would be if it were calculated using a discount rate that is 1-percentage-point lower (6.75%) or 1-percentage-point higher (8.75%) than the current rate:

	1% Decrease (6.75%)	Discount Rate (7.75%)	1% Increase (8.75%)
Proportionate share of the net pension liability	$ -	$ -	$ -

TRANSFERS

Fund	*Transfers In*	*Transfers Out*
General	$ 39,710	$ 59,710
Street/Storm Operating	-	20,000
City Hall Building	10,000	-
SPWF Maintenance	-	39,710
Street Reserve	20,000	-
Aurora Colony Days	10,000	-
Water	-	20,000
Sewer	-	40,000
Sewer Reserve	40,000	-
Water Reserve	59,710	-
	$ 179,420	$ 179,420

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.

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.

SUBSEQUENT EVENTS

Management has evaluated subsequent events through December 1, 2016, 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.

SUPPLEMENTAL INFORMATION

CITY OF AURORA, OREGON
COMBINING BALANCE SHEET (MODIFIED CASH BASIS) - NONMAJOR GOVERNMENTAL FUNDS
JUNE 30, 2016

	Capital Projects		
	Park SDC	***Park Reserve***	***Street / Storm SDC***
ASSETS			
Cash and cash equivalents	$ 42,777	$ 1,150	$ 48,961
LIABILITIES AND FUND BALANCE			
Liabilities:	$ -	$ -	$ -
Fund Balance:			
Restricted for:			
Capital acquisitions	42,777	-	-
Streets	-	-	48,961
Committed to:			
Capital acquisitions	-	1,150	-
Total Fund Balance	42,777	1,150	48,961
Total Liabilities and Fund Balance	$ 42,777	$ 1,150	$ 48,961

Capital Projects			
Street / Storm Reserve	*SPWF Project Maintenance*	*Aurora Colony Days*	*Total*
$ 82,446	$ -	$ 11,412	$ 186,746
$ -	$ -	$ -	$ -
82,446	-	-	125,223
-	-	-	48,961
-	-	11,412	12,562
82,446	-	11,412	186,746
$ 82,446	$ -	$ 11,412	$ 186,746

CITY OF AURORA, OREGON
COMBINING STATEMENT OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(MODIFIED CASH BASIS) - NONMAJOR GOVERNMENTAL FUNDS
YEAR ENDED JUNE 30, 2016

	Capital Projects		
	Park SDC	***Park Reserve***	***Street / Storm SDC***
REVENUES			
Licenses and permits	$ 11,025	$ -	$ 26,100
Charges for services	-	-	-
Miscellaneous	229	7	228
Total Revenues	11,254	7	26,328
EXPENDITURES			
General government	-	-	-
Capital acquisitions	-	-	-
Total Expenditures	-	-	-
REVENUES OVER (UNDER) EXPENDITURES	11,254	7	26,328
OTHER FINANCING SOURCES (USES)			
Transfers in	-	-	-
Transfers out	-	-	-
Total Other Financing Sources and Uses	-	-	-
NET CHANGE IN FUND BALANCE	11,254	7	26,328
FUND BALANCE, beginning of year	31,523	1,143	22,633
FUND BALANCE, end of year	$ 42,777	$ 1,150	$ 48,961

Capital Projects			
Street / Storm Reserve	*SPWF Project Maintenance*	*Aurora Colony Days*	*Total*
$ -	$ -	$ 4,868	$ 41,993
13,695	-	-	13,695
434	-	10,250	11,148
14,129	-	15,118	66,836
-	-	13,706	13,706
3,753	-	-	3,753
3,753	-	13,706	17,459
10,376	-	1,412	49,377
20,000	-	10,000	30,000
-	(39,710)	-	(39,710)
20,000	(39,710)	10,000	(9,710)
30,376	(39,710)	11,412	39,667
52,070	39,710	-	147,079
$ 82,446	$ -	$ 11,412	$ 186,746

CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(MODIFIED CASH BASIS) - BUDGET AND ACTUAL - GENERAL FUND
YEAR ENDED JUNE 30, 2016

	Budget Amounts			
	Original	***Final***	***Actual***	***Variance***
REVENUES				
Taxes and assessments	$ 240,932	$ 240,932	$ 251,730	$ 10,798
Fines and forfeitures	15,000	15,000	19,415	4,415
Licenses and permits	98,500	98,500	157,553	59,053
Intergovernmental	37,000	37,000	22,593	(14,407)
Miscellaneous	42,300	42,300	60,623	18,323
Total Revenues	433,732	433,732	511,914	78,182
EXPENDITURES				
Personal services	89,267	89,267	80,514	8,753
Materials and services	346,605	346,605	340,144	6,461
Capital outlay	18,870	18,870	18,602	268
Contingency	324,590	324,590	-	324,590
Total Expenditures	779,332	779,332	439,260	340,072
REVENUES OVER (UNDER) EXPENDITURES	(345,600)	(345,600)	72,654	418,254
OTHER FINANCING SOURCES (USES)				
Transfers in	39,710	39,710	39,710	-
Transfers out	(59,710)	(59,710)	(59,710)	-
Total Other Financing Sources and Uses	(20,000)	(20,000)	(20,000)	-
NET CHANGE IN FUND BALANCE	(365,600)	(365,600)	52,654	418,254
FUND BALANCE, beginning of year	365,600	365,600	400,734	35,134
FUND BALANCE, end of year	$ -	$ -	$ 453,388	$ 453,388

CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(MODIFIED CASH BASIS) - BUDGET AND ACTUAL - STREET/STORM OPERATING FUND
YEAR ENDED JUNE 30, 2016

	Budget Amounts			
	Original	***Final***	***Actual***	***Variance***
REVENUES				
Charges for services	$ 22,800	$ 22,800	$ 23,338	$ 538
Intergovernmental	105,000	105,000	56,323	(48,677)
Miscellaneous	1,600	1,600	1,062	(538)
Total Revenues	129,400	129,400	80,723	(48,677)
EXPENDITURES				
Personal services	24,444	24,444	21,191	3,253
Materials and services	70,000	70,000	51,406	18,594
Capital outlay	92,500	92,500	16,358	76,142
Contingency	102,456	102,456	-	102,456
Total Expenditures	289,400	289,400	88,955	200,445
REVENUES OVER (UNDER) EXPENDITURES	(160,000)	(160,000)	(8,232)	151,768
OTHER FINANCING SOURCES (USES)				
Transfers out	(20,000)	(20,000)	(20,000)	-
NET CHANGE IN FUND BALANCE	(180,000)	(180,000)	(28,232)	151,768
FUND BALANCE, beginning of year	180,000	180,000	181,892	1,892
FUND BALANCE, end of year	$ -	$ -	$ 153,660	$ 153,660

CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE (MODIFIED CASH BASIS) - BUDGET AND ACTUAL – CITY HALL BUILDING FUND YEAR ENDED JUNE 30, 2016

	Budget Amounts			
	Original	Final	Actual	Variance
REVENUES				
Licenses and permits	$ 1,700	$ 1,700	$ 2,041	$ 341
Miscellaneous	600	600	785	185
Total Revenues	2,300	2,300	2,826	526
EXPENDITURES				
Capital outlay	132,500	132,500	-	132,500
REVENUES OVER (UNDER) EXPENDITURES	(130,200)	(130,200)	2,826	133,026
OTHER FINANCING SOURCES (USES)				
Transfers in	10,000	10,000	10,000	-
NET CHANGE IN FUND BALANCE	(120,200)	(120,200)	12,826	133,026
FUND BALANCE, beginning of year	120,200	120,200	120,480	280
FUND BALANCE, end of year	$ -	$ -	$ 133,306	$ 133,306

CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(MODIFIED CASH BASIS) - BUDGET AND ACTUAL – PARK SDC FUND
YEAR ENDED JUNE 30, 2016

	Budget Amounts			
	Original	***Final***	***Actual***	***Variance***
REVENUES				
Licenses and permits	$ 2,205	$ 2,205	$ 11,025	$ 8,820
Miscellaneous	130	130	229	99
Total Revenues	2,335	2,335	11,254	8,919
EXPENDITURES				
Capital outlay	36,055	36,055	-	36,055
NET CHANGE IN FUND BALANCE	(33,720)	(33,720)	11,254	44,974
FUND BALANCE, beginning of year	33,720	33,720	31,523	(2,197)
FUND BALANCE, end of year	$ -	$ -	$ 42,777	$ 42,777

CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(MODIFIED CASH BASIS) - BUDGET AND ACTUAL – PARK RESERVE FUND
YEAR ENDED JUNE 30, 2016

	Budget Amounts			
	Original	***Final***	***Actual***	***Variance***
REVENUES				
Intergovernmental	$ 6,000	$ -	$ -	$ -
Miscellaneous	6	6,006	7	(5,999)
Total Revenues	6,006	6,006	7	(5,999)
EXPENDITURES				
Capital outlay	7,148	7,148	-	7,148
NET CHANGE IN FUND BALANCE	(1,142)	(1,142)	7	1,149
FUND BALANCE, beginning of year	1,142	1,142	1,143	1
FUND BALANCE, end of year	$ -	$ -	$ 1,150	$ 1,150

CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE (MODIFIED CASH BASIS) - BUDGET AND ACTUAL – STREET/STORM SDC FUND YEAR ENDED JUNE 30, 2016

	Budget Amounts			
	Original	Final	Actual	Variance
REVENUES				
Licenses and permits	$ 11,200	$ 11,200	$ 26,100	$ 14,900
Miscellaneous	80	80	228	148
Total Revenues	11,280	11,280	26,328	15,048
EXPENDITURES				
Capital outlay	31,000	31,000	-	31,000
NET CHANGE IN FUND BALANCE	(19,720)	(19,720)	26,328	46,048
FUND BALANCE, beginning of year	19,720	19,720	22,633	2,913
FUND BALANCE, end of year	$ -	$ -	$ 48,961	$ 48,961

CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE (MODIFIED CASH BASIS) - BUDGET AND ACTUAL – STREET/STORM RESERVE FUND YEAR ENDED JUNE 30, 2016

	Budget Amounts			
	Original	***Final***	***Actual***	***Variance***
REVENUES				
Charges for services	$ 13,500	$ 13,500	$ 13,695	$ 195
Miscellaneous	200	200	434	234
Total Revenues	13,700	13,700	14,129	429
EXPENDITURES				
Capital outlay	85,700	85,700	3,753	81,947
REVENUES OVER (UNDER) EXPENDITURES	(72,000)	(72,000)	10,376	82,376
OTHER FINANCING SOURCES (USES)				
Transfers in	20,000	20,000	20,000	-
NET CHANGE IN FUND BALANCE	(52,000)	(52,000)	30,376	82,376
FUND BALANCE, beginning of year	52,000	52,000	52,070	70
FUND BALANCE, end of year	$ -	$ -	$ 82,446	$ 82,446

CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(MODIFIED CASH BASIS) - BUDGET AND ACTUAL – SPWF PROJECT MAINTENANCE FUND
YEAR ENDED JUNE 30, 2016

	Budget Amounts			
	Original	*Final*	*Actual*	*Variance*
REVENUES	$ -	$ -	$ -	$ -
EXPENDITURES	-	-	-	-
REVENUES OVER (UNDER) EXPENDITURES	-	-	-	-
OTHER FINANCING SOURCES (USES)				
Transfers out	(39,710)	(39,710)	(39,710)	-
NET CHANGE IN FUND BALANCE	(39,710)	(39,710)	(39,710)	-
FUND BALANCE, beginning of year	39,710	39,710	39,710	-
FUND BALANCE, end of year	$ -	$ -	$ -	$ -

CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE (MODIFIED CASH BASIS) - BUDGET AND ACTUAL – AURORA COLONY DAYS FUND YEAR ENDED JUNE 30, 2016

	Budget Amounts			
	Original	***Final***	***Actual***	***Variance***
REVENUES				
Licenses and permits	$ 6,500	$ 6,500	$ 4,868	$ (1,632)
Miscellaneous	7,040	7,040	10,250	3,210
Total Revenues	13,540	13,540	15,118	1,578
EXPENDITURES				
Personal services	2,568	2,568	2,339	229
Materials and services	15,900	15,900	11,367	4,533
Contingency	5,072	5,072	-	5,072
Total Expenditures	23,540	23,540	13,706	9,834
REVENUES OVER (UNDER) EXPENDITURES	(10,000)	(10,000)	1,412	11,412
OTHER FINANCING SOURCES (USES)				
Transfers in	10,000	10,000	10,000	-
NET CHANGE IN FUND BALANCE	-	-	11,412	11,412
FUND BALANCE, beginning of year	-	-	-	-
FUND BALANCE, end of year	$ -	$ -	$ 11,412	$ 11,412

CITY OF AURORA, OREGON
COMBINING STATEMENT OF FUND NET POSITION (MODIFIED CASH BASIS) – NONMAJOR ENTERPRISE FUNDS
JUNE 30, 2016

	Water SDC	***Water Reserve***	***Sewer SDC***
ASSETS			
Cash and cash equivalents	$ 112,799	$ 107,049	$ 43,366
LIABILITIES	-	-	-
NET POSITION			
Restricted for:			
Construction	112,799	-	43,366
Unrestricted	-	107,049	-
Total Net Position	$ 112,799	$ 107,049	$ 43,366

Sewer Reserve	*Total*
$ 96,283	$ 359,497
-	-
-	156,165
96,283	203,332
$ 96,283	$ 359,497

CITY OF AURORA, OREGON
COMBINING STATEMENT OF REVENUES, EXPENSES AND CHANGES IN FUND NET POSITION
(MODIFIED CASH BASIS) - NONMAJOR ENTERPRISE FUNDS
YEAR ENDED JUNE 30, 2016

	Water SDC	***Water Reserve***	***Sewer SDC***
OPERATING REVENUES	$ -	$ -	$ -
OPERATING EXPENSES	-	-	-
OPERATING INCOME	-	-	-
NONOPERATING ITEMS			
Intergovernmental	-	-	-
Interest revenue	553	629	215
Capital acquisitions	-	-	-
Total Nonoperating Revenues (Expenses)	553	629	215
NET INCOME BEFORE CONTRIBUTIONS AND TRANSFERS	553	629	215
Capital contributions	49,887	-	18,288
Transfers in	-	59,710	-
CHANGE IN NET POSITION	50,440	60,339	18,503
NET POSITION, beginning of year	62,359	46,710	24,863
NET POSITION, end of year	$ 112,799	$ 107,049	$ 43,366

Sewer Reserve	*Total*
$ -	$ -
-	-
-	-
15,752	15,752
499	1,896
(15,752)	(15,752)
499	1,896
499	1,896
-	68,175
40,000	99,710
40,499	169,781
55,784	189,716
$ 96,283	$ 359,497

CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(MODIFIED CASH BASIS) - BUDGET AND ACTUAL - WATER FUND
YEAR ENDED JUNE 30, 2016

	Budget Amounts			
	Original	***Final***	***Actual***	***Variance***
REVENUES				
Charges for services	$ 285,650	$ 285,650	$ 299,160	$ 13,510
Miscellaneous	2,100	2,100	70	(2,030)
Interest earnings	950	950	1,493	543
Total Revenues	288,700	288,700	300,723	12,023
EXPENDITURES				
Personal services	90,812	90,812	79,367	11,445
Materials and services	146,494	146,494	105,589	40,905
Debt service				
Principal	12,640	12,640	12,640	-
Interest	8,252	8,252	8,252	-
Capital outlay	72,870	72,870	50,812	22,058
Contingency	159,132	159,132	-	159,132
Total Expenditures	490,200	490,200	256,660	233,540
REVENUES OVER (UNDER) EXPENDITURES	(201,500)	(201,500)	44,063	245,563
OTHER FINANCING SOURCES (USES)				
Transfers out	(20,000)	(20,000)	(20,000)	-
CHANGE IN FUND BALANCE	(221,500)	(221,500)	24,063	245,563
FUND BALANCE, beginning of year	221,500	221,500	229,615	8,115
FUND BALANCE, end of year	$ -	$ -	$ 253,678	$ 253,678

CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(MODIFIED CASH BASIS) - BUDGET AND ACTUAL - SEWER FUND
YEAR ENDED JUNE 30, 2016

	Budget Amounts			
	Original	***Final***	***Actual***	***Variance***
REVENUES				
Charges for services	$ 275,400	$ 275,400	$ 284,709	$ 9,309
Miscellaneous	2,000	2,000	-	(2,000)
Interest earnings	900	900	1,411	511
Total Revenues	278,300	278,300	286,120	7,820
EXPENDITURES				
Personal services	82,093	82,093	66,996	15,097
Materials and services	165,830	178,700	173,480	5,220
Capital outlay	47,870	35,000	30,451	4,549
Contingency	199,507	199,507	-	199,507
Total Expenditures	495,300	495,300	270,927	224,373
REVENUES OVER (UNDER) EXPENDITURES	(217,000)	(217,000)	15,193	232,193
OTHER FINANCING SOURCES (USES)				
Transfers out	(40,000)	(40,000)	(40,000)	-
CHANGE IN FUND BALANCE	(257,000)	(257,000)	(24,807)	232,193
FUND BALANCE, beginning of year	257,000	257,000	256,530	(470)
FUND BALANCE, end of year	$ -	$ -	$ 231,723	$ 231,723

CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(MODIFIED CASH BASIS) - BUDGET AND ACTUAL – GENERAL OBLIGATION WASTEWATER BOND FUND
YEAR ENDED JUNE 30, 2016

	Budget Amounts			
	Original	Final	Actual	Variance
REVENUES				
Taxes and assessments	$ 313,175	$ 313,175	$ 322,394	$ 9,219
Interest earnings	800	800	1,083	283
Total Revenues	313,975	313,975	323,477	9,502
EXPENDITURES				
Debt service				
Principal	215,000	215,000	215,000	-
Interest	107,975	107,975	107,975	-
Total Expenditures	322,975	322,975	322,975	-
CHANGE IN FUND BALANCE	(9,000)	(9,000)	502	9,502
FUND BALANCE, beginning of year	19,000	19,000	21,790	2,790
FUND BALANCE, end of year	$ 10,000	$ 10,000	$ 22,292	$ 12,292

CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(MODIFIED CASH BASIS) - BUDGET AND ACTUAL – WATER SDC FUND
YEAR ENDED JUNE 30, 2016

	Budget Amounts			
	Original	*Final*	*Actual*	*Variance*
REVENUES				
Licenses and permits	$ 20,326	$ 20,326	$ 49,887	$ 29,561
Interest earnings	240	240	553	313
Total Revenues	20,566	20,566	50,440	29,874
EXPENDITURES				
Capital outlay	77,376	77,376	-	77,376
CHANGE IN FUND BALANCE	(56,810)	(56,810)	50,440	107,250
FUND BALANCE, beginning of year	56,810	56,810	62,359	5,549
FUND BALANCE, end of year	$ -	$ -	$ 112,799	$ 112,799

CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(MODIFIED CASH BASIS) - BUDGET AND ACTUAL – WATER RESERVE FUND
YEAR ENDED JUNE 30, 2016

	Budget Amounts			
	Original	***Final***	***Actual***	***Variance***
REVENUES				
Interest earnings	$ 100	$ 100	$ 629	$ 529
EXPENDITURES				
Capital outlay	106,510	106,510	-	106,510
REVENUES OVER (UNDER) EXPENDITURES	(106,410)	(106,410)	629	107,039
OTHER FINANCING SOURCES (USES)				
Transfers in	59,710	59,710	59,710	-
CHANGE IN FUND BALANCE	(46,700)	(46,700)	60,339	107,039
FUND BALANCE, beginning of year	46,700	46,700	46,710	10
FUND BALANCE, end of year	$ -	$ -	$ 107,049	$ 107,049

CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(MODIFIED CASH BASIS) - BUDGET AND ACTUAL – SEWER SDC FUND
YEAR ENDED JUNE 30, 2016

	Budget Amounts			
	Original	***Final***	***Actual***	***Variance***
REVENUES				
Licenses and permits	$ 6,096	$ 6,096	$ 18,288	$ 12,192
Interest earnings	120	120	215	95
Total Revenues	6,216	6,216	18,503	12,287
EXPENDITURES				
Capital outlay	29,036	29,036	-	29,036
CHANGE IN FUND BALANCE	(22,820)	(22,820)	18,503	41,323
FUND BALANCE, beginning of year	22,820	22,820	24,863	2,043
FUND BALANCE, end of year	$ -	$ -	$ 43,366	$ 43,366

CITY OF AURORA, OREGON

SCHEDULE OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
(MODIFIED CASH BASIS) - BUDGET AND ACTUAL – SEWER RESERVE FUND
YEAR ENDED JUNE 30, 2016

	Budget Amounts			
	Original	***Final***	***Actual***	***Variance***
REVENUES				
Intergovernmental	$ -	$ -	$ 15,752	$ 15,752
Interest earnings	190	190	499	309
Total Revenues	190	190	16,251	16,061
EXPENDITURES				
Capital outlay	95,940	95,940	15,752	80,188
REVENUES OVER (UNDER) EXPENDITURES	(95,750)	(95,750)	499	96,249
OTHER FINANCING SOURCES (USES)				
Transfers in	40,000	40,000	40,000	-
CHANGE IN FUND BALANCE	(55,750)	(55,750)	40,499	96,249
FUND BALANCE, beginning of year	55,750	55,750	55,784	34
FUND BALANCE, end of year	$ -	$ -	$ 96,283	$ 96,283

COMPLIANCE SECTION

GROVE, MUELLER & SWANK, P.C.
CERTIFIED PUBLIC ACCOUNTANTS AND CONSULTANTS
475 Cottage Street NE, Suite 200, Salem, Oregon 97301
(503) 581-7788

INDEPENDENT AUDITOR'S REPORT REQUIRED BY OREGON STATE REGULATIONS

Honorable Mayor and Council Members
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, 2016, and have issued our report thereon dated December 1, 2016.

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.

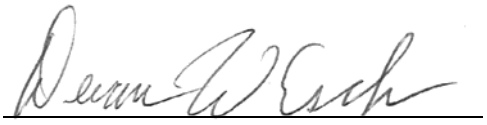
Internal Control Over Financial Reporting

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
December 1, 2016

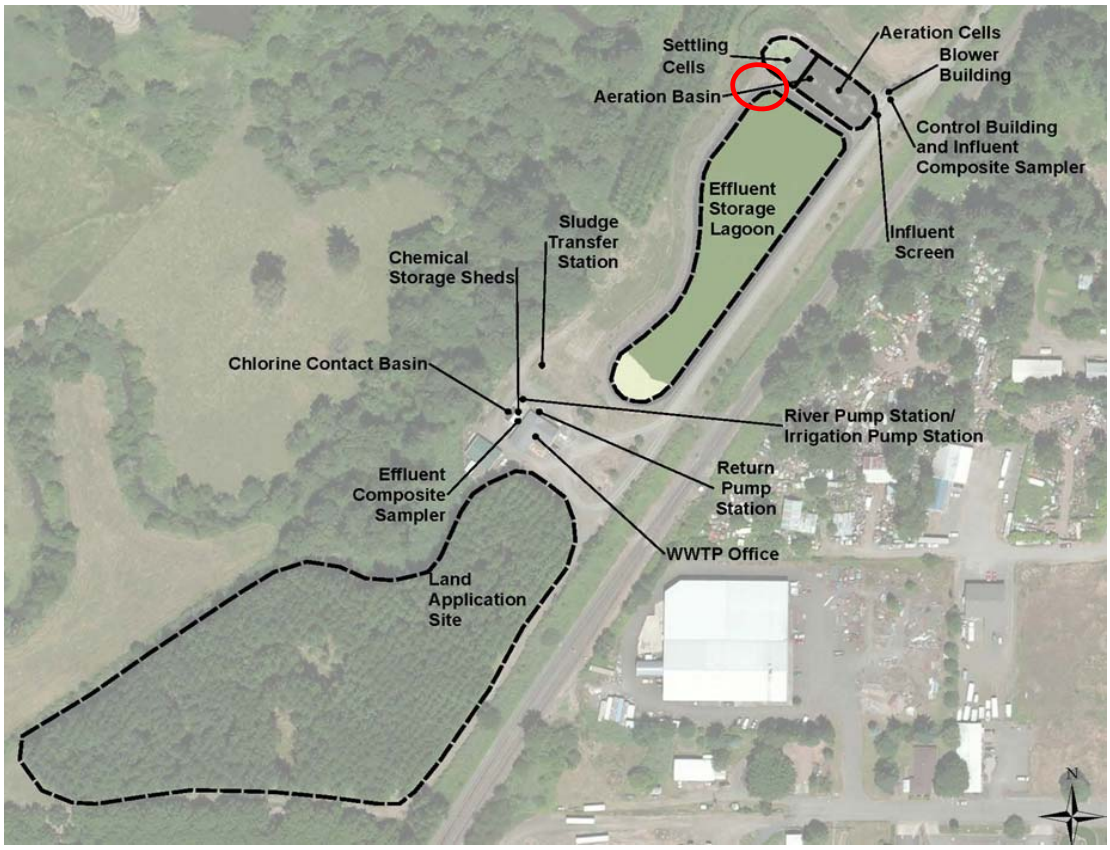
Appendix E
Project Summaries

Wastewater Facilities Project: Lagoon Overflow and Structural Inspection

Project Identifier: 1.1

Objective: Add an overflow to the lagoons to protect the lagoons from overtopping. Perform a structural inspection of the lagoons.

Project Location: Lagoons



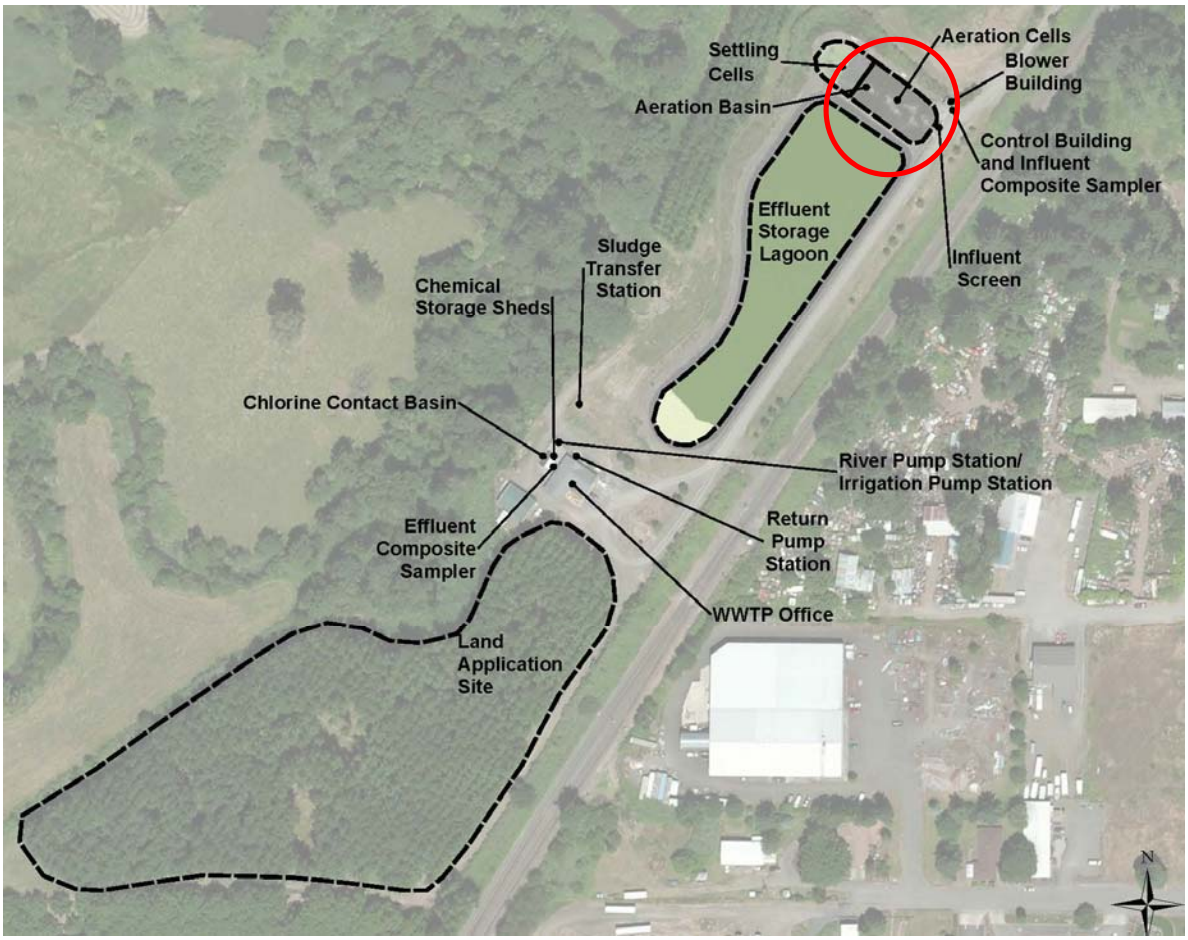
Item	Cost (2017)	
Structural Inspection	$	20,000
Overflows	$	80,000
Mobilization (10%)	$	10,000
Overhead and Profit (15%)	$	15,000
Contingency (30%)	$	30,000
Construction Subtotal	**$**	**155,000**
Soft Costs (25%)	$	39,000
Total Project Cost	**$**	**194,000**

Wastewater Facilities Project: Aerated Lagoon Aeration

Project Identifier: 1.2

Objective: Replace the existing aeration system with new diffusers that are more easily removable for inspection and maintenance and with additional aeration capacity through the planning period.

Project Location: Aerated Lagoon



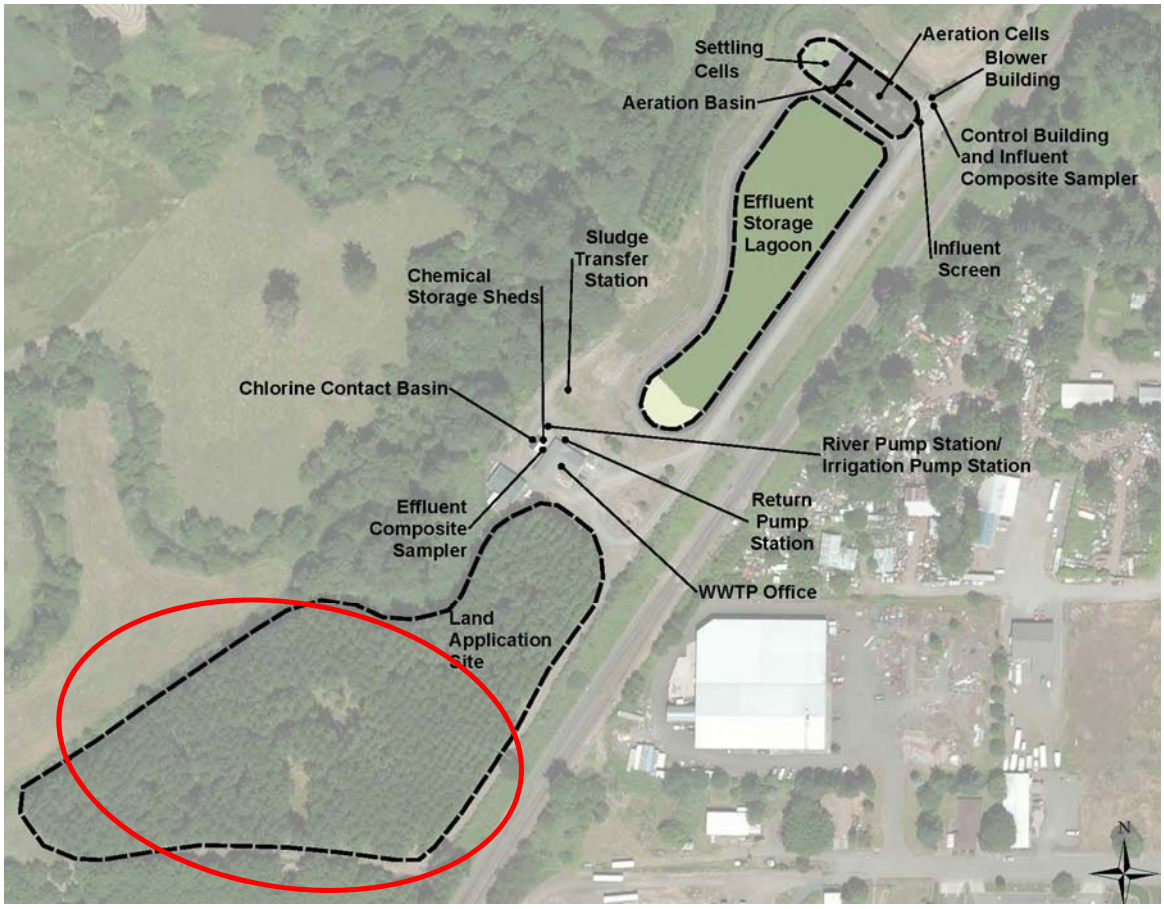
Item	Cost (2017)
Diffusers and Blowers	$ 75,000
Blower Shed	$ 10,000
Electrical/Controls	$ 13,000
Mobilization (10%)	$ 10,000
Overhead and Profit (15%)	$ 15,000
Contingency (30%)	$ 30,000
Construction Subtotal	**$ 153,000**
Soft Costs (25%)	$ 39,000
Total Project Cost	**$ 192,000**

Wastewater Facilities Project: **Additional Effluent Storage Lagoon**

Project Identifier: **1.3**

Objective: An additional effluent storage lagoon and pump station to store the water during the summer.

Project Location: New Effluent Storage Lagoon



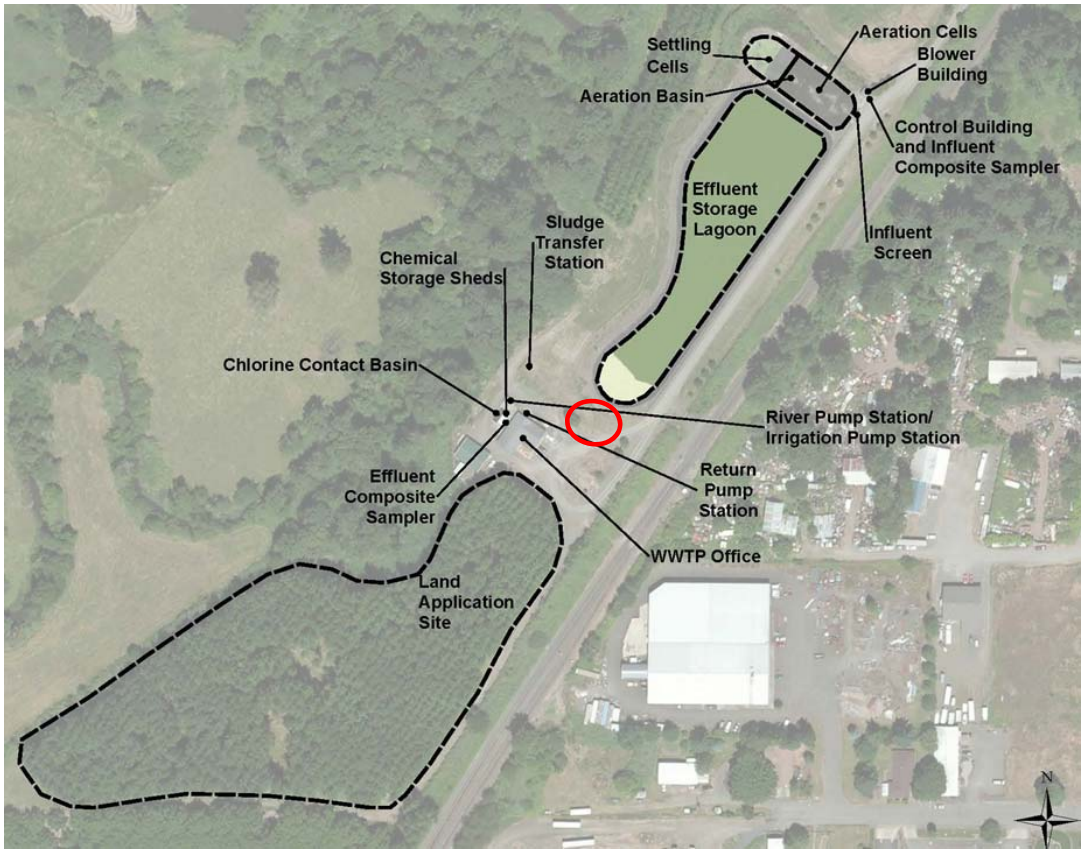
Item	Cost (2017)	
Site Work	$	20,000
Storage Lagoon	$	1,190,000
Pump Station	$	180,000
Piping/Valves and Instrumentation*	$	350,000
Electrical/Controls	$	50,000
Mobilization (10%)	$	180,000
Overhead and Profit (15%)	$	270,000
Contingency (30%)	$	540,000
Construction Subtotal	**$**	**2,780,000**
Soft Costs (25%)	$	700,000
Total Project Cost	**$**	**3,480,000**

Wastewater Facilities Project: Tertiary Treatment

Project Identifier: 1.4

Objective: Either of two options - aeration, baffle walls, floating cover, and chlorine piping added to the Effluent Storage Lagoons, or a downstream filter - would be installed to improve the tertiary removal of TSS and BOD5. Filtration is shown since it has the higher project cost.

Project Location: Near WWTP Office



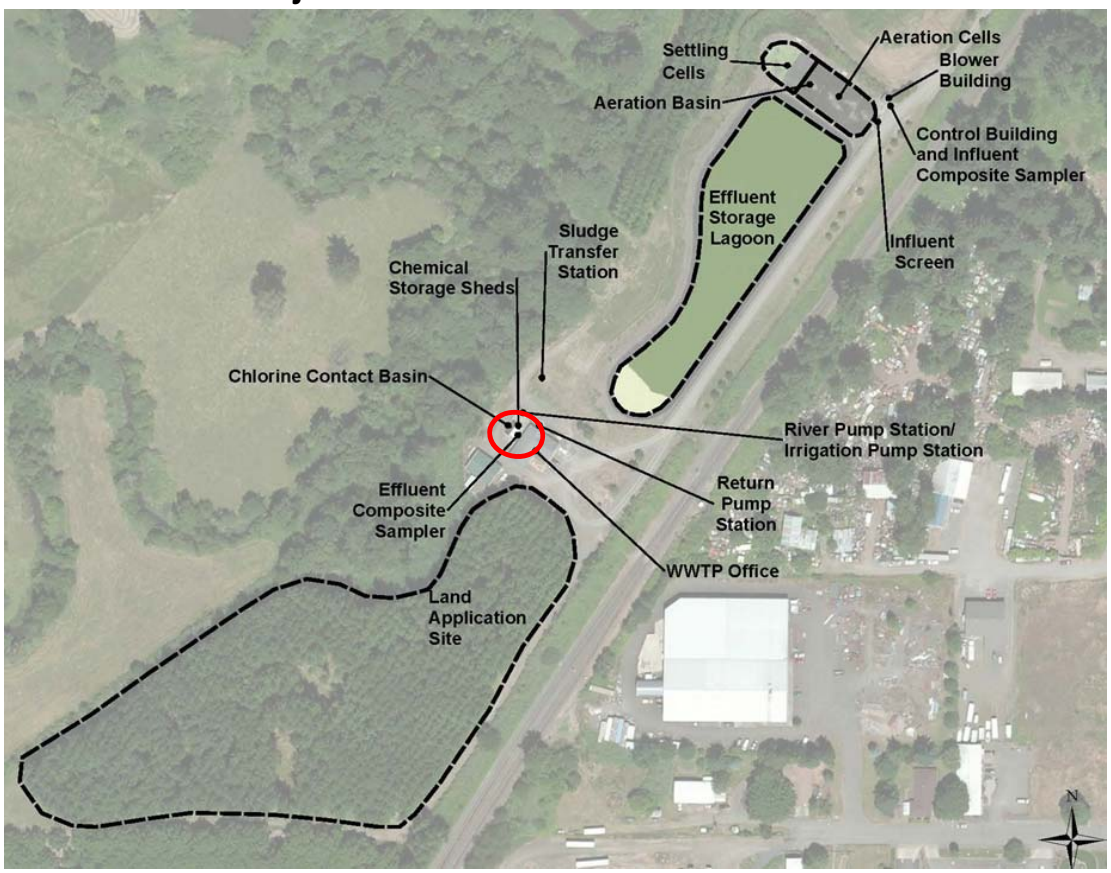
Item	Cost (2017)	
Site Work	$	20,000
Filters	$	450,000
Cover	$	10,000
Electrical/Controls	$	100,000
Mobilization (10%)	$	60,000
Overhead and Profit (15%)	$	90,000
Contingency (30%)	$	180,000
Construction Subtotal	**$**	**890,000**
Soft Costs (25%)	$	230,000
Total Project Cost	**$**	**1,120,000**

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.

Project Location: Chlorine Contact Basin



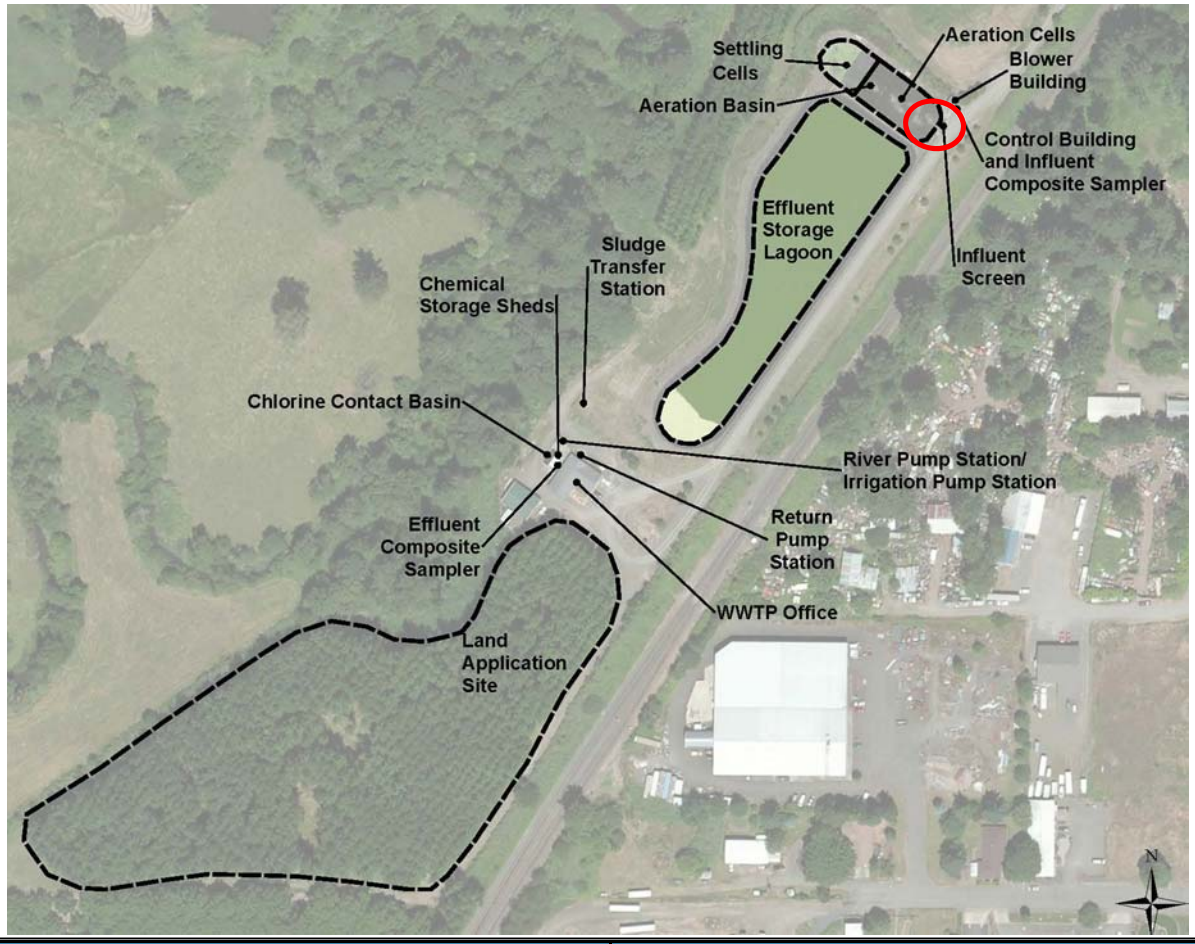
Item	Cost (2017)
Storage Buildings	$ 80,000
Chlorine Monitoring Equipment	$ 20,000
Evaluation and Baffles/Mixer Modifications	$ 20,000
Electrical/Controls	$ 20,000
Mobilization (10%)	$ 14,000
Overhead and Profit (15%)	$ 21,000
Contingency (30%)	$ 42,000
Construction Subtotal	**$ 217,000**
Soft Costs (25%)	$ 55,000
Total Project Cost	**$ 272,000**

Wastewater Facilities Project: Headworks Upgrade

Project Identifier: 1.6

Objective: Upgrade the headworks to add a cover and freeze protection to the influent screen. Also add a shelter around the composite sampler and move it closer to the sample location.

Project Location: Headworks



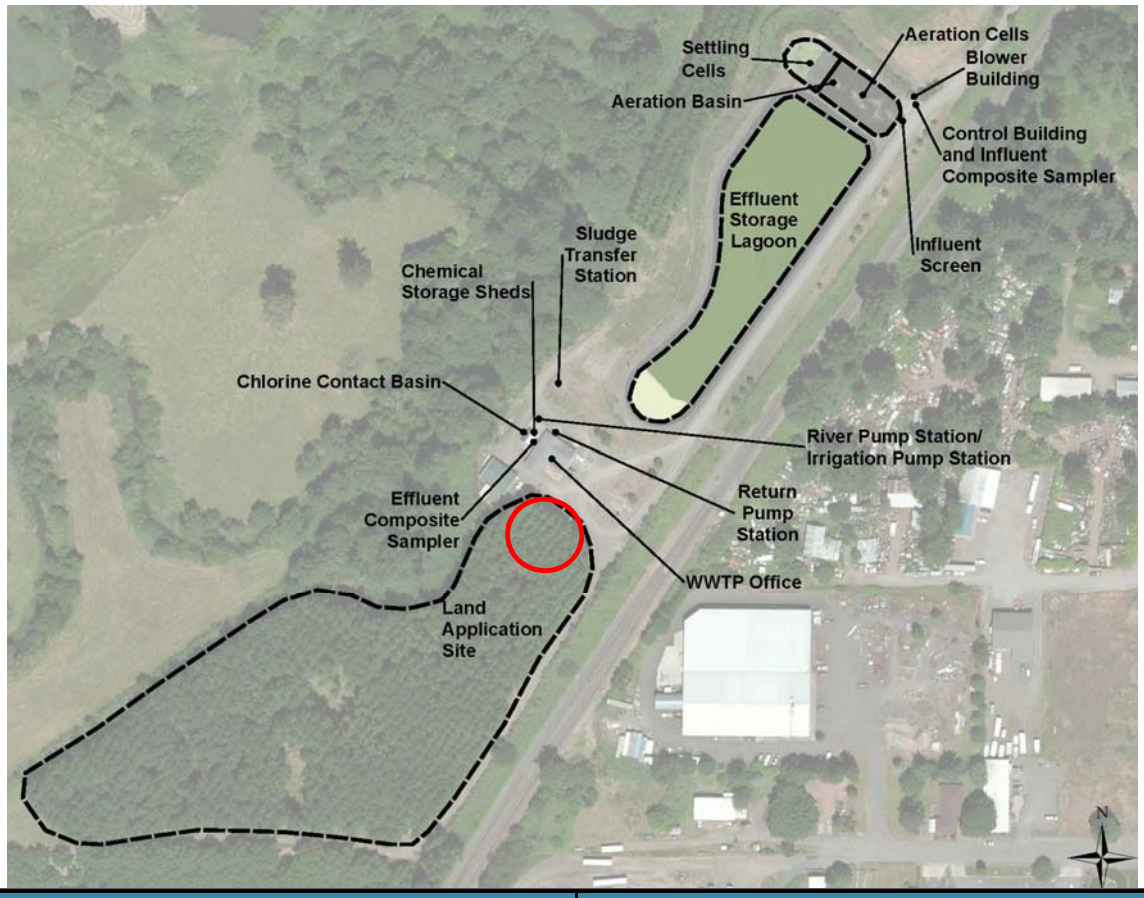
Item	Cost (2017)
Heat Tape Influent Screen	$ 30,000
Cover Influent Screen and Composite Sampler	$ 30,000
Mobilization (10%)	$ 6,000
Overhead and Profit (15%)	$ 9,000
Contingency (30%)	$ 18,000
Construction Subtotal	**$ 93,000**
Soft Costs (25%)	$ 24,000
Total Project Cost	**$ 117,000**

Wastewater Facilities Project: Aerobic Digester

Project Identifier: 1.7

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.

Project Location: Sludge Transfer Station



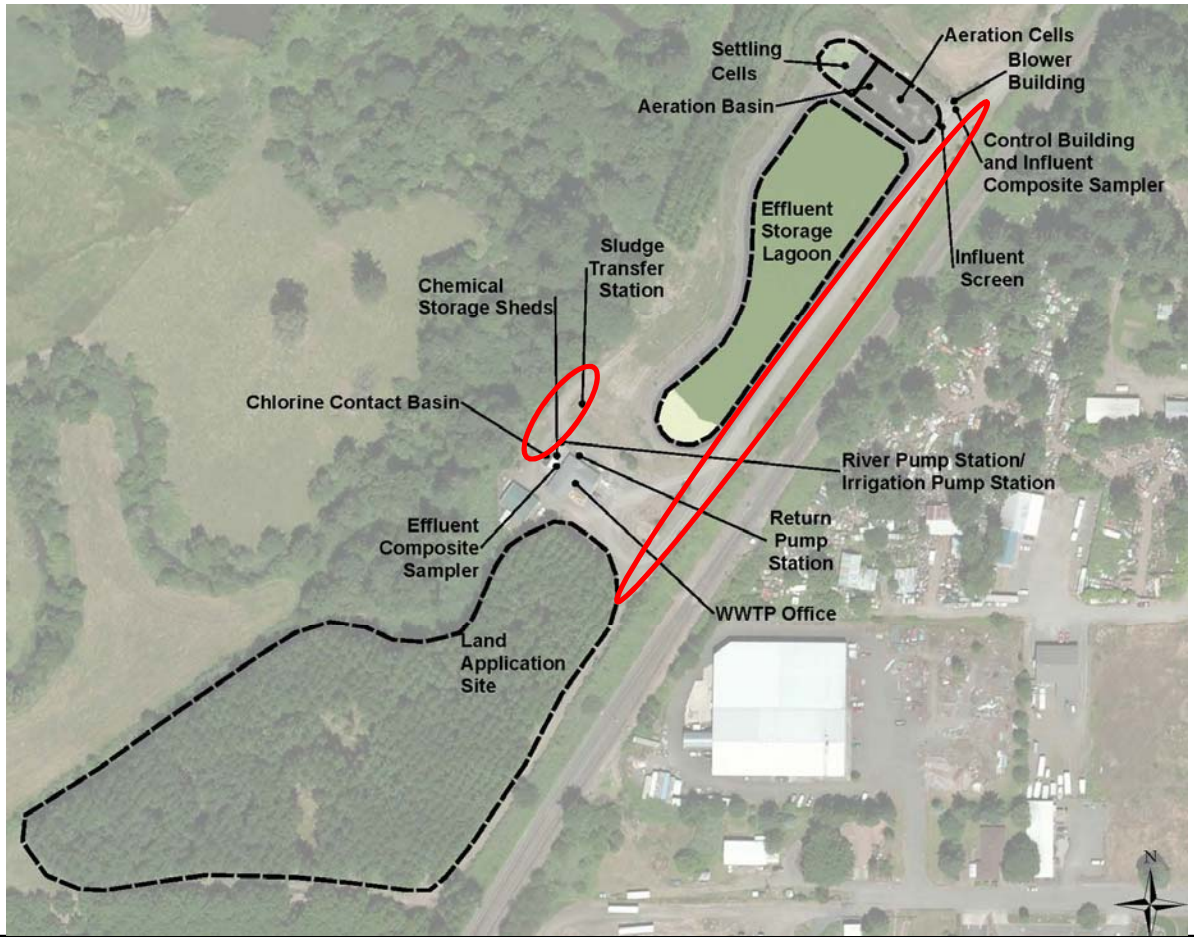
Item	Cost (2017)
Site Work	$ 10,000
Digester Basin (including guardrails, grating)	$ 100,000
Digester Equipment	$ 70,000
Digester Blower Building	$ 40,000
Piping/Valves and Instrumentation	$ 40,000
Electrical/Controls	$ 40,000
Mobilization (10%)	$ 30,000
Overhead and Profit (15%)	$ 50,000
Contingency (30%)	$ 90,000
Construction Subtotal	**$ 470,000**
Soft Costs (25%)	$ 120,000
Total Project Cost	**$ 590,000**

Wastewater Facilities Project: **Site Work At WWTP**

Project Identifier: **1.8**

Objective: Pave the road at the WWTP Office, add storm water drainage, and bank stabilization.

Project Location: Throughout WWTP



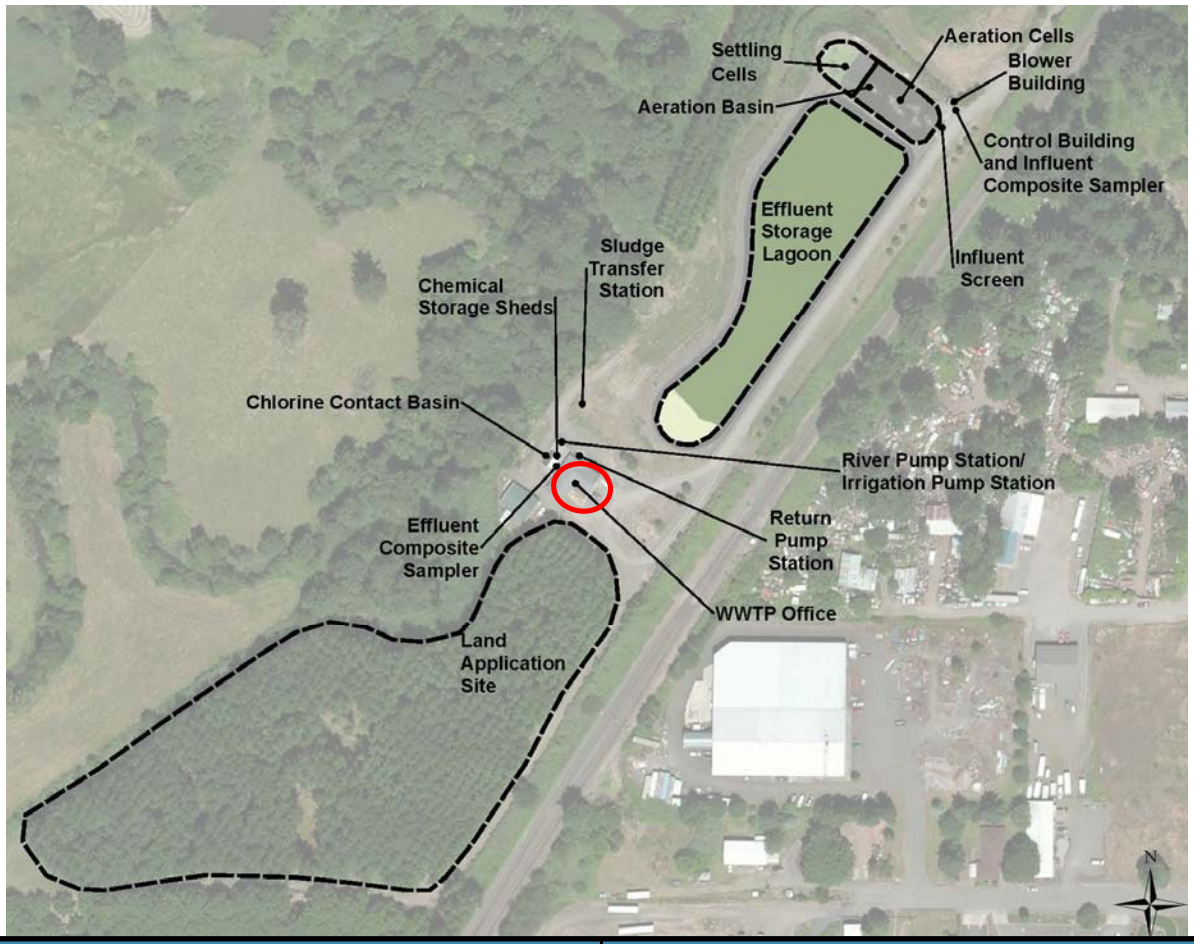
Item	Cost (2017)
Asphalt Pavement	$ 140,000
Bank Stabilization	$ 50,000
Culverts	$ 10,000
Mobilization (10%)	$ 20,000
Overhead and Profit (15%)	$ 30,000
Contingency (30%)	$ 60,000
Construction Subtotal	**$ 310,000**
Soft Costs (25%)	$ 78,000
Total Project Cost	**$ 388,000**

Wastewater Facilities Project: SCADA Upgrade

Project Identifier: 1.9

Objective: A new SCADA system to include the improvements and provide essential alarms.

Project Location: WWTP Office



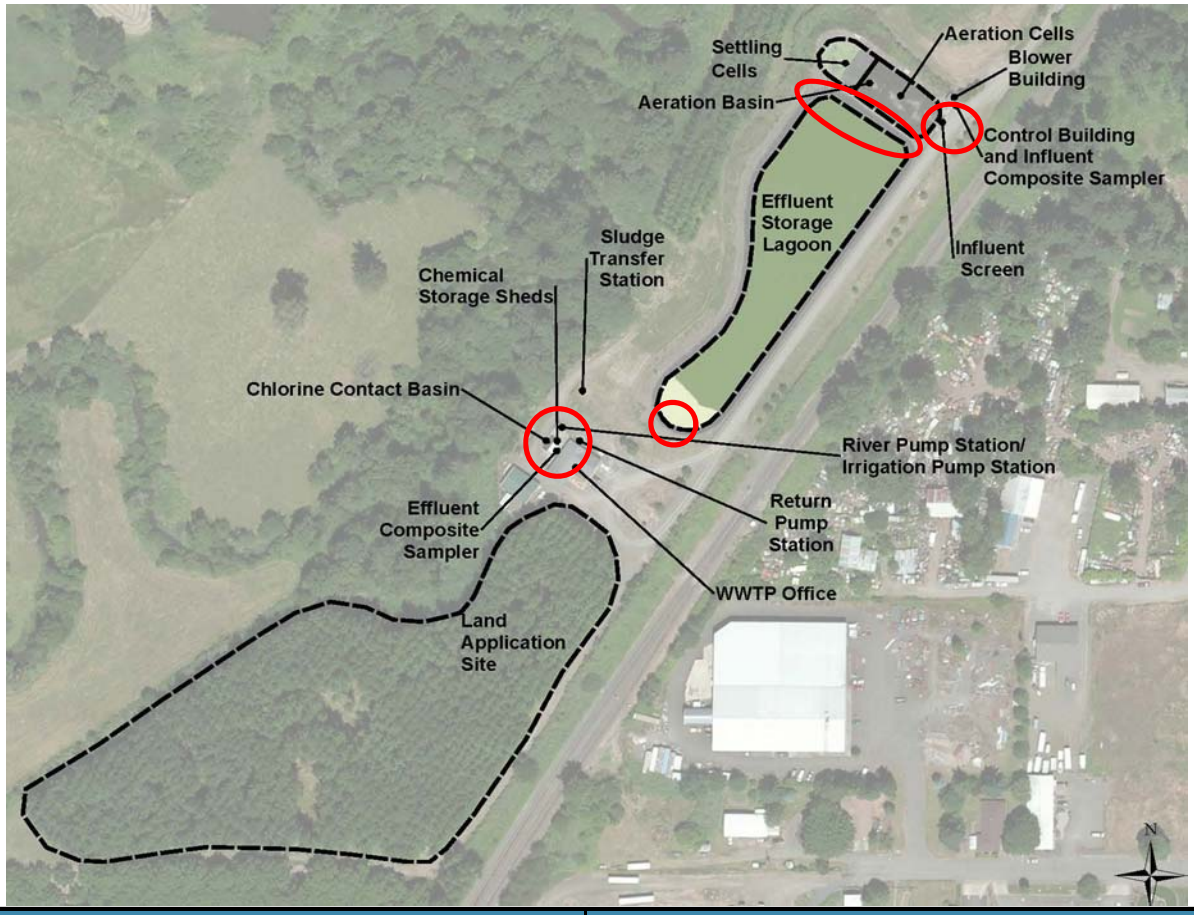
Item	Cost (2017)
SCADA System	$ 100,000
Mobilization (10%)	$ 10,000
Overhead and Profit (15%)	$ 15,000
Contingency (30%)	$ 30,000
Construction Subtotal	**$ 155,000**
Soft Costs (25%)	$ 39,000
Total Project Cost	**$ 194,000**

Wastewater Facilities Project: Fall Protection

Project Identifier: 2.1

Objective: Add fall protection to the Headworks, Lagoons, Chlorine Contact Basin, and WWTP Pump Stations.

Project Location: Throughout WWTP



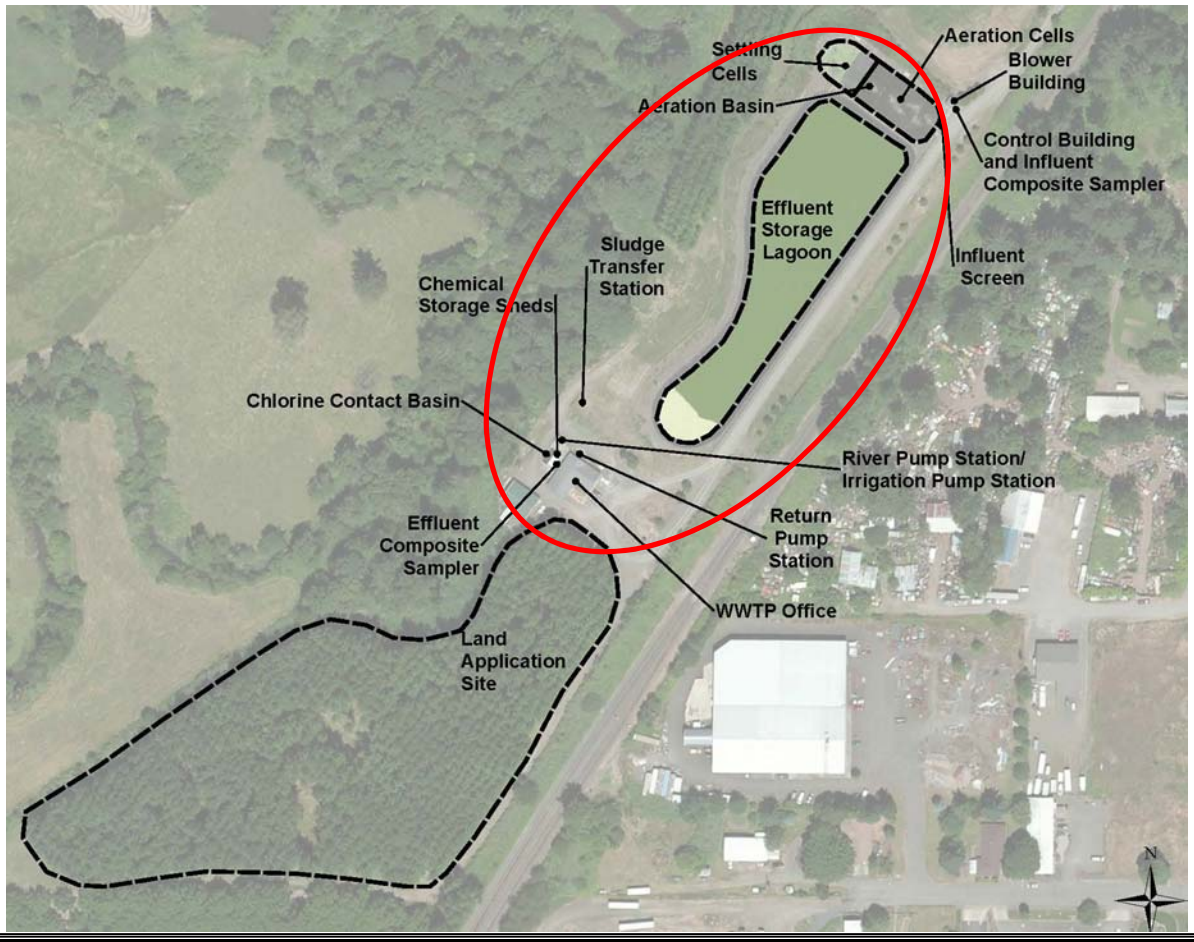
Item	Cost (2017)
Hookup Lifelines and Chlorine Contact Basin Railing	$ 60,000
Mobilization (10%)	$ 6,000
Overhead and Profit (15%)	$ 9,000
Contingency (30%)	$ 18,000
Construction Subtotal	**$ 93,000**
Soft Costs (25%)	$ 24,000
Total Project Cost	**$ 117,000**

Wastewater Facilities Project: Fencing

Project Identifier: 2.2

Objective: Add fencing around the WWTP (add to existing; does not include fence around land application).

Project Location: Throughout WWTP



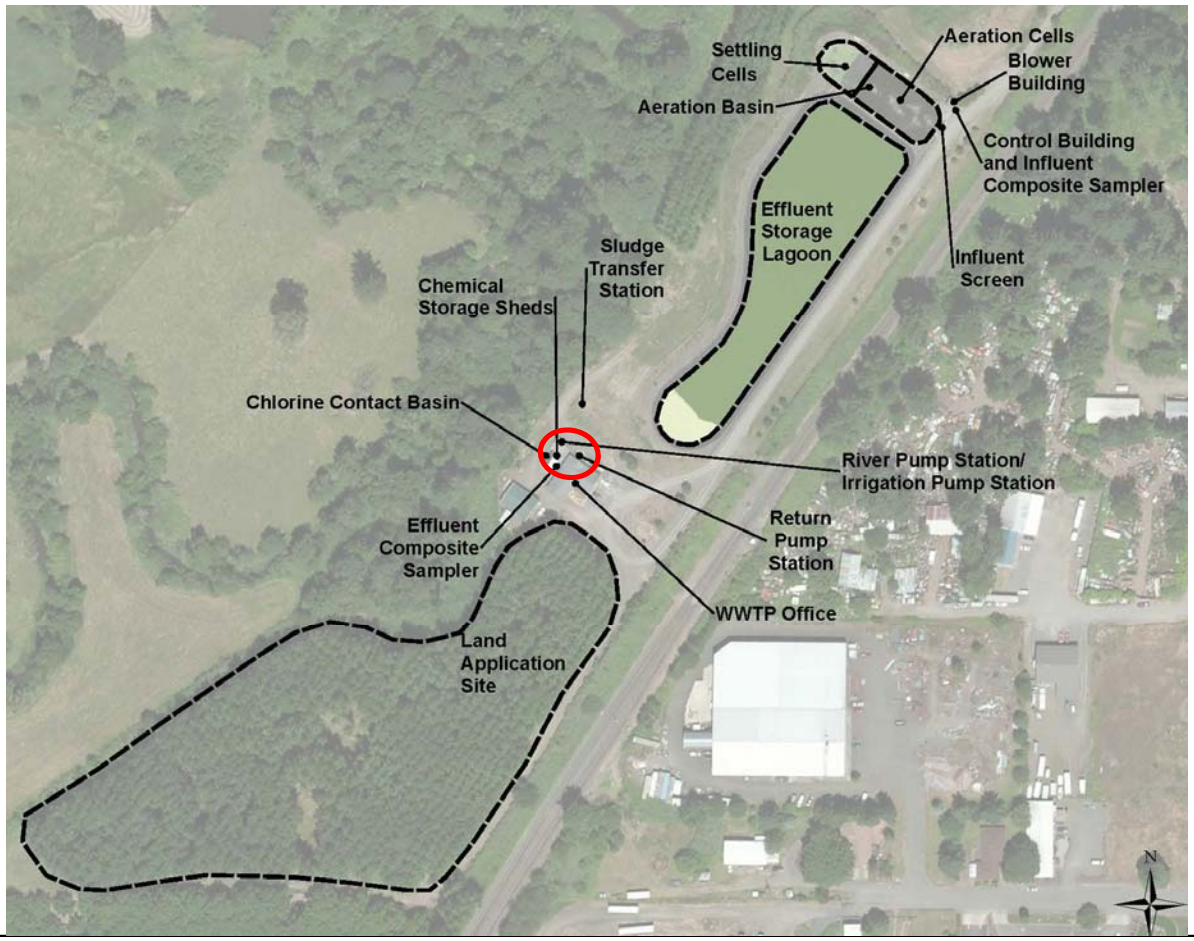
Item	Cost (2017)
Fencing and Gates	$ 50,000
Mobilization (10%)	$ 5,000
Overhead and Profit (15%)	$ 8,000
Contingency (30%)	$ 15,000
Construction Subtotal	**$ 78,000**
Soft Costs (25%)	$ 20,000
Total Project Cost	**$ 98,000**

Wastewater Facilities Project: **WWTP Pump Station VFDs**

Project Identifier: **2.3**

Objective: Replace the pump starters with VFDs to improve operation and reduce energy usage.

Project Location: WWTP Pump Stations



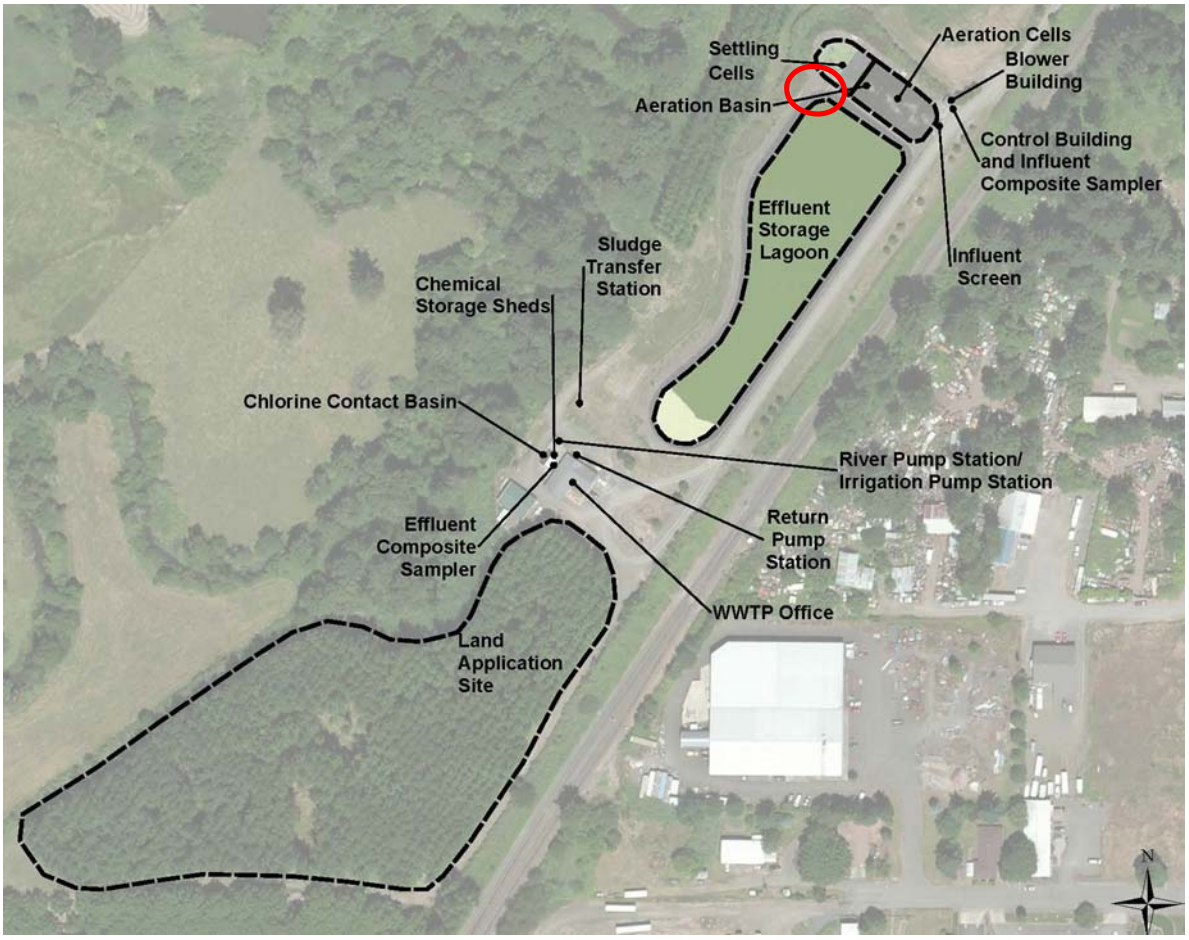
Item	Cost (2017)
WWTP Pump VFDs	$ 85,000
Mobilization (10%)	$ 9,000
Overhead and Profit (15%)	$ 13,000
Contingency (30%)	$ 26,000
Construction Subtotal	**$ 133,000**
Soft Costs (25%)	$ 34,000
Total Project Cost	**$ 167,000**

Wastewater Facilities Project: Aerated Lagoon Sludge Pumps

Project Identifier: 2.4

Objective: Add permanent pumps, flow meters, piping, and valves for sludge wasting, scum removal, and recycling.

Project Location: Aerated Lagoon



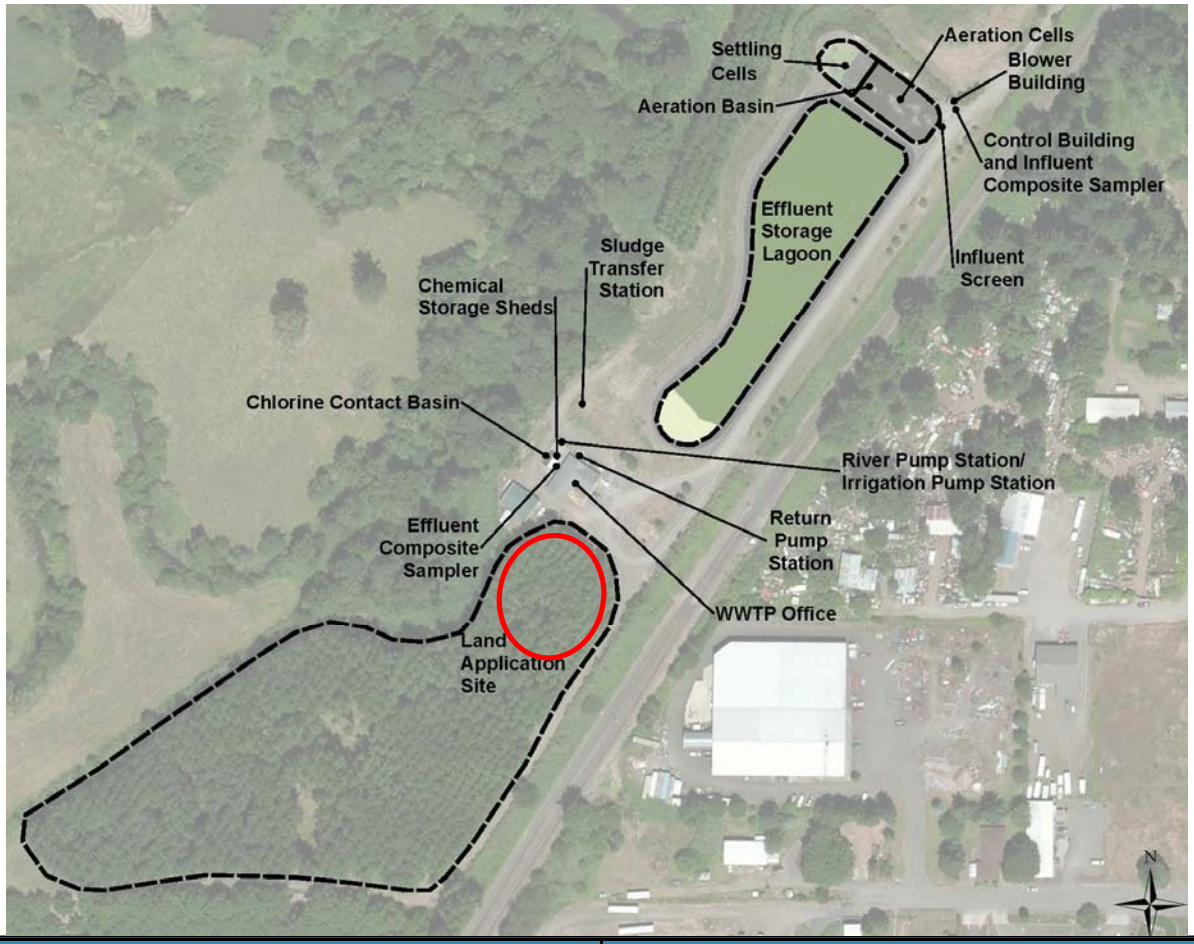
Item	Cost (2017)
Sludge Pumps with Enclosure	$ 40,000
Piping/Valves and Instrumentation	$ 40,000
Electrical/Controls	$ 16,000
Mobilization (10%)	$ 2,000
Overhead and Profit (15%)	$ 3,000
Contingency (30%)	$ 5,000
Construction Subtotal	**$ 106,000**
Soft Costs (25%)	$ 27,000
Total Project Cost	**$ 133,000**

Wastewater Facilities Project: **Permanent Irrigation System**

Project Identifier: **2.5**

Objective: Install a permanent irrigation system to reduce operator maintenance.

Project Location: Land Application Site



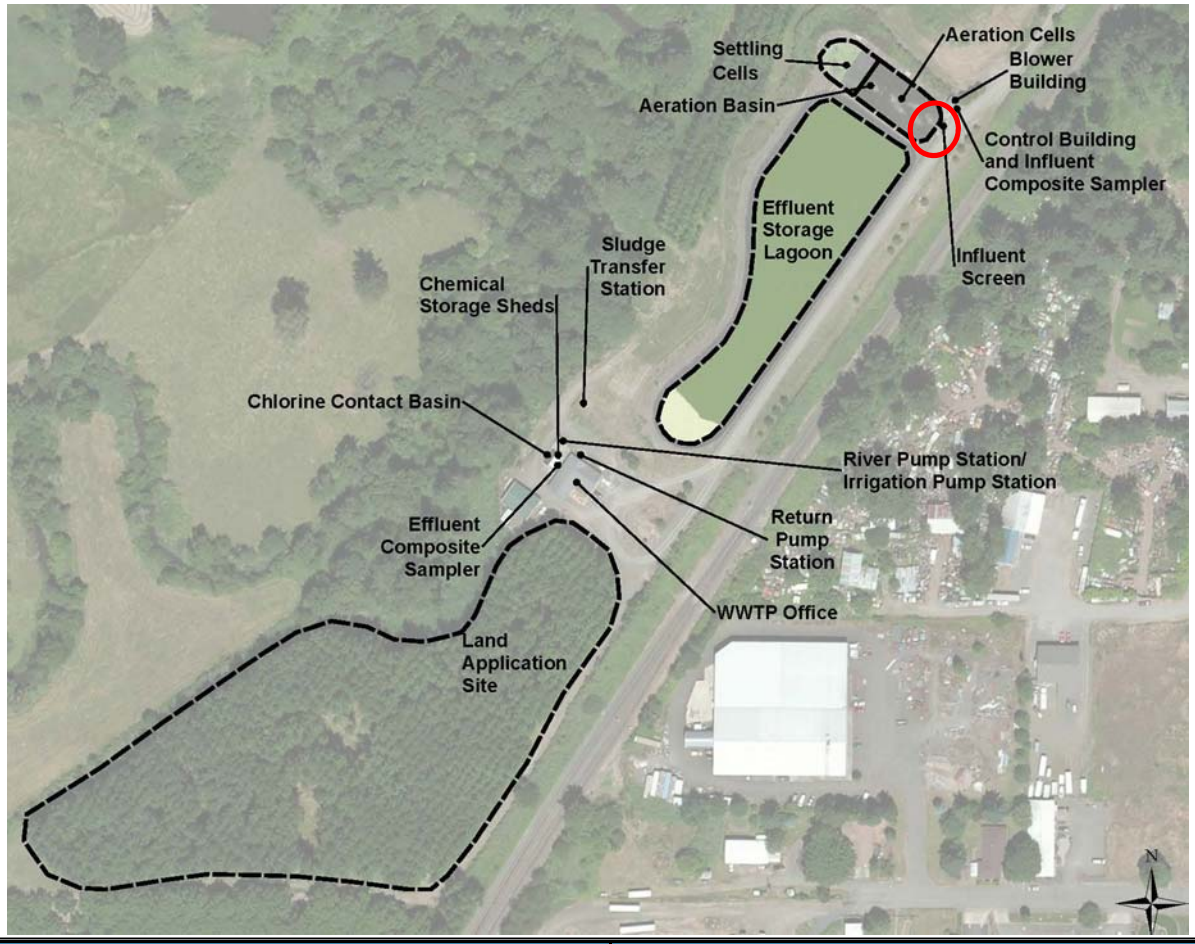
Item	Cost (2017)
Permanent Irrigation System	$ 30,000
Mobilization (10%)	$ 3,000
Overhead and Profit (15%)	$ 5,000
Contingency (30%)	$ 9,000
Construction Subtotal	**$ 47,000**
Soft Costs (25%)	$ 12,000
Total Project Cost	**$ 59,000**

Wastewater Facilities Project: Headworks Grit Removal

Project Identifier: 2.6

Objective: Upgrade the headworks to include grit removal.

Project Location: Headworks



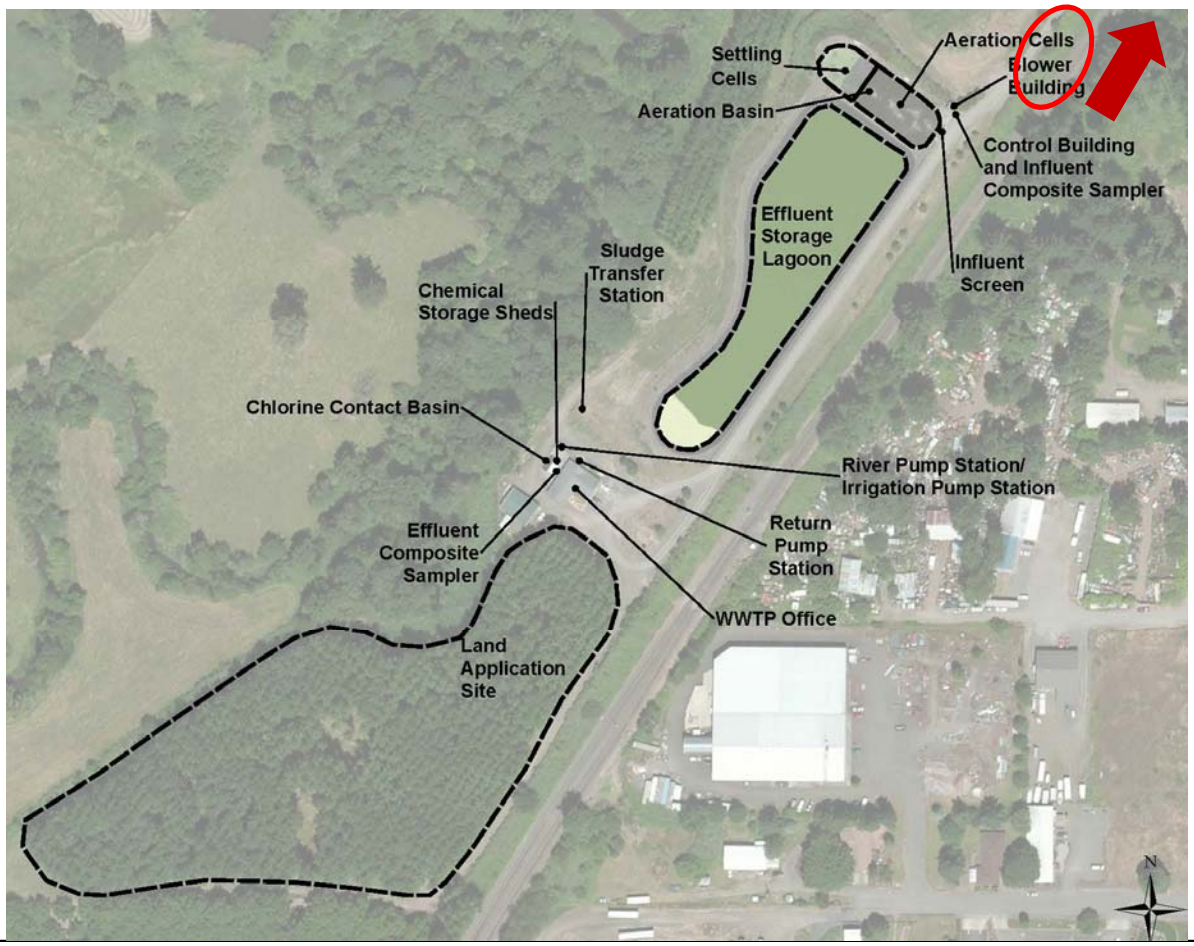
Item	Cost (2017)	
Grit Chamber and Classifier	$	400,000
Electrical/Controls	$	80,000
Mobilization (10%)	$	50,000
Overhead and Profit (15%)	$	80,000
Contingency (30%)	$	150,000
Construction Subtotal	**$**	**760,000**
Soft Costs (25%)	$	190,000
Total Project Cost	**$**	**950,000**

Wastewater Facilities Project: Paving Access Road

Project Identifier: 2.7

Objective: Pave the access road from the WWTP to Ehlen Road.

Project Location: Access Road to WWTP



Item	Cost (2017)
Asphalt Pavement	$ 175,000
Mobilization (10%)	$ 18,000
Overhead and Profit (15%)	$ 27,000
Contingency (30%)	$ 53,000
Construction Subtotal	**$ 273,000**
Soft Costs (25%)	$ 70,000
Total Project Cost	**$ 343,000**