City of
Prineville, Oregon
Wastewater Facilities Plan

2024

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WASTEWATER FACILITIES PLAN

FOR

CITY OF PRINEVILLE, OREGON

MARCH 2024

ANDERSON PERRY & ASSOCIATES, INC.

La Grande, Redmond, Hermiston, and Enterprise, Oregon
Walla Walla, Washington

 Job No. 1260-40

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VOLUME II

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Executive Summary

This Wastewater Facilities Plan (WWFP) has been developed to provide the City of Prineville, Oregon, with an up-to-date review of its wastewater collection system, wastewater treatment facility (WWTF), and the financial components of the entire wastewater system. Specifically, this WWFP evaluates the overall condition and performance of the wastewater collection system and the WWTF, describes alternatives to improve the system and facilities to meet the short- and long-term needs of the community and to ensure compliance with the conditions set forth in the National Pollutant Discharge Elimination System (NPDES) Permit, and provides a Capital Improvements Plan (CIP) schedule for recommended medium- and long-term improvements projects. The following summarizes the existing conditions, describes the WWTF and collection system evaluation, and briefly discusses improvements. Detailed discussions are provided in the individual sections of this WWFP. Appendices A through L contain documentation used in preparation of this WWFP and should be referenced as needed.

Existing Wastewater Collection System Description and Evaluation

The majority of the City's wastewater collection system was constructed in 1960. The gravity collection system is composed of pipes ranging in size from 4 to 48 inches in diameter, the majority being 8 inches in diameter, and eight lift stations. Six of the lift stations are City-owned, and two are privately owned. The two privately owned lift stations are outside the scope of this report and are not discussed further. Older pipe sections are either asbestos cement or concrete, and newer wastewater piping is predominately polyvinyl chloride. Additionally, forcemains transport wastewater from the eight lift stations to the gravity main lines, then the wastewater enters the WWTF lagoons.

Infiltration and inflow (I/I) is unwanted flows entering the wastewater collection system. I/I can occur in a collection system during precipitation events or periods with high groundwater levels. The 2018 WWFP identified I/I in the collection system as a recommended priority. In response to this recommendation, the City initiated collection system improvements and maintenance activities that have resulted in a significant reduction of I/I. A desktop evaluation of I/I determined the City likely has some degree of delayed inflow. Both inflow and infiltration are not considered excessive but have been identified as a concern for the City.

Further details regarding the evaluation of the collection system can be found in Sections 2 and 3.

Existing Wastewater Treatment Facility Description and Evaluation

The original WWTF began operation in 1960. The City's wastewater system is regulated by NPDES Permit No. 101433 (see Appendix A for a copy of the NPDES Permit, Permit Modification, and Permit Fact Sheet). Table ES-1 shows the outfalls identified in the NPDES Permit along with their location.

TABLE ES-1
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT-IDENTIFIED OUTFALLS

Outfall Number	Location
001	Crooked River Mile 46.8 (Direct River Discharge)
002	Meadow Lakes Golf Course
003	Land Irrigation (Pasture Area)
004	Wetland Discharge

Initially, the 1960 treatment system consisted of evaporative lagoons, with the WWTF receiving upgrades in 1992, 2005, and 2017. Improvements included increasing the capacity of the existing lagoons (Plant 1) and installing a second partially aerated facultative lagoon system, referred to as Plant 2. Wastewater is collected via a gravity flow collection system and is pumped to the treatment lagoons from an influent pump station. Disposal is completed via evaporation and controlled seepage from constructed wetlands for indirect discharge into the Crooked River, with the remainder stored in effluent storage ponds for disposal by irrigation reuse on City-owned pastureland and the Meadow Lakes Golf Course. See Figure 2-2 in Section 2 for an aerial photograph of the existing WWTF.

In 2017, the City constructed wastewater system improvements (WWSI) based on the 2005 WWFP and 2010 WWFP Update identifying the potential to outgrow the current WWTF capacity due to higher-than-anticipated municipal growth. The 2017 WWSI project converted a portion of the City's existing irrigated pastureland into a wastewater treatment and disposal wetland system. The conversion has increased treatment capacity for the WWTF, benefited local wildlife and aquatic organisms, and reduced groundwater temperatures where they interact with the Crooked River. As the treated effluent enters the Crooked River, it also provides augmented flows that improve the river environment for fish and other species. Additionally, the Crooked River Wetlands Complex has added an outdoor recreational space with walking trails, wildlife viewing, and educational opportunities for City residents and surrounding communities that has become quite popular.

The existing WWTF is composed of two partially aerated facultative lagoon treatment plants. Site piping allows cross-connection between plants. Influent from the main collection system passes through the influent screen on the north side of the river (installed as part of the 2017 upgrade) and then into the influent pump station. Influent from the airport industrial area, which is mostly cooling water effluent, passes through an influent screen on the south side of Pond 1 of Plant 1, where it enters the lagoon at the end of the aeration zone.

Plant 1 is the City's original lagoon system and received upgrades in 1992, 2005, and 2017. Plant 1 includes aerated and facultative lagoons, rock filters, and disinfection that produces Class C treated effluent. Effluent from Plant 1 is utilized for irrigation of the Meadow Lakes Golf Course.

Plant 2 consists of three treatment lagoons operated in a series that produce Class D treated effluent. Wastewater from an influent pump station travels through an aerated lagoon before passing sequentially through a partially aerated lagoon and then a facultative lagoon. Effluent is then disinfected in a chlorine contact chamber. The treated effluent is stored in the effluent storage pond (kidney pond) before it is utilized as irrigation for City-owned pastureland or discharged to the 15 constructed lined and unlined wetlands. See Section 2 for more detailed information on the existing wastewater system.

Since 2018, the City has completed aeration system improvements to Pond 1 of Plant 1 and Pond 1 of Plant 2 that replaced the surface-mounted aspirating aerators with fine bubble diffused aeration. Surface-mounted aspirating aerators continue to perform aeration in the partially aerated Pond 2 at Plant 2. Both fine bubble diffused aeration systems have diesel generators to provide backup emergency power in the event of a utility power failure.

Currently, the WWTF maintains compliance with the NPDES Permit. The use of two parallel lagoon treatment systems provides adequate redundancy and capacity. However, improvements to the WWTF have been identified to help improve operating efficiency, safety, and treatment quality. A wastewater system flow schematic for the existing facilities is shown on Figure 2-3 in Section 2. Further details regarding the evaluation of the WWTF can be found in Sections 2 and 3.

Improvements Prioritization and Funding

Capital Improvements Plan

Improvements identified under the CIP category include capital improvements projects that need to be completed to address existing system deficiencies irrespective of growth.

After a review of the City's wastewater collection and treatment facilities deficiencies, improvements were prioritized and the CIP was developed to help organize necessary improvements over the 20-year planning period. The CIP is divided into two phases: medium- and long-term. The medium- and long-term improvements should be completed in 0 to 10 years and 10 to 20 years, respectively, with portions of the medium-term improvements completed annually, such as the collection system inspection and evaluation, cured-in-place pipe (CIPP) lining, and manhole rehabilitation. A summary of the costs associated with the CIP is shown on Table ES-2.

TABLE ES-2
SUMMARY OF CAPITAL IMPROVEMENTS PROJECT PHASES (2023 DOLLARS)

Project Element	Project Purpose/Description	Total Estimated Project Cost
Medium-Term Improvements - 0 to 10 years		
Influent Screen Replacement	Replace the existing main influent screen.	$1,156,500
Update Headworks	Install new headworks influent pumps, electrical, and controls.	$576,000
System-wide Supervisory Control and Data Acquisition (SCADA) Upgrade	Upgrade the wastewater collection and treatment SCADA systems.	$427,000
Lift Station Improvements	Upgrades to the lift station pumps, equipment, electrical, and controls.	$380,500
Collection System Improvements - Annual I/I Reduction Program	Annually install 500 linear feet of CIPP lining. The total project cost of $855,000 is based on an annual budget of $150,000 to complete in six years.	$855,500
Manhole Rehabilitation Program	Repair/replace manholes as identified through inspection/evaluation.	$382,000
Collection System Inspection	Annual television inspection and evaluation of the existing collection system (footage per year to be determined).	$292,000
Upsize Existing Main Line from 10th Street to the North Side of Lamonta	Upsize existing pipe to remove the bottleneck in the collection system from northeast Prineville.	$2,276,800
Upsize Existing Main Line on Main Street from Lynn Boulevard to 1st Street	Upsize existing pipe that is currently 18 inches upstream, bottlenecks to 12 inches, then becomes 21 inches. Remove 12-inch bottleneck.	$1,293,500
TOTAL ESTIMATED COST OF MEDIUM-TERM IMPROVEMENTS		**$7,639,800**
Long-Term Improvements - 10 to 20 years		
Long-Term WWTF Improvements	Remove lagoon biosolids.	$541,000
TOTAL ESTIMATED COST OF LONG-TERM IMPROVEMENTS		**$541,000**

The estimated CIP costs listed above are provided in 2023 dollars for comparison. The recommended medium-term improvements projects are anticipated to be advertised for bid and awarded in 2026. The City and any potential funding agencies should recognize that, due to the recent escalation of inflation and construction costs, total relative project costs, including construction, administrative, legal, engineering, and contingencies, together with other project costs, will continue to increase until such time that the project is awarded. Therefore, costs for medium-term improvements have been inflated by 6.5 percent per year to 2026 dollars. The estimated year 2026 dollar amount is the amount of funds the City should apply for to cover actual project costs at the time the project is anticipated to be awarded. Table ES-3 shows the anticipated 2026 total project cost for the recommended medium-term improvements is $9,228,500.

TABLE ES-3
2026 TOTAL PROJECT COST FOR RECOMMENDED MEDIUM-TERM CAPITAL IMPROVEMENTS PLAN IMPROVEMENTS

Medium-Term Improvements (2023 Dollars)	$7,639,800
Assumed Annual Construction Cost Index Inflation Rate	6.5 percent
Total Estimated Project Cost (2026 Dollars)	**$9,228,500**

System Development Charge Plan

Improvements identified under the System Development Charge (SDC) category were developed to address those needs in the system to specifically support growth and associated increased system demands.

After a review of the City's wastewater collection and treatment facilities deficiencies, improvements were prioritized and the SDC Plan was developed to help organize necessary improvements over the 20-year planning period. The SDC improvements are not listed in any order of priority. Improvements will be completed based on where growth and development occur.

Table ES-4 lists the proposed SDC improvements as identified by a collection system evaluation completed for this WWFP and information provided by the City of Prineville Planning Department regarding potential growth areas.

TABLE ES-4
SUMMARY OF SYSTEM DEVELOPMENT CHARGE PROJECT PHASES (2023 DOLLARS)

Project Element	Project Purpose/Description	Total Estimated
WWTF Chlorination Conversion	Convert the existing chlorination system from gas chlorine to a bulk sodium hypochlorite system.	$652,000
Upsize Existing Main Line from 10th Street to the North Side of Lamonta	Cost difference to increase pipe size; used in conjunction with CIP 8 (discussed in Section 4).	$932,500
WWTF Operations Building and Laboratory	Construct an operations building with restrooms, showers, an employee locker room, offices, storage, conference space, kitchen, and laboratory.	$1,747,500
Main Line Extension North of Existing Main Line along Canal	To serve potential development on Rhoden property.	$325,250

Project Element	Project Purpose/Description	Total Estimated
Extend Pressure Sewer Main Line North on Highway 26 from N. Gardner Road	To serve future development north of Prineville along Highway 26.	$520,250
Upsize Existing Main Line on Main Street from Lynn to 1st Street	Cost difference to increase pipe size; used in conjunction with CIP 9 (discussed in Section 4).	$350,000
Extend Existing 18-inch Sewer Main Line South on Main Street	To serve future development south of Prineville along Main Street.	$1,772,500
Extend Combs Flat Interceptor to the East	To serve future development east of Prineville.	$2,330,750
Connect Williamson Area to Gravity Sewer. Remove Williamson Lift Station	To serve future development east of Prineville, remove the Williamson Lift Station, and serve the area by gravity.	$611,250
Melrose/Willowdale Sewer Main Line Installation	Install main lines and manholes to facilitate future connection of Melrose/Willowdale residents.	$3,169,500
	TOTAL ESTIMATED COST OF SDC IMPROVEMENTS	**$12,411,500**

The estimated project costs listed above are provided in 2023 dollars for comparison. The preferred improvements projects would be advertised for bid and awarded as growth dictates. For comparison, costs for the medium-term improvements have been inflated by 6.5 percent per year to 2026 dollars. Since SDC projects are directly related to growth, and location and timing of growth is unknown, the time frame for the improvements on Table ES-4 is unknown. Table ES-5 shows the anticipated 2026 total project cost for the SDC improvements.

TABLE ES-5
2026 TOTAL PROJECT COST FOR RECOMMENDED SYSTEM DEVELOPMENT CHARGE IMPROVEMENTS

SDC Improvements (2023 Dollars)	$12,411,500
Assumed Annual Construction Cost Index Inflation Rate	6.5 percent
TOTAL ESTIMATED PROJECT COST (2026 DOLLARS)	**$14,992,500**

Development and Evaluation of Improvement Alternatives

Only the lift stations and WWTF have alternatives that warrant evaluation. Improvements to the collection system are general in nature and should be completed as needed to maintain the system. More detailed information on the evaluation of improvement alternatives, as well as the proposed collection system improvements, is included in Sections 4 and 5.

Lift Stations

The six City-owned and operated lift stations were evaluated based on comments and information obtained from Public Works personnel and a field review of the lift stations by Anderson Perry & Associates, Inc.. Based on the information obtained, it was determined the lift stations are in good condition structurally; however, improvements to pumps, pumping mechanical equipment, electrical, and control systems are needed. Two alternatives were developed for the lift stations:

- Alternative 1 - No action.
- Alternative 2 - Replace existing pumping equipment and install new remote monitoring, electrical, and instrumentation and controls.

Wastewater Treatment Facility

The WWTF has adequate capacity and redundancy to meet the needs of the planning period while meeting NPDES Permit requirements. Recommended improvements are intended to improve operational efficiency, safety, reliability, expandability, and consistency.

Four conceptual WWTF improvements alternatives were evaluated during preparation of this WWFP:

- Alternative 1 - No action.
- Alternative 2 - Replace existing pumping equipment and electrical components.
- Alternative 3 - Replace existing pumping equipment, improve the main influent screen, and convert the gas chlorination system to sodium hypochlorite.
- Alternative 4 - Replace existing pumping equipment, improve the main influent screen, upgrade SCADA systems, convert the gas chlorination system to sodium hypochlorite, complete biosolids removal, and construct a new operations and laboratory building.

Development and Evaluation of Financial Status

The annual cost of operating and maintaining the wastewater system is summarized on Table 2-13 in Section 2. The annual cost includes all costs for the wastewater system such as operation, maintenance, and replacement; staff payroll; and existing debt service. A graphical plot of the City's sewer system budget, both revenue and expenditures, is shown on Chart 2-1 in Section 2. By plotting a "trend" line for the expenditures, the expenditures in a future year can be estimated, assuming no changes to the wastewater system occur. The trend line for the City's O&M expenditures suggests expenditures will be approximately $2,677,390 in the budget year 2024-25, not including debt service. An evaluation of the City's sewer system fund was used to determine the City's potential loan capacity for the City's recommended medium-term improvements.

Total revenue, total costs, and the net difference from fiscal years 2016-17 to 2020-21 were used to determine the potential annual loan repayment the City could afford.

To determine the City's ability to fund a WWSI project, Figures 6-2 and 6-3 in Section 6 were prepared. This WWFP shows how much the City would need to raise sewer rates to fund a project from strictly loan funds. The data shown on Figure 6-2 in Section 6 provide a general idea of the amount of debt the City could afford to service at various average monthly sewer rates.

Table ES-6 presents the approximate loan amounts the City could assume based on the City's current monthly sewer rate of $55.61 and using only loans without any grant assistance.

TABLE ES-6
ESTIMATED LOAN CAPACITY AT EXISTING SEWER RATE

Current City Monthly Sewer Rate	Water/Wastewater Loan Funding Capacity (2.53 Percent, 25-Year Term)[1]	CWSRF Loan Capacity (1.33 Percent, 15-Year Term)[2, 3]	CWSRF Loan Capacity (1.92 Percent, 30-Year Term)[2, 3]
$55.61	$10,000,000	$11,705,000	$19,608,000

[1] *Maximum loan amount*

[2] *Loan terms are further described in Section 6 of this WWFP. Loan capacities are rounded to the nearest $1,000.*

[3] *Does not include an annual fee of 0.5 percent of the remaining loan amount.*

If the City were to fund the selected WWSI projects identified in Section 5 of this WWFP without any grants, monthly sewer rates would need to be raised to approximately $62 per month assuming a 15-year loan term with a 1.33 percent interest rate or $57 per month assuming a 30-year loan term with a 1.92 percent interest rate.

If the City were to fund improvements using property taxes, Figure 6-3 provides a general idea of the impact to property taxes for varying interest rates and loan amounts if the debt payment is supported only by property taxes. Assuming that funding is provided by the Oregon Department of Environmental Quality (DEQ) Clean Water State Revolving Fund (CWSRF) with a 30-year loan term and 1.92 percent interest rate, the City would need to raise property taxes by approximately $28.99 per $1,000 assessed value.

A significant financial commitment will be required on the City's part to implement the improvements outlined in this WWFP. Based on the estimated cost of the improvements, the City will need to obtain low-interest loans coupled with grants to fund the improvements. The most likely sources of loan and grant funding are the Business Oregon Water/Wastewater Financing Program, the DEQ CWSRF, and the U.S. Department of Agriculture's Rural Development (RD) programs.

Project Implementation

The following action items and implementation steps, which are general in nature, need to be taken by the City of Prineville to implement the recommended medium- and long-term WWSI.

Action Items

- The City will need to formally adopt this WWFP, which will address review comments from the DEQ. A formally adopted WWFP is required by state and federal funding and regulatory agencies if the City wishes to pursue funding from these agencies to complete the improvements.
- The City will need to consult and initiate funding discussions with funding agencies (Business Oregon, DEQ, and RD) to ensure the best possible funding package is developed and obtained for the improvements. The City will need to contact the Business Oregon regional coordinator to start the intake process and, as necessary, complete the intake form and submit it to Business Oregon to initiate funding discussions.
- The City will need to prepare and submit funding applications to appropriate funding agencies.

- The City will need to investigate if authorization to incur debt for the WWSI is required by City charter. If authorization is required, the City will need to decide how to obtain the authorization to incur debt. Once decided (revenue bond or general obligation bond), a bond attorney should be consulted, and the appropriate resolution paperwork should be prepared and considered for implementation.
- The City will need to hold public information meetings to inform its citizens of the needs and scope of the project, answer questions, and generate support for the required sewer rate increase.

Implementation Schedule

Should the City wish to proceed with the recommended WWSI, the following implementation schedule outlines the key steps the City would need to undertake. The implementation steps and stated completion dates are presented as general guidance only and provide the estimated time needed to complete projects of this complexity and magnitude. The dates are subject to change and will depend on economic conditions within the community; implementation of the improvements could be delayed due to economic conditions.

Item No.	Implementation Item	Time Frame
1.	Submit draft WWFP to the City and agencies for review.	September 2023
2.	Finalize and adopt the WWFP.	December 2023
3.	Review and update the City's Comprehensive Plan with the WWFP as required.	Winter 2023-24
4.	Attend One Stop meeting.	Winter 2023-24
5.	Prepare and submit funding application(s) to appropriate agency(ies).	Spring 2024
6.	Finalize project funding.	Summer 2024
7.	Design system improvements.	Summer 2024 through Summer 2025
8.	Submit design documents for agency(ies) review.	Summer 2025
9.	Advertise, bid, and award construction project.	Winter 2025-26
10.	Project construction.	Spring 2026 through Winter 2026-27
11.	Project startup and construction completion.	Spring 2027
12.	Project closeout.	Summer 2027
13.	Monitor system performance to determine the impact of improvements and report impacts to the DEQ.	Two years after project closeout

The key to implementing the WWSI, as outlined in this WWFP, is the City's ability to acquire Business Oregon and/or DEQ low-interest loans coupled with grant funding. In addition, it is vital that the City supports the improvements and contributes their appropriate share of the cost. All improvements will likely not be economically feasible for the City unless grant funds can be obtained. The City will have to work closely with its citizens to inform them of the system needs and the necessity for increased sewer rates.

WWSI as outlined in this WWFP will provide the City with reliable, quality wastewater collection and treatment systems that will meet the City's needs for many years to come. The improved collection system and WWTF will help provide safer, more reliable, and more efficient operation and increased protection of the environment and public health.

Section 1 - Project Planning

General

This Wastewater Facilities Plan (WWFP) is authorized by agreement between the City of Prineville, Oregon, and Anderson Perry & Associates, Inc., dated March 18, 2022. The City completed a WWFP in 2005, a WWFP Update in 2010, and a WWFP in 2018. Due to an unexpected increase in the City's population, the City has requested completion of a new WWFP. This WWFP is intended to replace the 2018 WWFP and provide updated information on which future operation of the City's municipal wastewater systems can be based. This WWFP is also intended to fulfill the requirements of the Oregon Department of Environmental Quality for a current facilities plan for a 20-year planning period.

Location

The City is located in central Oregon at the intersection of Highway 26 (Madras-Prineville Highway) and Highway 126 (Ochoco Highway), adjacent to the Crooked River in Crook County. See Figure 1-1 for location and vicinity maps of the study area. The City of Prineville is the county seat and the only incorporated city in Crook County, with a population of 10,736 at the 2020 Census. The 2021 population for Prineville is 11,042, as estimated by the Population Research Center (PRC) at Portland State University (PSU).

Service Area

The existing wastewater treatment facility and wastewater collection system serve residents living within the urban growth boundary (UGB). Many areas with large tracts of undeveloped land currently exist within the UGB. With a significant area of open, undeveloped land available, the City has the potential for residential, commercial, and large commercial growth.

Topography

The City is located in central Oregon along the Crooked River, a major tributary of the Deschutes River, which flows north into the Columbia River. The valley through which the river flows is bordered on the north and east by the slopes of the Ochoco Mountains and on the south and west by the steep escarpments that rise to an extensive lava plateau. The City is situated in the high desert area east of the Cascade Mountains and west of the Ochoco National Forest with surface elevations ranging from 2,800 to 3,600 feet above mean sea level (AMSL). The City occupies 12.83 square miles and is accessed mainly via Highway 26 or Highway 126.

Land Use

The majority of land in the surrounding vicinity is privately owned, is residential land, or is used for livestock grazing and/or irrigated crop farming. Industries include wood manufacturing, data centers, tire manufacturing and storage, and regional trucking/ground transportation companies.

Zoning

The current zoning in the City is shown on Figure 1-2 and in Appendix B. Sixteen land use designations have been identified within the city limits. The majority of the City is designated for residential use. Areas along Highway 126 are primarily designated as Multipurpose and Airport, while areas along Highway 26 are primarily designated as Outlying Commercial, Core Commercial, and Open Space.

Environmental Resources Present

Water

The Crooked River, Ochoco Creek, Ryegrass Ditch, and several distribution canals are the primary surface waters located in the vicinity of the City. Some of the recommended wastewater system improvements (WWSI) will occur in the vicinity of waterbodies, although impacts to the waterbodies are not anticipated.

Flora and Fauna

Important fish and wildlife habitat in the proposed project area includes the Crooked River, Ochoco Creek, and associated riparian areas. Riparian areas are critical to the health of streams, as riparian vegetation provides shade and temperature regulation of the streams, provides cover for aquatic organisms, and stabilizes streambanks to prevent erosion.

According to a U.S. Fish and Wildlife Service Information for Planning and Consultation website search, bull trout (*Salvelinus confluentus*) and gray wolf (*Canis lupus*) have the potential to be present in the surrounding vicinity. Due to lack of suitable habitat, the gray wolf is unlikely to be present and, thus, is unlikely to be impacted. According to StreamNet, spring Chinook salmon (*Oncorhynchus tshawytscha*), summer steelhead (*Oncorhynchus mykiss*), pacific lamprey (*Entosphenus tridentatus*), and redband trout (*Oncorhynchus mykiss*) utilize the Crooked River and have the potential to be present in the vicinity of the proposed WWSI. Any potential impacts to these species will be mitigated using best management practices during construction activities. No Essential Fish Habitat or Critical Habitat designations are mapped within the surrounding vicinity.

Climate

The climate in the summer is typically dry with clear days. Winter brings rain, snow, and frozen soils. Temperatures vary from extremes of negative 30° Fahrenheit (F) in the winter to 120°F in the summer. These extreme temperatures are usually not prolonged. According to the Western Regional Climate Center (WRCC), the average annual temperature for Prineville is approximately 48°F, and the annual average precipitation is approximately 9.8 inches. See Table 1-1, Chart 1-1, and Appendix C.

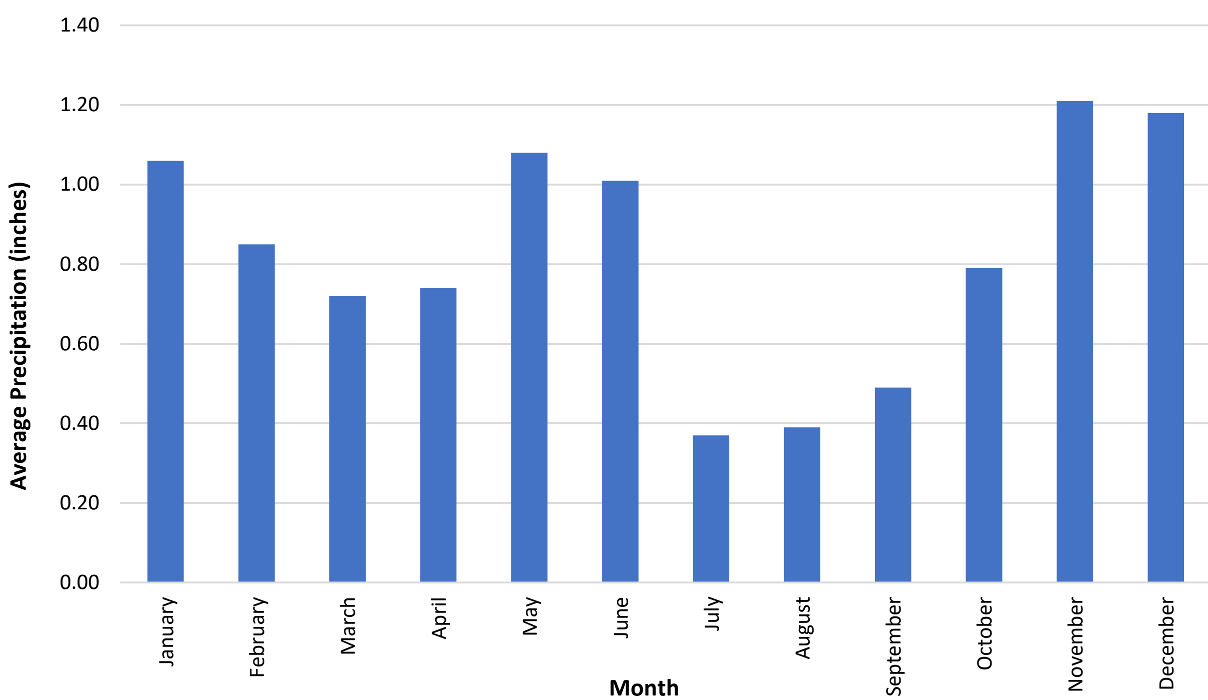
TABLE 1-1
TEMPERATURE, PRECIPITATION, AND EVAPOTRANSPIRATION SUMMARY

Month	Average Precipitation (inches)[1]		Average Temperature (F)[1]		Average Evapotranspiration (inches)[2]	
	Monthly	Annual	Monthly	Annual	Monthly	Annual
January	1.06	9.8	31.8	47.4	1.1	52.05
February	0.85		36.1		1.47	
March	0.72		40.2		2.79	
April	0.74		45.5		4.01	
May	1.08		52.1		5.95	
June	1.01		58.3		7.68	
July	0.37		64.8		9.55	
August	0.39		63.4		7.96	
September	0.49		56.4		5.41	
October	0.79		48.1		3.26	
November	1.21		39.2		1.70	
December	1.18		32.9		1.18	

[1]Data were obtained from the WRCC Co-op Station Number 356883 (Prineville 4 NW).

[2]Data were obtained from the Powell Butte, Oregon, AgriMet Weather Station (pobo).

CHART 1-1
AVERAGE PRECIPITATION FOR THE CITY OF PRINEVILLE



Floodplains

The Deschutes subbasin is located in central Oregon in the high desert. The Crooked River watershed, within the Deschutes subbasin, is the largest eastside tributary to the Deschutes River. The South Fork Crooked River and Beaver Creek join the North Fork Crooked River east of Prineville. The Crooked River flows immediately south of Prineville and reaches its confluence with the Deschutes River northwest of Prineville and southwest of Madras. The Deschutes River is a tributary of the Columbia River. In total, the Crooked River extends nearly 125 miles east to west from its source to the Deschutes River.

According to the Federal Emergency Management Agency (FEMA) Map Service Center, FEMA Flood Insurance Rate Map Panel Numbers 41013C0400C, 41013C0403C, 41013C0405C, 41013C0412C, 41013C0411C, 41013C0384C, 41013C0415C, and 41013C0416C (dated February 2, 2012) have been assigned to the project area. See Appendix D for the referenced FEMA floodplain maps.

Portions of the recommended WWSI appear to be located within FEMA Zone AE, an area located within the 100-year flood zone, and other flood areas.

Population Trends

To estimate future wastewater system flows, population projections must be made. Projections are usually made based on an annual percentage increase estimated from past growth rates combined with future expectations. In 2013, the Oregon legislature approved assigning coordinated population forecasting to the PRC at PSU. This allows counties to prepare coordinated population forecasts according to “generally accepted” demographic methods. The PRC is the official source of population data available in Oregon between the official Census data generated at the beginning of each decade.

The population projections and average annual growth rate (AAGR) shown on Table 1-2 appear within the anticipated range based on current data and recent historic population increases for Prineville.

TABLE 1-2
HISTORICAL AND FORECASTED POPULATION

Historical[1]		Forecasted[2]		
2010	2020	2021	2042	AAGR (2022 to 2042)
9,253	10,736	11,042	13,743	1.1 percent

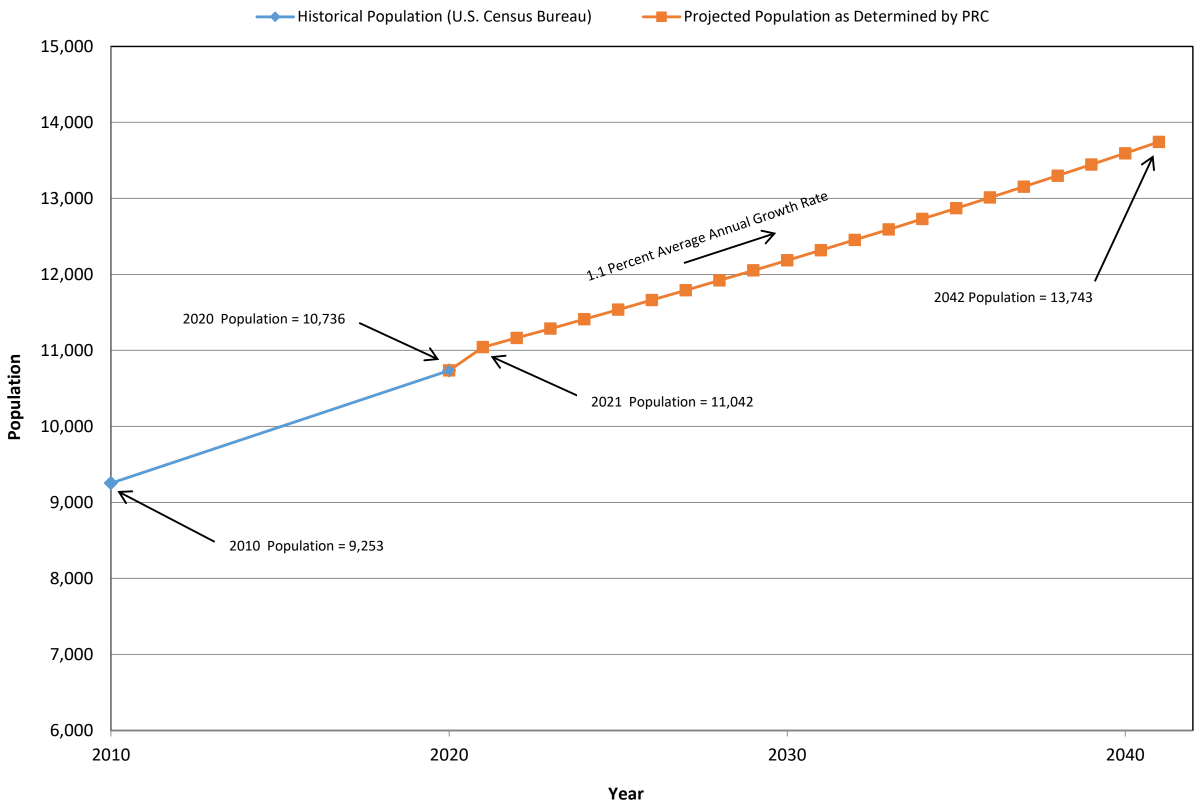
[1] *As provided by the U.S. Census Bureau.*

[2] *As provided by the PRC.*

The City’s population from the 2020 Census was 10,736. The certified population estimate by the PRC for 2021 was 11,042 with an AAGR of 1.1 percent between the years 2022 and 2042.

The historical population plus the projected AAGR results in a 20-year (year 2042) population estimate of 13,743. The 20-year design population inside the city limits of 13,743 was used in this WWFP. See Chart 1-2.

CHART 1-2
HISTORICAL AND PROJECTED POPULATION TREND



It is important to note that not all of the existing City population is connected to the wastewater system. In reviewing City records, the connected population was determined to be 10,771. For the purposes of this WWFP, a review of historical wastewater data must be completed using the connected population. Collection system improvements are needed to be able to connect the entire population within the city limits. In addition, there are areas of residential development outside the city limits but within the UGB. If 20 percent of these areas were annexed into the City, the City's population could potentially increase by 1,002 people to 11,773, without any additional people moving into the area.

To obtain a more accurate population that could require service by the wastewater system in the next 20 years, the estimated 2042 City population of 13,743 was added to the assumed 1,002 population from the UGB for a design population of 14,745 in the year 2042.

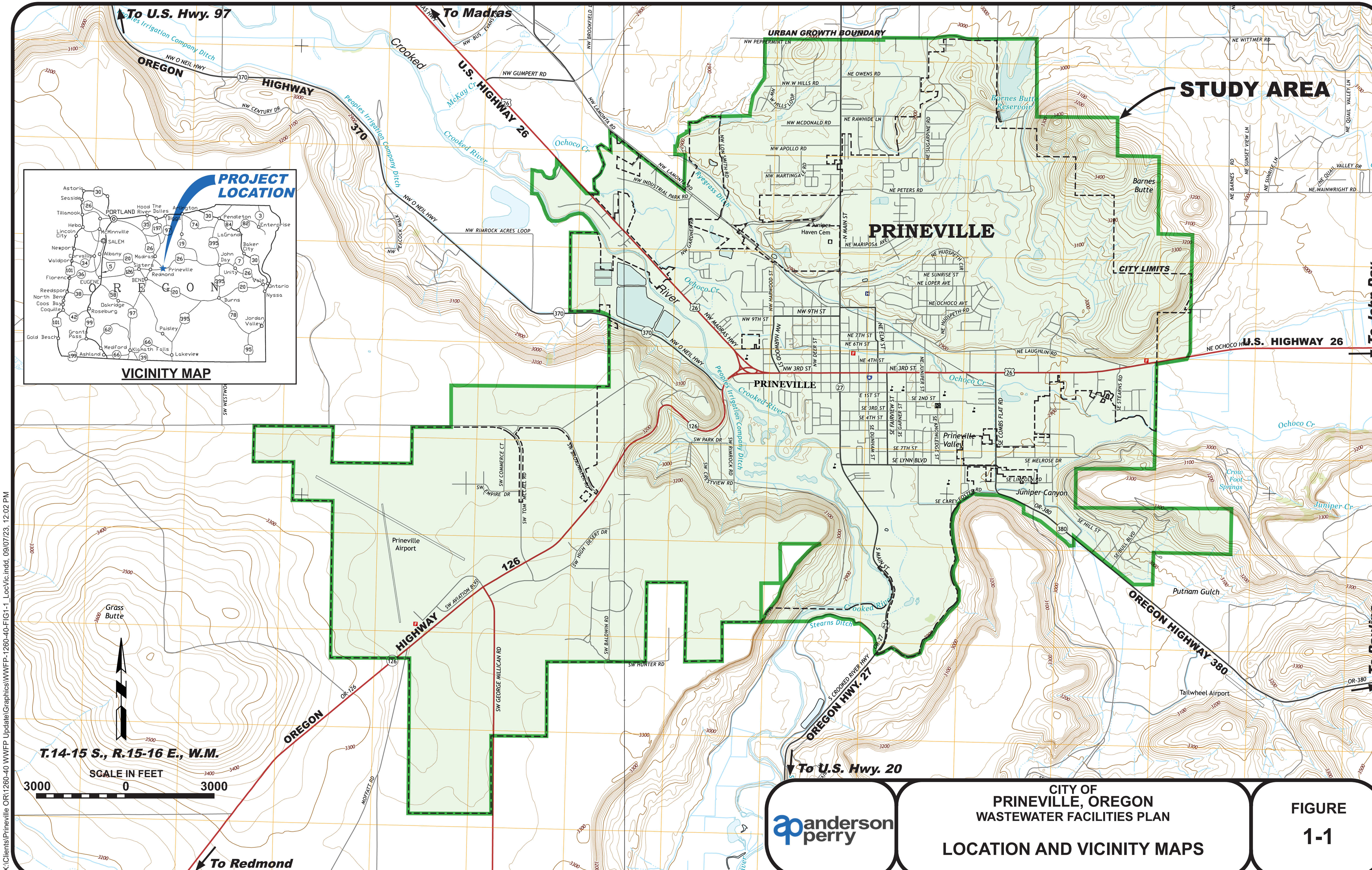
A copy of PSU's *Coordinated Population Forecast 2022 Through 2072 for Crook County* is located in Appendix E.

Community Engagement

WWSI as outlined in this WWFP are intended to provide the City with a reliable, quality wastewater system that will meet the needs of the City for the 20-year planning period and beyond. If the City wishes to implement the WWSI immediately due to rapid growth or aging infrastructure, funding from outside agencies will be needed. However, growth-related improvements can also be funded from the

System Development Charge funding category. All of the options may require sewer rates to be raised to adequately fund the recommended improvements over the 20-year planning period.

No community engagement has been completed prior to the development of this WWFP. However, the City does intend to engage all stakeholders during implementation of this WWFP and the proposed improvements. It will be important for the City to hold public meetings to inform citizens of the need for and scope of the improvements projects, to answer questions, and to explain the need for potential increases in user fees.

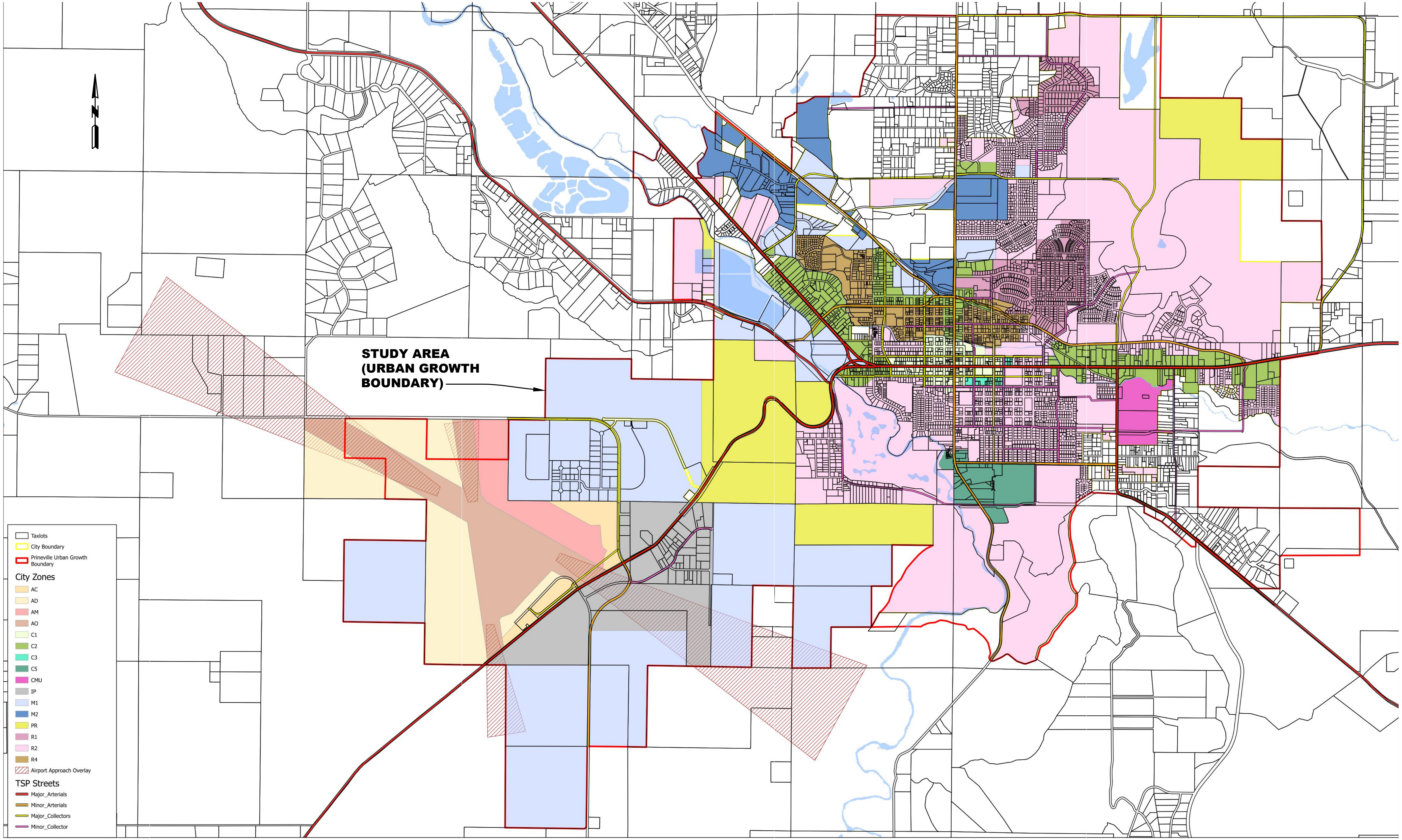


CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

LOCATION AND VICINITY MAPS

FIGURE 1-1

anderson perry



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ZONING MAP OBTAINED FROM CITY OF PRINEVILLE'S WEBSITE

anderson perry

CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

ZONING MAP

FIGURE
1-2

X:\Clients\Prineville OR\1260-40 WWFP Update\CAD\WWFP-1260-40-FIG1-2_Zoning.dwg, Layout1, 9/7/2023 1:54 PM, lmurphy

Section 2 - Existing Facilities

General

In this section, a description and evaluation of the City of Prineville's wastewater collection and treatment systems are provided. System elements are described, and the capacity of critical units is evaluated and compared to existing and future projected flows and loadings. An assessment of the condition of the equipment and components for each unit process is provided, and deficiencies within the system are identified.

Location Map

The existing wastewater facilities include:

- Approximately 1,291 manholes
- Approximately 339,860 linear feet of gravity main ranging from 4 to 48 inches in diameter
- Eight lift stations (six City-owned) ranging in location from the City's collection system to the wastewater treatment facility (WWTF)
- The WWTF
- Four outfalls (Crooked River Discharge, Golf Course Irrigation, Pasture Irrigation, and Wetland Discharge)

Figure 2-1 provides a map detailing the wastewater collection system in the City, and Figure 2-2 provides a site plan of the WWTF. Specific WWTF components are identified on Figure 2-3.

History

Wastewater Collection System History and Description

The majority of the City's wastewater collection system was constructed in 1960. The wastewater collection system serving the City is shown on Figure 2-1. The gravity collection system is composed of pipes ranging in size from 4 to 48 inches in diameter, the majority being 8 inches in diameter, and eight lift stations. Older pipe sections are either asbestos cement or concrete, and newer wastewater piping is predominately polyvinyl chloride (PVC). Additionally, sewage forcemains transport wastewater from the eight lift stations to the gravity main lines, through the main influent lift station, and then to the WWTF lagoons.

Currently, the collection system provides adequate capacity in the City; however, some bottlenecks exist in the system and extensions and upgrades are needed to support continued growth.

Wastewater Treatment Facility History and Description

The existing WWTF is composed of two partially aerated facultative lagoons, Plants 1 and 2. Site piping allows cross-connection between plants. Influent from the main collection system passes through the influent screen on the north side of the Crooked River, then into the influent pump station. Influent from the airport industrial area, which is mostly cooling water effluent, passes through an influent screen on the south side of Pond 1 of Plant 1, where it enters the lagoon at the end of the aeration zone. This south side effluent is very weak, as it is mostly cooling water effluent from the data centers.

Plant 1 is the City's original lagoon system and received upgrades in 1992, 2005, and 2017. Plant 1 includes aerated and facultative lagoons, rock filters, and disinfection and produces Class C treated effluent. Effluent from Plant 1 is utilized for irrigation of the Meadow Lakes Golf Course.

Plant 2 consists of three treatment lagoons operated in a series that produce Class D treated effluent. Wastewater from an influent pump station travels through an aerated lagoon before passing sequentially through a partially aerated lagoon and then a facultative lagoon. Effluent is then disinfected in a chlorine contact chamber. The treated effluent is stored in the effluent storage pond (kidney pond) before it is utilized as irrigation for City-owned pastureland or discharged to the 15 constructed lined and unlined wetlands.

Since 2018 the City has completed aeration system improvements to Plants 1 and 2 that replaced the surface-mounted aspirating aerators with fine bubble diffused aeration in Pond 1 of Plant 1 and Pond 1 of Plant 2. Surface-mounted aspirating aerators continue to perform aeration in the partially aerated Pond 2 at Plant 2.

A wastewater system flow schematic for the existing facilities is shown on Figure 2-3.

Historical Wastewater Data

A review of the historical wastewater data was performed for the City's WWTF. Information was obtained from the City's Discharge Monitoring Reports (DMRs). Figure 2-4 summarizes all DMR data used in the development of this WWFP. Figures 2-5 through 2-8 illustrate specific components of the DMR data, and Figure 2-9 summarizes the design criteria used in the development of this WWFP. A summary of the DMR data is included in Appendix F.

Wastewater Flows

The historical influent and effluent flows, including maximum, minimum, and average daily flows for the five-year period between January 2017 and December 2021, are shown on Figures 2-5 and 2-6, respectively. According to the influent flow data on Figure 2-5, the maximum monthly flow (MMF) of record occurred in April 2017 and was 1,741,000 gallons per day (gpd), which equates to approximately 193 gallons per capita per day (gpcd) utilizing the 2017 connected population estimate of 9,003. This flow was recorded during a period of rapid snowmelt after the heavy snowfall recorded over the winter of 2016-17 was impacted by a warming trend with above-average rainfall. The average annual flow (AAF) was 1,092,217 gpd during the five-year period between January 2017 and December 2021, which equates to approximately 101 gpcd using the current connected population of 10,771.

U.S. Environmental Protection Agency (EPA) guidelines for infiltration/inflow (I/I) evaluations state that "no further infiltration/inflow analysis will be required if domestic wastewater plus non-excessive infiltration does not exceed 120 gpcd during periods of high groundwater." The maximum monthly per capita flow was approximately 193 gpcd (2017 population). This is higher than the 120 gpcd allowed by the EPA for domestic wastewater during periods of high water. The flows listed above exceed the minimum EPA criteria for wet weather flows; therefore, based on EPA guidelines, continued I/I evaluation should be pursued. I/I evaluation could be of great benefit to the City, as I/I is a significant contributor to the system during high water events. The identification of I/I sources and their subsequent removal from the system through manhole and pipeline repair could reduce the total volume of water the City must treat and dispose of, which could provide long-term cost savings to the City. The 2018 WWFP developed a flow of 111 gpcd based on an average flow of 0.999 million gallons per day (MGD) with a population of 9,003. With current average flows of 1.092 MGD and a population of 10,771, the average flow is 101 gpcd. It should also be noted that the City estimated I/I flows have been reduced since the 2018 WWFP, from 0.340 MGD to 0.162 MGD. This could indicate that City efforts to reduce I/I are effective.

AAFs for small communities in eastern and central Oregon are typically in the range of 200 to 300 gpd per equivalent dwelling unit. Recorded flows for the City equate to approximately 212 gpd per EDU, which is within the typical range.

Wastewater Mass Loadings

Figure 2-7 summarizes historical municipal influent five-day biochemical oxygen demand (BOD_5) concentrations as recorded on the DMRs during the five-year period between January 2017 and December 2021. As indicated on Figure 2-7, the WWTF's average influent BOD_5 mass loading was approximately 2,195 pounds per day (lbs/day) and the maximum monthly lbs/day was 2,953. The City's WWTF, according to the data, achieved an average five-day carbonaceous biochemical oxygen demand ($CBOD_5$) removal of 96 percent with an effluent average mass discharge of 67 lbs/day.

The historical municipal influent total suspended solids (TSS) concentrations, as reported on the DMRs during the during the five-year period between 2017 and 2021, are shown on Figure 2-8. As illustrated on Figure 2-8, the average influent TSS was 213 milligrams per liter (mg/L). The WWTF's average influent TSS mass loading was approximately 1,911 lbs/day, and the maximum monthly lbs/day was 2,723. The City's WWTF, according to the data, achieved an average TSS removal of 90 percent with an effluent average mass discharge of 30 lbs/day.

The recorded BOD_5 and TSS mass loadings are within the expected range of residential-strength wastewater. BOD_5 and TSS per capita contributions typically range from 0.11 to 0.33 pounds per capita day (ppcd), with a normal contribution of approximately 0.20 ppcd. Therefore, for the community's population, mass loading is typical of national averages. For domestic wastewater systems serving mainly residential units, the BOD_5 and TSS concentrations normally range from 190 to 220 mg/L. The City's average concentrations over the historical data period for BOD_5 and TSS were 248 and 213 mg/L, respectively.

Wastewater Influent Flow and Mass Loading Projections (2042)

Typical flow rate design parameters used for sizing process systems of WWTFs are AAF, peak hourly flow, and MMF. Typical mass loading rate design parameters used for sizing process systems of WWTFs are maximum monthly $CBOD_5$ and BOD_5 in lbs/day and maximum month daily TSS in lbs/day.

For the historical data period, the average population used was 10,771. This WWFP has adopted a design year of 2042 with a projected population of 14,745. Projected flows and loadings for the design year were estimated by multiplying historical per capita values by the projected population. These design criteria are summarized on Figure 2-9.

Wastewater Effluent Mass Loading and Regulatory Requirements (2042)

The City is required to have a Recycled Water Use Plan (RWUP) that describes operation of the effluent reuse system and provides the necessary technical information to satisfy the requirements of the City's National Pollutant Discharge Elimination System (NPDES) Permit and Oregon Administrative Rules 340-055. See Appendix G for a copy of the RWUP.

The current NPDES Permit was developed for an AAF with no daily maximum limit and restricts to maximum effluent pollutant concentrations for BOD_5 and TSS between November 1 and April 30 when discharging to the Crooked River (Outfall 001) and between May 1 and October 31 for Outfalls 002, 003, and 004. Assuming the WWTF continues to treat and discharge effluent that meets allowable mass loadings concentrations, changes to the NPDES Permit conditions are not anticipated for the WWTF to continue to discharge to any of the outfalls through the design year of 2042.

Condition of Existing Facilities

The following sections describe the current conditions of the wastewater collection system and treatment facilities.

Wastewater Collection System Description and Evaluation

Collection System Description

The gravity collection system is supplemented with eight lift stations, two of which are privately owned and operated. The system has 1,291 manholes and approximately 64.4 miles of system piping. A detailed breakdown of the collection system piping by size is provided on Table 2-1.

TABLE 2-1
SEWER PIPE SUMMARY

Pipe Description	Footage	Miles
4-inch	1,170	0.22
6-inch	14,140	2.68
8-inch	227,100	43.0
10-inch	22,100	4.19
12-inch	25,050	4.74
14-inch	5,950	1.13
15-inch	8,700	1.65
18-inch	15,000	2.84
21-inch	9,500	1.8
24-inch	5,600	1.06
30-inch	1,900	0.36
36-inch	3,100	0.59
48-inch	550	0.10
TOTAL	**339,860**	**64.36**

Collection System Evaluation

Lift Stations

Airport Lift Station

The Airport Lift Station was constructed in 1997 in a manhole structure 15 feet deep with the pumps mounted on a rail system. The single-phase, 240-volt duplex pump station has a capacity of 76 gpm at 38 feet of total dynamic head (TDH) with one pump running. The forcemain is a 3-inch PVC pipe that discharges to the gravity sewer along the Ochoco Highway. The pump station includes a small backup power generator receptacle with a manual transfer switch. The pump station has been in service for more than 25 years, and a major upgrade, including new pumps and guide rails, level controls, a flowmeter, electrical panel and components, and SCADA upgrades, is recommended. The lift station discharges through a 3-inch PVC pipe to manhole (MH) 515 on the gravity sewer.

Oregon Youth Authority Lift Station

The Oregon Youth Authority constructed a lift station in 1997, which is located north of the Ochoco Highway. The submersible design is constructed in a manhole structure. The lift station is 28 feet deep with the pumps mounted on a rail system. The 3-phase, 460 volt lift station now serves the needs of the National Guard and flows originating from the west side of the Facebook data centers, the U.S. Forest Service air base, and the surrounding industrial park. The forcemain is an 8-inch PVC pipe that discharges to the gravity sewer along the Ochoco Highway. This lift station is equipped with a standby power connection and manual transfer switch and has two 40 horsepower (Hp) motors. The lift station has been in service for more than 25 years and a major upgrade, including new pumps and guide rails, level controls, a flowmeter, an electrical panel and components, and SCADA upgrades, is recommended. The lift station discharges through 8- and 14-inch PVC pipes to MH 538 on the gravity sewer.

Williamson Lift Station

The Williamson Lift Station is located south of the Ochoco Highway at the end of Williamson Drive. The lift station was constructed in 1995 and has a capacity of 225 gallons per minute (gpm) at 47 feet TDH with one pump running. The lift station contains two Hydronix self-primer pumps each with a 3-phase, 460-volt, 7.5 Hp motor. The two pumps and controls are mounted in a reinforced fiberglass pad-mounted enclosure. This enclosure is adjacent to a 12.5-foot deep sump-type wetwell. The wetwell has been set up for expansion. Currently, no electrical issues exist. The City has reported issues with the supervisory control and data acquisition (SCADA) system, and the well cover appears to have some damage. The forcemain is a 4-inch PVC pipe that discharges to MH 723 on the gravity sewer.

Saddle Ridge Lift Station

The Saddle Ridge Lift Station is a 3-phase, 240-volt duplex pump station constructed in 2007. The pumps are 2.9 Hp Hydronix submersible with a guide rail system. The lift station has a small backup power generator receptacle with a manual transfer switch. The lift station is located on N.W. Saddle Ridge Loop on the far north end of the City. The lift station is generally in good condition but could benefit from the installation of a flowmeter as well as an upgrade to the level controls. The lift station discharges to the gravity collection system at the intersection of N.E. Rawhide Lane and North Main Street.

Western Sky Lift Station

The Western Sky Lift Station was constructed in 1996 and is located on N.W. Western Sky Road south of Gardner Road. The pump station is constructed in a manhole structure and has two submersible pumps with an older guide rail system that requires entry into the wetwell to decouple the pumps for removal. The capacity of the lift station is 140 gpm at 30 feet TDH with one pump running. The motors are 3.0 Hp. The single-phase, 240-volt pump has no standby power but has a small backup power generator receptacle with a manual transfer switch. The forcemain is a 4-inch PVC pipe that discharges to the gravity sewer along Highway 26. This lift station has an adjacent wetwell that appears to be abandoned but still collects solids. The purpose of this wetwell is unknown; however, the wetwell may be able to be modified to eliminate the collection of solids and standing wastewater by installing a concrete floor where accumulated materials can be held until removed and disposed of. Needed lift station improvements include an upgraded guide rail system, SCADA upgrades, upgraded level controls, and installation of a flowmeter. The lift station discharges through a 4-inch PVC pipe to the gravity sewer in Highway 26.

McDougal Lift Station

The McDougal Lift Station is a single-phase, 120-volt duplex submersible pump system. It is located in a cul-de-sac off Highway 26 in the northwest part of the City. The 5 Hp lift station has no backup generator power connection. The capacity of the lift station is 100 gpm at 15 feet TDH with one pump running. Upgrades to the pump station were completed in 2014; however, additional upgrades are needed such as pump guide rails, SCADA upgrades, a flowmeter, and upgraded level controls. The lift station discharges through a 4-inch PVC pipe to the gravity sewer in Highway 26.

Infiltration and Inflow

I/I is unwanted flows entering the wastewater collection system. I/I in a collection system can occur during different times of the year. During the winter and early spring, the sources of inflow are normally storm events and spring runoff. During the summer, heavy irrigation and the filling of irrigation ditches and canals can raise groundwater levels, which can lead to inundation of sewer pipes resulting in increased infiltration. Poorly lined irrigation canals and ditches can be a source of infiltration because leaking irrigation water can elevate groundwater levels in the vicinity of wastewater main lines. Specifically, infiltration and inflow are defined as follows:

- Infiltration - Water entering the collection system and service connections from the ground through such means as, but not limited to, defective pipes, pipe joints, and defective service line connections or manhole walls. Infiltration does not include, and is distinguished from, inflow.

- Inflow - Water discharged into a collection system and service connections from such sources as, but not limited to, roof drains, cellars, yard and area drains, foundation drains, sump pumps, drains from springs and swampy areas, manhole covers, cross connections from storm sewers and combined sewers, catch basins, stormwater, surface runoff, and street washes or drainage.
- I/I - The total quantity of water from both infiltration and inflow without distinguishing the source.

Most cities have some I/I contributing to their wastewater collection system. Excessive I/I can be a problem because these flows must be treated along with normal wastewater flows and take up valuable treatment capacity at a treatment plant. Excessive I/I is defined as the quantity of I/I that can be economically eliminated from a collection system by rehabilitation or other means, as determined by a cost analysis that compares the cost effectiveness of correcting the I/I conditions with the total cost for transportation and treatment of I/I.

The EPA's "Guide for Estimating Infiltration and Inflow" outlines a methodology to estimate the amount of I/I entering a collection system. For infiltration analysis, flow data were collected over a six-month dry weather period. The average base flow (ABF) is determined by averaging the minimum daily flow for each year over a five-year period. Due to the large commercial users in Prineville, daily or weekly flow calculations or methodology based on overnight flows are impractical. By using average dry weather flow (ADWF), ABF, and average wet weather flow (AWWF) over a prolonged period, an estimate of I/I can be developed.

Based on a review of DMRs, there appears to be infiltration into the gravity wastewater system. The City appears to be experiencing I/I of approximately 162,000 gpd. This was determined by analyzing influent data in the DMRs (see Figure 2-4). The ADWFs for the last five years were compared to the ABF. A summary of data is provided on Table 2-2 below.

TABLE 2-2
INFILTRATION/INFLOW ANALYSIS SUMMARY

Parameter	Basis of Determination	MGD	gpcd[1]
AAF[2]	DMRs	1.092	101
ADWF[3]	DMRs	1.045	97
AWWF[4]	DMRs	1.140	106
ABF[5]	DMRs	0.930	86
Base I/I	DMRs	0.162	15

[1] The 2021 connected population of 10,771 was used for this analysis.

[2] Average of daily flows over the five-year period from January 2017 to December 2021.

[3] ADWF averaged from dry weather months July through December over the five-year period from 2017 to 2021.

[4] AWWF averaged from wet weather months January through June over the five-year period from 2017 to 2021.

[5] Minimum daily flow per year averaged over the five-year period from 2017 to 2021.

From these calculations, the base I/I flow is determined to be approximately 0.162 MGD. While this amount is not excessive and is an improvement from the 2018 WWFP that estimated I/I to be 0.340 MGD, the City is still pursuing improvements that will continue to reduce I/I flow. More detailed information regarding the collection system can be found in Sections 4 and 5. More detailed information regarding the CIP can be found in Appendix H.

Wastewater Treatment Facility Description and Evaluation

Wastewater Treatment Facility Description

The City of Prineville operates a secondary WWTF. The WWTF was originally constructed in 1960 and is composed of two partially aerated facultative lagoon treatment plants operating in parallel. These types of wastewater treatment lagoons are common throughout eastern Oregon. See Figure 2-2 for an aerial photograph of the WWTF. The process flow schematic is shown on Figure 2-10, and descriptions of the associated WWTF components are provided on Figure 2-11. The WWTF has adequate capacity and redundancy to meet the needs of the planning period while meeting NPDES Permit requirements. Summaries of the performance of the WWTF are provided on Tables 2-3, 2-4, and 2-5 below.

TABLE 2-3
WWTF PERFORMANCE SUMMARY

Effluent Discharge Parameter	Limits	Reported Average
Effluent pH	6.0 to 9.0	8.1
Effluent TSS Removal Efficiency (Outfalls 001, 002, and 003)	Greater than 65 percent	91 percent
Effluent TSS Removal Efficiency (Outfall 004)[1]	Not less than 85 percent monthly average	97 percent
Effluent $CBOD_5$ Removal Efficiency (Outfalls 001, 002, and 003)	Greater than 65 percent	96 percent
Effluent BOD_5 Removal Efficiency (Outfall 004)[1]	Not less than 85 percent monthly average	99 percent
Effluent Total Coliform Bacteria (Outfalls 001, 002, and 003)	7-day median less than 23, no two consecutive over 240	1
Effluent *E. coli* Bacteria (Outfall 004)[1]	Shall not exceed a monthly mean of 126 organisms per 100 milliliters (ml), with no single sample exceeding 406 organisms per 100 ml.	4
pH (Outfalls 001, 002, and 003)	6.0 to 9.0	8.1
pH (Outfall 004)[1]	6.5 to 8.5	7.2

[1]*All Outfall 004 reported results are as recorded in the Groundwater Monitoring Report per the approved Groundwater Monitoring Plan.*

TABLE 2-4
OUTFALL 001 $CBOD_5$ AND TSS

Parameter	Monthly Average (mg/L)	Monthly Average (lbs/day)	Daily Maximum (pounds)
$CBOD_5$	25	230	460
TSS	40	367	734
Reported Results[1]			
$CBOD_5$	11	61	114
TSS	30	160	370

[1]Sampling and reporting required only when discharging per Schedule A of NPDES Permit No. 101433.

TABLE 2-5
OUTFALL 004 BOD_5 AND TSS

Parameter	Monthly Average (mg/L)	Weekly Average (mg/L)
BOD_5 (May 1 through October 31)	10	15
TSS (May 1 through October 31)	10	15
BOD_5 (November 1 through April 30)	30	45
TSS (November 1 through April 30)	30	45
Reported Results[1]		
BOD_5	3	3
TSS	7	8

[1]Results sampled and reported from groundwater and surface water monitoring locations per Schedule B of NPDES Permit No. 101433 Modification executed on September 25, 2015.

Description and Evaluation of Treatment Process Systems and Components

Influent Screens

All influent from the City's collection system enters the WWTF through two influent screens. The first screen, referred to in this WWFP as the Treatment Plant No. 1 influent screen, is located on the west side of Pond 1 of Plant 1 just beyond the aeration zone. Influent from the airport industrial area enters the WWTF by gravity at this location. The Kusters in-channel fine screw screen, Model ICSS 3/6, has a maximum flow design capacity of 0.85 MGD. The screen is equipped with a totalizing digital flowmeter and is a 1/4-inch perforated rotary drum design with an integral screenings washer compactor installed at a 45-degree incline. The washed and compacted screenings are discharged to an automatic bagger system and hauled to the landfill for disposal. This screen was installed in 2020 and has no identified deficiencies.

The main influent screen system is located east of the influent pump station across the Crooked River as shown on Figure 2-3. The screen is a Huber ROTAMAT® RoK4 700/6 with a maximum flow design capacity of 4.5 MGD. The screen is a perforated basket design with a vertical shaftless screw installed in a vault off from the 48-inch ductile iron (DI) influent main line. The screen unit is equipped with an integral screenings washer/compactor. The washed and compacted screenings are deposited in a dumpster and hauled to the landfill for disposal.

A complete rebuild of the existing main influent screen system is in progress. Once complete, the rebuilt system will be evaluated over time to determine if a different screen system is needed.

Influent Main Lift Station to Wastewater Treatment Facility

The influent main lift station at the WWTF consists of four submersible influent pumps that receive screened wastewater from the 48-inch pipe that transports raw wastewater from the collection system. The pumps are equipped with 25 Hp submersible motors with a motor speed of 1,800 revolutions per minute (RPM) and are designed to pump 1,650 gpm at a TDH of 38.5 feet each. These pumps are currently being updated, with two of the four pumps having recently been replaced with similar pumps. The pumps lift the incoming wastewater into a concrete splitter box that splits flow between Plants 1 and 2 using adjustable weirs. Currently, the flow is fairly evenly split between the plants. Wastewater is then pumped to Plants 1 and 2 using dedicated submersible feed pumps. Each plant pump station has three feed pumps. Both sets of feed pumps have identical 25 Hp pumps designed to pump 1,760 gpm at a TDH of 35.2 feet each. Influent is pumped to Plant 1 via a 10-inch pipe and to Plant 2 via a 12-inch pipe. A Panametrics DF868 strap-on flowmeter is utilized after each plant's feed pumps to measure flows pumped into each plant.

Currently, the City is procuring replacement pumps for the influent lift station main pumps. Additional improvements will include electrical and control system upgrades, followed by similar upgrades to the feed pumps at Plants 1 and 2.

Plant 1

Plant 1 is the original WWTF and has a design influent flow capacity of 1.2 MGD. Plant 1 has a partially aerated primary lagoon with a facultative secondary lagoon. The calculated BOD_5 loading capacity of Plant 1 is approximately 2,690 lbs/day. The primary lagoon is partially aerated with a fine bubble diffuser system. The system uses three centralized 50 Hp blowers (two duty and one standby) that supply four laterals and 160 fine bubble membrane diffusers. The aeration system supplies 100 pounds of oxygen per hour to the lagoon. Wastewater pumped into Plant 1 is directed through the 37-acre primary lagoon, which has a detention time of 62 days at 1.1 MGD and an operating volume of approximately 68 million gallons (MG). After the primary lagoon, the wastewater enters a 10-acre secondary facultative lagoon with a detention time of 15 days at 1.1 MGD and a volume of approximately 16 MG. Information regarding the aeration system is shown on Table 2-6.

TABLE 2-6
PLANT 1 AERATION SYSTEM DESIGN SPECIFICATIONS

System Provider	Nexom
Number of Blowers	3
Blower Model	Aerzen Delta 50-L
Motor	50 Hp
Drive	Direct
Capacity	1,200 SCFM @ 4.0 psi
Number of Diffusers	160
Diffuser Model	HT25-8
Phase	3
Volts	460

psi = pounds per square inch

SCFM = standard cubic feet per minute

After passing through the two treatment lagoons, wastewater is disinfected in a two-basin chlorine contact chamber. Each basin has a volume of 26,600 gallons. This produces a contact time of 70 minutes at 1.1 MGD with both basins in operation.

The data center cooling water discharge enters the plant from a new dedicated pipeline and influent screen to the west side of the treatment plants. The primary discharge point is Pond 1 at Plant 1, at the end of the aeration zone. This location was selected because Plant 1 has more detention time for increased flows and the cooling water has negligible waste loads. This discharge location increases the detention time for the flows with normal waste loads entering Plant 1. Discharge piping has also been installed to connect to Plant 2 as an alternate discharge point if needed.

After disinfection, effluent is routed through the intermediate pump station. This pump station has two 15 Hp pumps with a combined capacity of 2,100 gpm at a TDH of 35 feet. The intermediate pump station allows flow to be routed either to the Plant 2 effluent storage pond (commonly referred to as the kidney pond) or the Plant 1 effluent storage pond (golf course irrigation storage pond). The Plant 1 storage lagoon has a volume of approximately 25 MG and a detention time of 23 days. Effluent is treated and disinfected as required by the NPDES Permit, and then is either pumped through the irrigation pump station for land irrigation or to the treatment and disposal wetlands, or occasionally discharged into the Crooked River. During the summer, some effluent is stored in the golf course irrigation storage pond and utilized for irrigation on the City-owned Meadow Lakes Golf Course. During winter months, effluent can be discharged to the Crooked River. The WWTF is not equipped with a filter system. A filter would normally be recommended for Class C effluent but the WWTF has been meeting the Class C limits without one.

Before discharging to the Crooked River, water from the golf course effluent storage pond needs to have chlorine residuals below the permitted amount. A sulfur burner is available to add sulfur to the water before discharge. When effluent is discharged into the Crooked River, an 18-inch diameter pipe with a three-port diffuser is utilized. The discharge rate is 11.5 feet per second at 1.1 MGD. Due to the construction of the treatment and disposal wetlands, it is unlikely this form of discharge will be utilized in the future; however, the outfall is maintained for the purpose of allowing discharge during unprecedented high flows.

Plant 2

Plant 2 has a design flow capacity of 1.3 MGD. Before wastewater reaches Plant 2, it flows through a diversion box constructed to allow expansion of the lagoons. Currently, the diversion box routes flow to the primary lagoon in Plant 2. Plant 2 consists of three treatment lagoons operated in series lined with a high density polyethylene liner. The first lagoon is an aerated lagoon, followed by a partially aerated facultative lagoon, and finally an unaerated facultative lagoon. The primary lagoon is an aerated basin 3.49 acres in size with a 10-foot operating depth and a volume of 11.4 MG. Aeration in the primary lagoon is performed by a fine bubble diffuser system. The system uses three centralized 75 Hp blowers (two duty and one standby) that supply ten laterals and 180 fine bubble membrane diffusers. The aeration system supplies 100 pounds of oxygen per hour to the lagoon. The second lagoon is equipped with four 10 Hp floating aspirating aerators. The second and third lagoons are both 2.91 acres in size with an operating depth of 6 feet and a combined volume of approximately 11.4 MG. The calculated BOD_5 loading capacity of Plant 2 is approximately 2,890 lbs/day. Information regarding the aeration system is shown on Table 2-7.

TABLE 2-7
PLANT 2 AERATION SYSTEM DESIGN SPECIFICATIONS

System Provider	Nexom
Number of Blowers	3
Blower Model	Aerzen Delta 50-L
Motor	75 Hp
Drive	Direct
Capacity	1,280 SCFM @ 4.0 psi
Number of Diffusers	180
Diffuser Model	HT25
Phase	3
Volts	460

After the three treatment lagoons, wastewater is disinfected in a 42-inch chlorine contact pipe that leads into a 21,500-gallon chlorine contact basin. The 12-inch PVC pipe from the transfer pumps to the effluent storage pond provides additional contact time for disinfection for a total of approximately 60 minutes at 1.2 MGD. Effluent is subsequently stored in the Plant 2 effluent storage pond (kidney pond) after being pumped through the effluent transfer pump station. The effluent transfer pump station has two vertical turbine pumps (VTP) with a capacity of 1,200 gpm and a TDH of 44 feet. Each VTP is equipped with a 20 Hp motor. The 29-acre kidney pond has a volume of 118 MG and a maximum detention time of 98 days. The Class D effluent from Plant 2 is either pumped through the effluent irrigation pump station and utilized for irrigation on City-owned pastureland in summer or processed through the constructed wetland complex and indirectly discharged into the Crooked River through controlled seepage. Additional water for irrigation of pastureland is pumped from the Crooked River using a variable speed VTP with a capacity of 2,400 gpm.

Chlorination System

As outlined in the descriptions of Plants 1 and 2, each plant has its own chlorine contact system. However, both plants are chlorinated from the same location, with the chlorine solution injected upstream into a contact pipe prior to entry into the respective contact chambers. Currently, chlorine gas is used to chlorinate the effluent prior to entry into the contact chambers. The contact chambers at Plant 1 consist of two basins with a volume of 26,600 gallons each, and Plant 2 has a single basin with a volume of 21,500 gallons.

The existing gas chlorination system is reaching the end of its useful life. Additionally, recent supply challenges procuring chlorine gas as well as additional safety requirements have initiated the design of a chlorination conversion project. The proposed project will convert the existing gas chlorination system to a bulk sodium hypochlorite system using two 5,500-gallon bulk sodium hypochlorite storage tanks and two peristaltic pump skids to provide chlorine solution dosing. Currently, the proposed project is at the 90 percent design stage and is identified as System Development Charge (SDC) 1 in the SDC category (see Section 4 for a discussion of SDCs.)

Final Effluent Discharge and Outfall

The City of Prineville's wastewater system is regulated by NPDES Permit No. 101433. Table 2-8 shows outfalls identified in the NPDES Permit and their locations.

TABLE 2-8
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT-IDENTIFIED OUTFALLS

Outfall Number	Location
001	Crooked River Mile 46.8 (Direct River Discharge)
002	Meadow Lakes Golf Course
003	Land Irrigation (Pasture Area)
004	Wetland Discharge

Each outfall has a different beneficial use and, therefore, different permitted water quality limits. For the complete NPDES Permit requirements, see Appendix A for a copy of the current NPDES Permit and Permit Modification. The NPDES Permit was issued in 2012 and the Permit Modification was issued in 2015. Both are scheduled for renewal in 2024. The following summarizes the treatment limits for each outfall.

1. Treated Effluent Outfall 001 - Direct River Discharge
    a. May 1 - October 31: No discharging permitted
    b. November 1 - April 30:
        i. No discharging when daily average flow in the Crooked River is less than 15 cubic feet per second (cfs).
        ii. When discharging, the quality of effluent shall meet the following:

Parameter	Monthly Average (mg/L)	Weekly Average (mg/L)	Monthly Average (lbs/day)	Weekly Average (lbs/day)	Daily Maximum (pounds)
$CBOD_5$	25	40	230	345	460
TSS	40	60	367	550	734

iii. Other parameters (year-round):

Total Coliform Bacteria	Shall not exceed a 7-day median of 23 organisms per 100 ml, with no two consecutive samples to exceed 240 organisms per 100 ml.
pH	6.0 to 9.0
$CBOD_5$ and TSS Removal Efficiency	65 percent for monthly average.
Total Chlorine Residual	Monthly average of 0.10 mg/L and daily maximum of 0.16 mg/L.
Effluent Discharge Rate	Not more than 1/15 of Crooked River flows when river flows are between 15 and 25 cfs.

2. Recycled Wastewater Outfall 002 (Golf Course Irrigation)
   a. Class C effluent treatment and disinfection to provide a seven-day median total coliform limit of 23 organisms per 100 ml, with no two consecutive samples exceeding 240 organisms per 100 ml.
3. Recycled Wastewater Outfall 003 (Pasture Irrigation)
   a. Class D effluent treatment and disinfection to provide a 30-day *E. coli* log mean of 126 organisms per 100 ml and no more than 406 organisms per 100 ml in any single sample.

The addition of Outfall 004 (Wetland Discharge) required a modification to the existing NPDES Permit. The following outlines the treatment limits for this outfall.

4. Treated Effluent Outfall 004 (Wetland Discharge)
   a. BOD_5 and TSS

Parameter	Monthly Average (mg/L)	Weekly Average (mg/L)	Monthly Average (lbs/day)	Weekly Average (lbs/day)	Daily Maximum (pounds)
BOD_5 (May 1 through October 31)	10	15	100	150	200
TSS (May 1 through October 31)	10	15	100	150	200
BOD_5 (November 1 through April 30)	30	45	280	410	550
TSS (November 1 through April 30)	30	45	300	450	600

   b. Other parameters (year-round):

E. coli Bacteria	Shall not exceed a monthly mean of 126 organisms per 100 ml, with no single sample exceeding 406 organisms per 100 ml.
pH	6.5 to 8.5
BOD_5 and TSS Removal Efficiency	Not less than 85 percent of monthly average.
Total Chlorine Residual	Must not exceed monthly average of 0.10 mg/L and daily maximum of 0.16 mg/L.

The treated and disinfected effluent is irrigated from the effluent storage ponds at the treatment plant on either the golf course or the pasturelands. The golf course is irrigated using an underground sprinkler system, while the pasture is irrigated using pivots. The golf course irrigation system consists of storage, pumps, and underground sprinklers. During the winter of 2020-21, the entire irrigation system at the golf course was upgraded and replaced with new components, and planning operations are underway to replace the golf course irrigation pumps, electrical, and control systems in 2023.

A portion of the treated effluent is disposed of by indirect discharge into the Crooked River through controlled seepage via the treatment and disposal wetlands; this is designated as Outfall 004. Composed of 160 acres, the wetlands are constructed with the treated effluent first passing through a lined treatment wetland train, then into one of the several unlined wetlands varying in size from 15 to 30 acres. The system consists of 15 separate wetlands: eight lined wetlands used for further treatment of the wastewater and seven disposal wetlands. The primary purpose of the wetlands is to reduce the nutrients and total nitrogen concentration in the water leaving the WWTF. The lined wetlands are split into two treatment trains, while disposal wetlands are controlled individually.

The first lined wetland treatment train consists of lined Wetlands 1, 2, 3, and 4. The second treatment train consists of lined Wetlands 5, 6, 7, and 8. The treatment trains are configured so water flows through a shallow aerobic wetland (lined Wetland 1 or 5), then flow is split between one or two deep anoxic wetlands (lined Wetlands 2 and 3 or 6 and 7). Flow from the two deep anoxic wetlands combines and travels through another shallow aerobic wetland (lined Wetland 4 or 8). Once through the second shallow aerobic wetland, the flow from each treatment train combines and can be sent to any of the seven disposal wetlands. A site plan of the wetlands is provided on Figure 2-12.

The wetlands do not have a minimum required detention time. However, the design detention time of the lined wetlands is approximately three days and is monitored to adjust wetland treatment. The wetland detention time varies in each wetland based on the wetland depth and flow through the wetland. The depths of the lined wetlands are controlled by the gate in the control structures directly downstream of each wetland. During operation, the disposal wetlands are monitored periodically to confirm that adequate drainage of the wetlands is occurring. The disposal wetlands are anticipated to reduce the temperature of the water flowing from them to the river. Groundwater monitoring data show July effluent temperatures in monitoring wells to be approximately 13.4° Celsius.

Monitoring data collected during 2022 shows that the shallow groundwater in the vicinity of the constructed wetlands is of moderate quality, with the average total dissolved solids (TDS) concentrations regularly exceeding the Oregon Department of Environmental Quality's groundwater quality guidance level in most of the monitoring wells associated with this project, just as they did in 2016 prior to use of the constructed wetlands. However, groundwater monitoring data collected since the wastewater effluent was first introduced to the constructed wetlands does not show any significant degradation of the groundwater as a result of the constructed wetlands and, in fact, may result in some improvements (e.g., TDS concentrations). A copy of the 2022 Groundwater Monitoring Report is included in Appendix I.

Preliminary engineering is underway to determine the feasibility of a tertiary treatment system to use treated effluent as data center cooling water. Currently, the evaluation is focused on the requested finished water quality, which will determine the type of treatment, quantity of treated effluent needed, quantity of treated effluent available, and discharge water chemistry as returned from the data centers. The preliminary engineering will also evaluate the overall cost to construct and operate the proposed system, which would be funded by private entities to supply their cooling system needs. The beneficial reuse of treated effluent represents an opportunity to reduce the use of existing limited groundwater sources to supply industrial cooling water while allowing treated wastewater to be recycled. While currently in the preliminary stage, the proposed Class A treatment system (proposed Outfall 005) will be owned and operated by the City.

Electrical, Controls, and Instrumentation

Currently, the City has minimal SCADA capabilities in the wastewater treatment and collection systems. Magnetic, ultrasonic, and propeller flowmeters measure flows entering the WWTF, then measure flows to Plants 1 and 2 separately. Flows are recorded daily by Public Works staff. The flowmeters do not have the ability to log flow variations over time. Therefore, only total daily flow readings are recorded at this time.

Irrigation Pump Station - Golf Course (Outfall 002)

During irrigation, stored water is pumped from the golf course effluent storage pond to the golf course irrigation system by an irrigation pump station near the southeast corner of the storage pond. The irrigation pump station is enclosed in a portion of a 40-foot by 24-foot building. The irrigation station is equipped with three irrigation pumps, an irrigation pump control panel, air release valves, control valves, piping, and a flowmeter with a totalizer. The effluent irrigation pump draws its suction from the storage pond through a 36-inch DI pipe into a 72-inch diameter wetwell and discharges through a 10-inch DI pipe into two effluent strainers. The effluent leaves the effluent strainers through an 18-inch DI pipe to the golf course.

Table 2-9 presents the pump station components constructed as part of the 1992 Wastewater System Improvements (WWSI) project:

TABLE 2-9
1992 IRRIGATION PUMP STATION DESIGN SPECIFICATIONS

Manufacturer	PSI Pumps
Number of Pumps	3
Model	12M90A
Motor	100 Hp
Drive	Vertical Turbine
Capacity	1,000 gpm @ 324 feet TDH
RPM	1,800
Cycle	60 Hertz
Phase	3
Volts	460

The pumps are protected from overloads, phase failure, and low voltage. An elapsed timer and start counter have been installed to assist the operator in monitoring the pumps. A backup diesel generator provides emergency power during a utility power outage.

Irrigation Pump Station - Pasture Irrigation (Outfall 003)

Table 2-10 presents the pump station components constructed as part of the 2005 WWSI project:

TABLE 2-10
2005 IRRIGATION PUMP STATION DESIGN SPECIFICATIONS

Manufacturer	FloWay
Number of Pumps	3
Model	11JKM
Motor	75 Hp
Drive	Vertical Turbine
Capacity	775 gpm @ 216 feet TDH
RPM	1,780
Cycle	60 Hertz
Phase	3
Volts	460

During irrigation, stored water is pumped from the kidney pond to one of two pivots by an irrigation pump station near the northwest corner of the storage pond. The irrigation pump station was constructed over a concrete wetwell on a 24-foot by 21-foot fabricated steel platform. The irrigation station is equipped with irrigation pumps, irrigation pump control panel, effluent strainers, control valves, and piping.

Irrigation Distribution System

Effluent in the irrigation system is pumped into an irrigation distribution header located north of the irrigation pump station and irrigation storage pond. From here, the pressurized effluent is distributed to the various irrigation systems and the disposal wetlands, when needed. If necessary, flow to the disposal wetlands can also be delivered to MH 4D where it joins flows from the treatment wetlands.

Hand lines and hard-set K-Pod style irrigation are used on approximately 55 acres of City-owned land directly west and adjacent to the WWTF. Effluent disposal in this location is done on rotation following conventional irrigation application standards for pasture grasses and NPDES Permit requirements.

Two Valley Irrigation center pivot electric drive irrigation systems were installed at the pasture irrigation area as part of the 1992 WWSI project. Between 1992 and 2017, a third Valley Irrigation center pivot irrigation system was added. Refer to Figure 2-12 for a site plan of the pivot irrigation area. Irrigation system operation is visibly checked during each startup cycle. Components not operating as intended are serviced or replaced. The center pivots consist of the following components:

- Buried 12- and 8-inch PVC main lines from the irrigation pump station to the center pivots. The 8-inch main line serves Pivot No. 1, while the 12-inch main line is split into two 8-inch main lines that serve Pivots No. 2 and 3.
- Center pivot irrigation systems
- Rotating drop nozzles with end guns manufactured by Nelson Irrigation
- Center pivot control panel
- Electric control valves at inlet to center pivot
- Center pivot manual stops

Pivot No. 1	
Flow Rate	900 gpm
Radius of Coverage with End Gun	975 feet
Radius of Coverage without End Gun	900 feet
Angle of Coverage	90 degrees
Field Size	17.1 acres
Pivot No. 2	
Flow Rate	900 gpm
Radius of Coverage with End Gun	975 feet
Radius of Coverage without End Gun	900 feet
Angle of Coverage	180 degrees
Field Size	34.3 acres
Pivot No. 3	
Flow Rate	720 gpm
Radius of Coverage with End Gun	725 feet
Radius of Coverage without End Gun	725 feet
Angle of Coverage	184 degrees
Field Size	18.9 acres

Pasture Irrigation Area Soils, Geology, and Groundwater

The soils in the Prineville area are generally considered good for farming and agriculture. The primary soil types in the pasture irrigation area are identified on Tables 2-11 and 2-12. In general, the soils are classified in variations of loam (see Appendix J for the Natural Resources Conservation Service Custom Soil Resource Report for the study area).

TABLE 2-11
PASTURE IRRIGATION AREA SITE SOIL PROFILE

Map Unit Symbol	Soil Type
013	Dryck Loam
014	Powder Silt Loam
015	Metolius Ashy Sandy Loam
016	Crooked-Stearns Complex
020	Boyce Silt Loam

TABLE 2-12
WASTEWATER TREATMENT FACILITY AND PASTURE IRRIGATION AREA
SOIL PROPERTIES AND QUALITIES

Parameter	Description
Depth to Bedrock	More than 80 inches
Drainage Class	Well-drained
Depth to Water Table	More than 80 inches
Available Water Capacity	Approximately 9.9 inches
Frequency of Flooding	Rare
Hazard of Erosion	Slight

No restrictive layers are identified in available soils information for the site. This soil series is not considered hydric.

Financial Status of Any Existing Facilities

The annual revenue received and the costs of operating and maintaining the City's wastewater system are summarized on Table 2-13. The costs presented were obtained from the City's audited financial statements and include all costs for the wastewater system, such as operation and maintenance (O&M), personnel services, materials and services, capital outlay, and debt service. These data are presented to provide insight into the general costs required to operate the City's existing wastewater system. For funding and other financial analysis, it is recommended that the audited financial statements be reviewed in detail to refine the costs prior to considering any available revenue for future debt purposes.

TABLE 2-13
SEWER SERVICE REVENUE

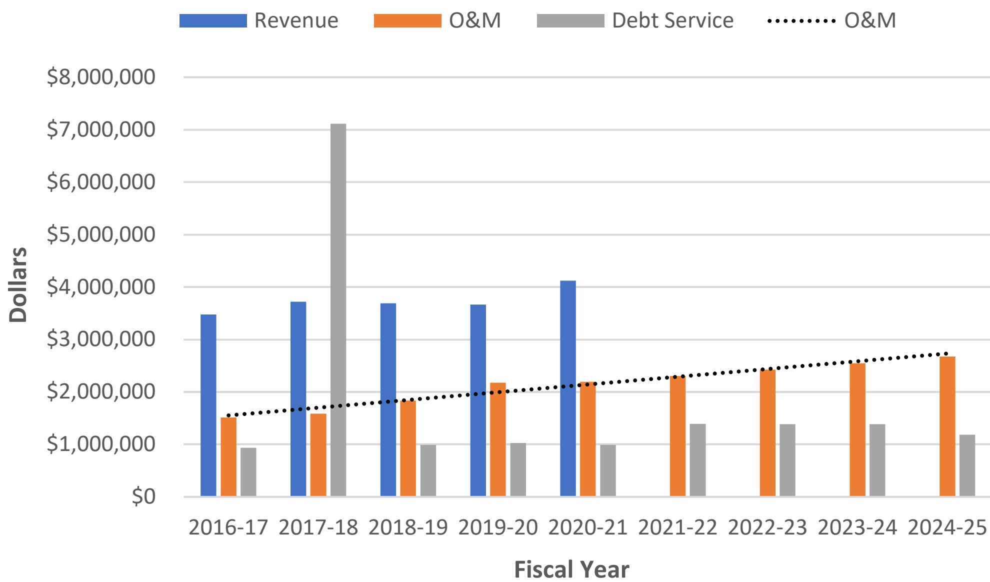
Fiscal Year	Total Revenue	Total Costs*	Net Difference
2016-17	$3,477,701	($1,511,658)	$1,966,043
2017-18	$3,722,627	($1,586,633)	$2,135,994
2018-19	$3,691,237	($1,838,247)	$1,852,990
2019-20	$3,663,030	($2,177,440)	$1,485,590
2020-21	$4,120,995	($2,194,325)	$1,926,670

**Total costs do not include debt service collections.*

Historical and Projected Budget Trends

A graphical plot of the City's wastewater system budget, with revenue and expenditures, is shown on Chart 2-1. O&M costs are projected to the 2024-25 fiscal year (FY) by applying a 5.1 percent inflation rate.

CHART 2-1
HISTORICAL AND PROJECTED BUDGET



The revenue and expenditures shown on Chart 2-1 are variable. O&M costs have increased in conjunction with the increase in standard industry costs. Revenues have also remained relatively constant with deviations well within expected ranges. While general trends can be developed over time, annual revenue and/or costs may vary during a particular year.

The average annual cost of operating and maintaining the City's WWTF over the planning period is anticipated to be $2,140,360. The average annual revenue over the planning period is $3,735,118. Annual wastewater system O&M costs, not including inter-fund transfers, have varied from a low of approximately $1,511,658 in FY 2016-17 to a high of $2,194,325 in FY 2020-21.

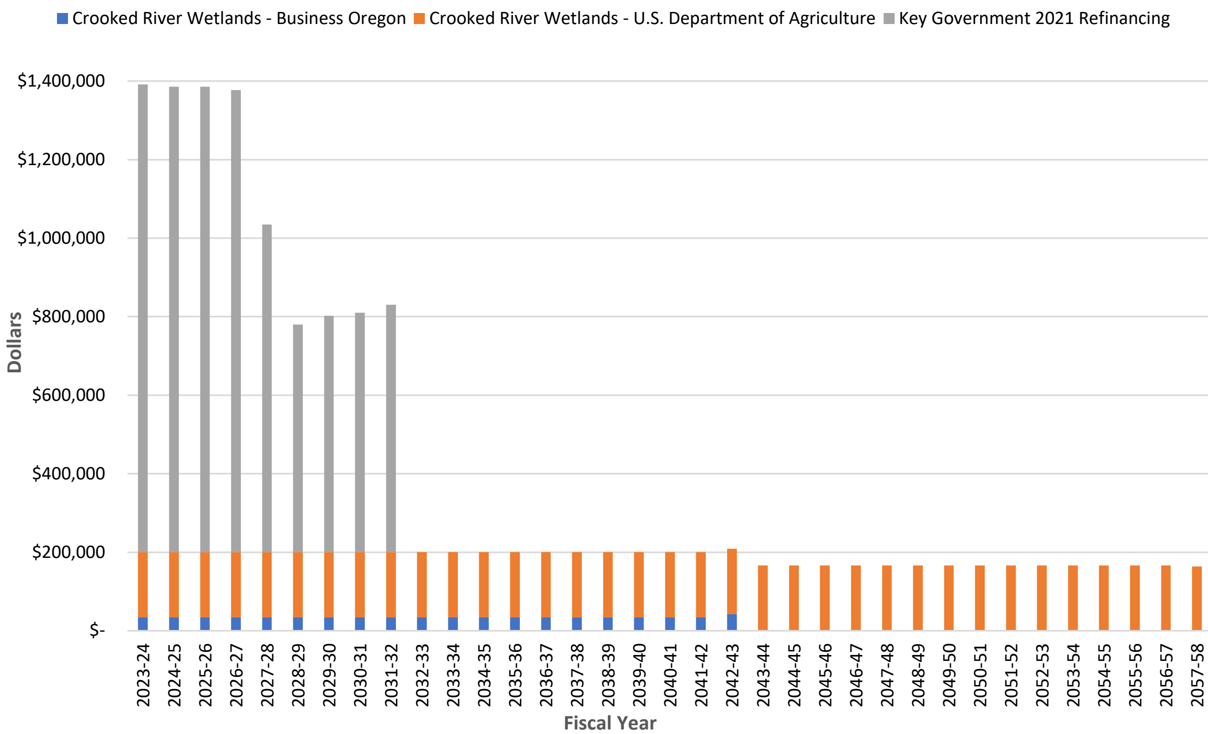
In general, an upward trend of O&M activities is observed. It is typically expected that expenditures should be increasing with time as the costs to own and operate a wastewater system continually increase. Any proposed upgrades to the system are anticipated to be constructed by FY 2025-26, which will add a debt service to the annual expenditures.

Currently, the City budgets reserve account funds for wastewater system operation, maintenance, and replacement costs. Because the City already has a reserve account, it is better prepared to deal with future wastewater system expenses and emergencies. Pump replacement, lagoon liner repairs, pipe repair/replacement, trash screen mechanical breakdowns, etc., are items that require funds from time to time.

Existing Debt

The City will complete repayment of the Key Government Refinancing debt in FY 2031-32, which accounts for $7,995,009 of the City's debt; the Business Oregon loan for the Crooked River Wetlands in FY 2042-43, which accounts for $689,714 of the City's debt; and the U.S. Department of Agriculture loan for the Crooked River Wetlands in 2058, which accounts for $5,813,181 of the City's debt. The annual debt service from 2022 to 2031 averages $1,066,303. From 2031 to 2042, the annual debt service averages $219,199. The annual debt service from 2042 to 2058 averages $166,160. A graphical plot of the City's debt service by FY is provided on Chart 2-2.

CHART 2-2
ANNUAL DEBT SERVICE

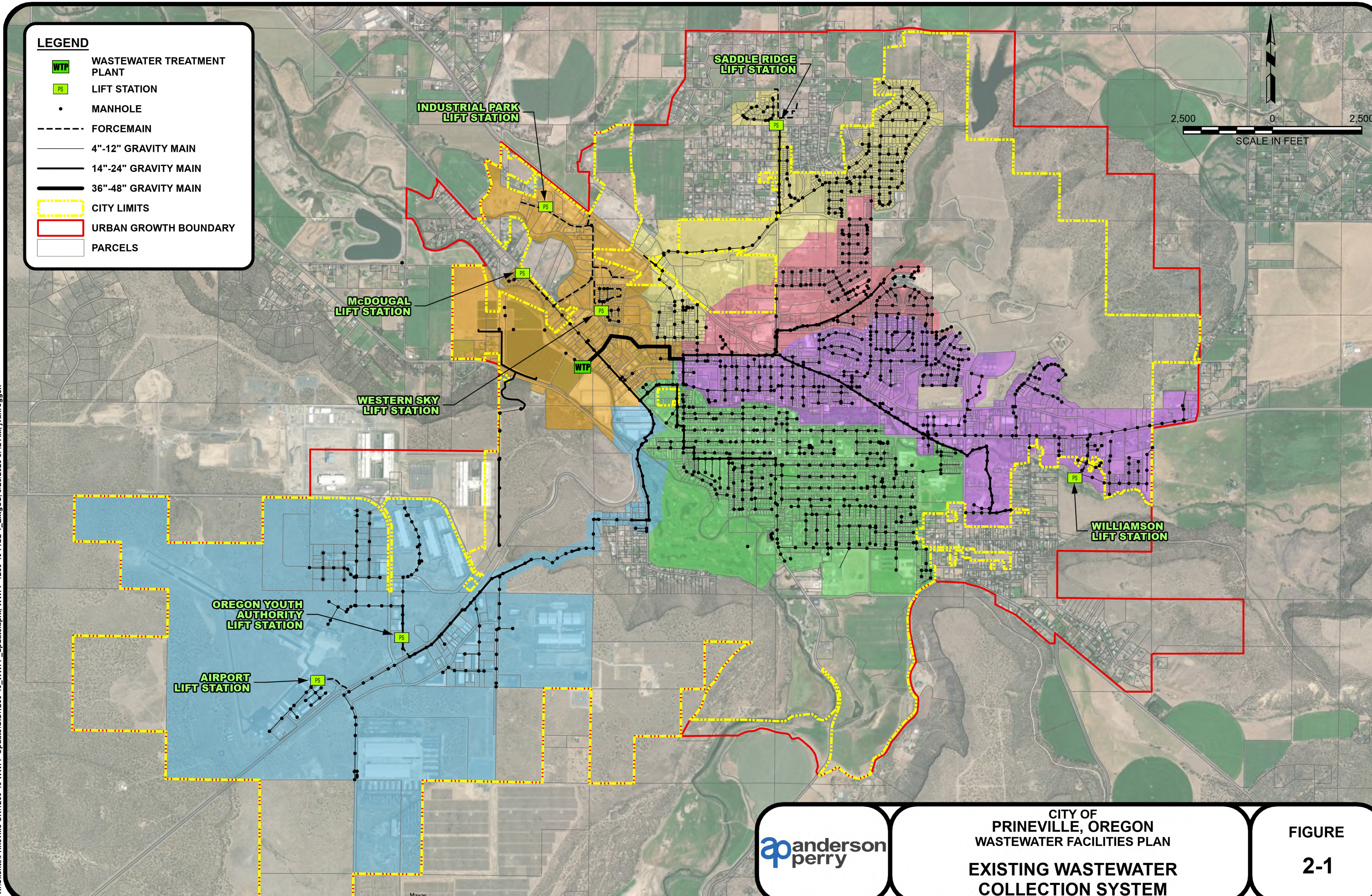


Water/Energy/Waste Audits

Minimal water, energy, or waste audit information is available. However, based on the City's 2021-23 biennial budget, the cost per MGD of electrical use and total cost are shown on Table 2-14.

TABLE 2-14
COST PER MILLION GALLONS PER DAY TREATED

Fiscal Year	2019 Actual	2020 Actual	2021 Actual	2022 Target	2023 Target
Electrical Costs per MGD Treated	$448.15	$450.38	$441.22	$472.37	$472.37
Total Cost per MGD Treated	$1,930.46	$1760.34	$2,288.95	$2,535.19	$2,514.41

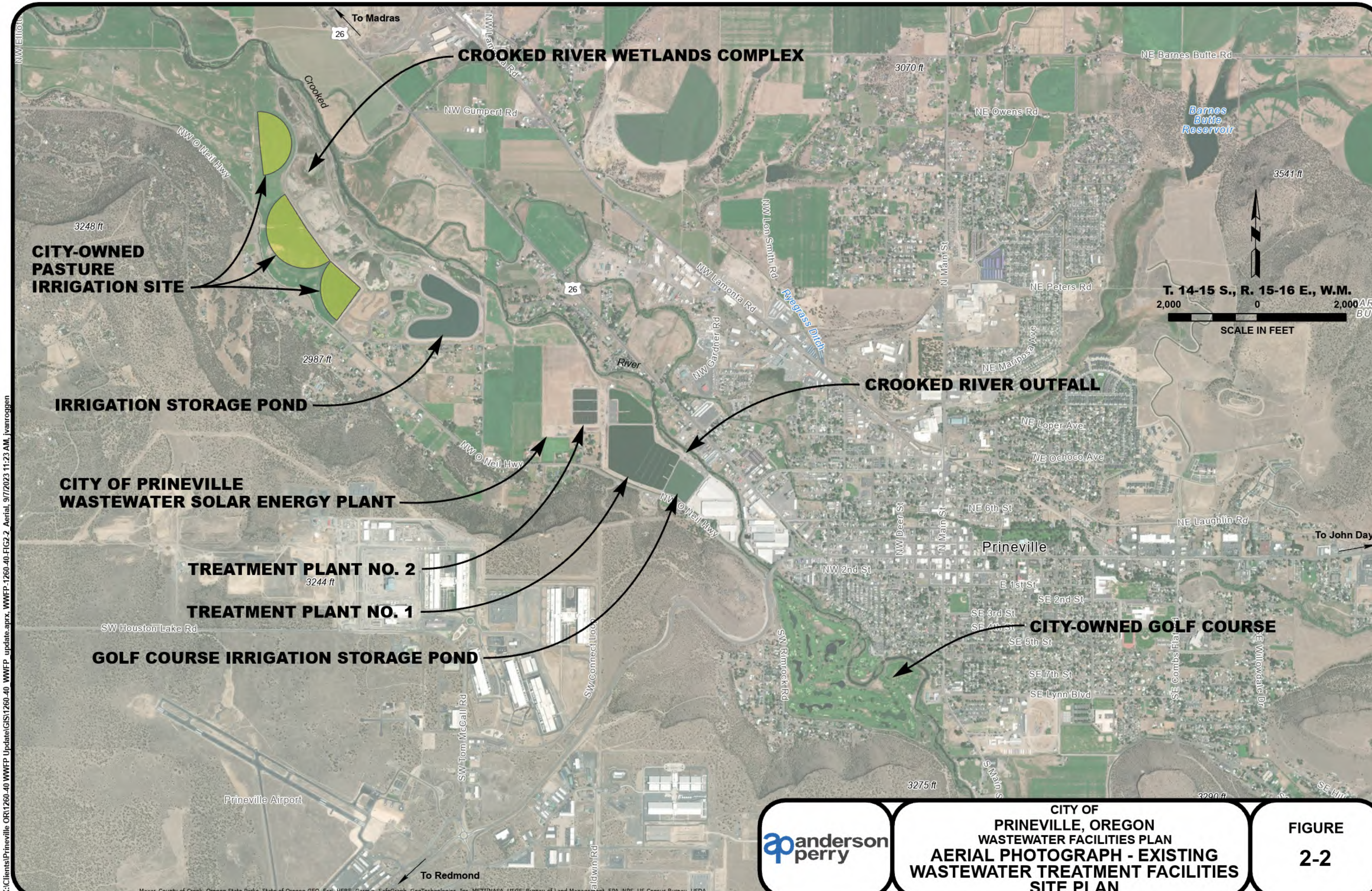


anderson perry

CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

EXISTING WASTEWATER COLLECTION SYSTEM

FIGURE 2-1

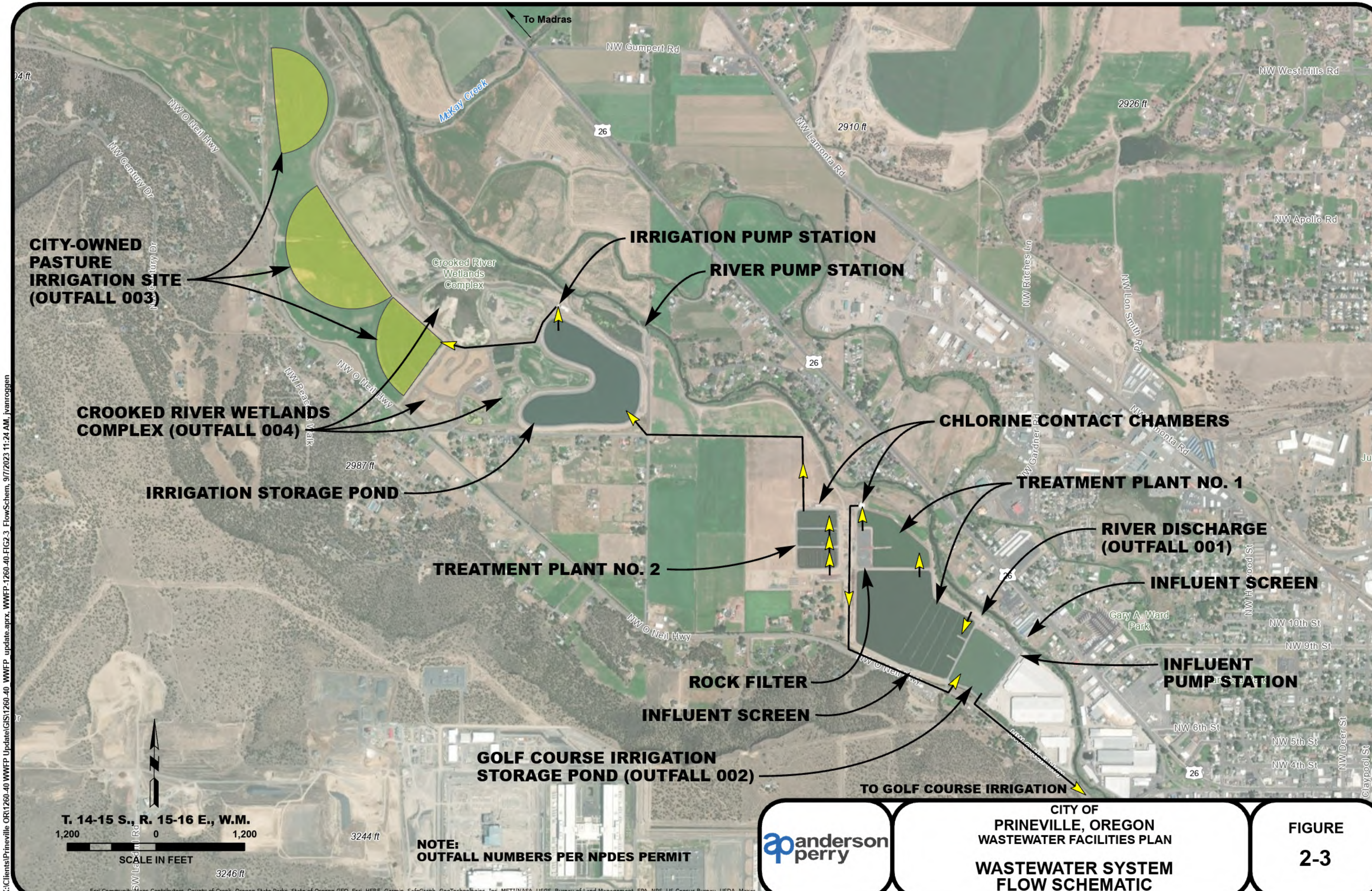


anderson perry

CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN
AERIAL PHOTOGRAPH - EXISTING WASTEWATER TREATMENT FACILITIES SITE PLAN

FIGURE 2-2

X:\Clients\Prineville OR\1260-40 WWFP Update\GIS\1260-40_WWFP_update.aprx, WWFP-1260-40-FIG2-2_Aerial, 9/7/2023 11:23 AM, jvanroggen



CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

WASTEWATER SYSTEM
FLOW SCHEMATIC

FIGURE
2-3

CITY OF PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN
SUMMARY OF DISCHARGE MONITORING REPORT DATA
JANUARY 2017 THROUGH DECEMBER 2021

	Influent															
Date	Plant 1 and 2 Influent Maximum Daily Flow (MGD)	Plant 1 and 2 Influent Minimum Daily Flow (MGD)	Plant 1 and 2 Influent Average Monthly Flow (MGD)	Plant 1 Influent Maximum Daily Flow (MGD)	Plant 1 Influent Minimum Daily Flow (MGD)	Plant 1 Influent Average Monthly Flow (MGD)	Plant 2 Influent Maximum Daily Flow (MGD)	Plant 2 Influent Minimum Daily Flow (MGD)	Plant 2 Influent Average Monthly Flow (MGD)	Total Influent Monthly Flow (MG)	Average Monthly BOD_5 (mg/L)	Average Monthly BOD_5 Loading (lbs/day)	Average Monthly $CBOD_5$ (mg/L)	Average Monthly $CBOD_5$ Loading (lbs/day)	Average Monthly TSS (mg/L)	Average Monthly TSS Loading (lbs/day)
Jan-17	1.439	0.583	1.064	1.090	0.182	0.672	0.548	0.000	0.392	32.985			258.0	2289	243.0	2156
Feb-17	1.642	0.674	1.059	1.059	0.125	0.525	0.601	0.458	0.534	29.645			225.0	1987	160.0	1413
Mar-17	1.748	1.090	1.427	1.126	0.591	0.893	0.622	0.456	0.534	44.239			222.0	2642	165.0	1964
Apr-17	1.862	1.632	1.741	1.214	1.053	1.131	0.668	0.560	0.609	52.243						
May-17	1.769	0.904	1.251	1.172	0.456	0.767	0.597	0.414	0.484	38.774						
Jun-17	1.252	1.077	1.130	1.014	0.688	0.746	0.432	0.135	0.384	33.898						
Jul-17	1.250	0.955	1.039	0.812	0.609	0.663	0.438	0.337	0.375	32.203						
Aug-17	1.274	0.996	1.092	0.762	0.618	0.677	0.526	0.363	0.415	33.862						
Sep-17	1.105	0.923	1.007	0.705	0.564	0.627	0.408	0.348	0.381	30.224						
Oct-17	1.084	0.923	1.003	0.667	0.530	0.590	0.477	0.359	0.413	31.094						
Nov-17	1.119	0.957	1.006	0.622	0.522	0.550	0.497	0.435	0.456	30.179						
Dec-17	1.146	0.957	1.021	0.664	0.514	0.561	0.483	0.443	0.460	31.651						
Jan-18	1.101	0.980	1.035	0.614	0.537	0.564	0.542	0.443	0.471	32.098	311.0	2685			207.0	1787
Feb-18	1.076	0.980	1.018	0.593	0.534	0.558	0.483	0.446	0.460	28.495	334.0	2836			276.0	2343
Mar-18	1.095	0.999	1.039	0.589	0.546	0.567	0.506	0.453	0.473	32.220	311.0	2695			244.0	2114
Apr-18	1.153	1.033	1.078	0.633	0.562	0.589	0.520	0.471	0.489	32.336	269.0	2418			247.0	2221
May-18	1.121	0.957	1.039	0.617	0.523	0.570	0.506	0.434	0.470	32.218	266.0	2305			248.0	2149
Jun-18	1.113	0.879	0.974	0.956	0.429	0.554	0.500	0.000	0.420	29.226	248.0	2015			252.0	2047
Jul-18	1.242	0.919	1.016	0.731	0.540	0.597	0.511	0.379	0.419	31.497	299.0	2534			226.0	1915
Aug-18	1.220	0.853	0.974	0.725	0.498	0.572	0.495	0.355	0.402	30.196	218.0	1771			255.0	2071
Sep-18	0.988	0.867	0.917	0.582	0.511	0.540	0.406	0.340	0.377	27.509	245.0	1874			202.0	1545
Oct-18	1.268	0.732	0.936	0.746	0.430	0.550	0.522	0.302	0.386	29.022	271.0	2115			183.0	1429
Nov-18	1.044	0.921	0.951	0.647	0.542	0.561	0.442	0.378	0.390	28.533	202.0	1602			142.0	1126
Dec-18	1.051	0.675	0.976	0.645	0.567	0.585	0.450	0.107	0.392	30.271						
Jan-19	1.113	0.963	1.035	0.665	0.570	0.616	0.448	0.393	0.420	32.092						
Feb-19	1.164	0.969	1.089	0.695	0.575	0.648	0.469	0.394	0.441	30.490						
Mar-19	1.384	1.105	1.213	0.830	0.659	0.725	0.554	0.446	0.488	37.607						
Apr-19	1.349	1.135	1.265	0.823	0.679	0.753	0.542	0.456	0.511	37.951						
May-19	1.438	1.101	1.229	1.024	0.656	0.857	0.547	0.228	0.372	38.110						
Jun-19	1.291	1.054	1.180	0.920	0.718	0.812	0.425	0.201	0.368	35.406						
Jul-19	1.333	1.056	1.139	0.895	0.627	0.720	0.511	0.379	0.419	35.300						
Aug-19	1.251	0.985	1.097	1.109	0.623	0.829	0.464	0.000	0.268	34.020						
Sep-19	1.147	0.944	1.054	0.582	0.511	0.540	0.586	0.407	0.514	31.634						
Oct-19	1.120	0.973	1.036	0.721	0.541	0.679	0.579	0.322	0.357	32.116						
Nov-19	1.065	0.873	0.953	0.647	0.542	0.561	0.458	0.310	0.392	28.580						
Dec-19	1.212	0.996	1.091	0.763	0.627	0.685	0.449	0.369	0.407	33.836						
Jan-20	1.127	1.017	1.056	0.704	0.631	0.660	0.423	0.378	0.396	32.750	228.0	2008			182.0	1603
Feb-20	1.161	1.033	1.087	0.720	0.646	0.682	0.445	0.387	0.405	31.534	205.0	1858			271.0	2457
Mar-20	1.169	1.002	1.071	0.732	0.642	0.671	0.437	0.360	0.400	33.197	240.0	2144			202.0	1804
Apr-20	1.124	1.038	1.070	0.700	0.643	0.667	0.424	0.391	0.403	32.111	243.0	2168			282.0	2517
May-20	1.454	1.018	1.152	1.122	0.636	0.810	0.411	0.227	0.342	35.702	253.0	2431			250.0	2402
Jun-20	1.264	1.032	1.128	0.927	0.759	0.816	0.362	0.273	0.312	33.827	263.0	2474			166.0	1562
Jul-20	1.220	0.995	1.071	0.896	0.735	0.790	0.324	0.260	0.282	33.212	238.0	2126			118.0	1054
Aug-20	1.271	0.914	1.045	0.935	0.713	0.770	0.336	0.201	0.274	33.383	240.0	2092			143.0	1246
Sep-20	1.294	0.945	1.040	0.898	0.570	0.696	0.440	0.263	0.344	31.208	218.0	1891			121.0	1050
Oct-20	1.012	0.916	0.956	0.614	0.554	0.580	0.407	0.362	0.376	29.641	282.0	2248			264.0	2105
Nov-20	1.255	0.973	1.086	0.759	0.592	0.657	0.496	0.381	0.429	32.572	326.0	2953			283.0	2563
Dec-20	1.167	1.025	1.075	0.706	0.407	0.646	0.461	0.407	0.429	33.312	252.0	2259			232.0	2080
Jan-21	1.219	1.049	1.098	0.736	0.627	0.661	0.483	0.421	0.438	34.040	206.0	1886			237.0	2170
Feb-21	1.242	1.106	1.152	0.750	0.667	0.692	0.496	0.437	0.460	32.253			137.0	1316	192.0	1845
Mar-21	1.172	1.008	1.102	0.703	0.599	0.658	0.471	0.409	0.444	34.168	191.0	1755			196.0	1801
Apr-21	1.201	1.069	1.114	0.936	0.640	0.676	0.486	0.157	0.429	33.428	222.0	2063			239.0	2220
May-21	1.401	1.066	1.137	1.000	0.683	0.761	0.502	0.091	0.376	35.235	210.0	1991			131.0	1242
Jun-21	1.762	1.024	1.162	1.133	0.661	0.753	0.629	0.360	0.409	34.863	252.0	2442			281.0	2723
Jul-21	1.845	1.024	1.160	1.183	0.752	0.859	0.662	0.272	0.340	35.971	229.0	2215			214.0	2070
Aug-21	1.323	0.589	1.010	0.979	0.283	0.360	0.261	0.713	0.297	31.305	195.0	1643			143.0	1205
Sep-21	1.196	0.992	1.092	0.873	0.718	0.794	0.330	0.274	0.298	32.748	256.0	2331			268.0	2441
Oct-21	1.390	0.970	1.127	1.002	0.697	0.820	0.388	0.273	0.307	34.946	226.0	2124			196.0	1842
Nov-21	1.370	1.032	1.215	1.033	0.751	0.869	0.409	0.281	0.346	36.463	227.0	2300	210.0	2128	181.0	1834
Dec-21	1.350	1.114	1.153	0.996	0.779	0.856	0.376	0.317	0.335	35.742	248.0	2385	203.0	1952	263.0	2529
Maximum	1.862	1.632	1.741	1.214	1.053	1.131	0.668	0.713	0.609	52.243	334.000	2952.660	258.000	2642.062	283.000	2723.193
Minimum	0.988	0.583	0.917	0.582	0.125	0.360	0.261	0.000	0.268	27.509	191.000	1602.131	137.000	1316.252	118.000	1049.506
Average	1.267	0.976	1.092	0.828	0.590	0.681	0.478	0.337	0.407	33.256	247.765	2195.225	209.167	2052.493	213.289	1911.720

	Plant Effluent													Contact Basin		
Date	Effluent Maximum Daily Flow (MGD)	Effluent Minimum Daily Flow (MGD)	Effluent Average Monthly Flow (MGD)	001/002 Average Total Kjeldahl Nitrogen (mg/L)	001/002 Average No_2+No_3-N	003 Average Ammonia NH_3-N	Average Monthly $CBOD_5$ (mg/L)	Average Monthly $CBOD_5$ Percent Removal	Average Monthly $CBOD_5$ Loading (lbs/day)	Average Monthly TSS (mg/L)	Average Monthly TSS Percent Removal	Average Monthly TSS Loading (lbs/day)	001/002 Average Monthly pH	001 Average Daily Chlorine Residual (mg/L)	001/002 Max Month Geo Mean TC Conc. (organisms/ 100 ml)	003 Max Month Geo Mean TC Conc. (organisms/ 100 ml)
Jan-17	0.772	0.000	0.254			6.9	11	98	23	19	96	40	7.90		538.0	0.0
Feb-17	1.099	0.638	0.833										8.00		0.0	0.0
Mar-17	1.055	0.671	0.853			6.7	16	95	114	52	84	370	9.00		0.0	0.0
Apr-17	3.858	1.813	2.539										8.30	3.4		
May-17	2.020	0.991	1.488										8.43	3.8		
Jun-17	1.830	0.718	1.229										8.05	4.9		
Jul-17	1.664	0.427	1.189										7.70	5.9		
Aug-17	1.737	1.004	1.249										7.86	4.4		
Sep-17	1.386	0.599	0.987										7.80	5.0		
Oct-17	1.537	0.505	0.949										7.82	5.0		
Nov-17	0.974	0.656	0.815										8.17	4.1		
Dec-17	1.054	0.677	0.800										8.25	4.4		
Jan-18	1.245	0.883	1.024												0.0	0.0
Feb-18	1.020	0.821	0.932												0.0	0.0
Mar-18	1.156	0.737	0.893												0.0	1.0
Apr-18	1.246	0.737	0.830	8.0	0.0	6.0									1.0	2.0
May-18	0.825	0.497	0.720	15.0	0.0	12.0							8.00		4.0	0.0
Jun-18	0.805	0.225	0.487	7.0	1.0	4.0							8.30		4.0	1.0
Jul-18	0.467	0.225	0.380	9.0	0.0	3.0							8.50		0.0	2.0
Aug-18	0.552	0.343	0.439	6.0	0.0	2.0							8.70		0.0	0.0
Sep-18	0.699	0.339	0.456	1.0	0.0	0.0									0.0	0.0
Oct-18	0.872	0.505	0.672	7.0	0.0	1.0							8.70		0.0	0.0
Nov-18	0.875	0.586	0.731												0.0	0.0
Dec-18	0.938	0.827	0.867										7.75	4.2		
Jan-19	1.239	0.801	0.964										7.87	3.3		
Feb-19	1.364	0.888	1.042										8.06	3.1		
Mar-19	1.257	0.997	1.140										8.21	5.2		
Apr-19	1.298	0.858	1.126										8.11	5.1		
May-19	1.582	0.559	0.962										8.18	5.9		
Jun-19	1.227	0.477	0.745										7.58	7.9		
Jul-19	0.647	0.349	0.538										7.60	8.1		
Aug-19	1.547	0.252	0.726										7.96	7.0		
Sep-19	0.748	0.342	0.481										8.06	7.7		
Oct-19	0.974	0.376	0.761										7.81	7.7		
Nov-19	1.003	0.610	0.890										7.96	6.0		
Dec-19	1.327	0.886	1.036										7.76	6.3		
Jan-20	1.047	0.819	0.947												0.0	0.0
Feb-20															0.0	0.0
Mar-20	0.914	0.824	0.859												1.0	0.0
Apr-20	0.950	0.753	0.852	13.0	1.0	8.0							8.00		0.0	0.0
May-20	1.326	0.600	0.876	10.0	1.0	8.0							8.20		2.0	5.0
Jun-20	0.887	0.619	0.739	8.0	1.0	3.0							8.00		1.0	2.0
Jul-20	1.220	0.995	1.071	7.0	1.0	0.0							8.20		10.0	8.0
Aug-20	0.716	0.486	0.596	1.0	3.0	1.0							8.30		3.0	2.0
Sep-20	0.854	0.575	0.707	7.0	1.0	3.0							8.50		0.0	2.0
Oct-20	0.865	0.586	0.711	5.0	0.0	3.0							7.60		0.0	0.0
Nov-20	1.238	0.741	1.035	7.0	0.0	4.0							7.80		0.0	0.0
Dec-20	1.148	0.882	1.005	9.0	1.0	5.0							7.60		0.0	0.0
Jan-21	1.307	0.864	1.035	10.0	0.0	6.0							7.80	8.0	0.0	0.0
Feb-21	1.273	0.907	1.096	9.0	1.0	6.0	7	95	64	18	89	165	7.00	6.5	1.0	1.0
Mar-21	1.014	0.751	0.886	5.0	0.0	0.0							8.20	7.0	0.0	0.0
Apr-21	0.523	0.322	0.428	10.0	1.0	6.0							7.90	7.0	0.0	6.0
May-21	0.712	0.327	0.468	9.0	0.0	7.0							8.34	8.0	7.0	1.0
Jun-21	0.781	0.053	0.476	10.0	1.0	6.0							8.25	8.0	1.0	16.0
Jul-21	0.742	0.147	0.542	7.0	1.0	4.0							8.64	9.0	13.0	15.0
Aug-21	0.778	0.122	0.448	6.0	1.0	3.0							8.42	9.0	0.0	8.0
Sep-21	1.254	0.560	0.799	5.0	1.0	2.0							8.50	6.0	3.0	1.0
Oct-21	0.432	0.000	0.129										7.60	9.0	0.0	0.0
Nov-21	1.529	0.981	1.131	6.0	0.0	4.0	4.4	98	42	6.7	96	63	7.90	6.7	2.0	2.0
Dec-21	1.314	0.838	1.071	6.0	1.0	4.0							8.00	7.5		
Maximum	3.858	1.813	2.539	15.000	3.000	12.000	16.000	98.000	113.824	52.000	96.000	369.929	9.000	9.000	538.000	16.000
Minimum	0.432	0.000	0.129	1.000	0.000	0.000	4.400	95.000	23.302	6.700	84.000	40.249	7.000	0.000	0.000	0.000
Average	1.131	0.620	0.846	7.519	0.630	4.297	9.600	96.500	60.653	23.925	91.250	159.477	8.062	5.962	0.000	0.000

Note: Shaded cells indicate months where reuse is permitted.

$CBOD_5$ = five-day carbonaceous biochemical oxygen demand
BOD_5 = five-day biochemical oxygen demand
ft = feet
lbs/day = pounds per day
mg/L = milligrams per liter
MGD = million gallons per day
ml = milliliters
TSS = total suspended solids

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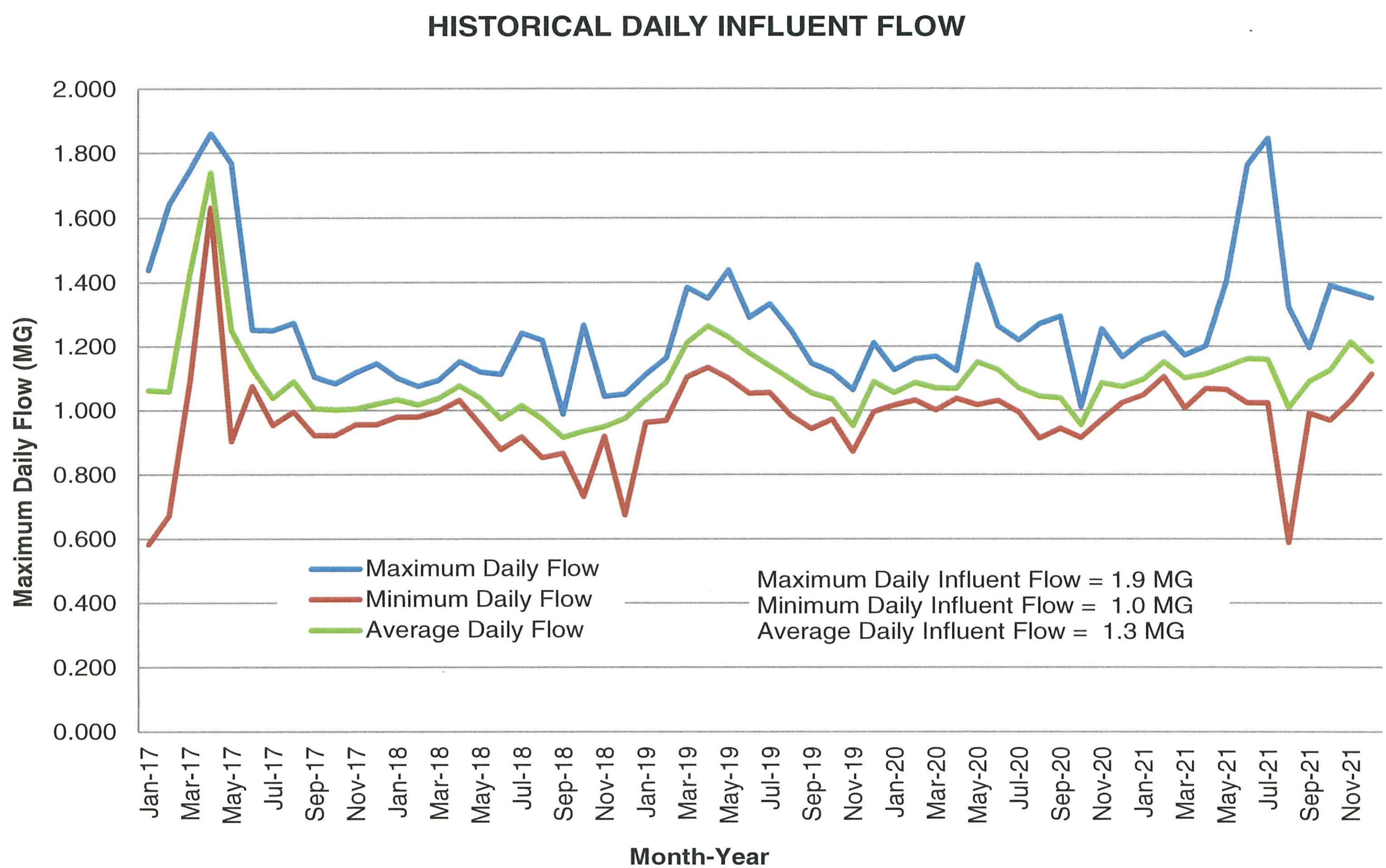
CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN
SUMMARY OF DISCHARGE MONITORING REPORT DATA

FIGURE
2-4



MG = million gallons

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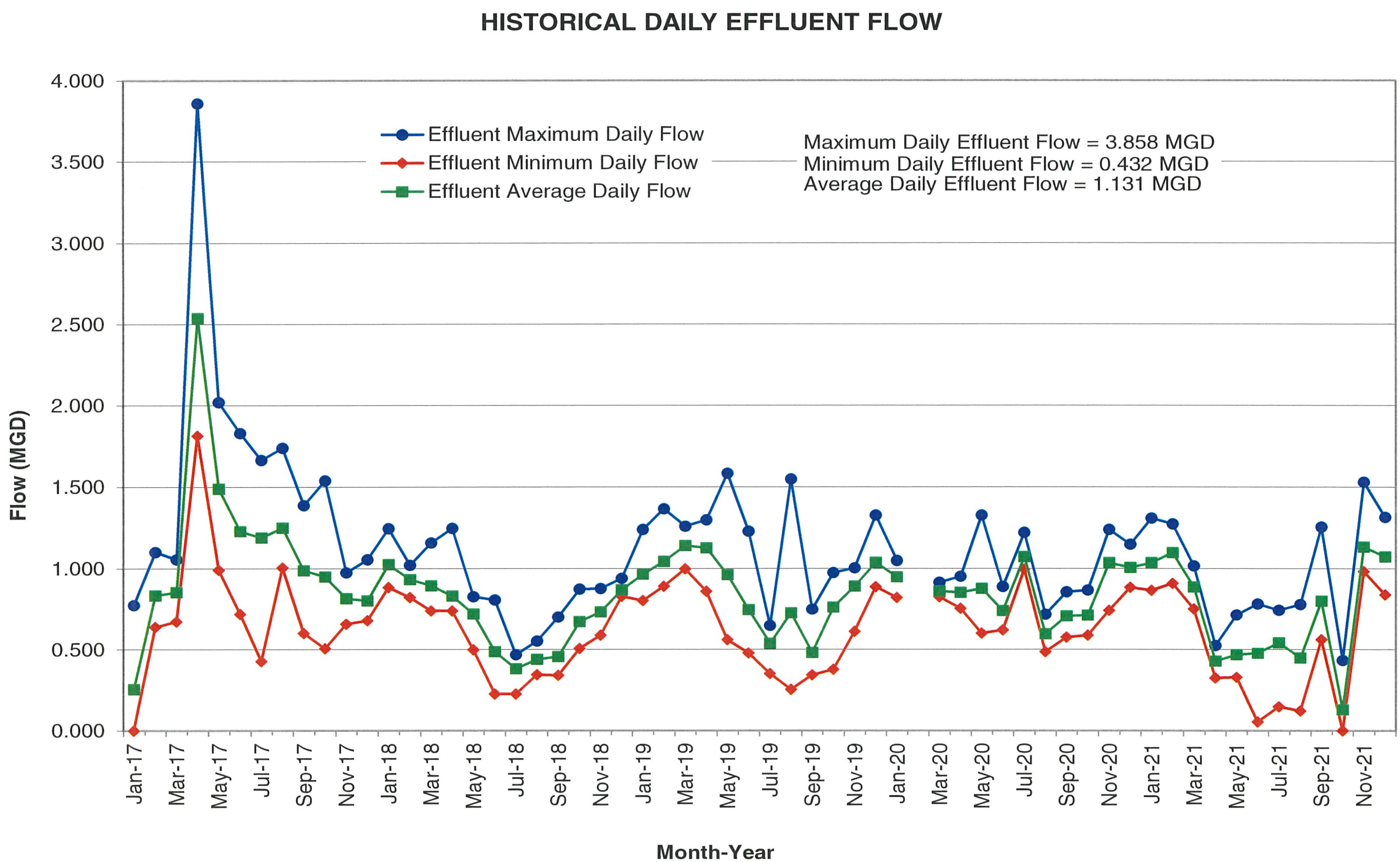
WASTEWATER FACILITIES PLAN

HISTORICAL DAILY INFLUENT FLOW

FIGURE 2-5



MGD = million gallons per day

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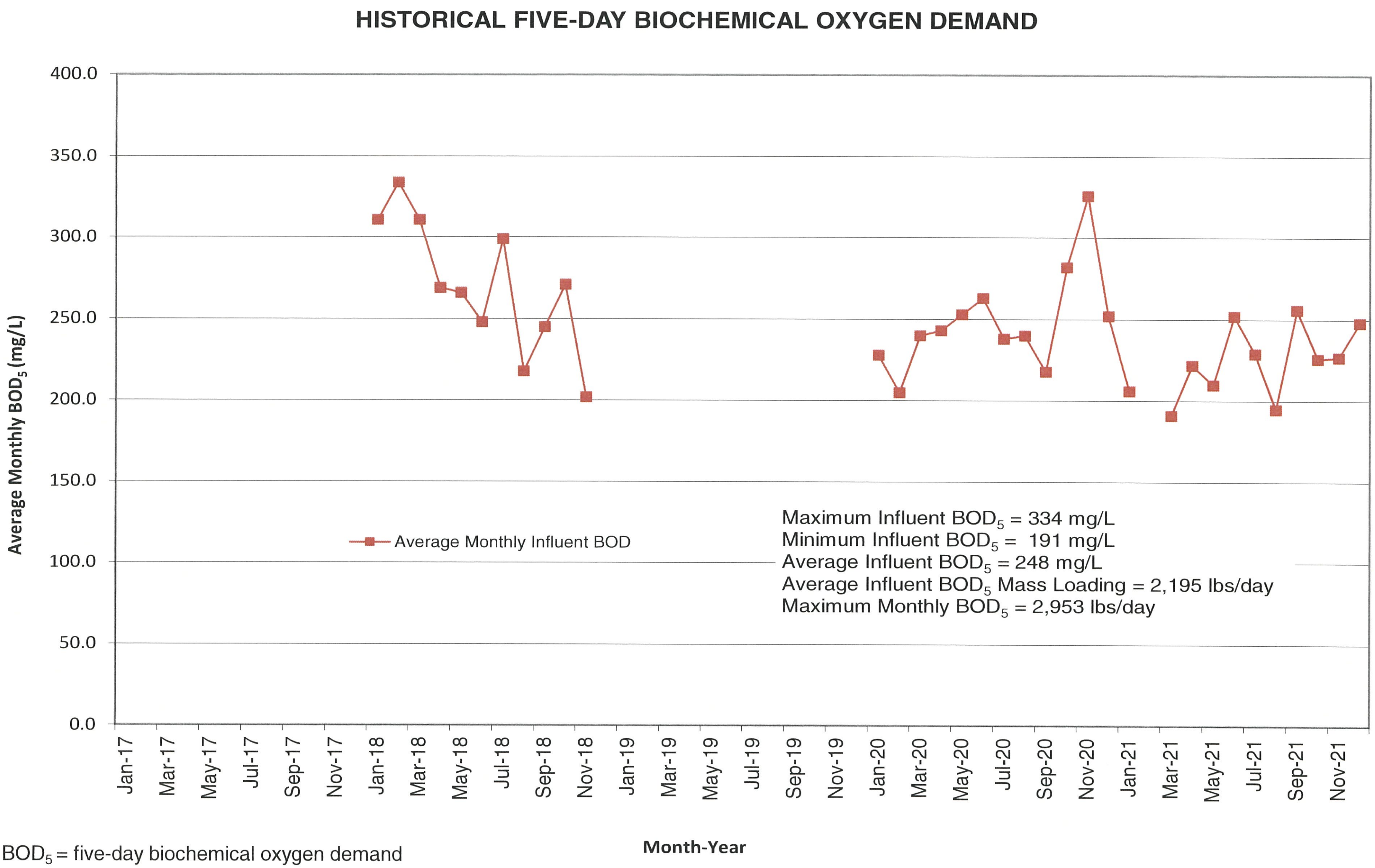
WASTEWATER FACILITIES PLAN

HISTORICAL DAILY EFFLUENT FLOW

FIGURE
2-6



BOD_5 = five-day biochemical oxygen demand
lbs/day = pounds per day
mg/L = milligrams per liter

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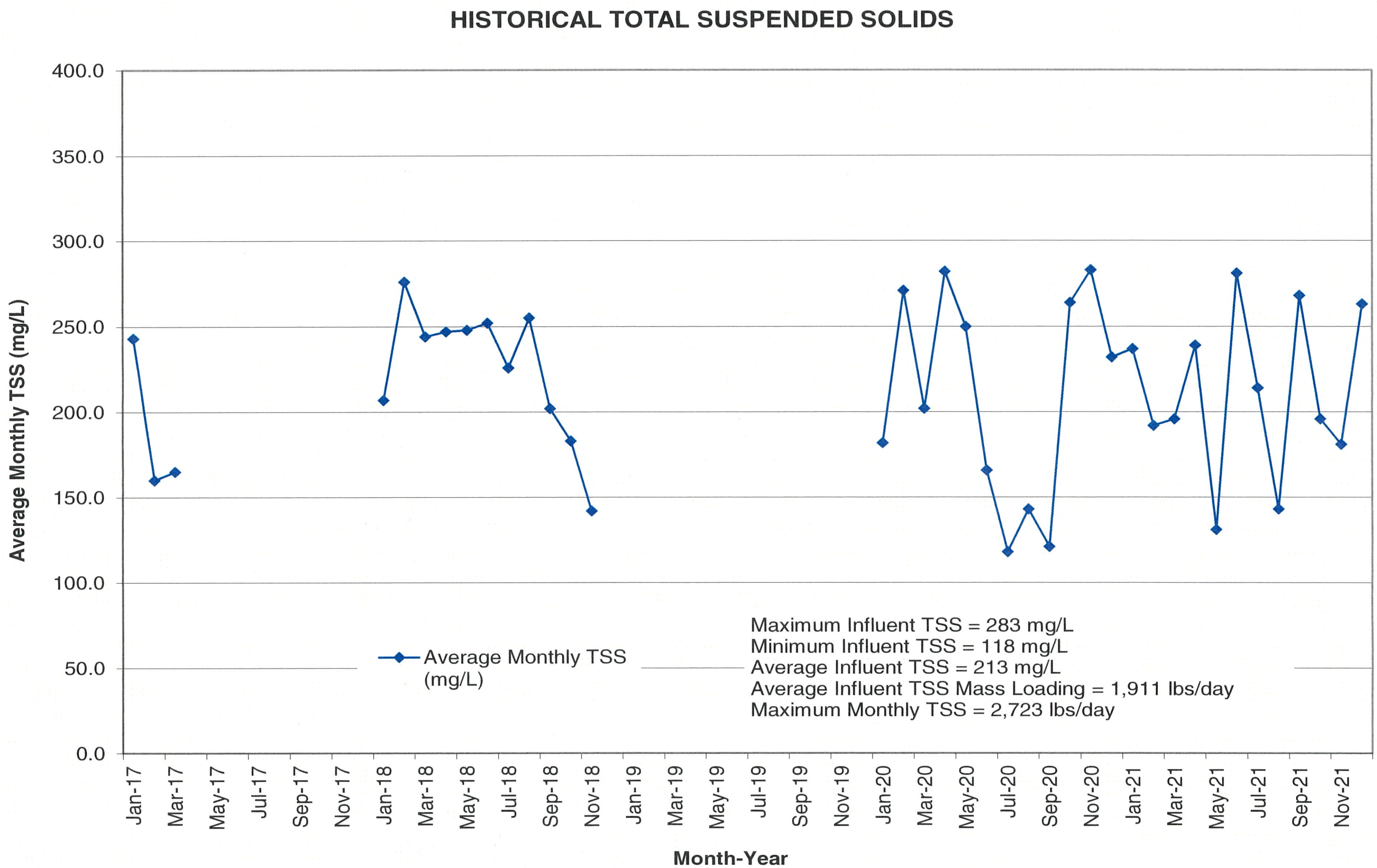
WASTEWATER FACILITIES PLAN

HISTORICAL FIVE-DAY BIOCHEMICAL OXYGEN DEMAND

FIGURE 2-7



lbs/day = pounds per day
mg/L = milligrams per liter
TSS = total suspended solids

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WASTEWATER FACILITIES PLAN

HISTORICAL TOTAL SUSPENDED SOLIDS

FIGURE
2-8

DESIGN CRITERIA

	EXISTING CONNECTED POPULATION[1] 2022		EXISTING POPULATION WITH IMPROVEMENTS[2] 2022		EXISTING POPULATION WITH IMPROVEMENTS AND ANTICIPATED UGB CONNECTIONS[3] 2022		FUTURE POPULATION WITH IMPROVEMENTS AND ANTICIPATED UGB CONNECTIONS[4] 2042	
	I/I[5]	Total[6]	I/I[7]	Total[8]	I/I[7]	Total[8]	I/I[7]	Total[8]
Population*		10,771		11,288		11,773		14,745
Average Base Flow (ABF), MGD[9]	----	0.930	----	0.975	----	1.017	----	1.273
Per Capita Flow, gpcd	----	86	----	86	----	86	----	86
Average Annual Flow[10] (AAF), MGD	0.162	1.092	0.162	1.137	0.162	1.179	0.162	1.435
Per Capita Flow, gpcd	15	101	14	101	14	100	11	97
Average Dry Weather Flow[10] (ADWF), MGD	0.115	1.045	0.115	1.090	0.115	1.132	0.115	1.388
Per Capita Flow, gpcd	11	97	10	97	10	96	8	94
Average Wet Weather Flow[10] (AWWF), MGD	0.210	1.140	0.210	1.185	0.210	1.227	0.210	1.483
Per Capita Flow, gpcd	19	106	19	106	18	106	14	106
Maximum Month Flow (MMF), MGD	0.811	1.741	0.811	1.786	0.811	1.828	0.811	2.084
Per Capita Flow, gpcd	75	162	72	158	69	155	55	141
Peak Hour Flow (PHF), MGD[11]	----	4.368	----	4.547	----	4.714	----	5.741
Per Capita Flow, gpcd	----	406	----	403	----	400	----	389
Average Influent BOD_5, mg/L	----	248	----	250	----	251	----	258
lbs/day	----	2259	----	2367	----	2469	----	3,092
lbs/capita/day	----	0.21	----	0.21	----	0.21	----	0.21
Average Influent TSS, mg/L	----	213	----	214	----	216	----	222
lbs/day	----	1940	----	2033	----	2120	----	2656
lbs/capita/day	----	0.18	----	0.18	----	0.18	----	0.18
Average Influent TKN[12], mg/L	----	40	----	40	----	40	----	40
lbs/day	----	364	----	379	----	393	----	479
lbs/capita/day	----	0.03	----	0.03	----	0.03	----	0.03

[1] Existing connected population was found by utilizing City billing reports to find the number of residences not connected to the sewer (210). According to the PRC at PSU, the average PPH within the City is 2.46. The certified population for 2021 was 11,042 per the PRC. For planning purposes, this population is utilized as the 2022 population. This population also includes the 100 residences that are served outside the city limits. A connected population was estimated utilizing these values.

[2] Existing 2022 population with improvements includes all residences within the city limits that could be served.

[3] Existing population with improvements and anticipated UGB connections includes all residences currently being served in addition to all residences within the city limits that could be served and subdivisions directly outside the city limits that could be served in the future (roughly 20 percent of current tax lots in the UGB or 197 residences). Population was estimated using a value of 2.46 PPH with 985 homes outside the UGB, not including those already served.

[4] The future 2042 population was found by utilizing AAGR values declared by the PRC. The growth values were applied to the existing connected population with improvements along with the anticipated UGB connections.

[5] The average contribution from I/I for each flow component (AAF, ADWF, AWWF, and MMF) was estimated by taking the difference of each of the current total flow values and the current base flow.

[6] Existing total flows and mass loads are based on historical WWTF operating data (DMRs).

[7] For projection purposes, it was assumed that the I/I flows currently being experienced in the system will remain constant throughout the planning period.

[8] Future total flow is estimated by taking the sum of the future ABF and I/I (example: AAF = 0.095 MGD + 0.049 MGD = 0.144 MGD).

[9] ABF is defined as the daily minimum flow recorded for each year averaged over the five years of available data.

[10] The AAF, ADWF, and AWWF were determined by taking the average of the corresponding flows from 2017 through 2021. Wet weather flows were estimated to occur from January through June, and dry weather flows were estimated to occur from July through December.

[11] The PHF was determined by multiplying the average annual wastewater flow by a peaking factor of 4.0. The peaking factor is an assumed value as no data exist that allow direct calculation to determine the value.

[12] TKN (organic nitrogen and ammonia nitrogen). Assumed concentration based on typical domestic wastewater influent values.

* Population estimate and projections from the PRC at PSU based on a certified population of 11,042 in 2021. Forecast AAGR of 1.1 percent to 2042.

AAGR = average annual growth rate
BOD_5 = five-day biochemical oxygen demand
DMRs = Discharge Monitoring Reports
gpcd = gallons per capita per day
I/I = infiltration and inflow
lbs/capita/day = pounds per capita per day
lbs/day = pounds per day
mg/L = milligrams per liter
MGD = million gallons per day
PPH = person per household
PRC = Population Research Center
PSU = Portland State University
TKN = Total Kjeldahl nitrogen
TSS = total suspended solids
UGB = urban growth boundary
WWTF = wastewater treatment facility

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CITY OF
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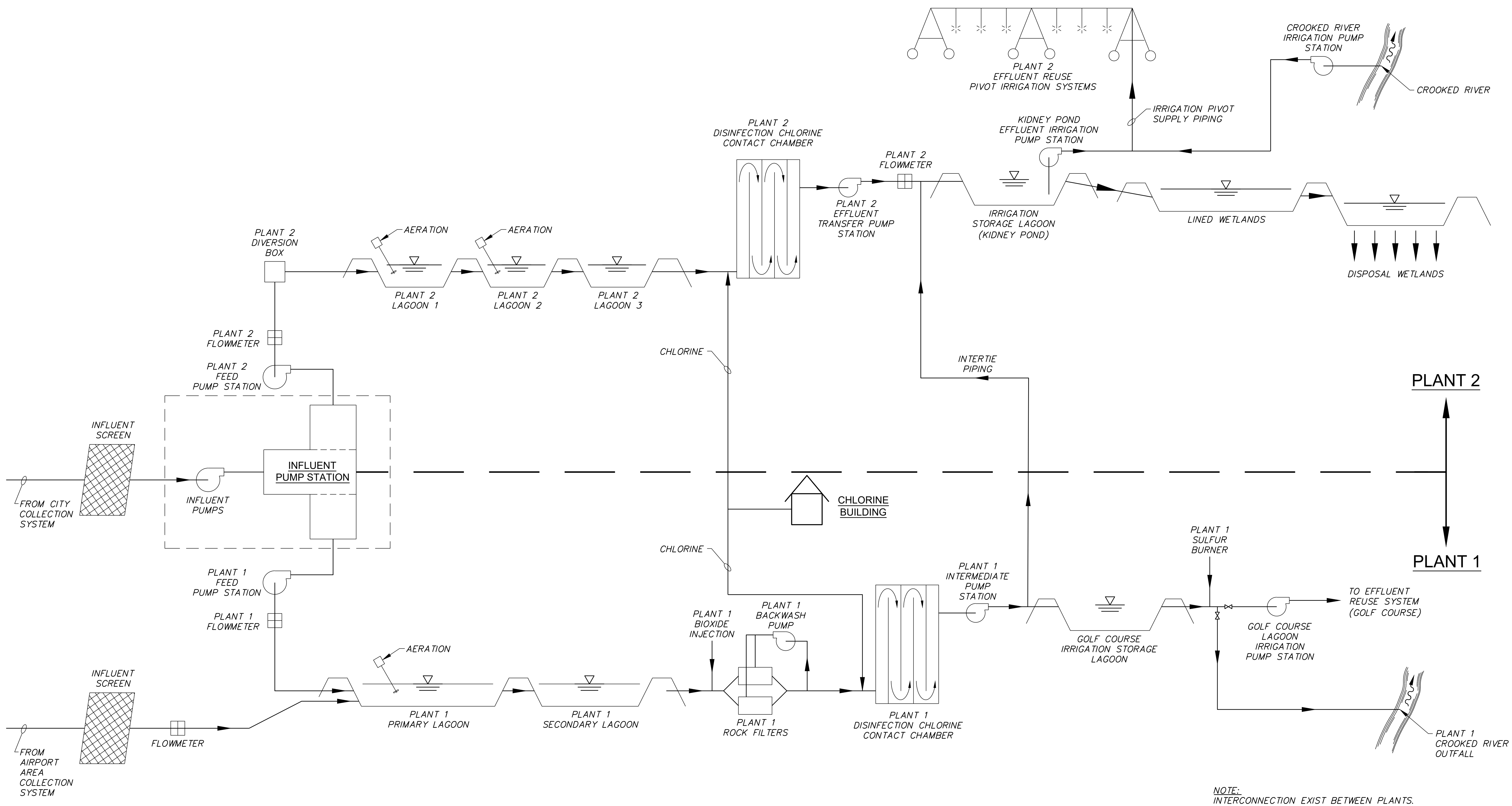
WASTEWATER FACILITIES PLAN

DESIGN CRITERIA

FIGURE
2-9



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CITY OF
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WASTEWATER FACILITIES PLAN

TREATMENT PROCESS FLOW SCHEMATIC

FIGURE
2-10

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Influent Screen

Date Constructed	2017
Capacity	4.5 MGD Max Flow
Type	Huber Rotamat RoK4 700/6 Fine Screen
Motor	230/460 VAC, 3 phase
Horse Power	5

Influent Pump Station

Date Constructed	2005
Pipe to Influent Pump Station	48" RCP San. Sewer
Quantity of Submersible Pumps	4
Model No.	KRT K150-315-310-1160
Discharge Connection	6"
First Operating Point	1650 gpm @ 38.5 feet
Second Operating Point	1750 @ 35.5 feet
Third Operating Point	1760 @ 35.2 feet
Shutoff Head	73.0 feet
Motor Speed	1800 rpm
Horsepower (each)	25

Plant 1 Feed Pump Station

Quantity of Submersible Pumps	3
Capacity	1760 gpm @ 35.2 feet
Horsepower (each)	25
Piping to Plant 1	10" diameter

Plant 1 Flowmeter

Panametrics DF868 Strap-on flowmeter

Influent Screen

Date Constructed	2020
Capacity	0.85 MGD Max Flow
Type	Kusters Model ICSS 3/6 In-channel Screw Screen
Motor	230/460 VAC, 3 phase
Horse Power	1
Flowmeter	Ultramag UM06

Plant 1 Partially Aerated Primary Lagoon

Area	37 acres
Operating Volume	68.7 MG
Max Operating Depth	5.7 feet
Max Weir	2854.9 feet
Min Weir	2853.4 feet
Bottom Elevation	2849.2 feet
Detention Time at 1.1 MGD	62 days
Number of Blowers	3
HP of Blowers (each)	50
Oxygen Transfer (lbs/hr)	100

Plant 1 Facultative Secondary Lagoon

Area	10 acres
Depth	5 feet
Bottom Elevation	2844.5 feet
Operating Volume	16 MG
Detention time at 1.1 MGD	15 days

Plant 1 Rock Filters

Filter Area (each)	1.2 acres
Quantity	2
Loading Rate	1.7 gpd/cf
Backwash Rate	1.66 times loading rate
Backwash Pump Capacity	1150 gpm @ 22 feet

Plant 1 Disinfection

Number of Basins	2
Basin L:W ratio	50:1
Basin Volume	26,600 gallons per basin
Chlorine Dosage at Contact Basin	0-100 lb per day

Plant 1 Intermediate Pump Station

Number of Pumps	2
Combined Rated Capacity	1300 gpm @ 48 feet
Horsepower (each)	15

Golf Course Irrigation Storage Lagoon

Area	10.5 acres
Storage Capacity	25 MG
Holding Capacity at 1.1 MGD	23 days

Irrigation Pump Station

Number of Pumps	3
Combined Rated Capacity	3000 gpm @ 324 feet
Horsepower (each)	100

Crooked River Outfall

Diffuser Nozzle Discharge	11.5 ft/sec @ 1.1 mgd
Number of Nozzles	3
Outfall Pipe Diameter	18 inches

Plant 2 Feed Pump Station

Quantity of Submersible Pumps	3
Capacity	1760 gpm @ 35.2 feet
Horsepower (each)	25
Piping to Plant 2	12" diameter

Plant 2 Flowmeter

Panametrics DF868 Strap-on flowmeter

Plant 2 Aerated Lagoon 1

Area	3.49 Acres
Operating Depth	10 feet
Volume	11.4 MG
Detention Time at 1.2 MGD	9.5 days
Number of Blowers	3
HP of Blowers (each)	75
Oxygen Transfer (lbs/hr)	100

Plant 2 Aerated Lagoon 2

Area	2.91 Acres
Operating Depth	6 feet
Volume	5.7 MG
Detention Time at 1.2 MGD	4.7 days
Quantity of Aspirating Aerators	4
Horsepower of Aerators (each)	10
Oxygen Transfer (lbs/Hp*hr)	2

Plant 2 Facultative Lagoon 3

Area	2.91 Acres
Operating Depth	6 feet
Volume	5.7 MG
Detention Time	4.7 days

Plant 2 Disinfection

Type	Chlorine Gas
Capacity	0-100 lbs chlorine per hour
Number of Basins	1
Basin Volume (gal)	21,500
42" Contact Pipe Volume (gal)	10,800
12" PVC Pipe Volume (gal)	20,000
Total Detention Time at 1.2 MGD	60 minutes

Plant 2 Effluent Transfer Pump Station

Number of Pumps	2 Vertical Turbine
Capacity	1200 gpm at 44 ft (TDH)
Horsepower (each)	20

Irrigation Storage Lagoon (Kidney Pond)

Area	29 acres
Volume	118 MG
Minimum Depth	1 foot
Maximum Depth	12.5 feet
Maximum Detention @1.2 MGD	98 days

Effluent Irrigation Pump Station

Number of pumps	3
Capacity	775 gpm @ 215 feet
Horsepower (each)	75

Effluent Reuse Pivot Irrigation Systems

Number of Pivots	3
Acreage Irrigated	120

Crooked River Irrigation Pump Station

Number of pumps	1
Capacity	2400 gpm
Horsepower	20
Variable Speed Drive	

Lined Treatment Wetland 1

Area	7.3 acres
Volume	3.9 MG

Lined Treatment Wetland 2

Area	1.8 acres
Volume	1.9 MG

Lined Treatment Wetland 3

Area	0.9 acres
Volume	0.8 MG

Lined Treatment Wetland 4

Area	7.5 acres
Volume	3.9 MG

Lined Treatment Wetland 5

Area	5.0 acres
Volume	2.5 MG

Lined Treatment Wetland 6

Area	1.3 acres
Volume	1.2 MG

Lined Treatment Wetland 7

Area	0.8 acres
Volume	0.6 MG

Lined Treatment Wetland 8

Area	4.1 acres
Volume	2.1 MG

Disposal Wetland 9

Area	10.2 acres
Volume	6.7 MG

Disposal Wetland 10

Area	13.8 acres
Volume	8.9 MG

Disposal Wetland 11

Area	12.6 acres
Volume	8.0 MG

Disposal Wetland 12

Area	13.4 acres
Volume	8.7 MG

Disposal Wetland 13

Area	14.9 acres
Volume	9.7 MG

Disposal Wetland 14

Area	6.6 acres
Volume	4.3 MG

Disposal Wetland 15

Area	4.7 acres
Volume	2.8 MG

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CITY OF
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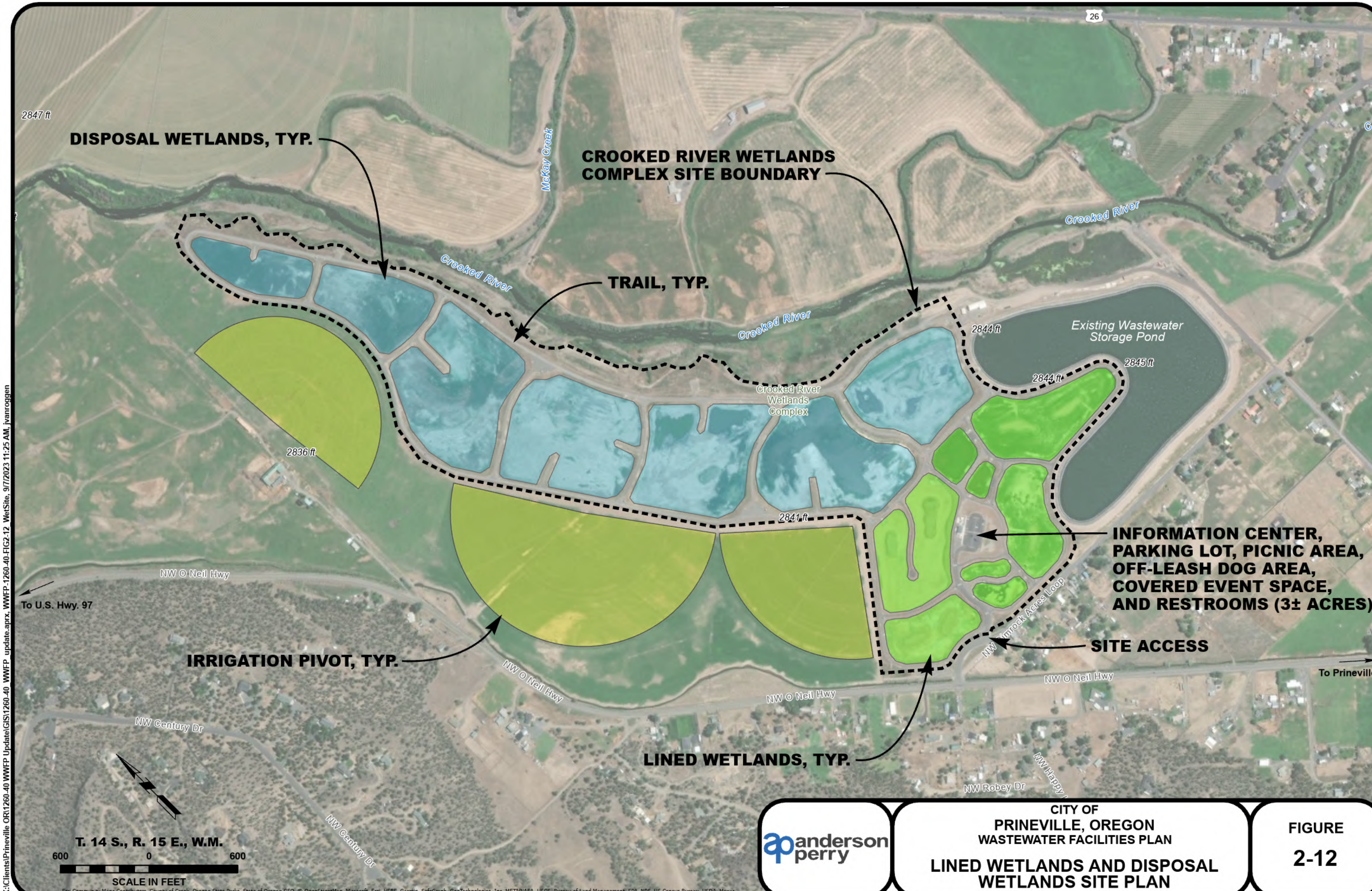
WASTEWATER FACILITIES PLAN

WASTEWATER TREATMENT FACILITY COMPONENTS

FIGURE
2-11



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Section 3 - Need for Project

General

This section discusses the Clean Water Act (CWA), state and federal regulations for wastewater treatment facilities (WWTFs) that discharge into Waters of the U.S., and the need for capital improvements projects, including aging infrastructure and reasonable growth.

Health, Sanitation, Environmental Regulations, and Security

Many state and federal regulations have been established that ensure the health, security, and safety of the general public are maintained as a high priority. This section describes how those requirements are impacted by the current condition of the regulated systems.

National Pollutant Discharge Elimination System Permit Requirements

The City of Prineville's wastewater system is regulated by National Pollutant Discharge Elimination System (NPDES) Permit No. 101433 and a Permit Modification (see Appendix A). The permit outfall requirements for the City's WWTF are described in detail in Section 2.

The WWTF improvement projects in 1993, 2005, and 2017 provided the necessary capacity for the planning period as well as the ability to consistently maintain permit compliance. Although the existing WWTF provides the currently needed capacity and treatment capabilities, modifications are needed to improve reliability, operator efficiency, and sanitation and reduce operation and maintenance (O&M) costs. Improvements to the main influent screen will reduce rags and other debris from entering the influent pumps and the lagoon system. Converting the existing gas chlorination system to a bulk sodium hypochlorite system will reduce risks associated with the gas chlorination systems and reduce operator interface with the introduction of supervisory control and data acquisition (SCADA) control and remote monitoring and alarms. Replacement of existing influent and effluent pumping systems with new pumps, electrical, and control systems will reduce energy use via efficient pumps, improved level control, starting and control systems, and reduced down time.

The majority of standard analyses for the WWTF are conducted by an outside laboratory and are subject to the costs and additional time needed for completion. By constructing a new operations building with improved sanitation, showers, locker rooms, a break room, office and operational space, and a laboratory, personnel will have the facilities required to properly operate and maintain the WWTF and collection systems. By adding a laboratory, WWTF personnel will be able to perform the majority of the required analyses, reducing the cost and added time sustained by using an outside laboratory.

Solids Treatment

As required by the CWA Amendments of 1987, the U.S. Environmental Protection Agency developed a regulation to protect public health and the environment from reasonably anticipated adverse effects of certain pollutants that might be present in municipal sewage biosolids. Biosolids are a natural byproduct of the wastewater treatment process.

Title 40 of the Code of Federal Regulations Part 503 separates biosolids into two classifications, Classes A and B, related to pathogen densities contained within the biosolids at the time of land application. Class A biosolids have much more stringent requirements related to pathogen density levels than Class B biosolids. Biosolids meeting Class A requirements can be sold in bags or bulk and applied on public areas such as lawns and home gardens. Class B biosolids are restricted to bulk application to agricultural land, rangeland, forest, or reclamation sites.

The City has not removed solids from the lagoon system since its construction. An accumulation of solids of approximately 70,520 cubic yards (CY) is present in Pond 1 of Plant 1. Anderson Perry & Associates, Inc. (AP) and the City performed a sludge survey on November 11, 2021 (see Figures 3-1A, 3-1B, and 3-1C for sludge depths). Sludge in Pond 1 of Plant 1 has been reduced by an average depth of 0.4 foot since the previous sludge survey completed in March 2017. An additional sludge survey was completed at Ponds 1 and 2 of Plant 2 with measured solids equal to approximately 6,440 CY and 2,130 CY, respectively.

In 2021, AP developed a preliminary Biosolids Removal Plan. The preliminary Biosolids Removal Plan identifies options for biosolids removal, if required, to maintain reasonable biosolids depths within the lagoons. Biosolids removal for Pond 1 at Plant 1 is identified as Capital Improvements Plan (CIP) 10 (further discussed in Section 4) and is considered a long-term improvement. Surveys should be conducted every three years to determine if biosolids depths continue to decline; action plans should be further developed to determine if the sludge needs to be removed, as it could cause operational issues, reduce the treatment capacity, and contribute odors. Characterization of the existing biosolids or an evaluation of requirements for biosolids disposal was not completed as part of this Wastewater Facilities Plan (WWFP).

Aging Infrastructure

Collection System

The City's collection system facilities vary in age but are generally approximately 60 years old. Repairs have been completed on collection system piping and manholes as identified through field inspections. Most of the collection system remains in adequate condition for rehabilitation using cured-in-place pipe (CIPP) lining trenchless technologies.

Gravity Sewers

Some locations of deteriorating gravity sewer mains, including areas of cracked pipe, root intrusions, and damaged gaskets, exist throughout the system. While this section demonstrates that infiltration and inflow (I/I) is not excessive, the structural integrity of sewer mains is equally important to prevent exfiltration for protection of groundwater and failure of the piping network. It is recommended the City implement an annual collection system inspection and evaluation program. The results of the evaluation will provide information to establish an annual pipe rehabilitation and replacement program that prioritizes the replacement/rehabilitation of damaged sections of pipe depending on the severity of the damage.

Specific locations have been identified for CIPP lining based on location and the ability to perform replacement. The locations identified on Table 3-1 are in areas where typical replacement is not possible, i.e., the pipes run under buildings or other improvements that prevent conventional construction. The locations of these improvements are shown on Figure 3-2.

TABLE 3-1
IDENTIFIED CURED-IN-PLACE PIPE LINING LOCATIONS

Pipe ID	Location Description	Length of Pipe (feet)	Size
1	N.W. Claypool to Deer between 3rd Street and 4th Street	313	8-inch
2	N.E. Dunham Street to N.E. Court Street between 3rd Street and 4th Street	320	8-inch
3	N.E. Fairview Street to N.E. Elm Street between 3rd Street and 4th Street	320	8-inch
4	N.E. Court Street to N.E. Belknap Street between 1st Street and 2nd Street	350	8-inch
5	S.E. Garner Street to S.E. Fairview Street between 5th Street and 4th Street	405	8-inch
6	N.E. Garner to N.E. Holly Street between 6th Street and the park	310	8-inch
7	N.E. Belknap Street and 9th Street line under the grocery store	305	8-inch
8	Between Mason Drive and Mountain View Drive under the creek	105	8-inch
9	Knowledge and 1st Street	355	8-inch
10	Knowledge and 1st Street	177	8-inch
11	Knowledge and 1st Street	300	8-inch
12	Between S. Main Street and Deer Street	269	12-inch
13	Between S. Main Street and Deer Street	328	12-inch
14	Between S. Main Street and Deer Street	328	12-inch

Wastewater Lift Stations

Structural aspects of the City's lift stations are in adequate condition. However, access to the wetwell structures that do not have functioning pump guide rails and quick connect elbows requires a permit-required confined space entry operation. The existing pumps, electrical, and control systems are beyond their life expectancy. The existing lift stations are also in need of new auxiliary alarms with remote monitoring and an alarm notification system. A summary of the City's lift stations is provided on Table 3-2.

TABLE 3-2
CITY LIFT STATION SUMMARY

Name/Location	Year Built	Number of Pumps	Horsepower	Pump Station Features[1]
Airport	1997	2	2	A, B, C
Oregon Youth Authority	1997	2	40	A, B, C
Williamson	1995	2	7.5	A, B, C
McDougal	Unknown	2	5	A, B
Western Sky	1996	2	5	A, B, C
Saddle Ridge	2007	2	2.9	A, B, C

[1] A = Submersible Pumps
B = No Bypass Available
C = Emergency Generator Connection

Wastewater Treatment Facility

The existing collection system could be improved with an ongoing effort to reduce I/I, which would reduce flows to the WWTF and extend the capacity of the treatment and disposal facilities. The WWTF has been designed for a total capacity of 2.5 million gallons per day (MGD). The average annual design flow for the 20-year planning period is 1.435 million gallons. The existing facilities are adequately sized for the planning period; however, continued monitoring of biosolids accumulation is recommended for Pond 1 of Plant 1, and Ponds 1 and 2 of Plant 2, to ensure that negative impacts from sludge buildup do not occur.

No significant deficiencies were found during the evaluation of the existing treatment lagoons. The system has adequate capacity and functions properly without significant issues outside of normal maintenance. However, recommended maintenance of the lagoons should continue and include screening improvements, influent pump station upgrades, and biosolids removal.

The existing main influent screen was installed in 2018. The screen removes small particles, rags, and other contaminants prior to entry into the lagoon system where they could potentially affect performance of aeration systems, outlet piping, and pumps. The recent improvements to the aeration system have minimized the negative effects of contaminants passing through the screen, but it is still important to maintain screening performance at the highest level possible. Recent inspections have shown that the existing screen needs significant maintenance work. A complete rebuild of the existing screen system is currently underway. Once complete, the rebuilt system will be evaluated over time to determine if a different screen system is needed.

In conjunction with maintenance of the influent screen, an upgrade to the headworks influent pump station is needed. While the pumps and systems continue to perform well, the pumps are older and should be upgraded due to their cumulative operational time, which makes them more prone to failure, increased O&M costs, and decreased efficiency. The replacement of the pumps at the influent pump station also includes major upgrades to the electrical and controls system for the pump station. The upgraded control system will allow for integration with the City-wide SCADA upgrade, allowing greater reporting and control options for operators. The headworks upgrade is identified as CIP 2 and the SCADA upgrade is identified as CIP 3, as discussed further in Section 4.

The lagoons also accumulate biosolids over time. A recent survey of the solids in the lagoons was completed. Solids in Pond 1 of Plant 1 are approximately 1-1/2 feet deep in the 5-foot deep lagoon. Ongoing solids surveys should be conducted to monitor the biosolids levels. When the levels reach 2 to 2-1/2 feet in depth, the solids should be removed. The solids could be removed by dredging at an estimated cost of approximately $4,350,000. If Plant 1 can be bypassed so Pond 1 can be dewatered and the solids dried to approximately 30 percent solids, then the solids could be removed for approximately $516,000. The solids could either be transported to a landfill or land-applied for beneficial use on pasture land. Solids removal would also remove the rags from Pond 1. Due to recent improvements in aeration systems, the volume of solids has been reduced and the proposed biosolids removal has been moved to CIP 10, as discussed in Section 4. It is recommended that surveys be conducted to determine biosolids accumulation on approximately three-year intervals and prioritization of this removal be adjusted accordingly based on survey results.

Aeration improvements to Pond 1 of Plant 1 and Pond 1 of Plant 2 have been completed in recent years with the existing surface-mounted aeration systems being replaced with fine bubble diffused aeration systems. It is believed that this improvement is responsible for an overall average reduction of biosolids accumulation of approximately 0.4-foot since 2017, which equates to approximately 74,600 cubic feet (2,763 CY) of biosolids reduction. Biosolids surveys should be conducted to ensure that the biosolids levels are maintained at an appropriate level without detrimental effect to the treatment process.

Redundancy in Unit Process Systems

The City's WWTF is unique in the fact that it has two separate plants that can be operated in combination or individually. This redundancy allows for maintenance and repairs to be completed by isolating the plants and their components individually during average flows. The influent and effluent systems are largely capable of being adjusted to allow for redirection of flows to accommodate maintenance activities.

Currently, the main influent screen does not have redundancy but does have a flow bypass available. This screen and influent pump station are equipped with a backup power supply from a diesel generator to maintain service during power outages.

The effluent disinfection system has some redundant features, but redundancy will be increased through the chlorination conversion project currently in design. The disinfection system is also equipped with a backup power supply from a diesel generator.

Both fine bubble diffused aeration systems have three blowers: two duty blowers and one standby. Both systems also have a backup power supply from a diesel generator.

Removal of Inorganic Solids

Prior to installation of the first screen in 2017, a considerable amount of inorganic materials had been deposited in Pond 1 of Plant 1. Rags and other items will need to be removed during future maintenance activities. Due to the addition of a new influent screen and a conversion of surface-mounted aspirating aerators to fine bubble diffused aerators, the issues caused by rags have been reduced significantly.

Biosolids Processing

Currently, the City does not have a biosolids processing facility. Since construction of the WWTF, the biosolids have not been removed. Recent plant equipment and operations improvements have resulted in a reduction in biosolids depth of approximately 0.4-foot in Pond 1 of Plant 1 between 2017 and 2021.

Wastewater Treatment Facility Plant Influent Pump Station

The pumps, electrical components, and control systems are reaching the end of their useful life. Currently, the City is procuring materials to upgrade these components as part of an asset management program. This improvement is identified as CIP 2, as discussed in Section 4.

Operations Building

The existing operations building is a single-wide modular structure with a simple operations station and a small kitchen area. The operations building has no restrooms, laboratory or testing equipment, conference space, or offices; however, a separate building provides some limited laboratory space. Currently, much of the laboratory analyses are conducted by a third-party laboratory. A proper operations building is needed at the WWTF that includes offices, storage, showers, restrooms, an employee locker room, and a laboratory.

Equipment and Component Deterioration

Most of the equipment and components in all processes of the existing WWTF have been upgraded or are in the process of being upgraded. Upgrades consist of the replacement with new or the rebuilding of existing components. Rebuilding existing equipment is cost-effective but does not realize the potential long-term savings of upgrading to new, more efficient equipment. For this reason, CIP 2, as discussed in Section 4, is included in this WWFP and will upgrade existing pumping systems to newer, more efficient equipment.

Electrical, Controls, and Instrumentation

Many current operational and monitoring practices are performed manually and are labor intensive. Influent and effluent samples are collected manually based on minimum NPDES Permit requirements. Minimal alarms or annunciators are provided to notify the WWTF operators of conditions that could result in damage to vital equipment, hazards to personnel, or a violation of the effluent limitations. Some electrical systems do not meet current electrical codes.

Currently, the chlorine residuals in the effluent discharge can vary significantly depending on the time of year and organic loading rate. Operators proactively perform readings and adjust for current conditions. A significant upgrade to the wastewater system's SCADA system is imperative as growth and staffing challenges continue and is identified in the CIP discussed in Section 4. The ability to maintain awareness of system function without the need for manual observation is an important component of meeting NPDES Permit requirements.

Reasonable Growth

The City of Prineville's population at the 2020 Census was 10,736 as reported by the U.S. Census Bureau. The certified population estimate by the Population Research Center for 2021 was 11,042 with an average annual growth rate (AAGR) of 1.1 percent between the years 2022 and 2042.

The historical population plus the projected AAGR results in a 20-year (year 2042) population estimate of 13,743. This WWFP uses 13,743 as the 20-year design population inside the city limits.

The City has experienced consistent growth between the years 2010 and 2020 averaging 1.6 percent annually. Between 2020 and 2021, the population increased by 306 persons or 2.9 percent.
To accommodate the continued growth of the community, additional improvements to improve the collection system should be considered. For this reason, System Development Charge (SDC) improvements are identified and discussed in Section 4 as are CIP improvements. Needed improvements are identified in the appropriate category to facilitate proactive action to maintain satisfactory services in response to the increasing population.

It is important to note that not all the existing City population is connected to the wastewater system. In reviewing City records, the connected population was determined to be 10,771. A review of historical wastewater data must be completed using the connected population. Collection system improvements are needed to be able to connect the entire population within the city limits. In addition, there are areas of residential development outside the city limits but within the urban growth boundary (UGB). If 20 percent of these areas outside the city limits but within the UGB is annexed into the City, the City's population could increase by 1,002 people, to 11,773, without any additional people moving into the area.

To obtain a realistic population that could require service by the wastewater system in the next 20 years, the estimated 2042 City population of 13,743 was added to the assumed 1,002 population from the annexation of areas within the UGB for a design population of 14,745 in the year 2042.

Wastewater flow projections for the year 2042 were made using the existing base per capita wastewater contributions extrapolated to the end of the 20-year planning period using the year 2042 design population of 14,745 and adding the existing I/I flow contribution. This assumes that I/I will remain constant over the 20-year planning period because I/I does not generally increase proportionally with population, as new pipelines are generally watertight.

Additional Projected Residential Wastewater Flow Contribution

A UGB development east of the Prineville city limits and south of Highway 26 is currently experiencing failing drinking water wells and septic systems. This is known as the Melrose/Willowdale area. Due to the size of the existing lots and setback requirements, replacing the failing septic systems is not feasible. With the wells in this area being very shallow, the concern exists that the groundwater may become contaminated by the failing septic systems. This potential contamination would affect individual residences as well as potentially cause contamination of the aquifer. At this time, some of the lots in the area are faced with condemnation, as the property owners are unable to make needed improvements due to income or lot size restrictions.

The City has been approached by residents of the Melrose/Willowdale area and wishes to assist them with necessary improvements. SDC 10, as discussed in Section 4, is specifically identified to provide wastewater main lines into this area to provide the needed infrastructure to facilitate domestic wastewater connections to the Melrose/Willowdale residents. Additional improvements will be needed to extend smaller diameter main lines to side streets, as well as to make service connections available.

The estimated number of residences in this area is 250. Using the current data of 2.46 persons per household, the estimated number of persons to connect is 615. The estimated additional sewer flow contribution to the wastewater system is summarized on Table 3-3.

TABLE 3-3
MELROSE/WILLOWDALE ADDITIONAL SYSTEM
WASTEWATER FLOW CONTRIBUTION

Parameter	System Flows (gpcd)	gpd
AAF	101	62,115
MMF	162	99,630

AAF = average annual flow
gpcd = gallons per capita per day
gpd = gallons per day
MMF = maximum monthly flow

Based on Table 3-3, the existing wastewater system has the capacity to accommodate the addition of the Melrose/Willowdale area residents.

Industrial/Large Commercial

The existing domestic flows and loadings include the small industrial flows that exist within the City. As the City grows in population, industrial flows in the system will also grow. Currently, the two data centers in use are contracted to produce a peak flow of 0.805 MGD to the treatment plant with an MMF of approximately 0.29 MGD. The historic flows for the completed data centers are included in this WWFP and have been analyzed as the data centers have completed construction and moved into operational status.

Additional Projected Commercial Wastewater Flows

In recognizing the potential need to provide additional wastewater service to future large commercial and industrial service customers located in undeveloped areas of the UGB, an additional allowance for the growth of the wastewater service population should be accounted for separately from the wastewater flow projections in this WWFP. The City has recently received requests from potential commercial tenants looking to site new facilities in the Prineville area. Several of the proposed facilities have large wastewater disposal requirements, and City leaders have indicated a desire to accommodate these proposed facilities.

Many factors must be reviewed during analysis of large commercial wastewater users. Instantaneous high flow contributions are analyzed to confirm that weir and other adjustments can be made at the WWTF to accommodate those flows while maintaining optimum treatment and detention times. Analysis of the proposed discharge returning to the WWTF will need to be completed to determine the concentration and makeup of the discharge chemistry, such as heavy metals, chemicals, or organic loading. Early analysis shows negligible waste loads in the discharge related to the specific commercial users requesting to locate new facilities in Prineville.

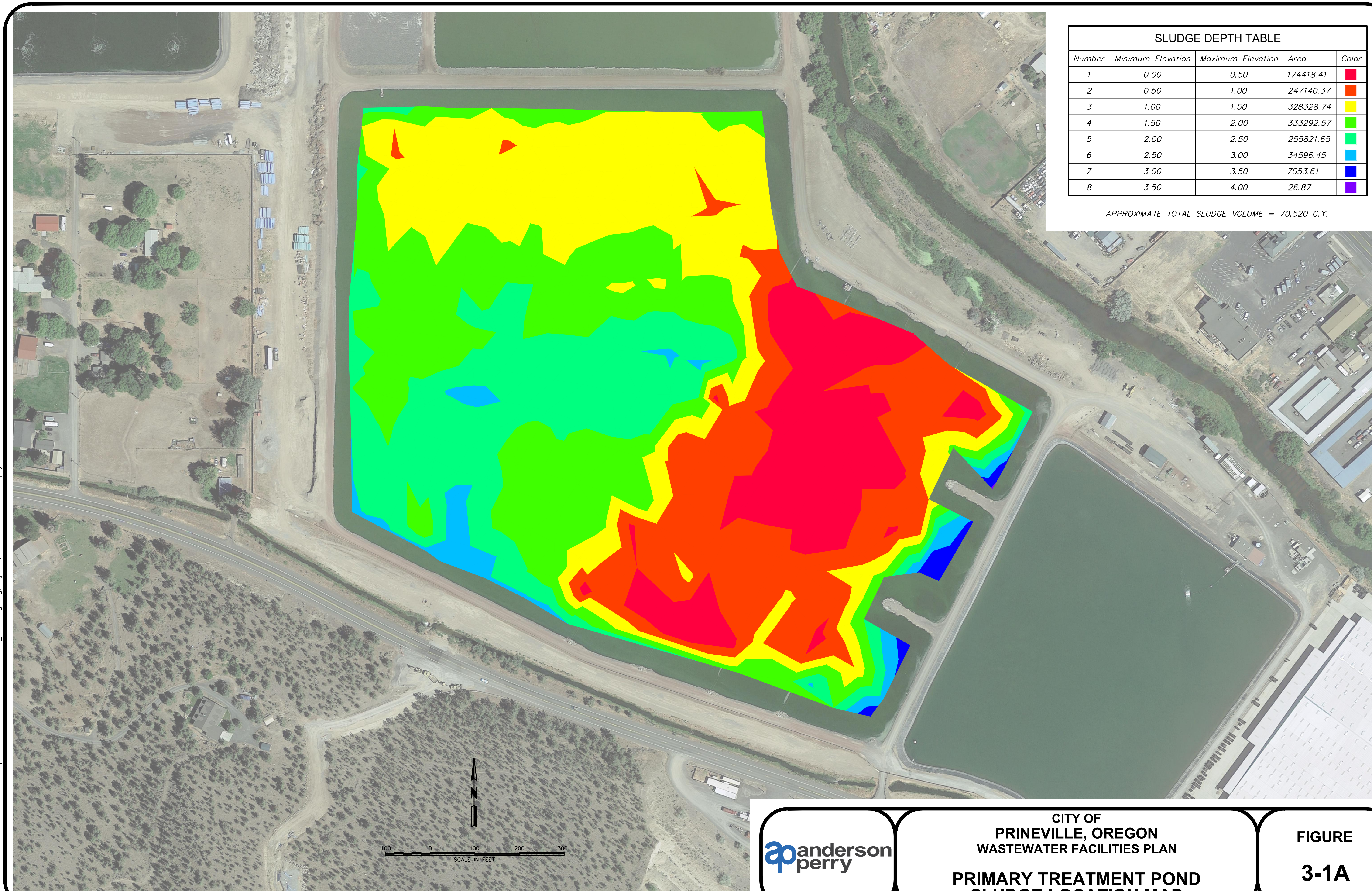
In response to these requests, the City has begun implementation of an Industrial Pretreatment Program. The program consists of a comprehensive framework that establishes minimum standards for industrial wastewater discharges into the WWTF. Wastewater users that qualify as Categorical Industrial Users are required to comply with the program. Additionally, the City has analyzed a series of scenarios utilizing weirs and other flow control devices at the WWTF to confirm that operational capacity, treatment and detention times, and the public collection system can perform properly in response to the proposed discharge flows from data center cooling water systems.

It is recommended that specific industrial discharge requests are reviewed individually. The chemical makeup and volume of discharge, including peak daily flow, should be evaluated. Specific pretreatment processes should be reviewed to address discharge flow chemistry, if needed, as well as peak flows, including attenuation measures for gradual release of instantaneous high flows.

Domestic and Commercial Mass Loadings

The domestic and commercial design mass loadings (five-day biochemical oxygen demand [BOD_5] and total suspended solids [TSS]) to the WWTF were estimated based on the average influent per capita BOD_5 and TSS contributions projected to the end of the 20-year planning period using the year 2042 design population of 14,745 (i.e., mass loading [BOD_5 or TSS] = contribution [BOD_5 or TSS] pounds per capita per day [lbs/capita/day] x 14,745). Using the design mass loading of 0.21 and 0.18 lbs/capita/day for BOD_5 and TSS, respectively, yields a year 2042 domestic mass loading of 3,096 and 2,654 pounds per day, respectively.

This section demonstrates that growth is a considerable driver for improvements. While the systems are adequately sized for the projected flows and loadings, the potential for collection system problems to develop will be determined by the locations where growth occurs. Improvements proposed for the collection system, lift stations, and WWTF are primarily intended to improve reliability, efficiency, safety, and permit compliance. These improvements are also beneficial to future growth. However, these improvements are also needed due to age, deterioration, and lack of reliability of certain system components. These factors remain the primary evaluation criteria for the improvements discussed later in this WWFP.



SLUDGE DEPTH TABLE

Number	Minimum Elevation	Maximum Elevation	Area	Color
1	0.00	0.50	174418.41	
2	0.50	1.00	247140.37	
3	1.00	1.50	328328.74	
4	1.50	2.00	333292.57	
5	2.00	2.50	255821.65	
6	2.50	3.00	34596.45	
7	3.00	3.50	7053.61	
8	3.50	4.00	26.87	

APPROXIMATE TOTAL SLUDGE VOLUME = 70,520 C.Y.

anderson perry

CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

PRIMARY TREATMENT POND
SLUDGE LOCATION MAP

FIGURE
3-1A

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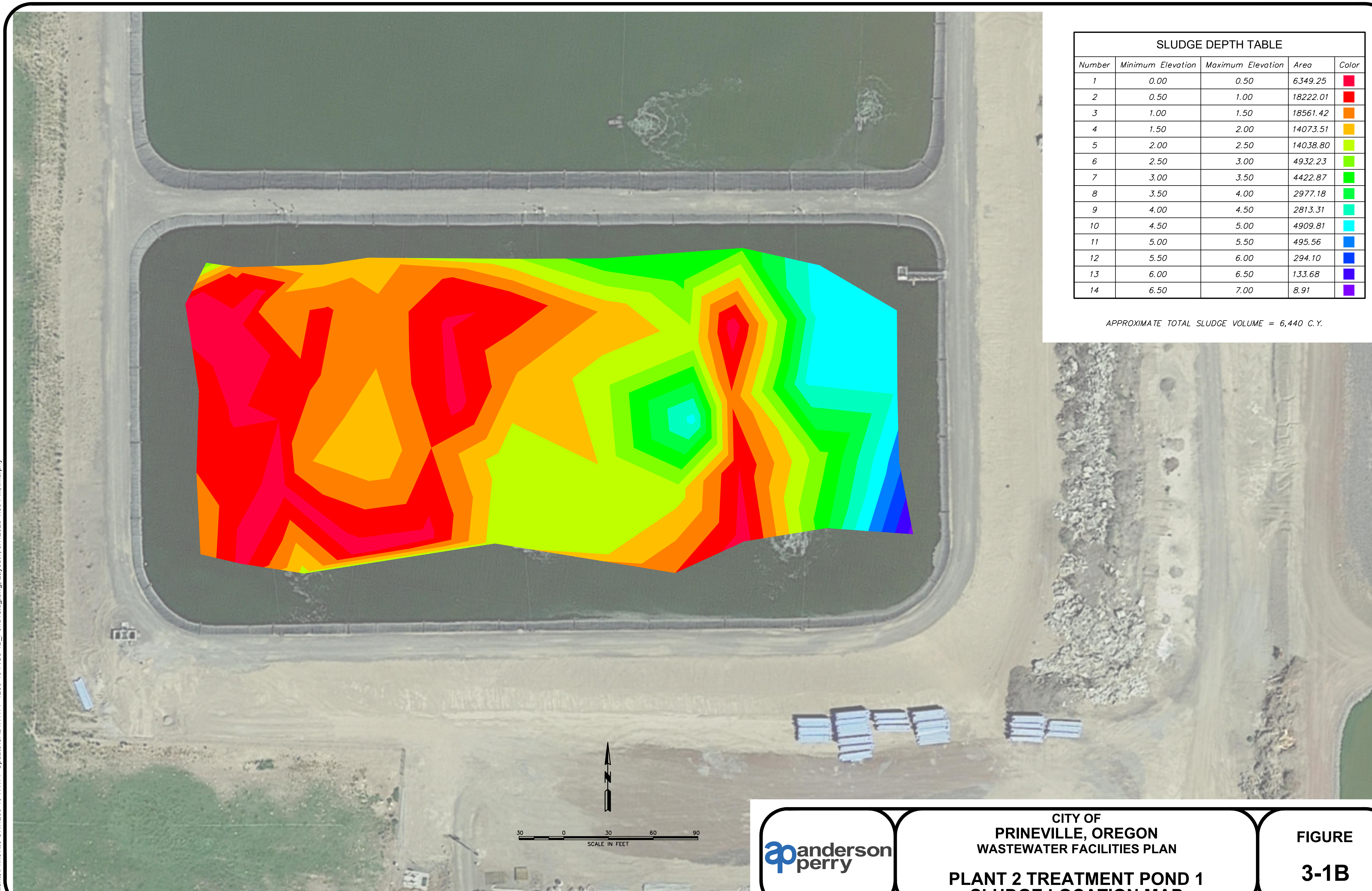

SLUDGE DEPTH TABLE

Number	Minimum Elevation	Maximum Elevation	Area	Color
1	0.00	0.50	6349.25	
2	0.50	1.00	18222.01	
3	1.00	1.50	18561.42	
4	1.50	2.00	14073.51	
5	2.00	2.50	14038.80	
6	2.50	3.00	4932.23	
7	3.00	3.50	4422.87	
8	3.50	4.00	2977.18	
9	4.00	4.50	2813.31	
10	4.50	5.00	4909.81	
11	5.00	5.50	495.56	
12	5.50	6.00	294.10	
13	6.00	6.50	133.68	
14	6.50	7.00	8.91	

APPROXIMATE TOTAL SLUDGE VOLUME = 6,440 C.Y.

anderson perry

CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

PLANT 2 TREATMENT POND 1
SLUDGE LOCATION MAP

FIGURE
3-1B

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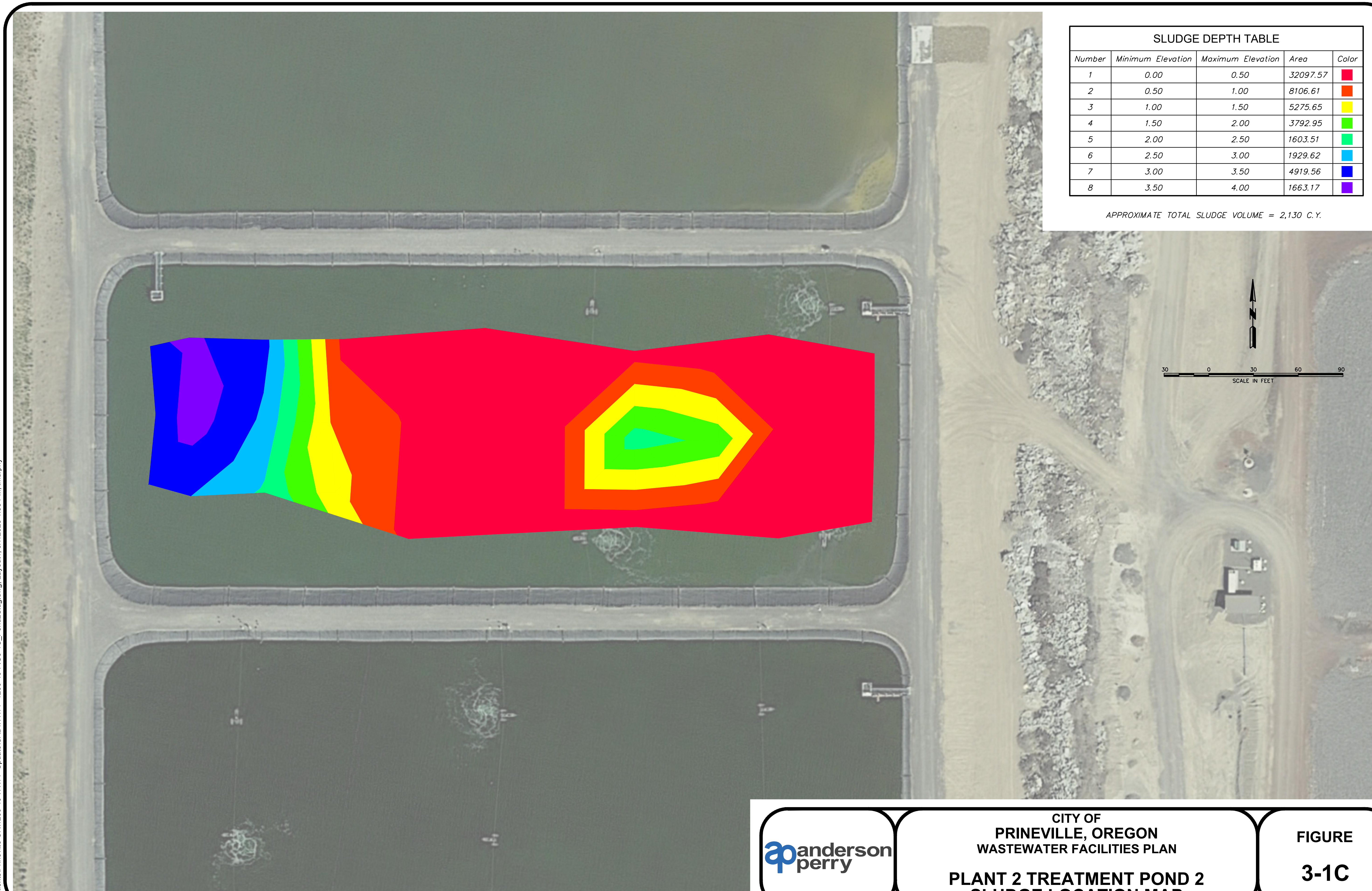


SLUDGE DEPTH TABLE

Number	Minimum Elevation	Maximum Elevation	Area	Color
1	0.00	0.50	32097.57	
2	0.50	1.00	8106.61	
3	1.00	1.50	5275.65	
4	1.50	2.00	3792.95	
5	2.00	2.50	1603.51	
6	2.50	3.00	1929.62	
7	3.00	3.50	4919.56	
8	3.50	4.00	1663.17	

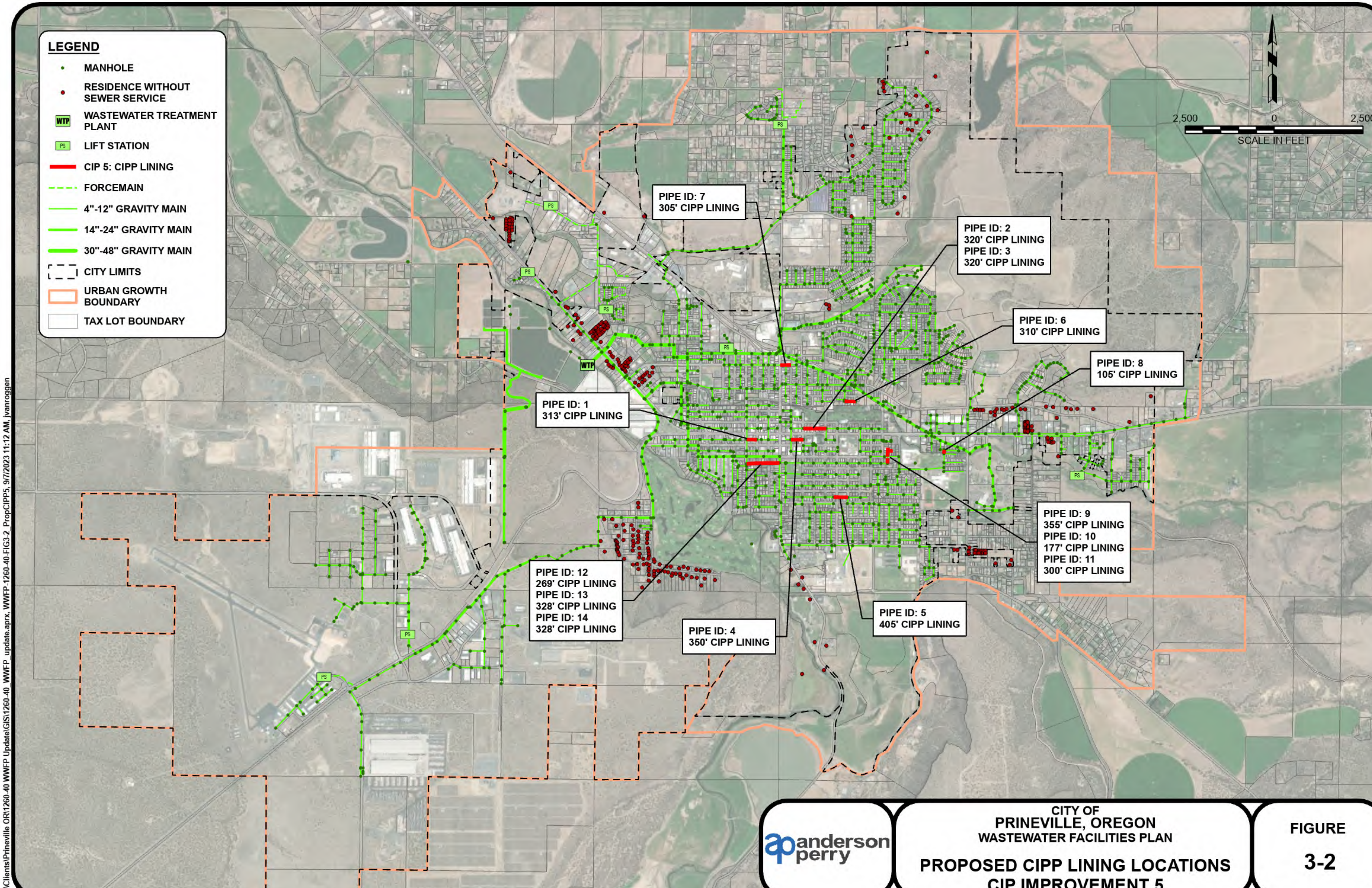
APPROXIMATE TOTAL SLUDGE VOLUME = 2,130 C.Y.

anderson perry

CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

PLANT 2 TREATMENT POND 2
SLUDGE LOCATION MAP

FIGURE
3-1C



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anderson perry

CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

PROPOSED CIPP LINING LOCATIONS
CIP IMPROVEMENT 5

FIGURE
3-2

Section 4 - Alternatives Considered

Description

This section presents alternatives to improve the City of Prineville's collection system, lift stations, and wastewater treatment facility (WWTF) to address the deficiencies and issues identified previously. First, design criteria are summarized followed by key objectives of improvement alternative outcomes. Then, a conceptual discussion of improvement alternatives considered is presented with cost estimates for viable alternatives. An environmental impact evaluation is included that identifies the impacts on specific resources. Finally, a discussion on land requirements and potential construction problems, sustainability considerations, and water and energy efficiency is provided.

Design Criteria

To properly evaluate the proposed alternatives, it is necessary to develop design criteria to confirm that the proposed alternatives will provide the necessary capacity to properly treat wastewater throughout the 20-year planning period. The design criteria were discussed in detail in Section 2 and are summarized below.

Wastewater Influent Flow and Mass Loading Projections (2042)

Typical flow rate design parameters used for sizing process systems of WWTFs are average annual flow (AAF), peak hourly flow, and maximum monthly flow. Typical mass loading rate design parameters used for sizing process systems of lagoon WWTFs are maximum monthly five-day biochemical oxygen demand (BOD_5) in pounds per day (lbs/day) and maximum month daily total suspended solids (TSS) in lbs/day.

For the historical data period, the average population used was 10,771 people. This Wastewater Facilities Plan (WWFP) has adopted a design year of 2042 with a projected population of 14,745. Projected flows and loadings for the design year were estimated by multiplying historical per capita values by the projected population. These design criteria are provided on Figure 2-9 in Section 2.

Wastewater Effluent Mass Loading and Regulatory Requirements (2042)

The current National Pollutant Discharge Elimination System (NPDES) Permit was developed for an AAF with no daily maximum limit and restricts to maximum effluent pollutant concentrations for BOD_5 and TSS between November 1 and April 30 when discharging to the Crooked River (Outfall 001) and between May 1 and October 31 for Outfalls 002, 003, and 004. Assuming the WWTF continues to treat and discharge effluent that meets allowable mass loadings concentrations, no change to the NPDES Permit conditions will be required for the WWTF to continue to discharge to any of the outfalls for the design year of 2042.

Key Objectives to be Addressed by Alternatives

A key step in the conceptual evaluation of improvement alternatives is identifying outcomes to be addressed in the final Capital Improvements Plan (CIP) and System Development Charge (SDC) Plan.

Through discussions with the collection and treatment system operators, city manager, and Public Works personnel, the following key objectives should be addressed by alternatives considered:

- Collection System Key Objectives
    - Inspect and evaluate the collection system by closed-circuit television inspection, smoke testing, and visual inspection of manholes. Record results for selection of repair/ replacement locations.
    - Repair damaged and deteriorating collection system mains, as necessary.
    - Repair damaged and deteriorating collection system manholes, as necessary.
    - Upsize 6-inch gravity mains during any new construction or redevelopment.
- Lift Station Key Objectives
    - Address deteriorating equipment, maintenance issues, and absence of instrumentation and controls at the City's lift stations.
    - Improve reliability at the City's lift stations.
    - Provide upgraded supervisory control and data acquisition (SCADA) systems for operator efficiency and notification of deficiencies or failures.
- WWTF Key Objectives
    - Provide equipment to effectively remove inorganic solids at the headworks.
    - Provide equipment to accurately measure and record influent and effluent flows and provide for wastewater constituent sampling.
    - Replace deteriorating mechanical equipment and components required by the chosen alternative.
    - Convert gas chlorine disinfection system to a bulk sodium hypochlorite system. Improvement includes backup diesel generator power for the chlorine system and effluent pumps.
    - Implement controls and instrumentation to allow automation of processes, detect abnormalities, and provide on-site and remote notifications to the WWTF operator or other City personnel of potential problems.
    - Provide proper facilities for WWTF personnel such as showers, crew locker room, laundry, office space, break room space, and storage.
    - Provide laboratory space for WWTF personnel to conduct required analyses.
    - Provide equipment and facilities to effectively remove and dewater biosolids.

Conceptual Discussion of Wastewater Collection System Alternatives

Gravity Sewer Improvement Alternatives

This section outlines the suggested prioritization plan and presents the recommendations and associated cost estimates to complete the wastewater collection system improvements.

When determining the means of repair/replacement of problem areas, the location and overall condition of the main line, service lines, and manholes should be considered. The decision to repair or replace a main line should take into consideration the location, number, and type of deficiencies within the specific reach from manhole to manhole. Cured-in-place pipe (CIPP) lining should generally be used to repair main lines in paved streets that are in poor condition where adequate capacity exists within the existing pipe because of its ease of use and capability to repair existing problems. CIPP lining also reduces asphalt surface restoration and disruption to neighborhoods. CIPP lining is not an appropriate repair method in all cases and should be evaluated on a case-by-case basis to determine its validity and applicability. For example, CIPP lining should not be used when significant bellies exist in the pipe run, as this method of pipe rehabilitation will not address these pipe deficiency situations because the lining follows the existing pipe path and the bellies will still be present after lining has been completed. Replacement should be evaluated when the location is not in a high traffic or unrealistic area to dig (i.e., newly replaced highway) or where CIPP lining rehabilitation is not appropriate to employ.

Collection system and manhole evaluation and rehabilitation should be staged through a ten-year CIP. The majority of the City's sewer lines are in adequate condition and capacity to be rehabilitated with CIPP lining; thus, the useful life of the wastewater collection system could be greatly extended. However, some locations may exist where damage is too severe or other conditions exist that prevent rehabilitation with CIPP lining and must be replaced with new pipe. Recommended improvements have been placed in two priority categories based on the anticipated sequence of phased improvements through a 20-year planning period. The two categories are referred to herein as medium- and long-term improvements. Medium- and long-term improvements projects should be completed within 0 to 10 years and 10 to 20 years, respectively. By dividing improvements and implementing a phased sewer rehabilitation CIP schedule, the City will be able to divide the required work throughout the 20-year planning period, which will allow the City to assign funds more evenly. It is also recommended the City implement an ongoing sewer main inspection and evaluation program addressing any pipe repair or replacement during any new construction, redevelopment, or street reconstruction projects.

Medium-term collection system repairs will typically consist of CIPP lining of sections of pipe where damage exists or where conventional replacement cannot occur due to improvements above or near the pipe location. CIPP lining in longer sections (manhole to manhole) is generally much more economical when considering substantial lengths of sewer lines in need of repair and expensive asphalt surface restoration in roadways. The exact number of sections of severely damaged pipe will need to be verified by the City after adoption of this WWFP, and implementation of an annual television (TV) inspection and an evaluation of the collection system should occur. As CIPP lining installation requires that protruding objects are not present within the pipe to be lined, each section of pipe will need to be inspected (with a closed-circuit camera) and any protruding laterals or other obstructions will need to be addressed prior to installation.

For the purposes of this WWFP and based on Table 3-1 in Section 3, approximately 14 locations are anticipated to need CIPP lining. Figure 4-1 identifies the collection system alternatives by cost and funding category, and Figure 4-2 presents the total estimated project cost and net present worth of the collection system medium-term improvements.

Other collection system improvements projects not identified generally include the rehabilitation of any remaining lengths of pipe not addressed in the medium-term improvements in addition to potential sources of infiltration and inflow (I/I) or increased maintenance, including sagging piping, debris in the laterals, light roots around laterals, or heavy grease in the pipe. These improvements will be identified during the collection system inspection and evaluation project. Additionally, due to age and general characteristics of forcemain deterioration, the existing forcemains servicing the Williamson, Western Sky, McDougal, Oregon Youth Authority, and Airport Lift Stations will need to be evaluated for replacement within the 20-year planning period.

It should be noted that of the improvements shown on Table 3-1 in Section 3 are labeled as medium-term improvements as presented in this section and on Figures 4-1 and 4-2. This is because completing all the priority improvements shown on Table 3-1 in a five-year period is impractical due to budget constraints. Therefore, collection system improvements have been allocated to medium-term projects based on location and anticipated flow. In general, the medium-term improvements shown on Table 3-1 consist of main lines and are expected to be completed within the 0 to 10 year time frame as funding allows. Figures 4-1 and 4-2 present the total estimated project cost and net present worth of the collection system improvements. The collection system improvements are outlined on Table 4-1.

TABLE 4-1
SUMMARY OF COLLECTION SYSTEM IMPROVEMENTS

Improvement	Improvement Purpose/Description	Estimated Cost
CIP 5	Collection System Improvements - Maintenance, Rehabilitation, I/I Reduction (500 LF Annually)	$855,500
CIP 6	Manhole Rehabilitation Program (Manhole Repair/Replacement as Identified Annually)	$382,000
CIP 7	Collection System Inspection/Evaluation (Annual Inspection Program to Evaluate Collection System Condition)	$292,000
CIP 8	Replace Existing Main Line from N.W. 10th Street to the North Side of Lamonta Road	$2,276,800
SDC 2	Increase Size of Main Line from N.W. 10th Street to the North Side of Lamonta Road	$932,500
SDC 4	Extend main line to serve property north of Lamonta and west of Main Street	$325,250
CIP 9	Replace Existing Main Line on Main Street from Lynn Boulevard to 1st Street	$1,293,500
SDC 6	Increase Size of Main Line on Main Street from Lynn Boulevard to 1st Street	$350,000
SDC 5	Extend Pressure Sewer North on Highway 26 from N. Gardner Road to Serve Future Growth	$520,250

Improvement	Improvement Purpose/Description	Estimated Cost
SDC 7	Extend 18-inch Sanitary Sewer South on Main Street to Serve Future Growth	$1,772,500
SDC 8	Extend Existing Interceptor Main Line East from Combs Flat	$2,330,750
SDC 9	Connect Williamson Area to Gravity Sewer - Remove Williamson Lift Station	$611,250
SDC 10	Extend Sanitary Sewer Main Line and Manholes to Melrose/Willowdale Area	$3,169,500

LF = linear feet

Lift Station Alternatives

The following alternatives are discussed conceptually and evaluated to address the wastewater lift station deficiencies.

Lift Station - Alternative 1 - No Action

Under this alternative, the City would continue to use the lift stations in their current conditions. As discussed previously, the existing pumps are beyond their life expectancy and should be replaced. A failure could lead to a sanitary sewer overflow if the pumps were to fail, and the existing, unreliable automatic alarm notification system fails. If use of the existing lift stations was to continue, a major failure could potentially result in the City proceeding with Lift Station - Alternative 2, thus requiring that emergency bypass pumping be implemented until the improvements project were completed. This scenario could potentially add significant costs to mitigating such a scenario in comparison with completing the selected improvements while the existing lift stations are still operational.

Lift Station - Alternative 2 - Replace Existing Pumping Equipment and Install New Remote Monitoring, Electrical, and Instrumentation and Controls

Under this alternative, the City would replace the existing pumps and install new instrumentation and controls with local and remote monitoring and notification capabilities. Alternative 2 would be a long-term solution to extend the operation of the existing lift stations as is. The existing wetwells are in fair to good condition and should be able to perform throughout the 20-year planning period. The design and construction of four of the existing wetwells will require installation of new guide rails for pump installation to allow crews to safely remove the pumps for maintenance without entering the wetwells. Additionally, the ability to standardize pumps, guide rails, level controls, and other components to a single manufacturer will minimize the additional parts required to be kept in stock by the City. Figure 4-3 identifies the lift station alternatives by cost and funding category, and Figure 4-4 presents the total estimated project cost and net present worth of Lift Station - Alternative 2. A summary of the Lift Station - Alternative 2 improvements is provided on Table 4-2.

TABLE 4-2
SUMMARY OF LIFT STATION - ALTERNATIVE 2

Name/Location	Estimated Improvement Cost
Airport	$45,100.00
Oregon Youth Authority	$84,500.00
Williamson	$21,000.00
McDougal	$60,900.00
Western Sky	$42,500.00
Saddle Ridge	$10,500.00
Total Estimated Improvements Cost	**$264,500.00**
Engineering, Contingency, and Mobilization	**$116,000.00**
TOTAL REPLACEMENT COST (2023 DOLLARS)	**$380,500.00**

Wastewater Treatment Facility Alternatives

The following four alternatives are discussed conceptually and evaluated to address WWTF deficiencies.

Wastewater Treatment Facility Alternative 1 - No Action

Under this alternative, the City would continue to use the WWTF in its current condition. As discussed previously, from a capacity and operational standpoint, the existing WWTF is capable of treating the design year flows and loadings. It should be noted that the ability of the WWTF to continue to satisfy current requirements requires necessary maintenance improvements.

Wastewater Treatment Facility - Alternative 2 - Replace Existing Pumping Equipment and Electrical Components

Under Alternative 2, the City would replace the influent and effluent pumps required for operation of the WWTF. The pumps are approaching the end of their useful life and should be replaced, including upgrading associated electrical and control components.

Wastewater Treatment Facility - Alternative 3 - Replace Existing Pumping Equipment, Rebuild the Main Influent Screen, and Convert the Gas Chlorination System to a Bulk Sodium Hypochlorite System

Under Alternative 3, the City would complete the improvements identified in Alternative 2. Additionally, the existing vertical screw screen on the main influent line would be rebuilt and updated with new components.

The existing gas chlorination system and associated scrubber equipment would be replaced with a new bulk sodium hypochlorite chlorination system.

Wastewater Treatment Facility Alternative 4 - Replace Existing Pumping Equipment, Rebuild the Main Influent Screen, Upgrade Supervisory Control and Data Acquisition Systems, Convert the Gas Chlorination System to a Bulk Sodium Hypochlorite System, Complete Biosolids Removal, and Construct a New Operations and Laboratory Building

Under Alternative 4, the City would complete the improvements identified in Alternative 3. Additionally, the WWTF SCADA systems would be upgraded or replaced, including new SCADA software, sensors, and other necessary equipment.

Alternative 4 would also include the construction of a new operations and laboratory building to provide improved facilities for WWTF personnel, as well as the ability to conduct a considerable portion of the necessary permit-required analyses currently contracted to outside laboratories. This alternative would also develop a biosolids removal process with construction of drying beds in preparation for removal, when required.

Cost Comparison of Wastewater Treatment Facility Improvement Alternatives

Alternative 1 is not included in this comparison, as this alternative is not considered viable. The estimated costs for Alternatives 2, 3, and 4 are presented on Table 4-3 for comparison. Figure 4-5 identifies the wastewater treatment facility alternatives by cost and funding category, and Figure 4-6 presents the total estimated project cost and net present worth of WWTF - Alternatives 2, 3, and 4.

TABLE 4-3
SUMMARY OF ESTIMATED COSTS FOR
WASTEWATER TREATMENT FACILITY IMPROVEMENTS ALTERNATIVES (2023 DOLLARS)

Alternative	Estimated Construction Cost including Contingency	Estimated Engineering Fees	Total Estimated Project Cost	Estimated Annual OM&R Costs	Estimated Net Present Worth[1]
2	$480,000	$96,000	$576,000	$40,000	$1,191,000
3	$1,947,500	$437,000	$2,384,500	$50,000	$3,042,000
4	$4,353,000	$747,000	$5,100,000	$60,000	$5,738,000

[1] Net present value based on Office of Management and Budget Circular A-94, Appendix C, February 2023 update.

OM&R = operation, maintenance, and replacement

As Table 4-3 indicates, Alternative 4 is estimated to cost approximately $2,715,500 more than Alternative 3 to design and construct. This difference in estimated total project cost is approximately 53 percent higher for Alternative 4 when compared to Alternative 3 with a Net Present Worth difference of $2,696,000. Currently, the City operates an efficient WWTF. Utilizing lagoon and wetlands treatment uses less energy than traditional mechanical treatment facilities. Therefore, efficiency improvements in equipment, processes, and operations are the factors that result in OM&R savings.

The City spent $42,000 in fiscal year 2021-22 for third-party laboratory testing at the WWTF and $45,000 for testing at the wetlands. Alternative 4 includes construction of a new operations and laboratory building, which results in estimated cost savings to the City of $40,000 annually due to the ability to perform in-house analyses. This estimated savings is applied to Alternative 4 on Table 4-4.

TABLE 4-4
ESTIMATED OM&R SAVINGS PER ALTERNATIVE (2023 DOLLARS)

Alternative	Annual Operating Expense	2021 Personnel Costs	2021 Materials and Services	Estimated Annual OM&R Savings	Estimated 20-year OM&R savings at 2.0%
2	$937,368	$151,307	$786,061	$5,000	$103,900
3	$937,368	$151,307	$786,061	$20,000	$415,450
4	$937,368	$151,307	$786,061	$70,000	$1,454,100

Summary of Wastewater Treatment Facility Alternatives

Alternative 1 is not viable, although the City would be able to continue to meet NPDES Permit limits throughout the 20-year planning period. However, a failure within the system could result in a prolonged period of non-compliance before the issue could be resolved.

Alternative 2 would require the City to self-fund the project as it does not meet the Oregon Department of Environmental Quality's (DEQ) requirements for redundancy and reliability. The alternative would improve reliability in the plant influent pumping system but would not improve reliability or redundancy in the Plant 1 influent screen or the WWTF chlorination system. The replacement pumps are more efficient than the original pumps, which would also result in energy savings. Additionally, upgrading the pumps to a single vendor/model would reduce the number of units that must be kept in inventory as backup for failure situations. Therefore, Alternative 2 is not a viable option as the WWTF would continue to operate while continuing to meet permit limits but would be doing so at risk of failure should the systems not included in Alternative 2 fail.

Alternative 3 would result in a system with improved redundancy and reliability. However, improved sanitation facilities for wastewater personnel, laboratory space for required analyses, and biosolids dewatering and handling options are not included. Additionally, a needed SCADA upgrade is not included in Alternative 3, which would result in continued personnel visits to monitor, maintain, and control systems more frequently than would be needed with proper remote monitoring and control systems.

Alternative 4 includes the necessary improvements to increase efficiency and reliability in response to continued population growth, additional sampling and testing requirements, and increased costs to operate. A new operations building would house proper accommodations for personnel and a laboratory to perform required analyses in-house. An upgraded SCADA system would monitor system performance and notify the WWTF operator remotely of alarm conditions, as well as provide remote control capability for operators. The resulting system would be easier to operate, efficient, compliant, reliable, long-lasting, expandable, and appropriately sized for the anticipated flows and loadings, which would provide savings when considering long-term OM&R, energy, and third-party laboratory analysis costs.

Improvements Prioritization and Capital Improvements Plan

A CIP provides a framework to prioritize and implement a city's facility and infrastructure asset improvement process over a specified time period. A CIP is a financing and construction plan for projects that require significant capital investment and are essential to safeguarding the financial health of a city, while providing continued delivery of utility and other services to residents and businesses.

As part of this WWFP, the City has developed a CIP based on identified deficiencies and improvements required to address the City's wastewater system needs for the next 20 years. The CIP will need to be reviewed and updated periodically (at least every five years) to accommodate changing community needs, additional improvements that may be identified through time, and changes in financial resources. The CIP lists the City's capital improvements projects, places the projects in a priority order (subject to periodic review), and schedules the projects for funding and construction. Additionally, improvements may be prioritized as components of another project, such as a street improvements project. The schedule of these other improvements will have an impact on the priorities identified in the CIP if wastewater system upgrades are needed within a broader project area.

The CIP is a tool to be used in the development of responsible and progressive financial planning and generally complies with the City's financial policies. City policies and the CIP form the basis for making annual capital budget decisions and supporting the City's continued commitment to sound, long-term financial planning.

The CIP identifies and prioritizes medium- and long-term projects of all types based on the wastewater system facilities planning process. Wastewater system improvements (WWSI) projects will be coordinated with the annual budget process to maintain full utilization of available resources. For each recommended improvement, the CIP provides a variety of information, including a project description and the service needing to be addressed, a proposed timetable, and proposed funding levels. WWSI projects will be prioritized with the most urgent projects first. Ongoing operating costs are not included in the estimated CIP project costs. It should be noted that while improvements projects are listed in order of priority, the ability to fund the project will determine the length of time to complete the entirety of the identified improvements. For this reason, these improvements will need to be further evaluated based on priority improvements to be funded individually, along with other necessary projects.

Development of a CIP is a collaborative effort between the City manager and engineer, City Council members, department heads, and the City's engineering and financial consultants. City staff participate in the CIP development via specific master plans and other planning tools. Major improvements projects require City Council interaction during project development and a determination of where funding allocations are made.

After review of the City's wastewater collection and treatment facilities deficiencies, an improvements prioritization and CIP were developed to organize necessary improvements over the 20-year planning period. The CIP is divided into two phases: medium- and long-term. Completion of medium- and long-term improvements should be completed in 0 to 10 years and 10 to 20 years, respectively. A summary of the costs associated with each phase of the CIP is shown on Table 4-5. The proposed CIP Improvements are shown on Figure 4-7.

TABLE 4-5
SUMMARY OF CAPITAL IMPROVEMENTS PROJECT PHASES (2023 DOLLARS)

Project Element	Project Purpose/Description	Total Estimated Project Cost
Medium-Term Improvements - 0 to 10 years		
Influent Screen Replacement	Replace the existing main influent screen.	$1,156,500
Update Headworks	Install new headworks influent pumps, electrical, and controls.	$576,000
System-wide SCADA Upgrade	Upgrade the wastewater collection and treatment SCADA systems.	$427,000
Lift Station Improvements	Upgrades to the lift station pumps, equipment, electrical, and controls.	$380,500
Collection System Improvements - Annual I/I Reduction Program	Annually install 500 LF of CIPP lining.	$855,500
Manhole Rehabilitation Program	Repair/replace manholes as identified through inspection/evaluation.	$382,000
Collection System Inspection	Annual TV inspection and evaluation of the existing collection system (footage per year to be determined).	$292,000
Upsize Existing Main Line from 10th Street to the North Side of Lamonta	Upsize existing pipe to remove the bottleneck in the collection system from northeast Prineville.	$2,276,800
Upsize Existing Main Line on Main Street from Lynn Boulevard to 1st Street	Upsize existing pipe that is currently 18 inches upstream, bottlenecks to 12 inches, then becomes 21 inches. Remove the 12-inch bottleneck.	$1,293,500
TOTAL ESTIMATED COST OF MEDIUM-TERM IMPROVEMENTS		**$7,639,800**
Long-Term Improvements - 10 to 20 years		
Long-Term WWTF Improvements	Remove lagoon biosolids.	$541,000
TOTAL ESTIMATED COST OF LONG-TERM IMPROVEMENTS		**$541,000**

The estimated CIP costs listed above are provided in 2023 dollars for comparison. The recommended medium-term improvements projects are anticipated to be advertised for bid and awarded in 2026. The City and any potential funding agencies should recognize that, due to the recent escalation of inflation and construction costs, total relative project costs, including construction, administrative, legal, engineering, and contingencies, together with other project costs, will continue to increase until such time that the project is awarded. Therefore, costs for medium-term improvements have been inflated by 6.5 percent per year to 2026 dollars. The estimated year 2026 dollar amount is the amount of funds the City should apply for to cover actual project costs at the time the project is anticipated to be awarded. Table 4-6 shows the anticipated 2026 total project cost for the recommended medium-term improvements is $9,228,500.

TABLE 4-6
2026 TOTAL PROJECT COST FOR RECOMMENDED MEDIUM-TERM CAPITAL IMPROVEMENTS PLAN IMPROVEMENTS

Medium-Term Improvements (2023 Dollars)	$7,639,800
Assumed Annual Construction Cost Index Inflation Rate	6.5 percent
Total Estimated Project Cost (2026 Dollars)	**$9,228,500**

Improvements Prioritization and System Development Charge Plan

This section summarizes and describes those identified improvements that have been included in the SDC funding category. The estimated costs of the various improvements are also presented.

System Development Charge Fee Categories

Oregon Revised Statutes (ORS) 223.297 through 223.314 require SDCs be divided into two fee categories: Reimbursement Fee and Improvement Fee.

Reimbursement Fee

The Reimbursement Fee establishes the value of the unused capacity of the existing system infrastructure. The value of the unused capacity can be assessed to future connections until the excess capacity is exhausted. The Reimbursement Fee is levied upon new developments to contribute a proportionate share of the cost of constructing existing facilities with the capacity to serve new developments. The Reimbursement Fee is based on original construction costs and the remaining capacity of the system component.

Improvement Fee

The Improvement Fee establishes the cost of planned capital improvements to be constructed within the planning period. The Improvement Fee is levied upon new developments to provide funding for planned capital improvements projects, to increase system capacity, and to provide the needed service.

The Reimbursement Fee and the Improvement Fee are combined and result in the overall total SDC fee.

Establishment of System Development Charges

The State of Oregon SDC statutes require the City to develop a methodology for establishing an SDC fee schedule. These fees can be assessed to new developments requiring City wastewater services. Additional detailed discussions of the SDC methodologies and a comprehensive SDC analysis are presented in an SDC study prepared by GEL Oregon, Inc., as part of the overall wastewater facilities planning effort.

Table 4-7 lists the proposed SDC improvements as identified by a collection system evaluation completed for this WWFP and information provided by the City of Prineville Planning Department regarding potential growth areas. The proposed SDC Improvements are identified on Figure 4-8.

TABLE 4-7
SUMMARY OF SYSTEM DEVELOPMENT CHARGE PROJECT PHASES (2023 DOLLARS)

Project Element	Project Purpose/Description	Total Estimated Project Cost
WWTF Chlorination Conversion	Convert the existing chlorination system from gas chlorine to a bulk sodium hypochlorite system.	$652,000
Upsize Existing Main Line from 10th Street to the North Side of Lamonta	Cost difference to increase pipe size - used in conjunction with CIP 8.	$932,500
WWTF Operations Building and Laboratory	Construct an operations building with restrooms, showers, an employee locker room, offices, storage, conference space, kitchen, and laboratory.	$1,747,500
Main Line Extension North of Existing Main Line along Canal	To serve potential development on Rhoden property.	$325,250
Extend Pressure Sewer Main Line North on Highway 26 from N. Gardner Road	To serve future development north of Prineville along Highway 26.	$520,250
Upsize Existing Main Line on Main Street from Lynn to 1st Street	Cost difference to increase pipe size - used in conjunction with CIP 9.	$350,000
Extend Existing 18-inch Sewer Main Line South on Main Street	To serve future development south of Prineville along Main Street.	$1,772,500
Extend Combs Flat Interceptor to the East	To serve future development east of Prineville.	$2,330,750
Connect Williamson Area to Gravity Sewer. Remove Williamson Lift Station.	To serve future development east of Prineville, remove the Williamson Lift Station, and serve the area by gravity.	$611,250
Melrose/Willowdale Sewer Main Line Installation	Install main lines and manholes to facilitate future connection of Melrose/Willowdale residents.	$3,169,500
	TOTAL ESTIMATED COST OF SDC IMPROVEMENTS	**$12,411,500**

The estimated project costs listed above are provided in 2023 dollars for comparison. The preferred improvements projects would be advertised for bid and awarded as growth dictates. For comparison, costs for the medium-term improvements have been inflated by 6.5 percent per year to 2026 dollars. Since SDC projects are directly related to growth, and location and timing of growth is unknown, the time frame for the improvements on Table 4-7 is unknown. Table 4-8 shows the anticipated 2026 total project cost for the SDC improvements.

TABLE 4-8
2026 TOTAL PROJECT COST FOR RECOMMENDED
SYSTEM DEVELOPMENT CHARGE IMPROVEMENTS

SDC Improvements (2023 Dollars)	$12,411,500
Assumed Annual Construction Cost Index Inflation Rate	6.5 percent
TOTAL ESTIMATED PROJECT COST (2026 DOLLARS)	**$14,992,500**

Environmental Impacts

Land Use

All the proposed WWSI are within the city limits and the urban growth boundary (UGB). Proposed improvements at the Saddle Ridge Lift Station, Williamson Lift Station, and in the Melrose/ Willowdale area are outside the city limits but within the UGB. These improvements are not anticipated to require a Conditional Use Permit.

Important Farmland

The soils in the Prineville area are generally considered good for farming and agriculture. The primary soil types in the vicinity are summarized on Table 4-9. In general, the soils are classified in variations of loam.

TABLE 4-9
FARMLAND CLASSIFICATION, SUMMARY BY MAP UNIT, CROOK COUNTY, OREGON

Map Unit Symbol	Map Unit Name	Rating
014	Powder silt loam, 0 to 2 percent slopes	Prime Farmland if Irrigated
015	Metolius ashy sandy loam, 0 to 2 percent slopes	Prime Farmland if Irrigated
016	Crooked-Stearns complex, 0 to 2 percent slopes	Farmland of Statewide Importance
036	Agentia-Era complex, 40 to 70 percent north slopes	Farmland of Statewide Importance
104Am	Redmond ashy sandy loam, 0 to 3 percent slopes	Prime Farmland if Irrigated
121	Era ashy sandy loam, 0 to 3 percent slopes	Prime Farmland if Irrigated
123	Ochoco-Prineville complex, 0 to 3 percent slopes	Prime Farmland if Irrigated
143	Stukmond-Lickskillet-Redmond complex, 0 to 8 percent slopes	Farmland of Statewide Importance
144	Redmond-Stukmond complex, 0 to 8 percent slopes	Farmland of Statewide Importance

All proposed WWSI are within the UGB and are not located on Exclusive Farm Use land. None of the WWSI are anticipated to affect prime farmland; if farmland could be potentially impacted by a project, consultation under the Farmland Protection Program would be necessary.

Formally Classified Lands

Formally classified lands are lands designated by federal, state, and local governments for special purposes. These include parks, monuments, landmarks, historic trails, wild and scenic areas, wilderness areas, Native American-owned lands, etc.

A number of city parks are in the vicinity of the proposed improvements, including Gary A. Ward Park, Davidson Park, Harwood Park, Library Park, Stryker Park, Yellowpine Park, and Ochoco Creek Park. No impacts to formally classified lands are anticipated.

Floodplains

The Deschutes subbasin is located in central Oregon in the high desert. The Crooked River watershed, within the Deschutes subbasin, is the largest eastside tributary to the Deschutes River.

The South Fork Crooked River and Beaver Creek join the North Fork Crooked River east of Prineville. The Crooked River flows immediately south of Prineville and reaches its confluence with the Deschutes River northwest of Prineville and southwest of Madras. The Deschutes River is a tributary of the Columbia River. In total, the Crooked River extends nearly 125 miles east to west from its source to the Deschutes River.

According to the Federal Emergency Management Agency (FEMA) Map Service Center, FEMA Flood Insurance Rate Map Panel Numbers 41013C0400C, 41013C0403C, 41013C0405C, 41013C0412C, 41013C0411C, 41013C0384C, 41013C0415C, and 41013C0416C (dated February 2, 2012) have been assigned to the project area. See Appendix D for the referenced FEMA floodplain maps.

Portions of the recommended WWSI appear to be located within FEMA Zone AE, an area located within the 100-year flood zone, and other flood areas. Construction activities will consist of upgrading/replacing and burying main lines and restoring the sites to preconstruction conditions. No permanent impacts to the 100-year flood zone are anticipated. Any activity within floodplains will be required to comply with applicable local floodplain development standards.

Wetlands

The National Wetlands Inventory Map identifies several freshwater emergent wetlands and a freshwater forested/shrub wetland within the surrounding vicinity. A wetland determination/ delineation should be completed prior to construction, and wetlands should be avoided if possible during design. If avoidance is impracticable or unfeasible, permits will be obtained, and appropriate environmental documents will be prepared prior to construction.

Cultural/Historic Resources

A search of the National Register of Historic Places was conducted. Five historic buildings are listed in the City of Prineville. The majority of the recommended WWSI would be located in existing rights-of-way (ROW) that have been previously disturbed; however, portions of the WWSI may be located in areas of ground that do not appear to have been previously disturbed. These SDC main line extensions may require additional review.

Additional requirements may be necessary depending on federal involvement (funding or permits), which may necessitate compliance with Section 106 of the National Historic Preservation Act. If no federal nexus is identified, the projects must still comply with ORS 97.740, ORS 358.905-358.961, and ORS 390.235 and Oregon Administrative Rules 736-051-0090, which protect Native American cairns, graves, and associated items, items of cultural patrimony, and archaeological sites on non-federal and private lands. Additional archaeological survey, testing, and/or permitting may be required to comply with state laws.

Biological Resources

Important fish and wildlife habitat in the surrounding vicinity includes the Crooked River, Ochoco Creek, and associated riparian areas. Riparian areas are critical to the health of streams, as riparian vegetation provides shade and temperature regulation for the streams, provides cover for aquatic organisms, and stabilizes streambanks to prevent erosion.

According to a U.S. Fish and Wildlife Service Information for Planning and Consultation website search, bull trout (*Salvelinus confluentus*) and gray wolf (*Canis lupus*) have the potential to be present in the surrounding vicinity. Due to lack of suitable habitat, the gray wolf is unlikely to be present and, thus, is unlikely to be impacted. According to StreamNet, spring Chinook salmon (*Oncorhynchus tshawytscha*), summer steelhead (*Oncorhynchus mykiss*), pacific lamprey (*Entosphenus tridentatus*), and redband trout (*Oncorhynchus mykiss*) utilize the Crooked River and have the potential to be present in the surrounding vicinity. Any potential impacts to these species would be mitigated using best management practices (BMPs) during construction activities of the recommended improvements. No Essential Fish Habitat or Critical Habitat is mapped within the surrounding vicinity.

One of the recommended improvements (SDC 9) is anticipated to cross Ochoco Creek. SDC 7 is adjacent to the Crooked River. These projects have the potential to impact waterbodies. If trenching through waterbodies occurs, it is anticipated that an Oregon Department of State Lands removal/fill permit, U.S. Army Corps of Engineers Section 404 Permit, and DEQ 401 Water Quality Certification will be required; however, potential crossings are anticipated to be accomplished in the least environmentally damaging way possible (e.g., boring, crossing on established roadways, etc.). If impacts to waterbodies are unavoidable, appropriate permits and mitigation will be completed.

Water Quality

The Crooked River, Ochoco Creek, Ryegrass Ditch, and several distribution canals are the primary surface waters located in the vicinity of Prineville. Some of the recommended improvements would occur in the vicinity of waterbodies, although no impacts are anticipated. BMPs will be employed to control potential erosion and sedimentation that could temporarily impact water quality. Due to the anticipated size of the recommended improvements being greater than 1 acre and the potential for stormwater discharge to Waters of the State, it is anticipated that a 1200-C Construction Stormwater General Permit will be required.

Impacts to Groundwater

The City of Prineville and the surrounding area do not lie in a Sole Source Aquifer or Critical Groundwater Area, but the City is located within the Upper Deschutes Groundwater Mitigation Area, which regulates groundwater withdrawal and mitigation. The recommended improvements do not involve any groundwater removal, so the Upper Deschutes Groundwater Mitigation Area regulations do not apply. No impacts to groundwater are anticipated.

Socioeconomic/Environmental Justice

No elderly or minority populations residing in the vicinity of the recommended improvement areas will be impacted by the project. No business or residential relocations will be required as part of the recommended improvements.

Completion of the recommended WWSI projects is necessary to provide adequate wastewater treatment and disposal for the anticipated population growth over the 20-year planning period.

Air

A majority of the recommended improvements would be constructed within the city limits and UGB and, as such, are subject to the City's ordinances. According to Josh Smith, Planning Director, the dust ordinance simply states that activity cannot create a "nuisance." He noted that this is complaint-based and can usually be addressed by spraying water on the affected areas to reduce dust.

The recommended improvements have the potential to temporarily affect air quality. Short-term impacts could include emissions from equipment operation and dust generated from construction activities.

No substantial particulate matter or detrimental emissions will be released as a result of the recommended improvements. It is unlikely that the DEQ will require air quality permits.

Noise

The recommended improvements will not emit additional noise. However, construction activities will create significant intermittent and temporary noise. To minimize impacts, work will generally be confined to the project area during daylight hours. Construction activities will be subject to any City and/or County noise ordinances.

Traffic

During construction of the recommended improvements there may be temporary increases in traffic due to construction vehicles. No permanent or long-term impacts to transportation are anticipated as a result of the recommended improvements.

Hazardous Material

According to the DEQ, there is potential for buried asbestos cement (AC) pipe in the potential work areas. The City installed AC pipe for its water and sewer systems from 1960 through the latter part of the 1970s. The recommended WWSI could potentially cross existing AC lines.

Environmental records were reviewed for identified hazardous waste sites, environmental cleanup sites, leaking underground storage tanks (LUSTs) and underground storage tanks (USTs) using information on the DEQ Environmental Cleanup Site Information (ECSI) website. According to the ECSI database, 119 environmental cleanup sites, hazardous waste sites, LUSTs, and USTs are located in the vicinity of the City of Prineville. The following environmental records were found for sites adjacent to the proposed WWSI:

- Adjacent to the location of CIP 8:
    - Miller Oil, Inc. (Facility ID 88782)
        - ECSI - listed for tracking
        - Four active USTs

- Adjacent to the location of 313 feet of CIPP lining:
  - Prineville Exxon (Facility ID 40827)
    - LUST - No further action (NFA) issued
    - ECSI - Soil and groundwater contamination were documented in 1999. The 2008 site monitoring indicated the site does not present a significant risk.
  - Prineville Chevron (Facility ID 23743)
    - LUST - NFA issued
    - Four active USTs
- Adjacent to the location of 305 feet of CIPP lining:
  - Main Station (Facility ID 24219)
    - Four active USTs
- Adjacent to the location of 320 feet of CIPP lining:
  - Prineville Area Groundwater Contamination (Facility ID 40601)
    - ECSI - Air, soil, and groundwater contamination were documented. LUSTs and potential LUSTs were removed, and contaminants were reduced to acceptable levels.
  - Pacific Power and Light (Facility ID 41268)
    - ECSI - Soil and groundwater contamination were documented in 2005; conditional NFA issued.
    - LUST - Soil and groundwater contamination were documented in 1996; cleanup completed/administrative closure status.
  - Bryan Gold's Texaco (Facility ID 20077)
    - ECSI - Soil and groundwater contamination were documented in 1998; conditional NFA issued.
    - LUST - Soil and groundwater contamination were documented in 1997; cleanup completed status.
- Adjacent to the location of 350 feet of CIPP lining:
  - Belknapp, Wilford (Facility ID 16297)
    - LUST - Soil contamination documented in 1992; NFA issued.
- Adjacent to the location of 355 feet, 177 feet, and 300 feet of CIPP lining:
  - Heating Oil Tank (Facility ID 143522)
    - LUST - Groundwater contamination was documented in 2016; NFA issued.
  - Heating Oil Tank (Facility ID 123809)
    - LUST - Soil contamination was documented in 2012; cleanup completed status.
- Adjacent to the location of 405 feet of CIPP lining:
  - Heating Oil Tank (Facility ID 145921)
    - LUST - Oil contamination was documented in 2017; cleanup completed status.

All adjacent sites appear to be closed or remediated and are not anticipated to present a significant risk to the projects with the exception of sites adjacent to the location of 320 feet of CIPP lining. If soil or groundwater is disturbed in this area, contaminants may be encountered. Due to the large number of sites within the general Prineville area, the potential to encounter contaminated soil or groundwater exists. Additional hazardous materials analysis may be required during the project design phase, depending on funding requirements.

Land Requirements

Improvements located within the city limits but outside existing City ROW will need easements, although none are currently identified in the proposed CIP and SDC improvements. Improvements located outside the city limits but within the UGB will require annexation and ROW for the improvements to be constructed and maintained. These improvements include SDC 7, 8, 9, and 10. Any needed ROW or easements are anticipated to be a condition of approval during the planning phase and, as such, should not require acquisition of land.

Potential Construction Problems

The valley floor of Prineville has a shallow groundwater aquifer in many areas. This high water table may impact construction of some improvements depending on the depth and location of the improvement. Timing of construction activities in locations where shallow groundwater exists should be carefully considered to minimize groundwater impacts, such as avoiding areas near open irrigation canals during irrigation season.

The airport area of Prineville sits on a basalt plateau approximately 350 feet above the valley floor. Subsurface rock is present in much of this region, although shallow groundwater does not exist here. Potential improvements in this area consist of upgrades to existing wastewater lift stations and should not require excavation outside previously disturbed areas.

Costs for the recommended improvements have taken into consideration these potential construction problems and represent actual estimated costs for construction with the above factors included.

Sustainability Considerations

The existing WWTF has had considerable improvements to increase sustainability. The construction and operation of a treatment wetland system, which uses gravity flow and native vegetation for treatment, is a significant step toward sustainability. The treatment and disposal wetlands have created an important environmental and social improvement to the community. The Crooked River Wetlands Complex has become a destination for bird watching, hiking, bicycling, and other outdoor recreational activities. With 5.4 miles of trails, a covered pavilion, picnic area, and restrooms, the Complex has also become an important destination for local schools to tour and view first-hand effective wastewater treatment while providing an important community improvement. Thirteen educational kiosks that local school children designed are located along the trails for future educational opportunities.

The recommended improvements only seek to enhance the overall efficiency of the wastewater collection and treatment systems. These will reduce energy consumption, improve effluent quality and operations efficiency, and control long-term costs to users.

The construction of a 1.2 megawatt (MW) solar field on the WWTF property and backup power generation at critical operation locations have already been completed. Improvements to pumping, electrical, and control systems will improve operational simplicity and efficiency and reduce energy costs, leading to a more resilient system overall.

Water and Energy Efficiency

As discussed previously, the current WWTF utilizes lagoon and wetland treatment, which is energy efficient. Pumping of wastewater influent and effluent consumes energy, and improvements identified for the wastewater lift stations, headworks influent pumping, and collection system (I/I reduction) are intended to reduce energy use and provide a more efficient system. New, more efficient pumps, controls, and electrical systems will reduce energy usage. Collection systems that result in I/I reduction will reduce the overall wastewater influent/effluent being pumped and, thus, reduce energy costs.

The City completed construction of a 1.2 MW solar field at the WWTF in 2021. The solar field was constructed under partnership with the solar provider, which allows the WWTF and other City facilities to purchase power at a discounted rate from a renewable energy source. The use of solar energy in conjunction with an efficient WWTF and the recommended improvements is an important goal for the City to reduce energy consumption and improve efficiency in the energy used.

Green Infrastructure

The existing wastewater treatment systems have been designed and constructed in an effort to mimic natural processes for wastewater treatment and discharge (Outfall 004). Construction of the wetland treatment and disposal system has created additional storage and treatment capacity while introducing natural effluent finishing processes to the wastewater system. Additionally, the constructed wetlands have created a popular open space for walking, bird watching, and educational opportunities for schools. The use of treated effluent on the City-owned Meadow Lakes Golf Course and pasture irrigation areas (Outfalls 002 and 003) represents another beneficial reuse of treated wastewater effluent.

The existing wastewater collection system is identified in the CIP for improvements that will reduce the potential for I/I and exfiltration through phased evaluation of the collection system followed by commensurate rehabilitation and repair. These proposed improvements will reduce non-wastewater contributions to the influent flow as well as improve the overall functionality and efficiency of the collection system.

The proposed improvements to the wastewater lift stations have been selected to upgrade aging infrastructure with more efficient systems that will reduce energy consumption with more efficient electrical and pumping systems, reduced site visits by operations personnel, and provide remote monitoring as part of a system-wide SCADA system upgrade.

Proposed improvements at the WWTF have also been selected to upgrade aging facilities with more energy efficient systems. Upgraded control systems will reduce the number of site visits by operations personnel to the amount needed to properly observe the treatment process, take samples, and perform regular maintenance. The proposed conversion of the gas chlorination system to a bulk sodium hypochlorite system will reduce the risk of hazardous chlorine gas release, increase operator safety, and reduce the overall cost of treatment.

The improvements proposed in both the Capital Improvements and SDC Plans were selected not only out of the necessity to upgrade aging systems but to reduce energy consumption, operations personnel visits, and overall system monitoring and control. These improvements, in addition to the existing system, represent an opportunity to position the City of Prineville as an example of green infrastructure for the rest of the industry.

Cost Estimates

Cost estimates for the proposed alternatives are provided as Figures 4-1 through 4-6. Locations for proposed improvements are identified on Figures 4-7 and 4-8.

The prepared cost information represents the anticipated complete cost of the improvement inclusive of all costs to the system. Additional personnel, administrative costs, water purchase, insurance, energy cost, process chemicals, monitoring and testing, or other miscellaneous costs should not be incurred. In fact, the analysis predicts that these costs will be reduced by the proposed alternatives due to reduced energy use, operator efficiency, and ease of operation.

CITY OF PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN
COLLECTION SYSTEM ALTERNATIVES BY COST AND FUNDING CATEGORY

Improvement	Funding Category	Improvement Purpose/Description	Medium-/Long-Term	Primary Purpose	Total Estimated Cost (2023)	SDC Growth Apportionment		City's Estimated Portion
						Percent	Cost (2023)	
Proposed Collection System Improvements								
5	CIP	Collection System Improvements - Maintenance, rehabilitation, I/I reduction (500 LF completed annually).	Medium	Operations Reliability Compliance	$855,500	0%	$0	$855,500
6	CIP	Manhole Rehabilitation Program - Manhole repair/replacement as identified annually.	Medium	Operations Reliability Compliance	$382,000	0%	$0	$382,000
7	CIP	Collection System Inspection/Evaluation - Annual inspection program to evaluate collection system condition.	Medium	Operations Reliability Compliance	$292,000	0%	$0	$292,000
8	CIP	Replace existing main line from N.W. 10th Street to the north side of Lamonta Road.	Medium	Operations Reliability	$2,276,800	0%	$0	$2,276,800
2	SDC	Increase size of main line from N.W. 10th Street to the north side of Lamonta Road (constructed in conjunction with CIP 8).	Medium	Capacity	$932,500	100%	$932,500	$0
4	SDC	Extend main line to serve property north of Lamonta and west of Main Street.	Medium	Capacity	$325,250	0%	$0	$325,250
9	CIP	Replace existing main line on Main Street from Lynn Boulevard to 1st Street.	Medium	Operations Reliability	$1,293,500	0%	$0	$1,293,500
6	SDC	Increase size of main line on Main Street from Lynn Boulevard to 1st Street (constructed in conjunction with CIP 9).	Medium	Capacity	$350,000	100%	$350,000	$0
5	SDC	Extend pressure sewer north on Highway 26 from N. Gardner Road to serve future growth.	Medium	Capacity	$520,250	100%	$520,250	$0
7	SDC	Extend 18-inch sanitary sewer south on Main Street to serve future growth.	Medium	Capacity	$1,772,500	100%	$1,772,500	$0
8	SDC	Extend existing interceptor main line east from Combs Flat.	Medium	Operations Reliability	$2,330,750	100%	$2,330,750	$0
9	SDC	Connect Williamson area to gravity sewer. Remove Williamson Lift Station.	Medium	Capacity	$611,250	100%	$611,250	$0
10	SDC	Extend sanitary sewer main line and manholes to Melrose/Willowdale area.	Medium	Operations Reliability	$3,169,500	100%	$3,169,500	$0
				TOTAL COST	**$15,112,000**		**$9,687,000**	**$5,426,000**

CIP = Capital Improvements Plan
I/I = infiltration and inflow
LF = linear feet
SDC = System Development Charge

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CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN
COLLECTION SYSTEM ALTERNATIVES BY COST AND FUNDING CATEGORY

FIGURE
4-1

CITY OF PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN
COLLECTION SYSTEM ALTERNATIVES PRELIMINARY COST AND NET PRESENT WORTH

Improvement	Funding Category	Improvement Description	Medium/Long-Term	Total Estimated Cost (2023)	Annual OM&R	Present Worth O&M Present Worth of an Annuity, 2 Percent, 20 years (Present Worth Factor = 16.3514)	Salvage Value	Present Worth Salvage Present Worth of a Future Value, 2 Percent, 20 Years (Present Worth Factor = 0.6730)	Net Present Worth[1]
Proposed Collection System Improvements									
5	CIP	Collection System Improvements - Maintenance, rehabilitation, I/I reduction (500 LF completed annually).	Medium	$855,500	$7,500	$122,636	$85,500	$57,542	$920,594
6	CIP	Manhole Rehabilitation Program - Manhole repair/replacement as identified annually.	Medium	$382,000	$5,000	$81,757	$38,200	$25,709	$438,048
7	CIP	Collection System Inspection/Evaluation - Annual inspection program to evaluate collection system condition.	Medium	$292,000	$7,500	$122,636	$29,200	$19,652	$394,984
8	CIP	Replace existing main line from 10th Street to north side of Lamonta.	Medium	$2,276,800	$5,000	$81,757	$227,680	$153,229	$2,205,328
2	SDC	Increase size of main line from 10th Street to north side of Lamonta Road (constructed in conjunction with CIP 8).	Medium	$932,500	$5,000	$81,757	$93,250	$62,757	$951,500
4	SDC	Extend main line to serve property north of Lamonta and west of Main Street.	Medium	$325,250	$5,000	$81,757	$93,250	$62,757	$344,250
9	CIP	Replace existing main line on Main Street from Lynn Boulevard to 1st Street.	Medium	$1,293,500	$5,000	$81,757	$129,350	$87,053	$1,288,204
6	SDC	Increase size of main line on Main Street from Lynn Boulevard to 1st Street (constructed in conjunction with CIP 9).	Medium	$350,000	$5,000	$81,757	$35,000	$23,555	$408,202
5	SDC	Extend pressure sewer north on Highway 26 from N. Gardner Road to serve future growth.	Medium	$520,250	$5,000	$81,757	$35,000	$23,555	$578,452
7	SDC	Extend 18-inch sanitary sewer south on Main Street to serve future growth.	Medium	$1,772,500	$5,000	$81,757	$35,000	$23,555	$1,830,702
8	SDC	Extend existing interceptor main line east from Combs Flat.	Medium	$2,330,750	$5,000	$81,757	$35,000	$23,555	$2,388,952
9	SDC	Connect Williamson area to gravity sewer. Remove Williamson Lift Station.	Medium	$611,250	$5,000	$81,757	$35,000	$23,555	$669,452
10	SDC	Extend sanitary sewer main line and manholes to Melrose/Willowdale area.	Medium	$3,169,500	$5,000	$81,757	$35,000	$23,555	$3,227,702
			TOTAL COST	**$15,112,000**		**$1,145,000**		**TOTAL NET PRESENT WORTH**	**$15,646,000**

[1] Net present worth based on Office of Management and Budget Circular A-94, Appendix C, February 2023 update

CIP = Capital Improvements Plan
I/I = infiltration and inflow
LF = linear feet
O&M = operation and maintenance
OM&R = operation, maintenance, and replacement
SDC = System Development Charge

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CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN
COLLECTION SYSTEM ALTERNATIVES
PRELIMINARY COST AND NET PRESENT WORTH

FIGURE
4-2

CITY OF PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN
LIFT STATION ALTERNATIVE BY COST AND FUNDING CATEGORY

Improvement[1]	Funding Category	Improvement Description	Medium-/Long-Term	Primary Purpose	Total Estimated Cost (2023)	City's Estimated Portion
2	CIP	Replace existing pumping equipment, install new remote monitoring, electrical, instrumentation, and controls.	Medium	Operations Reliability Compliance Safety	$380,500	$380,500
				TOTAL COST	**$380,500**	**$380,500**

[1] Lift Station - Alternative 1 - No Action was not evaluated.

CIP = Capital Improvements Plan

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CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITES PLAN
LIFT STATION ALTERNATIVE BY COST AND FUNDING CATEGORY

FIGURE
4-3

CITY OF PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN
LIFT STATION ALTERNATIVE PRELIMINARY COST AND NET PRESENT WORTH

Improvement[1]	Funding Category	Improvement Description	Medium-/Long-Term	Total Estimated Cost (2023)	Annual OM&R	Present Worth O&M Present Worth of an Annuity, 2 Percent, 20 years (Present Worth Factor = 16.3514)	Salvage Value	Present Worth Salvage Present Worth of a Future Value, 2 Percent, 20 Years (Present Worth Factor = 0.6730)	Net Present Worth
2	CIP	Replace existing pumping equipment, install new remote monitoring, electrical, instrumentation, and controls.	Medium	$380,500	$45,000	$735,813	$38,050	$25,700	$1,090,613
			TOTAL COST	**$380,500**				**TOTAL NET PRESENT WORTH**	**$1,091,000**

[1] Lift Station - Alternative 1 - No Action was not evaluated.

CIP = Capital Improvements Plan
O&M = operation and maintenance
OM&R = operation, maintenance, and replacement

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CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN
LIFT STATION ALTERNATIVE PRELIMINARY COST AND NET PRESENT WORTH

FIGURE
4-4

CITY OF PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN
WASTEWATER TREATMENT FACILITY ALTERNATIVE BY COST AND FUNDING CATEGORY

Improvement[1]	Funding Category	Improvement Description	Medium-/Long-Term	Primary Purpose	Total Estimated Cost (2023)	SDC Growth Apportionment		City's Estimated Portion (2023 Cost)[2]
						Percent	Cost (2023)	
Alternative 2								
2	CIP	Replace existing pumping equipment, electrical, and control components.	Medium	Operations Reliability	$576,000	0%	$0	$576,000
				TOTAL COST	$576,000	SDC TOTAL	$0	$576,000
Alternative 3								
1	CIP	Improve/replace existing main influent screen.	Medium	Operations Reliability	$1,156,500	0%	$0	$1,156,500
2	CIP	Replace existing pumping equipment, electrical, and control components.	Medium	Operations Reliability	$576,000	0%	$0	$576,000
1	SDC	Convert existing gas chlorination disinfection system to a bulk sodium hypochlorite disinfection system.	Medium	Operations Reliability	$652,000	100%	$652,000	$0
				TOTAL COST	$2,384,500	SDC TOTAL	$652,000	$1,732,500
Alternative 4								
1	CIP	Improve/replace existing main influent screen.	Medium	Operations Reliability	$1,156,500	0%	$0	$1,156,500
2	CIP	Replace existing pumping equipment, electrical, and control components.	Medium	Operations Reliability	$576,000	0%	$0	$576,000
3	CIP	System-wide Supervisory Control and Data Acquisition Upgrade	Medium	Operations Reliability	$427,000	0%	$0	$427,000
10	CIP	Lagoon biosolids removal.	Long	Operations Compliance Capacity	$541,000	0%	$0	$541,000
1	SDC	Convert existing gas chlorination disinfection system to a bulk sodium hypochlorite disinfection system.	Medium	Operations Reliability	$652,000	100%	$652,000	$0
3	SDC	Construct WWTF operations building and laboratory.	Medium	Operations Compliance Capacity	$1,747,500	100%	$1,747,500	$0
				TOTAL COST	$5,100,000	SDC TOTAL	$2,399,500	$2,700,500

[1] Wastewater Treatment Facility - Alternative 1 - No Action was not evaluated.

[2] May change to list of benefits.

CIP = Capital Improvements Plan
SCADA = supervisory control and data acquisition
SDC = System Development Charge
WWTF = wastewater treatment facility

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CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN
WASTEWATER TREATMENT FACILITY
ALTERNATIVE BY COST AND FUNDING CATEGORY

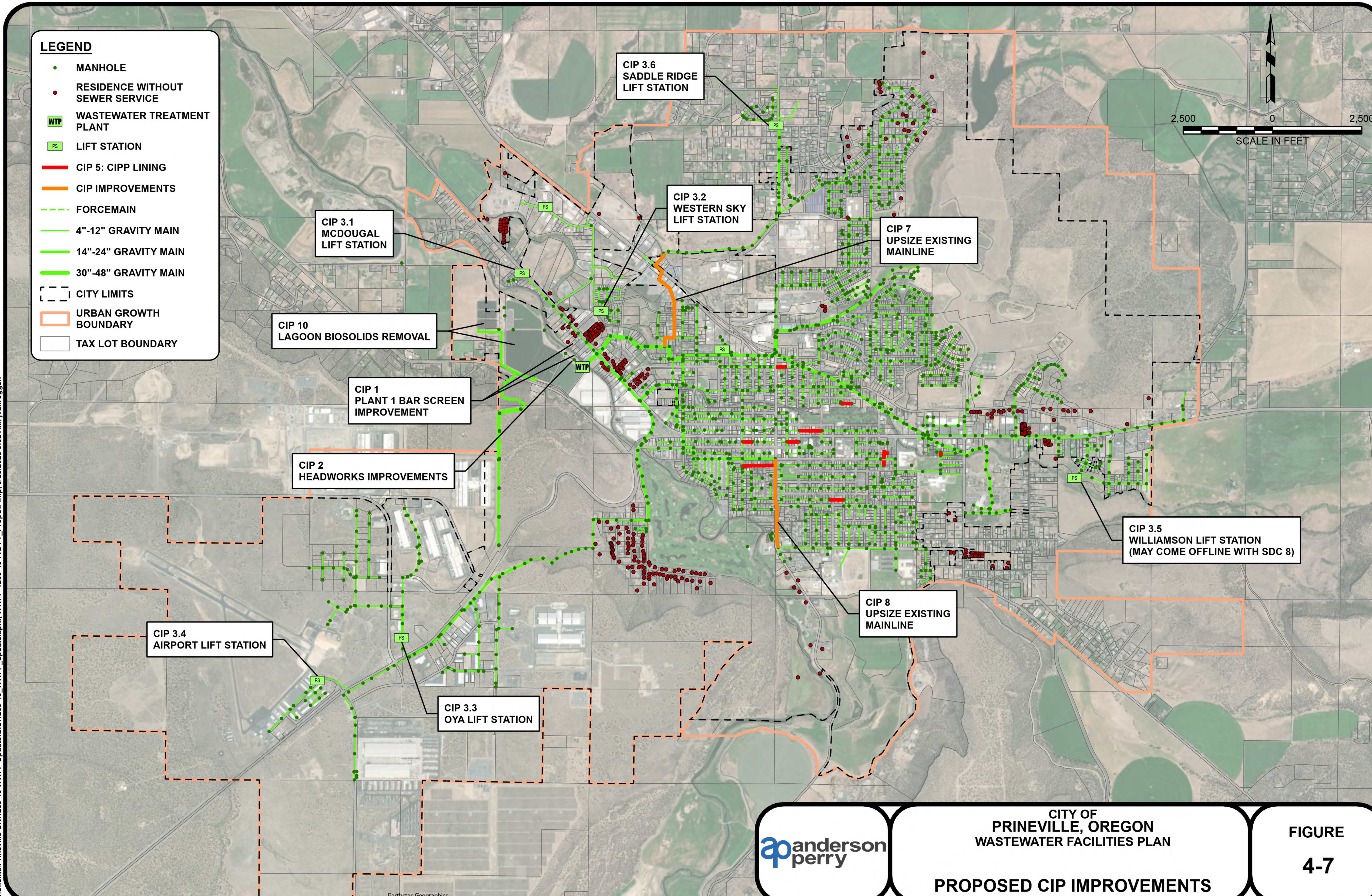
FIGURE
4-5

CITY OF PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN
WASTEWATER TREATMENT FACILITY ALTERNATIVE PRELIMINARY COST AND NET PRESENT WORTH

Improvement[1]	Funding Category	Improvement Description	Medium-/Long-Term	Total Estimated Cost (2023)	Annual OM&R	Present Worth O&M Present Worth of an Annuity, 2 Percent, 20 years (Present Worth Factor = 16.3514)	Salvage Value	Present Worth Salvage Present Worth of a Future Value, 2 Percent, 20 Years (Present Worth Factor = 0.6730)	Net Present Worth
Alternative 2									
2	CIP	Replace existing pumping equipment, electrical, and control components.	Medium	$576,000	$40,000	$654,056	$57,600	$38,800	$1,191,256
			TOTAL COST	**$576,000**				**TOTAL NET PRESENT WORTH**	**$1,191,000**
Alternative 3									
1	CIP	Improve/replace existing main influent screen.	Medium	$1,156,500	$10,000	$163,514	$115,650	$77,900	$1,242,114
2	CIP	Replace existing pumping equipment, electrical, and control components.	Medium	$576,000	$30,000	$490,542	$57,600	$38,800	$1,027,742
1	SDC	Convert existing gas chlorination disinfection system to a bulk sodium hypochlorite disinfection system.	Medium	$652,000	$10,000	$163,514	$65,200	$43,900	$771,614
			TOTAL COST	**$2,384,500**				**TOTAL NET PRESENT WORTH**	**$3,042,000**
Alternative 4									
1	CIP	Improve/replace existing main influent screen.	Medium	$1,156,500	$10,000	$163,514	$115,650	$77,900	$1,242,114
2	CIP	Replace existing pumping equipment, electrical, and control components.	Medium	$576,000	$10,000	$163,514	$57,600	$38,800	$700,714
3	CIP	System-wide Supervisory Control and Data Acquisition Upgrade	Medium	$427,000	$10,000	$163,514	$42,700	$28,800	$561,714
10	CIP	Lagoon biosolids removal	Long	$541,000	$10,000	$163,514	$54,100	$36,500	$668,014
1	SDC	Convert existing gas chlorination disinfection system to a bulk sodium hypochlorite disinfection system.	Medium	$652,000	$10,000	$163,514	$65,200	$43,900	$771,614
3	SDC	Construct WWTF operations building and laboratory.	Medium	$1,747,500	$10,000	$163,514	$174,750	$117,700	$1,793,314
			TOTAL COST	**$5,100,000**				**TOTAL NET PRESENT WORTH**	**$5,738,000**

[1] Wastewater Treatment Facility - Alternative 1 - No Action was not evaluated.

CIP = Capital Improvements Plan
SCADA = supervisory control and data acquisition
SDC = System Development Charge
O&M = operation and maintenance
OM&R = operation, maintenance, and replacement
WWTF = wastewater treatment facility



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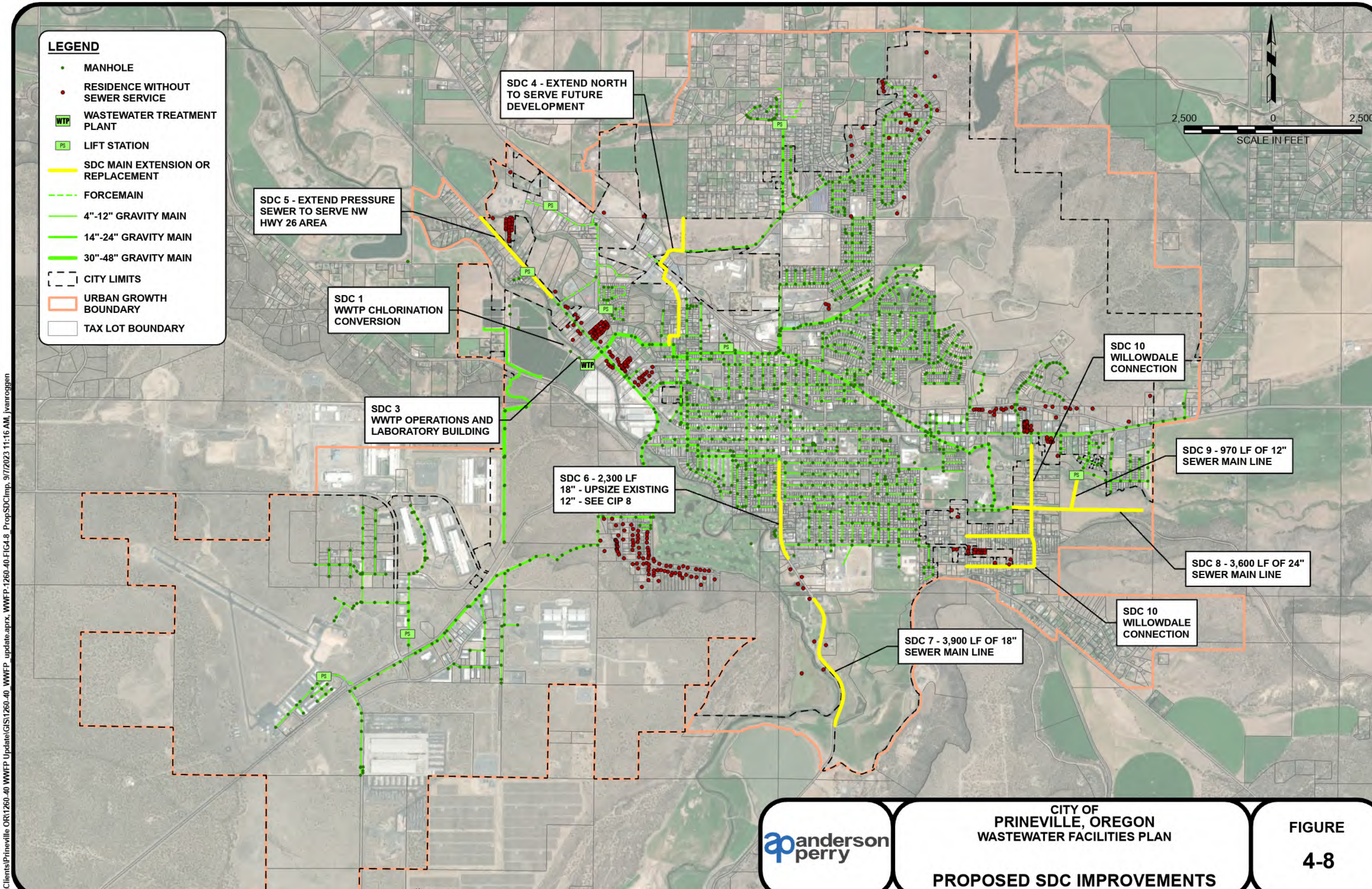

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CITY OF PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

PROPOSED SDC IMPROVEMENTS

FIGURE 4-8

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Section 5 - Selection of an Alternative

General

This section describes the process used to identify recommended alternatives. This analysis considers monetary factors followed by non-monetary factors, such as efficiency, energy efficiency, and long-term operation of the improved facilities.

Operation, maintenance, and replacement (OM&R) costs are also evaluated with each alternative. It is anticipated that operation and maintenance (O&M) costs will be reduced but replacement costs will increase as replacement monies are set aside for the new improvements. These costs are identified on Tables 5-1, 5-2, and 5-3 presented later in this section and represent the OM&R costs for the specific alternative identified only. Table 5-4 represents the actual, overall annual OM&R costs for the fiscal year ending June 30, 2021.

Evaluation Process

Only the lift stations and wastewater treatment facility (WWTF) have alternatives that warrant evaluation. The collection system evaluation criteria are provided below; however, the improvements to the collection system are general in nature and should be completed as needed to maintain the system.

Lift Stations

The six City-owned and operated lift stations were evaluated based on comments from Public Works personnel. Based on the information obtained, it was determined the lift stations are in good condition structurally; however, improvements to pumps, pumping mechanical equipment, and electrical and controls systems are needed. Two alternatives were developed for the lift stations:

- Alternative 1 - No action
- Alternative 2 - Replace existing pumping equipment and install new remote monitoring, electrical, and instrumentation and controls

Wastewater Treatment Facility

The WWTF has adequate capacity and redundancy to meet the needs of the planning period while meeting National Pollutant Discharge Elimination System Permit requirements. Recommended improvements are intended to improve operational efficiency, safety, reliability, expandability, and consistency.

Four conceptual wastewater treatment improvement alternatives were evaluated during preparation of this Wastewater Facilities Plan (WWFP):

- Alternative 1 - No action
- Alternative 2 - Replace existing pumping equipment and electrical components
- Alternative 3 - Replace existing pumping equipment, rebuild the main influent screen, and convert the gas chlorination system to a bulk sodium hypochlorite system

- Alternative 4 - Replace existing pumping equipment, rebuild the main influent screen, upgrade supervisory control and data acquisition systems, convert the gas chlorination system to a bulk sodium hypochlorite system, complete biosolids removal, and construct a new operations and laboratory building

Life Cycle Cost Analysis

Collection System

The collection system should be cleaned and television (TV) inspected to define problem areas, a meaningful rating system to prioritize areas needing repairs or replacement should be applied, and the highest priority areas should be corrected on an annual basis as funds permit. This approach should be augmented by adding smoke testing to the TV inspection stage of the process. Smoke testing will help identify sources of inflow into the collection system. Once sources of inflow are identified, these areas can be rated and prioritized along with other identified problem areas. Improvements can then be made as part of the annual plan. By implementing a repair and replacement program systematically, the entire collection system can be repaired or replaced over a period of time, and infiltration and inflow (I/I) can be effectively reduced. The TV inspection program is identified in the Capital Improvements Plan (CIP) as CIP 7, and the repair and replacement plan is identified as CIP 5. These two recommended improvements are intended to be completed concurrently with the collection system inspection program, providing locations for priority collection system repairs or pipe replacement.

The recommended collection system improvements are related to maintenance and growth. Energy reduction and social and environmental impacts are expected to be minimal. However, improvements to the existing collection system should reduce the risk of leakage, I/I, and possible wastewater overflows.

A life cycle cost analysis is presented on Table 5-1 below.

TABLE 5-1
LIFE CYCLE COST ANALYSIS - COLLECTION SYSTEM IMPROVEMENTS

A	B	C	D	E	
Capital Cost	**Annual OM&R**	**Present Worth OM&R, Present Worth of an Annuity, 2 percent, 20 years (Present Worth Factor = 16.3514)[1]**	**Salvage Value[2]**	**Present Worth Salvage, Present Worth of a Future Value, 2 percent, 20 years (Present Worth Factor = 0.6730)**	**A + C - E Net Present Worth**
$15,113,000	$70,000	$1,145,000	$1,511,300	$610,000	$15,647,000

[1] Present worth percentage for 20 years (2 percent) was obtained from Office of Management and Budget Circular A-94, Appendix C, for the year 2023.

[2] For comparison purposes, salvage value is assumed to be 10 percent of the initial capital cost.

Lift Stations

An evaluation of the conceptual lift station improvements alternatives determined that Alternative 1 is not viable. Therefore, the cost information presented on Table 5-2 for Alternative 2 is provided for informational purposes only.

TABLE 5-2
LIFE CYCLE COST ANALYSIS - LIFT STATION IMPROVEMENTS

	A	B	C	D	E	
Alternative	Capital Cost	Annual OM&R	Present Worth OM&R, Present Worth of an Annuity, 2 percent, 20 years (Present Worth Factor = 16.3514)[1]	Salvage Value[2]	Present Worth Salvage, Present Worth of a Future Value, 2 percent, 20 years (Present Worth Factor = 0.6730)	A + C - E Net Present Worth
2	$380,500	$45,000	$735,813	$38,050	$25,700	$1,090,613

[1] Present worth percentage for 20 years (2 percent) was obtained from Office of Management and Budget Circular A-94, Appendix C, for the year 2023.

[2] For comparison purposes, salvage value is assumed to be 10 percent of the initial capital cost.

Wastewater Treatment Facility

An evaluation of the WWTF produced four alternatives for analysis. While each of the alternatives is viable, the long-term goals of the City and the need to meet future system demands requires further evaluation of the alternatives. A thorough evaluation of the proposed alternatives and detailed information is provided in Section 4 of this WWFP.

Table 5-3 presents a life cycle cost analysis that compares the monetary value of the four alternatives. Additionally, a comparison of the estimated OM&R savings is provided.

OM&R costs are increased based on the cost of replacement set aside for each alternative. O&M costs are expected to decrease through the use of more efficient pumping systems and operational efficiency gained through the improvements.

TABLE 5-3
LIFE CYCLE COST ANALYSIS - WASTEWATER TREATMENT FACILITY IMPROVEMENTS

	A	B	C	D	E	
Alternative	Capital Cost	Annual OM&R	Present Worth OM&R, Present Worth of an Annuity, 2 percent, 20 years (Present Worth Factor = 16.3514)[1]	Salvage Value[2]	Present Worth Salvage, Present Worth of a Future Value, 2 percent, 20 years (Present Worth Factor = 0.6730)	A + C - E Net Present Worth
2	$576,000	$40,000	$654,000	$57,600	$38,800	$1,191,000
3	$2,384,500	$50,000	$817,600	$238,450	$160,600	$3,042,000
4	$5,100,000	$60,000	$981,100	$510,000	$343,600	$5,738,000

[1] Present worth percentage for 20 years (2 percent) was obtained from Office of Management and Budget Circular A-94, Appendix C, for the year 2023.

[2] For comparison purposes, salvage value is assumed to be 10 percent of the initial capital cost.

A reduction in OM&R costs is anticipated, dependent on the alternative selected. These reductions are related to improved efficiency, reduced energy consumption, and reduced reliance on third-party testing laboratories. These estimated OM&R savings are summarized on Table 5-4 below.

TABLE 5-4
ESTIMATED OPERATION, MAINTENANCE, AND REPLACEMENT SAVINGS PER ALTERNATIVE
(2023 DOLLARS)

Alternative	Personnel Costs[1]	Materials and Services[1]	Annual Operating Expense[2]	Estimated Annual OM&R Savings[3]	Estimated 20-year OM&R savings at 2 Percent
2	$151,307	$786,061	$937,368	$5,000	$103,900
3	$151,307	$786,061	$937,368	$20,000	$415,450
4	$151,307	$786,061	$937,368	$70,000	$1,454,100

[1]Costs from City of Prineville Annual Comprehensive Financial Report - Fiscal Year Ending June 30, 2021.

[2] Sum of Personnel and Material and Services costs. All OM&R expenses for the Wastewater Department are included for the year ending June 30, 2021.

[3]Estimated Annual OM&R Savings accounts for additional OM&R identified on Table 5-3. Replacement costs unchanged.

Currently, the City operates an efficient WWTF. Utilizing lagoon and wetlands treatment uses less energy than traditional mechanical treatment facilities. Therefore, efficiency improvements in equipment, processes, and operations are the factors that result in the estimated OM&R savings.

The City spent $42,000 in fiscal year 2021-22 for third-party laboratory testing at the WWTF and $45,000 for testing at the wetlands. Alternative 4 includes construction of a new operations and laboratory building, which results in estimated cost savings to the City of $40,000 annually due to the ability to perform in-house analyses. This estimated savings is applied to Alternative 4 on Table 5-4 above in addition to other estimated OM&R savings.

Non-Monetary Factors

Efficiency

Currently, the City operates a reasonably efficient system. However, improvements in remote monitoring and notifications are needed to reduce the possibility of unrecognized system failures and the number of personnel required to properly operate the system.

Environmental

System components nearing the end of their useful life are at risk for system failure, potentially resulting in negative environmental impacts. Outdated pumps, controls, and electrical systems are at greater risk of failure as they reach the end of their normal life cycle. These failures may result in environmental emergencies requiring major cleanup and mitigation activities. It should also be noted that the proposed improvements will be completely within the existing facility and no ground disturbance or other impacts outside the facility are anticipated.

Energy Efficiency

As technology continues to evolve, the improved efficiency of pumps, motors, controls, and electrical systems reduces energy consumption and energy costs to the system. Variable frequency drives and other electrical and controls components can further improve the energy efficiency of new pumps and motors as part of a larger system upgrade.

Section 6 - Recommended Alternatives

General

This section identifies the recommended alternatives, provides an evaluation of the financial status of the City of Prineville's Wastewater Department, and outlines options for financing and implementing the recommended medium- and long-term priority improvements as outlined earlier, referred to herein as the recommended wastewater system improvements (WWSI) projects. A summary of state and federal funding programs is presented, including a review of funding options potentially available to the City for high priority WWSI projects. To design and construct the recommended improvements, a financing plan acceptable to the residents of the City must be developed to complete the improvements. Financing resources will need to include low-interest loans coupled with grant funding, if available, to make it feasible for the City to implement the improvements.

Although a detailed analysis of the City's current sewer rate structure is beyond the scope of this Wastewater Facilities Plan (WWFP), a discussion of the existing rate structure and current and future wastewater system budgets is included. A summary of potential sewer rate structures to provide project funding is also presented. Generally, most utility rate structures include funding for periodic minor system improvements and maintenance items, payroll costs for staff, and a set-aside for future improvements.

Recommended Alternatives

Collection System

The needed improvements to the collection system are general in nature and should be completed as needed to maintain the system. Recommended improvements have been divided into two phases based on the most economical approach for organizing projects, resulting in the lowest cost to the City. The two phases are referred to as medium- (0 to 10 years) and long-term (10 to 20 years) improvements. Medium-term improvements include rehabilitating main line sewers with trenchless technologies, collection system inspection and evaluation, pipe replacements, and manhole rehabilitation. Medium-term improvements also include an annual inspection and evaluation of the collection system. More detailed information regarding the collection system improvements can be found in Section 4 and on Figure 3-2 in Section 3 and Figures 4-7 and 4-8 in Section 4.

Lift Stations

An evaluation of the conceptual lift station improvements alternatives determined that Alternative 1 is not viable, as the existing mechanical equipment is reaching the end of its useful life and equipment failures would result in sanitary sewer overflows.

Alternative 2 would extend the useful life of the existing stations without requiring extensive structural improvements. The evaluation of the lift stations determined that the existing wetwells are in relatively good condition, while the pumping, electrical, and controls components are reaching the end of their useful life. The ability to upgrade the existing components without a full replacement of the lift stations is a considerable benefit and cost savings to the City while improving the lift stations' reliability and efficiency. Therefore, the recommended alternative is Lift Station - Alternative 2. The locations of the lift station improvements are shown on Figure 4-7 in Section 4.

Wastewater Treatment Facility

An evaluation of the conceptual wastewater treatment facility (WWTF) alternatives determined that Alternatives 1 and 2 are viable, as the City would be able to continue meeting treatment requirements and currently possesses adequate redundancy. Alternative 3 was determined to be a needed improvement but falls short of the long-term needs of the facility as the City continues to see increased residential and commercial growth.

The factors that determined the evaluation process were based on components such as construction costs; operation, maintenance, and replacement (OM&R); and ease of operations. As described in Sections 4 and 5 of this WWFP, after a review and a cost comparison of the two most viable alternatives and following discussions and meetings with the Public Works Director, the WWTF operator, and Public Works personnel, Alternative 4 was selected as the recommended alternative.

Criteria for the WWTF alternatives included:

- Design to provide treatment for projected flows and loadings through year 2042, as previously discussed.
- Maintain resiliency at all critical operations including backup power supply, backup manual control operation, and alarm notification to operators.
- Operator-friendly and energy-efficient system to minimize the amount of operator time required and minimize long-term operational costs.
- Production of effluent that meets Oregon Department of Environmental Quality (DEQ) requirements for treatment per the existing and future National Pollutant Discharge Elimination System Permit program.
- Provide improved facilities for wastewater personnel.
- Reduce third-party analysis costs.

Alternative 4 includes the necessary improvements to increase efficiency and reliability in response to continued population growth, additional sampling and testing requirements, and increased costs to operate. A new operations building would house proper accommodations for personnel and a laboratory to perform required analyses in-house. Upgraded supervisory control and data acquisition systems would monitor system performance and notify the WWTF operator remotely of alarm conditions, as well as provide remote control capability for operators. The resulting system would be easier to operate, efficient, compliant, reliable, long-lasting, expandable, and appropriately sized for the anticipated flows and loadings, which would provide savings when considering long-term OM&R, energy, and third-party laboratory analysis costs.

Currently, the City uses a third-party testing laboratory for the majority of its required analyses, and the ability to self-perform these analyses would result in cost savings to the City. Locations of the WWTF Improvements are shown on Figures 4-7 and 4-8 in Section 4.

Current Sewer Rates, Revenue, and Operation and Maintenance Costs

Operation and maintenance (O&M) of the existing wastewater system is financed through the City's annual budget. Revenue is obtained primarily from sewer user fees but also comes from other sources, such as sewer connection fees, system development charges (SDCs), and investment income. The City is authorized to collect sewer connection and service fees under Ordinances No. 714, 980, and 1111. A copy of these ordinances is included in Appendix K.

The data presented on Table 6-1 were provided by the City. The data provide the number of sewer service accounts as of December 2022 and the associated sewer service rate effective July 1, 2022. The rates were set by Resolution No. 1530 and were approved on June 26, 2022. A copy of Resolution No. 1530 is included in Appendix L.

TABLE 6-1
SEWER SERVICE ACCOUNTS

Account Type	Total Number of Connections	Monthly Service Charge per Account	Total Monthly Revenue
Residential	4,335	$55.61	$241,100
Commercial	724	$55.61	$40,200
Large General Service - Metered Water Usage in Excess of 5 Units per Month (per 100 cubic feet)[1]	14	$6.62	Based on usage
Industrial Use	5	Determined on a case-by-case basis	Determined on a case-by-case basis
TOTAL	**5,078**		**$342,530[2]**

[1]*Varies per month based on usage. Not included in the total number of connections.*

[2]*Average monthly revenue for 2022.*

Revenue generated from the City's sewer service fees and investment income is presented on Table 6-2. Rates are reviewed and revised periodically to ensure adequate revenue is generated to pay the total OM&R costs of the wastewater system.

TABLE 6-2
SEWER SERVICE REVENUE

Fiscal Year	Total Revenue	Total Costs*	Net Difference
2016-17	$3,477,701	($1,511,658)	$1,966,043
2017-18	$3,722,627	($1,586,633)	$2,135,994
2018-19	$3,691,237	($1,838,247)	$1,852,990
2019-20	$3,663,030	($2,177,440)	$1,485,590
2020-21	$4,120,995	($2,194,325)	$1,926,670

**Total costs do not include debt service collections.*

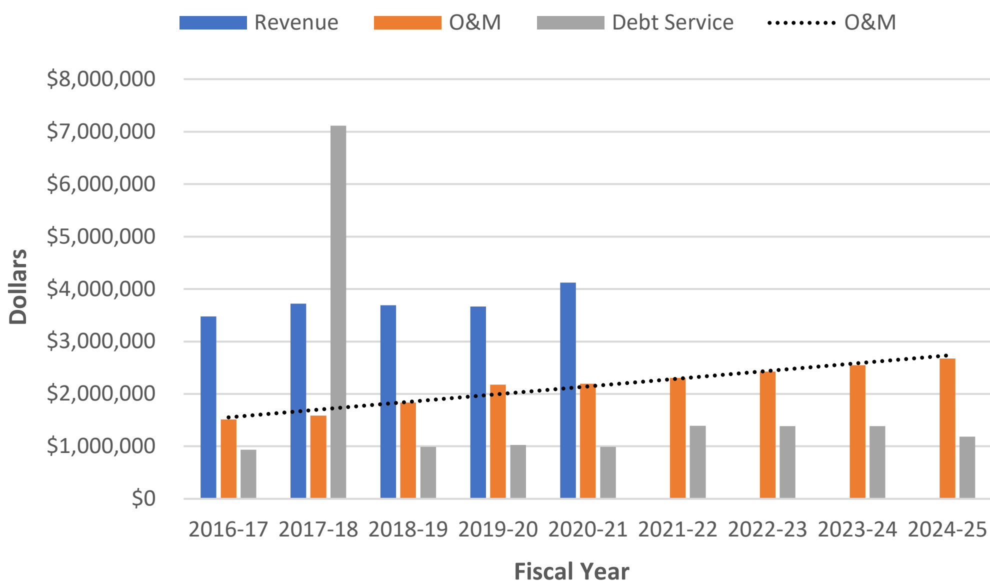
Current Financial Status

The annual revenue received and the cost of operating and maintaining the City's wastewater system are summarized on Figures 6-1 and 6-2. The costs presented were obtained from the City's audited financial statements and include all costs for the wastewater system, such as O&M, personnel services, materials and services, and capital outlay. These data are presented to provide insight into the general costs required to operate the City's existing wastewater system. For funding and other financial analysis, it is recommended that the audited financial statements be reviewed in detail to refine the costs prior to considering any available revenue for future debt purposes.

Historical and Projected Budget Trends

A graphical plot of the City's wastewater system budget, with revenue and expenditures, is shown on Chart 6-1. O&M costs are projected to the fiscal year (FY) 2024-25 by applying a 5.1 percent inflation rate.

CHART 6-1
HISTORICAL AND PROJECTED BUDGET



The revenue and expenditures shown on Chart 6-1 are variable. O&M costs have seen a consistent increase due to normal cost increases expected in the industry. Revenues have also remained relatively constant with deviations well within expected ranges. While general trends can be developed over time, annual revenue and/or costs may vary during a particular year.

The average annual cost of operating and maintaining the City's WWTF over the planning period was $2,073,233. The average annual revenue over the planning period was $3,735,118. Annual wastewater system O&M costs, not including inter-fund transfers or debt service, have varied from a low of approximately $1,511,658 in FY 2016-17 to a high of $2,194,325 in FY 2020-21.

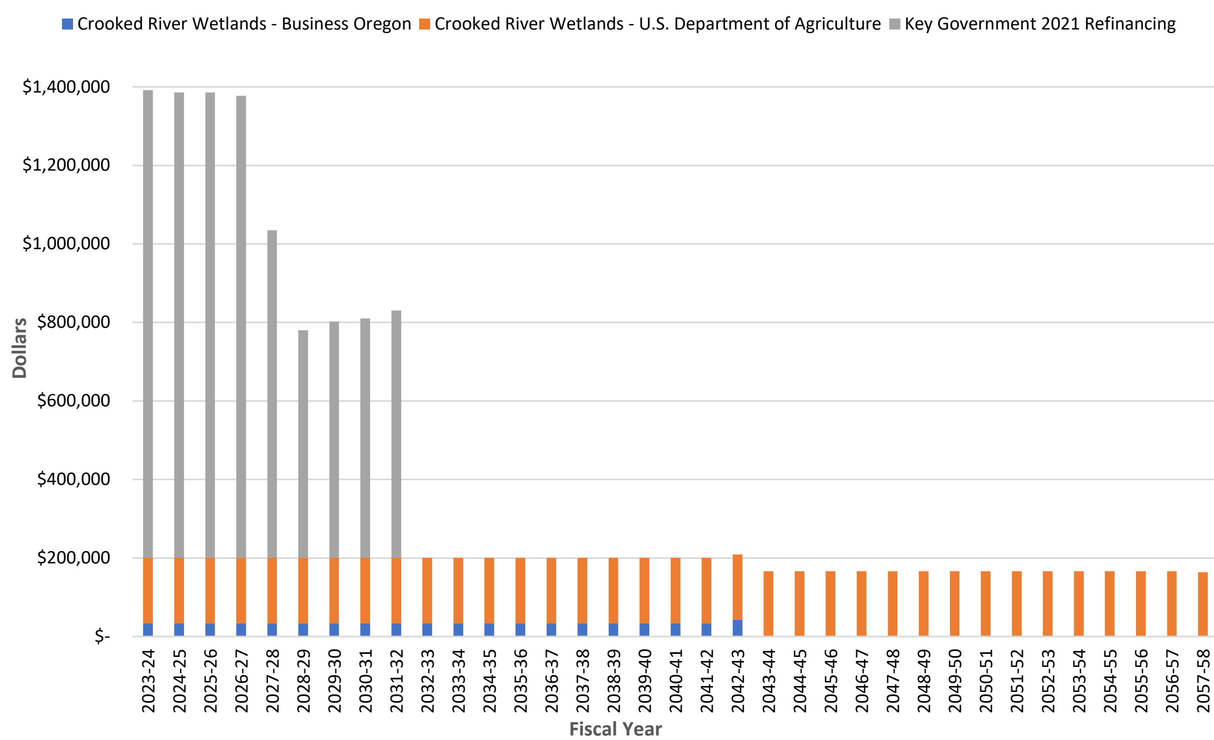
In general, an upward trend of O&M activities is observed. It is typically expected that expenditures should be increasing with time as the costs to own and operate a wastewater system continually increase. Any proposed upgrades to the system are anticipated to be constructed by FY 2025-26, which will add debt service to the annual expenditures.

Currently, the City budgets reserve account funds for wastewater system OM&R costs. Because the City already has a reserve account, it is better prepared to deal with future wastewater system expenses and emergencies. Pump replacement, lagoon liner repairs, pipe repair/replacement, trash screen mechanical breakdowns, etc., are items that require funds from time to time.

Existing Wastewater System Debt

The City will complete repayment of the Key Government Refinancing debt in FY 2031-32, which accounts for $7,995,009 of the City's debt; the Business Oregon loan for the Crooked River Wetlands in FY 2042-43, which accounts for $689,714 of the City's debt; and the U.S. Department of Agriculture loan for the Crooked River Wetlands in 2058, which accounts for $5,813,181 of the City's debt. The annual debt service from 2022 to 2031 averages $1,066,303. From 2031 to 2042, the annual debt service averages $219,199. The annual debt service from 2042 to 2058 averages $166,160. A graphical plot of the City's debt service by FY is provided on Chart 6-2.

CHART 6-2
ANNUAL DEBT SERVICE



State and Federal Grant and Loan Programs

Financing public improvements projects is a complex issue that must be resolved before a project can move beyond the planning stage. The cost of providing local financing for WWSI often exceeds the financial capability of local businesses and residents. Federal and state financing programs are in place that may allow the City to access low-interest loans and, possibly, grants. Federal and state programs are designed to keep monthly user rates affordable, simultaneously making the improvements project possible.

A number of federal and state grant and loan programs can provide assistance to Oregon cities for municipal improvements projects. These programs offer various levels of funding aimed at different types of projects. These include programs administered by the U.S. Department of Agriculture Rural Development (RD), the U.S. Economic Development Administration (EDA), Business Oregon, the DEQ, and others. These agencies can provide low-interest loan funding, and possibly grant funding, to assist rural communities with public works projects. Most of these agencies will require sewer rates that equal or exceed the City's Affordability Index of approximately $44 per month to support a loan for WWSI, both as a condition of receiving monies and prior to being considered for grant funds.

The following section briefly summarizes the primary funding programs available to assist the City with a WWSI project. It should be noted that the monthly user rates discussed in this section can represent a combination of monthly usage fees and taxes.

Summary of State Funding Programs

Business Oregon Finance Programs

Community Development Block Grant Program

The primary objective of the Community Development Block Grant (CDBG) program is development of viable (livable) urban communities by expanding economic opportunities and providing decent housing and a suitable living environment principally for persons of low and moderate incomes (LMIs).

This is a federally funded grant program. The state receives an annual allocation from Housing and Urban Development for the CDBG program. Grant funding is subject to applicant need, availability of funds, and any other restrictions in the state's Method of Distribution (i.e., program guidelines). It is not possible to determine how much, if any, grant funds may be awarded prior to an analysis of the application and financial information.

Eligibility for the CDBG program requires that greater than 51 percent of persons within the community fall into the LMI category. According to the 2021 5-Year American Community Survey utilized by Business Oregon, in 2021 the City of Prineville had approximately 55.3 percent of the population within the LMI category. This puts the City within the criteria to qualify for CDBG funds.

Water/Wastewater Financing Program

This is a loan and grant program that provides for the design and construction of public infrastructure when needed to ensure compliance with the Safe Drinking Water Act (SDWA) or the Clean Water Act (CWA). To be eligible, a system must have received, or is likely to soon receive, a Notice of Non-Compliance by the appropriate regulatory agency associated with the SDWA or the CWA.

While this is primarily a loan program, grants are available for municipalities that meet eligibility criteria. The loan/grant amounts are determined by a financial analysis of the applicant's ability to afford a loan (debt capacity, repayment sources, current and projected utility rates, and other factors). The maximum loan term is 25 years, or the useful life of the infrastructure financed, whichever is less. The maximum loan amount is $10 million per project, determined by financial review, and may be offered through a combination of direct and/or bond-funded loans. Loans are generally repaid with utility revenues or voter-approved bond issues. A limited tax general obligation pledge may also be required. Creditworthy applicants may be funded through the sale of state revenue bonds.

The maximum grant is $750,000 per project based on a financial analysis. An applicant is not eligible for grant funds if the applicant's annual median household income (MHI) is equal to or greater than 100 percent of the state average MHI for the same year. The State of Oregon's annual MHI from 2017 to 2021 was $70,084. The City of Prineville's annual MHI from 2017 to 2021 was $44,167, which is 63 percent of the statewide MHI. Based on this information, the City should be eligible for grant funds through the Water/Wastewater financing program.

Special Public Works Fund

The Special Public Works Fund (SPWF) program was established by the Oregon legislature in 1985 to provide primarily loan funding for municipally owned infrastructure and other facilities that support economic and community development. Loans and grants are available to municipalities for planning, designing, purchasing, improving, and constructing municipally owned facilities, replacing owned essential community facilities, and emergency projects as a result of a disaster.

For design and construction projects, loans are primarily available; however, grants are available for projects that will create and/or retain traded-sector jobs. A traded-sector industry sells its goods or services into nationally or internationally competitive markets. Loans range in size from less than $100,000 to $10 million. The SPWF is able to offer very attractive interest rates that reflect tax-exempt market rates for very good quality creditors. Loan terms can be up to 25 years or the useful life of the project, whichever is less. Grants are limited to projects associated with job creation/retention. The maximum grant award is $500,000 or 85 percent of the project cost, whichever is less. The grant amount per project is based on up to $5,000 per eligible job created or retained. Unless the City can tie the needed improvements to job creation, the SPWF is not a likely funding source for WWSI.

For Business Oregon Programs - Contact Regional Development Officer

Since program eligibility and funds availability may change from year to year, potential applicants are encouraged to contact their respective regional development officer to obtain the most accurate and up-to-date information for each program.

Oregon Department of Environmental Quality

Clean Water State Revolving Fund Program

This program, administered by the DEQ, provides low-interest rate loans to public agencies for the planning, design, and construction of various projects that prevent or mitigate water pollution (e.g., wastewater treatment facilities), as well as for some publicly owned estuary management and non-point source control projects. Priority in the agency's ranking process is always given to projects addressing documented water quality problems and health hazards.

The Clean Water State Revolving Fund (CWSRF) program charges interest rates that are calculated based on criteria defined in Oregon Administrative Rules 340-054-0065. Different interest rates and other financial terms apply to different types of loans and to loans of differing repayment periods. Rates are adjusted quarterly, based on the average Bond Buyer rates of the previous quarter, as published by the Federal Reserve. Under CWSRF program rules, interest rates on all standard design and/or construction loans are set at 65 percent of the municipal bond rate as of the quarter preceding the signing of the loan agreement. These percentages vary from 25 to 55 percent of the bond rate depending on the length of the repayment period. In 2021, loans for design and construction had an interest rate that varied from 1.91 to 2.60 percent, with repayment of 15 years up to 30 years, depending on the MHI and other factors. For small communities below the statewide MHI, design/construction interest rates for loans executed from January 1 through March 30, 2023, were less than 2 percent. Current interest rates can be found on the DEQ's website: https://www.oregon.gov/deq/wq/cwsrf/Pages/CWSRF-Rates.aspx. Once a loan is signed, the interest rate is fixed for the life of the loan. In addition, fees are assessed to cover program administration costs by the DEQ. A servicing fee of 0.5 percent of the outstanding balance is collected annually, and a loan reserve equal to 50 percent of the annual debt service is also to be set aside in a separate fund. This program has also implemented measures for principal forgiveness or hardship grants to be allocated to cities in combination with loans. The DEQ CWSRF program is an attractive low-interest loan and potential grant source for the City, although priority in the agency's ranking process would need to be sought by the City.

The CWSRF program can also sometimes provide principal forgiveness in combination with a loan for eligible communities. To be eligible, the project must either support a community with an MHI below the statewide MHI or meet Green Project guidelines. The CWSRF program has a limited amount of money available for principal forgiveness each year. If the community is eligible and money is available at the time of loan signing, the DEQ can offer principal forgiveness for 50 percent of the loan amount, for a maximum amount of $500,000. The Infrastructure Investment and Jobs Act, also known as the "Bipartisan Infrastructure Law," was signed into law in November 2021. With the passage of this Act, the DEQ has the ability to offer principal forgiveness of 50 percent up to $2 million through the CWSRF program.

The CWSRF program may be a low-interest loan and potential principal forgiveness source for the City of Prineville.

Summary of Federal Grant and Loan Programs

U.S. Department of Agriculture Rural Development

RD can provide financial assistance to communities with a population under 50,000 through the Water and Waste Disposal Loan Guarantees Program. Under this program, the City can seek private lender funding for projects with the agency providing loan guarantee to the lender on behalf of the City.

U.S. Economic Development Administration

EDA grant and loan monies are available to public agencies to fund projects that stimulate the economy of an area, and the overall goal of the program is to create or retain jobs. The EDA has invested a great deal of money in Oregon to fund public works improvements projects in areas where new industries are locating or planning to locate in the future. In addition, the agency has a program known as the Public Works Impact Program to fund projects in areas with extremely high rates of unemployment. This program is targeted toward creating additional jobs and reducing the unemployment rate in the area. Unless the City's WWSI can be linked directly to industrial expansion or job retention, the City is not likely to be in a competitive position to receive funding from the EDA.

Hardship grants may be available through this program for rural communities that have:

1. Fewer than 3,000 residents with no access to a centralized wastewater treatment/collection system or need improvements to on-site systems.
2. A community per capita income of less than 80 percent of the national average.
3. An unemployment rate exceeding the national average by one percentage point or more.

The City of Prineville may meet some of these criteria, so a hardship grant through the EDA may be available.

Local Financing Options

Regardless of the ultimate project scope and agency from which loan and grant funds are obtained, the City may need to develop authorization to incur debt, i.e., bonding, for the recommended improvements. The need to develop authorization to incur debt depends on funding agency requirements and provisions in the City Charter.

Two options are generally available for a city to use for its bonding authority (authorization to incur debt): general obligation bonds and revenue bonds. General obligation bonds require a vote of the people to give the City the authority to repay the debt service through tax assessments, sewer rate revenues, or a combination of both. The taxing authority of the City provides the guarantee for the debt. Revenue bonds are financed through revenues of the wastewater system. Authority to issue revenue bonds can come in two forms. One would be through a local bond election similar to that needed to sell a general obligation bond, and the second would be through City Council action authorizing the sale of revenue bonds, if the City Charter allows. If more than 5 percent of the registered voters do not object to the bonding authority resolution during a 60-day remonstrance period, the City would have authority to sell these revenue bonds.

Bonding is not typically required for the Business Oregon and CWSRF programs. Due to current tax measure limitations in Oregon, careful consultation with experienced, licensed bonding attorneys needs to occur if the City begins the process of obtaining bonding authority for the recommended WWSI. It would be wise for the City to consult its City Charter and City attorney to see if debt for the wastewater system can be assumed.

Funding Summary

It appears that more than one funding source is available to the City, including Business Oregon's Water/Wastewater program and the DEQ's CWSRF program. These programs appear to be sources that can provide the funds needed to potentially make the recommended improvements financially feasible for the City, if immediate implementation is needed or desired.

It is important for the City to consult with funding agencies early in project development to ascertain which funding programs the City would be eligible to receive funding from for its recommended improvements and understand which funding programs would provide the best funding package. This consultation with funding agencies may be done at a One Stop meeting, discussed later in this section.

Preliminary Equivalent Dwelling Unit Analysis

When projecting future revenue for a wastewater system, an equivalent dwelling unit (EDU) analysis is usually completed. One EDU is intended to represent the average residential wastewater contribution for a “typical” user for a given city. As an example, each residential connection in Prineville would represent one EDU. A commercial or industrial connection user with wastewater flows similar to the average residential flow would also be considered one EDU, while a commercial connection such as a café, with three times the typical wastewater flows as an average residential sewer connection, would be considered three EDUs.

The City’s sewer service accounts, as of September 2022, are shown on Table 6-3. The number of EDUs allocated to schools and commercial businesses have been estimated based on current rates being charged to residential users. An exception is the data centers, which account for 3,208 EDUs.

TABLE 6-3
PRELIMINARY EQUIVALENT DWELLING UNITS ANALYSIS

Connection Type	Total Number of Accounts	Estimated EDUs
Residential	4,335	4,335
Commercial	724	3,680
Large General Service	14	Included in Commercial
Industrial Use	5	Included in Commercial
TOTAL	**5,078**	**8,015**

Based on the above EDU analysis, the City has 4,335 residential wastewater system accounts that represent 4,335 EDUs with a connected population of 10,771 and a persons per household of 2.46. The estimated commercial EDUs is 3,680 with a large portion of the EDUs associated with the data centers. Most funding agencies will use this type of EDU analysis as a basis for estimating future yearly revenues and debt capabilities for a city. The EDU determination is intended to equitably distribute wastewater system costs among all users. The EDU determination helps funding agencies determine the maximum loan (debt) amount a city can afford to service.

Debt Repayment Options and Loan Capacity

Debt Repayment Using Sewer User Fees

One method for repayment of loans is through increased sewer user fees. Sewer user fee increases are determined by the annual debt service cost of the recommended improvements selected by the City of Prineville and annual O&M costs for the WWTF and collection system. Figure 6-2 was prepared to determine the City's capacity for repayment of loans with sewer user fees given different funding options (discussed below). Several assumptions were made to develop the analysis presented on Figure 6-2.

- Wastewater user fee revenue is based on 8,015 EDUs.
- Wastewater system expenditures for the budget year 2021-22 were set at $4,482,681 per year. The year 2021-22 was used because this is the most recent budget data available including debt service.
- The estimated OM&R expenditures do not take into consideration the anticipated savings that may result from the improved treatment process and collection system operating more efficiently with less labor demands.
- Future debt service was calculated based on a typical Business Oregon loan at 2.53 percent interest for a 25-year repayment period and a CWSRF loan at 1.33 and 1.52 percent interest for a 15- and 30-year repayment period, respectively, depending on which financing program is able to assist the City.

The data shown on Figure 6-2 provide a general idea of the amount of debt the City could service at various average monthly sewer service costs. As shown on Figure 6-2, the current wastewater rate of $55.61 allows for a total estimated project cost of $10,000,000 (maximum loan amount) if the entire project were funded with a loan only through the Water/Wastewater Financing program, or $19,608,000 if the project were funded with a loan only through the CWSRF fund with a 30-year loan term (not including a 0.5 percent annual fee). If the City were to fund the selected medium-term WWSI projects identified previously without any grants and with DEQ CWSRF loans only, monthly sewer rates would need to be raised to approximately $62 per month assuming a 15-year loan term with a 1.33 percent interest rate or $57 per month assuming a 30-year loan term with a 1.92 percent interest rate. These potential rates confirm that it is important for the City to pursue potential grant funds or loan forgiveness to assist with project financing.

It is important to note that the estimated loan capacities shown on Figure 6-2 are based on the current EDU estimate and interest rates. Interest rates were lowered due to the COVID-19 pandemic and are increasing to reduce inflation. Interest rates need to be verified as project funding proceeds. It should be recognized that this is only a preliminary analysis and the financial assumptions and figures presented in this WWFP should be refined as project implementation proceeds in the future and as agreements are drafted with funding agencies.

Debt Repayment Using Property Tax Revenue

Under the Oregon Property Tax Limitation-Measure 5, property tax rates can be used to repay WWSI costs through property tax revenues. Figure 6-3 lists the increases in property tax rates required to finance loan amounts solely with property taxes.

Debt repayment may also be achieved by some combination of sewer user fees, SDCs, and property taxes.

Project Funding Options

To complete all recommended improvements, low-interest loan funds coupled with grant funds, if available, may need to be acquired. Actual funding amounts and breakdowns will be based on a financial review completed by each agency and could vary from the estimated amounts shown herein. Other potential funding measures may be available to the City to reduce the potential rate increase impact on the City's customers. It will be important for the City to work directly with a Business Oregon regional development officer, RD area specialist, and DEQ finance administrators to evaluate these options.

The four funding agencies require some level of environmental review, although specific requirements and processes may vary. A cursory environmental review is provided in Section 4.

Project One Stop Meeting

To evaluate all potential project funding options, a One Stop meeting is generally requested by a city. One Stop meetings are often scheduled in Salem or the city, upon request, where representatives of DEQ, Business Oregon, and other funding agencies meet with the city to discuss the project and funding needs. This joint meeting provides a forum to evaluate and identify the most suitable funding package for the project and the city. After the meeting, the city is usually invited to submit a funding application to the preferred funding program(s) identified in the One Stop meeting.

Implementation Steps

The key to implementing part or all of the City's WWSI is the City's ability to finance them. The City will have to work closely with its residents to inform them of the system needs and the necessity for increased sewer user costs. It is also possible for the City to complete the identified improvements by seeking funding assistance from both state and federal funding sources.

The WWSI outlined herein are anticipated to provide the City with a higher quality wastewater system with significantly improved efficiency and reliability. The funding sources outlined in this section are potential sources of loans and grants for the City to consider if improvements projects are pursued.

Project Implementation

The following action items and implementation steps need to occur to implement the proposed WWSI projects. The steps outlined are general in nature and include the major steps that need to be undertaken.

Action Items

- The City will need to formally adopt this WWFP, which addresses review comments from Business Oregon and the DEQ. A formally adopted WWFP is required by state and federal funding and regulatory agencies if the City pursues funding from these agencies to complete the improvements.
- The City will need to consult and initiate funding discussions with funding agencies (Business Oregon and the DEQ) to ensure the best possible funding package is developed and obtained for the projects. The City will need to contact the Business Oregon regional

coordinator to start the intake process and, as necessary, complete the intake form and submit it to Business Oregon to initiate funding discussions.

- The City will need to prepare and submit funding applications to appropriate funding agencies.
- The City will need to investigate if authorization to incur debt for the WWSI projects is required by City Charter. If authorization is required by City Charter, the City will need to decide how to obtain the authorization to incur debt. Once decided (revenue bond or general obligation bond), a bond attorney should be consulted, and the appropriate resolution paperwork should be prepared and considered for implementation.
- The City will need to hold public information meetings to inform its residents of the needs and scope of the project, answer questions, and generate support for the required sewer rate increase.

Implementation Schedule

Should the City wish to proceed with the recommended WWSI, the following Implementation Schedule outlines the key steps the City would need to undertake. The implementation steps and stated completion dates are presented as general guidance only and provide the estimated time needed to complete projects of this complexity and magnitude. The dates are subject to change and will depend on economic conditions within the community; implementation of the improvements could be delayed due to economic conditions.

Item No.	Implementation Item	Time Frame
1.	Submit draft WWFP to the City and agencies for review.	September 2023
2.	Finalize and adopt the WWFP.	December 2023
3.	Review and update the City's Comprehensive Plan with the WWFP as required.	Winter 2023-24
4.	Attend One Stop meeting.	Winter 2023-24
5.	Prepare and submit funding application(s) to appropriate agency(ies).	Spring 2024
6.	Finalize project funding.	Summer 2024
7.	Design system improvements.	Summer 2024 through Summer 2025
8.	Submit design documents for agency(ies) review.	Summer 2025
9.	Advertise, bid, and award construction project.	Winter 2025-26
10.	Project construction.	Spring 2026 through Winter 2026-27
11.	Project startup and construction completion.	Spring 2027
12.	Project closeout.	Summer 2027
13.	Monitor system performance to determine the impact of improvements and report impacts to the DEQ.	Two years after project closeout

It should be noted that these implementation steps assume the City pursues and obtains project funding in summer 2024. Should delays occur in securing project funding, completion of the improvements will likely be delayed. Similar timelines will occur with funding for the medium-term and long-term WWSI projects.

The key to implementing the WWSI, as outlined in this WWFP, is the City's ability to acquire Business Oregon and/or DEQ low-interest loans coupled with grant funding. In addition, it is vital that the City supports the improvements and contributes their appropriate share of the cost. All improvements will likely not be economically feasible for the City unless grant funds can be obtained. The City will have to work closely with its citizens to inform them of the system needs and the necessity for increased sewer rates.

WWSI as outlined in this WWFP will provide the City with reliable, quality wastewater collection and treatment systems that will meet the City's needs for many years to come. The improved collection system and WWTF will help provide safer, more reliable, and more efficient operation and increased protection of the environment and public health.

Project Schedule

Figures 6-4 and 6-5 provide project schedules, including Gantt charts, for the implementation of the planning process as well as the phased construction of the collection system improvements. The schedules provide estimated timelines for processes to be completed and to illustrate the execution of the collection system improvements over the estimated duration of those improvements.

Permit Requirements

As shown on Figures 4-7 and 4-8 in Section 4, the majority of the proposed improvements are located within the city limits. Permits required through the Crook County Building Department will be acquired as appropriate. Proposed improvements in the Melrose/Willowdale area will be located outside the city limits but within the urban growth boundary. Annexation of this area will be required to construct the needed WWSI in this area.

Where needed, access permits, a Joint Permit Application, and county building permits will be acquired. Any projects resulting in total ground disturbance of 1 acre or more will acquire a general stormwater discharge permit.

Sustainability Considerations

The improvements selected by the City will provide aspects of sustainability including water and energy efficiency and system resiliency.

Water and Energy Efficiency

The proposed improvements include reduction of infiltration and inflow (I/I), upgrades to pumping systems, and collection system extensions that will result in wastewater lift station removal. I/I reduction will decrease the amount of non-wastewater being transported and treated in the City's collection and treatment systems. Pumping system improvements will reduce energy consumption through the replacement of outdated or inefficient pumping equipment.

Other benefits of the proposed improvements include improved telemetry and supervisory control and data acquisition (SCADA) capabilities, which will reduce the number of vehicle trips required by Public Works personnel.

Green Infrastructure

All proposed improvements are intended to utilize efficient equipment wherever possible. Selecting highly efficient pumping and control systems during design and installing them during construction will reduce energy use considerably throughout the wastewater collection and treatment systems. Improvements in control systems, such as smart controllers, aid in the reduction of energy use by operating at the most efficient operating point when sized and selected correctly. Self-cleaning systems reduce the use of additional water to clean wetwells and other improvements requiring regular washdown. Additionally, new impermeable surfaces will not be added with the proposed improvements with the exception of the WWTF operations and laboratory building.

Other (System Resiliency)

The proposed system improvements will provide the City with the ability to more easily maintain its current wastewater collection, treatment, and disposal/irrigation systems. The WWTF will continue to operate in a manner similar to the current operations but with the upgrade of selected components to improve efficiency and reliability.

Total Project Cost Estimate

Capital Improvements Plan

Improvements identified under the Capital Improvements Plan (CIP) category include projects that need to be completed to address existing system deficiencies irrespective of growth.

After a review of the City's wastewater collection and treatment facilities' deficiencies, improvements were prioritized and the CIP was developed to help organize necessary improvements over the 20-year planning period. The CIP is divided into two phases: medium- and long-term. The medium- and long-term improvements should be completed in 0 to 10 years and 10 to 20 years, respectively, with portions of the medium-term improvements completed annually, such as the collection system inspection and evaluation, cured-in-place pipe (CIPP) lining, and manhole rehabilitation. A summary of the costs associated with the CIP is provided on Table 6-4. Detailed project cost estimates are included in Appendix H.

TABLE 6-4
SUMMARY OF CAPITAL IMPROVEMENTS PROJECT PHASES (2023 DOLLARS)

Project Element	Project Purpose/Description	Total Estimated Project Cost
Medium-Term Improvements - 0 to 10 years		
Influent Screen Replacement	Replace the existing main influent screen.	$1,156,500
Update Headworks	Install new headworks influent pumps, electrical, and controls.	$576,000
System-wide SCADA Upgrade	Upgrade the wastewater collection and treatment SCADA systems.	$427,000
Lift Station Improvements	Upgrades to the lift station pumps, equipment, electrical, and controls.	$380,500

Project Element	Project Purpose/Description	Total Estimated Project Cost
Collection System Improvements - Annual I/I Reduction Program	Annually install 500 linear feet of CIPP lining. The total project cost of $855,000 is based on an annual budget of $150,000 to complete in six years.	$855,500
Manhole Rehabilitation Program	Repair/replace manholes as identified through inspection/evaluation.	$382,000
Collection System Inspection	Annual television inspection and evaluation of the existing collection system (footage per year to be determined).	$292,000
Upsize Existing Main Line from 10th Street to the North Side of Lamonta	Upsize existing pipe to remove the bottleneck in the collection system from northeast Prineville.	$2,276,800
Upsize Existing Main Line on Main Street from Lynn Boulevard to 1st Street	Upsize existing pipe that is currently 18 inches upstream, bottlenecks to 12 inches, then becomes 21 inches. Remove 12-inch bottleneck.	$1,293,500
TOTAL ESTIMATED COST OF MEDIUM-TERM IMPROVEMENTS		**$7,639,800**
Long-Term Improvements - 10 to 20 years		
Long-Term WWTF Improvements	Remove lagoon biosolids.	$541,000
TOTAL ESTIMATED COST OF LONG-TERM IMPROVEMENTS		**$541,000**

The estimated CIP costs listed above are provided in 2023 dollars for comparison. The recommended medium-term improvements projects are anticipated to be advertised for bid and awarded in 2026. The City and any potential funding agencies should recognize that, due to the recent escalation of inflation and construction costs, total relative project costs, including construction, administrative, legal, engineering, and contingencies, together with other project costs, will continue to increase until such time that the project is awarded. Therefore, costs for medium-term improvements have been inflated by 6.5 percent per year to 2026 dollars. The estimated year 2026 dollar amount is the amount of funds the City should apply for to cover anticipated project costs at the time the project is anticipated to be awarded. Table 6-5 shows the anticipated 2026 total project cost for the recommended medium-term improvements is $9,228,500.

TABLE 6-5
2026 TOTAL PROJECT COST FOR RECOMMENDED MEDIUM-TERM CAPITAL IMPROVEMENTS PLAN IMPROVEMENTS

Medium-Term Improvements (2023 Dollars)	$7,639,800
Assumed Annual Construction Cost Index Inflation Rate	6.5 percent
TOTAL ESTIMATED PROJECT COST (2026 DOLLARS)	**$9,228,500**

System Development Charge Plan

Improvements identified under the SDC category were developed to address those needs in the system to specifically support growth and associated increased system demands.

After a review of the City's wastewater collection and treatment facilities' deficiencies, improvements were prioritized and the SDC Plan was developed to help organize necessary improvements over the 20-year planning period. The SDC improvements are not listed in any order of priority. Improvements will be completed based on where growth and development occur.

TABLE 6-6
SUMMARY OF SYSTEM DEVELOPMENT CHARGE PROJECT PHASES (2023 DOLLARS)

Project Element	Project Purpose/Description	Total Estimated
WWTF Chlorination Conversion	Convert the existing chlorination system from gas chlorine to a bulk sodium hypochlorite system.	$652,000
Upsize Existing Main Line from 10th Street to the North Side of Lamonta	Cost difference to increase pipe size; used in conjunction with CIP 8 (discussed in Section 4).	$932,500
WWTF Operations Building and Laboratory	Construct an operations building with restrooms, showers, an employee locker room, offices, storage, conference space, kitchen, and laboratory.	$1,747,500
Main Line Extension North of Existing Main Line along Canal	To serve potential development on Rhoden property.	$325,250
Extend Pressure Sewer Main Line North on Highway 26 from N. Gardner Road	To serve future development north of Prineville along Highway 26.	$520,250
Upsize Existing Main Line on Main Street from Lynn to 1st Street	Cost difference to increase pipe size; used in conjunction with CIP 9 (discussed in Section 4).	$350,000
Extend Existing 18-inch Sewer Main Line South on Main Street	To serve future development south of Prineville along Main Street.	$1,772,500
Extend Combs Flat Interceptor to the East	To serve future development east of Prineville.	$2,330,750
Connect Williamson Area to Gravity Sewer. Remove Williamson Lift Station	To serve future development east of Prineville, remove the Williamson Lift Station, and serve the area by gravity.	$611,250
Melrose/Willowdale Sewer Main Line Installation	Install main lines and manholes to facilitate future connection of Melrose/Willowdale residents.	$3,169,500
	TOTAL ESTIMATED COST OF SDC IMPROVEMENTS	**$12,411,500**

The estimated project costs listed above are provided in 2023 dollars for comparison. The preferred improvements projects would be advertised for bid and awarded as growth dictates. For comparison, costs for the SDC improvements have been inflated by 6.5 percent per year to 2026 dollars. Since SDC projects are directly related to growth, and location and timing of growth is unknown, the time frame for the improvements outlined on Table 6-6 is unknown. Table 6-7 shows the anticipated 2026 total project cost for the SDC improvements.

TABLE 6-7
2026 TOTAL PROJECT COST FOR RECOMMENDED SYSTEM DEVELOPMENT CHARGE IMPROVEMENTS

SDC Improvements (2023 Dollars)	$12,411,500
Assumed Annual Construction Cost Index Inflation Rate	6.5 percent
TOTAL ESTIMATED PROJECT COST (2026 DOLLARS)	**$14,992,500**

Summary of Estimated Total Costs

The estimated total project costs are summarized on Tables 6-4 and 6-6. The year 2023 costs shown on Tables 6-4 and 6-6 were estimated utilizing associated rates of 2019 to 2022 with a 5 percent inflation rate per year to the year 2023, as this provides the City with a more consistent anticipated cost for the capital improvements. The total estimated project cost in 2023 dollars is $20,051,300. Detailed cost estimates are included in Appendix H.

Annual Operating Budget

The average annual cost to operate and maintain the City's WWTF over the planning period is anticipated to be $2,140,360. The average annual revenue over the planning period is anticipated to be $3,735,118. Annual wastewater system O&M costs, not including inter-fund transfers, have varied from a low of approximately $1,511,658 in FY 2016-17 to a high of $2,194,325 in FY 2020-21.

In general, an upward trend of O&M activities is observed. It is typically expected that expenditures should increase with time as the costs to own and operate a wastewater system continually increase. Any proposed upgrades to the system are anticipated to be constructed by FY 2025-26, which will add a debt service to the annual expenditures.

Reserves

Currently, the City budgets reserve account funds for wastewater system OM&R costs. Because the City already has a reserve account, it is better prepared to deal with future wastewater system expenses and emergencies. Pump replacement, lagoon liner repairs, pipe repair/replacement, trash screen mechanical breakdowns, etc., are items that require funds from time to time. According to the FY 2025 biennial budget adopted in July 2023, the City currently maintains a Short-Lived Asset Replacement Account of $302,600, an emergency reserve of $239,003, and a budgeted contingency of $602,224.

Income

O&M of the existing wastewater system is financed through the City's annual budget. Revenue is obtained primarily from sewer user fees. The current monthly wastewater rates at the time this WWFP was prepared are summarized on Table 2-1 and Chart 2-1 in Section 2.

The annual revenue received and the costs of operating and maintaining the City's wastewater system are summarized on Table 6-8. The costs presented were obtained from the City's audited financial statements and include all costs for the wastewater system, such as O&M, personnel services, materials and services, capital outlay, and debt service. These data are presented to provide insight into the general costs required to operate the City's existing wastewater system. For funding and other financial analysis, it is recommended that the audited financial statements be reviewed in detail to refine the costs prior to considering any available revenue for future debt purposes.

TABLE 6-8
SEWER SERVICE REVENUE

Fiscal Year	Total Revenue	Total Costs*	Net Difference
2016-17	$3,477,701	($1,511,658)	$1,966,043
2017-18	$3,722,627	($1,586,633)	$2,135,994
2018-19	$3,691,237	($1,838,247)	$1,852,990
2019-20	$3,663,030	($2,177,440)	$1,485,590
2020-21	$4,120,995	($2,194,325)	$1,926,670

Total costs do not include debt service collections.

A portion of the project cost will be eligible to be paid off with SDCs. This is discussed in further detail in Section 2.

CITY OF PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN
HISTORICAL SEWER SYSTEM FUNDS

Fiscal Year	Sewer Fees Revenue	Additional Revenue[1]	Personnel Services[2]	Materials and Services[3]	Capital Outlay	Total O&M[4] Expenditures	Debt Service	Total Expenditures	Net Fund Balance[5]
2016-17	$3,419,401	$58,300	$117,047	$831,520	$374,029	$1,322,596	$934,344	$2,256,940	$1,220,761
2017-18	$3,627,913	$94,714	$117,330	$723,610	$633,434	$1,474,374	$7,114,455	$8,588,829	($4,866,202)
2018-19	$3,482,719	$208,518	$127,070	$889,227	$340,152	$1,356,449	$991,971	$2,348,420	$1,342,817
2019-20	$3,628,250	$4,780	$123,575	$651,652	$141,315	$916,542	$1,029,305	$1,945,847	$1,687,183
2020-21	$3,995,331	$125,664	$151,307	$786,061	$343,922	$1,281,290	$991,971	$2,273,261	$1,847,734

Notes:

[1] Additional revenue includes cash flows provided by investing activities.

[2] Includes sewer and administration personnel services.

[3] Includes sewer and administration materials and services.

[4] O&M = operation and maintenance.

[5] Net fund balance does not include annual cash carryover or capital reserve transfers into fund.

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CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

HISTORICAL SEWER SYSTEM FUNDS

FIGURE
6-1

CITY OF PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN
PRELIMINARY SEWER RATE ANALYSIS FOR LOAN CAPACITY
2023-24 BUDGET YEAR

Average Monthly Rate[1]	Revenue Potential[2]	Estimated OM&R Costs[3]	Revenue Available for Future Debt Service	Water/ Wastewater Loan Funding Capacity (2.53 Percent, 25-Year Term)[4,5]	CWSRF Loan Capacity (1.33 Percent, 15-Year Term)[4]	CWSRF Loan Capacity (1.92 Percent, 30-Year Term)[4]
$ 55.61	$ 5,348,570	$ 4,482,681	$ 865,889	$ 10,000,000	$ 11,705,000	$ 19,608,000
$ 56	$ 5,386,080	$ 4,482,681	$ 903,399		$ 12,212,000	$ 20,457,000
$ 57	$ 5,482,260	$ 4,482,681	$ 999,579		$ 13,512,000	$ 22,635,000
$ 58	$ 5,578,440	$ 4,482,681	$ 1,095,759		$ 14,812,000	$ 24,813,000
$ 59	$ 5,674,620	$ 4,482,681	$ 1,191,939		$ 16,112,000	$ 26,991,000
$ 60	$ 5,770,800	$ 4,482,681	$ 1,288,119		$ 17,412,000	$ 29,169,000
$ 61	$ 5,866,980	$ 4,482,681	$ 1,384,299		$ 18,712,000	$ 31,347,000
$ 62	$ 5,963,160	$ 4,482,681	$ 1,480,479		$ 20,012,000	$ 33,525,000
$ 63	$ 6,059,340	$ 4,482,681	$ 1,576,659		$ 21,312,000	$ 35,703,000
$ 64	$ 6,155,520	$ 4,482,681	$ 1,672,839		$ 22,612,000	$ 37,881,000
$ 65	$ 6,251,700	$ 4,482,681	$ 1,769,019		$ 23,913,000	$ 40,059,000
$ 66	$ 6,347,880	$ 4,482,681	$ 1,865,199		$ 25,213,000	$ 42,237,000
$ 67	$ 6,444,060	$ 4,482,681	$ 1,961,379		$ 26,513,000	$ 44,415,000
$ 68	$ 6,540,240	$ 4,482,681	$ 2,057,559		$ 27,813,000	$ 46,593,000
$ 69	$ 6,636,420	$ 4,482,681	$ 2,153,739		$ 29,113,000	$ 48,771,000
$ 70	$ 6,732,600	$ 4,482,681	$ 2,249,919		$ 30,413,000	$ 50,949,000
$ 71	$ 6,828,780	$ 4,482,681	$ 2,346,099		$ 31,713,000	$ 53,127,000
$ 72	$ 6,924,960	$ 4,482,681	$ 2,442,279		$ 33,013,000	$ 55,305,000
$ 73	$ 7,021,140	$ 4,482,681	$ 2,538,459		$ 34,313,000	$ 57,483,000
$ 74	$ 7,117,320	$ 4,482,681	$ 2,634,639		$ 35,614,000	$ 59,661,000
$ 75	$ 7,213,500	$ 4,482,681	$ 2,730,819		$ 36,914,000	$ 61,839,000
$ 76	$ 7,309,680	$ 4,482,681	$ 2,826,999		$ 38,214,000	$ 64,017,000
$ 77	$ 7,405,860	$ 4,482,681	$ 2,923,179		$ 39,514,000	$ 66,195,000
$ 78	$ 7,502,040	$ 4,482,681	$ 3,019,359		$ 40,814,000	$ 68,373,000
$ 79	$ 7,598,220	$ 4,482,681	$ 3,115,539		$ 42,114,000	$ 70,551,000
$ 80	$ 7,694,400	$ 4,482,681	$ 3,211,719		$ 43,414,000	$ 72,729,000
$ 81	$ 7,790,580	$ 4,482,681	$ 3,307,899		$ 44,714,000	$ 74,907,000
$ 82	$ 7,886,760	$ 4,482,681	$ 3,404,079		$ 46,014,000	$ 77,085,000
$ 83	$ 7,982,940	$ 4,482,681	$ 3,500,259		$ 47,315,000	$ 79,263,000
$ 84	$ 8,079,120	$ 4,482,681	$ 3,596,439		$ 48,615,000	$ 81,441,000
$ 85	$ 8,175,300	$ 4,482,681	$ 3,692,619		$ 49,915,000	$ 83,619,000
$ 86	$ 8,271,480	$ 4,482,681	$ 3,788,799		$ 51,215,000	$ 85,797,000
$ 87	$ 8,367,660	$ 4,482,681	$ 3,884,979		$ 52,515,000	$ 87,975,000
$ 88	$ 8,463,840	$ 4,482,681	$ 3,981,159		$ 53,815,000	$ 90,153,000
$ 89	$ 8,560,020	$ 4,482,681	$ 4,077,339		$ 55,115,000	$ 92,330,000
$ 90	$ 8,656,200	$ 4,482,681	$ 4,173,519		$ 56,415,000	$ 94,508,000
$ 91	$ 8,752,380	$ 4,482,681	$ 4,269,699		$ 57,715,000	$ 96,686,000
$ 92	$ 8,848,560	$ 4,482,681	$ 4,365,879		$ 59,015,000	$ 98,864,000
$ 93	$ 8,944,740	$ 4,482,681	$ 4,462,059		$ 60,316,000	$ 101,042,000
$ 94	$ 9,040,920	$ 4,482,681	$ 4,558,239		$ 61,616,000	$ 103,220,000
$ 95	$ 9,137,100	$ 4,482,681	$ 4,654,419		$ 62,916,000	$ 105,398,000
$ 96	$ 9,233,280	$ 4,482,681	$ 4,750,599		$ 64,216,000	$ 107,576,000
$ 97	$ 9,329,460	$ 4,482,681	$ 4,846,779		$ 65,516,000	$ 109,754,000
$ 98	$ 9,425,640	$ 4,482,681	$ 4,942,959		$ 66,816,000	$ 111,932,000
$ 99	$ 9,521,820	$ 4,482,681	$ 5,039,139		$ 68,116,000	$ 114,110,000
$ 100	$ 9,618,000	$ 4,482,681	$ 5,135,319		$ 69,416,000	$ 116,288,000
$ 101	$ 9,714,180	$ 4,482,681	$ 5,231,499		$ 70,716,000	$ 118,466,000
$ 102	$ 9,810,360	$ 4,482,681	$ 5,327,679		$ 72,017,000	$ 120,644,000
$ 103	$ 9,906,540	$ 4,482,681	$ 5,423,859		$ 73,317,000	$ 122,822,000
$ 104	$ 10,002,720	$ 4,482,681	$ 5,520,039		$ 74,617,000	$ 125,000,000
$ 105	$ 10,098,900	$ 4,482,681	$ 5,616,219		$ 75,917,000	$ 127,178,000
$ 106	$ 10,195,080	$ 4,482,681	$ 5,712,399		$ 77,217,000	$ 129,356,000
$ 107	$ 10,291,260	$ 4,482,681	$ 5,808,579		$ 78,517,000	$ 131,534,000
$ 108	$ 10,387,440	$ 4,482,681	$ 5,904,759		$ 79,817,000	$ 133,712,000
$ 109	$ 10,483,620	$ 4,482,681	$ 6,000,939		$ 81,117,000	$ 135,890,000
$ 110	$ 10,579,800	$ 4,482,681	$ 6,097,119		$ 82,417,000	$ 138,068,000
$ 111	$ 10,675,980	$ 4,482,681	$ 6,193,299		$ 83,718,000	$ 140,246,000
$ 112	$ 10,772,160	$ 4,482,681	$ 6,289,479		$ 85,018,000	$ 142,424,000
$ 113	$ 10,868,340	$ 4,482,681	$ 6,385,659		$ 86,318,000	$ 144,602,000
$ 114	$ 10,964,520	$ 4,482,681	$ 6,481,839		$ 87,618,000	$ 146,780,000
$ 115	$ 11,060,700	$ 4,482,681	$ 6,578,019		$ 88,918,000	$ 148,958,000
$ 116	$ 11,156,880	$ 4,482,681	$ 6,674,199		$ 90,218,000	$ 151,136,000
$ 117	$ 11,253,060	$ 4,482,681	$ 6,770,379		$ 91,518,000	$ 153,314,000
$ 118	$ 11,349,240	$ 4,482,681	$ 6,866,559		$ 92,818,000	$ 155,492,000

Notes:

1 Current monthly rate = $55.61.

2 Revenue potential determined by assuming 8,015 Residential EDU accounts and using the following formula:
Revenue = (Total Number of EDUs = 8,015 x Monthly Rate) x 12

3 Estimated operation, maintenance, and replacement costs are projected for the 2021-22 budget year.

4 Loan terms are further described in Chapter 6 of the Wastewater Facilities Plan. Loan capacities are rounded to the nearest $1,000.

5 Maximum loan amount is $10 million. Does not include an annual fee of 0.5 percent of the remaining loan amount.

CWSRF = Clean Water State Revolving Fund

EDU = Equivalent Dwelling Unit

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CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

PRELIMINARY SEWER RATE ANALYSIS FOR LOAN CAPACITY

FIGURE 6-2

CITY OF PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN
PRELIMINARY PROPERTY TAX BONDING CAPACITY ANALYSIS

Typical CWSRF Loan - 30-Year Term

Loan Amount	Interest Rate[1]	Loan Period (years)	Estimated Annual Payment	Estimated Annual Tax Rate Increase per $1,000[2,3]	Estimated Annual Tax Increase for a $100,000 Home	
					Monthly	Annual
$1,000,000	1.52%	30	$44,160	$1.45	$12.08	$145.00
$2,000,000	1.52%	30	$88,321	$2.90	$24.17	$290.00
$3,000,000	1.52%	30	$132,481	$4.35	$36.25	$435.00
$4,000,000	1.52%	30	$176,641	$5.80	$48.33	$580.00
$5,000,000	1.52%	30	$220,801	$7.25	$60.42	$725.00
$6,000,000	1.52%	30	$264,962	$8.70	$72.50	$870.00
$7,000,000	1.52%	30	$309,122	$10.15	$84.58	$1,015.00
$8,000,000	1.52%	30	$353,282	$11.60	$96.67	$1,160.00
$9,000,000	1.52%	30	$397,442	$13.05	$108.75	$1,305.00
$10,000,000	1.52%	30	$441,603	$14.49	$120.75	$1,449.00
$11,000,000	1.52%	30	$485,763	$15.94	$132.83	$1,594.00
$12,000,000	1.52%	30	$529,923	$17.39	$144.92	$1,739.00
$13,000,000	1.52%	30	$574,083	$18.84	$157.00	$1,884.00
$14,000,000	1.52%	30	$618,244	$20.29	$169.08	$2,029.00
$15,000,000	1.52%	30	$662,404	$21.74	$181.17	$2,174.00
$16,000,000	1.52%	30	$706,564	$23.19	$193.25	$2,319.00
$17,000,000	1.52%	30	$750,725	$24.64	$205.33	$2,464.00
$18,000,000	1.52%	30	$794,885	$26.09	$217.42	$2,609.00
$19,000,000	1.52%	30	$839,045	$27.54	$229.50	$2,754.00
$20,000,000	1.52%	30	$883,205	$28.99	$241.58	$2,899.00

[1] Actual loan interest rates could vary. Rates adopted are based on recent information available.

[2] Actual loan interest rates could vary. Rate adopted for an intermediate borrow for the first quarter fiscal year 2023.

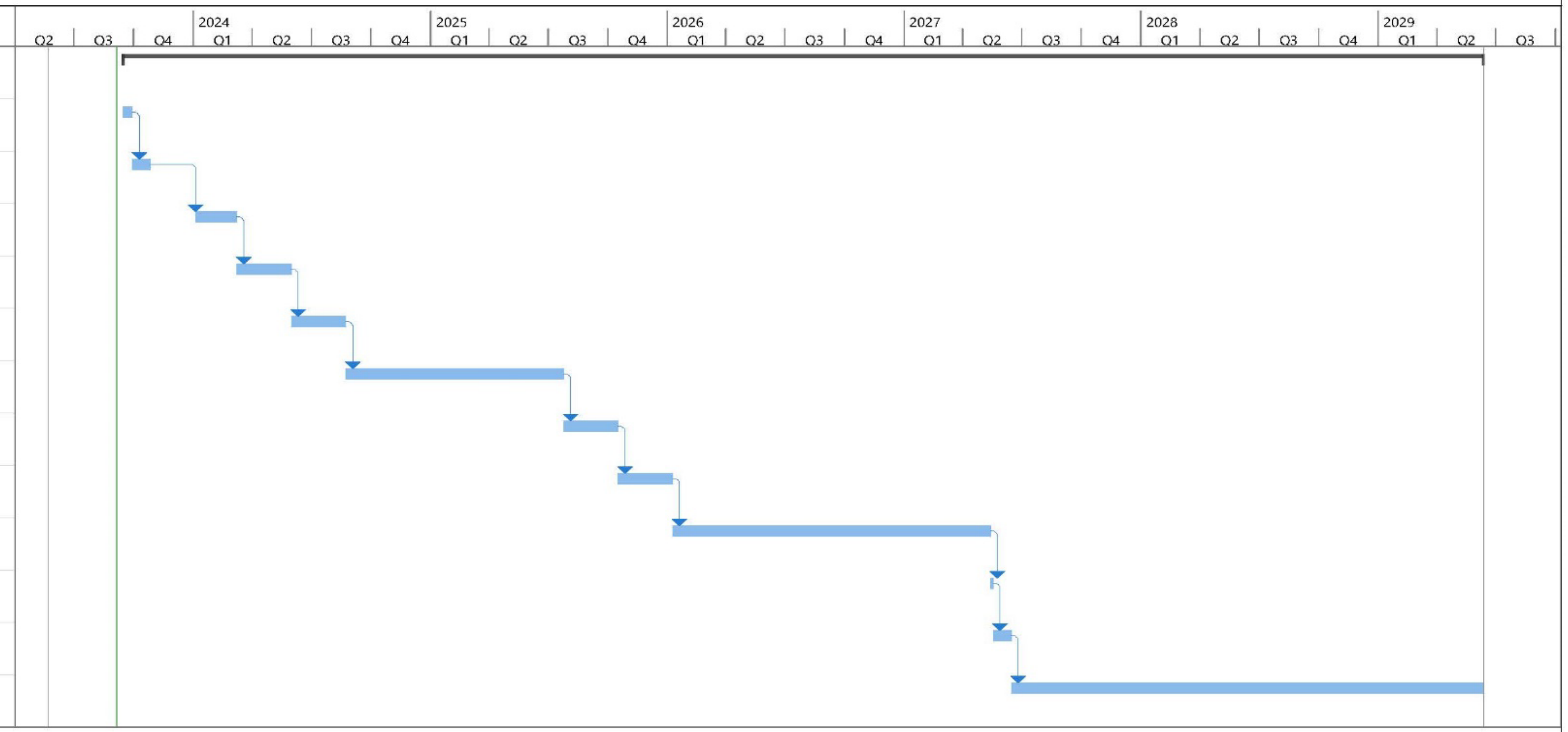
[3] The annual tax rate increase is based on the City of Prineville's 2020-21 assessed valuation of $1,152,433,106. It was also assumed that 100 percent of taxes would be collected. Typically, a small percentage of taxes is not paid, which would require the estimated tax rate to be increased slightly higher than what is shown herein. Per ORS 287.004(2) "no city shall issue or have outstanding at any one time bonds in excess of 3 percent of the real market value of all taxable property within its boundaries, computed in accordance with ORS 308.297." This allows a legal debt margin of $30,466,879.

CWSRF = Clean Water State Revolving Fund

ORS = Oregon Revised Statutes

CITY OF PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN
PLANNING PROCESS IMPLEMENTATION SCHEDULE

ID	Task Name
1	**City of Prineville Wastewater Facilities (WWFP) Plan**
2	Submit Draft WWFP to the City for Review
3	Finalize and Adopt the WWFP
4	Attend One Stop Meeting
5	Prepare and Submit Funding Packages
6	Finalize Project Funding
7	Design System Improvements
8	Submit Design Documents for Agency Review
9	Advertise, Bid, and Award Construction Project
10	Project Construction
11	Project Startup and Construction Complete
12	Project Closeout
13	Monitor System Performance



Project: Prineville WWFP Sched
Date: Tue 9/5/23

Task | Split | Milestone ◆

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CITY OF
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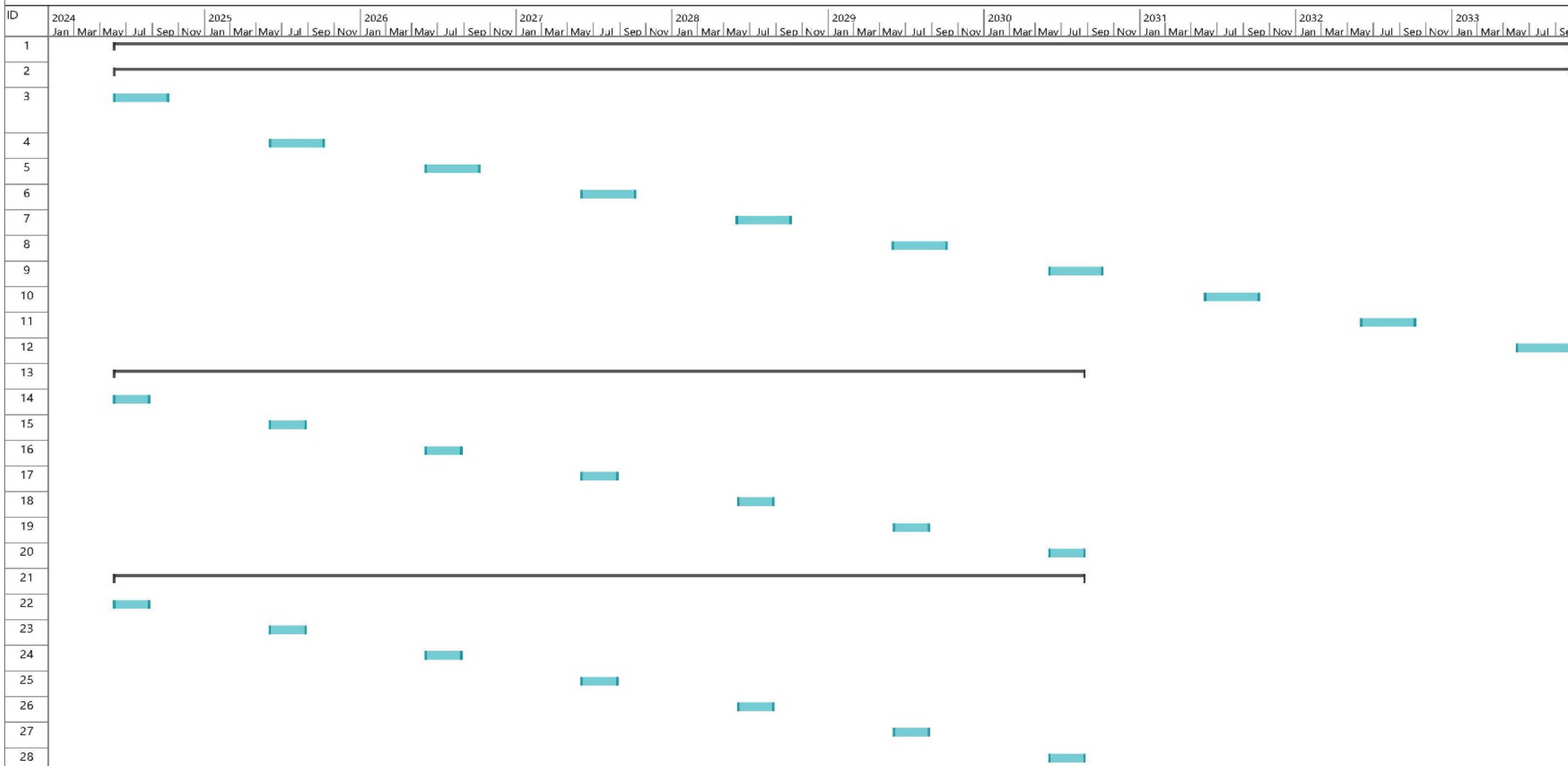
WASTEWATER FACILITIES PLAN
PLANNING PROCESS
IMPLEMENTATION SCHEDULE

FIGURE
6-4

CITY OF PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN
COLLECTION SYSTEM IMPROVEMENTS IMPLEMENTATION SCHEDULE



Project: Prineville Collection Sy
Date: Tue 9/5/23

Task Split Milestone ◆

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CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN
COLLECTION SYSTEM IMPROVEMENTS
IMPLEMENTATION SCHEDULE

FIGURE
6-5

Section 7 - Conclusions and Recommendations

General

The primary goal of this Wastewater Facilities Plan (WWFP) is to develop flexible, dynamic facilities that address potential regulatory, social, environmental, population, and economic changes. Each component is recommended on the basis of a distinct need, condition, capacity, performance, regulatory criteria, or some combination thereof.

Coordination with all stakeholders is important to optimize the benefits of the planned improvements. It is recommended that the City continue to gather data and work with regulatory agencies and stakeholders to define the impacts of newly developed treatment standards and explore options for how those requirements may be met. This coordination is imperative to maintaining an open dialogue to address challenges and successes and to maintain a cooperative environment of participation.

Permit Renewal

The City of Prineville's National Pollutant Discharge Elimination System (NPDES) Permit renewal is scheduled for 2024. Activities that the Oregon Department of Environmental Quality (DEQ) is requiring as part of the NPDES Permit renewal process for the City that are outside the scope of this WWFP include:

- Develop and implement an Industrial Pretreatment Program (IPP)
- Conduct additional sampling per the DEQ request on March 28, 2022, and as modified by the City's request on May 4, 2022

Industrial Pretreatment Program

The DEQ required the City to submit an Industrial User (IU) Survey as described in 40 Code of Federal Regulations 403.8(f)(2)(i-iii) "suitable to make a determination as to the need for development of a pretreatment program." The IU Survey was provided to the DEQ in July 2018. A public hearing regarding the IPP was held at the City Council meeting on September 27, 2022. No questions or written testimony were received. The IPP Manual is in the final stages of completion for submittal to the DEQ in 2023.

Additional Sampling Requirements

On March 28, 2022, the DEQ sent a letter to the City requiring additional information to fully evaluate the site-specific conditions of the wastewater treatment facility (WWTF) in order to proceed with the NPDES Permit renewal. A summary of the required supplemental information follows:

- Receiving Water Ammonia as N. Sampling analyzed with a quantitation limit no greater than 0.2 milligrams per liter and to be reported with monthly Discharge Monitoring Report data.

- Copper Biotic Ligand Model and Aluminum Parameter Data
- Toxic Pollutants
- Mixing Zone Information

The City and Anderson Perry & Associates, Inc., requested a modification to the additional sampling requirements in a meeting with the DEQ on April 11, 2022. On May 4, 2022, the DEQ responded with a modification to the original request for additional information. The constituent sampling remains the same; however, the number of sampling locations and, therefore, the number of samples, have been reduced. The City continues to complete the required additional sampling and reporting to the DEQ.

Additional Recommendations

In addition to the recommended improvements in this WWFP, other recommendations for improving the maintenance and management of the wastewater system include:

- Asset Management
    - Continue to update data, such as pipe material, year installed, and invert elevations in the City's geographic information systems database.
    - Continue to update information on mechanical equipment, such as brand, model number, horsepower, and year installed, and performance information, if applicable, such as pump curves.
    - Establish a maintenance schedule for system components based on manufacturers' recommended intervals.
    - Standardize condition assessments and television inspection reports, and update the database whenever those inspections are conducted.
- Additional Reuse Opportunities
    - Continue to pursue additional wastewater effluent reuse opportunities, such as industrial cooling water.

Conclusions

Currently, the City of Prineville operates a very resilient and redundant WWTF. The use of two separate plants operating in parallel allows for simplified maintenance and an enhanced ability to respond to changing conditions. With backup power generation at all critical facilities, solar power, and a wetlands disposal system, the WWTF represents a strong foundation for future growth. With the recommended improvements identified in this WWFP, the City can improve critical systems that, although function properly, need updating. These recommended improvements will improve operational efficiency, reduce energy consumption and cost, and improve the quality of treatment. Upgrades to the existing supervisory control and data acquisition (SCADA) systems will improve data acquisition and system awareness for operators. Additionally, the construction of a needed operations building and laboratory will reduce annual testing costs and provide improved facilities for wastewater personnel.

While the majority of the collection system was constructed in the 1960s, it continues to perform adequately. Root removal and other maintenance is completed regularly, as needed. Additional inspection and evaluation of the collection system will provide guidance for maintenance activities and funding to be prioritized by need for pipe lining, pipe replacement, and manhole repair. System bottlenecks, although few, can be addressed through pipe replacement, including larger diameter pipe and manholes as appropriate and sized for future growth.

The six wastewater lift stations owned and operated by the City continue to perform as required; however, significant upgrades are needed. The lift stations are in good condition structurally, with minor periodic maintenance required, but the pumps and appurtenances, controls, and electrical systems are out of date and at risk of failure. Two of the lift stations do not have proper guide rail and disconnect systems for the pumps, and two lift stations have guide rail and disconnect systems that are badly corroded, which requires WWTF personnel to enter the wetwell to remove pumps for maintenance or replacement. The risk to personnel is considerable, and the proposed upgrades will greatly reduce the need for operators to enter wetwells. SCADA upgrades to the lift stations will allow for remote data acquisition, control, and alarms to warn operators of system conditions that need attention. Additionally, standardizing pumps and appurtenances, controls, and electrical systems will reduce the need to keep multiple replacement parts in inventory, reducing inventory cost and storage space requirements.

Overall, the City of Prineville has a good wastewater system. The system is well-operated and maintained, and the City continues to pursue opportunities to improve the system by increasing operator efficiency, reducing energy consumption, and finding opportunities to improve the environment in and around Prineville, such as using treatment wetlands for effluent treatment. While population growth in excess of forecasted numbers continues, the City’s wastewater system can handle this growth and, with the proposed improvements, the City can continue to expand its wastewater capabilities to serve users through the 20-year planning period and beyond.