WASTEWATER FACILITIES PLAN

FOR

CITY OF PRINEVILLE, OREGON

2018

anderson perry & associates, inc.

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

DOWL

Bend, Oregon

Job No. 1260-15

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Introduction

This report presents the results of a Wastewater Facilities Plan (WWFP) authorized by agreement between the City of Prineville, Oregon, and Anderson Perry & Associates, Inc., dated August 17, 2016. The City of Prineville completed a WWFP in 2000, a Wastewater Master Plan Update in 2005, and a WWFP Update in 2010 for their wastewater system. Due to recent improvements to the wastewater treatment facility (WWTF), the City of Prineville is updating the WWFP.

Background Information

The original WWTF began operation in 1960. The 1960 treatment system consisted of evaporative lagoons. The WWTF was upgraded in 1993, 2005, and 2016. This included improving system capacity by 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. 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 the Meadow Lakes Golf Course and on City-owned pasture land. Currently, the design and construction of a tertiary treatment plant is being pursued for wastewater reuse as data center cooling and humidification water. See Figure 1-2 in Chapter 1 for an aerial photo of the existing WWTF.

Population

To estimate future wastewater system demands, population projections must be made. Projections are usually made on the basis of an annual percentage increase estimated from past growth rates combined with future expectations. The City of Prineville's population at the 2010 Census was 9,253. The certified population estimate by the Population Research Center at Portland State University for 2017 was 9,646 with an average annual growth rate of 0.7 percent between the years 2016 and 2035 and 0.1 percent between the years 2035 and 2066.

The historical population plus the projected annual growth rate results in a 20-year (year 2037) population estimate of 10,958. This WWFP uses 10,958 as the 20-year design population inside the city limits.

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 9,003. A review of historical wastewater data must be completed using the connected population. Improvements are needed to the collection system 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 are annexed into the City, the City population could increase by 744 people to 10,390, 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 2037 City population of 10,958 was added to the estimated 2037 UGB population of 744 for a design population of 11,702 in the year 2037.

Design Criteria

Wastewater design criteria are developed from the amount of historic wastewater produced and are projected for future needs using the population estimates noted above. The criteria used in this WWFP were developed for several design conditions: the estimated 2017 population that is currently connected to the City sewer system; the 2017 population with the assumption everyone within the city limits is connected to the sewer system; the 2017 population with the entire City and 20 percent of the developments in the UGB that could be connected during the planning period; and the latter with the current City population projected to the design year of 2037.

According to the Coordinated Population Forecast Report for Crook County, the estimated number of persons per household is 2.51. This value allows the total population connected to the WWTF to be estimated and flow values to be calculated. Figure 3-4 in Chapter 3 shows the projected 2037 design population, design flows, and expected future influent wastewater strength characteristics.

Existing System Description and Evaluation

Collection System

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 inches to 48 inches in diameter with eight lift stations. Sewer pipes are predominately polyvinyl chloride, but much of the older pipe is asbestos cement and concrete. Additionally, sewage forcemain pipes transport wastewater from the lift stations to the gravity sewer main pipelines. Flow then enters the lagoon WWTF. Although diameters of the sewer pipes range from 4 to 48 inches, the majority of the piping is 8 inches in diameter. Infiltration and inflow (I/I) has been identified as a concern for the City.

Figure 5-1 in Chapter 5 shows the results of modeling the existing collection system and 2017 flows. Figure 5-1 assumes the Oregon Youth Authority (OYA) pump station pumps are downsized to match the needs of its service area. The pipelines shown in red are running full. It is suggested that pipelines be designed to run approximately half full. Figure 5-2 shows the results of modeling the existing collection system with the future 2037 design flows. These figures show the pipelines that need increased capacity now and for the 20-year design. Figure 5-3 shows the recommended improvements to meet the 2037 design criteria. Some of the improvements are identified for areas in the UGB and are subject to annexation. These areas in the UGB may or may not annex in the next 20 years while additional areas not shown for annexation may. The improvements to connect the areas in the UGB should not be pursued until annexation is completed. The estimated cost for these improvements is shown on Figure 5-4.

Figure 5-5 shows the size of the pipelines needed to serve the buildout of the UGB. In the event that areas other than the ones shown are developed first, the collection system improvements identified can be adjusted for the revised service areas. An overall plan for serving the entire UGB has been developed to ensure that some pipelines installed to provide short-term service will still be useful when the area in the UGB is developed. Currently, not all of the pipelines to service the UGB are proposed for installation, as the UGB is not anticipated to be fully developed in the next 20 years.

Lift Station Improvements

The lift stations are generally in good condition, but some minor improvements have been suggested. These improvements are shown on Table ES-1. The cost estimate for the improvements is shown on Figure 5-4.

TABLE ES-1
LIFT STATION IMPROVEMENTS

Lift Station	Improvement
Williamson	Install new enclosure and telemetry system
Saddle Ridge	Improve telemetry system
Western Sky	Install concrete floor in adjacent wetwell
McDougal	Install standby power generator connection
OYA	Replace pumps with smaller ones
Airport	Modify or remove flush valve

Infiltration and Inflow-Related Improvements

As discussed in Chapter 4, the City's existing collection system is currently experiencing I/I of approximately 340,000 gallons per day. This amount of water is approximately one-third of the current average flow entering the WWTF. I/I reduction can be difficult to achieve. For this reason, it is recommended that an annual program for identification and reduction of I/I sources be developed and funded using user fees. A comprehensive evaluation of the collection system is beyond the scope of this planning effort but should be included as part of the annual program. The rationale for the annual program has been developed and is presented as follows:

- The cost to remove I/I from the City's collection system during a one-time improvement project is unknown and could cost millions of dollars.
- A large portion of the City's collection system is old, deteriorated, and in need of replacement and/or repair, regardless of I/I issues.
- Systematic improvements made over time, targeting priority areas, would correct I/I issues, replace old and deteriorated collection system lines, and be affordable.

The collection system should be cleaned and television 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 television inspection stage of the process. Smoke testing will help identify the sources of inflow into the collection system. Once sources of inflow are identified, these areas can be rated and prioritized along with other 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 I/I can be effectively reduced.

Treatment Plant

The WWTF has been designed for a total capacity of 2.5 MGD. The 20-year average annual design flow for this planning effort is 1.16 MG. The existing facilities are adequately sized for the planning period but improvements to the aerators to prevent ragging are needed, and the accumulated solids need to be removed from Pond 1 in Plant 1.

Disposal System

The disposal system includes the irrigation system for the golf course, the irrigation system for the pasture, and the constructed wetlands. The golf course irrigation ponds need to be dredged and the pumps and sprinklers will need to be replaced in the future. The cost estimated by the City for these improvements is approximately $725,000.

A tertiary treatment plant is currently being designed to use treated effluent as data center cooling water. This facility is not needed to provide additional disposal capacity, but does provide the required treatment for reusing the wastewater for data center cooling.

Summary of Estimated Costs

System Development Charge

Collection System and Lift Station Improvements	$4,307,000

Capital Improvements Plan

I/I Reduction Improvement Plan	$100,000 per year
Lagoon Aerator Improvements	$500,000 (current fiscal year budget)
Lagoon Biosolids Removal	$516,000 to $4,350,000
Golf Course Irrigation Improvements	$725,000

The estimated costs represent 2017 dollars. As project funding is established, costs should be projected to the year of the anticipated expenditure to account for inflation.

Project Financing and Implementation

The project financing is discussed in Chapter 6 and in the Wastewater Rate and System Development Charge (SDC) Studies prepared by GEL Oregon, Inc. Copies of these studies will be available at Prineville City Hall. At the time this WWFP was finalized, the Wastewater Rate and SDC Studies were not complete.

Chapter 1 - Introduction

Introduction

This report presents the results of a Wastewater Facilities Plan (WWFP) authorized by agreement between the City of Prineville, Oregon, and Anderson Perry & Associates, Inc., dated August 17, 2016. The City of Prineville completed a WWFP in 2000, a Wastewater Master Plan Update in 2005, and a WWFP Update in 2010 for their wastewater system. Due to recent improvements and proposed additions to the wastewater treatment facility (WWTF), the City of Prineville is updating the WWFP.

Study Area

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 by the slopes of the Ochoco Mountains and on the south by the steep escarpments that rise to an extensive lava plateau south of the Prineville area. 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 9,253 at the 2010 Census. The 2017 estimated population for Prineville is 9,646, as estimated by the Population Research Center (PRC) at Portland State University (PSU).

Background Information

The original WWTF began operation in 1960. The 1960 treatment system consisted of evaporative lagoons. The WWTF was upgraded in 1993, 2005, and 2016. This included improving system capacity by 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. 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 the Meadow Lakes Golf Course and on City-owned pasture land. Currently, the design and construction of a tertiary treatment plant is being pursued for wastewater reuse as data center cooling and humidification water. See Figure 1-2 for an aerial photo of the existing WWTF.

The constructed wetlands site used for treated wastewater disposal has been designed to be publically accessible as a wildlife park. The wetlands benefit local wildlife and aquatic organisms and also help provide improved, cooler groundwater flows into the Crooked River to help augment summer flows, all benefiting the river environment for fish and other species. This allows the utilization of wetland characteristics to increase the disposal capacity of the WWTF and improve environmental health. The wetland disposal improvement also eliminates the need to discharge treated wastewater directly to the Crooked River, which is anticipated to help improve water quality in the river. In addition, reuse of treated wastewater for irrigation and data center cooling would reduce the demand on the City's drinking water sources and provide a valuable resource for these uses.

Purpose

This WWFP was developed for the following purposes:

- Provide an overview on the current status of wastewater collection, treatment, and disposal facilities in the City of Prineville.
- Provide population projections developed by the PRC at PSU.
- Develop design criteria for the 20-year planning period.
- Evaluate the capacity of collection, treatment, and disposal facilities for the 20-year planning period.
- Provide an evaluation of improvement alternatives with cost estimates for the 20-year (2037) projected needs.

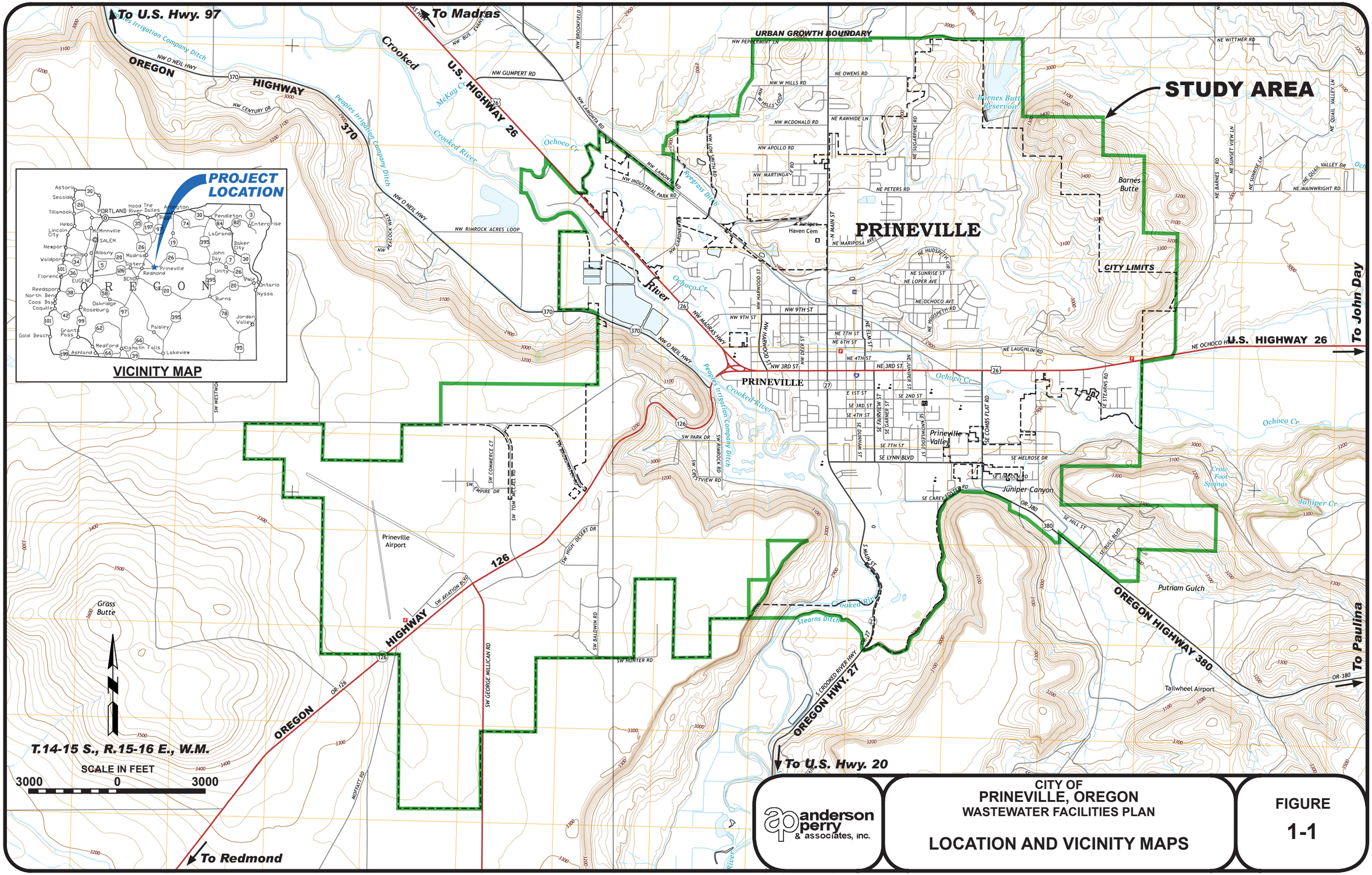
Scope

To meet the intentions and goals of the WWFP, the following scope was identified in the 2016 Agreement for Engineering Services:

- A statement of purpose, background, and need for the WWFP.
- A review and update of the current wastewater flows and loads, as well as the 20-year projection of future population, wastewater flows, and waste loads. Design criteria to be developed based on this information.
- An evaluation and model of the existing collection system.
- A review of the evaluation of the existing wastewater lagoon treatment system and an update of the identified deficiencies based on the review.
- An evaluation of the feasibility of various improvement options and cost effectiveness analysis of the alternatives over a 20-year period. Treatment standards and cost estimates for each alternative to be identified. The evaluation is not to include an infiltration/inflow (I/I) study but is to identify estimated amounts of I/I in the system based on flow data.
- An evaluation and detailed description of a preferred improvements alternative with a capital improvements plan. Treatment and regulatory standards are to be identified and estimated costs are to be outlined.
- An analysis of financing options and review of a possible financing plan for both construction and long-term operation, including projected sewer use charges.
- A preliminary environmental analysis. *Note: This analysis does not include the preparation of environmental reports for design and construction funding applications, biological assessments, wetland delineations, cultural resources evaluations, mitigation plans, or other related environmental documents.*

Presentation of Recommendations

Based on a review with the City, recommended system improvements are identified for the collection system and treatment and disposal systems. Included with these recommendations are a prioritization of needs, cost estimates, and a preliminary environmental analysis of the preferred option.



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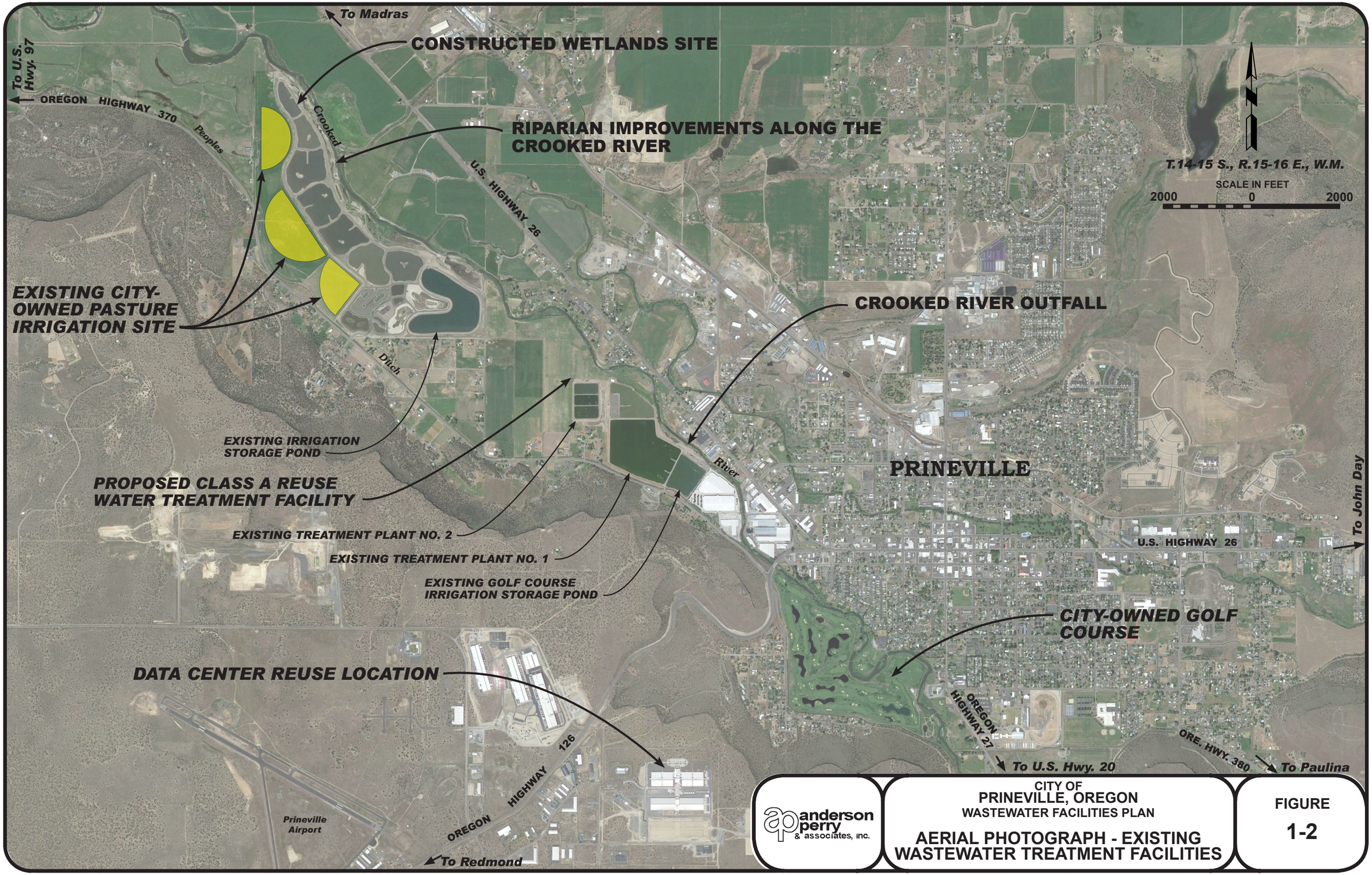

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CITY OF
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WASTEWATER FACILITIES PLAN

AERIAL PHOTOGRAPH - EXISTING WASTEWATER TREATMENT FACILITIES

FIGURE
1-2

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Chapter 2 - Background Information

General

In this chapter, environmental conditions and the social environment in and around the City of Prineville are discussed to provide background information pertinent to completion of the system evaluation and decisions made in this Wastewater Facilities Plan (WWFP). The existing wastewater collection, treatment, and disposal facilities are also described as an introduction to subsequent chapters detailing wastewater system design criteria and capacity and operational deficiencies within the existing wastewater system.

Regional Setting

The City of Prineville 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 by the slopes of the Ochoco Mountains and on the south by the steep escarpments that rise to an extensive lava plateau south of the Prineville area. Location and vicinity maps for the City of Prineville are shown on Figure 1-1 in Chapter 1. The City of Prineville is the county seat and the only incorporated city in Crook County, with a population of 9,253 at the 2010 Census. The 2017 estimated population for Prineville is 9,646, as estimated by the Population Research Center at Portland State University.

The climate in the summer is typically dry with clear days. Winter brings rain, snow, and frozen soils. Temperatures vary from extremes of -30°F in the winter to 120°F in the summer. These extreme temperatures are usually not prolonged. According to the Western Regional Climate Center, the average annual temperature of Prineville is approximately 47°F and the annual average precipitation is approximately 9.9 inches.

Transportation is provided to the City of Prineville by State Highways 26 and 126. Prineville is positioned at the intersection of these two highways and is approximately 16 miles west of U.S. Highway 97, which is a major north-south highway for Oregon.

Soils

The soils throughout the City of Prineville are generally designated silt loams or sandy loams. The major types are Ochoco-Prineville complex, Powder silt loam, Crooked stearns complex, and Metolius ashy sandy loam. These soils are generally nearly level well-drained to moderately well-drained soils with parent materials of volcanic ash over mixed alluvium from volcanic rock.

Land Use

The current zoning in the City is shown on Figure 2-1. 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.

Existing Wastewater System

The existing wastewater treatment facility is composed of two partially aerated facultative lagoon treatment plants that produce Class C treated effluent. Site piping allows cross-connection between plants. Influent from the collection system passes through the influent screen on the north side of the river and then into the influent pump station.

Plant 1 is the City's original lagoon system, which was upgraded in 1990 and again in 2005. The plant includes aerated and facultative lagoons, rock filters, disinfection, and a pump station. Effluent from Plant 1 is utilized for irrigation of the Meadow Lakes Golf Course. Plant 2 consists of three treatment lagoons operated in series. 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 chlorinated effluent is stored in the effluent storage pond (kidney pond) before it is utilized as irrigation for City-owned pasture land or discharged to the constructed wetlands. The constructed wetlands provide indirect discharge to the Crooked River. Fifteen lined and unlined wetlands assist in the treatment and discharge of treated effluent. For more detailed information on the existing wastewater system, see Chapter 4.

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

Proposed Class A Reuse Water Treatment Facility

This WWFP also describes the proposal of an additional Class A reuse water treatment facility to produce cooling water for data centers. The proposed facility is to be located on City-owned property near the City's existing Plant 2 treatment ponds. Water for this facility would be taken from the effluent storage pond. From the reuse water treatment facility, reuse water would be pumped up the hill to the reuse water storage reservoir. This reservoir would be located on an existing City easement, near the City industrial park. Reuse water would be conveyed from the reuse water storage reservoir to the data center via a booster pump system.

National Pollutant Discharge Elimination System Permit

The City of Prineville's wastewater system is regulated by National Pollutant Discharge Elimination System (NPDES) Permit No. 101433 (see Appendix A). The following outfalls have been identified in the NPDES Permit with their location.

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

Each outfall has a different beneficial use and, therefore, different permitted water quality limits. The following summarizes the treatment limits for each outfall. For the complete NPDES Permit requirements, see Appendix A.

1. Treated Effluent Outfall 001 - Direct River Discharge.
    a. May 1 - October 31: No discharge permitted.

b. November 1 - April 30:

i. No discharge 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 (lb/day)	Weekly Average (lb/day)	Daily Maximum (pounds)
$CBOD_5$	25	40	230	340	460
TSS	40	60	370	550	730

$CBOD_5$ = five-day carbonaceous biochemical oxygen demand

lb/day = pounds per day

mg/L = milligrams per liter

TSS = total suspended solids

iii. Other parameters (year-round):

Total Coliform Bacteria	Shall not exceed a 7-day median of 23 organisms per 100 milliliters (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. Reclaimed Wastewater Outfall 002 and 003 (Golf Course and Pasture Irrigation)

a. Biological treatment and disinfection to provide a 7-day median total coliform limit of 23 organisms per 100 ml, with no two consecutive samples exceeding 240 organisms per 100 ml.

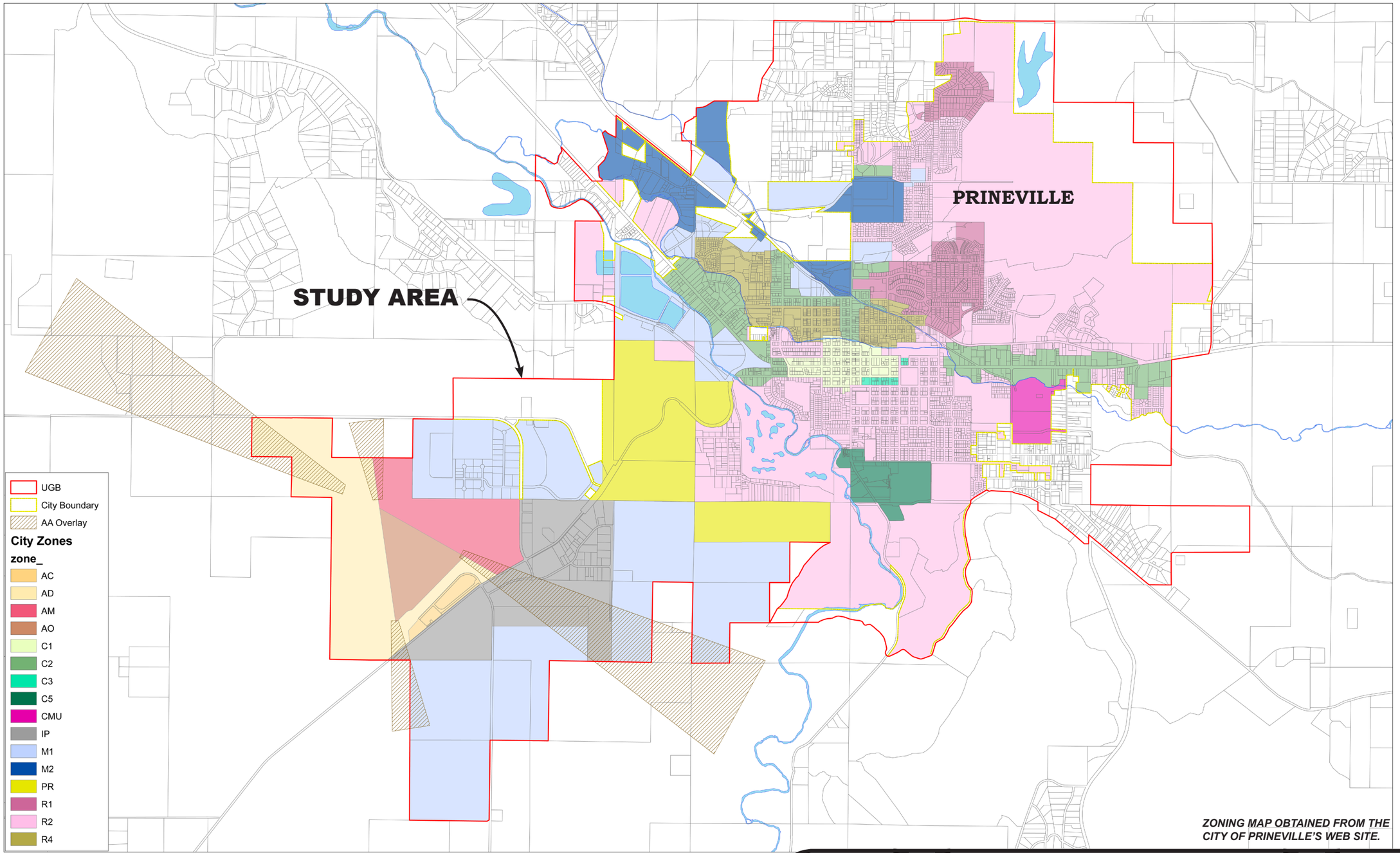
3. Treated Effluent Outfall 004 (Constructed Wetlands)

a. BOD_5 and TSS

Parameter	Monthly Average (mg/L)	Weekly Average (mg/L)	Month Average (lb/day)	Weekly Average (lb/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

i. Other parameters (year-round):

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



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Zoning - City of Prineville ending 2015

N W E S

0 0.25 0.5 1 Miles

Date: 12/28/2015

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CITY OF
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WASTEWATER FACILITIES PLAN

ZONING MAP

FIGURE
2-1

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To Madras

To U.S. Hwy. 97

OREGON HIGHWAY 370

Crooked

U.S. HIGHWAY 26

CONSTRUCTED WETLANDS SITE (OUTFALL 004)

IRRIGATION PUMP STATION

RIVER PUMP STATION

PRINEVILLE

CITY-OWNED PASTURE IRRIGATION SITE, TYP. (OUTFALL 003)

CHLORINE CONTACT CHAMBERS

IRRIGATION STORAGE POND

River

PLANT 2

PLANT 1

ROCK FILTER

RIVER DISCHARGE (OUTFALL 001)

PLANT 1

INFLUENT SCREEN

INFLUENT PUMP STATION

GOLF COURSE IRRIGATION STORAGE POND (OUTFALL 002)

To Golf Course Irrigation

T.14-15 S., R.15-16 E., W.M.

SCALE IN FEET

1200 0 1200

NOTE:
OUTFALL NUMBERS PER NPDES PERMIT

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CITY OF
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WASTEWATER FACILITIES PLAN

WASTEWATER SYSTEM FLOW SCHEMATIC

FIGURE
2-2

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Chapter 3 - Basic Planning and Design Data

General

This chapter presents the basic planning and design data necessary to evaluate the City's existing wastewater collection, treatment, and disposal facilities. These data were used to determine the facilities' ability to serve the wastewater system needs of Prineville for the selected planning period and form the basis for evaluating options for required improvements. First, population information and year 2037 population projections for the City of Prineville are presented. This is followed by a section that lists the year 2037 design criteria used for this Wastewater Facilities Plan (WWFP).

Population

To estimate future wastewater system demands, population projections must be made. Projections are usually made on the basis of an annual percentage increase estimated from past growth rates combined with future expectations. The historical population data shown on Table 3-1 and Chart 3-1 were provided by the Population Research Center (PRC) at Portland State University (PSU). This agency is the official source of population data available in Oregon between the official Census data generated at the beginning of each decade. Projections are usually made on the basis of an annual percentage increase estimated from past growth rates combined with future expectations. The historical population data shown on Table 3-1 and Chart 3-1 were provided by the PSU Population Forecast Program. In 2013, the Oregon House of Representatives and Senate approved legislation assigning coordinated population forecasting to the PRC at PSU. This allows counties to prepare coordinated population forecasts according to “generally accepted” demographic methods

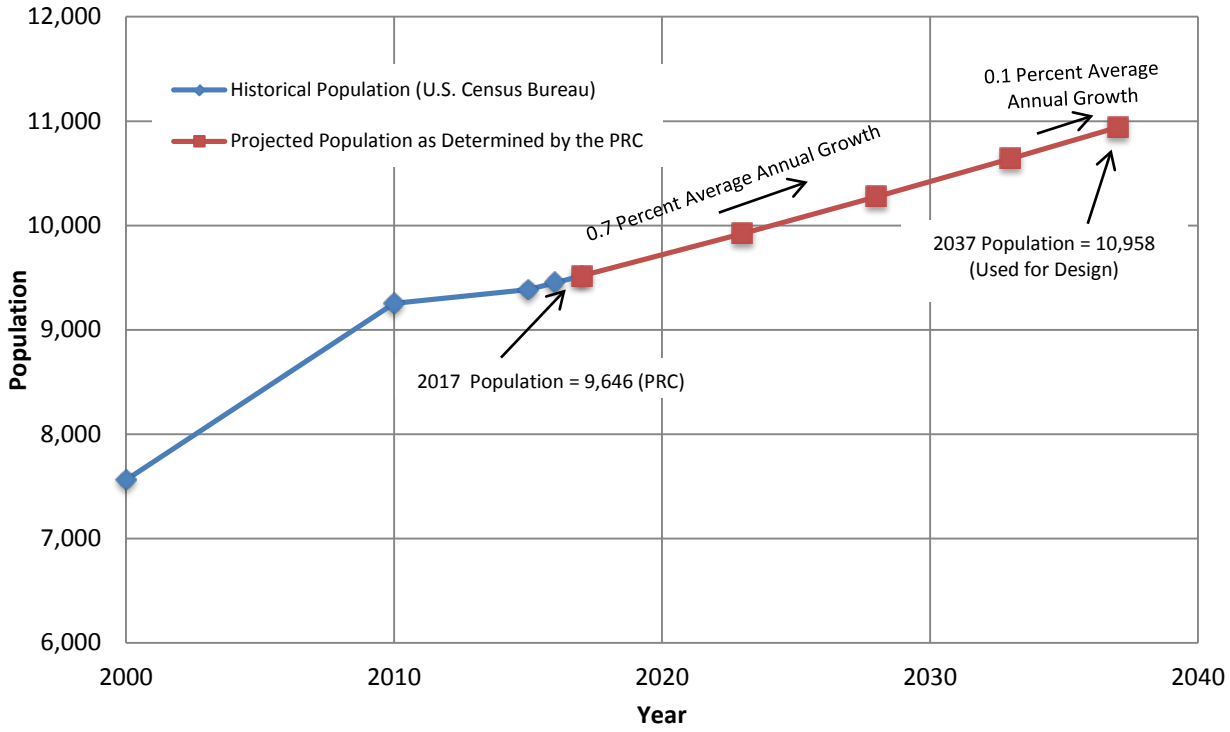
The population projections and average annual growth rates (AAGR) shown appear to be a realistic range based on current data as well as recent historic population increases for Prineville.

TABLE 3-1
HISTORICAL AND FORECASTED POPULATIONS FOR PRINEVILLE, OREGON[1]

Historical		Forecast			
2000	2010	2017	2037	AAGR (2016 to 2035)	AAGR (2035 to 2066)
7,358	9,253	9,646	10,958	*0.7 percent*	*0.1 percent*

[1] *As provided by the PRC.*

CHART 3-1
HISTORICAL AND PROJECTED POPULATIONS



The City of Prineville's population at the 2010 Census was 9,253. The certified population estimate by the PRC for 2017 was 9,646 with an AAGR of 0.7 percent between the years 2016 and 2035 and 0.1 percent between the years 2035 and 2066.

The historical population plus the projected annual growth rate results in a 20-year (year 2037) population estimate of 10,958. This WWFP uses 10,958 as the 20-year design population inside the city limits.

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 9,003. A review of historical wastewater data must be completed using the connected population. Improvements are needed to the collection system 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 are annexed into the City, the City population could increase by 744 people to 10,390, 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 2037 City population of 10,958 was added to the 744 population from the UGB for a design population of 11,702 in the year 2037.

Historical Wastewater Data

This section provides a review of the historical wastewater data for the City of Prineville's wastewater treatment facility (WWTF). Information provided in this section was obtained from the City's Discharge Monitoring Reports (DMRs).

The historical influent flows, including maximum daily flows and average monthly flows for the 5-year period between January 2012 and December 2016, are shown on Figure 3-1. According to the data, the maximum monthly flow of record occurred in December 2016, and was 1,503,000 gallons per day (gpd), which equates to approximately 167 gallons per capita per day (gpcd) utilizing the current year connected population estimate of 9,003. The average annual flow was 967,000 gpd during the time period analyzed, which equates to approximately 107 gpcd.

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 167 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. The identification of I/I sources and their removal from the system through manhole and pipeline repair could reduce the total volume of water the City must treat and dispose of. This reduction could provide a long-term cost savings to the City.

Figure 3-2 summarizes historical municipal influent five-day carbonaceous biochemical oxygen demand ($CBOD_5$) concentrations as recorded on the DMRs during the 5-year period between 2012 and 2016. As indicated on Figure 3-2, the maximum, minimum, and average influent $CBOD_5$ were 275 milligrams per liter (mg/L), 49 mg/L, and 128 mg/L, respectively. The WWTF's average $CBOD_5$ mass loading was approximately 1,051 pounds per day (lb/day). The City's secondary WWTF, according to the data, achieved an average $CBOD_5$ removal of 90 percent with an effluent average mass discharge of 33 lb/day.

The historical municipal influent total suspended solids (TSS) concentrations, as reported on the DMRs during the period described previously, are shown on Figure 3-3. As illustrated on Figure 3-3, the maximum, minimum, and average influent TSS were 314 mg/L, 80 mg/L, and 175 mg/L, respectively. The WWTF's average TSS mass loading was approximately 1,082 lb/day. The City's secondary WWTF, according to the data, achieved an average TSS removal of 83 percent with an effluent average mass discharge of 74 lb/day.

Both the $CBOD_5$ and TSS concentrations appear to be increasing. This may be in response to efforts to reduce I/I.

Design Criteria

Figure 3-4 summarizes basic wastewater design criteria used in this WWFP under several design conditions: the estimated 2017 population that is currently connected to the City sewer system; the 2017 population with the assumption everyone within the city limits is connected to the sewer system; the 2017 population with the entire City and 20 percent of the developments in the UGB that could be connected during the planning period; and the latter with the current City population projected to the design year of 2037.

According to the Coordinated Population Forecast Report for Crook County, the estimated number of persons per household is 2.51. This value allows the total population connected to the WWTF to be estimated and flow values to be calculated. Figure 3-4 shows the projected 2037 design population, design flows, and expected future influent wastewater strength characteristics.

Wastewater Flow Projections

Domestic

Wastewater flow projections for the year 2037 were made using the existing base per capita wastewater contributions extrapolated to the end of the 20-year planning period using the year 2037 design population of 11,702 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 water-tight.

Industrial

The existing domestic flows and loadings include the small industrial flows that exist within the City. As the City grows in population, similar industrial flow demands on the system will also grow. Any large industrial demands on the system have not been included in the design criteria. If a large industry with large wastewater production is identified for the City, then a separate evaluation would need to be completed to evaluate its impacts. There is potential for the data center, receiving Class A effluent water for cooling, to return approximately 0.01 million gallons per day (MGD) to the treatment plant with possible future flows increasing to 0.08 MGD during the summer. These flows can be considered small industrial flows.

Mass Loadings

Domestic and Commercial

The domestic and commercial design mass loadings ($CBOD_5$ and TSS) to the WWTF were estimated based on the average influent per capita $CBOD_5$ and TSS contributions projected to the end of the 20-year planning period using the year 2037 design population of 11,702 (i.e., mass loading [$CBOD_5$ or TSS] = contribution [$CBOD_5$ or TSS] lb/capita/day x 11,702). Using the design mass loading of 0.11 and 0.16 lb/capita/day for BOD_5 and TSS, respectively, yields a year 2037 domestic mass loading of 1,342 and 1,834 lb/day, respectively.

Industrial

See the industrial flow projections above.

Historical Wastewater Characterization

Chemicals and Materials

The only chemicals currently used at the WWTF are chlorine for final disinfection of effluent prior to discharging to the Crooked River or effluent reuse and calcium nitrate (Bioxide) for odor control. A sulfur dioxide dechlorination system was installed but is not used, as dechlorination is achieved in the effluent storage ponds via natural processes.

Characterization of Waste and Wastewater

Wastewater samples are obtained by the City at the point of discharge to the Crooked River during the time of year when discharge is permitted. As dictated by the City's National Pollutant Discharge

Elimination System (NPDES) Permit, effluent samples are collected regularly (when discharging to the river) for $CBOD_5$, TSS, pH, chlorine residual, ammonia, total Kjeldahl nitrogen (TKN), phosphorus, nitrate, and nitrite. In addition, a total coliform sample is collected as a grab sample and tests are performed bi-weekly. Concentrations are measured from composite samples and mass loading is calculated from concentration and flow data. See Appendix A for a copy of the NPDES Permit.

During the irrigation season, samples are collected from the wastewater before it enters the effluent storage ponds for total coliform bacteria (weekly), chlorine residual (daily), and pH (bi-weekly). All other samples are collected monthly. Nutrients tested for include TKN, nitrate, and nitrite. Sampling began in fall 2016 for discharge to and from the constructed wetlands, so historic data for this discharge point do not exist.

The City has maintained compliance with all NPDES Permit requirements ($CBOD_5$, TSS, pH, chlorine, and coliform) over the last several years. The NPDES Permit requirements are outlined in Chapter 2. According to Summary of DMR Data presented on Figure 3-1, test results for nutrients in the treated effluent showed that TKN ranged from 1.5 to 19.0 mg/L and nitrate-nitrite ranged from 0.1 to 9.4 mg/L.

Characterization of Solids

Solids are accumulated in the lagoons, where they continue to decompose over a period of several years. These solids are referred to as biosolids. The lagoon biosolids are normally removed from the lagoon when they accumulate to an average depth over 2 feet. This usually occurs over a period of 15 to 30 years, depending on wastewater characteristics. When the biosolids are removed, they must be characterized and disposed of in accordance with Oregon Department of Environmental Quality rules and guidelines. This WWFP does not characterize existing biosolids or evaluate requirements for their removal.

Summary

Information for the review of the historical wastewater data for the City of Prineville's WWTF was obtained from the City's DMRs. Historical average influent flows and $CBOD_5$ and TSS concentrations for the period from January 2012 to December 2016 were used during development of the design criteria of this WWFP. It should be noted that the $CBOD_5$ and TSS loadings appear to be significantly lower than typical loadings that would be expected from a similar population. This could be attributed to I/I entering the system.

SUMMARY OF HISTORICAL WASTEWATER DATA

	Influent						Plant Effluent													Contact Basins		
Date	Plant 1 & 2 Influent Average Monthly Flow (MGD)	Total Influent Monthly Flow (MG)	Average Monthly $CBOD_5$ (mg/L)	Average Monthly CBOD5 Loading (lb/day)	Average Monthly TSS (mg/L)	Average Monthly TSS Loading (lb/day)	Effluent Average Monthly Flow (MGD)	001/002 Ave. Total Kjeidahl Nitrogen (mg/L)	003 Ave. Total Kjeidahl Nitrogen (mg/L)	001/002 Ave. No2+No3-N (mg/l)	003 Ave. Ammonia NH_3-N (mg/l)	003 Ave. No2+No3-N (mg/l)	Average Monthly $CBOD_5$ (mg/L)	Average Monthly $CBOD_5$ % Removal	Average Monthly $CBOD_5$ Loading (lb/day)	Average Monthly TSS (mg/L)	Average Monthly TSS % Removal	Average Monthly TSS Loading (lb/day)	001/002 Ave. Monthly pH	001 Avg. Daily Chlorine Residual (mg/L)	001/002 Max Mo. Geo Mean E Coli Conc. (organisms/ 100 ml)	003 Max. Mo. Geo Mean E coli Conc. (organisms/ 100 ml)
Jan-12	0.909	28.18	90.8	688	141.0	1,069	0.362	8.5		1.5	1.4		21.9	75	66	36.5	66	110	8.98			
Feb-12	0.922	26.74	104.1	800	148.6	1,143	0.021						9.77	84	2	40	65	7	8.90			
Mar-12	0.917	28.43	106.4	814	130.0	994	0.191	8.9		1.3	2.3		19.2	79	31	38.167	66	61	8.92	0.1	1.0	
Apr-12	1.081	32.42	99.2	894	129.5	1,167		8.9	9.4	2.0	0.8	9.4									3.1	1.0
May-12	1.071	33.20	72.7	649	148.8	1,329		7.6	12.5	1.0	1.6	0.9									1.0	18.7
Jun-12	1.017	30.50	83.2	705	137.5	1,166		5.4	8.7	0.1		1.3									8.5	8.5
Jul-12	0.930	28.83	62.1	482	90.7	703		3.2	8.7			1.7									7.3	12.2
Aug-12	0.879	27.24	65.9	483	125.3	918		2.1	6.7			0.7									7.3	12.1
Sep-12	0.846	25.37	57.4	404	119.5	843		1.5	4.8			0.7									13.2	2.0
Oct-12	0.939	29.11	69.0	540	130.8	1,024		2.9	4.7	0.5		0.7									8.5	6.3
Nov-12	0.980	29.41	137.0	1,120	205.0	1,676	0.403	4.6		0.5	1.7		5	96	17	11	93	37	7.68			
Dec-12	1.012	31.37	90.0	760	103.0	869	0.521				4.1		6	94	26	16	84	70	7.77		1.0	
Jan-13	1.050	32.57	88.0	771	142.0	1,243	0.513				8.7		7	91	30	20	83	86	7.50			
Feb-13	0.894	27.71	98.0	731	158.0	1,178	0.384				8.6		10	89	32	33	67	106	8.00			
Mar-13	0.926	28.72	99.0	765	140.0	1,081																
Apr-13	0.996	29.89	77.0	640	124.0	1,030			12.0		2.0											
May-13	0.969	30.04	75.0	606	171.0	1,382			12.0		9.0								8.50			
Jun-13	0.897	27.81	49.0	367	80.0	598			10.0													
Jul-13	0.927	28.73	85.0	657	118.0	912			7.0		5.0	1.0										
Aug-13	0.883	27.38	71.0	523	111.0	817			6.0		4.0	1.0										
Sep-13	0.892	26.76	90.0	670	129.0	960			6.0		1.0	2.0										
Oct-13	0.915	28.36	62.0	473	99.0	755																
Nov-13	0.863	26.76	102.0	734	180.0	1,296	0.500	3.0		1.0			7	94	29	10	94	42				
Dec-13	0.954	29.58	75.0	597	119.0	947	0.500						6	91	25	22	79	92	7.80	33.6	1.0	
Jan-14	0.905	28.07	112.0	845	161.0	1,215	0.300						13	88	33	33	81	83	8.00	0.1		
Feb-14	0.951	29.47	80.0	635	163.0	1,293	0.600				.		15	80	75	40	74	200	7.00			
Mar-14	1.010	31.31	94.0	792	118.0	994	0.300						18	77	45	33	71	83	7.70		1.0	3.0
Apr-14	0.934	28.96	83.0	647	128.0	997	0.100	13.0	9.0	1.0	10.0		17	80	14	37	70	31				1.0
May-14	0.962	29.84	94.0	754	176.0	1,412			15.0		8.0	1.0										
Jun-14	0.950	28.51	186.0	1,474	235.0	1,862			12.0		7.0	1.0										
Jul-14	0.930	28.82	83.0	644	153.0	1,187			9.0		3.0	1.0										
Aug-14	0.885	27.45	103.0	760	142.0	1,048			7.0		1.0	2.0										
Sep-14	0.844	26.18	98.0	690	180.0	1,267			6.0		1.0											
Oct-14	0.884	27.40	89.0	656	185.0	1,364			8.0		3.0											
Nov-14	1.036	32.12	127.0	1,097	153.0	1,322																
Dec-14	1.025	31.76	113.0	966	157.0	1,342	0.100						9	95	8	19	91	16	7.00		1.0	
Jan-15	1.071	33.20	112.0	1,000	149.0	1,331	0.300						6	96	15	27	81	68	7.00			
Feb-15	0.937	29.06	123.0	961	303.0	2,368	0.400						14	88	47	55	79	183	7.00			
Mar-15	0.991	30.71	90.0	744	229.0	1,893							13	85		47	78		7.00			
Apr-15	0.964	29.89	100.0	804	218.0	1,753		13.0	16.0	2.0	10.0	1.0	9	94		16	92		7.00	0.1		
May-15	1.009	31.28	109.0	917	314.0	2,642			12.0		8.0	2.0										
Jun-15	0.946	29.32	167.0	1,318	202.0	1,594			12.0		9.0	1.0										
Jul-15	0.896	27.78	177.0	1,323	145.0	1,084			10.0		7.0											
Aug-15	0.923	28.61	144.0	1,108	177.0	1,363			9.0		5.0	1.0										
Sep-15	0.878	27.22	194.0	1,421	277.0	2,028			7.0		1.0	1.0										
Oct-15	0.916	28.39	180.0	1,375	234.0	1,788			7.0		3.0	1.0										
Nov-15	0.924	28.65	187.0	1,441	259.0	1,996							4	98		5	98				2.0	
Dec-15	1.065	33.01	181.0	1,608	223.0	1,981	0.300						5	97	13	5	98	13	7.00			
Jan-16	1.037	32.14	191.0	1,652	292.0	303	0.700						10	95	58	11	96	64	7.00			
Feb-16	0.945	29.30	241.0	1,899	280.0	265	0.400						20	91	67	17	94	57	8.00			
Mar-16	1.103	34.20	217.0	1,996	200.0	221	0.400	19.0				3.0	20	91	67	37	80	123	8.00			
Apr-16	1.091	33.81	175.0	1,592	200.0	218	0.100		11.0		5.0	2.0	13	98	11	56	93	47	9.00			
May-16	1.111	34.44	203.0	1,881	233.0	259			14.0		5.0	1.0										
Jun-16	1.014	31.42	184.0	1,556	212.0	215			12.0		6.0	1.0										
Jul-16	1.037	32.14	191.0	1,652	292.0	303	0.700						10	95	15	11	96	64	7.00			
Aug-16	0.989	30.66	215.0	1,773	155.0	153					2.0	1.0							8.10			
Sep-16	0.924	28.66	249.0	1,919	197.0	182			4.0										8.20			
Oct-16	0.964	29.89	273.0	2,195	158.0	152			3.0		1.0											
Nov-16	0.828	25.68	237.0	1,637	260.0	215	0.500						7	97	29	7	97	29	8.00			
Dec-16	1.503	32.64	275.0	3,447	152	228	0.500						12	97	50	25	87	104	8.00			
Maximum	1.503	34.44	275	3,447	314	2,642	0.700	19.0	16.0	2.0	10.0	9.4	22	98	75	56	98	200	9.00	33.6	13.2	18.7
Minimum	0.828	25.37	49	367	80	152	0.021	1.5	3.0	0.1	0.8	0.7	4	75	2	5	65	7	7.00	0.1	1.0	1.0
Average	0.967	29.62	128	1,051	175	1,082	0.379	7.3	9.1	1.1	4.5	1.6	11	90	33	26	83	74	7.78	8.5	4.3	7.2

BOD_5 = Five-day biochemical oxygen demand
ft = Feet
lb = Pounds
lb/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
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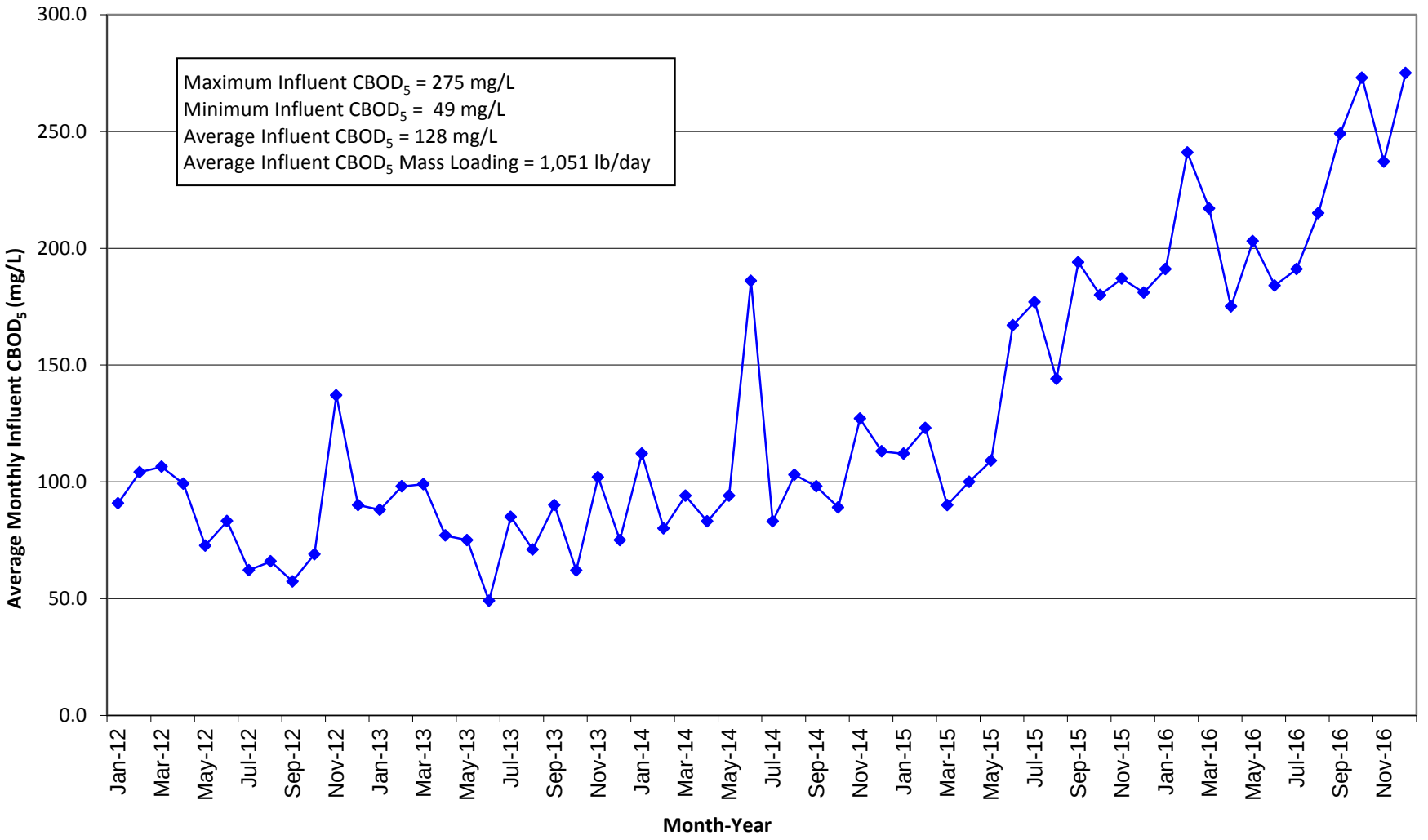
WASTEWATER FACILITIES PLAN

SUMMARY OF DMR DATA

FIGURE
3-1



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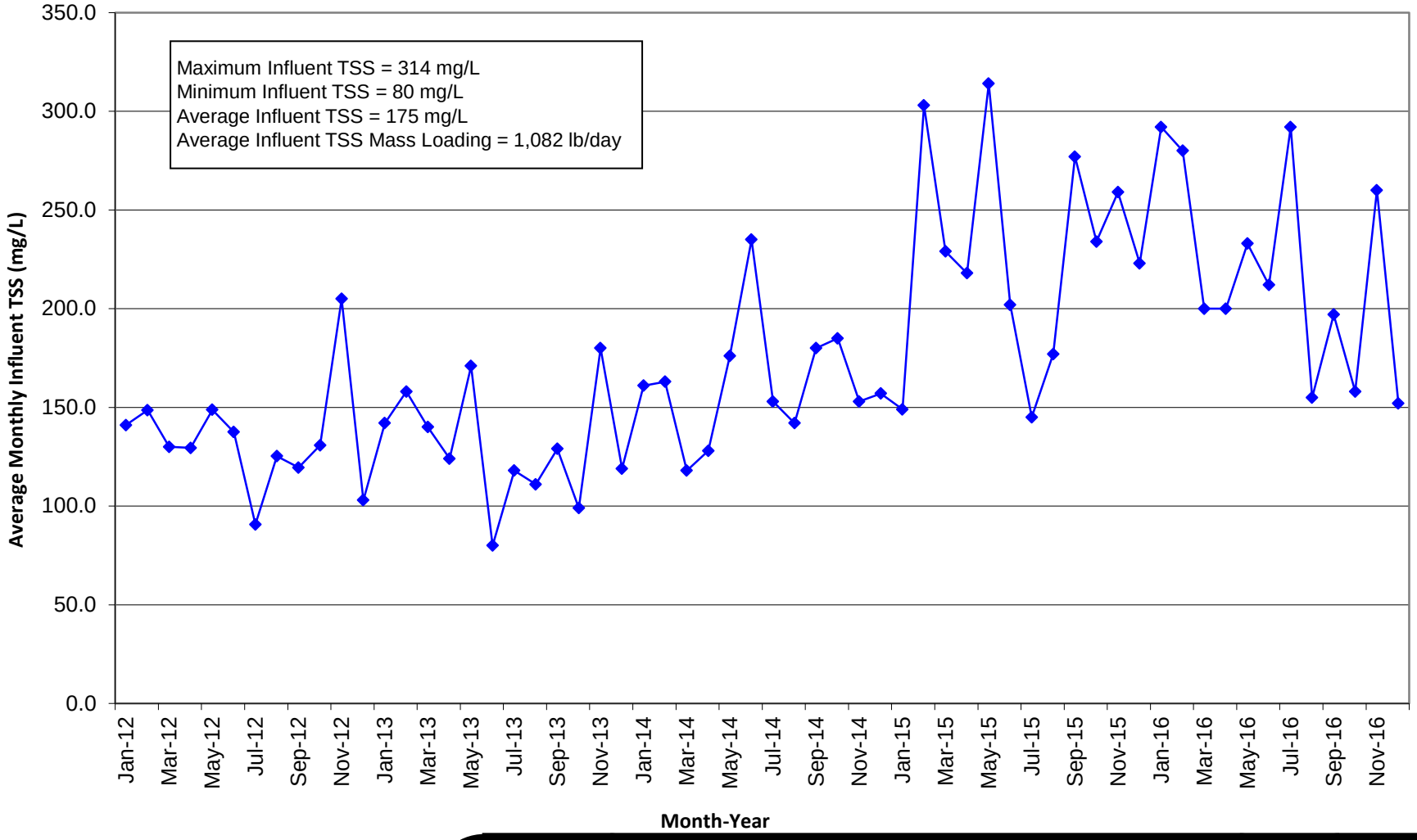
CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN
HISTORICAL MONTHLY
INFLUENT $CBOD_5$

FIGURE
3-2

CITY OF PRINEVILLE, OREGON
HISTORICAL MONTHLY INFLUENT TSS



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CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN
HISTORICAL MONTHLY
INFLUENT TSS

FIGURE
3-3

CITY OF PRINEVILLE, OREGON
DESIGN CRITERIA

	EXISTING CONNECTED POPULATION[1] 2017		EXISTING POPULATION WITH IMPROVEMENTS[2] 2017		EXISTING POPULATION WITH IMPROVEMENTS AND ANTICIPATED URBAN GROWTH BOUNDARY CONNECTIONS[3] 2017		FUTURE POPULATION WITH IMPROVEMENTS AND ANTICIPATED URBAN GROWTH BOUNDARY CONNECTIONS[4] 2037	
	I/I[5]	Total[6]	I/I[7]	Total[8]	I/I[7]	Total[8]	I/I[7]	Total[8]
Population*		9,003		9,897		10,390		11,702
Average Base Flow (ABF), MGD[9]	----	0.691	----	0.759	----	0.797	----	0.898
Per Capita Flow, gpcd	----	77	----	77	----	77	----	77
Average Annual Flow[10] (AAF), MGD	0.309	0.999	0.309	1.068	0.309	1.105	0.309	1.206
Per Capita Flow, gpcd	34	111	31	108	31	106	26	103
Average Dry Weather Flow[10] (ADWF), MGD	0.243	0.933	0.243	1.002	0.243	1.040	0.243	1.140
Per Capita Flow, gpcd	27	104	25	101	25	100	21	97
Average Wet Weather Flow[10] (AWWF), MGD	0.367	1.057	0.367	1.126	0.367	1.163	0.367	1.264
Per Capita Flow, gpcd	41	117	37	114	37	112	31	108
Maximum Month Wet Weather Flow (MMWWF), MGD	0.860	1.551	0.860	1.619	0.860	1.657	0.860	1.758
Per Capita Flow, gpcd	96	172	87	164	87	160	74	150
Maximum Month Dry Weather Flow (MMDWF), MGD	0.516	1.206	0.516	1.275	0.516	1.313	0.516	1.413
Per Capita Flow, gpcd	57	134	52	129	52	126	44	121
Peak Hour Flow (PHF), MGD[11]	----	3.996	----	4.270	----	4.422	----	4.824
Per Capita Flow, gpcd	----	444	----	431	----	426	----	412
Average Influent $CBOD_5$, mg/L	----	109	----	112	----	114	----	118
lb/day	----	911	----	1001	----	1051	----	1,184
lb/capita/day	----	0.10	----	0.10	----	0.10	----	0.10
Average Influent TSS, mg/L	----	159	----	164	----	166	----	171
lb/day	----	1326	----	1457	----	1530	----	1723
lb/capita/day	----	0.15	----	0.15	----	0.15	----	0.15
Average Influent TKN[12], mg/L	----	40	----	40	----	40	----	40
lb/day	----	333	----	356	----	369	----	402
lb/capita/day	----	0.04	----	0.04	----	0.04	----	0.03

[1] Existing connected population was found by utilizing City billing reports to find the number of residences not connected to the sewer (356). According to the Population Research Center (PRC) at Portland State University (PSU) the average person per household (PPH) within the City is 2.51. The certified population for 2016 was 9,646 per the PRC. For planning purposes, this population is utilized as the 2017 population. This population also includes the 100 residences that are served outside the city limits. A connected population is estimated utilizing these values.

[2] Existing 2017 population with improvements includes all residences within city limtis that could be served.

[3] Existing population with improvements and anticipated urban growth connections includes all residences currently being served in addition to all residences within the city limits that could be served and subdivisions directly outside of the city limits that could be served in the future (roughly 20 percent of current tax lots in the urban growth boundary). Population was estimated using a value of 2.51 PPH.

[4] The future 2037 population was found by utilizing AAGR values declared by PRC. The growth values were applied to the existing connected population with improvements along with the anticipiated urban growth boundary connections.

[5] The average contribution from infiltration and inflow (I/I) for each flow component (AAF, ADWF, AWWF, and MMWWF) was estimated by taking the difference of each of the current total flow values and the current base flow (example: average annual I/I contribution = current AAF - ABF = 0.128 MGD - 0.079 MGD = 0.049 MGD).

[6] Existing total flows and mass loads are based on historical plant operating data (i.e., Discharge Monitoring Reports).

[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 2010 through July 2016. 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] Total Kjeldahl nitrogen (organic nitrogen and ammonia nitrogen). Assumed concentration based on typical domestic wastewater influent values.

$CBOD_5$ = Carbonaceous five-day biochemical oxygen demand
gpcd = Gallons per capita per day
lb/day = Pounds per day
mg/L = Milligrams per liter
MGD = Million gallons per day
TSS = Total suspended solids
TKN = Total Kjeldahl nitrogen

* Population estimate and projections from the PRC at PSU based on a certified population of 9,646 in 2017.

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CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

DESIGN CRITERIA

FIGURE
3-4

Chapter 4 - Existing Wastewater System Characteristics

Introduction

In this chapter, the existing wastewater collection, treatment, and disposal facilities are described and evaluated. Additionally, a brief history of the construction of the existing system is presented.

Collection System Description and Evaluation

The majority of the City's wastewater collection system was constructed in 1960. The wastewater collection system serving the City of Prineville is shown on Figure 4-1. The gravity collection system is composed of pipes ranging in size from 4 inches to 48 inches in diameter with eight lift stations. Sewer pipes are predominately polyvinyl chloride (PVC), but much of the older pipe is asbestos cement and concrete. Additionally, sewage forcemain pipes transport wastewater from the lift stations to the gravity sewer main pipelines. Flow then enters the lagoon wastewater treatment facility (WWTF). Although diameters of the sewer pipes range from 4 to 48 inches, the majority of the piping is 8 inches in diameter. Infiltration and inflow (I/I) has been identified as a concern for the City.

Collection System Connections

Locations of lift stations, forcemains, and main lines are shown on Figure 4-1. As mentioned in the design criteria presented in Chapter 3, there are approximately 894 residents within the city limits not currently connected to the collection system. Figure 4-2 shows residences not currently connected. Figure 4-3 shows the 100 residences outside the city limits that are served and create a demand on the system. Alternatives for connecting all residences within the city limits are addressed in Chapter 5. As mentioned in Chapter 2, some areas directly outside the city limits but inside the urban growth boundary (UGB) are densely populated and considered for future growth of the collection system. Figure 4-1 illustrates the tax lots and densely populated areas outside the city limits but in the UGB that could be added to the collection system. For the purposes of this Wastewater Facilities Plan, 20 percent of these residences are assumed to be connected to the City collection system by 2037.

Collection System 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 I/I 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 increased I/I. Poorly lined irrigation canals and ditches can be a source of I/I because leaking irrigation water can elevate groundwater levels in the vicinity of sewer main lines. Specifically, infiltration and inflow are defined as follows:

Infiltration - The 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 - The 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, cooling water discharges, 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.

Nearly all cities have some amount of I/I into their wastewater collection systems. Based on a review of Discharge Monitoring Reports (DMRs), there appears to be infiltration into the gravity sewer system. The City appears to be experiencing I/I of approximately 340,000 gallons per day. This was determined by analyzing influent data in the DMRs (see Figure 3-5). An improvement plan for I/I removal is presented in Chapter 5.

Collection System Capacity

The capacity of the existing collection system was modeled to determine how full the pipes were anticipated to be during peak hour use. The results of this model are shown in Chapter 5. Generally, the collection system has adequate capacity to serve the anticipated peak hour flows for existing users, but a couple of sections of pipe need some improvement. Improvements are also necessary to serve the 20-year needs as discussed in Chapter 5.

Lift Stations

The City's sewer system includes eight wastewater lift stations. Following is a brief description of each lift station. The locations of these stations are shown on Figure 4-1.

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 225-gallon-per-minute (gpm) capacity at 47 feet total dynamic head (TDH) with one pump running. The station contains two Hydronix self-primer pumps with a 3-phase, 480-volt, 7.5 horsepower (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 is set up for expansion, and there are no current electrical issues. The City has reported maintenance issues with the supervisory control and data acquisition system, and the cover appears to have some damage. The forcemain is 4-inch PVC pipe to the gravity sewer in the Ochoco Highway.

The Saddle Ridge Lift Station is a 240-volt, 3-phase duplex pump station. The pumps are 2.9 Hp Hydronix submersible with a guide rail system. The lift station is located on Northwest Saddle Ridge Loop on the far north end of the City. The City has reported issues with the telemetry's line of sight.

The Western Sky Lift Station was constructed in 1996 and is located on Northwest Western Sky Road south of Gardner Road. The pump station is constructed in a manhole-like structure and is dual submersible with a guide rail system. The capacity of the 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. The forcemain is a 4-inch PVC pipe to the gravity sewer along the Madras-Prineville Highway. This lift station has an adjacent wetwell that appears to be abandoned but still collects solids. The purpose

of this wetwell is unknown, but it may be able to be modified to eliminate the collection of solids and standing wastewater.

The McDougal Lift Station is a single-phase, 120-volt duplex submersible pump system. It is located in a cul-de-sac off the Madras-Prineville Highway in the northwest part of the City. The 1/3 Hp lift station has no standby power connection. The capacity of the lift station is 100 gpm at 15 feet TDH with one pump running. The pump station was refurbished in August 2014.

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. 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 two 40 Hp motors. The pumps are oversized for current needs.

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 TDH with one pump running. The forcemain is a 3-inch PVC pipe to the gravity sewer along the Ochoco Highway.

The Industrial Park Lift Station and Forest Service Lift Station are currently privately owned and operated.

Wastewater Treatment Facility Description

The City treats its wastewater using 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 1-2 in Chapter 1 for an aerial photo of the WWTF. The process flow schematic is shown on Figure 4-4 and descriptions of the associated WWTF components are provided on Figure 4-5.

Influent Screen

In 2017, the City installed a new influent screen upstream of the influent pump station to remove rags and debris to remediate issues with operation, maintenance, and safety. The Huber Rotamat RoK4 700/6 fine screen has a capacity of 4.5 million gallons per day (MGD) maximum flow. The screen is a perforated basket design with a vertical shaftless screw design. The motor is 3-phase, 5 Hp, and 460-volt.

Influent Pump Station

The influent pump station at the WWTF consists of four submersible influent pumps that receive water from the 48-inch pipe that brings raw sewage from the collection system. The pumps are 25 Hp with a motor speed of 1,800 revolutions per minute. These pumps are currently being updated, with two of the four pumps having recently been replaced with similar pumps. These pumps lift the incoming wastewater into a concrete splitter box that splits flow between Plants 1 and 2 using adjustable weirs. Wastewater is then pumped to Plants 1 and 2 using dedicated submersible feed pumps. Each plant pump station has a total of three feed pumps. Both sets of feed pumps have identical 25 Hp pumps. 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 both feed pumps to measure flows pumped into each plant.

Plant 1

Plant 1 is the original WWTF and has a design influent flow capacity of 1.1 MGD. This plant has a partially aerated primary lagoon with a facultative secondary lagoon. The primary lagoon is partially aerated with floating mechanical aspirating aerators. The floating aerators are experiencing maintenance issues due to rags getting caught in the impellers. 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). The primary lagoon is aerated with 14 mechanical aerators. Each aerator is 7.5 Hp. The design oxygen transfer rate of the aerators is 1.5 pounds of oxygen per Hp-hour. Plant operators have expressed concern over the condition of this equipment and how to safely operate and maintain it. Alternative equipment that is more reliable and easier to maintain could be pursued. 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.

After passing through the two treatment lagoons, wastewater passes through two rock filters, each having an area of 1.2 acres. At the entrance of the rock filters, Bioxide (calcium nitrate) is injected to control odor. Sixteen inches of rock was added to the top of the rock filters in the summer of 2016 to increase the flow capacity. The rock filter has a backwash pump with a capacity of 1,150 gpm at 22 feet TDH. The backwash rate is 1.66 times the loading rate. Finally, the 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.

After disinfection, effluent is routed through the intermediate pump station. This pump station has two 15 Hp pumps with a combined capacity of 1,300 gpm at a TDH of 48 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 National Pollutant Discharge Elimination System Permit and is then pumped through the irrigation pump station or discharged into the Crooked River. During the summer, effluent is stored in the golf course irrigation storage pond and utilized for irrigation on the City-owned golf course. During the 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 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. This burner has not been needed for a few years, as dechlorination has been achieved naturally in the effluent storage pond. When the 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. It is unlikely this form of discharge will be utilized in the future due to the presence of the constructed wetlands; 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 1.2 MGD. Before wastewater reaches Plant 2, it is run through a diversion box constructed to allow expansion of the lagoons. At this time, the diversion box routes flow to the primary lagoon in Plant 2. The plant consists of three treatment lagoons operated in series. The lagoons are lined with a high-density polyethylene liner. The first lagoon is an aerated lagoon, which is 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 nine floating aspirating aerators. Each aerator is 7.5 Hp and has an aeration capacity of 1.5 pounds of oxygen per HP-hour. The second lagoon is also equipped with four 10 Hp 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.

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 to total 60 minutes of contact time 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 a total of two vertical turbine pumps (VTP) with a capacity of 1,200 gpm and a TDH of 44 feet. These pumps were recently upgraded during the wastewater improvement efforts in 2016. Each VTP is 20 Hp. The 29-acre kidney pond has a volume of 118 MG and a maximum detention time of 98 days. Effluent from Plant 2 either is pumped through the effluent irrigation pump station and utilized for irrigation on City-owned pasture lands in summer or is processed through the constructed wetland complex and indirectly discharged into the Crooked River through controlled seepage. Additional water for irrigation of pasture lands is pumped from the Crooked River using a variable speed VTP with a capacity of 2,400 gpm.

Effluent Disposal

The treated and disinfected effluent is irrigated from the effluent storage ponds at the treatment plant to 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. The effluent storage ponds have accumulated solids that need to be cleaned, and the pumps and sprinklers are approaching the end of their useful life, so future replacement should be planned.

A portion of the treated effluent is disposed of by indirect discharge into the Crooked River through controlled seepage via the newly constructed wetlands. Composed of 160 acres, the wetlands are constructed with the treated effluent first passing through a lined treatment wetland and then into one of the several unlined wetlands varying in size from 15 to 30 acres. The system consists of 15 separate wetlands. There are 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 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). The wetlands are designed to help reduce the total nitrogen concentration in the wastewater. 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 schematic of the wetlands is provided on Figure 4-6.

There is no required minimum detention time for the wetlands. 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 draining of the wetlands is occurring. A tertiary treatment plant is currently being designed to use treated effluent as data center cooling water. This facility is anticipated to be operational in a couple of years.

Solids Disposal

The City of Prineville has never removed solids from the lagoon system. A significant accumulation of solids has occurred in Pond 1 of Plant 1. These solids equate to approximately 86,000 cubic yards. Anderson Perry & Associates, Inc., and the City performed a sludge survey on March 15, 2017 (see Figures 4-7A and 4-7B for sludge depths). Sludge in Pond 1 in Plant 1 needs to be removed, as it will cause operational issues, reduce the treatment capacity, and contribute to odors.

Summary

The existing collection system has some areas that need improvement. An ongoing effort to reduce I/I 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 MGD. The 20-year average annual design flow for this planning effort is 1.16 MG. The existing facilities are adequately sized for the planning period but improvements to the aerators to prevent ragging are needed, and the accumulated solids need to be removed from Pond 1 in Plant 1.

LEGEND

- WTP — WASTEWATER TREATMENT PLANT
- PS — LIFT STATION
- MANHOLE
- FORCE MAIN
- 4"-12" GRAVITY MAIN
- 14"-24" GRAVITY MAIN
- 36"-48" GRAVITY MAIN
- CITY LIMITS
- URBAN GROWTH BOUNDARY
- PARCELS

SADDLE RIDGE LIFT STATION

INDUSTRIAL PARK LIFT STATION

McDOUGAL LIFT STATION

WESTERN SKY LIFT STATION

FOREST SERVICE LIFT STATION

WTP

WILLIAMSON LIFT STATION

OREGON YOUTH AUTHORITY LIFT STATION

AIRPORT LIFT STATION

N

2,500 0 2,500

SCALE IN FEET

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CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

EXISTING WASTEWATER COLLECTION SYSTEM

FIGURE
4-1

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LEGEND

- RESIDENCE WITHOUT SEWER SERVICE
- WASTEWATER TREATMENT PLANT
- LIFT STATION
- MANHOLE
- FORCE MAIN
- 4"-12" GRAVITY MAIN
- 14"-24" GRAVITY MAIN
- 36"-48" GRAVITY MAIN
- CITY LIMITS
- URBAN GROWTH BOUNDARY
- PARCELS

N

2,500 0 2,500

SCALE IN FEET

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CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

CITY RESIDENCES NOT CONNECTED TO WASTEWATER SYSTEM

FIGURE
4-2

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LEGEND

- RESIDENCES SERVED OUTSIDE CITY LIMITS
- WASTEWATER TREATMENT PLANT
- LIFT STATION
- MANHOLE
- FORCE MAIN
- 4"-12" GRAVITY MAIN
- 14"-24" GRAVITY MAIN
- 36"-48" GRAVITY MAIN
- CITY LIMITS
- URBAN GROWTH BOUNDARY
- PARCELS

N

2,500 0 2,500

SCALE IN FEET

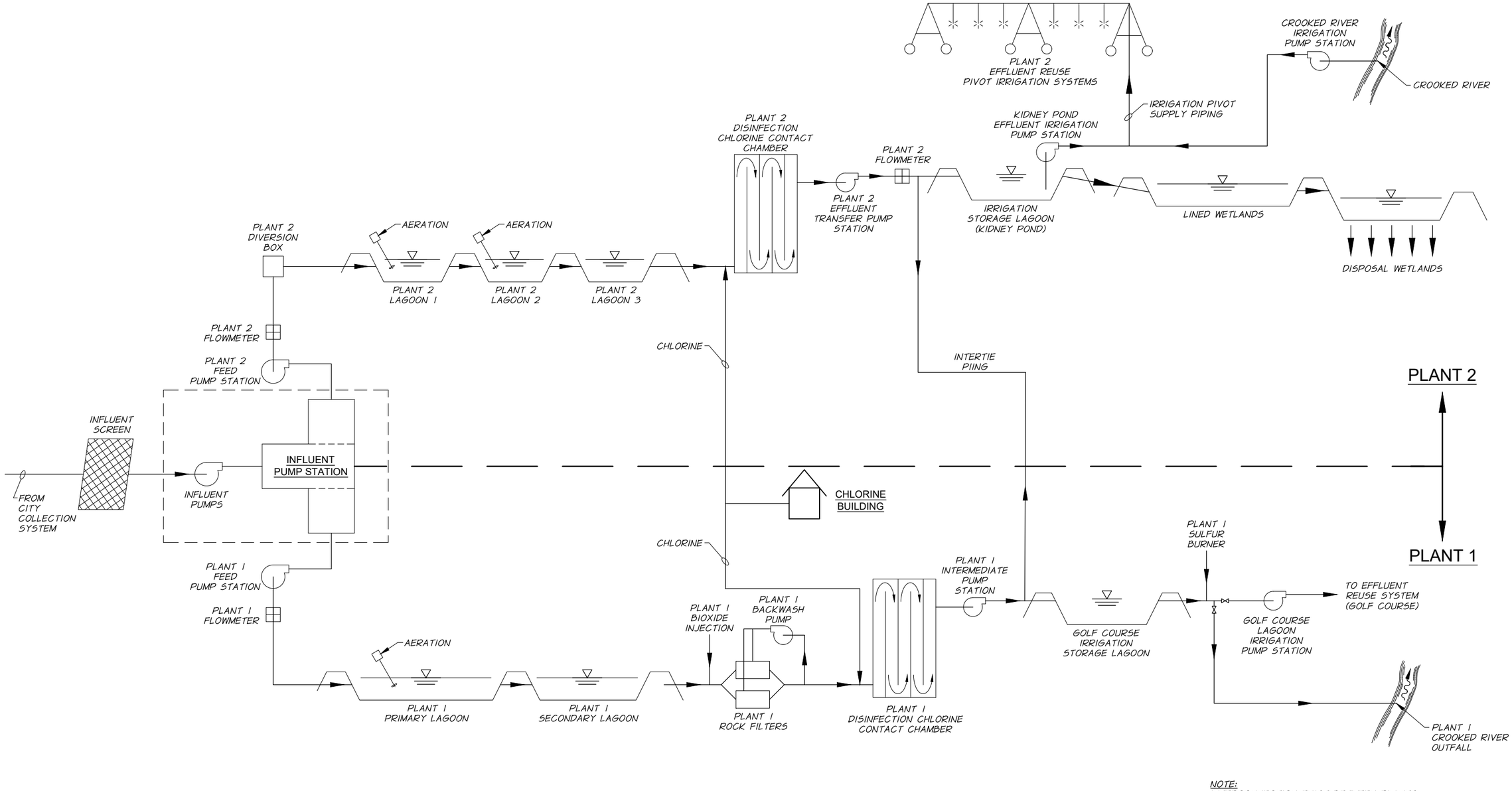
anderson perry & associates, inc.

CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

RESIDENCES OUTSIDE CITY LIMITS CONNECTED TO WASTEWATER SYSTEM

FIGURE
4-3

\\LGSVR6\gisprojects\Prineville\1260-15_PublicFacilitiesMasterPlanning\Fig_ResServOutCity.mxd, 3/15/2017, 10:17:56 AM, DMC



NOTE:
INTERCONNECTION EXIST BETWEEN PLANTS.

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CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

TREATMENT PROCESS FLOW SCHEMATIC

FIGURE
4-4

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	1650gpm @ 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

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 Mechanical Aerators	15
HP of Aerators (each)	7.5
Oxygen Transfer (lbs/Hp*hr)	1.5

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 Capcity	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

Golf Course Lagoon Irrigation Pump Station

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

Crooked River Outfall

Diffuser Nozzel 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
Quantity of Aspirating Aerators	9
Horsepower of Aerators (each)	7.5
Oxygen Transfer (lbs/Hp*hr)	1.5

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 Verticle 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

Kidney Pond 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	

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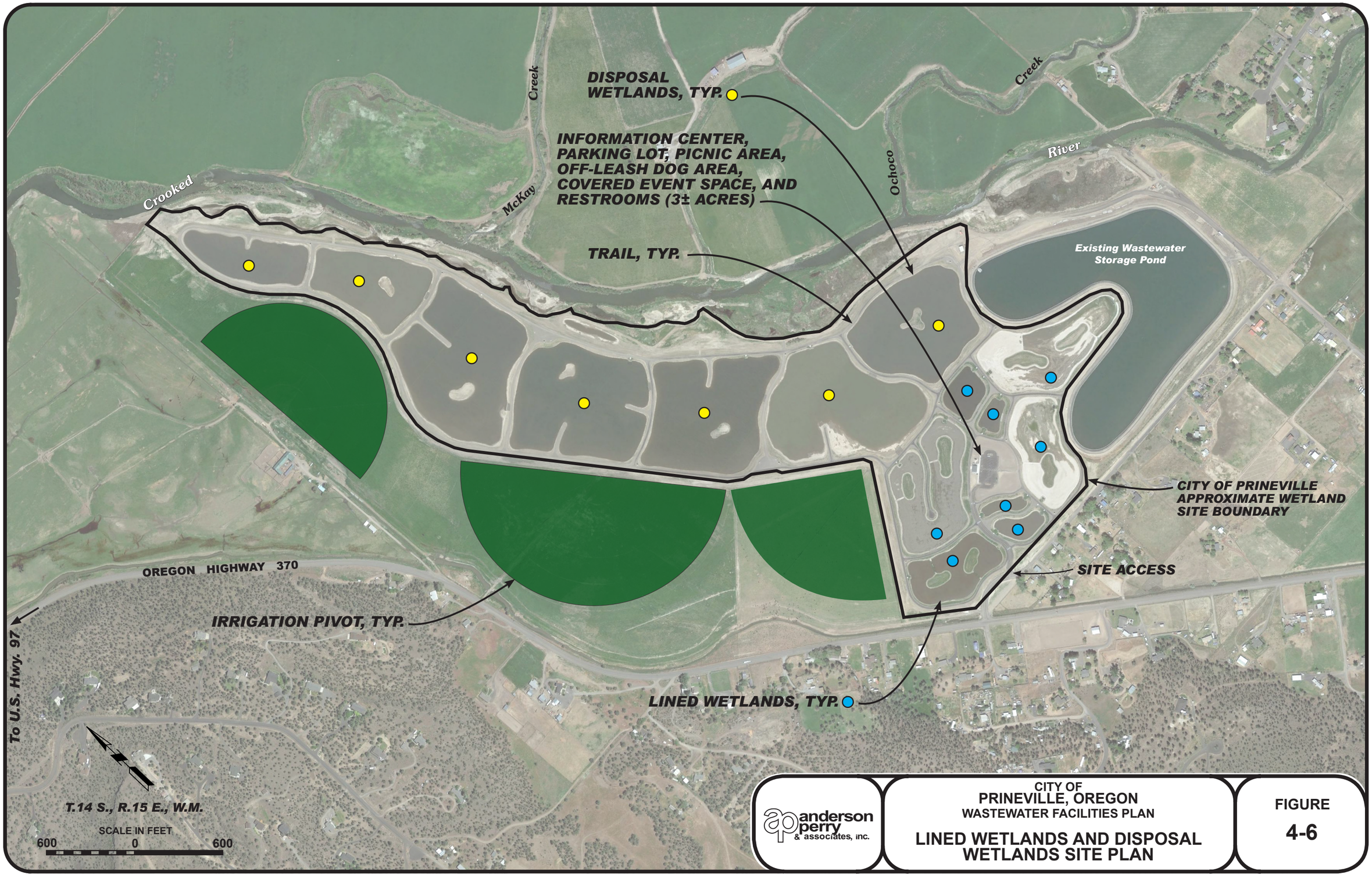
CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

WASTEWATER TREATMENT PLANT COMPONENTS

FIGURE
4-5



CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

LINED WETLANDS AND DISPOSAL WETLANDS SITE PLAN

FIGURE
4-6

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Job# 1260-15-021 May 31, 2018 lbauer

N.T.S.

POND 2

WATER SURFACE ELEV.
2853.78 ON 03/15/2017

GRID#1 1.9' 2.3'
GRID#2 1.3' 1.2' 1.2'
GRID#3 1.2' 1.0' 1.0' 1.3'
GRID#4 1.5' 1.1' 1.1' 1.2' 1.2'
GRID#5 1.4' 1.4' 0.9' 1.0' 1.4' 1.3'
GRID#6 1.2' 1.3' 1.2' 1.1' 1.2' 1.2'
GRID#7 1.4' 0.9' 1.0' 0.9' 1.3' 1.2'
GRID#8 1.2' 1.0' 1.1' 1.0' 1.1' 0.5'
GRID#9 2.4' 1.3'
GRID#10 1.8' 1.8'
GRID#G
GRID#F
GRID#E
GRID#D
GRID#C
GRID#B
GRID#A
GRID#H

POND 1

WATER SURFACE ELEV.
2858.25 ON 03/15/2017

GRID#1 2.7' 1.9' 0.7'
GRID#2 2.1' 1.6' 2.0' 2.8'
GRID#3 2.1' 1.5' 2.4' 3.0' 2.3' 1.5'
GRID#4 2.1' 1.5' 2.3' 2.7' 2.5' 1.8' 1.7'
GRID#5 2.1' 1.6' 2.4' 2.1' 2.8' 2.2' 2.5'
GRID#6 2.3' 1.6' 2.0' 2.5' 2.7' 2.6' 2.6'
GRID#7 1.9' 1.7' 2.0' 2.0' 2.4' 2.3'
GRID#F
GRID#E
GRID#D
GRID#C
GRID#B
GRID#A
GRID#Z

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CITY OF PRINEVILLE
WASTEWATER FACILITIES PLAN

PLANT 1 - SLUDGE DEPTHS

FIGURE
4-7A

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N.T.S.

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CITY OF PRINEVILLE
WASTEWATER FACILITIES PLAN

PLANT 2 - SLUDGE DEPTHS

FIGURE
4-7B

R:\PRINEVILLE\1260-15 WW Fac Pln\DRAFTING\1260-15-021F-102SEL.dwg, PLANT2, 8/17/2017 4:16:45 PM, AutoCAD PDF (General Documentation).pc3, DMC

Chapter 5 - System Improvements

General

This chapter develops and evaluates options to improve the City of Prineville's wastewater collection, treatment, and effluent disposal facilities to address the needs identified in Chapter 4. The System Development Charge (SDC), Capital Improvements Plan (CIP), and Local Improvement District (LID) improvements categories are identified and discussed. Chronologically, priorities for improvements under the SDC and CIP categories are outlined, and estimated costs to complete the improvements are presented. Additional detailed discussion of the SDC methodologies and comprehensive SDC analysis are presented in the Wastewater Rate and SDC studies prepared by GEL Oregon, Inc. Copies of these studies will be available at Prineville City Hall.

Categories of Improvements

The City of Prineville, Oregon, is proposing to complete wastewater system improvements utilizing two different funding categories. These categories are:

- SDC - Improvements identified under the SDC category have been developed to address those needs in the system to specifically support growth and associated increased system demands.
- CIP - Improvements identified under the CIP category include capital improvements projects that need to be completed to address existing system deficiencies irrespective of growth.

A third category to fund improvements is potentially available. This category is the formation of LIDs. Oregon Revised Statutes (ORS), Chapter 223-001 provides the statutory definition of an LID. An LID is an area a city council determines should be benefited by public improvement, and the improvement is financed by the City and repaid by owners of benefited properties.

Wastewater Collection System Improvements

Figure 5-1 shows the results of modeling the existing collection system and 2017 flows. Figure 5-1 assumes the Oregon Youth Authority (OYA) pump station pumps are downsized to match the needs of its service area. The pipelines shown in red are running full. It is suggested that pipelines be designed to run approximately half full. Figure 5-2 shows the results of modeling the existing collection system with the future 2037 design flows assuming the 24-inch railroad grade pipeline has been installed. These figures show the pipelines that need increased capacity now and for the 20-year design period. Figure 5-3 shows the recommended improvements to meet the 2037 design criteria. Some of the improvements are identified for areas in the urban growth boundary (UGB) and are subject to annexation. As described in Chapter 2, an estimated 20 percent of the residential development outside the city limits but within the urban growth boundaries is assumed to be annexed into the City sewer service area. Figure 5-3 shows the improvements needed to accommodate this annexed area. Locations of future extensions are schematic in nature and may be constructed in locations not shown on the figure.

The sewer line extension running from the Airport Industrial Park to the wastewater treatment facility (WWTF) is anticipated to accommodate future industrial growth. Improvements to the existing system shown on Figure 5-3, however, will occur in the locations as shown on the map. Figure 5-3 also includes

those residential developed areas that can be served by formation of LIDs, shaded in green. Estimated costs for assumed LIDs have not been developed as part of this WWFP as that is beyond the scope of work identified. The estimated cost for the proposed SDC-funded improvements is shown on Figure 5-4.

Figure 5-5 shows the size of the pipelines needed to serve the buildout of the UGB. In the event that areas other than the ones shown are developed first, the collection system improvements identified can be adjusted for the revised service areas. An overall plan for serving the entire UGB has been developed to ensure that some pipelines installed to provide short-term service will still be useful when the area in the UGB is developed. Currently, not all of the pipelines to service the UGB are proposed for installation, as the UGB is not anticipated to be fully developed in the next 20 years.

Lift Station Improvements

The lift stations are generally in good condition but some minor improvements have been suggested. These improvements are shown on Table 5-1. The cost estimate for the improvements is shown on Figure 5-4.

TABLE 5-1
LIFT STATION IMPROVEMENTS

Lift Station	Improvement
Williamson	Install new enclosure and telemetry system
Saddle Ridge	Improve telemetry system
Western Sky	Install concrete floor in adjacent wetwell
McDougal	Install standby power generator connection
OYA	Replace pumps with smaller ones
Airport	Modify or remove flush valve

Infiltration and Inflow-Related Improvements

As discussed in Chapter 4, the City's existing collection system is currently experiencing infiltration and inflow (I/I) of approximately 340,000 gallons per day. This amount of water is approximately one-third of the current average flow entering the WWTF. I/I reduction can be difficult to achieve. For this reason, it is recommended that an annual program for identification and reduction of I/I sources be developed and funded using user fees. A comprehensive evaluation of the collection system is beyond the scope of this planning effort but should be included as part of the annual program. The rationale for the annual program has been developed and is presented as follows:

- The cost to remove I/I from the City’s collection system during a one-time improvement project is unknown and could cost millions of dollars.
- A large portion of the City’s collection system is old, deteriorated, and in need of replacement and/or repair, regardless of I/I issues.
- Systematic improvements made over time, targeting priority areas, would correct I/I issues, replace old and deteriorated collection system lines, and be affordable.

The collection system should be cleaned and television 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 television inspection stage of the process. Smoke testing will help identify the sources of inflow into the collection system. Once sources of inflow are identified, these areas can be rated and prioritized along with other 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 I/I can be effectively reduced.

Infiltration and Inflow Reduction Improvement Plan

General

The improvement plan includes collection system evaluation, cleaning and television inspection, smoke testing, I/I analysis, evaluation of structural and physical conditions, and repair and replacement cost scenarios. By implementing the procedures discussed in this section, the City can have a modified, systematic annual approach to removing I/I from its collection system piping and, at the same time, rehabilitate its aging collection system through replacement and/or repair.

Two sources of information regarding I/I reduction programs are as follows. Some important points from these references are summarized in this section.

1. Sewer System Infrastructure Analysis and Rehabilitation, U.S. Environmental Protection Agency, EPA/625/6-91/030, October 1991.
2. Existing Sewer Evaluation and Rehabilitation, Water Environment Federation Manual of Practice, FD-6, American Society of Civil Engineers Manual and Report on Engineering Practice, No. 62, 1994.

One of the first steps of establishing a collection system evaluation plan is developing a data gathering network. Obtaining relevant data greatly aids the decision process for repair and/or replacement of collection system main lines. Data that can be gathered for each collection system basin include the following:

- Depth of sewer main lines and service lines.
- Depth to shallow groundwater, including seasonal high and low groundwater levels.
- Typical time of year for high and low shallow groundwater levels.
- Typical time of year for highest I/I flow in each basin.
- Average age of collection system main lines and service lines.
- Soil data (high or low permeability).
- Description of manhole, depth, pipe connections, and condition.
- Description of pipe, size, type, and condition.
- Description of pipe laterals, connection locations, types, and sizes.
- Flow data and related precipitation data for inflow analysis.

Once these data have been gathered for each basin, night flow observations should be completed during the season of high I/I. Night flow observations are the systematic visual and sometimes metered observation of the flows in the system during the period when most people are asleep and not using the sewer system. This is when basins and areas contributing I/I can be most effectively identified and quantified. After night flow observations are completed, several assumptions can be made to prioritize City-wide rehabilitation efforts and focus efforts in each basin. A database, when developed with at least the above parameters, will allow the City to make educated decisions concerning prioritizing television inspections, repair, and replacement efforts.

Cleaning and Television Inspection

When the high priority areas have been identified, the collection system should be cleaned and television inspected to identify structural and grade defects, sources of I/I, etc.

The need to complete collection system television inspection activities at the optimum time of year (to identify I/I sources) cannot be stressed enough. If television inspection is completed when I/I flows are low, most sources of I/I will not be identified. Therefore, television inspection of a collection system should be completed during the highest flow period of the year to identify the most I/I sources possible. However, high flows in the collection system piping often limit visibility in the pipe and can limit the inspection of the lower portion of the collection system piping that is out of view (under the flow). In this case, television inspection primarily focuses on evaluating sources of I/I flow. Depending on the City's television inspection needs (I/I or structural inspection, etc.), each situation will need to be evaluated on a case-by-case basis to best determine when internal inspection should be made.

Structural Condition

A key component of collection system television inspection activities is performing a structural evaluation of the pipes and manholes. The goal of this field evaluation is to locate structural deficiencies and determine their cause so proper corrective action can be taken. There are a number of reasons for structural defects in wastewater collection system piping and manholes. In older piping with grouted joints, the grout often deteriorates and wears away over time. Eventually, groundwater may leak into the pipe through these joints. Where improper bedding of the pipe has occurred, the pipeline may begin to sag. Some joints may have been improperly grouted or gasketed. In some cases where pipe deflection has occurred, the joints may be out of round, permitting root intrusion, cracking, or infiltration. This represents just a sampling of some of the possible structural defects.

Physical Condition

When performing a collection system evaluation, it is important to have a clear understanding of the physical condition of collection system piping. Key items for the physical condition of a collection system are as follows.

1. Operation and Maintenance Problems. A record-keeping system to track collection system operation and maintenance problems should be in place. Common problems range from overflowing manholes to sewer backups and pavement settling around manholes. All reported problems should be recorded so a detailed history can be developed.

2. Collection System Mapping and Updating. A current, up-to-date computer-based collection system map should be available to properly plan investigative and rehabilitation activities. Corrections and changes to this map should be monitored at a centralized location. Various map sizes would also be useful (i.e., maps that show the overall collection system and smaller maps that show individual basins or other areas). This mapping may be most efficient to maintain in a GIS format.

Smoke Testing

Smoke testing is often used to locate sources of I/I, particularly inflow sources. Smoke is blown into collection system piping using smoke bombs or canisters. Smoke escapes through structural defects or undesirable connections to the wastewater collection system. Smoke testing is useful in detecting inflow sources such as storm sewer connections, roof drain connections, and foundation drain connections.

Replacement/Repair

Once data have been gathered and needed improvements identified and prioritized, system repair/replacement can then be pursued using annually budgeted funds. With this type of program, funds are allocated annually to perform collection system investigative and/or rehabilitative work. It is anticipated that I/I would be reduced at a rate that would offset some demands on the system due to growth in the City.

The annual dollar amount set aside will need to be sufficient to complete the following activities:

- Investigative Work - This would include the preparation (cleaning) and television inspection of collection system lines. It is assumed this work would be performed by City crews utilizing a closed circuit television inspection system. If City crews are not available to complete work in the required time frame (because of other commitments), the City should contract the inspection work. Contracting the work may be slightly higher in cost, but this would allow the work to be completed in the relatively short window of opportunity each year. Additionally, smoke testing and visual inspections would be completed during this effort.
- Rehabilitation Work - This work may include such items as pipeline slip lining, placement of repair clamps, grouting of manholes or joints, replacement of short sections of pipe for structural repair, raising of manholes to grade, etc.
- Replacement Work - This work may include replacing defective pipelines and/or manholes.
- Project Administration - This would include gathering and analyzing flow data to help prioritize rehabilitation work, bidding and contracting of rehabilitation work, monitoring the annual collection system rehabilitation program, record keeping, etc.

Summary

There is significant I/I in the collection system, and the City needs to develop a plan to appropriately identify and reduce the I/I sources. It is suggested the City set aside approximately $100,000 per year toward collection system improvements targeted to remove I/I and/or address structurally defective pipe. In developing a plan and appropriately funding improvements to the collection

system, the City would also be making a wise investment by extending the useful life of the pipelines and WWTF.

Wastewater Treatment Facility Improvements and Effluent Disposal Improvements

The WWTF is adequately sized for the design flows identified, so capacity improvements to the treatment system are not needed at this time, based on the current permit requirements. However, a few improvements to individual system components could be considered.

Lagoon Improvements

The lagoons consist of both Plant 1 and Plant 2 ponds with their associated floating surface aerators. The lagoons and lagoon aerators are adequately sized to handle the flows and loadings. However, a significant number of rags has been deposited in the lagoons that bind in the aerator impellers, causing ongoing maintenance issues. Also, maintaining the floating surface aerators is difficult. It is recommended the City either clean all the rags out of the lagoons and prevent rags from entering in the future or install an alternative aeration system. The estimated cost for an alternative aeration system is approximately $500,000.

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 2-1/2 feet deep in the 5-foot deep lagoon. These solids need to be removed as soon as financially feasible. 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 landfilled or land-applied for beneficial use on farmland. Solids removal will also remove the rags from Pond 1.

Disinfection System Improvements

The chlorine contact chambers and chlorination system are adequately sized to handle the flows and loadings, so no improvements are recommended.

Disposal System Improvements

The disposal system includes the irrigation system for the golf course, the irrigation system for the pasture, and the constructed wetlands. The golf course irrigation ponds need to be dredged and the pumps and sprinklers will need to be replaced in the future. The cost estimated by the City for these improvements is approximately $725,000.

Improvements Included in the System Development Charge Funding Category

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

System Development Charge Fee Categories

ORS 223.297 to 223.314 require SDCs be divided into two fee categories, as follows:

- Reimbursement Fee - This 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. This fee is levied on 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.
- Capital Improvements Fee - This fee establishes the cost of planned capital improvements to be constructed within the planning period. This cost is levied on new developments to provide funding for planned capital improvements projects, increase system capacity, and provide the needed service.

The Reimbursement and Capital Improvements Fees are combined to result in the total SDC Fee.

Establishment of System Development Charges

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

Identified Improvements and Estimated Costs

As previously mentioned, improvements for the 20-year planning period have been identified that will be necessary, assuming wastewater system expansion will be needed to support future development and growth. The SDC costs include collection system and lift station improvements. The estimated costs for identified improvements categorized under the SDC funding category are presented on Figure 5-4. The reference numbers shown on the figures have been arbitrarily assigned and are not in order of priority. It is not possible to assign priorities to the improvements identified under the SDC funding category as they are development driven, and it is unknown which areas of the City will develop first or how quickly development within the City will occur.

Capital Improvements Plan

Introduction

A CIP provides a framework to prioritize and implement the 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 the City, while providing continued delivery of utility and other services to citizens and businesses.

As part of this WWFP, the City is developing a CIP based on identified deficiencies and improvements required to address the wastewater system needs of the City 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 will list the City's capital improvements projects, place the projects in a priority order (subject to periodic review), and schedule the projects for funding and construction.

The CIP is a tool to be used in the development of responsible and progressive financial planning. The program 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 and direction.

Capital wastewater system improvements projects will be coordinated with the annual budget process to maintain full utilization of available resources. For each capital improvements project, the CIP provides a variety of information, including a project description and the service need to be addressed, a proposed timetable, and proposed funding levels. Capital wastewater system improvements projects will be prioritized with the most urgent projects first. Ongoing operating costs are not included in the CIP's estimated project costs.

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 participates in CIP development via specific master plans and other planning tools. Major capital improvements projects require City Council interaction during project development and where funding allocations are made.

Identified Improvements and Estimated Costs

This section summarizes and describes those identified improvements that have been included in the CIP funding category. The chronological listing of priorities is outlined and the estimated costs of the various CIP improvements are presented. The CIP improvements outlined are intended to correct deficiencies identified in the existing system and will provide the means to connect a portion of those residences located in the City not currently connected to the municipal wastewater collection system.

Proposed Improvements to be Completed within 10 Years

- **CIP 1** - Lagoon Biosolids Removal. CIP 1 involves removing accumulated solids from Pond 1 in Plant 1 to recapture Plant 1 treatment capacity. Currently, the pond is approximately half full of biosolids, so the actual treatment capacity of this plant is much less than design. It is recommended the City take Pond 1 offline to dry the solids for mechanical removal at a cost of approximately $516,000. If the pond is wet dredged, the removal cost is estimated to be $4,350,000.
- **CIP 2** - Infiltration and Inflow Reduction Improvement Plan. CIP 2 has been designated as a top priority to be completed by the City. These improvements would include collection system evaluation, cleaning and television inspection, smoke testing, I/I analysis, evaluation of structural and physical conditions, and repair and replacement cost scenarios. By implementing the procedures discussed in this section, the City would have a modified, systematic annual approach to removing I/I from its collection system piping and, at the same time, rehabilitate its aging collection system through replacement and/or repair.
- **CIP 3** - Lagoon Aerator Improvements. It is recommended the City either clean all the rags out of the lagoons and prevent rags from entering in the future or install an alternative aeration system. The estimated cost for an alternative aeration system is approximately $500,000.
- **CIP 4** - Golf Course Irrigation Improvements. The disposal system includes the irrigation system for the golf course, the irrigation system for the pasture, and the constructed wetlands. The golf

course irrigation ponds need to be dredged, and the pumps and sprinklers need to be replaced in the future. The cost estimated by the City for these improvements is approximately $725,000.

The estimated costs of the identified improvements categorized under the CIP funding category are presented on Figure 5-6. The reference numbers shown on the figure were assigned based on City-established priorities (1 - highest and 4 - lowest).

Further detailed evaluation of the proposed CIP improvements impact on sewer rates is presented in a Wastewater Rate Study prepared by GEL Oregon, Inc., and Anderson Perry & Associates, Inc., as part of the overall planning efforts related to this WWFP. Project financing and implementation is discussed in Chapter 7.

Summary of Estimated Costs

System Development Charge (See Figure 5-4)

Collection System and Lift Station Improvements	$4,307,000

Capital Improvements Plan (See Figure 5-6)

I/I Reduction Improvement Plan	$100,000 per year
Lagoon Aerator Improvements	$500,000 (current fiscal year budget)
Lagoon Biosolids Removal	$516,000
Golf Course Irrigation Improvements	$725,000

The estimated costs represent 2017 dollars. As project funding is established, costs should be projected to the year of the anticipated expenditure to account for inflation.

Preliminary Environmental Review of the Selected Wastewater System Improvements for the City of Prineville, Oregon - Wastewater Facilities Plan 2017

Introduction

This section presents a preliminary environmental review of the selected wastewater system improvements. As the project is further developed and funding is sought, a more detailed report should be completed to meet specific agency requirements.

Affected Environment/Environmental Consequences

Land Use

The City of Prineville is located in northwestern Crook County in central Oregon. The Population Research Center at Portland State University approximated the population of Prineville at 9,253 in 2010, based on the 2010 Census. The majority of land in the vicinity is privately owned and is either residential or used for livestock grazing or irrigated crop farming. Located at an elevation of 2,877 feet above mean sea level, the Prineville area is situated in the high desert area east of the Cascade Mountains and west of the Ochoco National Forest. The City occupies 6.65 square miles. The main access to Prineville is via the

Madras Highway (OR 26) or the Ochoco Highway (OR 126). The City of Prineville adopted an updated Comprehensive Plan in April 2007.

The proposed collection system improvements are within the City limits and 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 Prineville vicinity are summarized on Table 5-2. In general, the soils are classified in variations of loam.

TABLE 5-2
FARMLAND CLASSIFICATION, SUMMARY BY MAP UNIT,
CROOK COUNTY, OREGON

Map Unit Symbol	Map Unit Name	Rating
013	Dryck loam, 0 to 2 percent slopes	Prime Farmland if Irrigated
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
020	Boyce silt loam, 0 to 2 percent slopes	Prime Farmland if Irrigated and Drained

One of the proposed collection system improvements is located on Lamonta Road, which is adjacent to an Exclusive Farm Use (EFU) zone. All of other the proposed collection system improvements are within the UGB and are not located on EFU land. None of the collection system improvements are anticipated to affect prime farmland; if farmland could be impacted by the project (particularly the Lamonta Road segment), 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 project, including Gary A. Ward Park, Davidson 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 41013C0385C, 41013C0403C, 41013C0412C, 41013C0411C, 41013C0384C, 41013C0415C, and 41013C0416C (dated February 2, 2012) have been assigned to the project area.

Small lengths of the proposed collection system improvements 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 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 identified several Freshwater Emergent Wetlands within the project vicinity. A wetland determination/delineation should be completed prior to construction. Wetlands will be avoided if possible. 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 within the City of Prineville. The majority of the collection system main line improvements will be located on existing rights-of-way that have been previously disturbed.

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 project must still comply with Oregon Revised Statutes (ORS) 97.740, ORS 358.905-358.961, and ORS 390.235 and Oregon Administrative Rules 736-051-0090, which protects 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 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 for the streams, provides cover for aquatic organisms, and stabilizes streambanks to prevent erosion.

One of the proposed collection system improvements appears to cross an irrigation ditch. This project is not anticipated to have impacts to waterbodies. Potential crossings are anticipated to be accomplished in the least environmentally damaging way possible (e.g., boring, crossing on established roadways, etc.). No impacts to any threatened, endangered,

or rare species or habitat are anticipated. 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 proposed collection system improvements would occur in the vicinity of waterbodies, although no impacts are anticipated. Best management practices will be employed to control potential erosion and sedimentation that could temporarily impact water quality.

Impacts to Groundwater

The project area does not lie in a Sole Source Aquifer or Critical Groundwater Area. The project is located within the Deschutes Groundwater Mitigation Area, which regulates groundwater withdrawal and mitigation. This project does not involve any groundwater removal, so the Deschutes Groundwater Mitigation Area regulations do not apply. No impacts to groundwater are anticipated.

Socioeconomic/Environmental Justice

No elderly or minority populations residing adjacent to the proposed project area will be impacted by the project. No business or residential relocations will be required as part of the proposed project.

Completion of the proposed collection system improvements project is necessary to provide adequate wastewater treatment and disposal for the anticipated population growth over the 20-year planning period.

Air

The collection system improvements fall within the city limits and UGB and, as such, are subject to the City of Prineville's ordinances. According to Josh Smith, City Planner, the dust ordinance simply states that activity cannot create a "nuisance." Smith noted that this is complaint-based and can usually be addressed by spraying water on the affected areas to reduce dust.

The project has the potential to temporarily affect air quality. Short-term impacts would 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 proposed project. It is unlikely that the Oregon Department of Environmental Quality (DEQ) would require air quality permits for the proposed project.

Noise

The proposed collection system 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 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 proposed project.

Hazardous Material

According to the DEQ, there is potential for buried asbestos cement (AC) pipe in the work areas. The City of Prineville installed AC pipe for their water and sewer systems from 1960 through the latter part of the 1970s. The proposed collection system main lines will potentially cross existing AC lines.

Environmental records were reviewed for identified hazardous and solid waste sites, cleanup sites, and leaking and underground storage tanks using information on the DEQ Environmental Cleanup Site Information (ECSI) website. According to the ECSI database, 61 cleanup sites are located in the vicinity of the City of Prineville; however, none appear to be adjacent to the collection system improvements area. No environmental records were found adjacent to the project corridor. Additional hazardous materials analysis may be required during the project design phase.

Legend

- Lift Stations
- WWTP
- Manholes
- Force Main

Gravity Main
Depth/Diameter Ratio

- 0.00 - 0.25
- 0.26 - 0.50
- 0.51 - 0.75
- 0.76 - 0.99
- 1.00
- City Limits
- Parcels
- Waterbodies
- Existing Service Area

Saddle Ridge Lift Station Flow = 83 gpm

Industrial Park Lift Station Flow = 116 gpm

McDougal Lift Station Flow = 95 gpm

Forest Service Lift Station Flow = 70 gpm

Western Sky Lift Station Flow = 266 gpm

WTP

Oregon Youth Authority Lift Station Flow = 518 gpm

Airport Lift Station Flow = 166 gpm

Williamson Lift Station Flow = 79 gpm

0 2,000 4,000
SCALE IN FEET

Existing Connected Population 2017 Peak Hour Scenario
Approximate Population Served = 9,003
Total System Flow = 2.51 MGD (w/o lift stations running)
Total System Flow = 4.25 MGD (w/ all lift stations running)

DOWL

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CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

COLLECTION SYSTEM MODEL RESULTS WITH 2017 FLOWS

FIGURE
5-1

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Legend

- Lift Stations
- WWTP
- Surcharged Manholes

Future Loading Manholes

Added Load (gpd)

- 90 - 5,000
- 5,001 - 25,000
- 25,001 - 54,189
- Manholes
- Force Main

Gravity Main

Depth/Diameter Ratio

- 0.00 - 0.25
- 0.26 - 0.50
- 0.51 - 0.75
- 0.76 - 0.99
- 1.00

- Future Extensions
- City Limits
- Urban Growth Boundary
- Parcels
- Waterbodies
- Existing Service Area
- Future Service Areas Needing Lift Stations

Future Service Area

- Commercial and Industrial
- Residential Developed
- Residential R1
- Residential R2

0 3,000 6,000
SCALE IN FEET

Future Lift Station Flow = 71 gpm
Industrial Park Lift Station Flow = 166 gpm
Saddle Ridge Lift Station Flow = 83 gpm
Future Lift Station Flow = 17 gpm
McDougal Lift Station Flow = 95 gpm
Western Sky Lift Station Flow = 266 gpm
Forest Service Lift Station Flow = 70 gpm
Williamson Lift Station Flow = 79 gpm
Oregon Youth Authority Lift Station Flow = 518 gpm
Airport Lift Station Flow = 166 gpm

Future Connected Population 2037 Peak Hour Scenario
Approximate Population Served = 11,702
Total System Flow = 3.55 MGD (w/o lift stations running)
Total System Flow = 5.25 MGD (w/ all lift stations running)

Note: All future extensions reflect 8-inch diameter gravity main.
Loads for modeled extensions were applied proportionally along the entire extension.

DOWL

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CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

COLLECTION SYSTEM MODEL RESULTS WITH 2037 FLOWS

FIGURE
5-2

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Legend

- Existing Lift Stations
- Future Lift Stations
- WWTP
- Force Main
- Existing System Gravity Main
- Diameter (inches)
  - 4 - 12
  - 13 - 24
  - 25 - 48
- Future Extensions
- Improvements to Existing System
- City Limits
- Urban Growth Boundary
- Parcels
- Waterbodies
- Existing Service Area
- Future Service Areas Needing Lift Stations
- Future Service Area
  - Commercial and Industrial
  - Residential Developed
  - Residential R1
  - Residential R2

Future Lift Station 1
2037 Peak Hour Flow = 15 gpm
Full Build Out Peak Hour Flow = 200 gpm
Approx. 1,600 LF of Force Main

Saddle Ridge Lift Station

Industrial Pak Lift Station

McDougal Lift Station

Western Sky Lift Station

Upsize existing 2,280 LF of 8 and 10-inch gravity main to 18-inch

Forest Service Lift Station

Oregon Youth Authority Lift Station

Airport Lift Station

2,265 LF of new 24-inch gravity main

Williamson Lift Station

Upsize existing 941 LF of 10-inch gravity main to 12-inch

Future Gravity Main Extensions = 15,285 LF
(Locations and Lengths shown are estimated)

WTP

PS

0 3,000 6,000
SCALE IN FEET

DOWL

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CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

COLLECTION SYSTEM IMPROVEMENTS FOR 2037 DESIGN CRITERIA

FIGURE
5-3

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CITY OF PRINEVILLE, OREGON
PROPOSED SYSTEM DEVELOPMENT CHARGE-FUNDED IMPROVEMENTS
COLLECTION SYSTEM IMPROVEMENTS
ESTIMATED PROJECT COST
(Year 2017 Costs)

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization, Bonding, and Insurance	L.S.	$ 142,000	All Req'd	$ 142,000
2	Temporary Protection and Direction of Traffic/Project Safety and Quality Control	L.S.	20,000	All Req'd	20,000
3	8-inch PVC Gravity Sewer Line[1]	L.F.	30	15,285	458,550
4	12-inch PVC Gravity Sewer Line[1]	L.F.	45	8,941	402,345
5	18-inch PVC Gravity Sewer Line[1]	L.F.	60	2,280	136,800
6	24-inch PVC Gravity Sewer Line[1]	L.F.	65	2,265	147,225
7	Precast Manhole (48-inch)	Each	4,000	300	1,200,000
8	Precast Manhole (60-inch)	Each	5,000	25	125,000
9	Remove Existing Manhole	Each	1,200	6	7,200
10	Connection to Existing Main Line	Each	1,000	12	12,000
11	Sewer Service Connection	Each	500	50	25,000
12	Asphalt Surface Restoration	L.F.	30	5,486	164,580
13	4-inch Forcemain	L.F.	25	1,600	40,000
14	Lift Station	L.S.	250,000	All Req'd	250,000
				Subtotal	**$ 3,130,700**
				Existing Lift Station Improvements	81,000
				Administration, Legal, Engineering, and Contingencies @ 35%	1,095,300
				TOTAL ESTIMATED PROJECT COST (2017)	**$ 4,307,000**

[1] Cost estimates for gravity sewer mains include excavation and backfill.

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CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

COLLECTION SYSTEM IMPROVEMENTS
PRELIMINARY COST ESTIMATE

FIGURE
5-4

Legend

- Lift Stations (PS)
- WWTP
- Manholes
- Force Main
- Gravity Main
- Diameter (inches)
  - 4 - 12
  - 13 - 24
  - 25 - 48
- City Limits
- Urban Growth Boundary
- Parcels
- Waterbodies
- Existing Service Area
- Future Service Area

Recommended Gravity Main Improvements

Diameter (inches)

- 8
- 10
- 12
- 15
- 18
- 21
- 24
- 27
- 30
- 33

Future Lift Station 1 (Upsize for Peak Hour Flow = 200 gpm)

Saddle Ridge Lift Station

Industrial Park Lift Station

Future Lift Station 2 (Upsize for Peak Hour Flow = 800 gpm)

McDougal Lift Station (Upsize for Peak Hour Flow = 350 gpm)

Western Sky Lift Station

WTP

Forest Service Lift Station

Williamson Lift Station (Upsize for Peak Hour Flow = 400 gpm)

Oregon Youth Authority Lift Station

Airport Lift Station

0 3,000 6,000

SCALE IN FEET

DOWL

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CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

RECOMMENDED COLLECTION SYSTEM PIPELINE SIZES FOR BUILDOUT

FIGURE
5-5

\\LGSVR6\gisprojects\Prineville\1260-15_PublicFacilitiesMasterPlanning\Fig_RecommendPipeSize.mxd, 8/17/2017, 2:10:14 PM, DMC

CITY OF PRINEVILLE, OREGON
PROPOSED CAPITAL IMPROVEMENTS PLAN-FUNDED IMPROVEMENTS
ESTIMATED PROJECT COSTS
(YEAR 2017 COSTS)

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
CIP 1:	**Plant 1 Pond 1 Biosolids Removal**				
1	Mobilization/Demobilization	LS	$ 21,000	All Req'd	$ 21,000
2	Temporary Protection and Direction of Traffic/Project Safety	LS	5,000	All Req'd	$ 5,000
3	Biosolids Removal (30 Percent Solids)	CY	17,000	25	$ 425,000
				Subtotal	**$ 451,000**
				Construction Contingency Cost (10%)	50,000
				Total Estimated Construction Cost	**$ 501,000**
				Biosolids Management Plan	15,000
				TOTAL ESTIMATED IMPROVEMENT COST (2017 DOLLARS)	**$ 516,000**

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
CIP 2:	**Collection System Improvements - Annual Infiltration and Inflow Reduction Improvement Plan**				
1	Mobilization/Demobilization	LS	$ 5,000	All Req'd	$ 5,000
2	Temporary Protection and Direction of Traffic/Project Safety	LS	10,000	All Req'd	10,000
3	Collection System Evaluation, Cleaning, Smoke Testing, and Television Inspection	EA	15,000	All Req'd	15,000
4	Collection System Replacement/Repair	EA	60,000	All Req'd	60,000
				Subtotal	**$90,000**
				Construction Contingency Cost (11%)	10,000
				TOTAL ESTIMATED IMPROVEMENT COST (2017 DOLLARS)	**$100,000**

Note: These improvements are occuring annually and are based on a future annual allotment of $100,000. Cost for line items may change depending on the improvements being completed in any given year.

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CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

ESTIMATED PROJECT COSTS

FIGURE
5-6

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
CIP 3: Wastewater Treatment Facility Improvements - Lagoon Aerator Improvements					
1	Mobilization/Demobilization	LS	$ 17,000	All Req'd	$ 17,000
2	Project Safety	LS	5,000	All Req'd	5,000
3	New Aeration System Including Valves and All Associated Appurtenances	LS	348,000	All Req'd	348,000
				Estimated Construction Cost	**$ 370,000**
				Construction Contingency Cost (15%)	55,000
				Total Estimated Construction Cost	**$ 425,000**
				Preliminary, Design, and Construction Engineering (20%)	75,000
				TOTAL ESTIMATED IMPROVEMENT COST (2017 DOLLARS)	**$ 500,000**

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
CIP 4: Wastewater Treatment Facility Effluent Disposal Improvements - Golf Course Irrigation Improvements					
1	Mobilization/Demobilization	LS	$ 25,000	All Req'd	$ 25,000
2	Project Safety	LS	5,000	All Req'd	5,000
3	Polyvinyl Chloride Lateral Lines Including Valves	LS	125,000	All Req'd	125,000
4	Main Line, Pumps, and Associated Appurtenances	LS	150,000	All Req'd	150,000
5	Pond Improvements Including Sludge Removal and Replacing Liners	LS	200,000	All Req'd	200,000
				Subtotal	**$ 505,000**
				Construction Contingency Cost (15%)	75,000
				Total Estimated Construction Cost	**$ 580,000**
				Preliminary, Design, and Construction Engineering (20%)	115,000
				Environmental Report, Cultural Resources Investigation, Permitting, Plan Reviews (5%)	30,000
				TOTAL ESTIMATED IMPROVEMENT COST (2017 DOLLARS)	**$ 725,000**

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CITY OF
PRINEVILLE, OREGON
WASTEWATER FACILITIES PLAN

ESTIMATED PROJECT COSTS

FIGURE
5-6
CONT'D

Chapter 6 - Project Financing and Implementation

General

This chapter briefly outlines alternatives for financing the City of Prineville's wastewater system improvements. A summary of federal and state funding programs is presented, including a review of funding options potentially available to the City for the wastewater system improvements. To construct some or all of the proposed improvements, a financing plan acceptable to the City of Prineville must be developed to complete the improvements.

A detailed analysis of the City's current wastewater rate structure was completed as part of the City's master planning process. Refer to the Wastewater Rate and System Development Charge (SDC) studies prepared by GEL Oregon, Inc., for a comprehensive evaluation of options to fund the selected wastewater system improvements while maintaining adequate revenue to support operation and maintenance (O&M) and other system expenditures.

The City is currently planning to complete the identified improvements as funds are developed from user rates and the SDC fees. If improvements are needed before sufficient funds are developed, then an alternative funding source may be needed.

Federal and State 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 wastewater system improvements often exceeds the financial capability of local businesses and residents. Federal and state financing programs are in place that may allow the City of Prineville 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 improvement 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 Oregon Department of Environmental Quality (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 of Prineville's Affordability Index of approximately $32 per month to support a loan for wastewater system improvements, 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 of Prineville with a wastewater system improvements 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 Federal Grant and Loan Programs

U.S. Department of Agriculture Rural Development

RD can provide financial assistance to communities with a population less than 10,000 through both loans and direct grants. The interest rate for these bonds is dependent on the median household income (MHI) of the community and other factors, and varies from year to year based on other economic factors nationally. The fixed interest rate is generally in the 2 to 3 percent range, with a repayment period of up to 40 years. For the City of Prineville, the reported MHI for 2015 is $30,291, which will likely qualify the City for low interest rates with a repayment period of up to 40 years through this program. Applying for this type of funding is a fairly lengthy process involving development of an Environmental Report and a detailed funding application.

The agency generally requires communities to establish average residential user costs in the range of similar systems with similar demographics before the community qualifies for grant funds. Typical monthly cost requirements are in the $45 to $50 per month range. Loans without grant funds may be acquired from RD that may not require rates to reach this level, depending on the results of an RD funding analysis. The user costs must provide sufficient revenue to pay for all system O&M costs and pay for the local debt service incurred as a result of the project. All project costs above this level may be paid for by grant funds, up to given limits, which are usually not more than 45 percent of the total project cost. The objective of the RD loan/grant program is to keep the cost for utilities in small, rural communities at a level similar to what other communities pay.

Another of the agency's requirements is that loan recipients establish a reserve fund of 10 percent of the bond repayment during the first 10 years of the project, which can make the net interest rate higher if such a reserve does not already exist. The RD program requires either revenue or general obligation bonds to be established through the agency for the project (refer to the Local Financing Options information later in this section for further discussion). These bonds can usually be purchased for a period of 40 years if grant funding is also received. A loan and possibly grant funds from RD are likely options for the City of Prineville to implement wastewater system improvements and are evaluated later in this chapter.

U.S. Economic Development Administration

The 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 wastewater system improvements 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 also 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.

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

Summary of State Funding Programs

Business Oregon Finance Programs

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 of Prineville can tie the needed improvements to job creation, the SPWF is not a likely funding source for wastewater system improvements.

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" borrowers 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 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 in 2014 was $50,521. The City of Prineville's annual MHI in 2015 was $30,291, which is 59.1 percent of the statewide MHI. The Water/Wastewater program is a potential funding source for the proposed Prineville Wastewater System Improvements identified in this Wastewater Facilities Plan.

Community Development Block Grant Program

The primary objective of the Community Development Block Grant (CDBG) program is the 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 income.

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 the 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 a low to moderate percent income of equal to or greater than 51 percent. The State of Oregon's 2015 MHI was $51,243. The City of Prineville's percentage of low to moderate income is 44.40 percent, based on the Business Oregon's 2015 Low/Moderate Income Summary Data used by the CDBG program, so funding from the CDBG program does not appear to be available to the City of Prineville. It is important to note these data are updated annually and should be monitored to see if the City becomes eligible for CDBG program funds in future years.

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.

Under the Clean Water State Revolving Fund (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 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 2016, loans for design and construction for small communities had an interest rate that varied from 1.14 to

1.30 percent, with repayment of 15 years or up to 30 years, depending on the MHI and other factors. In addition, fees were 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 of Prineville, although priority in the agency's ranking process would need to be sought by the City.

Funding Program Summary

It appears that more than one funding source is available to the City, potentially including the 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 proposed 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 the project development stages to ascertain which funding programs the City would be eligible to receive funding for their proposed improvements and understand which funding programs would provide the best funding package for the proposed improvements. This consultation with funding agencies may be done at a "One Stop" meeting.

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 needed project improvements. The need to develop authorization to incur debt depends on funding agency requirements and provisions in the City Charter. RD requires a city to obtain authorization to incur debt.

There are generally two options a city may 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.

The RD program accepts either revenue bonds or general obligation 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 be made if the City of Prineville begins the process of obtaining bonding authority for the proposed wastewater system improvements. 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.

Implementation Steps

The key to implementing part or all of the City of Prineville's wastewater system improvements is the City's ability to finance them. The City will have to work closely with its citizens 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 wastewater system improvements outlined herein are anticipated to provide the City with a higher quality wastewater system with significantly improved reliability. The funding sources outlined in this chapter are potential sources of loans and grants for the City to consider if an improvements project is pursued.

APPENDIX A
National Pollutant Discharge Elimination System Permit

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT

Department of Environmental Quality
Eastern Region – Bend Office
475 NE Bellevue Dr., Suite110, Bend, OR 97701
Telephone: (541) 388-6146

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

ISSUED TO:

City of Prineville
387 NE 3rd Street
Prineville, OR 97754

SOURCES COVERED BY THIS PERMIT:

Type of Waste	Outfall Number	Outfall Location
Treated Wastewater	001	R.M. 46.8
Recycled Water Reuse	002	Golf Course
Recycled Water Reuse	003	Land Irrigation

FACILITY TYPE AND LOCATION:

Stabilization Lagoons with Aeration &
Facultative Lagoons
1 mile N.W. of Prineville
Prineville, OR

RECEIVING STREAM INFORMATION:

Basin: Deschutes River
Sub-Basin: Lower Crooked
Receiving Stream: Crooked River
LLID: 1212676445778 46.8 D
County: Crook

Treatment System Class: Level II
Collection System Class: Level III

EPA REFERENCE NO: OR-002361-2

Issued in response to Application No. 973920 received September 20, 2007.

This permit is issued based on the land use findings in the permit record.

Cheryll Hutchens-Woods

Cheryll Hutchens-Woods, Water Quality Manager
Eastern Region

November 16, 2012
Date

PERMITTED ACTIVITIES

Until this permit expires or is modified or revoked, the permittee is authorized to construct, install, modify, or operate a wastewater collection, treatment, control and disposal system and discharge to public waters adequately treated wastewaters only from the authorized discharge point or points established in Schedule A and only in conformance with all the requirements, limitations, and conditions set forth in the attached schedules as follows:

Unless specifically authorized by this permit, by another NPDES or WPCF permit, or by Oregon Administrative Rule, any other direct or indirect discharge of pollutants to waters of the state is prohibited.

SCHEDULE A

Waste Discharge Limitations not to be exceeded after permit issuance.

1. Treated Effluent Outfall 001 (River Discharge) (See Note 1/)

   a. May 1- October 31: No discharge to waters of the State

   b. November 1 - April 30:

      i. No discharge when daily average flow in the Crooked River is less than 15 cfs.

      ii. When the daily average flow in the Crooked River is 15 cfs or greater, the quality of effluent discharged shall meet the following:

Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
$CBOD_5$ (See Note 2)	25 mg/L	40 mg/L	230	345	460
TSS	40 mg/L	60 mg/L	367	550	734

* Average dry weather design flow to the facility equals 1.1 MGD. Mass load limits based upon average dry weather design flow to the facility.

c.

Other parameters (year-round)	Limitations
Total Coliform Bacteria	Must not exceed a 7-day median of 23 organisms with no two consecutive samples to exceed 240 organisms per 100 mL. (See Note 3/)
pH	Must be within the range of 6.0 – 9.0
$CBOD_5$ and TSS Removal Efficiency	Must not be less than 65% monthly average for $CBOD_5$ and 65% monthly average for TSS.
Total Chlorine Residual	Must not exceed a monthly average of 0.10 mg/l and a daily maximum of 0.16 mg/l.
Effluent Discharge	When the daily average flow of the Crooked River is 15 cfs or greater but less than 25 cfs, the quantity of effluent discharged to the Crooked River must not exceed 1/15 of the flow of the Crooked River at the point of discharge.

d. No wastes may be discharged or activities conducted that cause or contribute to a violation of water quality standards in OAR Chapter 340, Division 41 applicable to the Deschutes River basin except as provided for in OAR 340-045-0080 and the following regulatory mixing zone:

The regulatory mixing zone is that portion of the Crooked River contained within a point 50 feet downstream from the outfall and extending 3 feet on either side of the diffuser. The Zone of Initial Dilution (ZID) is defined as that portion of the regulatory mixing zone that is within 5 feet of the point of discharge.

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

3. **Recycled Water Outfall 002 and 003 (Golf Course and Land Irrigation Site)**
The permittee is authorized to distribute recycled water if it is:
a. Treated and used according to the criteria listed in the table below.
b. Managed as described in its DEQ-approved Recycled Water Use Plan unless exempt as provided in Schedule D.
c. Used in a manner and applied at a rate that does not impact groundwater quality.
d. Applied at a rate and in accordance with site management practices that ensure continued agricultural, horticultural, or silvicultural production and does not reduce the productivity of the site.
e. Irrigated using sound irrigation practices to prevent:
   i. Offsite surface runoff or subsurface drainage through drainage tile;
   ii. Creation of odors, fly and mosquito breeding, or other nuisance conditions; and
   iii. Overloading of land with nutrients, organics, or other pollutants.

Recycled Water Limits

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

NOTES:

1/ All Outfall 001 limitations must apply prior to discharge to the Crooked River except for total coliform, which must apply prior to discharge into the storage pond.

2/ The $CBOD_5$ concentration limits are considered equivalent to the minimum design criteria for BOD_5 specified in Oregon Administrative Rules (OAR) 340-041. These limits and $CBOD_5$ mass limits may be adjusted (up or down) by permit action if more accurate information regarding $CBOD_5/BOD_5$ becomes available.

3/ If two consecutive samples exceed 240 organisms per 100 mL, then five consecutive re-samples may be taken at four hour intervals beginning within 28 hours after the original samples were taken. If the log mean of the five re-samples is less than or equal to 23 organisms per 100 mL, a violation shall not be triggered. This procedure can only be applied when discharging to the river.

SCHEDULE B

Minimum Monitoring and Reporting Requirements

1. **Monitoring and Reporting Protocols**

a. **Sampling, Test Methods, and Laboratory Quality Assurance and Quality Control (QA/QC).**
For all test methods used, the analyses must meet the quantitation limits specified in this schedule unless otherwise approved by the Department in writing. For further instruction on proper sampling techniques, test methods and the use of laboratories with QA/QC procedures, see Schedule F, Sections B.1 and C.

b. **Re-analysis and Re-sampling if QA/QC Requirements Not Met**
The permittee must re-analyze the sample if QA/QC requirements are not met. If the sample cannot be re-analyzed, the permittee must re-sample and analyze at the earliest opportunity.

c. **Significant Figures and Rounding Conventions**
The permittee must report the same number of significant digits as the permit limit for a given parameter. Regardless of the rounding conventions used by the permittee (i.e., rounding 5 up for the calculated results or, in the case of laboratory results, rounding 5 to the nearest even number), the permittee must use the convention consistently, and must ensure that laboratories employed by the permittee use the same convention.

d. **Reporting of Detection Levels and Quantitation Limits**
When reporting sampling results, the permittee must record the laboratory detection level and quantitation limit as defined below for each analyte except BOD, TSS, pH, total coliform, and fats, oils and grease (FOG).

i. Detection Level (DL): The Method Detection Limit (MDL) or Limit of Detection (LOD) and derived using 40 CFR §136 Appendix B; and

ii. Quantitation Limit (QL): The Method Reporting Limit (MRL) or Limit of Quantitation (LOQ). It is the lowest level at which the entire analytical system gives a recognizable signal and acceptable calibration for the analyte. It is equivalent to the concentration of the lowest calibration standard assuming that all method-specified sample weights, volumes, and cleanup procedures have been employed.

e. **Reporting Sample Results**
The permittee must follow the procedures listed below when reporting sampling results.

i. If a sample result is at or below the DL, report the result as less than the specified DL. For example, if the DL is 1.0 µg/L and the result is non-detect, report "<1.0 µg/L" on the discharge monitoring report (DMR).

ii. If a sample result is above the DL but below the QL, report the result as the DL preceded by DEQ's data code "e". For example, if the DL is 1.0 µg/l, the QL is 3.0 µg/L, and the result is estimated to be between the DL and QL, report "e1.0 µg/L" on the DMR.

iii. If a sample result does not meet QA/QC requirements, the result must be included in the DMR along with a notation but must not be used in any calculation required by this permit.

These requirements do not apply to the following parameters: BOD, TSS, pH, total coliform, and fats, oils and grease (FOG).

f. **Calculating and Reporting Mass Loads**
The permittee must follow the procedures listed below when calculating and reporting mass loads.

i. When concentration data are below the DL: To calculate the mass load from this result, use the DL. Report the mass load as less than the calculated mass load. For example, if flow is 2

MGD and the reported sample result is <1.0 µg/L, report "<0.02 lb/day" for mass load on the DMR (1.0 µg/L x 2 MGD x conversion factor = 0.017 lb/day, round off to 0.02 lb/day).

ii. When concentration data are above the DL, but below the QL: To calculate the mass load from this result, use the detection level. Report the mass load as the calculated mass load preceded by "e". For example, if flow is 2 MGD and the reported sample result is e1.0 µg/L, report "e0.02 lb/day" for mass load on the DMR (1.0 µg/L x 2 MGD x conversion factor = 0.017 lb/day, round off to 0.02 lb/day).

2. **Minimum Monitoring Requirements**

a. **Influent Monitoring:**
The permittee must collect influent samples and take influent measurements just prior to the bar screen. The permittee must monitor influent for the pollutant parameters listed below in accordance with the following table.

Item or Parameter	Time Period	Minimum Frequency	Type of Sample/Action	Report
Total Flow (MGD)	Year-round	Daily	Measurement	Daily values Monthly total Monthly average
Flow Meter Calibration	Year-round	Semi-Annual	Verification	Report that calibration was complete
$CBOD_5$ (mg/L)	Year-round	2/Week	24-hour Composite	Daily values Monthly average
TSS (mg/L)	Year-round	2/Week	24-hour Composite	Daily values Monthly average
pH (S.U.)	Year-round	3/Week	Grab	Daily values

b. **Compliance Effluent Monitoring:**
The permittee must collect effluent samples and take effluent measurements at Outfall 001 prior to discharge to the river. The permittee must monitor/measure the effluent for the pollutant parameters/measurements listed below in accordance with the following table:

Item or Parameter	Minimum Frequency	Type of Sample	Report
Total Flow (MGD)	Daily	Measurement	Daily values Monthly total Monthly average
Flow Meter Calibration	Semi-Annual	Verification	Report that calibration was completed.
$CBOD_5$ (mg/L)	2/Week	24-hour Composite	Daily values Monthly average Weekly average Maximum weekly average
TSS (mg/L)	2/Week	24-hour Composite	Same as CBOD
pH (S.U.)	3/Week	Grab	Daily values
Total Coliform	2/Week	Grab	Organisms per 100 mL

Item or Parameter	Minimum Frequency	Type of Sample	Report
Ammonia (NH3-N)	1/Week	24-hour Composite	Daily values Monthly average concentration Maximum daily concentration
Nutrients: TKN, NO2+NO3-N, Total Phosphorus[2]	Nov. 2012, 2013, & April 2012, 2013	24-hour Composite	Same as ammonia
Quantity Chlorine Used (lbs)	Daily	Measurement	Lbs.
Chlorine, Total Residual	Daily	Grab; taken after dechlorination and before effluent flume	mg/L
Pounds discharged TSS & CBOD	2/Week	Calculation	Daily values Monthly average Weekly average Maximum weekly average Maximum daily value
Average % removed TSS & $CBOD_5$	Monthly	Calculation	Daily values Monthly average minimum % value
Silver (ug/l)[1]	Every other Month	24-hour Composite	Daily value
Temperature°C	3/Week	Grab	Daily value Monthly average
Dissolved Oxygen[2]	Nov. 2012, 2013, & April 2012, 2013	Grab	Daily value
Oil & Grease[2]	Nov. 2012, 2013, & April 2012, 2013	Grab	Daily value
Total Dissolved Solids[2]	Nov. 2012, 2013, & April 2012, 2013	Grab	Daily value
Turbidity	Monthly	Grab	Daily value
Alkalinity as CaCO3	Quarterly	24-hour Composite	Daily value

1 After two year, the Department will perform a new RPA for silver to determine if the discharge has a potential to cause orontribute to an excursion above the state water quality criteria. Depending on the outcome of the new RPA, the Department may modify the permit as necessary to include a limit for silver. All metal analysis will be for total recoverable concentrations.
2 Tier 1 monitoring must be conducted in the first 2 years after permit issuance.

c. **Recycled Wastewater Outfall 002 and 003 (Golf Course and Land Irrigation Site)**

Item or Parameter	Minimum Frequency	Type of Sample
Total Flow (MGD)	Daily	Measurement
Quantity Irrigated (inches/acre)	Monthly	Calculation
Flow Meter Calibration	Annually	Verification
Total Coliform	1/Week	Grab
Quantity Chlorine Used	Monthly	Measurement
Total Chlorine Residual	Daily	Grab

Item or Parameter	Minimum Frequency	Type of Sample
pH	2/Week	Grab
Nutrients: (TKN, NO_2+NO_3-N, NH_3, Total Phosphorus)	Monthly when irrigating	Grab

d. Crooked River-Background (November 1-April 30)

Item or Parameter	Minimum Frequency	Type of Sample
pH	1/Week	Grab
Turbidity	Monthly	Grab
Flow	Daily	Measurement

e. Groundwater Monitoring [1]

Groundwater Minimum Monitoring and Reporting Requirements

i. Groundwater monitoring must be conducted in the following monitoring wells:

Monitoring Well	Well Designation
L2	Detection
L3	Detection
L4	Compliance

[1] Groundwater monitoring must be conducted in accordance with the approved Groundwater Monitoring Plan. Each monitoring well (L2, L3, and L4) must be monitored. Grab samples from groundwater monitoring wells must be collected after the well has been purged according to accepted practices for groundwater well monitoring.

ii. At a minimum, the permittee must monitor groundwater for the parameters and at the frequencies as specified below:

Parameter	Minimum Frequency	Type of Sample
Water Surface Elevation	Quarterly	Measurement
pH	Quarterly	Grab
NH3-N	Quarterly	Grab
NO2+NO3-N	Quarterly	Grab
Conductivity	Quarterly	Grab

iii. Groundwater Reporting Requirements

(1) Quarterly Reporting: Analytical results of groundwater monitoring must be reported quarterly in a Department approved format. At a minimum, the report must contain the quarterly reporting information identified in the approved monitoring plan. Reports are due to the Department by the 30th day of the first full month following the sampling event.

(2) Annual Data Analysis and Reporting: An annual data analysis report must be submitted to the Department by March 31st following each year of monitoring. The annual report must contain the annual data analysis and reporting information identified in the approved monitoring plan.

iv. Groundwater Monitoring Re-sampling Requirements

(1) If monitoring indicates a significant increase (increase or decrease for pH) in the value of a parameter monitored, the permittee must immediately resample. A significant change will be deemed to have occurred for any parameter if the change is not within three standard deviations of the running average for that parameter. If the resampling confirms the change in water quality, the permittee must:

(a) Report the results to the Department within 10 days of receipt of the laboratory data; and

(b) Prepare and submit to the Department within 30 days a plan for developing a preliminary assessment unless another time schedule is approved by the Department.

(2) The Department may reopen the permit, if necessary, to include new or revised monitoring items or parameters, minimum frequency, or type of sample, or reporting procedures.

(3) Should monitoring data indicate that the permittee's discharge poses a significant threat to groundwater quality, the Department may reopen this permit, if necessary, to include corrective action and/or additional monitoring requirements.

3. **Effluent Toxics Characterization Monitoring**

The permittee must take effluent samples at Outfall 001 after the storage pond but prior to river discharge unless otherwise specified and measurements of the pollutant parameters listed below in accordance with the following table. These must be 24-hour composite samples collected in November 2012, April 2013, November 2013, and April 2014.

Metals[1], Cyanide, Total Phenols and Hardness (ug/l unless otherwise specified)					
Pollutant	**CAS[3]**	**QL**	**Pollutant**	**CAS**	**QL**
Antimony	7440360	0.10	Lead	7439921	5
Arsenic	7440382	0.50	Mercury	7439976	0.010
Arsenic (Inorganic)[4]	7440382	1.0	Nickel	7440020	10
Arsenic III[4]	22541544	50	Selenium	7782492	2.0
Beryllium	7440417	0.10	Silver	7440224	1.0
Cadmium	7440439	0.10	Thallium	7440280	0.10
Chromium	7440473	0.40	Zinc	7440666	5.0
Copper	7440508	10	Cyanide (Total)[2]	57125	5.0
Iron	7439896	00	Total Phelonic Compounds		na
			Hardness (Total as CaCO3)		

[1] All metals must be analyzed for total recoverable concentration unless otherwise specified.

[2] For effluent cyanide samples, at least six discrete grab samples must be collected over the

Metals[1], Cyanide, Total Phenols and Hardness (ug/l unless otherwise specified)					
Pollutant	**CAS[3]**	**QL**	**Pollutant**	**CAS**	**QL**

operating day. Each aliquot must not be less than 100 mL and must be collected and composited into a larger container which has been preserved with sodium hydroxide to insure sample integrity.

[3] Chemical Abstract Service

[4] Arsenic Methods: Measurement of Total Arsenic meets the requirement of inorganic and Arsenic III as long as the Total Arsenic result is < 1.0 µg/L and < 50 µg/L respectively. Method EPA 1632A is used to monitor Arsenic III and Arsenic (Inorganic).

Volatile Organic Compounds (ug/l unless otherwise specified)					
Pollutant	**CAS**	**QL**	**Pollutant**	**CAS**	**QL**
acrolein	107028	5.0	1,1-dichloroethylene	75354	0.50
acrylonitrile	107131	5.0	1,2-dichloropropane	78875	0.50
benzene	71432	0.50	1,3-dichloropropylene	542756	0.50
bromoform	75252	0.50	ethylbenzene	100414	0.50
carbon tetrachloride	56235	0.50	methyl bromide	74839	0.50
chlorobenzene	108907	0.50	methyl chloride	74873	0.50
chlorodibromomethane	124481	0.50	methylene chloride	75092	0.50
chloroethane	75003	0.50	1,1,2,2-tetrachloroethane	79345	0.50
2-chloroethylvinyl ether	110758	5.0	tetrachloroethylene	127184	0.50
chloroform	67663	0.50	toluene	108883	0.50
dichlorobromomethane	75274	0.50	1,1,1-trichloroethane	71556	0.50
1,1-dichloroethane	75343	0.50	1,1,2-trichloroethane	79005	0.50
1,2-dichloroethane	107062	0.50	trichloroethylene	79016	0.50
1,2-trans-dichloroethylene	156605	0.50	vinyl chloride	75014	0.50

The permittee must collect six discrete samples (not less than 40 mL) over the operating day and analyze each separately. The analytical results for all samples must be averaged for reporting purposes. VOC samples must be in preserved VOA vials with no head space. Permit holder should ask their environmental lab for guidance.

Acid-extractable Compounds (ug/l unless otherwise specified)					
Pollutant	**CAS**	**QL**	**Pollutant**	**CAS**	**QL**
p-chloro-m-cresol	59507	1.0	2-nitrophenol	88755	2.0
2-chlorophenol	95578	1.0	4-nitrophenol	100027	5.0
2,4-dichlorophenol	120832	1.0	pentachlorophenol	87865	2.0
2,4-dimethylphenol	105679	5.0	phenol	108952	1.0
2,4-dinitro-o-cresol	534521	2.0	2,4,5-trichlorophenol[1]	95954	2.0
dinitrophenols	25550597	n/a	2,4,6-trichlorophenol	88062	1.0

Acid-extractable Compounds (ug/l unless otherwise specified)					
Pollutant	**CAS**	**QL**	**Pollutant**	**CAS**	**QL**
2,4-dinitrophenol[2]	51285	5.0			

[1]Some QL's may need methods with modification allowed by EPA's **Solutions for Analytical chemistry Problems w/Clean Water Methods, March 2007.**
(url: http://water.epa.gov/scitech/methods/cwa/atp/upload/2008_02_06_methods_pumpkin.pdf)

[2]If necessary, monitoring results from this parameter will also be used to characterize for dinitrophenols.

Base-Neutral Compounds[1] (ug/l unless otherwise specified)					
Pollutant	**CAS**	**QL**	**Pollutant**	**CAS**	**QL**
acenaphthene	83329	1.0	3,3-Dichlorobenzidine	91941	1.0
acenaphthylene	208968	1.0	diethyl phthalate	84662	1.0
anthracene	120127	1.0	dimethyl phthalate	131113	1.0
benzidine	92875	10	2,4-dinitrotoluene	121142	1.0
benzo(a)anthracene	56553	1.0	2,6-dinitrotoluene	606202	1.0
benzo(a)pyrene	50328	1.0	1,2-diphenylhydrazine	122667	5.0
3,4-benzofluoranthene	205992	1.0	fluroranthene	206440	2.0
benzo(ghi)perylene	191242	1.0	fluorene	86737	1.0
benzo(k)fluoranthene	207089	1.0	hexachlorobenzene	118741	1.0
bis(2-chloroethoxy)methane	111911	2.0	hexachlorobutadiene	87683	2.0
bis(2-chloroethyl)ether	111444	1.0	hexachlorocyclopentadiene	77474	2.0
bis(2-chloroisopropyl)ether	108601	2.0	hexachloroethane	67721	2.0
Bis (Chloromethyl) ether	542881	na	indeno(1,2,3-cd)pyrene	193395	1.0
bis (2-ethylhexyl)phthalate	117817	1.0	isophorone	78591	10
4-bromophenyl phenyl ether	101553	1.0	napthalene	91203	1.0
butylbenzyl phthalate	85687	1.0	nitrobenzene	98953	1.0
2-chloronaphthalene	91587	1.0	N-nitrosodimethylamine	62759	1.0
4-chlorophenyl phenyl ether	7005723	1.0	N-nitrosodi-n-propylamine	621647	2.0
chrysene	218019	1.0	N-nitrosodiphenylamine	86306	1.0
di-n-butyl phthalate	84742	1.0	Pentachlorobenzene	608935	10
di-n-octyl phthalate	117817	1.0	phenanthrene	85018	1.0
dibenzo(a,h)anthracene	53703	1.0	pyrene	129000	1.0
1,2-Dichlorobenzene (o)	95501	0.50	1,2,4-trichlorobenzene	128821	5.0
1,3-Dichlorobenzene (m)	541731	0.50	Tetrachlorobenzene,1,2,4,5[2]	95943	1.0
1,4-Dichlorobenzene (p)	106467	0.50			

Base-Neutral Compounds[1] (ug/l unless otherwise specified)					
Pollutant	**CAS**	**QL**	**Pollutant**	**CAS**	**QL**

[1]Some QL's may need methods with modification allowed by EPA's *Solutions for Analytical chemistry Problems w/Clean Water Methods, March 2007.*
[2]Analytic Methods: Pentachlorobenzene and Tetrachlorobenzene 1,2,4,5 use EPA 625.

4. **Ambient and Additional Effluent Characterization Monitoring:**
DEQ will evaluate the results of monitoring required by Feb. 2015 to determine whether the permittee will be required to conduct additional ambient water quality and/or effluent monitoring. DEQ will notify the permittee of its evaluation through a written "Monitoring Action Letter."

a. Sampling Plan
If additional monitoring is needed, the permittee must submit a sample and analysis plan to DEQ for approval within 3 months of receipt of the DEQ Monitoring Action Letter. The sampling plan must ensure characterization of the following:

i. Ambient water quality for any pollutants identified as having the reasonable potential to exceed the water quality criterion at the edge of the mixing zone.

ii. Effluent and ambient water quality for Inorganic Arsenic, Arsenic III, Chrome III, Chrome IV, Elemental Phosphorus or free Cyanide when the "total dissolved" variant of the pollutant parameter is identified as having the reasonable potential to exceed the water quality criterion at the point of discharge.

iii. Effluent and ambient water quality for new pollutant parameters adopted by the EQC since permit issuance.

iv. Effluent and, if necessary, ambient water quality for new pollutant parameters when the receiving water body is listed as impaired on DEQ's 303(d) list for these parameters after permit issuance.

b. Implementation
The permittee must implement the approved plan within 3 months of approval. Samples must be analyzed using EPA-approved methods and achieve the QLs specified in Schedule B.

5. **Whole Effluent Toxicity Testing:**
The permittee must take effluent samples of the pollutant parameters listed below in accordance with Schedule D and the following table for Outfall 001 unless otherwise specified.

WET Test Monitoring

Parameter	Minimum Frequency	Type of Sample
Acute toxicity	Beginning November 2012, once during each of the following time periods until 4 consecutive tests show no toxicity at acute (ZID) and chronic (RMZ) dilutions: 1. November-April	Grab, taken after dechlorination and before the effluent flume.
Chronic toxicity		24-hr composite, taken after dechlorination and before the effluent flume.
All test methods and procedures must be in accordance with Schedule D of this permit.		

6. **Industrial Waste Survey Update/Pretreatment Program**

a. As soon as practicable, but by no later than twenty four (24) months from permit issuance date, the permittee shall submit to the Department an update to the industrial waste survey that was

completed during the last permit cycle. The update should be completed as described in 40 CFR 403.8(f)(2)(i-iii) and suitable to make a determination as to the need for development of a pretreatment program.

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

7. Additional Parameters

The permittee must monitor additional parameters as listed below.

Additional Parameters

Item or Parameter	Minimum Frequency	Action
Name, certificate classification, and grade level of each responsible principal operator designated by the permittee and identification of each system classification.	Monthly	Record
Quantity and method of use or disposal of all wastewater solids removed from the treatment facility.	Monthly	Record
Equipment breakdowns and bypassing.	Monthly	Record

8. Minimum Reporting Requirements

The permittee must report monitoring results as listed below.

Reporting Requirements and Due Dates

Reporting Requirement	Frequency	Due Date	Report Form	Submit To:
1. Influent Monitoring 2. Effluent Monitoring 3. Additional Parameters	Monthly	15th day following the completed monitoring period	DEQ-approved discharge monitoring report (DMR) form, electronic and hard copy	For majors: • DEQ Regional Office • DEQ Water Quality Division, OIS
Effluent Toxics Characterization	Once (covering the 4 sampling events)	End of the 25th month of this permit term	-DEQ - approved electronic summary template -1 hard copy	DEQ Regional Office
Ambient and Additional Effluent Toxics Characterization Data	Once	If required, by Feb. 2015	-1 hard copy -Data in electronic format to upload to LASAR	DEQ Regional Office

Reporting Requirement	Frequency	Due Date	Report Form	Submit To:
WET Test Monitoring	Yearly	Within the month following the performance of the test.	1 hard copy	DEQ Regional Office
1. Recycled water annual report describing effectiveness of recycled water system in complying with the DEQ-approved recycled water use plan, OAR 340-055, and this permit. 2. Recycled water monitoring	Annually	January 15	2 hard copies	One each to: • DEQ Regional Office • DEQ Water Reuse Program Coordinator

SCHEDULE D

Special Conditions

1. Whole Effluent Toxicity Testing - Freshwater

a. The permittee must conduct whole effluent toxicity (WET) tests as specified in Schedule B of this permit.

b. The facility is required to sample once per year during the winter discharge months over the first four years of the permit. The facility may choose to perform two WET tests per year, one at the beginning (November) and one at the end (April) of the discharge period. If changes to the facility allow for an all year discharge, the facility is required to sample once per year over the first four years of the permit. The sampling events and toxicity tests should take place in a different quarter each year (i.e. Year 1, Qtr 1). The facility may choose to conduct all tests within a single year of the permit, in which case, the tests shall be conducted quarterly.

c. Acute Toxicity Testing - Organisms and Protocols

i. The permittee must conduct 48-hour static renewal tests with *Ceriodaphnia dubia* (water flea) and 96-hour static renewal tests with *Pimephales promelas* (fathead minnow).

ii. All test methods and procedures must be in accordance with **Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms**, Fifth Edition, EPA-821-R-02-012, October 2002. Any deviation of the bioassay procedures outlined in this method must be submitted in writing to the Department for review and approval prior to use.

iii. Tests must be conducted on final effluent sample collected as a single grab sample. No treatments to the final effluent (i.e. dechlorination, etc), except those included as part of the methodology, must be performed by the laboratory unless approved by the Department prior to analysis.

iv. Acute tests must be conducted on a control and the following dilution series, unless otherwise approved by the Department in writing: 15%, 25%, 45%, 75%, and 100% and a control (0%).

v. An acute WET test must be considered to show toxicity if there is a statistically significant difference in survival between the control and 45% effluent.

d. Chronic Toxicity Testing - Organisms and Protocols

i. The permittee must conduct tests with: *Ceriodaphnia dubia* (water flea) for reproduction and survival test endpoint, *Pimephales promelas* (fathead minnow) for growth and survival test endpoint, and *Raphidocelis subcapitata* (green alga formerly known as *Selanastrum capricornutum*) for growth test endpoint.

ii. All test methods and procedures must be in accordance with **Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms**, Fourth Edition, EPA-821-R-02-013, October 2002. Any deviation of the bioassay procedures outlined in this method must be submitted in writing to the Department for review and approval prior to use.

iii. Tests must be conducted on final effluent samples collected as 24-hour composite samples. No treatments to the final effluent (i.e. dechlorination, etc), except those included as part of the methodology, must be performed by the laboratory unless approved by the Department prior to analysis.

iv. Chronic tests must be conducted on a control and the following dilution series, unless otherwise approved by the Department in writing: 2.5%, 4.5%, 20%, 50%, and 100% and a control (0%).

v. A chronic WET test must be considered to show toxicity if the IC_{25} (25% inhibition concentration) occurs at dilutions equal to or less than the dilution that is known to occur at the edge of the mixing zone, i.e. $IC_{25} \leq 22\%$.

e. Dual End-Point Tests –

i. WET tests may be dual end-point tests in which both acute and chronic end-points can be determined from the results of a single chronic test. The acute end-point shall be based on 48-hours for the *Ceriodaphnia dubia* (water flea) and 96-hours for the *Pimephales promelas* (fathead minnow).

ii. All test methods and procedures must be in accordance with **Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms**, Fourth Edition, EPA-821-R-02-013, October 2002. Any deviation of the bioassay procedures outlined in this method must be submitted in writing to the Department for review and approval prior to use.

iii. Tests must be conducted on final effluent samples collected as described in item d. (3).

iv. Tests run as dual end-point tests must be conducted on a control and the following dilution series, unless otherwise approved by the Department in writing: 2.25%, 4.5%, 45%, 75%, and 100% and a control (0%).

v. Toxicity determinations for dual end-point tests must correspond to the acute, c.(5), and chronic, d.(5), described above.

f. Additional Sampling Requirements

i. At the time of WET sampling, effluent samples should also be collected and analyzed for arsenic.

g. Evaluation of Causes and Exceedances

i. If any test exhibits toxicity, as defined in sections c.(5) or d.(5) of this permit condition, another toxicity test using the same species and Department approved methodology shall be conducted within two weeks, unless otherwise approved by the Department.

ii. If two consecutive WET test results indicate acute and/or chronic toxicity, as defined in sections c.(5) or d.(5) of this permit condition, the permittee must immediately notify the Department of the results. The Department will work with the permittee to determine the appropriate course of action to evaluate and address the toxicity.

h. Quality Assurance / Reporting

i. Quality assurance criteria, statistical analyses, and data reporting for the WET tests must be in accordance with the EPA documents stated in this condition.

ii. A bioassay laboratory report for each test must be prepared according to the EPA method documents referenced in this Schedule. This must include all QA/QC documentation, statistical analysis for each test performed, standard reference toxicant test (SRT) conducted on each species required for the toxicity tests, and completed Chain of Custody forms for the samples including time of sample collection and receipt. Reports shall be submitted to the Department within 45 days of test completion.

iii. The report should include all endpoints measured in the test, i.e. NOEC, LOEC, and IC_{25}.

iv. The permittee must make available to the Department, on request, the written standard operating procedures they, or the laboratory performing the WET tests, are using for all toxicity tests required by the Department.

i. Reopener

i. The Department may reopen and modify this permit to include new limitations, monitoring requirements, and/or conditions as determined by the Department to be appropriate, and in accordance with procedures outlined in Oregon Administrative Rules, Chapter 340, Division 45, if:
   a. WET testing data indicate acute and/or chronic toxicity.
   b. The facility undergoes any process changes.
   c. Discharge monitoring data indicate a change in the reasonable potential to exhibit toxicity.

2. Recycled Water

a. Recycled Water Use Plan
The permittee must maintain a Recycled Water Use Plan meeting the requirements in OAR 340-055-0025. The permittee must submit substantial modifications to an existing plan to DEQ for approval at least 60 days prior to making the proposed changes. Conditions in the plan are enforceable requirements under this permit.

b. Exempt Activities
The permittee is exempt from the requirement to prepare a Recycled Water Use Plan and the total coliform limits in Schedule A, when recycled water is used at the wastewater treatment system for landscape irrigation or for in-plant processes at a wastewater treatment system and all of the following conditions are met:
i. The recycled water is an oxidized and disinfected wastewater.
ii. The recycled water is used at the wastewater treatment system site where it is generated or at an auxiliary wastewater or sludge treatment facility that is subject to the same NPDES or WPCF permit as the wastewater treatment system. Contiguous property to the parcel of land upon which the treatment system is located is considered the wastewater treatment system site if under the same ownership.
iii. Spray or drift or both from the use does not occur off the site.
iv. Public access to the site is restricted.

3. Unless otherwise approved in writing by the Department, a deep-rooted, permanent grass cover must be maintained on the land irrigation area at all times. Grass must be periodically cut and removed to ensure maximum evapotranspiration and nutrient capture.

4. The permittee must notify the DEQ Eastern Region - Bend Office (541) 388-6146 in accordance with the response times noted in the General Conditions of this permit, of any malfunction so that corrective action can be coordinated between the permittee and the Department.

5 **Spill Response Plan**

The permittee must have an up-to-date spill response plan for prevention and handling of spills and unplanned discharges. The spill response plan must include the following:

a. A description of the reporting system that will be used to alert responsible managers and legal authorities in the event of a spill.
b. A description of preventive measures and facilities (including an overall facility plot showing drainage patterns) to prevent, contain, or treat spills of these materials.
c. A description of the permittee's training program to ensure that employees are properly trained at all times to respond to unplanned and emergency incidents.
d. A description of the applicable reporting requirements. These must be consistent with the reporting requirements found in Schedule F, condition D.5.

6. **Management and Maintenance of Groundwater Monitoring Wells**

a. The permittee must protect and maintain each groundwater monitoring well so that samples collected are representative of actual conditions.

b. All monitoring well abandonments, replacements, repairs, and installations must be conducted in accordance with the Water Resources Department Oregon Administrative Rules, Chapter 690, Division 240, and with the Department's guidance "Groundwater Monitoring Well Drilling, Construction, and Decommissioning", dated August 22, 1992. All monitoring well abandonments, replacements, repairs, and installations must be documented in a report prepared by an Oregon registered geologist.

c. If a monitoring well becomes damaged or inoperable, the permittee must notify the Department in writing within 14 days of when the permittee becomes aware of the circumstances. The written report shall describe: what problem has occurred, the remedial measures that have been or will be taken to correct the problem, and the measures taken to prevent the recurrence of damage or inoperation. The Department may require the replacement of inoperable monitoring wells.

d. Prior to installation of new or replacement monitoring wells, the placement or design must be approved in writing by the Department. Well logs and a well completion report shall be submitted to the Department within 30 days of installation of the well. The report shall include a survey drawing showing the location of all monitoring wells, disposal sites, and water bodies.

e. Prior to abandonment of existing wells deemed unsuitable for groundwater monitoring, an abandonment plan must be submitted to the Department for review and approval.

7. By December 15, 2014, the permittee shall develop a methyl-mercury minimization plan (MMP) as described in the Departments Methyl-Mercury Minimization Plan Internal Management Directive (IMD). The permittee must conduct on-going effluent monitoring using a sufficiently sensitive EPA-approved method (method 1630 suggested) to enable evaluation of the effectiveness and implementation of the MMP. The permit may be reopened to modify permit conditions if the MMP is not found to be effective or if a water column translation of the fish tissue criterion is developed.

8. Operator Certification

a. Definitions

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

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

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

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

b. The permittee must comply with OAR Chapter 340, Division 49, "Regulations Pertaining to Certification of Wastewater System Operator Personnel" and designate a supervisor whose certification corresponds with the classification of the collection and/or treatment system as specified on p. 1 of this permit.

c. The permittee must have its system supervised full-time by one or more operators who hold a valid certificate for the type of wastewater treatment or wastewater collection system, and at a grade equal to or greater than the wastewater system's classification as specified on p. 1 one of this permit.

d. The permittee's wastewater system may not be without the designated supervisor for more than 30 days. During this period, there must be another person available to supervise who is certified at no more than one grade lower than the classification of the wastewater system. The permittee must delegate authority to this operator to supervise the operation of the system.

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

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

g. The permittee must notify DEQ in writing of the name of the system supervisor. The permittee may replace or re-designate the system supervisor with another properly certified operator at any time and must notify DEQ in writing within 30 days of replacement or re-designation of operator in charge. As of this writing, the notice of replacement or re-designation must be sent to Water Quality Division, Operator Certification Program, 2020 SW 4th Avenue, Suite 400, Portland, OR 97201.

h. Upon written request, DEQ may grant the permittee reasonable time, not to exceed 120 days, to obtain the services of a qualified person to supervise the wastewater system. The written request must include a justification for the time needed, schedule for recruiting and hiring, date the system supervisor availability ceased, and name of the alternate system supervisor as required by above.

9. Wastewater Solids

a. Transfers

i. *Within state.* The permittee may transfer wastewater solids to another facility permitted to process or dispose of wastewater solids, including but not limited to, another wastewater

treatment facility, landfill, or incinerator. The permittee must monitor, report, and dispose of solids as required under the permit of the receiving facility.

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

b. Acceptance

i. *Within state.* The permittee may accept wastewater solids from another wastewater treatment facility. The permittee must monitor, report, and dispose of solids as required by this permit.

ii. *Out of state.* The permittee may accept wastewater solids from out-of-state facilities for treatment and land application when authorized in writing by DEQ provided the pollutant concentrations in the out-of-state solids do not exceed the ceiling concentration limits.

SCHEDULE F
NPDES GENERAL CONDITION – DOMESTIC FACILITIES

SECTION A. STANDARD CONDITIONS

A1. Duty to Comply with Permit

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

A2. Penalties for Water Pollution and Permit Condition Violations

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

ORS 468.140 allows DEQ to impose civil penalties up to $10,000 per day for violation of a term, condition, or requirement of a permit. The federal Clean Water Act provides for civil penalties not to exceed $32,500 and administrative penalties not to exceed $11,000 per day for each violation of any condition or limitation of this permit.

Under ORS 468.943, unlawful water pollution, if committed by a person with criminal negligence, is punishable by a fine of up to $25,000, imprisonment for not more than one year, or both. Each day on which a violation occurs or continues is a separately punishable offense. The federal Clean Water Act provides for criminal penalties of not more than $50,000 per day of violation, or imprisonment of not more than 2 years, or both for second or subsequent negligent violations of this permit.

Under ORS 468.946, a person who knowingly discharges, places, or causes to be placed any waste into the waters of the state or in a location where the waste is likely to escape into the waters of the state is subject to a Class B felony punishable by a fine not to exceed $250,000 and up to 10 years in prison per ORS chapter 161. The federal Clean Water Act provides for criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment of not more than 3 years, or both for knowing violations of the permit. In the case of a second or subsequent conviction for knowing violation, a person is subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both.

A3. Duty to Mitigate

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

A4. Duty to Reapply

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

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

A5. Permit Actions

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

a. Violation of any term, condition, or requirement of this permit, a rule, or a statute.
b. Obtaining this permit by misrepresentation or failure to disclose fully all material facts.
c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.
d. The permittee is identified as a Designated Management Agency or allocated a wasteload under a total maximum daily load (TMDL).
e. New information or regulations.
f. Modification of compliance schedules.
g. Requirements of permit reopener conditions
h. Correction of technical mistakes made in determining permit conditions.
i. Determination that the permitted activity endangers human health or the environment.
j. Other causes as specified in 40 CFR §§ 122.62, 122.64, and 124.5.
k. For communities with combined sewer overflows (CSOs):
   (1) To comply with any state or federal law regulation for CSOs that is adopted or promulgated subsequent to the effective date of this permit.
   (2) If new information that was not available at the time of permit issuance indicates that CSO controls imposed under this permit have failed to ensure attainment of water quality standards, including protection of designated uses.
   (3) Resulting from implementation of the permittee's long-term control plan and/or permit conditions related to CSOs.

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

A6. Toxic Pollutants

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

A7. Property Rights and Other Legal Requirements

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

A8. Permit References

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

A9. Permit Fees

The permittee must pay the fees required by OAR.

SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

B1. Proper Operation and Maintenance

The permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate

quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems that are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

B2. Need to Halt or Reduce Activity Not a Defense

For industrial or commercial facilities, upon reduction, loss, or failure of the treatment facility, the permittee must, to the extent necessary to maintain compliance with its permit, control production or all discharges or both until the facility is restored or an alternative method of treatment is provided. This requirement applies, for example, when the primary source of power of the treatment facility fails or is reduced or lost. It is not a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

B3. Bypass of Treatment Facilities

a. Definitions
   (1) "Bypass" means intentional diversion of waste streams from any portion of the treatment facility. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, provided the diversion is to allow essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs b and c of this section.
   (2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Prohibition of bypass.
   (1) Bypass is prohibited and DEQ may take enforcement action against a permittee for bypass unless:
      i. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
      ii. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventative maintenance; and
      iii. The permittee submitted notices and requests as required under General Condition B3.c.
   (2) DEQ may approve an anticipated bypass, after considering its adverse effects and any alternatives to bypassing, if DEQ determines that it will meet the three conditions listed above in General Condition B3.b.(1).

c. Notice and request for bypass.
   (1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, a written notice must be submitted to DEQ at least ten days before the date of the bypass.
   (2) Unanticipated bypass. The permittee must submit notice of an unanticipated bypass as required in General Condition D5.

B4. Upset

a. Definition. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operation error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

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

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

(1) An upset occurred and that the permittee can identify the causes(s) of the upset;
(2) The permitted facility was at the time being properly operated;
(3) The permittee submitted notice of the upset as required in General Condition D5, hereof (24-hour notice); and
(4) The permittee complied with any remedial measures required under General Condition A3 hereof.

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

B5. Treatment of Single Operational Upset

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

B6. Overflows from Wastewater Conveyance Systems and Associated Pump Stations

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

b. Prohibition of overflows. Overflows are prohibited. DEQ may exercise enforcement discretion regarding overflow events. In exercising its enforcement discretion, DEQ may consider various factors, including the adequacy of the conveyance system's capacity and the magnitude, duration and return frequency of storm events.

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

B7. Public Notification of Effluent Violation or Overflow

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

B8. Emergency Response and Public Notification Plan

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

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

B9. Removed Substances
Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters must be disposed of in such a manner as to prevent any pollutant from such materials from entering waters of the state, causing nuisance conditions, or creating a public health hazard.

SECTION C. MONITORING AND RECORDS

C1. Representative Sampling
Sampling and measurements taken as required herein must be representative of the volume aud nature of the monitored discharge. All samples must be taken at the monitoring points specified in this permit, and must be taken, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water, or substance. Monitoring points must not be changed without notification to aud the approval of DEQ.

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

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

C4. Penalties of Tampering
The federal Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit may, upon conviction, be punished by a fine of not more than $10,000 per violation, imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person, punishment is a fine not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both.

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

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

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

C8. Retention of Records
Records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities must be retained for a period of at least 5 years (or longer as required by 40 CFR part 503). Records of all monitoring information including all calibration and maintenance records, all original strip chart

recordings for continuous monitoring instrumentation, copies of all reports required by this permit and records of all data used to complete the application for this permit must be retained for a period of at least 3 years from the date of the sample, measurement, report, or application. This period may be extended by request of DEQ at any time.

C9. Records Contents

Records of monitoring information must include:

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

C10. Inspection and Entry

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

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

C11. Confidentiality of Information

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

SECTION D. REPORTING REQUIREMENTS

D1. Planned Changes

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

D2. Anticipated Noncompliance

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

D3. Transfers

This permit may be transferred to a new permittee provided the transferee acquires a property interest in the permitted activity and agrees in writing to fully comply with all the terms and conditions of the permit and EQC rules. No permit may be transferred to a third party without prior written approval from DEQ. DEQ may require modification, revocation, and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under 40 CFR § 122.61. The permittee must notify DEQ when a transfer of property interest takes place.

D4. Compliance Schedule

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

D5. Twenty-Four Hour Reporting

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

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

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

b. Other instances of noncompliance.
   (1) The following instances of noncompliance must be reported:
      i. Any unanticipated bypass that exceeds any effluent limitation in this permit;
      ii. Any upset that exceeds any effluent limitation in this permit;
      iii. Violation of maximum daily discharge limitation for any of the pollutants listed by DEQ in this permit; and
      iv. Any noncompliance that may endanger human health or the environment.
   (2) During normal business hours, the DEQ regional office must be called. Outside of normal business hours, DEQ must be contacted at 1-800-452-0311 (Oregon Emergency Response System).
   (3) A written submission must be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission must contain:
      i. A description of the noncompliance and its cause;
      ii. The period of noncompliance, including exact dates and times;
      iii. The estimated time noncompliance is expected to continue if it has not been corrected;

iv. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance; and
v. Public notification steps taken, pursuant to General Condition B7.

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

D6. Other Noncompliance

The permittee must report all instances of noncompliance not reported under General Condition D4 or D5 at the time monitoring reports are submitted. The reports must contain:

a. A description of the noncompliance and its cause;
b. The period of noncompliance, including exact dates and times;
c. The estimated time noncompliance is expected to continue if it has not been corrected; and
d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

D7. Duty to Provide Information

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

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

D8. Signatory Requirements

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

D9. Falsification of Information

Under ORS 468.953, any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance, is subject to a Class C felony punishable by a fine not to exceed $125,000 per violation and up to 5 years in prison per ORS chapter 161. Additionally, according to 40 CFR § 122.41(k)(2), any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit including monitoring reports or reports of compliance or non-compliance will, upon conviction, be punished by a federal civil penalty not to exceed $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

D10. Changes to Indirect Dischargers

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

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

SECTION E. DEFINITIONS

E1. *BOD* or BOD_5 means five-day biochemical oxygen demand.
E2. *CBOD* or $CBOD_5$ means five-day carbonaceous biochemical oxygen demand.
E3. *TSS* means total suspended solids.

E4. *Bacteria* means but is not limited to fecal coliform bacteria, total coliform bacteria, *Escherichia coli* (*E. coli*) bacteria, and *Enterococcus* bacteria.
E5. *FC* means fecal coliform bacteria.
E6. *Total residual chlorine* means combined chlorine forms plus free residual chlorine
E7. *Technology based permit effluent limitations* means technology-based treatment requirements as defined in 40 CFR § 125.3, and concentration and mass load effluent limitations that are based on minimum design criteria specified in OAR 340-041.
E8. *mg/l* means milligrams per liter.
E9. *µg/l* means microgram per liter.
E10. *kg* means kilograms.
E11. m^3/d means cubic meters per day.
E12. *MGD* means million gallons per day.
E13. *Average monthly effluent limitation* as defined at 40 CFR § 122.2 means the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.
E14. *Average weekly effluent limitation* as defined at 40 CFR § 122.2 means the highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.
E15. *Daily discharge* as defined at 40 CFR § 122.2 means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the daily discharge must be calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge must be calculated as the average measurement of the pollutant over the day.
E16. *24-hour composite sample* means a sample formed by collecting and mixing discrete samples taken periodically and based on time or flow. The sample must be collected and stored in accordance with 40 CFR part 136.
E17. *Grab sample* means an individual discrete sample collected over a period of time not to exceed 15 minutes.
E18. *Quarter* means January through March, April through June, July through September, or October through December.
E19. *Month* means calendar month.
E20. *Week* means a calendar week of Sunday through Saturday.
E21. *POTW* means a publicly-owned treatment works.

NPDES WASTEWATER DISCHARGE PERMIT EVALUATION

Department of Environmental Quality
Eastern Region – Bend Office
475 NE Bellevue Dr., Suite 110 Bend, OR 97701
Telephone: (541) 388-6146

PERMITTEE:	City of Prineville 387 NE 3rd Street Prineville, OR 97754 File Number: 72252 Permit Number: 101433
SOURCE LOCATION:	1 mile NW of Prineville
SOURCE CONTACT:	Eric Sather Telephone Number: 541-419-1095
PERMIT WRITER:	Jayne West Telephone Number: 541-633-2028
PROPOSED ACTION:	Renewal of a National Pollutant Discharge Elimination System (NPDES) wastewater discharge permit
SOURCE CATEGORY:	Major Domestic
TREATMENT SYSTEM CLASS:	Level II
COLLECTION SYSTEM CLASS:	Level III
PERMIT APPLICATION DATE:	September 20, 2007
PERMIT APPLICATION NUMBER:	973920

INTRODUCTION & BACKGROUND

The City of Prineville, in Crook County, owns and operates a secondary wastewater treatment facility which currently serves approximately 9,253 residents. Prineville's treatment facility became operational in 1960 and is located one mile northwest of the City. Modifications were made to the facility in 1969, 1982, 1993 and 2005. A major facility upgrade was completed in 1993, increasing the design capacity from 0.83 MGD to 1.1 MGD. The facility at that time consisted of a 37-acre primary lagoon and a 13-acre secondary lagoon, 10.5-acre storage pond, rock filter system, chlorine disinfection, dechlorination, summertime effluent reuse, and wintertime river discharge and remained that way until the most recent upgrade in 2005. The City discharges to the Crooked River in the winter at river mile 46.8. Summer effluent is beneficially reused for irrigation on the 123-acre Meadow Lakes Golf Course and more recently on farmland adjacent to the facility.

The current NPDES Permit expired on January 31, 2008. On September 20, 2007, the Department received a renewal application, number 973920, from Prineville for a National Pollutant Discharge Elimination System (NPDES) waste discharge permit pursuant to provisions of Oregon Revised Statutes (ORS) 468B.050 and the Federal Clean

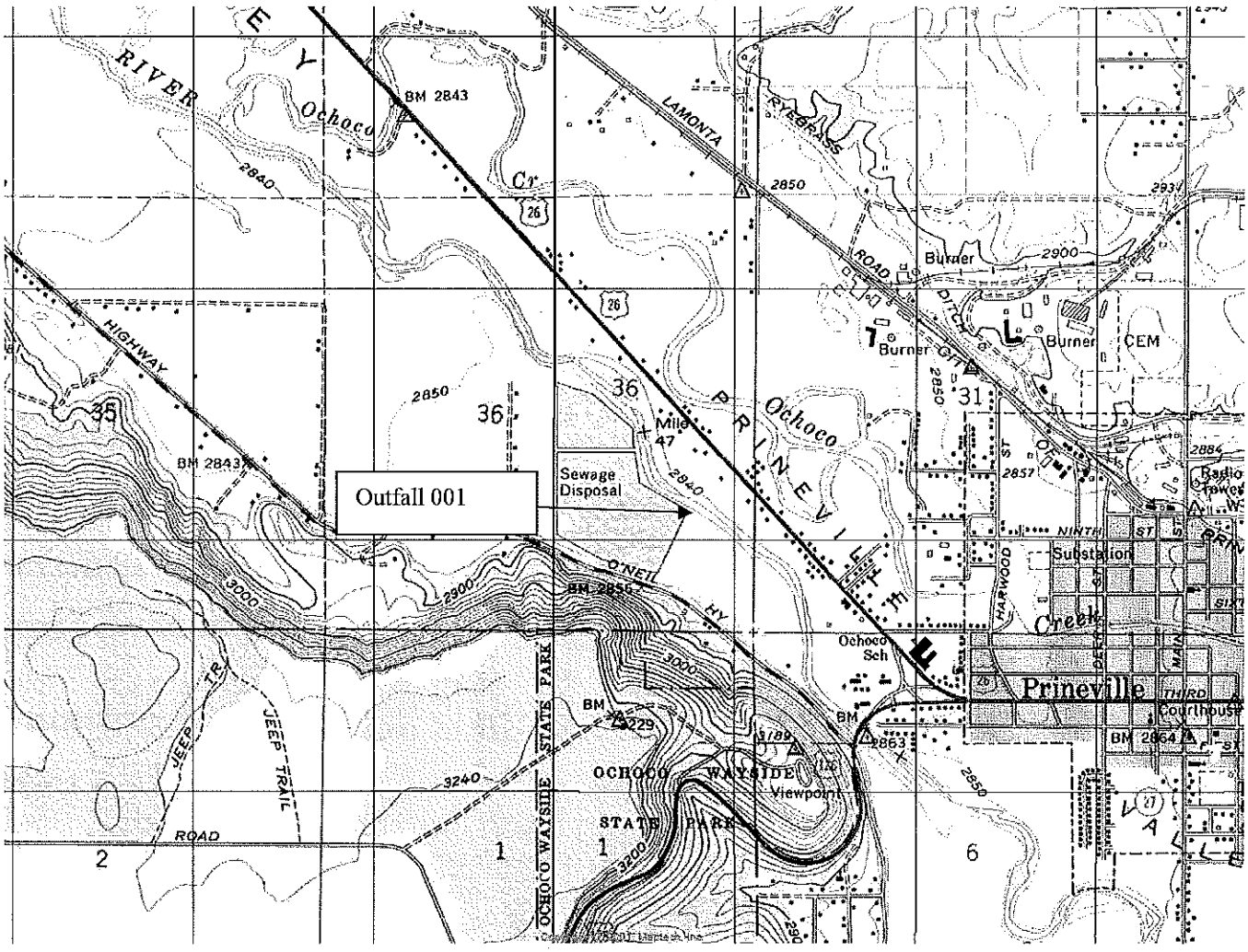
Water Act. This permit evaluation report describes the basis and methodology used in developing the permit. The permit is divided into several sections:

Schedule A – Waste discharge limits

Schedule B – Minimum monitoring and reporting requirements
Schedule C – Compliance conditions and schedules
Schedule D – Special conditions
Schedule F – General conditions

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

RECENT UPGRADE AND FACILITY DESCRIPTION



In 2005 the City completed another major upgrade in response to accelerated growth in the community. The population for the City in 2020 is projected to be 14,981 people assuming a growth rate between 3.5%-5%. A Wastewater Facility Plan was submitted to the Department for approval on January 18, 2001 by ACE Consultants, Inc. which was updated in 2006, and again in 2011 by Anderson-Perry. The 2005 upgrade consisted of constructing a 0.565 MGD partially aerated lagoon treatment facility on land northwest of and adjacent to the existing facility. The construction was originally to take place in two phases each totaling 0.565 MGD, however, it is unclear at this time if the City will construct additional lagoons or choose an alternate treatment option for Phase II. This upgrade while adding to the capacity of the treatment facility is strictly treated and routed for land application disposal and does not increase the volume or mass load discharged to the Crooked River.

The wastewater treatment facility now consists of two (2) partially aerated facultative lagoon treatment plants operating in parallel. The treatment capacity of these systems together is nominally 1.67 million gallons per day

(mgd)and produces a Class C effluent for irrigation. A newly constructed Influent Pump Station is used to split the amount of flow between the existing (Plant 1) and new facilities (Plant 2). There are influent flow meters measuring the flows pumped to each of the facilities. The influent pump station consists of 10 submersible sewage pumps capable of pumping up to 5,160 gpm for short periods of time.

Plant 1 is the City's original 1.1 mgd lagoon system that was upgraded to a partially aerated facultative lagoon system in 1990 and then retrofitted with solar powered low energy mixers as supplemental aeration in 2005 in order to cut back on aeration power usage. The system consists of aerated and facultative lagoons, rock filter, and disinfection chamber. The design influent flow is 1.1 mgd with a maximum daily influent flow of 1.4 mgd. The primary lagoon is 37 acres in size and has a detention time at 1.0 mgd of 60 days. The secondary lagoon is 13 acres in size and has a detention time at 1.0 mgd for 21 days. After the treatment lagoons, the water is then filtered through two (2) rock filter chambers, both 1.2 acres in size. Once the wastewater passes through the treatment system, it is disinfected using a chlorine solution. The effluent is discharged to the Crooked River during the winter months and is stored in an Effluent Storage Lagoon and used for irrigation during the summer on the City owned golf course.

Plant 2 is the new 0.57 mgd facultative lagoon system operated in parallel with Plant 1. The plant consists of three treatment lagoons normally operated in series. Wastewater from the Influent Pump Station is discharged first into an aerated lagoon and then passes sequentially through two facultative lagoons. After treatment in the lagoons the wastewater effluent is held in a chlorine contact chamber where it is disinfected. The chlorinated effluent is stored in the Effluent Storage Lagoon in the winter months and is used for irrigation in the summer months on City owned pasture lands adjacent to the treatment facility. The average daily flow of Plant 2 is 0.57 mgd with a peak daily flow of 1.54 mgd. Lagoon 1 is an aerated basin 3.49 acres in size with a 10 foot operating depth. Detention time at 0.57 mgd is 17.5 days. Lagoons 2 & 3 are facultative in nature and are 2.91 acres each with an operating depth of 6 feet. Detention time in Lagoons 2 & 3 at 0.57 mgd is 9.15 days each.

COLLECTION SYSTEM

The wastewater collection system is a combination of different pipe materials (concrete, asbestos cement, and PVC) with varying dates of installation. The collection system is primarily a gravity system; however, there are six major pump stations on the system: Saddle Ridge, Airport Pump Station; Oregon Youth Authority Pump Station; McDougal Pump Station; Western Sky Pump Station; and Williamson Pump Station. The collection system is comprised of a total of 248,352 feet of gravity sewers and five wastewater pumping stations with 11,254 feet of pumped forcemain. The collection system contains a total of 49.2 miles of pipelines ranging in size from 3-inches to 48-inches in diameter and approximately 800 manholes.

INFLOW AND INFILTRATION

According to the City's 2005 Wastewater Master Plan Update, I/I can contribute as much as 0.6 MGD to the influent flow entering the treatment facility. The City has worked diligently over the years on reducing their I/I and should continue to be a long-term commitment for the City

Collection system overflows can result from catastrophic failure of the treatment plant or pump station or high flows due to storm events. The permit prohibits raw sewage discharges. The permittee has experienced no overflows during the prior permit cycle.

The current permit requires a removal efficiency of 65 percent for both carbonaceous biochemical oxygen demand ($CBOD_5$) and total suspended solids (TSS). The permittee has not violated the above removal efficiency limit.

INDUSTRIAL PRETREATMENT

The permittee does not have a formal pretreatment program, nor is one required for this source at this time. However, upon expansion of the collection system to accommodate industrial development, it is recommended that the City review and update as needed it's industrial user ordinance which outlines the pretreatment requirements for any industry which discharges to the City's wastewater treatment facility.

The City conducted an Industrial Waste Survey during the last permit cycle and determined that a DEQ-approved industrial pretreatment program is not needed. The proposed permit requires the permittee to conduct and submit to DEQ an updated Industrial Waste Survey (Survey) within two years of permit issuance. DEQ will review the Survey results and, if DEQ determines that a pretreatment program is required, the permit may be reopened and modified to require development of a pretreatment program.

GROUNDWATER

The City currently monitors three groundwater monitoring wells located near the south lagoons according to Schedule B of the existing permit. Monitoring wells located adjacent to the wastewater lagoons show some adverse effects potentially resulting from lagoon leakage. Results for nitrates in the wells from 2004 to present indicate an increasing trend in nitrate concentrations with the highest result currently at 10.3 mg/l.. Quarterly sampling for the monitoring wells will remain the same in the proposed permit. Four peizometers were installed during the last upgrade around the new irrigation site to measure depth to groundwater during the irrigation season.

STORMWATER

The City of Prineville manages stormwater and other infrastructure development under their Standards and Specifications, Section II, design standards, which requires that all stormwater, where possible, be managed via drainage swales on site. The use of Underground Injection Control (UIC) devices is prohibited as is connection to the sanitary sewer system. This document directs developers to utilize the City's Stormwater Master Plan 2011 for design standards. The Master Plan directs developers to size retention areas to hold the 50 year storm with infiltration and to model the effects of the 100 year storm.

BIOSOLIDS MANAGEMENT

No biosolids have been removed from the lagoons to date. Stabilization of the facility's sludge occurs within the lagoons. During backwashing of the facility's rock filters, biosolids, especially algae, are removed from the rock filters and sent back to the primary cell. No sludge is removed from the lagoon site on a regular basis. Lagoon systems, however, generally require sludge removal as the sludge accumulates.

PERMIT HISTORY

As mentioned above, the wastewater treatment facility was upgraded in 2005 which increased the capacity of the facility which in turn increased the dry weather design flow to 1.6 MGD. Any facility with a design flow greater than 1 MGD is considered a "major" facility. Major dischargers include those industrial and domestic sources that are classified as major sources for permit fee purposes in OAR 340-045-0075(2). The Department has determined that Prineville should be designated as a major wastewater treatment facility. As a major facility the City will be required to perform additional sampling in this proposed permit for metals, toxics, priority pollutants, and WET testing.

COMPLIANCE HISTORY

Following is a summary of activity for the existing permit:

Effective Date	Action
June 12, 2002	Notice of Noncompliance (NON) for TSS limit exceedance.
July 9, 2003	NPDES permit Schedule C deadline violation.
July 10, 2012	Pre-Enforcement Notice (PEN) CBOD and TSS limit exceedances

WATER QUALIY

The Department is responsible for protecting water quality in the state of Oregon. To fulfill this responsibility, the Department sets instream water quality standards for each river basin. The standards are set with the goal of providing full protection to beneficial uses. The City's wastewater treatment facility discharges to the Crooked River at river mile 46.8. OAR 340-41-0130, Table 130A lists the beneficial uses for which Crooked River water quality will be protected. Included in Table 130A are: public domestic water supply; private domestic water supply; industrial water supply; irrigation; livestock watering; anadromous fish passage; salmonid fish rearing; salmonid fish spawning; resident fish & aquatic life; wildlife & hunting; fishing; boating; water contact recreation; aesthetic quality; and hydro power. The applicable water quality standards for the Crooked River (Deschutes Basin) which protect these uses are found in OAR 340-041-0130.

The Department's 2004-2006 303d list indicates that the Crooked River between its mouth and Baldwin Dam (located at RM 57) is water quality limited for:

1. pH annually; and

2. Temperature during the summer.

It does not appear that the Prineville sewage treatment facility is contributing much to the impairment of the Crooked River and its listing on the 303d list since the discharge occurs only during the winter months, and also, since the monitoring station is located upstream of the treatment facility's discharge.

In addition, the Crooked River flows into Lake Billy Chinook, which is also on the Department's 303d list of impaired waterbodies. Lake Billy Chinook is a reservoir located at the mouth of the Crooked River and is water quality limited for chlorophyll *a* and pH in the summer. These two problems are assumed to be caused by excessive phosphorus concentrations that foster the growth of algae. The photosynthetic processes utilized by algae create high pH levels during daylight hours. The Department is scheduled to develop a Total Maximum Daily Load (TMDL) for Lake Billy Chinook and the Upper Deschutes sometime in the near future.

In addition to the responsibility of protecting the water quality of waters of the state, the Department is also responsible for protecting groundwater quality. The use of recycled water is not authorized unless all the requirements of OAR 340-040, Groundwater Quality Protection, are satisfied. Division 40 is considered satisfied by the Department if the City demonstrates that recycled water will not be used in a manner or applied at rates that cause contaminants to be leached into the groundwater in quantities that will adversely affect groundwater quality. The Department has approved a recycled water use plan submitted by the City that indicates that recycled water will be applied to the golf course and the newly approved farmland at agronomic rates and follow sound irrigation practices. The Department requires that the City submit an annual report which demonstrates compliance with their permit, their approved recycled water use plan, and OAR 340-055, Regulations Pertaining to the Use of Recycled Water (Treated Effluent) from Sewage Treatment Plants.

TURBIDITY

Turbidity is a measure of cloudiness in water. It can be caused by soil erosion, waste discharges, and runoff. High turbidity levels mean that water bodies have denser concentrations of particles in the water. Turbidity may adversely affect a wide range of aquatic species, including endangered fish.

The turbidity standard does not allow a discharge that would cause more than a ten percent cumulative increase in natural stream turbidities. The Department has included a requirement to monitor turbidity on a monthly basis in the proposed permit to gather data to determine compliance with the standard.

The Department is currently conducting a rule revision for turbidity.

MIXING ZONE ANALYSIS

Federal regulations and Oregon Administrative Rules allow DEQ to suspend all or part of the water quality standards in small, designated areas around a discharge point. Initial mixing of the wastewater with the receiving stream occurs in these small areas. These are known as "allocated impact zones" or "regulatory mixing zones." Two mixing zones can be developed for each discharge: 1) The acute mixing zone, also known as the "zone of initial dilution" (ZID), and 2) the chronic mixing zone, usually referred to as "the mixing zone." The ZID is a small area where acute criteria can be exceeded as long as it does not cause acute toxicity to organisms drifting through it. The mixing zone is an area where acute criteria must be met but chronic criteria can be exceeded. It must be designed to protect the integrity of the entire water body. The applicable rules for Oregon are found in OAR 340-041-0053.

In 2007 DEQ lab personnel conducted a mixing zone analysis which included three days of effluent and instream monitoring. Also, the Department recently conducted a mixing zone analysis using Cormix 5.0, an EPA supported mixing zone model. Dilution values derived from the model were used in all subsequent reviews including determining the reasonable potential for toxicity in the Crooked River. Dilution at the regulatory mixing zone was determined to be 22 while the dilution at the ZID is 14.

REASONABLE POTENTIAL ANALYSIS

EPA has developed a methodology called Reasonable Potential Analysis (RPA) for determining if there is a reasonable potential for a discharge to cause or contribute to violations of water quality standards. RPA takes into account effluent variability, available dilution (if applicable), receiving stream water quality, aquatic health water quality standards, and human health water quality standards.

DEQ has adopted EPA's methodology for conducting RPA. If the RPA results indicate that there is a potential for the discharge to cause or contribute to exceedances of water quality standards, the methodology is then used to determine permit limits for the discharge so as to *not* cause or contribute to violations of water quality standards.

A Reasonable Potential Analysis was conducted for this permit renewal and is attached to this report (Attachments 4, 5, and 6).

AMMONIA

Ammonia is a substance normally found in wastewater. The wastewater treatment processes, particularly aeration and biological treatment, can convert (oxidize) a large portion of ammonia to nitrate and nitrite, but the treated effluent still contains some ammonia. After discharge, continued ammonia oxidation removes dissolved oxygen from the receiving stream. Un-oxidized ammonia is also a toxic agent and may have to be limited to prevent in-stream toxicity. Ammonia toxicity varies with pH and temperature of the water. Photosynthetic consumption of CO2 tends to increase pH during the day while respiratory production of CO2 tends to decrease pH at night. The pH rise and drop is almost entirely based on CO2 levels. During the day when photosynthesis is actively occurring, CO2 levels drop due to the consumption of oxygen, and pH goes up. At night when photosynthesis decreases so does the pH since organisms are respiring CO2 and more hydrogen ions make the water more acidic. Employing the process of photosynthesis for growth, algae and aquatic plants consume carbon dioxide (thus raising pH) and produce an overabundance of oxygen. At night the algae and plants respire, depleting available dissolved oxygen. Diurnal patterns in pH due to photosynthesis and respiration could significantly affect ammonia speciation and thus un-ionized ammonia concentrations.

Finally, ammonia and other nitrogen compounds are nutrients that can contribute to excessive biological growth that may cause violations of water quality standards. The problems could manifest as visual or aesthetic impairment or could be the cause of large fluctuations of dissolved oxygen or pH.

Ammonia is a common constituent in sewage, and its conversion to nitrates varies among treatment facilities. Ammonia can be toxic to aquatic organisms, and therefore, sewage treatment plants in Oregon must meet the state toxicity standards for ammonia. Ammonia also exerts a very large oxygen demand on the receiving stream.

Ammonia limits are included in permits under two circumstances; if the discharge violates toxicity standards; or if the receiving stream is water quality limited for dissolved oxygen. Again, ammonia toxicity varies depending on the stream temperature and pH, and both are used in setting the effluent limit.

A reasonable potential analysis for ammonia was conducted to determine if the ammonia in the effluent had the potential to cause toxicity in the Crooked River (Attachment 6). The analysis indicated that there is no potential for ammonia toxicity to occur from the discharge outside the allowable mixing zone. Please refer to the reasonable potential analysis spreadsheet attached to this report. Dilution values were derived from modeling the effluent discharge utilizing Cormix 5.0, an EPA supported mixing zone model. Dilution at the edge of the mixing zone was determined to be 22 with dilution at the ZID at 14. There were 133 ammonia samples analyzed over a 5 year period with the highest concentration at 17 mg/L. The 7Q10, 1Q10, and 30Q5 stream flow values were derived using DFLOW, an EPA supported software for calculating critical low stream flows.

TEMPERATURE

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

Each basin in the State has adopted water quality standards. The purpose of the temperature standard, like all water quality standards, is to protect the beneficial uses of waters of the state and to preserve the health of our aquatic ecosystems. In achieving these purposes, the water quality standards also serve the goal of the federal Clean Water Act: to maintain and restore the chemical, physical and biological integrity of the nation's waters. The beneficial uses most sensitive to water temperature are fish and aquatic life and, therefore, the temperature standard is based on protecting these beneficial uses.

The Crooked River is listed on the 303(d) list for temperature during the summer. Since the City only discharges to the Crooked in the winter months the Department is mostly concerned with those "shoulder" months (April and November) when higher stream temperatures may be an issue.

Since the last permit was issued, the Department has adopted a new temperature standard. In addition, for streams that are listed on Oregon's 303(d) list, prior to the completion of a temperature TMDL or other cumulative effects analysis, the rule states that no single NPDES point source that discharges into a temperature water quality limited water may cause the temperature of the water body to increase more than 0.3 degrees Celsius (0.5 Fahrenheit) above the applicable criteria after mixing with either twenty five (25) percent of the stream flow, or the temperature mixing zone, whichever is more restrictive (340-041-0028(12)(b). The existing permit for this facility required collection of effluent temperature data for the first time. In addition, the Department monitored river temperature during the critical months of April and November in 2006 and 2007, and used this data to determine the reasonable potential for a significant increase in temperature resulting from the discharge.

In addition to this rule, however, there are two additional requirements in the new temperature rules that apply to this source: cold water protection (OAR 340-041-0028(11) and thermal mixing zones (340-041-0053).

The Department uses the following equations to determine compliance with the biologically based criteria and cold water protection temperature standards (Refer to the attached Excel worksheet):

Equation used to calculate the change in temperature (ΔT_{mz}) at edge of the Mixing Zone:

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

Equation used to calculate thermal load limit:

$$TLL = 3.78541 Q_e S \Delta T_{all} C_p \rho$$

Where:

Qe = Effluent Flow in mgd
S = Dilution
ΔT_{all} = Allowable temperature increase at edge of MZ (°C)
Cp = Specific Heat of Water (1 cal/g °C)
P = Density of Water (1 g/cm^3)
3.78541 = Conversion from mgd to m^3/day (3,785.41) and from cal to kcal (1/1000)
T*e* = Effluent temperature (°C)
T*a* = Ambient stream temperature criterion (°C)

As can be seen from the worksheets the discharge from the wastewater treatment facility does not cause the temperature of the Crooked River to be increased greater than 0.3°C above the applicable criteria (18°C) at the edge of the mixing zone, at 100% of the stream flow, or at 25% of the stream flow. Based on the above analysis, there appears to be no reasonable potential that this facility will cause or contribute to a temperature standard violation in the Crooked River.

Although these results show compliance with the biological criteria and cold water sections of the temperature standard, the thermal plume requirements also apply to the discharge.

Thermal Plume Criteria

Recent revisions to the Department's water quality standards include temperature thermal plume limitations in OAR 340-041-0053(d). This section of the rules contains criteria to prevent potential adverse impacts that may result from thermal plumes. Note that the temperature thermal plume limitations that the Department has adopted are similar to the recommendations in the April 2003 EPA Region X Temperature guidance.

The criteria as they apply to the Prineville STP are discussed below:

- *OAR 340-041-0053(d)(A)*: Impairment of an active salmonid spawning area where spawning redds are located or likely to be located.
  Prineville discharge: There is no sahnonid spawning in this segment of the Crooked River. This segment of the Crooked serves as a rearing and migration corridor for salmonids (OAR340-041, Figure 130A).

- *OAR 340-041-0053(d)(B)*: Acute impairment or instantaneous lethality is prevented or minimized by limiting potential fish exposure to temperatures of 32°C or more to less than 2 seconds.
  Prineville discharge: Based on temperature data collected at the STP, the maximum effluent temperature at outfall 001 is 17°C. Thus, the discharge is not expected to cause an acute impairment or instantaneous lethality.

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

Prineville discharge: The mixing zone has been set so that it does not occupy more than 5% of the width of the river. The Reasonable Potential Analysis spreadsheet shows that there is no potential for thermal shock in this scenario.

- *OAR 340-041-0053(d)(D)*: Unless ambient temperature is 21°C or greater, migration blockage is prevented or minimized by limiting potential fish exposure to temperatures of 21°C or more to less than 25% of the cross-section of 100% of the 7Q10 flow of the waterbody.
  Prineville discharge: The mixing zone is less than 25% of the cross section of 100% of the 7Q10 flow for the waterbody, thus the discharge will not be a cause for migration blockage. Effluent temperatures when discharged are less than 21°C.

Thus, the analysis indicates that the discharge from the Prineville STP meets the temperature thermal plume limitations in OAR 340-041-0053(d).

TOXICS

DEQ requires that major NPDES dischargers, i.e. those that discharge more than 1 mgd, conduct extensive toxicity tests on their effluent. The testing aims at determining whether the effluent contains toxic concentrations of specific substances (metals, cyanide, phenols, volatile organics, acid extractables, and base neutrals) as well as whether the effluent as a whole may have toxic effects on aquatic life.

The federal Clean Water Act requires states to develop and, from time to time, revise state water quality standards. While the Act requires states to develop and adopt the regulations, EPA retains an oversight role and must approve the regulations before states can implement them. The Oregon Environmental Quality Commission approved DEQ's proposed revised standards through a rulemaking earlier in 2011. The U.S. Environmental Protection Agency approved Oregon's proposed water quality standards for toxic pollutants affecting human health on Oct. 17, 2011. These standards establish goals for Oregon's surface waters, including protecting sources of drinking water and helping ensure that fish from Oregon's waters are safe to eat. DEQ's revised water quality standards incorporate a fish consumption rate that reflects the range of fish consumed by Oregonians. The EPA-approved standards revised the human health criteria for 113 toxic pollutants based on a per-capita fish consumption rate of 175 grams per day (equivalent to 23 eight-ounce fish meals per month). The Department has subsequently updated our Reasonable Potential Analysis (RPA) tool for evaluating whether point sources have the potential to cause toxicity in the receiving stream. For Prineville, 3 pollutants (arsenic, silver, and methylmercury) were identified in the effluent discharge at concentrations of concern, meriting additional water quality analysis. For these parameters, additional effluent and ambient data was used to perform a complete RPA and model the potential impacts upon the receiving water body.

ARSENIC

Arsenic is found at naturally occurring elevated levels in many of the streams and ground water in Oregon, including the Crooked River. The total arsenic concentration in the Crooked River has been measured with results ranging from 1 ug/l to 4 ug/l (2007-2011 data). As mentioned above, the Department has recently revised its human health arsenic criterion which now better reflects the more toxic speciation's of arsenic (inorganic arsenic) using a regionally appropriate health-risk calculation method. The water quality human health criterion for arsenic is now 2.3 ug/l (water and fish ingestion).

Evaluating effluent characterization data, Arsenic was identified as a pollutant of concern meriting additional water quality analysis. Using ambient characterization data in conjunction with the effluent data, it was determined that there was no reasonable potential for the discharge to cause or contribute to an exceedence of the in-stream water quality criterion (see RPA spreadsheet). What this means for the City is that the current mixing zone is adequate to provide enough dilution to meet the new arsenic criteria. The concern for the Department is that any increase in the discharge volume or increase in arsenic concentration could result in an in-stream exceedence of the water quality criterion. The City will need to monitor existing and new industrial discharges closely to insure that arsenic levels do not increase significantly.

It should also be noted that the new arsenic criteria is for inorganic arsenic. The RPA was run using total arsenic as a surrogate for inorganic arsenic which for now should reflect a more conservative result. The City may continue to run effluent samples for total arsenic if ambient samples are also collected at the same time (split process) or alternatively the City can begin to run inorganic arsenic samples.

SILVER

According to the most recent Reasonable Potential Analysis (RPA) conducted for this permit evaluation, silver has been shown to have the potential to cause aquatic toxicity in the Crooked River. Based on this analysis the permittee will be required to monitor for silver at the increased rate of once per month for two years and at a quantitation limit of 1ug/l or less. No limit will be required at this time since it appears that the analysis may have been skewed by one high data point. This high value could have been caused by an upset condition, such as, a storm event or other onetime event. The increase in monitoring will help determine the validity of the existing data and help reduce sampling error anomalies. After two years, the Department will perform another RPA and if necessary, reopen the permit and include an effluent limit for silver.

METHYL-MERCURY

As mentioned above, EPA approved revisions to Oregon's water quality standards in 2011. One of the revisions included the addition of a new methyl-mercury (MeHg) water quality criterion because methylation of mercury is a key step in the entrance of mercury into food chains. Oregon's new criterion of 0.040 mg/kg is expressed as a fish tissue residue concentration rather than a water column concentration as all other human health criteria adopted by Oregon. Humans are exposed primarily to methyl-mercury rather than to inorganic mercury and the dominant exposure pathway is through consumption of contaminated fish and shellfish rather than from drinking or swimming in water.

Instream and effluent sample results for the City of Prineville show a quantifiable amount of total mercury in the discharge. At this time, DEQ considers any facility with consistent concentrations of total mercury in the discharge to have a reasonable potential to exceed the methyl-mercury criterion in the receiving stream unless a site specific survey has determined otherwise. For this reason, the permit requires the city to develop and begin implementation of a department-approved mercury minimization plan (MMP) by 2014 unless the city can demonstrate that in-stream fish tissue concentrations are less than the water quality criterion. DEQ is scheduled to complete guidance for MMPs by the end of 2012; however, should guidance be delayed or the city need to begin its process earlier, DEQ will accept plans developed in accordance with EPA Region 5: EPA's **Guidance for implementing the January 2001 Methylmercury Water Quality Criterion.**

WHOLE EFFLUENT TOXICITY

In addition to analyzing the effluent for individual pollutants, the permittee will also be required to test the effluent to determine its aggregate effect on aquatic organisms. These tests are known as whole effluent toxicity (WET) tests. Effluent samples are collected and aquatic organisms are subjected to various effluent concentrations in controlled laboratory experiments.

WET tests are used to determine the percentage of effluent that produces an adverse effect on a group of test organisms. The measured effect may be fertilization, growth, reproduction, or survival. EPA's methodology includes both an acute test and a chronic test. An acute WET test is considered to show toxicity if significant mortality occurs at effluent concentrations less than that which is found at the edge of the zone of immediate dilution (ZID). A chronic WET test is considered to show toxicity if significant adverse affects occur at effluent concentration less than that which is known to occur at the edge of the mixing zone.

EPA has developed WET test protocols using freshwater, marine, and estuarine test species. EPA recommends running tests using an invertebrate, vertebrate, and a plant test organism. Organisms used in WET tests are indicators or surrogates for the aquatic community to be protected, and a measure of the real biological impact from exposure to the effluent. To protect water quality, EPA recommends that WET tests be used in NPDES permits together with requirements based on chemical-specific monitoring.

DEQ has included WET testing in the proposed renewal permit. Details of the WET testing can be found in Schedule D of the proposed renewal permit.

TRADING

Water quality trading is an innovative approach aimed at achieving water quality goals more efficiently than traditional methods. The Clean Water Act authorizes EPA, states, and tribes to develop a variety of programs and activities to control pollution, such as water trading. In addition, Oregon Revised Statute (ORS) 468B.555 directs DEQ to develop and implement a pollutant reduction trading program as a means of achieving water quality objectives and standards in Oregon in a manner that complies with state and federal water quality regulations and promotes economic efficiency.

ANTI-DEGRADATION

DEQ performed an anti-degradation review for this discharge. Permit renewals with the same discharge loadings as the previous permit are not considered to lower water quality from the existing condition. Based on the anti-degradation review (see Attachment 1). DEQ determined that the proposed discharge complies with the Anti-degradation Policy for Surface Waters found in OAR 340-041-0026.

PERMIT LIMITS

There are two categories of effluent limits for NPDES permits: Technology-based effluent limits (TBEL) and Water quality-based effluent limits (WQBEL).

Technology-based effluent limits define a minimum level of treatment using readily-available technology. In the case of domestic wastewater treatment facilities, federal technology-based effluent limits address biochemical oxygen demand (BOD_5) and total suspended solids (TSS) concentrations and removal efficiency as well as pH.

The minimum treatment levels referred to above are the secondary treatment standards established by EPA for domestic wastewater treatment facilities (found in 40 CFR Part 133). In general, domestic facilities must achieve biochemical oxygen demand (BOD_5) and suspended solids (TSS) monthly average concentrations of 30 mg/L and weekly average concentrations of 45 mg/L. If carbonaceous biochemical oxygen demand ($CBOD_5$) is substituted for BOD_5, the monthly average concentration is 25 mg/L and the weekly average concentration is 40 mg/L. In addition, a minimum removal efficiency of 85 percent is required of domestic dischargers for BOD_5 (or $CBOD_5$) and TSS. Finally, the pH must be between 6.0 and 9.0.

Oregon Administrative Rules establish minimum design criteria for domestic treatment facilities. In this portion of the Deschutes Basin, the BOD_5 and TSS minimum design criteria are monthly average concentrations of 10 mg/L in the low stream flow period and secondary treatment standards in the high stream flow period (OAR 340-041-0130(5)). In addition, there are requirements for disinfection, dilution of oxygen demanding pollutants, and prevention of raw sewage overflows (OAR 340-041-0009).

In contrast, water quality-based effluent limits are developed independent of the available treatment technology and, instead, take into account the quality and quantity of the receiving stream. Water quality-based effluent limits are typically more stringent than technology-based permit limits when the receiving stream is small, is water quality-limited or shows evidence of impairment.

When renewing/reissuing a permit, a permit writer typically evaluates the existing limits in the permit against changes to technology based standards and water quality standards that may have occurred during the permit term. With some exceptions, the anti-backsliding provisions (described in CFR 122.44(l)) do not allow relaxation of effluent limits in renewed/reissued permits. The most stringent of the existing or new limits must be included in the new permit.

FACE PAGE

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

to construct, install, modify, or operate a wastewater collection, treatment, control, and disposal system. The permit allows discharge to the Crooked River within limits set by Schedule A and the following schedules. It prohibits all other discharges.

In accordance with state and federal law, NPDES permits will be effective for a fixed term not to exceed 5 years. Upon issuance, this permit will be effective for no more than 5 years expiring in 2016.

DEQ evaluated the classifications for the treatment and collection systems. The treatment system is considered a Class II system and the collection system is considered a Class III system. DEQ is not proposing any changes to the system classifications.

SCHEDULE A-WASTE DISCHARGE LIMITATIONS

Lagoons are exempt from having to meet federal secondary treatment limits of 30 mg/l each and 85% removal for BOD_5 and TSS. Under 40 CFR 133.105 "treatment equivalent to secondary treatment", lagoon systems qualify for less stringent effluent limits. However, 40 CFR 133.105(f) requires that BOD_5 and TSS permit limitations be more stringent than the "equivalent to secondary" limits for those existing and new facilities capable of achieving more stringent limitations through proper operation and maintenance of the treatment works.

The TSS limits in the proposed permit will remain the same as the existing permit at a maximum of 40 mg/l average monthly effluent concentration; maximum of 60 mg/l weekly effluent concentration; and a minimum of 65% removal.

BOD_5 was replaced by $CBOD_5$ in the existing permit and will remain the same in the proposed permit. The City has determined through an evaluation that the $CBOD_5$ test is more representative of the effluent then BOD_5 because of interfering effects from nitrifying bacteria coming from the rock filter. The allowable alternate $CBOD_5$ permit limits for concentration and percent removal are set by federal law (40 CFR, Part 133). The equivalent values are as follows:

$CBOD_5$ – maximum of 25 mg/l average monthly effluent concentration; maximum of 40 mg/l weekly effluent concentration; and a minimum of 65% removal.

The permit establishes mass load limits for the wintertime discharge of wastewater to the Crooked River. In accordance with OAR 340-041-0061 (9), these mass load limits are calculated based on the treatment facility's capabilities and the highest and best practicable treatment to minimize the discharge of pollutants. Winter monthly average mass load limits for TSS are based upon the achievable monthly average effluent concentration of 40 mg/l and a DADWF of 1.1 MGD. Winter monthly average mass load limits for $CBOD_5$ are based upon a monthly average effluent concentration of 25 mg/l and a DADWF of 1.1 MGD. Mass loads are based on 1.1 MGD since the upgrade in 2005 (0.5 MGD increase in capacity) increased storage holding capacity for the land application system. There has been no increase in the volume of discharge to the Crooked River, and therefore, no lowering of water quality in the river. Weekly average and daily maximum load limits are calculated using standard 1.5 and 2.0 multipliers of the calculated monthly average mass load limits.

The table below indicates the seasonal effluent limitations along with mass load calculations:

Parameter	Monthly Average		Weekly Average		Daily Maximum	
	mg/l	lb/day	mg/l	lb/day	mg/l	lb/day
$CBOD_5$	25	230	40	345	--	460
TSS	40	367	60	550	--	734

(a) $CBOD_5$ Winter Load Calculations:

(1) 25 mg/l achievable monthly average x 8.34 lb/gal x 1.1 MGD = 229.35 (230) lb/day monthly average.

(2) 230 lb/day monthly average x 1.5 = 345 lb/day weekly average.

(3) 230 lb/day monthly average x 2.0 = 460 lb/day daily average.

(b) TSS Winter Load Calculations:

(1) 40 mg/l achievable monthly average x 8.34 lb/gal x 1.1 MGD = 366.96 (367) lb/day monthly average.

(2) 367 lb/day monthly average x 1.5 = 550 lb/day weekly average.

(3) 367 lb/day monthly average x 2.0 = 734 lb/day daily average.

BACTERIA

Upon disinfection and discharge into the storage/dechlorination pond, wastewater, after a period of storage, is discharged either to the river (winter) or the golf course or adjacent land application site (summer). Instream standards for bacteria is typically *E. coli,* however, since Prineville discharges to the river in the winter and land applies in the summer (which requires a total coliform standard), the City has requested that they be allowed to monitor and meet limitations for total coliform only, rather than for both total coliform and *E. coli.*

Pursuant to OAR 340-041-0009(5)(c), wastewater treatment facilities that are authorized to use recycled wastewater pursuant to OAR 340-055, and which also use a storage pond as a means to dechlorinate their effluent prior to discharge to public waters, effluent limitations for bacteria shall, upon request by the permittee, be based upon appropriate total coliform limits as required by OAR 340-055.
Regarding the general condition 6 found in Section B of Schedule F in this permit which prohibits overflows from wastewater conveyance systems, the Environmental Quality Commission (EQC) recognizes that it is impossible to design and construct a conveyance system that will prevent overflows under all storm conditions. The applicant is not seeking permit coverage for overflows and the permit does not authorize such discharges. The State of Oregon has determined that all wastewater conveyance systems should be designed to transport storm events up to a specific size to the treatment facility. Therefore, in exercising its enforcement discretion regarding Sanitary Sewer Overflows, the Department will consider the following:

(1) Whether the permittee has conveyance and treatment facilities adequate to prevent overflows except during a storm event greater than the one-in-five-year, 24-hour duration storm from November 1 through May 21 and except during a storm event greater than the one-in-ten-year, 24-hour duration storm from May 22 through October 31. In addition, DEQ will also consider using enforcement discretion for overflows that occur during a storm event less than the one-in-five-year, 24-hour duration storm from November 1 through May 21 if the permittee had separate sanitary and storm sewers on January 10, 1996, had experienced sanitary sewer overflows due to inflow and infiltration problems, and has submitted an acceptable plan to the Department to address these sanitary sewer overflows by January 1, 2010;

(2) Whether the permittee has provided the highest and best practicable treatment and/or control of wastes, activities, and flows and has properly operated the conveyance and treatment facilities;

(3) Whether the permittee has minimized the potential environmental and public health impacts from the overflow; and

(4) Whether the permittee has properly maintained the capacity of the conveyance system.

DEQ will review the permittee's determination of the one-in-five-year, 24-hour duration winter storm and the one-in-ten year, 24-hour duration summer storm as described above in the permit holder's facilities plan. In the event that a permit holder reports an overflow event associated with a storm event and DEQ does not have information from the permit holder sufficient to determine whether or not the storm event exceeds storm events as specified in OAR 340-041-0009(6) & (7), DEQ will perform the determination using the information contained in Figure 26 of the 1973 NOAA Atlas 2 entitled "Precipitation-Frequency Atlas of the Western United States, Volume X – Oregon". This figure is entitled "Isopluvials of 5-yr 24-hr precipitation in tenths of an inch". The Atlas can be obtained on line at http://hdsc.nws.noaa.gov/hdsc/pfds/other/or_pfds.html, however the file is very large. A scanned version of Figure 26 is available at: http://www.wrcc.dri.edu/pcpnfreq/or5y24.gif. DEQ will compare the information in this figure with rainfall data available from the National Weather Service, or other source as necessary.

pH

The pH is a measure of how acidic or basic a solution is. At a pH of 7.0 s.u. the solution is considered neutral. The purpose of an in-stream water quality pH standard is generally the protection of aquatic life since most aquatic organisms can only tolerate a fairly narrow range around 7.0 s.u.

The Deschutes Basin Water Quality Standard for pH is found in OAR 340-041-0135(1)(a). The allowed range is 6.5 to 8.5 s.u. The proposed permit limits pH to the range 6.0 to 9.0 s.u. This limit is based on Federal secondary treatment standards for wastewater treatment facilities (40 CFR Part 133.102), and is applied to the majority of domestic NPDES permittees in the state. Within the permittee's mixing zone, the water quality standard for pH does not have to be met. The Department evaluated pH using a spreadsheet that derives the pH at the mixing zone boundary **(See pH Worksheet-Attachment 2).** Mixing with ambient water within the mixing zone will ensure that the pH at the edge of the mixing zone meets the ambient criteria. Therefore, the Department considers the proposed permit limits to be protective of the water quality standard.

TOTAL RESIDUAL CHLORINE

Chlorine is a strong chemical oxidizer that is toxic to many aquatic organisms. Its oxidizing properties also make it an effective disinfectant. Wastewater treatment plants, for example, often use it to kill bacteria in their effluent before discharging into waters of the state.

The City uses chlorine in its disinfection stage of treatment. Unfortunately, chlorine is very toxic to aquatic organisms in receiving streams. The City's storage pond allows for de-chlorination of the treated effluent prior to discharge. Like the existing permit, the proposed permit contains a limitation for total chlorine residual to assure that toxicity due to chlorine in the effluent is controlled. The Department modeled the discharge and determined that a monthly average concentration of 0.10 mg/l and a daily maximum of 0.16 mg/l would prevent acute toxicity at the edge of the Zone of Dilution (ZID) and chronic toxicity at the edge of the mixing zone. These limits have been retained in the proposed permit.

EFFLUENT DISCHARGE

OAR 340-41-0007(16)(A)(i)requires that, for the Crooked River sub-basin, effluent BOD_5 concentrations in mg/l, divided by the dilution factor (ratio of receiving stream flow to effluent flow) shall not exceed one unless otherwise approved by the EQC. The dilution rule, if applied would require discharge only if the discharge effluent flow were limited to 1/30 of the river flow. During a previous permit renewal, the City requested and was granted an exception to the dilution rule based upon a water quality analysis that shows that the dissolved oxygen standard would not be

violated provided discharge is limited to periods when river flow is 15 cfs or greater and such that up to 25 cfs, discharged effluent flow is limited to 1/15 of the flow of the river. This requirement is unchanged in the proposed permit.

Outfall Number 002 & 003 - Meadow Lakes Golf Course and New Farmland Irrigation Site

No discharge to state waters is permitted from Outfall Number 002 and 003. All recycled water is to be irrigated on the golf course and new irrigation site in accordance with the Recycled Water Use Plan approved April 28, 2004.

The recycled water shall receive at least Class C treatment as defined in OAR 340-055-0012(5).

SCHEDULE B – MINIMUM MONITORING AND REPORTING REQUIREMENTS

Schedule B describes the minimum monitoring and reporting necessary to demonstrate compliance with the conditions of this permit. The authority to require periodic reporting by permittees is included in ORS 468.065 (5). In 1988, the Department developed a monitoring matrix for commonly monitored parameters which was updated in 2012. Proposed monitoring frequencies for all parameters are based on this matrix and, in some cases, may have changed from the current permit. Self-monitoring requirements are the primary means of ensuring that permit limits are being met. Other parameters may also need to be monitored when insufficient data exist to establish a limit, but where there is a potential for a water quality concern. The proposed monitoring frequencies for all parameters correspond to those of facilities of similar size and complexity in the state.

The permittee is required to have a laboratory Quality Assurance/Quality Control program. The Department recognizes that some tests do not accurately reflect the performance of a treatment facility due to quality assurance/quality control problems. These tests should not be considered when evaluating the compliance of the facility with the permit limitations.

Several new monitoring and reporting requirements have been added to the proposed permit including Priority Pollutant Scans and Whole Effluent Toxicity (WET) testing. Silver is also required to be monitored every other month for two year in response to a Reasonable Potential Analysis (RPA) which showed a reasonable potential for silver to cause toxicity in the Crooked River. After two years another RPA will be run using the additional data to determine if silver is a concern. Daily monitoring of effluent flow is required in this permit. In addition, calibration of the flow meter is required on a regular basis.

Monitoring for Carbonaceous Biochemical Oxygen Demand (CBOD) has been substituted for BOD monitoring. Typically, whenever one or more permit limitations are based on CBOD, Department policy requires monitoring for ammonia concentration in the same sample.

Discharge monitoring reports must be submitted to the Department monthly by the 15th day of the following month. The monitoring reports need to identify the principal operators designated by the City to supervise the treatment and collection systems.

The City of Prineville is not required to have a formal pretreatment program at this time. As such, monitoring for specific toxic parameters has not been included in the proposed permit.

Groundwater monitoring requirements are the same as the existing permit.

SCHEDULE C – COMPLIANCE CONDITIONS AND SCHEDULES

There is no Schedule C included in this proposed permit.

SCHEDULE D - SPECIAL CONDITIONS

The permittee must have the facilities supervised by personnel certified by the Department in the operation of treatment and/or collection systems.

Schedule D includes a condition requiring the development and implementation of a contingency plan for the prevention and handling of spills and unplanned discharges.

Schedule D includes a special condition on the management and maintenance of groundwater monitoring wells.

This schedule also includes a condition for the proper use of recycled water, and procedures for whole effluent toxicity testing.

And finally, Schedule D includes a requirement for the City of develop a Methyl-Mercury Minimization Plan by December 15, 2014 (see Methyl-Mercury section on page 10).

SCHEDULE F – GENERAL CONDITIONS

These conditions are standard to all domestic NPDES permits and include language regarding operation and maintenance of facilities, monitoring and record keeping, and reporting requirements. The General Conditions have been revised since the last permit was issued. A summary of the changes is as follows:

- There are additional citations to the federal Clean Water Act and CFR, including references to standards for sewage sludge use or disposal.
- There is additional language regarding federal penalties.
- Bypass language has been made consistent with the Code of Federal Regulations.
- Overflow language has been modified. Formerly the language stated that overflows in response to the five or ten year event would not violate the permit. Now it states that overflows are prohibited. DEQ will continue to exercise enforcement discretion with respect to overflows consistent with the provisions of the Bacteria Rule (OAR 340-041-0009).
- Reporting requirements regarding overflows have been made more explicit.
- Requirements regarding emergency response and public notification plans have been made more explicit.
- Language pertaining to duty to provide information has been made more explicit.
- Confidentiality of information is addressed.

Next Steps

Public Comment Period

The proposed NPDES permit will be made available for public comment for 35 days. Public notice and links to the proposed permit will be posted on DEQ's website, advertised in newspapers (major sources), and sent to subscribers to DEQ's pertinent public notice e-mail lists. A Public Hearing will be scheduled if requested by 10 or more people, or by an authorized person representing an organization of at least 10 people. If a public hearing is to be held, then an additional public notice would be published to advertise the public hearing.

Response to Comments

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

Modifications to Permit Evaluation Report and Fact Sheet

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

Issuance

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

MODIFICATION
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT

Department of Environmental Quality
Eastern Region – Bend Office
475 NE Bellevue Dr., Suite110, Bend, OR 97701
Telephone: (541) 388-6146

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

ISSUED TO:

City of Prineville
387 NE 3rd Street
Prineville, OR 97754

SOURCES COVERED BY THIS PERMIT:

Type of Waste	Outfall Number	Outfall Location
Treated Wastewater	001	R.M. 46.8
Recycled Water Reuse	002	Golf Course
Recycled Water Reuse	003	Land Irrigation
Wetland Discharge	004	Monitoring Wells within R.M. 45.6-44.6

FACILITY TYPE AND LOCATION:

Stabilization Lagoons with Aeration,
Facultative Lagoons, Constructed Wetlands
1 mile N.W. of Prineville
Prineville, OR

Treatment System Class: Level II
Collection System Class: Level III

EPA REFERENCE NO: OR-002361-2

RECEIVING STREAM INFORMATION:

Basin: Deschutes River
Sub-Basin: Lower Crooked
Receiving Stream: Crooked River
LLID: 1212676445778 46.8 D
County: Crook

Don Butcher, Water Quality Permit Manager
Eastern Region

September 25, 2015
Date

ADDENDUM NO. 1

NPDES Permit No. 101433, Face Page, Schedules A, B, and D are hereby modified as shown to include Outfall 004. This permit modification shall be attached to and be made part of the existing NPDES Permit. All other conditions in NPDES Permit #101433 remain unchanged by this permit modification.

SCHEDULE A shall be modified to include:

4. Treated Effluent Outfall 004 (effective upon completion of upgrade)

a. BOD_5 and TSS

i. May 1 – October 31: During this time period the permittee must comply with the limits in the following table:

Table A1: BOD_5 and TSS Limits

Parameter	Average Effluent Concentrations, mg/L		Monthly Average lbs/day	Weekly Average lbs/day	Daily Maximum lbs
	Monthly	Weekly			
BOD_5	10	15	100	150	200
TSS	10	15	100	150	200

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

Table A2: BOD_5 and TSS Limits

Parameter	Average Effluent Concentrations, mg/L		Monthly Average lbs/day	Weekly Average lbs/day	Daily Maximum Lbs
	Monthly	Weekly			
BOD_5	30	45	280	410	550
TSS	30	45	300	450	600

iii. Additional information for the limits in Tables A1 and A2 above.
1) For BOD5, average dry weather design flow to the facility equals 1.2 MGD. Mass load limits are based on 1.1 MGD.
2) For TSS, average dry weather design flow to the facility equals 1.2 MGD. Mass load limits are based on 1.2 MGD.

b.

Other parameters (year-round)	Limitations
E. coli Bacteria (see Note 1.)	Monthly geometric mean may not exceed 126 organisms per 100 ml. No single sample may exceed 406 organisms per 100 ml.
pH (see Note 2.)	Must be within the range of 6.5 – 8.5
BOD_5 and TSS Removal Efficiency	Must not be less than 85% monthly average .
Total Chlorine Residual	Must not exceed a monthly average of 0.10 mg/l and a daily maximum of 0.16 mg/l.

NOTES:

4/ No single *E. coli* sample may exceed 406 organisms per 100 mL; however, DEQ will not cite a violation of this limit if the permittee takes at least 5 consecutive re-samples at 4 hour intervals beginning within 28 hours after the original sample was taken and the geometric mean of the 5 re-samples is less than or equal to 126 *E. coli* organisms/100 mL.

5/ pH must be monitored at the compliance wells.

SCHEDULE B shall be modified to include:

2. Minimum Monitoring Requirements

f. Effluent Monitoring at outfall 004 (effective upon completion of Outfall 004)

i. Background and compliance monitoring must be conducted in the following monitoring wells and surface water stations:

Monitoring Well	Well Designation[1]
MW-1	Upgradient
MW-2	Upgradient
MW-3	Upgradient
MW-4	Upgradient
MW-5	Compliance/detection
MW-6	Compliance/detection
MW-7	Compliance/detection
MW-8	Compliance/detection
MW-9	Compliance/detection
SW-1 thru SW-7	Surface Water Stations
Detection Well	Detection

[1] Groundwater monitoring and compliance monitoring must be conducted in accordance with the approved Groundwater Monitoring Plan. Each monitoring well (MW-1 thru MW-9, SW-1 thru SW-7, and Detection) must be monitored. Grab samples from groundwater monitoring wells must be collected after the well has been purged according to accepted practices for groundwater well monitoring. Grab samples from compliance and detection wells must be collected in accordance with the approved groundwater monitoring plan.

ii. At a minimum, the permittee must monitor Outfall 004 for the parameters and at the frequencies as specified below[1,2]:

Parameter	Minimum Frequency	Type of Sample
Flow	Daily	Measurement
Flow Meter Calibration	Annual	Report completion of event
Water Surface Elevation	Monthly	Field Measurement
pH[3]	2/week	Field Measurement
NH3-N[3]	Weekly	Grab
NO2+NO3-N	Monthly	Grab
Conductivity	Monthly	Field Measurement
BOD5[3]	2/week	Grab
TSS[3]	2/week	Grab
E. Coli[3]	2/week	Grab
Sulfate	Quarterly	Grab
Chloride	Quarterly	Grab
Average Percent Removed (BOD5 & TSS)	Monthly	Calculation
Total Dissolved Solids	Monthly	Grab
Temperature[3]	2/week	Field Measurement

[1]Monitoring may be reduced after two years upon permittee request and Department approval. The Department will evaluate each parameter and only reduce monitoring for those parameters where data has been determined to be sufficient.
[2]Detection monitoring wells must be sampled as identified in the Department approved Groundwater Monitoring Plan.
[3]Monitoring may be reduced after one year upon permittee request and Department approval. The Department will evaluate each parameter and only reduce monitoring for those parameters where data has been determined to be sufficient

iii. At a minimum, the permittee must monitor upgradient groundwater wells (MW-1, MW-2, MW-3, and MW-4)[1] for the parameters and at the frequencies as specified below:

Parameter	Minimum Frequency	Type of Sample
Water Surface Elevation	Monthly	Field Measurement
NO2+NO3-N	Quarterly	Grab
E. Coli	Quarterly	Grab
Sulfate	Quarterly	Grab
Chloride	Quarterly	Grab
Total Dissolved Solids	Quarterly	Grab

[1]Monitoring may be reduced after two years upon permittee request and Department approval. The Department will evaluate each parameter and only reduce monitoring for those parameters where data has been determined to be sufficient.

iv. At a minimum, the permittee must monitor surface water stations (SW-1 thru SW-4 both up & down & side; and SW-5 thru SW-7) for the parameters and at the frequencies as specified below:

Parameter	Minimum Frequency	Type of Sample
Water Elevations [1]	Monthly	Field Measurement

[1]Monitoring may be reduced after two years upon permittee request and Department approval. The Department will evaluate each parameter and only reduce monitoring for those parameters where data has been determined to be sufficient.

v. Groundwater Reporting Requirements

(1) Quarterly Reporting: Analytical results of groundwater monitoring must be reported quarterly in a Department approved format. At a minimum, the report must contain the quarterly reporting information identified in the approved monitoring plan. Reports are due to the Department by the 30th day of the first full month following the sampling event.

(2) Annual Data Analysis and Reporting: An annual data analysis report must be submitted to the Department by March 31st following each year of monitoring. The annual report must contain the annual data analysis and reporting information identified in the approved monitoring plan.

(3) Compliance monitoring results will be submitted monthly on discharge monitoring report forms.

vi. Groundwater Monitoring Re-sampling Requirements

(1) If monitoring indicates a significant increase (increase or decrease for pH) in the value of a parameter monitored, the permittee must immediately resample. A significant change will be deemed to have occurred for any parameter if the change is not within three standard deviations of the running average for that parameter. If the resampling confirms the change in water quality, the permittee must:

(a) Report the results to the Department within 10 days of receipt of the laboratory data; and

(b) Prepare and submit to the Department within 30 days a plan for developing a preliminary assessment unless another time schedule is approved by the Department.

(2) The Department may reopen the permit, if necessary, to include new or revised monitoring items or parameters, minimum frequency, or type of sample, or reporting procedures.

(3) Should monitoring data indicate that the permittee's discharge poses a significant threat to groundwater quality, the Department may reopen this permit, if necessary, to include corrective action and/or additional monitoring requirements.

SCHEDULE D shall be modified to include:

10. The Department may reopen the permit, if necessary, to include new or revised discharge limitations, monitoring or reporting requirements, compliance conditions and schedules, and special conditions.