City of LA PINE

City of
La Pine, Oregon
WASTEWATER SYSTEM STUDY UPDATE

2016

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WASTEWATER SYSTEM STUDY UPDATE

FOR

CITY OF LA PINE, OREGON

2016

The City of La Pine, Oregon, has reviewed this Wastewater System Study Update and adopted it.

_____ _____

Signature and Title Date

This project was funded through the Water/Wastewater Financial Program, administered by Business Oregon - Infrastructure Finance Authority, and the City of La Pine.

ANDERSON PERRY & ASSOCIATES, INC.

La Grande, Oregon
Prineville, Oregon
Walla Walla, Washington

Job No. 33-06

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Executive Summary

Introduction

This Executive Summary briefly summarizes the results of the Wastewater System Study (WWSS) Update prepared by Anderson Perry & Associates, Inc. (AP) for the City of La Pine, Oregon. The recommendations outlined hereafter have been developed in cooperation with the La Pine City Council and City staff. The focus of this WWSS Update is on the overall wastewater system, including the collection, treatment, and disposal systems and, most notably, the existing system's ability to serve the potential addition of the Cagle and Glenwood Acres areas. This WWSS Update includes an analysis of the existing system and its performance, evaluation of system needs, evaluation of improvement alternatives, and development of a financial plan and project implementation plan. Included in this Executive Summary is a brief discussion of the existing wastewater system, the wastewater system improvements selected by the City Council, the current financial status of the Water Department, and a preliminary project implementation plan. For a more detailed discussion of the information presented in this Executive Summary, please refer to the individual chapters of this WWSS Update.

Existing Collection System Overview

Construction of the majority of the City's wastewater collection system was completed in the late 1980s, with a major system expansion in 2004. The wastewater collection system serving the City of La Pine is shown on the Wastewater System Map attached at the end of this WWSS Update. The Wastewater System Map shows that the gravity collection system drains to four primary lift stations and one smaller lift station. The four primary lift stations utilize pressure sewer lines that transport the wastewater from the lift stations to the lagoon wastewater treatment system.

Gravity and Pressure Sewer

The portions of the collection system that would be affected by the addition of the Cagle and Glenwood Acres areas were evaluated. All gravity mains were reportedly constructed of 3034 polyvinyl chloride (PVC) sewer pipe. These gravity mains collect septic tank effluent from users and direct it to one of the five lift stations within the collection system. Each lift station conveys the septic tank effluent to the wastewater treatment facility (WWTF) via pressure mains. Discussions with City staff indicate that the collection system seems to be in relatively good condition.

Lift Stations

Complete and detailed evaluations of each lift station were not performed as part of this WWSS Update. The addition of the Cagle and Glenwood Acres areas will only impact the Wickiup Lift Station. AP recently completed a study and design to upgrade the Wickiup Lift Station to serve the addition of the Cagle and Glenwood Acres areas. That analysis is not repeated herein but is included in the Appendices of this WWSS Update. The City's lift stations are shown on the Wastewater System Map. The four primary lift stations owned by the City are the 1st Street Lift Station, the Wickiup Lift Station, the Newberry Lift Station, and the Industrial Park Lift Station. The small Heath Drive Lift Station is also owned by the City and serves only a few homes.

Wastewater Treatment Facility Overview

General

The City's WWTF is shown schematically on Figure ES-1. The WWTF is located adjacent to the Burlington Northern Santa Fe Railroad and Reed Road and includes the treatment and storage cells, a septage receiving station, an operation and maintenance building, and a wastewater disposal site.

Description

The City treats its wastewater using a three-cell, partially aerated facultative lagoon secondary treatment system, with a fourth cell used for storage of treated wastewater. The geometric data for the City's lagoons are summarized on Table ES-1. The City's treatment lagoons are considered facultative lagoons, meaning both aerobic and anaerobic processes are used to treat the wastewater. These types of wastewater treatment lagoons are common throughout central and eastern Oregon. The original WWTF and pivot irrigation system were constructed in 1989, with upgrades to the WWTF occurring in 1998 and 2003. The major reason for the 2003 improvements was to provide additional storage for wintertime flows.

TABLE ES-1
POND GEOMETRIC DATA

Parameter	Cell 1	Cell 2	Cell 3	Cell 4
Nominal Dike Height (feet)	13.5	13.5	13.5	15.4
Minimum Water Depth (feet)	3	3	3	3
Maximum Water Depth (feet)	10.5	10.5	10.5	12.4
Surface Area (acres)	4.79	2.67	2.67	13.19
Maximum Usable Storage Volume				
• Acre-feet	44.6	22.5	22.5	132.9
• Million gallons (MG)	14.5	7.3	7.3	43.3

The City's lagoons are also equipped with aeration and mixing systems. The systems are known as an Aero-Fac aerated facultative lagoon system and include aeration and mixing components. Wind- and electric-powered mixers are also located in all four cells. The normal flow process is a series operation from Cell 1 to Cell 2 to Cell 3. From Cell 3, the treated effluent enters Cell 4, the storage lagoon, where it is then pumped to the disposal area. The effluent pump is used to pump the treated effluent through an 18-inch diameter chlorine contact chamber, which outlets to the 4-inch pressure sewer line that transports the disinfected effluent to the hay field outfall (see Figure ES-1).

Wastewater Disposal Facility Overview

Description

The City utilizes irrigation of a hay crop to dispose of treated wastewater. The disposal area consists of a 75-acre irrigation pivot located adjacent to the WWTF, as shown on Figure ES-1. The outer banks of the lagoon dikes have been planted with grass, and irrigation systems have been set up to water the grass; however, these irrigation systems are not currently used. The City currently operates the wastewater disposal facility under Water Pollution Control Facilities Permit

No. 102069. The permitted outfalls include land application and a biomass facility. The City currently utilizes the land application method, as plans for a biomass facility in La Pine have been delayed. The City does not currently discharge to any surface water.

Service Population and Planning Period

To estimate the demands that may be placed on a municipal wastewater system, a determination of the population to be served must be made. Population estimates must be made with reference to time. Projections are usually made on the basis of an annual percentage increase estimated from past growth rates, tempered by future expectations. It is difficult to accurately predict the population of a small community over an extended period of time. For the purposes of this WWSS Update, a planning period of 20 years is used, extending to 2035.

The certified 2014 population of the City of La Pine was 1,670, according to Portland State University's Population Research Center. This agency is the official source of population data available in Oregon between the official Census data generated at the beginning of each decade. For the purpose of this WWSS Update, 1,670 is used as the current total population. According to the City's 2009 Water Capital Facilities Plan, there are approximately 275 homes in the Cagle and Glenwood Acres areas. For planning purposes, a value of 2.5 people per home was used to estimate a total population of 688 in the Cagle and Glenwood Acres areas. The current estimated population being served by the wastewater system is 982, because the Cagle and Glenwood Acres areas are not connected to the existing wastewater system.

Historical population information for the City of La Pine is limited, as the City was incorporated in 2007. According to the City of La Pine Comprehensive Plan, an annual growth of 2.2 percent was used for planning purposes to the year 2025. In discussions with the City, it was decided to use an annual population growth rate of 2.2 percent for the purposes of this WWSS Update.

CHART ES-1
HISTORICAL AND PROJECTED POPULATION

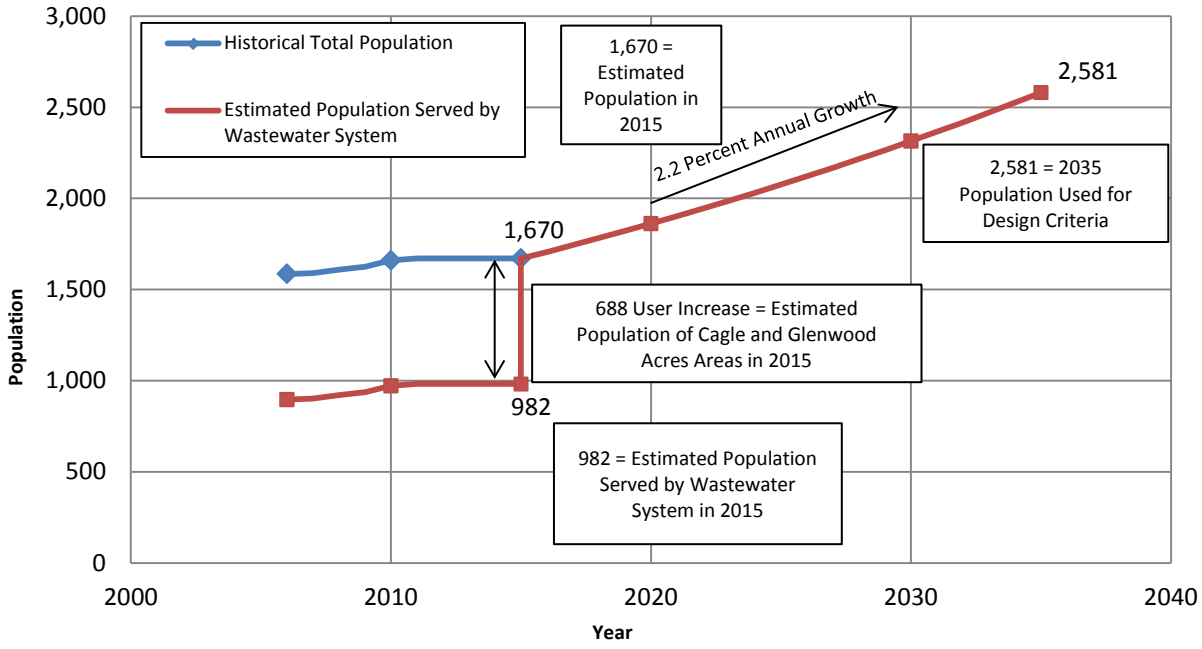


Chart ES-1 shows the impact to the City's wastewater system when the Cagle and Glenwood Acres areas are added to the system and a steady population growth of 2.2 percent per year occurs over the next 20 years. For projection purposes, the chart assumed that the Cagle and Glenwood Acres areas were added in 2015, adding approximately 688 users to the system instantaneously. The 20-year projected population for the City, including the Cagle and Glenwood Acres areas, is 2,581 people.

Summary of Collection, Treatment, and Disposal System Needs

Collection

According to the 2006 Wastewater Capital Facilities Plan by HGE, Inc., the gravity and pressure collection system appeared to be in good condition. All gravity mains were reportedly constructed of 3034 PVC pipe. Discussions with City staff also indicated that the collection system seems to be in relatively good condition. Due to the City's septic tank effluent gravity system, the pipelines have relatively shallow burial depths, which make them less susceptible to groundwater infiltration/inflow.

The City plans to upgrade the Wickiup Lift Station in 2016. At this time, it appears the other lift stations are working properly and are able to meet demands. The City should continue to monitor and perform required maintenance for each lift station to ensure it continues to be reliable and is working properly. The telemetry systems should be improved so the lift station alarms can be relayed to operators in case of an emergency.

Wastewater Treatment

The City utilizes a partially aerated three-cell facultative lagoon system for wastewater treatment. The City receives septic tank effluent as well as septage from those septic tanks connected to the City's system, plus additional septage from outside customers.

With the current wastewater loadings at the WWTF and the estimated treatment capacity of the system, the City should be able to adequately treat the incoming wastewater in addition to the permitted amount of septage for the current condition, as well as the addition of the Cagle and Glenwood Acres areas. It is estimated that shortly after the 20-year design period, the City may not be able to sufficiently treat the levels of loading with the existing system. At that point, the City could consider providing additional aeration to the system to increase the level of treatment capacity or reducing the amount of septage received from outside sources to reduce the overall loading on the system.

Wastewater Disposal

Water balances show that the existing disposal system is able to adequately dispose of the City's treated wastewater by irrigating at agronomic rates. However, with the addition of the Cagle and Glenwood Acres areas, the disposal area will be too small to dispose of all of the City's wastewater. The City will need to expand the wastewater disposal system if the Cagle and Glenwood Acres areas are to be included in the system. The City owns approximately 750 acres of undeveloped land east of the existing WWTF that is intended to be used for effluent disposal. The existing effluent disposal area has been overloaded historically, when both treated wastewater and septage are applied, and has fairly shallow groundwater. Since the City has adequate land area to dispose of its treated

effluent, it is recommended that the existing disposal area no longer be utilized. Alternatives are evaluated in Chapter 4.

Proposed Improvements

The City intends to add the Cagle and Glenwood Acres areas to the City's wastewater system. To do so, several improvements will need to be completed to serve these areas. Collection system piping and lift stations will need to be constructed in the Cagle and Glenwood Acres areas to convey wastewater to the City's WWTF. The WWTF has the capacity and flexibility to serve the Cagle and Glenwood Acres areas, as well as the future population of La Pine. The City's existing effluent disposal system is not adequate to serve the addition of the Cagle and Glenwood Acres areas. The following describes the proposed improvements for the collection, treatment, and disposal systems:

Collection System Improvements

To provide service to customers in the Cagle and Glenwood Acres areas, collection system improvements must be completed. Collection system piping should be constructed in these areas to serve residents. Due to the topography in the area, it is anticipated that two lift stations will be required to convey wastewater effluent to the Wickiup Lift Station, which, in turn, will pump wastewater to the City's WWTF. The proposed improvements are shown on Figure ES-2. Replacement septic tanks and piping from the home to the septic tank will need to be provided. Small-diameter collection piping from septic tanks to larger diameter collection piping will also need to be constructed. These improvements are not shown on Figure ES-2.

Wastewater Treatment Facility Improvements

As previously discussed, the City's WWTF has the capacity to serve the existing population, as well as the addition of the Cagle and Glenwood Acres areas. The City may need to make improvements to the system to serve the 20-year population if the City elects to receive septage at the maximum allowable rate. Rather than construct expensive improvements at this time, the City could elect to limit septage intake from outside sources if treatment capacity becomes an issue in the future. In the short term, it is proposed the City replace the existing septage receiving station with a new unit to provide a safe and sanitary working environment for staff members. This improvement is included in the proposed improvements cost estimate summarized on Figure ES-3.

Effluent Disposal System Improvements

As discussed in Chapter 3, the City's wastewater disposal system is currently able to dispose of the City's treated wastewater by irrigating at agronomic rates. However, with the addition of the Cagle and Glenwood Acres areas, the system will be unable to store and dispose of the additional effluent flows. The proposed improvements that will enable the City to store and dispose of treated wastewater to meet the design criteria of this WWSS Update are to expand the irrigation area to approximately 210 acres of City-owned land east of the existing WWTF and to construct a 22 MG storage lagoon (Option 3). The City-owned property and proposed site for the facilities is shown on Figure ES-2. Push probe tests completed by the City in 2006 in the vicinity of the proposed effluent disposal site show groundwater levels at approximately 48 feet below the ground surface. The proposed improvements will allow the City to dispose of treated wastewater by irrigating at agronomic rates, minimizing the risk of harming shallow groundwater.

Summary of Estimated Costs

A summary of the estimated costs for the proposed improvements is shown on Figure ES-3. A summary is also shown below.

Collection System Improvements	$7,757,000
Treatment and Effluent Disposal Improvements (Option 3)	$4,370,000
Other Project Costs	$210,000
Total Project Cost (Year 2015 Cost)	**$12,337,000**
Total Project Cost (Year 2018 Cost)	**$13,877,000**

Notes:

1. *Total estimated improvements costs include construction contingency, preliminary and final design, and construction engineering costs.*
2. *Bidding for the project, if funding were secured by late 2016, would most likely occur in 2018. Therefore, the above year 2015 cost was projected to 2018, assuming 4 percent annual inflation.*

Current Financial Status

The annual revenue received and the costs of operating and maintaining the City's wastewater system are summarized on Figure ES-4. The costs presented were obtained from the City's audited financial reports and include all costs for the wastewater system, such as operation, maintenance, and replacement (OM&R), and staff payroll. The expenditures shown on Figure ES-5 are a limited data set due to the City's lack of historical data. To project future costs, an inflation rate of 5 percent per year was assumed. The proposed improvements are anticipated to be constructed in the budget year 2017-2018. As shown on Figure ES-5, the City's estimated OM&R costs are projected to be approximately $350,000 per year. This does not include any debt service associated with loans required to construct the proposed improvements.

A major financial commitment will be required on the part of the City to implement part or all of the proposed wastewater system improvements outlined in this WWSS Update. An increase in wastewater rates will be required to fund part or all of the proposed system improvements.

Proposed Project Implementation

For the City to successfully implement the selected wastewater system improvements presented herein, the City will need to coordinate directly with the Oregon Department of Environmental Quality, USDA Rural Development, and the Oregon Business Development Department - Infrastructure Finance Authority to aggressively pursue federal, state, and potentially local financing opportunities provided through low-interest loans and potential grants. It is recommended that the City pursue funding for the full project to maximize potential grant and low-interest loan opportunities. A proposed implementation plan and schedule is summarized on Table ES-2.

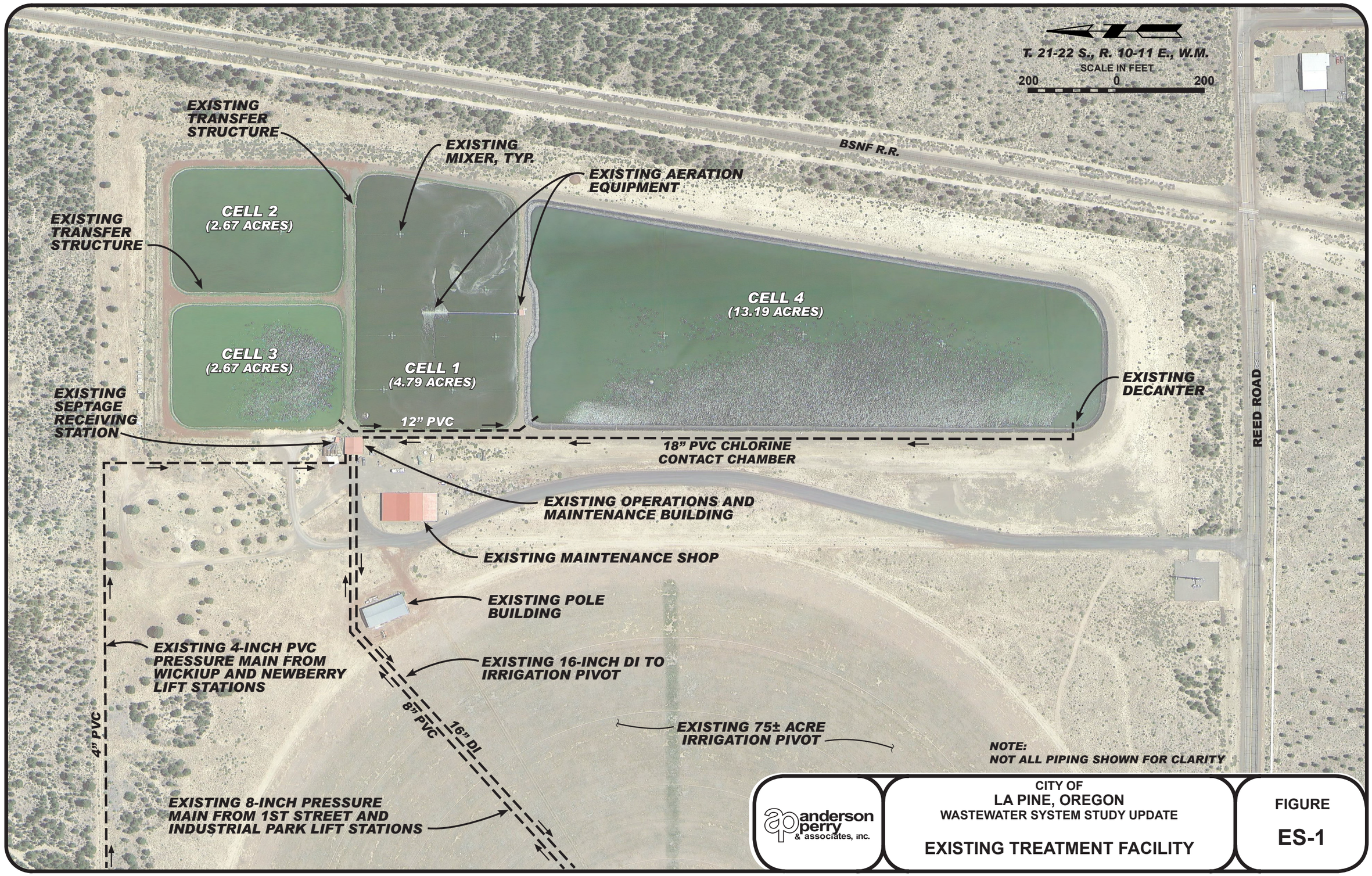
TABLE ES-2
IMPLEMENTATION PLAN AND SCHEDULE

Item No.	Implementation Item	Time Frame
1	Submit draft WWSS Update to agencies for review.	January 2016
2	Finalize and adopt the WWSS Update.	March 2016
3	Initiate funding agency discussions and participate in a One Stop meeting.	Spring 2016
4	Conduct public information meeting(s), as required.	Spring 2016
5	Submit funding application(s) to appropriate agency(ies).	Spring 2016
6	Funding agency review of application(s).	Summer 2016
7	Finalize project funding.	Fall 2016
8	Conduct public information meeting(s), as required.	Fall 2016
9	Environmental permitting process.	Winter 2016 to Winter 2017
10	Design system improvements.	Winter 2016 to Spring 2018
11	Submit design documents for agency review.	Spring 2018
12	Advertise, bid, and award construction project.	Spring 2018
13	Project construction.	Summer 2018 to Fall 2019
14	Construction completion and project startup.	Fall 2019
15	Project closeout.	Winter 2019

It should be noted that these implementation steps assume the City aggressively pursues project funding upon completion of this WWSS Update and that project funding is able to be secured relatively quickly. Should delays in completion of any of the identified implementation items occur, the estimated completion time of the project will likely be delayed.

The key to implementing the City's wastewater system improvements project, as outlined herein, is the City's ability to acquire low-interest loan funding and grant funds. The City will have to work closely with its citizens to inform them of the system needs and the need for an increase in sewer user costs.

Wastewater system improvements as outlined in this WWSS Update will provide the City with a reliable, quality wastewater system that will maintain regulatory compliance while meeting the needs of the City for many years to come.



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WASTEWATER SYSTEM STUDY UPDATE

EXISTING TREATMENT FACILITY

FIGURE
ES-1

Job# 33-06-020 Dec. 15, 2015 lbauer

TO GILCHRIST

HWY 97

HUNTINGTON ROAD

REED ROAD

75± ACRES TO BE ABANDONED

NEW SEPTAGE RECEIVING STATION

EXISTING PUMP STATION MODIFICATIONS

22 MG STORAGE LAGOON

BSNF RAILROAD

COLLECTION SYSTEM IMPROVEMENTS

PIPE BORE CROSSING

FINLEY BUTTE ROAD

12-INCH IRRIGATION PIPELINE

8-INCH IRRIGATION PIPE LINE

TO BEND

105± ACRE EFFLUENT PIVOT IRRIGATION AREA (210± ACRES TOTAL)

LEGEND

- NEW 4" PRESSURE SEWER PIPE
- NEW 6" GRAVITY SEWER PIPE
- NEW 8" GRAVITY SEWER PIPE
- EXISTING SEWER PIPE (SIZE NOT SHOWN)
- NEW LIFT STATION
- EXISTING LIFT STATION

1000 0 1000 2000 3000
SCALE IN FEET

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WASTEWATER SYSTEM STUDY UPDATE

PROPOSED WASTEWATER SYSTEM IMPROVEMENTS

FIGURE
ES-2

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CITY OF LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE
PROPOSED WASTEWATER SYSTEM IMPROVEMENTS
SUMMARY OF ESTIMATED PROJECT COSTS
(Year 2015 Costs)

Estimated Improvements Costs		
Collection System Improvements	$	5,941,000
Treatment and Disposal Improvements		4,370,000
Subtotal Estimated Improvements Costs (2015 Dollars)	**$**	**10,311,000**
Other Estimated Project Costs		
Legal	$	30,000
Labor Sandards		30,000
Grant Administration		25,000
Easements		10,000
Environmental Review Report		30,000
Archaeological Report		15,000
Cultural Resource Monitoring		75,000
Permits		20,000
Regulatory Agency Reporting and Review Fees		5,000
Subtotal Other Project Costs (2015 Dollars)	**$**	**240,000**
TOTAL ESTIMATED PROJECT COST (2015 DOLLARS)	**$**	**10,551,000**

Note: Other project costs include anticipated requirements for the Community Development Block Grant funding program.

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CITY OF
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WASTEWATER SYSTEM STUDY UPDATE
PROPOSED WASTEWATER SYSTEM
IMPROVEMENTS SUMMARY OF
ESTIMATED PROJECT COSTS

FIGURE
ES-3

CITY OF LA PINE, OREGON
HISTORICAL SEWER DEPARTMENT FUNDS

	Revenue			Expenditures							
Fiscal Year	Sewer Sales Revenue	Other Income[1]	Total Revenue	Personnel Services	Materials and Services	Systems Operations	Capital Outlay	Total OM&R Expenditures[2]	Debt Service	Total Expenditures	Net Operating Income (Loss)
2012-2013	$ 496,321	$ 46,949	$ 543,270	$ 127,648	$ 79,530	$ -	$ -	$ 207,178	-	$ 207,178	$ 336,092
2013-2014	$ 482,525	$ 8,121	$ 490,646	$ 131,322	$ 153,861	$ -	$ -	$ 285,183	-	$ 285,183	$ 205,463

Notes:

[1] Other Income is from connection/extension charges, interfund transfers, and other miscellaneous income.

[2] Refers to operation, maintenance, and replacement. Does not include transfers to other funds or Debt Service.

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CITY OF
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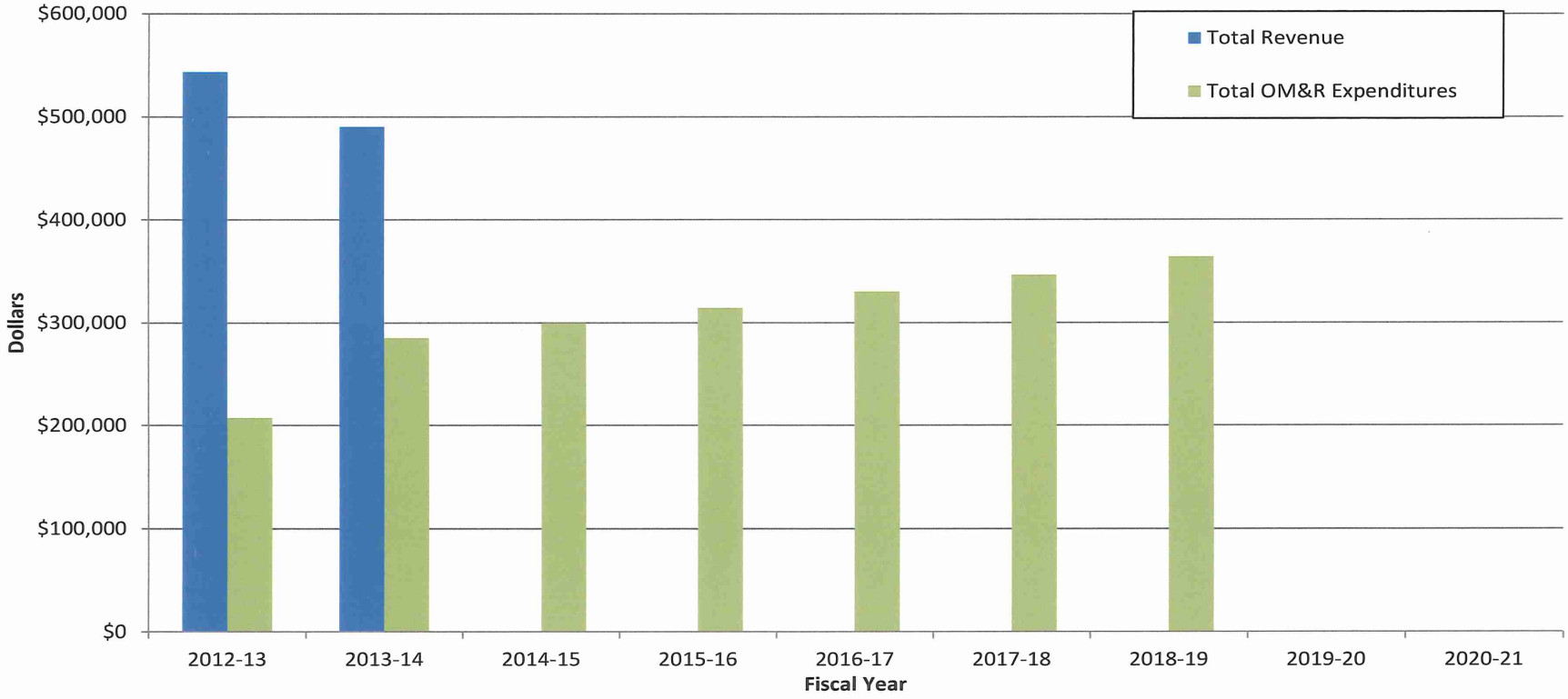
WASTEWATER SYSTEM STUDY UPDATE
HISTORICAL SEWER
DEPARTMENT FUNDS

FIGURE
ES-4

CITY OF LA PINE, OREGON
HISTORICAL AND PROJECTED CITY SEWER BUDGET



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CITY OF
LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE
HISTORICAL AND PROJECTED CITY SEWER BUDGET

FIGURE ES-5

Chapter 1 - Introduction and Background Information

Purpose of Study

This Wastewater System Study (WWSS) Update is intended to provide current information related to the City of La Pine's wastewater system. A Wastewater Capital Facilities Plan (WWCFP) was completed in 2006 by HGE, Inc., for what was then the La Pine Special Sewer District (District). The City now owns the wastewater system. Figure 1-1 shows the location and vicinity of the City and major wastewater system components.

This WWSS Update is intended to update the information provided in the 2006 WWCFP and analyze the capacity of the existing wastewater system to provide service to the City's current and anticipated customers for the next 20 years. Currently, the City is considering the extension of wastewater service to neighborhoods inside the City limits that are not currently connected to the City's wastewater system. These neighborhoods, known as the Cagle and Glenwood Acres areas, are shown on Figure 2-1 at the end of Chapter 2. This area within the City of La Pine's City limits still utilizes septic tanks and drainfields for each residence. The area of south Deschutes County has had high nitrate levels in the groundwater for many years. Connecting this area to the City's wastewater system could be an opportunity to remove a potential source of groundwater contamination. This WWSS Update is also intended to provide the City with a list of improvements and associated costs required to include the Cagle and Glenwood Acres areas into the City's wastewater service area.

This WWSS Update does not include a full evaluation of the existing wastewater collection system, including underground piping and lift stations. The information provided in the 2006 WWCFP was relied upon for these portions of the WWSS Update. Where applicable, this WWSS Update references information from the 2006 WWCFP.

Organization of Study

This WWSS Update is divided into five main chapters with an Executive Summary. Specifically, this WWSS Update includes the following:

1. The Executive Summary describes wastewater quality and service goals (design criteria), present and future wastewater system deficiencies, the City's selected improvements for achieving the goals and correcting the deficiencies, and the recommended implementation schedule and financing program for constructing improvements.

2. Chapter 1, "Introduction and Background Information," discusses the objectives of this WWSS Update, describes the community, and provides a brief history of the past development and operation of the City's wastewater system.

3. Chapter 2, "Design Criteria," develops the data upon which recommended improvements to the wastewater system are based. Data relating to elements such as service area, population, land use, historical wastewater flows, state and federal regulations, and the design criteria developed

for this WWSS are presented. A description of the wastewater quality and permit requirements for the wastewater system (considering existing and anticipated future regulatory requirements), capacity needs related to wastewater and septage flows, and disposal needs is also provided.

4. Chapter 3, "Existing Wastewater System Evaluation," discusses the operation, capacity, and quality of the existing wastewater system with respect to existing and future system demands and regulations.

5. Chapter 4, "Improvement Alternatives," discusses alternatives and associated costs for the addition of the Cagle and Glenwood Acres areas, as well as the 20-year projected population growth of the City.

6. Chapter 5, "Project Financing and Implementation," presents information related to the City's current financial situation, potential funding programs for project implementation, and the City's debt capacity.

The Appendices contain key materials referenced in this WWSS Update, which are provided for future reference by City staff. This information includes the Water Pollution Control Facilities Permit, wastewater system ordinances, and other pertinent wastewater system information.

Sources of Information

The conclusions and recommendations outlined in this WWSS Update are based on data, information, and records provided by the City. This information includes, in part, past flow records (wastewater and septage); financial data (operational costs, revenues, and cost distribution); descriptions of system operation, condition of system components, and identification of problem areas; wastewater quality data; and system layout and sizing. The system evaluation, recommendations, and conclusions are, therefore, dependent on the completeness and accuracy of the base information provided.

The 2006 WWCFP discussed earlier was also used for information during the preparation of this WWSS Update.

Review and Updating of Study

This WWSS Update should be reviewed and updated periodically in order to stay current with population growth, wastewater system demands, and changing state and federal regulations. It is recommended that this WWSS Update be reviewed at 5-year intervals and be updated at 10-year intervals, or as growth and/or regulations dictate.

Objectives of Study

The primary objectives of this WWSS Update are to provide the following information:

1. Establish planning criteria including service area boundaries; population growth projections; past, present, and future wastewater flow patterns; federal and state standards; system capacities; and service goals.

2. Analyze the individual components of the existing wastewater system considering capacity, compliance with current wastewater treatment standards, condition of components, operational dependability, and cost of operation. Develop the wastewater treatment needs for the planning period and identify cost-effective alternatives for meeting long-term wastewater treatment needs.

3. Analyze the existing wastewater disposal facilities considering capacity, condition of the components, and size of the facilities. Assess the City's storage and disposal capacity considering existing wastewater flows and growth throughout the planning period. Identify the storage and disposal requirements of the wastewater system for the planning period.

4. Utilize existing collection system maps and City records and generally review the condition and adequacy of the collection system piping and lift stations as it relates to the area to be served. Identify system deficiencies and alternatives for meeting current and future system needs. Provide estimated costs for implementation of recommended improvements.

5. Review the existing Wastewater Department financial condition considering historical wastewater system revenues, operational and maintenance costs, and debt service including the adequacy of existing wastewater user fees. Project the future cost of operation and maintenance, capital improvement investments, and debt service for the wastewater system. Develop a financing plan for meeting the long-term system needs including general user rate charges and outside financial assistance.

6. Provide information on potential state and federal grant and loan programs that may be available to assist the City in implementing any needed system improvements.

7. Prepare a summary identifying current and future wastewater system needs with their associated total estimated costs. Make recommendations for the needed wastewater system improvements to meet the wastewater system needs for the planning period.

8. Provide an implementation schedule for recommended wastewater system improvements outlining the key steps the City would need to take to implement the improvements.

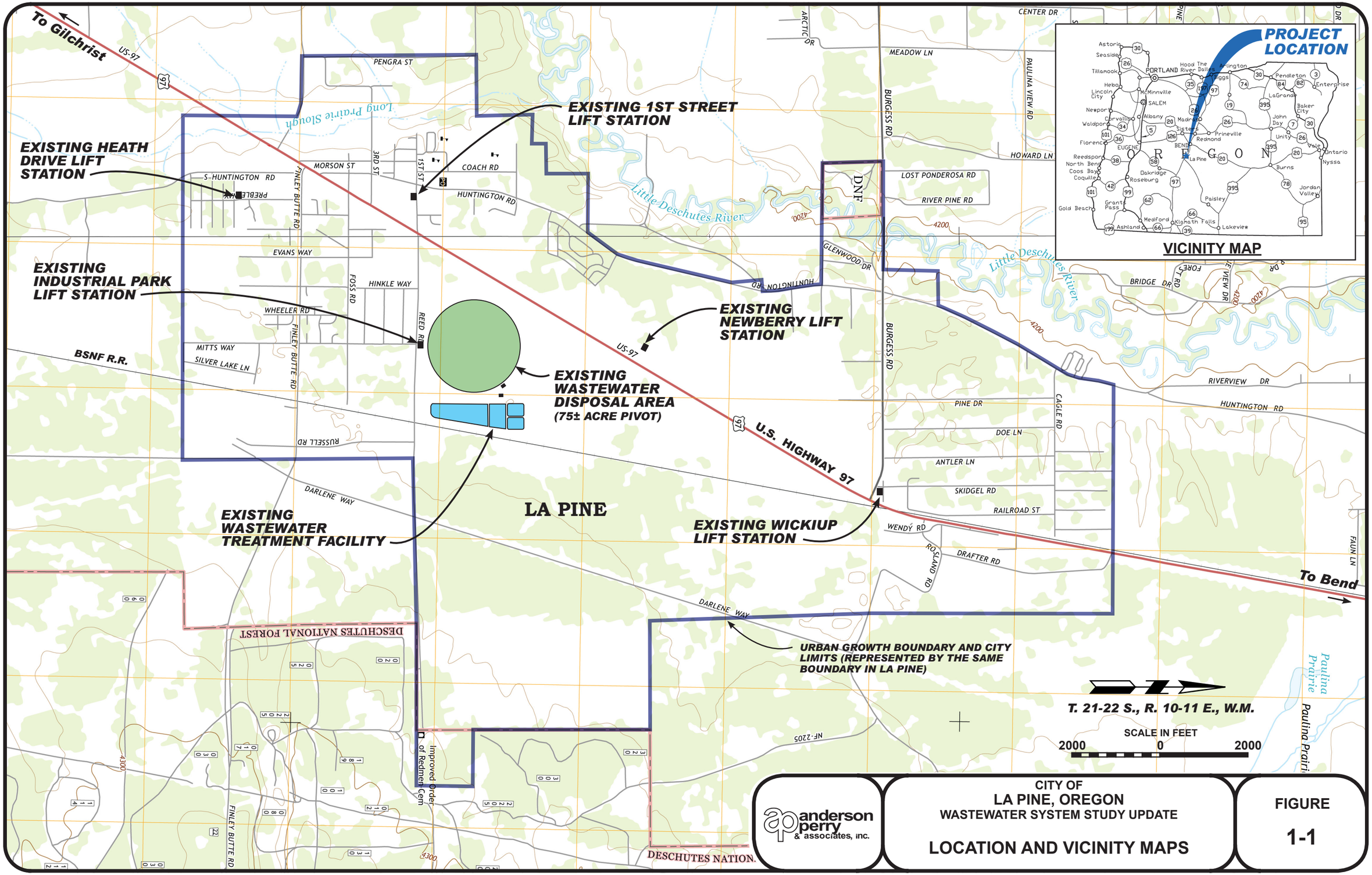
Location

The City of La Pine is located in southern Deschutes County, approximately 30 miles south of Bend. The City is located on State Highway 97 and is adjacent to the Little Deschutes River. The City has a unique layout, with two sections (north and south) separated by approximately 2 miles of open space. The general location of the community is shown on Figure 1-1.

Wastewater System History

The City of La Pine was incorporated in 2007 and took ownership of the District's wastewater system in 2012. The District's wastewater system included four lift stations, collection piping, a four-cell facultative lagoon treatment and storage system, a septage receiving station, and a 75-acre hay field used for effluent disposal. The City's system is unconventional in that it is a septic tank effluent gravity system. Each individual user has a septic tank, and septic tank effluent is sent to the wastewater treatment facility (WWTF) for further treatment and disposal. The solids are deposited in the septic tanks, which

are pumped periodically, and the septage is hauled and received at the WWTF. For more information on the wastewater system history, the reader is encouraged to review the 2006 WWCFP.



CITY OF
LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE

LOCATION AND VICINITY MAPS

FIGURE
1-1

anderson perry & associates, inc.

Job# 33-06-020 Nov. 16, 2015 lbauer

Chapter 2 - Design Criteria

General

This chapter presents information from which criteria have been developed for evaluating the City of La Pine's existing wastewater system and for defining and sizing the required components of the system for the 20-year planning period. Information concerning the service area, population projections, water use, and state and federal requirements is presented.

Service Area

The term "service area" refers to the area being served by the City's wastewater system. Both the present and future service areas are considered in this Wastewater System Study (WWSS) Update. The present service area primarily consists of the developed lands within the boundaries of the City limits and urban growth boundary. However, the existing service area does not include the Cagle and Glenwood Acres areas. These areas are included in the future service area, which comprises all areas within the City limits. Figure 2-1 shows both the existing and proposed service areas.

Population

In order to estimate the demands that may be placed upon a municipal wastewater system, a determination of the population to be served must be made with reference to time. Projections are usually made on the basis of an annual percentage increase estimated from past growth rates and tempered by future expectations. It is very difficult to accurately predict the population of a small community over an extended period of time. For the purposes of this WWSS Update, a planning period of 20 years is used, extending to 2035.

The certified 2014 population of the City of La Pine was 1,670 according to Portland State University's Population Research Center. This agency is the official source of population data available in Oregon between the official Census data generated at the beginning of each decade. For the purpose of this WWSS Update, 1,670 is used as the current total population. According to the Wastewater Capital Facilities Plan completed by HGE, Inc., in 2006, there are approximately 275 homes in the Cagle and Glenwood Acres areas. For planning purposes, a value of 2.5 people per home was used to estimate a total population of 688 in the Cagle and Glenwood Acres areas. The current estimated population being served by the wastewater system is 982 because the Cagle and Glenwood Acres areas are not connected to the existing wastewater system.

Historical population information for the City is limited, as the City was incorporated in 2007. According to the City of La Pine Comprehensive Plan, an annual growth of 2.2 percent was used for planning purposes to the year 2025. In discussions with the City, it was decided to use a growth rate of 2.2 percent for the purposes of this WWSS Update. Legislation has been passed that will require communities to utilize the population projections developed by the Population Research Center at Portland State University. These projections are not anticipated to be finalized until mid-2016 and, thus, have not been utilized in this Study.

CHART 2-1
HISTORICAL AND PROJECTED POPULATION

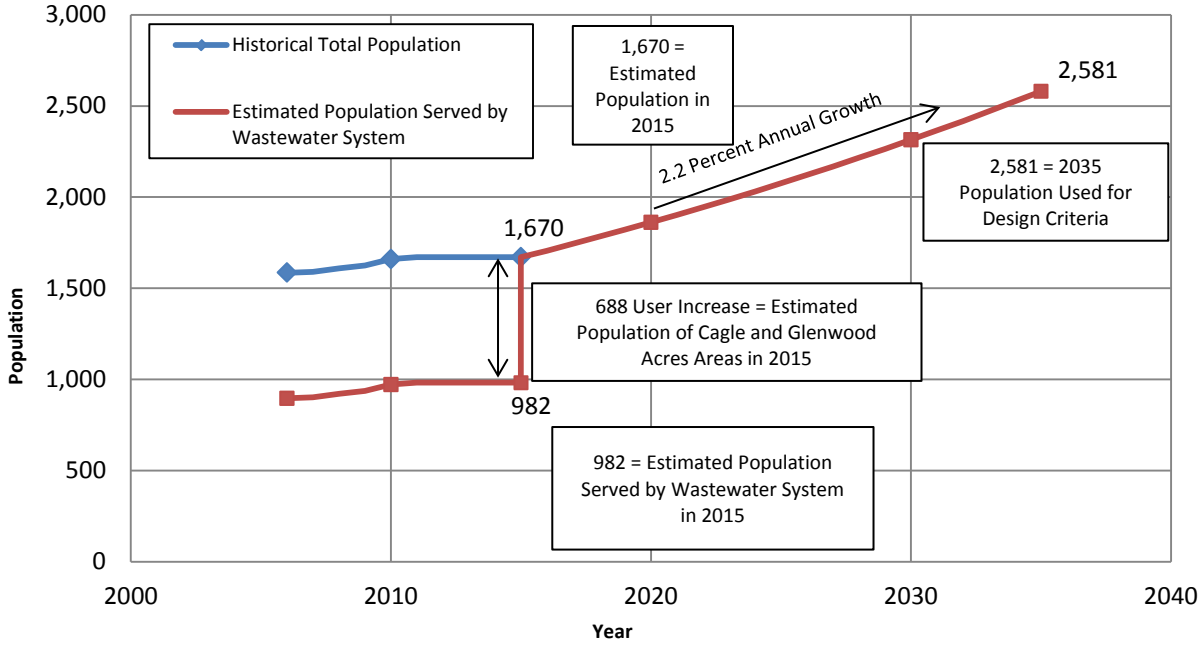


Chart 2-1 shows the impact to the City's wastewater system when the Cagle and Glenwood Acres areas are added to the system and a steady growth of 2.2 percent per year occurs over the next 20 years. The chart assumes that the Cagle and Glenwood Acres areas would be added in 2015, adding approximately 688 users to the system instantaneously. This is shown for population illustration purposes, as it would likely take several years for the needed improvements to add the Cagle and Glenwood Acres areas to the system to be funded, designed, and constructed.

Land Use

The current zoning in the City is shown on Figure 2-2. As designated in the City of La Pine Comprehensive Plan, 10 land use classifications have been identified. It is apparent that the City's developments are clustered within the north and south areas of the City limits. The southern area of La Pine consists of a large share of the residential, commercial, and industrial areas of the City. The Wickiup Junction area to the north contains the majority of the remaining residential, commercial, and industrial areas in La Pine. Between these two areas is a large, mostly vacant area designated as Master Plan Residential and Public Facilities. This area contains approximately 370 acres of developable land.

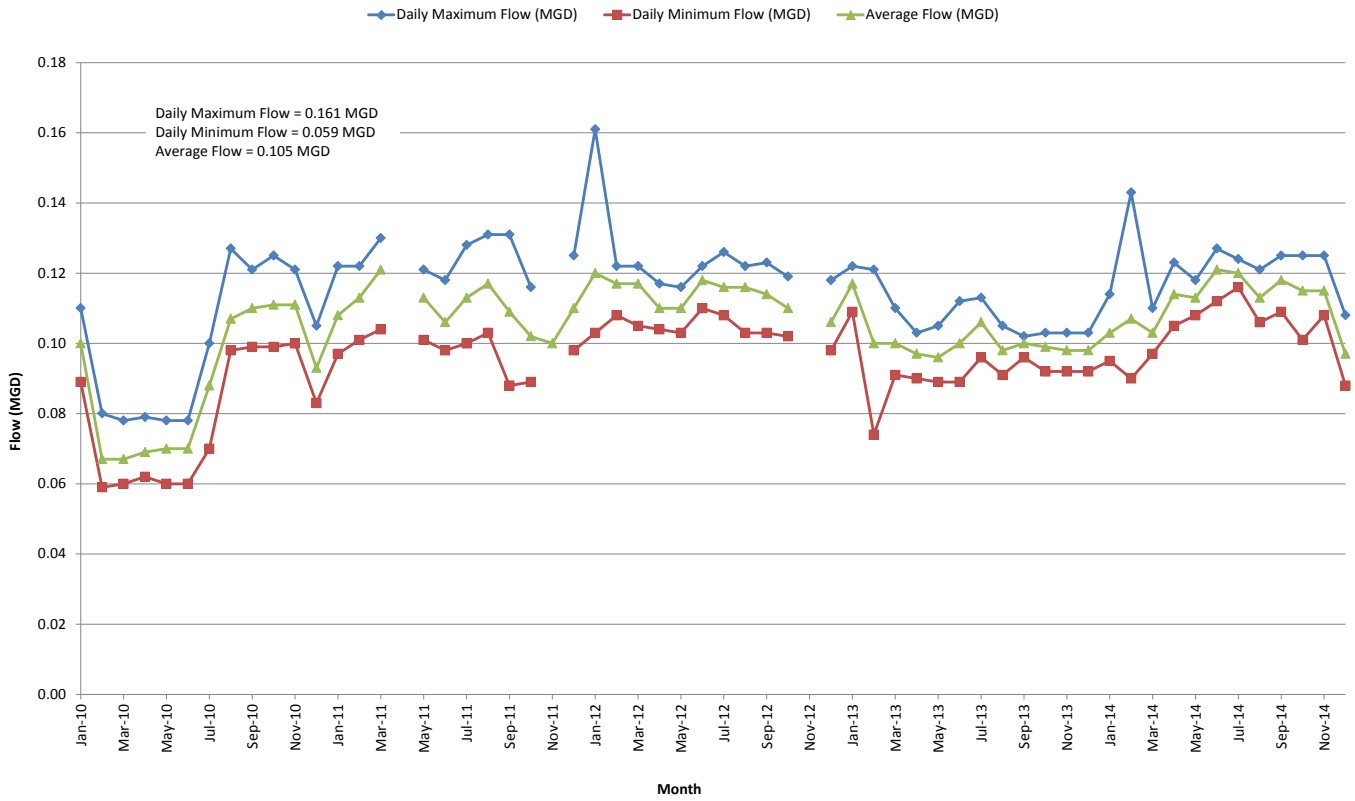
Historical Wastewater Data

This section provides a review of the historical wastewater data for the City'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 period between January 2010 and December 2014, are shown on Figure 2-3. According to the data, the maximum daily flow occurred on January 24, 2012, and was 161,000 gallons per day (gpd), which equates to approximately 164 gallons per capita per day (gpcd). The average annual flow was

105,000 gpd during the time period analyzed, which equates to approximately 107 gpcd. Average summer and winter flows are also shown, reflecting higher flows in the late winter and spring as compared to other times of the year. The City's historical monthly influent flows are shown below on Chart 2-2.

CHART 2-2
HISTORICAL MONTHLY INFLUENT FLOWS



Charts 2-3 and 2-4 summarize the historical influent mass loading concentrations. The average mass loadings are based on a summary of DMR records from January 2010 to December 2014. During that period, the analyses of the influent were for five-day biochemical oxygen demand (BOD_5) and total suspended solids (TSS). As indicated on Chart 2-3, the average influent BOD_5 concentration was approximately 136 milligrams per liter (mg/L), which equates to an average loading of 110 pounds/day and 0.11 pounds/capita/day. As indicated on Chart 2-4, the average influent TSS concentration was approximately 28.7 mg/L, which equates to an average loading of 23 pounds/day and 0.02 pounds/capita/day.

CHART 2-3
HISTORICAL AVERAGE MONTHLY BOD_5

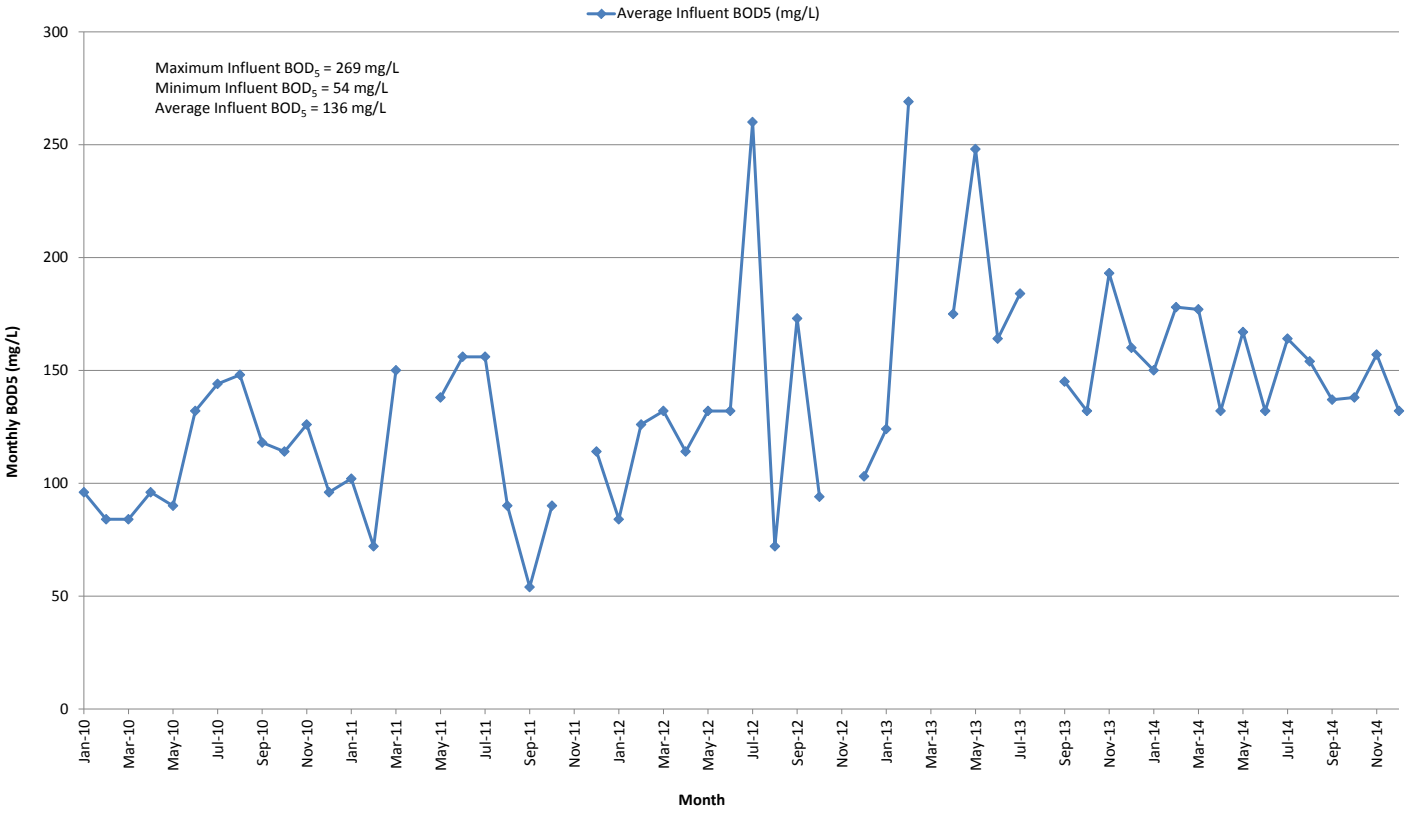


CHART 2-4
HISTORICAL MONTHLY TSS

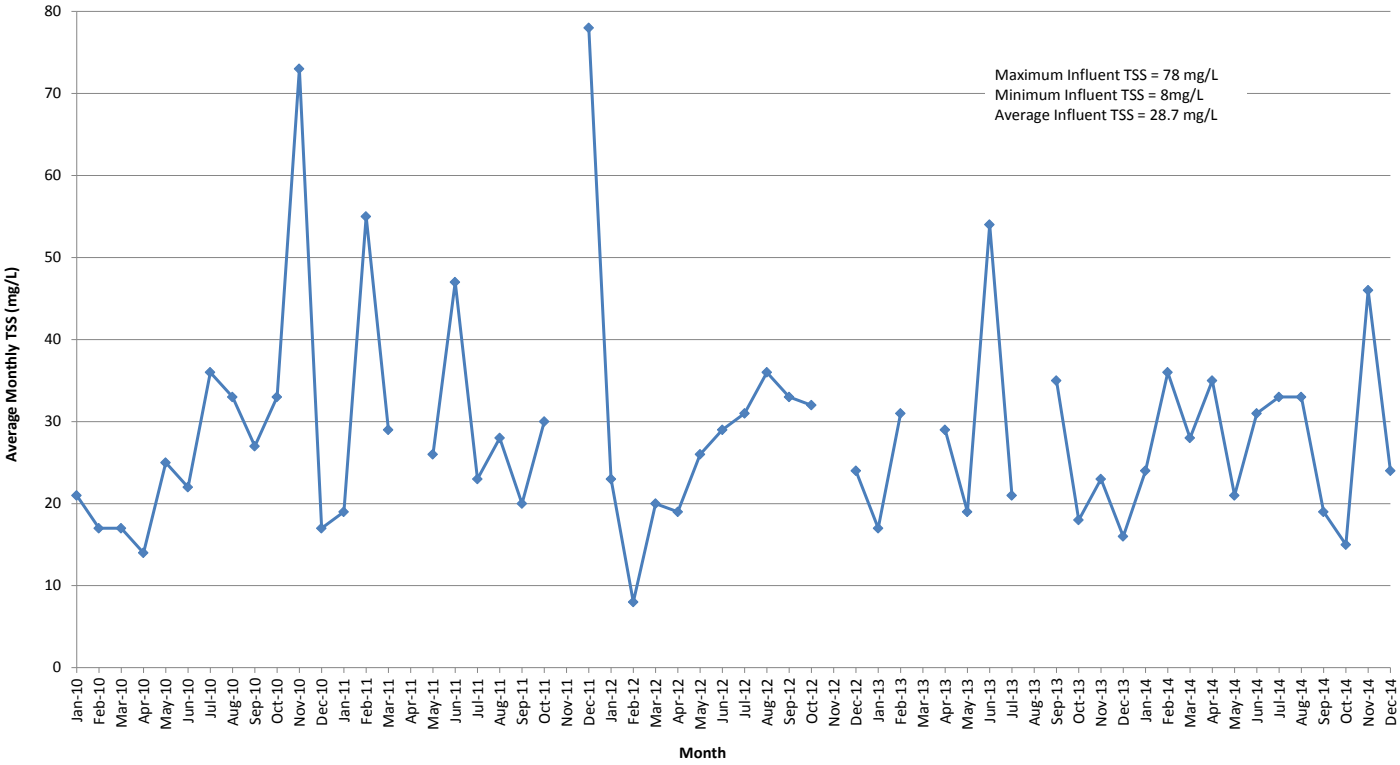
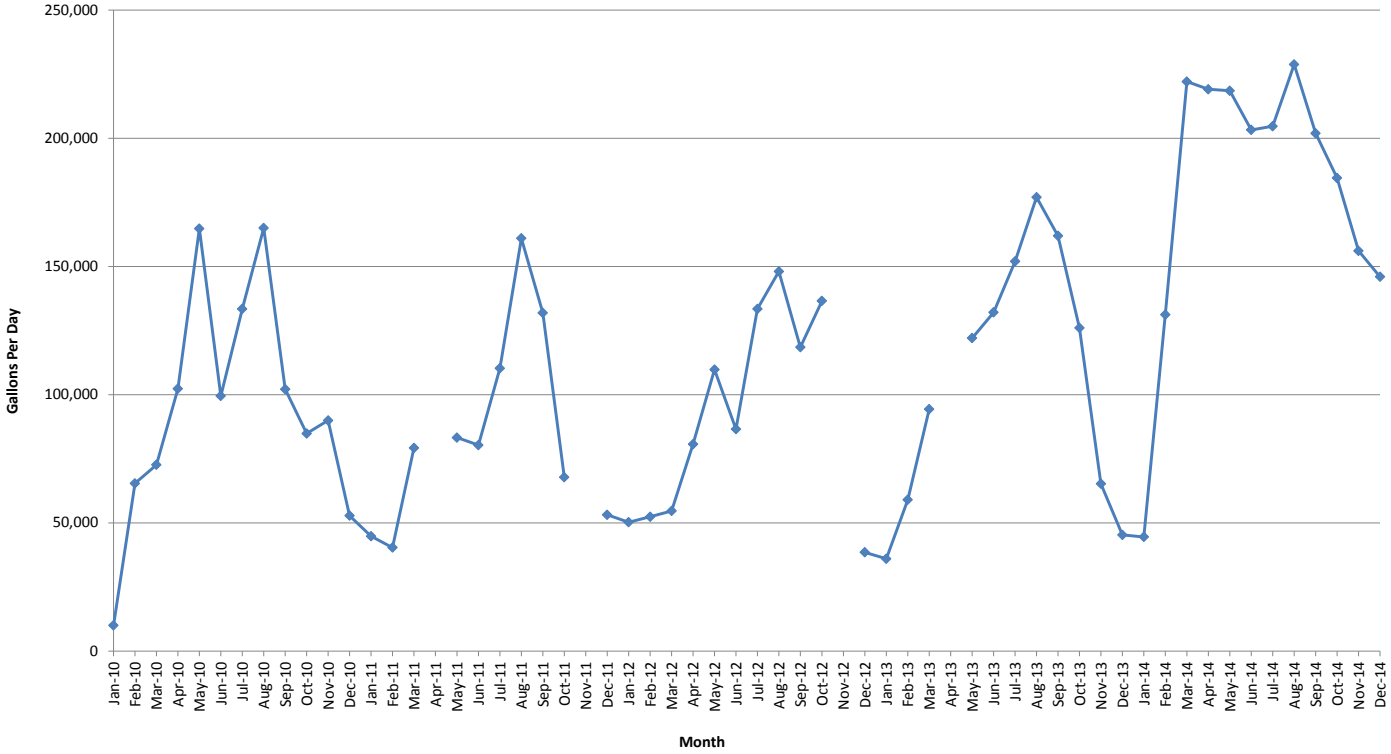


Chart 2-5 summarizes the historical septage received by the WWTF. The City not only receives the septage from City users' septic tank effluent gravity (STEG) systems, but also receives septage from outside communities and public entities. The amount of septage received is based on DMR records from January 2010 to December 2014. The City's Water Pollution Control Facilities (WPCF) Permit allows receipt of up to 250,000 gallons of septage per month. As shown on Chart 2-5 below, the City rarely comes close to maximizing the allowable amount of septage received by the WPCF Permit. The City is not required to test for BOD_5 or TSS for the septage that is received by the WWTF. For the purposes of this WWSS Update, typical design mass loadings for septage were used. It is assumed that the septage has a BOD_5 loading of 6,500 mg/L and a TSS loading of 13,000 mg/L. These values were provided by the Environmental Protection Agency (EPA) Guide to Septage Treatment and Disposal.

CHART 2-5
SEPTAGE RECEIVED AT LAGOON NO. 1



As previously mentioned, the City utilizes a STEG system to contain, collect, and transfer user wastewater. Because of this, the influent BOD_5 and TSS mass loadings, which only contain the liquid effluent from septic tanks, are at the very low end of a normally expected range. Data collected from many domestic wastewater systems similar to La Pine's indicate that average annual daily flows usually range from 75 to 120 gpcd, and average BOD_5 and TSS per capita contributions typically range from 0.15 to 0.25 pounds/capita/day, with a normal contribution of approximately 0.2 pounds/capita/day. Since the wastewater influent flows fall within the typical range, and the STEG system generally has shallower sewer lines, it is assumed that the City experiences little groundwater infiltration/inflow (I/I). The lower-than-normal BOD_5 and TSS levels are due to the fact that the majority of the solids are deposited in septic tanks and added to the system at a later time.

Design Criteria

Figure 2-4 summarizes basic wastewater design criteria used in this WWSS Update for the current year (2015), the current year with the addition of the Cagle and Glenwood Acres areas, and the design year (2035). Shown on Figure 2-4 are the estimated design population, design flows, and expected future influent wastewater strength characteristics.

Figure 2-4 should be referred to during the review of subsequent chapters of this WWSS Update, as it provides key information upon which wastewater system options are developed and evaluated.

Wastewater Flow Projections

Domestic

Wastewater flow projections for the addition of the Cagle and Glenwood Acres areas and the year 2035 were made using the existing average annual per capita wastewater contributions extrapolated to the future populations using the current population of 1,670 for the addition of the Cagle and Glenwood Acres areas and the year 2035 design population of 2,581. In situations where significant I/I is present, this would not likely be the best method to estimate design flows. I/I does not generally increase proportionally with population. However, City staff and flow records have indicated low I/I in the City's collection system; therefore, this method appears reasonable for approximating the year 2035 design flows.

Industrial

The domestic wastewater flow projections are based solely upon growth within the residential and commercial sectors. No separate industrial flow component was considered in projecting future conditions. Certain industries could locate within the City by utilizing a portion of the residential and commercial capacity. This capacity will allow limited industrial growth within the City while maintaining capacity to serve the residential and commercial growth. The assumed reserve capacity will not, however, account for industries with high flow and loading contributions, such as food processing. If a high flow or loading contributing industry were to locate within the City, the wastewater system would need to be re-evaluated to ensure enough capacity is available to accommodate that industry, or the industry would be responsible for a pretreatment requirement before discharge to the City or for treatment and disposal/reuse of its own wastewater.

Septage Receiving Projections

As described in the WPCF Permit, the City is allowed to receive up to 250,000 gallons of septage per month. As shown earlier in this Chapter on Chart 2-5, the City typically does not come close to reaching that amount. For the purposes of this WWSS Update, it is assumed that the City maximizes the amount of septage it receives during a given month (in order to be conservative). It is also assumed that the septage received has an average mass loading of 6,500 mg/L of BOD_5 and 13,000 mg/L of TSS.

Mass Loadings

Domestic and Commercial

The domestic and commercial design mass loadings (BOD_5 and TSS) to the WWTF were estimated using average annual per capita BOD_5 and TSS contributions projected to the future populations with the addition of the Cagle and Glenwood Acres areas and the 20-year planning period using the year 2035 design population of 2,581 (i.e., mass loading [BOD_5 or TSS] = contribution [BOD_5 or TSS] pounds/capita/day x 2,581). Using the average mass loading of 0.11 pounds/capita/day for BOD_5 and 0.02 pounds/capita/day for TSS yields a year 2035 domestic mass loading of 284 pounds of BOD_5/day and 52 pounds of TSS/day.

Industrial

Similar to domestic flow projections, no separate industrial mass loading component was considered in projecting future loading conditions. Refer to the prior discussion under Wastewater Flow Projections for the reasoning and justification for this assumption.

Septage

The septage design mass loadings (BOD_5 and TSS) to the WWTF were estimated using the maximum amount of septage reception allowed by the City's WPCF Permit, and assumed design loading values of 6,500 and 13,000 mg/L of BOD_5 and TSS, respectively. Since this amount of septage is not dependent on growth, the loadings for the current population, the current population plus the Cagle and Glenwood Acres areas, and the 20-year design population are all the same. With the above-mentioned assumptions, the mass loadings due to septage are 452 pounds/day of BOD_5 and 903 pounds/day of TSS. As growth occurs in the City, more local septage would be received at the WWTF, requiring a corresponding reduction in septage from outside the City to remain within the maximum allowed septage amount.

Treatment and Regulatory Requirements

Liquid Treatment

The City's existing facultative lagoon WWTF provides secondary treatment of the City's domestic wastewater and septage. Discharge of treated effluent from the WWTF is regulated under the City's WPCF Permit (No. 102069), which is included in Appendix A. Current effluent limitations for the City's WWTF are given in the City's WPCF Permit. The current Permit has limitations on total coliforms, pH, and total chlorine residual concentration depending on the permitted outfall location. The City only currently utilizes Outfall No. 2, which is land application on 75 acres of hay. Use of this outfall is limited only by the total coliforms present in the effluent.

Solids Treatment

As required by the Clean Water Act Amendments of 1987, the EPA developed a regulation to protect public health and the environment from reasonably anticipated adverse effects of certain pollutants that might be present in municipal sewage biosolids. This regulation, The Standards for the Use or Disposal of Sewage Biosolids (40 Code of Federal Regulations [CFR], Part 503), was published in the Federal Register (58 FR 9248 to 9404) on February 19, 1993, and became effective on March 22, 1993. The regulations that govern the recycling and disposal of sewage biosolids in the State of Oregon are contained in Oregon Revised Statute 340-50 and follow 40 CFR, Part 503.

The provisions of the Part 503 rule are consistent with the EPA's policy of promoting beneficial uses of biosolids (refer to 49 FR 24358, June 12, 1984, for further information). Land application takes advantage of the soil conditioning and fertilizing properties of biosolids.

The Part 503 rule includes five subparts: Subpart A - General Provisions; Subpart B - Requirements for Land Application; Subpart C - Surface Disposal; Subpart D - Pathogen and Vector Attraction Reduction; and Subpart E - Incineration. For each of the three use or disposal options (land application, surface disposal, and incineration), a Part 503 Standard includes general requirements, pollutant limits, management practices, operational standards, and requirements for the frequency

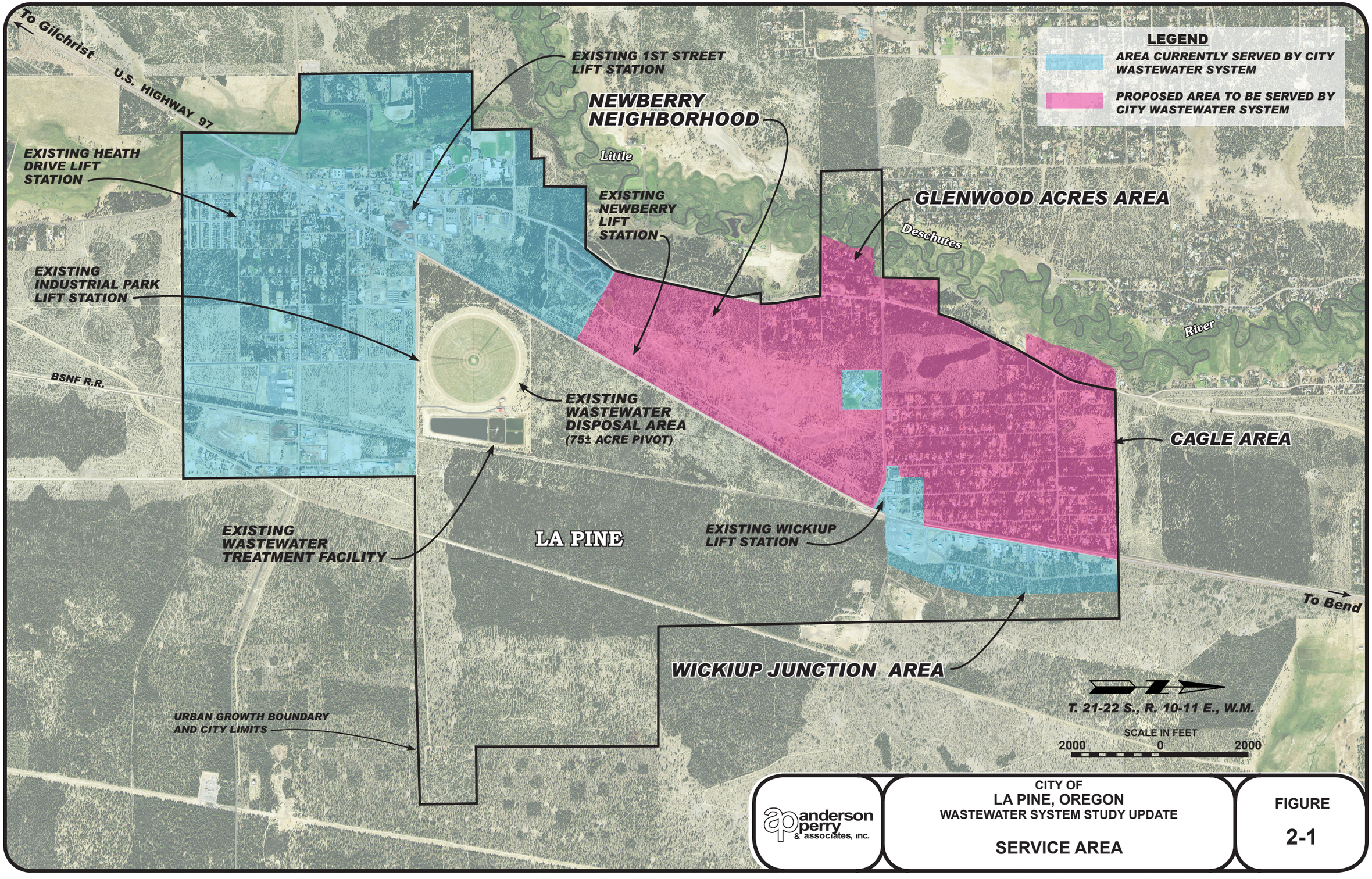
of monitoring, recordkeeping, and reporting. Since La Pine would likely benefit from the use of their biosolids through land application, the only regulations pertaining to the City would be Subparts A, B, and D, as Subparts C and E pertain to disposal and incineration of the biosolids.

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

The City does not currently have a Biosolids Management Plan. The City has not removed biosolids from its lagoons in the recent past. The depth of biosolids in the lagoons should be evaluated to determine whether they should be removed in the near future. Before biosolids are removed, the City would need to characterize the chemical nature of the biosolids and submit a Biosolids Management Plan to the Oregon Department of Environmental Quality for review.

Conclusions

This chapter of the City's WWSS Update presents design criteria for the current and future anticipated wastewater flows and loadings. The design criteria, as summarized on Figure 2-4, provide the basis for evaluation of wastewater collection, treatment, and disposal options discussed in later chapters of this WWSS Update.



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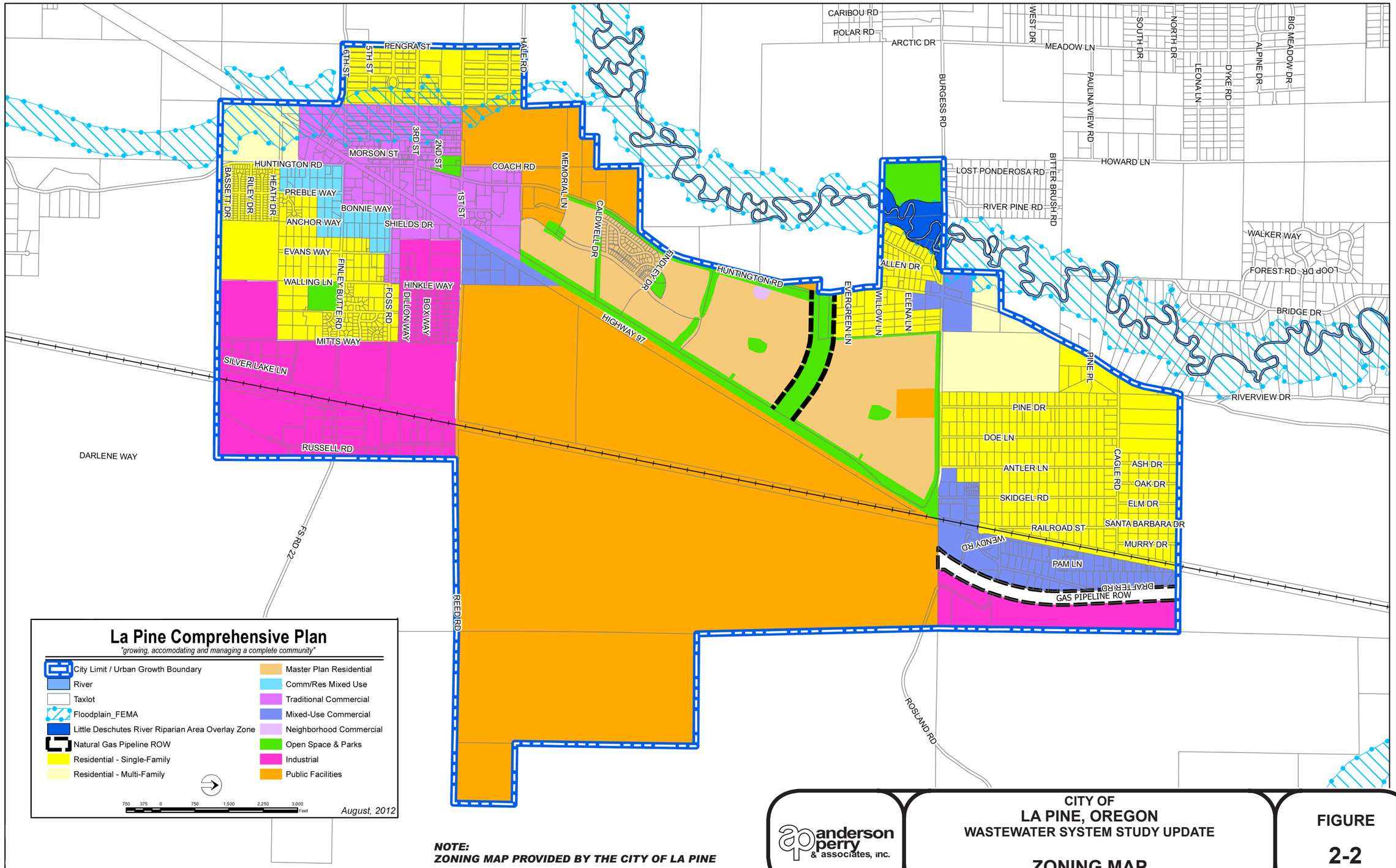
CITY OF
LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE

SERVICE AREA

FIGURE
2-1

Job# 33-06-020 Nov. 16, 2015 lbauer



La Pine Comprehensive Plan

"growing, accomodating and managing a complete community"

- City Limit / Urban Growth Boundary
- River
- Taxlot
- Floodplain_FEMA
- Little Deschutes River Riparian Area Overlay Zone
- Natural Gas Pipeline ROW
- Residential - Single-Family
- Residential - Multi-Family
- Master Plan Residential
- Comm/Res Mixed Use
- Traditional Commercial
- Mixed-Use Commercial
- Neighborhood Commercial
- Open Space & Parks
- Industrial
- Public Facilities

750 375 0 750 1,500 2,250 3,000 Feet

August, 2012

NOTE:
ZONING MAP PROVIDED BY THE CITY OF LA PINE

anderson perry & associates, inc.

CITY OF
LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE

ZONING MAP

FIGURE
2-2

Job# 33-06-020 Sep. 29, 2015 lbauer

SUMMARY OF HISTORICAL WASTEWATER DATA

	Influent									Irrigation Effluent (Gal)
	Daily Maximum Flow (MGD)	Daily Minimum Flow (MGD)	Average Flow (MGD)	Average Influent BOD_5 (mg/L)	Average Influent BOD_5 (lbs/day)	Average Influent TSS (mg/L)	Average Influent TSS (lbs/day)	Septage to Lagoon No. 1 (GPD)	Supplemental Water (Gal)	
Jan-10	0.110	0.089	0.100	96	80.1	21	17.5	10,000		
Feb-10	0.080	0.059	0.067	84	46.9	17	9.5	65,400		
Mar-10	0.078	0.060	0.067	84	46.9	17	9.5	72,650		
Apr-10	0.079	0.062	0.069	96	55.2	14	8.1	102,300		
May-10	0.078	0.060	0.070	90	52.5	25	14.6	164,775		
Jun-10	0.078	0.060	0.070	132	77.1	22	12.8	99,500		2,856,500
Jul-10	0.100	0.070	0.088	144	105.7	36	26.4	133,450		6,343,600
Aug-10	0.127	0.098	0.107	148	132.1	33	29.4	165,050		4,523,900
Sep-10	0.121	0.099	0.110	118	108.3	27	24.8	102,140		
Oct-10	0.125	0.099	0.111	114	105.5	33	30.5	84,850		
Nov-10	0.121	0.100	0.111	126	116.6	73	67.6	89,950		
Dec-10	0.105	0.083	0.093	96	74.5	17	13.2	52,800		
Jan-11	0.122	0.097	0.108	102	91.9	19	17.1	44,800		
Feb-11	0.122	0.101	0.113	72	67.9	55	51.8	40,350		
Mar-11	0.130	0.104	0.121	150	151.4	29	29.3	79,200		
Apr-11					0.0		0.0			
May-11	0.121	0.101	0.113	138	130.1	26	24.5	83,280		
Jun-11	0.118	0.098	0.106	156	137.9	47	41.5	80,330		1,288,500
Jul-11	0.128	0.100	0.113	156	147.0	23	21.7	110,300		7,052,800
Aug-11	0.131	0.103	0.117	90	87.8	28	27.3	161,000		14,664,100
Sep-11	0.131	0.088	0.109	54	49.1	20	18.2	131,900		16,092,300
Oct-11	0.116	0.089	0.102	90	76.6	30	25.5	67,800		
Nov-11			0.100		0.0		0.0			
Dec-11	0.125	0.098	0.110	114	104.6	78	71.6	53,150		
Jan-12	0.161	0.103	0.120	84	84.1	23	23.0	50,250		
Feb-12	0.122	0.108	0.117	126	122.9	8	7.8	52,400	595,400	
Mar-12	0.122	0.105	0.117	132	128.8	20	19.5	54,650	2,340,500	
Apr-12	0.117	0.104	0.110	114	104.6	19	17.4	80,700	2,187,400	
May-12	0.116	0.103	0.110	132	121.1	26	23.9	109,800	2,244,200	
Jun-12	0.122	0.110	0.118	132	129.9	29	28.5	86,550	2,049,100	
Jul-12	0.126	0.108	0.116	260	251.5	31	30.0	133,475	1,878,100	8,924,000
Aug-12	0.122	0.103	0.116	72	69.7	36	34.8	148,075	2,027,200	16,297,700
Sep-12	0.123	0.103	0.114	173	164.5	33	31.4	118,500		
Oct-12	0.119	0.102	0.110	94	86.2	32	29.4	136,550		
Nov-12					0.0		0.0			
Dec-12	0.118	0.098	0.106	103	91.1	24	21.2	38,500		
Jan-13	0.122	0.109	0.117	124	121.0	17	16.6	35,980		
Feb-13	0.121	0.074	0.100	269	224.3	31	25.9	59,000		
Mar-13	0.110	0.091	0.100		0.0		0.0	94,350		
Apr-13	0.103	0.090	0.097	175	141.6	29	23.5			
May-13	0.105	0.089	0.096	248	198.6	19	15.2	122,075		
Jun-13	0.112	0.089	0.100	164	136.8	54	45.0	132,100		
Jul-13	0.113	0.096	0.106	184	162.7	21	18.6	152,000		
Aug-13	0.105	0.091	0.098		0.0		0.0	177,050		
Sep-13	0.102	0.096	0.100	145	120.9	35	29.2	161,950		
Oct-13	0.103	0.092	0.099	132	109.0	18	14.9	126,050		
Nov-13	0.103	0.092	0.098	193	157.7	23	18.8	65,250		
Dec-13	0.103	0.092	0.098	160	130.8	16	13.1	45,300		
Jan-14	0.114	0.095	0.103	150	128.9	24	20.6	44,500		
Feb-14	0.143	0.090	0.107	178	158.8	36	32.1	131,205		
Mar-14	0.110	0.097	0.103	177	152.0	28	24.1	222,130		
Apr-14	0.123	0.105	0.114	132	125.5	35	33.3	219,130		
May-14	0.118	0.108	0.113	167	157.4	21	19.8	218,550		
Jun-14	0.127	0.112	0.121	132	133.2	31	31.3	203,300		5,650,000
Jul-14	0.124	0.116	0.120	164	164.1	33	33.0	204,725		7,622,000
Aug-14	0.121	0.106	0.113	154	145.1	33	31.1	228,850		
Sep-14	0.125	0.109	0.118	137	134.8	19	18.7	201,970		5,881,000
Oct-14	0.125	0.101	0.115	138	132.4	15	14.4	184,520		
Nov-14	0.125	0.108	0.115	157	150.6	46	44.1	156,130		
Dec-14	0.108	0.088	0.097	132	106.8	24	19.4	146,010		
Maximum	0.161	0.116	0.121	269	251.5	78.00	71.56	228,850.00	2,340,500.00	16,297,700
Minimum	0.078	0.059	0.067	54	0.0	8.00	0.00	10,000.00	595,400.00	1,288,500
Average	0.115	0.095	0.105	136	109.9	28.71	23.37	113,152.68	1,903,128.57	8,099,700

MGD = Million gallons per day
mg/L = Milligrams per liter
lbs/day = Pounds per day
GPD = Gallons per day
Gal = Gallons

anderson perry & associates, inc.

CITY OF
LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE

SUMMARY OF HISTORICAL WASTEWATER DATA

FIGURE 2-3

DESIGN CRITERIA

Parameter	Year 2015	Cagle and Glenwood Acres Areas	Year 2035 with 2.2 Percent Annual Population Growth
Septic Tank Effluent			
Estimated Population Served by System[1]	982	1,670	2,581
Average Annual Wastewater Flow (MGD) 2010-2014 DMR Data[2]	0.105	0.179	0.276
Average Annual Wastewater Flow (gpcd)	107	107	107
Peak Daily Flow (MGD)[3]	0.161	0.274	0.423
Peak Daily Flow (gpcd)	164	164	164
Peak Hourly Flow (MGD)[4]	0.473	0.804	1.243
Peak Hourly Flow (gpcd)	481	481	481
Wastewater BOD_5 Loading (lbs/day)[5]	110	184	284
Wastewater BOD_5 Loading (lbs/capita/day)	0.11	0.11	0.11
Wastewater TSS Loading (lbs/day)[6]	23	33	52
Wastewater TSS Loading (lbs/capita/day)	0.02	0.02	0.02
Septage			
Average Monthly Septage Reception (MGD)[7]	0.00833	0.00833	0.00833
Estimated Septage BOD_5 Loading (mg/L)[8]	6,500	6,500	6,500
Estimated Septage TSS Loading (mg/L)[8]	13,000	13,000	13,000
Septage BOD_5 Loading (lbs/day)	452	452	452
Septage TSS Loading (lbs/day)	903	903	903
Total BOD_5 Loading (lbs/day)	561	635	735
Total TSS Loading (lbs/day)	927	937	955

[1] Current population estimated from Portland State University Population Research Center data. Existing Cagle and Glenwood Acres areas populations estimated from 2006 Wastewater Capital Facilities Plan.
[2] Wastewater Discharge Monitoring Reports (DMRs) from the La Pine Special Sanitary District and the City of La Pine.
[3] Peak flow from DMRs, reported on January 24, 2010.
[4] Assumed factor of 4.5 times the average annual flow.
[5] Average BOD_5 loading from DMRs.
[6] Average TSS loading from DMRs.
[7] Assumes the City receives 250,000 gallons per month, the maximum amount allowed by the Water Pollution Control Facilities Permit.
[8] Average value from the Environmental Protection Agency's "Guide to Septage Treatment and Disposal."

BOD_5 = five-day biochemical oxygen demand
gpcd = gallons per capita per day
MGD = million gallons per day
TSS = total suspended solids
mg/L = milligrams per liter

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CITY OF
LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE

DESIGN CRITERIA

FIGURE
2-4

Chapter 3 - Existing Wastewater System Evaluation

Introduction

In this chapter, the existing wastewater collection, treatment, and disposal facilities are described. The system components are evaluated to determine whether the current system can handle the addition of the Cagle and Glenwood Acres areas. A full evaluation of the collection system was not completed as part of this Wastewater System Study (WWSS) Update. Refer to the 2006 Wastewater System Capital Facilities Plan (WWCFP) for more information regarding the existing wastewater system.

General Collection System Overview

Construction of the majority of the City's wastewater collection system was completed in the late 1980s, with a major system expansion in 2004. The wastewater collection system serving the City of La Pine is shown on the Wastewater System Map located at the end of this WWSS Update. The map includes major collection system piping, lift stations, etc. Septic tanks and associated piping, which are owned and maintained by the City, are not shown on the map. The Wastewater System Map was prepared by Anderson Perry & Associates, Inc. (AP) using information from the City. Available resources were utilized to make the Map as accurate as possible.

Referring to the Wastewater System Map, the gravity collection system drains to four primary lift stations and one smaller, localized lift station. The four primary lift stations then utilize pressure sewer lines that transport the wastewater from the lift stations to the lagoon wastewater treatment system.

Gravity and Pressure Sewer

The portions of the collection system that would be affected by the addition of the Cagle and Glenwood Acres areas were evaluated. According to the 2006 WWCFP, the gravity collection system consisted of 42,996 lineal feet of 4-inch gravity main, 10,944 lineal feet of 6-inch gravity main, 18,155 feet of 8-inch gravity main, and 2,540 lineal feet of 12-inch gravity main. All gravity mains were reportedly constructed of 3034 polyvinyl chloride (PVC) sewer pipe. These gravity mains collect septic tank effluent from users and direct it to one of four primary lift stations within the collection system. Each lift station conveys the septic tank effluent to the wastewater treatment facility (WWTF) via pressure mains. The forcemain from the 1st Street Lift Station is approximately 5,100 lineal feet of 4-inch Class 160 PVC pipe, the forcemain from the Wickiup and Newberry Lift Stations is approximately 11,900 lineal feet of C-900 PVC, and the forcemain from the Industrial Park Lift Station is approximately 1,160 lineal feet of C-900 PVC. Discussions with City staff indicate that the collection system seems to be in relatively good condition.

Lift Stations

Complete and detailed evaluations of each lift station were not completed as part of this WWSS Update. The addition of the Cagle and Glenwood Acres areas will only impact the Wickiup Lift Station. AP recently completed a study and design to upgrade the Wickiup Lift Station in order to serve the addition of the Cagle and Glenwood Acres areas. That analysis is not repeated here but is

presented in Appendix C for reference. The following is a brief description of each lift station and the area it serves. These lift stations are shown on the Wastewater System Map.

The four main lift stations owned by the City are the 1st Street Lift Station, the Wickiup Lift Station, the Newberry Lift Station, and the Industrial Park Lift Station. These lift stations were all designed using a similar template. The lift stations each contain duplex submersible pumps with a capacity of approximately 50 to 90 gallons per minute (gpm) with both pumps in operation. Both pumps are 5 horsepower (Hp) Hydromatic Pumps. The wetwell for the 1st Street Lift Station is a 3,000-gallon rectangular wetwell, while the wetwells at the Wickiup, Newberry, and Industrial Park Lift Stations are all 6-foot diameter wetwells.

The lift stations are designed as fixed speed pump systems. The pumps are operated based on the wastewater level in the wetwell. In 2005, a radio telemetry system was installed to transmit all alarms and status signals at each lift station to the WWTF. According to conversations with City staff, these alarms and dialers are no longer functioning.

1st Street Lift Station

The 1st Street Lift Station is located on 1st Street, east of the intersection of 1st Street and Huntington Road. This lift station is equipped with a 35 kilowatt (kW) generator for standby power and serves the area west of Highway 97 and south of Memorial Lane. Two other lift stations, owned by the La Pine Schools, are also located in this area.

Wickiup Lift Station

The Wickiup Lift Station is located at the intersection of Highway 97 and Burgess Road. The Wickiup Lift Station currently serves the Wickiup Junction area in north La Pine and is proposed to also serve the Cagle and Glenwood Acres areas. This lift station is also equipped with a 35 kW generator.

Newberry Lift Station

The Newberry Lift Station is located near Highway 97, north of the Crescent Creek Subdivision. Currently, this lift station services only the Crescent Creek subdivision and pumps wastewater into the pressure sewer line that runs from the Wickiup Lift Station to the WWTF. This lift station is equipped with a 30 kW generator.

Industrial Park Lift Station

The Industrial Park Lift Station is located at the intersection of Reed Road and Mitts Way, near the City's effluent irrigation site. This lift station serves the industrial park area east of Highway 97 and south of Reed Road. This lift station does not have a generator for backup standby power.

Heath Drive Lift Station

The Heath Drive Lift Station is an E/One packaged lift station that serves only a few homes on Heath Drive. The wastewater is lifted to a gravity sewer in the adjacent street.

Wastewater Treatment Facility Overview

General

The City's WWTF is shown schematically on Figure 3-1. The WWTF is located adjacent to the Burlington Northern Santa Fe Railroad and Reed Road and includes the treatment and storage cells, a septage receiving station, an operation and maintenance building, and a wastewater disposal site.

Description

The City treats its wastewater using a three-cell partially aerated facultative lagoon secondary treatment system, with a fourth cell used for storage of treated wastewater. The geometric data for the City's lagoons are summarized on Table 3-1. The City's treatment lagoons are considered facultative lagoons, meaning both aerobic and anaerobic processes are used to treat the wastewater. These types of wastewater treatment lagoons are common throughout central and eastern Oregon. The original WWTF and pivot irrigation system were constructed in 1989, with upgrades to the WWTF occurring in 1998 and 2003. The major reason for the improvements in 2003 was to provide additional storage for wintertime flows.

TABLE 3-1
POND GEOMETRIC DATA

Parameter	Cell 1	Cell 2	Cell 3	Cell 4
Nominal Dike Height (feet)	13.5	13.5	13.5	15.4
Minimum Water Depth (feet)	3	3	3	3
Maximum Water Depth (feet)	10.5	10.5	10.5	12.4
Surface Area (acres)	4.79	2.67	2.67	13.19
Maximum Usable Storage Volume				
• Acre-feet	44.6	22.5	22.5	132.9
• Million gallons (MG)	14.5	7.3	7.3	43.3

Influent enters the lagoon system from two pressure sewer lines at the northwest corner of Cell 1 (refer to Figure 3-1). Influent flow is recorded by an insertion meter located inside the operations and maintenance building. The Cell 1 inlet is located in the northwest corner of the lagoon. Wastewater is transferred from Cell 1 to Cell 2 via a transfer structure located in the northeast corner of Cell 1. A similar transfer structure is located at the northwest corner of Cell 2 to transfer wastewater from Cell 2 to Cell 3. Wastewater from Cell 3 is then piped around the west side of Cell 1 into the northwest corner of Cell 4. Piping and valving is present in the dikes that allow each cell to be isolated.

The City's lagoons are also equipped with an aeration and mixing system. The system is known as an Aero-Fac aerated facultative lagoon system that includes aeration and mixing components. The aeration equipment, including the blower and diffuser unit, is located in and adjacent to Cell 1. The blower is located in a small building on the lagoon dike between Cells 1 and 4. The blower is a 30 Hp unit that provides air to the stainless steel diffuser unit located in Cell 1. It is estimated that the blower is able to provide approximately 1,750 cubic feet per minute of air to the system. Wind- and electric-powered mixers are also located in all four cells. The system was originally designed to keep

the dissolved oxygen level in Cell 1 to a preset level. However, the sensor in the system does not work properly, and the blower is currently operated continuously. The electric mixers are also operated continuously by either wind power or electricity.

Normal flow process is a series operation from Cell 1 to Cell 2 to Cell 3. From Cell 3, the treated effluent enters into Cell 4, the storage lagoon, where it is then pumped to the disposal area. The effluent pump is used to pump the treated effluent through an 18-inch diameter chlorine contact chamber, which outlets to the 16-inch pressure sewer line that transports the disinfected effluent to the hay field outfall (refer to Figure 3-1).

The operations and maintenance building houses the effluent irrigation pumps, pump piping, water supply system, and chlorination equipment. The chlorination system uses gas chlorine and is located in a separate room in the operations and maintenance building. Chlorine solution is injected into the effluent stream within the pump piping downstream of the effluent pump. Water supply for chlorination and washdown is obtained from a groundwater well located adjacent to the WWTF. The effluent pumps include two 20 Hp, 500 gpm centrifugal pumps with a vacuum pumping system. The effluent flow from the pump system is metered using a probe-type flowmeter.

Lagoon Treatment Evaluation

As discussed previously, the City's WWTF is considered a partially aerated facultative lagoon system. In this type of system, five-day biochemical oxygen demand (BOD_5) reduction is accomplished by both the addition of oxygen from the aeration system as well as the addition of oxygen from the facultative lagoon processes (photosynthesis, atmosphere, etc.). In order to provide a conservative estimate for the purposes of evaluating the available treatment capacity, the oxygen provided from the facultative processes was not included. Only the oxygen provided by the City's existing aeration system was considered available for BOD_5 reduction in Cell 1.

As shown in the design criteria on Figure 2-4 in Chapter 2, the existing loading rate is 562 pounds of BOD_5/day and the anticipated future loading rate is 736 pounds of BOD_5/day. The following Table 3-2 shows the estimated BOD_5 loading compared to the amount of oxygen provided by the aeration system. Based on available data, it is estimated that the aeration system is able to provide approximately 650 pounds of oxygen per day to Cell 1 assuming 2.0 percent oxygen transfer efficiency.

TABLE 3-2
BOD_5 LOADING RATES

	Year 2015	Year 2015 with Cagle and Glenwood Acres Areas	Year 2035 with 2.2 Percent Annual Population Growth
Influent BOD_5 Loading (lbs/day)	110	184	284
Septage BOD_5 Loading (lbs/day)	452	452	452
Total BOD_5 Loading (lbs/day)	562	636	736
Estimated Oxygen Provided by Aeration (lbs/day)	650	650	650

Assuming there is a one-to-one correlation between pounds of oxygen provided to pounds of BOD_5 removed, Table 3-2 shows that the City's WWTF has enough capacity to meet the current BOD_5 loading of 562 pounds per day, as well as the BOD_5 loading of 636 pounds per day with the addition

of the Cagle and Glenwood Acres areas. The 20-year design period loading of 736 pounds per day would require approximately 86 pounds of BOD_5 to be treated by Cells 2 and 3. This amount of loading is well below typical design standards for facultative lagoon systems.

The City's BOD_5 loadings were calculated assuming the City received the maximum amount of septage allowed by its Water Pollution Control Facilities (WPCF) Permit, which is 250,000 gallons per month. This conservative estimate, along with the design of the existing treatment cells, provides operational flexibility for the City. In the future the City could elect to receive less septage from outside sources, thereby lowering the BOD_5 loading in the system. The City could also elect to add additional aeration to any or all of the treatment cells. Due to the relatively deep treatment cells (approximately 10.5 feet), the City could add aeration, which would increase the treatment capacity of the system.

Treatment efficiency of the lagoons typically varies due to seasonal changes. Winter "ice-over," spring turnover, and spring algae blooms affect treatment. With winter "ice-over" conditions, oxygen transfer reduces and anaerobic conditions occur, and BOD_5 reductions become limited. This is typical of facultative lagoons in the Northwest and can affect the ability to discharge treated water. As long as lagoon capacity is available, this is normally acceptable.

It should be noted that the current septage receiving station is outdated and requires City employees to manually handle raw septage. The septage receiving station should be upgraded as discussed in Chapter 4.

Effluent Pump Station

The effluent pump system and associated piping are located within the operations and maintenance building just west of Cell 1 as shown on Figure 3-1. Effluent is drawn from Cell 4 through the decanter located at the southwest corner of Cell 4. Effluent is conveyed through an 18-inch PVC chlorine contact pipeline to the effluent pump station. The effluent pumps then convey treated wastewater to the irrigation pivot via an 8-inch ductile iron transmission pipeline. The existing pumps appear to be operating efficiently. The pumps are each 20 Hp units capable of providing 500 gpm. All parts of the pumping and piping systems seem to be operating properly and have sufficient capacity to serve the addition of the Cagle and Glenwood Acres areas. The flowmeter also appears to be operating correctly.

Wastewater Disposal Facility

Description

The City utilizes irrigation of a hay crop to dispose of treated wastewater. The disposal area consists of a 75-acre irrigation pivot located adjacent to the WWTF, as shown on Figure 3-1. The outer banks of the lagoon dikes have also been planted with grass and irrigation systems have been set up, however; these irrigation systems are not currently used. The City currently operates the wastewater disposal facility under WPCF Permit Number 102069. The permitted outfalls include land application and a biomass facility. The City currently utilizes the land application method, as plans for a biomass facility in La Pine have been delayed. The City does not currently discharge to any surface water. The pivot is relatively old and the particular type is no longer manufactured. The City has difficulty obtaining parts and service for the pivot.

This site has relatively shallow groundwater levels, estimated at approximately 8 feet below the ground surface. The Oregon Department of Environmental Quality has expressed concern over potential contamination of groundwater at the existing disposal site.

Water Balance

In order to assess the City's lagoon storage capacity and the overall operation of the wastewater system, water balances were developed. A water balance is a means to account for all water entering and leaving the lagoon system. The influent flow as well as the estimated effects of evaporation, precipitation, irrigation, and seepage (if it occurs) are shown in order to account for all inflow to and outflow from the system. The water balance for the existing system can be seen on Figure 3-2. Further details on the assumptions used in the water balance are shown at the bottom of the Figure. Since the lagoons are lined with either PVC or high-density polyethylene liners, the seepage rate was assumed to be zero. From the current water balance, it appears the City can irrigate at agronomic rates and dispose of all treated wastewater.

Figure 3-3 is a water balance for the existing system plus the addition of the Cagle and Glenwood Acres areas. Figure 3-3 shows that once Cagle and Glenwood Acres are added to the system, approximately 140 total acres of hay field would be needed to dispose of the treated wastewater while continuing to irrigate at agronomic rates. Figure 3-4 shows a water balance for the 20-year planning period, which includes the addition of Cagle and Glenwood Acres and a 2.2 percent annual population growth for a total 2035 population of 2,581 people. Approximately 210 acres of hay would be required for disposal at agronomic rates for the 20-year design criteria.

Water balances also indicate whether the system has enough available storage to store the wastewater flows during the winter months until they can be disposed of during the irrigation season. The City currently utilizes Cell 4 as a storage lagoon, filling it during the winter months and disposing of treated wastewater to empty the lagoon during the summer months. Cell 4 has approximately 44.7 MG of available storage. As shown on Figure 3-2, the cumulative storage currently required is only 31.41 MG. Figure 3-3 shows that the highest cumulative storage required with the addition of the Cagle and Glenwood Acres areas is approximately 47.9 MG, or 3.2 MG more than what the City currently has available. However, the City could potentially make up this volume simply by lowering the treatment cells approximately 1 foot during the summer to allow for some additional storage. Figure 3-4 shows that with the addition of the Cagle and Glenwood Acres areas plus the assumed population growth over a 20-year period, approximately 22 MG of additional storage will be required.

Summary

Collection

According to the 2006 WWCFP, the gravity and pressure collection system appeared to be in good condition. All gravity mains were reportedly constructed of 3034 PVC pipe. Discussions with City staff also indicated that the collection system seems to be in relatively good condition. Due to the City's septic tank effluent gravity system, the pipelines have relatively shallow burial depths, which make them less susceptible to groundwater infiltration/inflow.

The City has plans to upgrade the Wickiup Lift Station in 2016. At this time, it appears the other lift stations are working properly and are able to meet demands. The City should continue to monitor and perform required maintenance for each lift station to ensure they continue to be reliable and are working properly. The telemetry systems should be improved so the lift station alarms can be relayed to operators in case of an emergency.

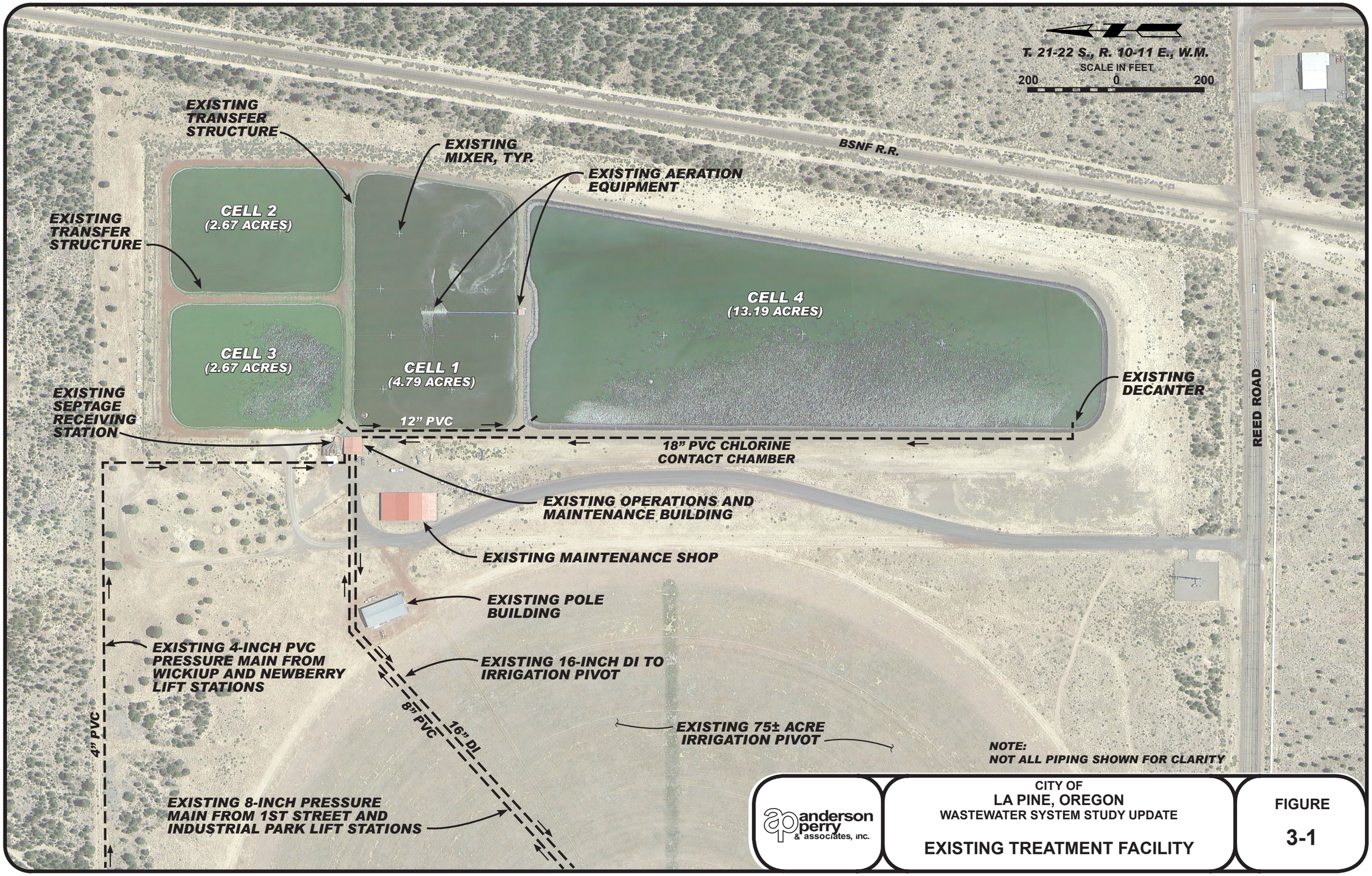
Wastewater Treatment

The City utilizes a partially aerated three-cell facultative lagoon system for wastewater treatment. The City receives septic tank effluent as well as septage from those septic tanks connected to the City's system, plus additional septage from outside customers.

With the current wastewater loadings at the WWTF and the estimated treatment capacity of the system, the City should be able to adequately treat the incoming wastewater in addition to the permitted amount of septage for the current condition as well as the addition of the Cagle and Glenwood Acres areas. It is estimated that after the 20-year design period, the City may not be able to sufficiently treat the levels of loading with the existing system. At that point the City could consider providing additional aeration to the system to increase the level of treatment capacity or reducing the amount of septage received from outside sources to reduce the overall loading on the system.

Wastewater Disposal

Water balances show that the existing disposal system is able to adequately dispose of the City's treated wastewater by irrigating at agronomic rates. However, with the addition of the Cagle and Glenwood Acres areas, the disposal area will be too small to properly dispose of all of the City's wastewater. Also, due to shallow groundwater levels at the existing effluent disposal site, it is proposed to discontinue the use of this site. The City will need to expand the wastewater disposal system if the Cagle and Glenwood Acres areas are to be included in the system. Alternatives are evaluated in Chapter 4.



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CITY OF
LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE

EXISTING TREATMENT FACILITY

FIGURE
3-1

Job# 33-06-020 Dec. 15, 2015 lbauer

WATER BALANCE WITH EFFLUENT IRRIGATION
CURRENT POPULATION

Month	Influent[1] (MG)	Septage[2] (MG)	Precipitation[3] (in)	Precipitation[3] (MG)	Evaporation[4] (in)	Evaporation[4] (MG)	Seepage[5] (MG)	Irrigation Crop: Acreage: (in)	Irrigation Alfalfa 75 (MG)	Storage Volume (+/-) (MG)	Cumulative Storage Volume (MG)[6]
January	3.90	0.04	3.11	1.97	0.00	0.00	0.00	-	0.00	5.91	20.87
February	3.29	0.07	2.55	1.61	0.00	0.00	0.00	-	0.00	4.98	25.85
March	3.41	0.10	1.74	1.10	0.00	0.00	0.00	-	0.00	4.62	30.46
April	3.17	0.13	1.36	0.86	2.09	1.33	0.00	0.93	1.89	0.94	31.41
May	3.34	0.14	1.28	0.81	3.60	2.28	0.00	3.49	7.12	-5.11	26.30
June	3.34	0.12	1.01	0.64	4.52	2.86	0.00	4.84	9.85	-8.61	17.69
July	3.66	0.15	0.74	0.47	5.59	3.54	0.00	6.40	13.03	-12.30	5.39
August	3.76	0.18	0.67	0.42	4.79	3.03	0.00	4.95	10.09	-8.76	-3.37
September	3.61	0.14	0.71	0.45	3.28	2.07	0.00	3.47	7.07	-4.94	0.00
October	3.65	0.12	1.42	0.90	1.72	1.09	0.00	-	0.00	3.57	3.57
November	3.49	0.10	3.08	1.95	0.00	0.00	0.00	-	0.00	5.54	9.12
December	3.47	0.07	3.65	2.31	0.00	0.00	0.00	-	0.00	5.84	14.96
TOTALS	**42.08**	**1.36**	**21.32**	**13.50**	**25.59**	**16.20**	**0.00**	**24.08**	**49.04**	**-8.31**	

MG = Million gallons
in = inches

	Acres	Square Feet	MG
Cell 1 Area	4.79	208,652	13.27
Cell 2 Area	2.67	116,305	7.39
Cell 3 Area	2.67	116,305	7.39
Cell 4 Area	13.19	574,556	44.70
Total	**23.3**	**1,015,819**	**72.75**

Crop Usage Data - Alfalfa hay

Month	Precip. (in)	Evapotran.[7] (in)	Net Irrigation Req'd. (in)	70 Percent Efficiency (in)
Apr	1.36	2.01	0.65	0.93
May	1.28	4.25	2.97	3.49
Jun	1.01	5.12	4.11	4.84
Jul	0.74	6.18	5.44	6.40
Aug	0.67	4.88	4.21	4.95
Sep	0.71	3.66	2.95	3.47
Oct	1.42	0.00	0.00	0.00
			20.33	24.08

Notes:

[1] Influent. Influent flows are based on average monthly flow from January 2010 to December 2014. Data obtained from Discharge Monitoring Reports (DMRs).
[2] Septage. Septage flows are based on average monthly flow from January 2010 to December 2014. Data obtained from DMRs.
[3] Precipitation. Utilized precipitation on record with the Western Regional Climate Center (WRCC) for the Wickiup Dam weather station from 1981 to 2010. Mean rainfall used for each month.
[4] Evaporation. Utilized pan evaporation data obtained from the WRCC for the Wickiup Dam station, with a pan coefficient of 0.70.
[5] Seepage. Existing lagoon seepage assumed to be 0 because the lagoons are lined.
[6] Total storage available in storage lagoon (Cell 4) estimated to be 44.70 million gallons.
[7] Evapotranspiration. Based on data from Oregon Crop Water Use and Irrigation Requirements, Oregon State University Extension Publication 8530.

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CITY OF
LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE
WATER BALANCE WITH EFFLUENT IRRIGATION
CURRENT POPULATION

FIGURE
3-2

WATER BALANCE WITH EFFLUENT IRRIGATION
2015 POPULATION, PLUS CAGLE AND GLENWOOD ACRES AREAS

Month	Influent[1] (MG)	Septage[2] (MG)	Precipitation[2] (in)	Precipitation[2] (MG)	Evaporation[4] (in)	Evaporation[4] (MG)	Seepage[5] (MG)	Irrigation Crop: Acreage: (in)	Irrigation Alfalfa 140 (MG)	Storage Volume (+/-) (MG)	Cumulative Storage Volume[6] (MG)
January	6.63	0.04	3.11	1.97	0.00	0.00	0.00	-	0.00	8.64	31.03
February	5.60	0.07	2.55	1.61	0.00	0.00	0.00	-	0.00	7.28	38.31
March	5.80	0.10	1.74	1.10	0.00	0.00	0.00	-	0.00	7.01	45.32
April	5.38	0.13	1.36	0.86	2.09	1.33	0.00	0.65	2.47	2.58	47.90
May	5.67	0.14	1.28	0.81	3.60	2.28	0.00	2.97	11.29	-6.95	40.95
June	5.68	0.12	1.01	0.64	4.52	2.86	0.00	4.11	15.62	-12.04	28.91
July	6.23	0.15	0.74	0.47	5.59	3.54	0.00	5.44	20.68	-17.38	11.53
August	6.39	0.18	0.67	0.42	4.79	3.03	0.00	4.21	16.00	-12.05	-0.51
September	6.14	0.14	0.71	0.45	3.28	2.07	0.00	2.95	11.21	-6.55	0.00
October	6.20	0.12	1.42	0.90	1.72	1.09	0.00	-	0.00	6.13	6.13
November	5.94	0.10	3.08	1.95	0.00	0.00	0.00	-	0.00	7.99	14.12
December	5.89	0.07	3.65	2.31	0.00	0.00	0.00	-	0.00	8.27	22.39
TOTALS	**71.56**	**1.36**	**21.32**	**13.50**	**25.59**	**16.20**	**0.00**	**20.33**	**77.29**	**-7.07**	

MG = Million gallons
in = inches

	Acres	Square Feet	MG
Cell 1 Area	4.79	208,652	13.27
Cell 2 Area	2.67	116,305	7.39
Cell 3 Area	2.67	116,305	7.39
Cell 4 Area	13.19	574,556	44.70
Total	**23.3**	**1,015,819**	**72.75**

Crop Usage Data - Alfalfa hay

Month	Precip. (in)	Evapotran.[7] (in)	Net Irrigation Req'd. (in)	85 Percent Efficiency (in)
Apr	1.36	2.01	0.65	0.76
May	1.28	4.25	2.97	3.49
Jun	1.01	5.12	4.11	4.84
Jul	0.74	6.18	5.44	6.40
Aug	0.67	4.88	4.21	4.95
Sep	0.71	3.66	2.95	3.47
Oct	1.42	0.00	0.00	0.00

Notes:

[1] Influent. Influent flows are based on average monthly flow from January 2010 to December 2014. Data obtained from Discharge Monitoring Reports (DMRs).
[2] Septage. Septage flows are based on average monthly flow from January 2010 to December 2014. Data obtained from DMRs.
[3] Precipitation. Utilized precipitation on record with the Western Regional Climate Center (WRCC) for the Wickiup Dam weather station from 1981 to 2010. Mean rainfall used for each month.
[4] Evaporation. Utilized pan evaporation data obtained from the WRCC for the Wickiup Dam station, with a pan coefficient of 0.70.
[5] Seepage. Existing lagoon seepage assumed to be 0 because the lagoons are lined.
[6] Total storage available in storage lagoon (Cell 4) estimated to be 44.70 million gallons.
[7] Evapotranspiration. Based on data from Oregon Crop Water Use and Irrigation Requirements, Oregon State University Extension Publication 8530.

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CITY OF
LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE
WATER BALANCE WITH EFFLUENT IRRIGATION 2015 POPULATION, PLUS CAGLE AND GLENWOOD ACRES AREAS

FIGURE
3-3

WATER BALANCE WITH EFFLUENT IRRIGATION
2035 POPULATION, PLUS CAGLE AND GLENWOOD ACRES AREAS

Month	Influent[1] (MG)	Septage[2] (MG)	Precipitation[3] (in)	Precipitation[3] (MG)	Evaporation[4] (in)	Evaporation[4] (MG)	Seepage[5] (MG)	Irrigation Crop: Acreage: (in)	Irrigation Alfalfa 210 (MG)	Storage Volume (+/-) (MG)	Cumulative Storage Volume[6] (MG)
January	9.86	0.04	3.11	1.97	0.00	0.00	0.00	-	0.00	11.86	43.02
February	8.32	0.07	2.55	1.61	0.00	0.00	0.00	-	0.00	10.01	53.03
March	8.62	0.10	1.74	1.10	0.00	0.00	0.00	-	0.00	9.83	62.85
April	8.00	0.13	1.36	0.86	2.09	1.33	0.00	0.65	3.71	3.96	66.81
May	8.43	0.14	1.28	0.81	3.60	2.28	0.00	2.97	16.94	-9.83	56.98
June	8.45	0.12	1.01	0.64	4.52	2.86	0.00	4.11	23.44	-17.09	39.89
July	9.26	0.15	0.74	0.47	5.59	3.54	0.00	5.44	31.02	-24.69	15.20
August	9.50	0.18	0.67	0.42	4.79	3.03	0.00	4.21	24.01	-16.94	-1.74
September	9.13	0.14	0.71	0.45	3.28	2.07	0.00	2.95	16.82	-9.17	0.00
October	9.21	0.12	1.42	0.90	1.72	1.09	0.00	-	0.00	9.14	9.14
November	8.82	0.10	3.08	1.95	0.00	0.00	0.00	-	0.00	10.87	20.02
December	8.76	0.07	3.65	2.31	0.00	0.00	0.00	-	0.00	11.14	31.16
TOTALS	**106.36**	**1.36**	**21.32**	**13.50**	**25.59**	**16.20**	**0.00**	**20.33**	**115.93**	**-10.92**	

MG = Million gallons
in = inches

	Acres	Square Feet	MG
Cell 1 Area	4.79	208,652	13.27
Cell 2 Area	2.67	116,305	7.39
Cell 3 Area	2.67	116,305	7.39
Cell 4 Area	13.19	574,556	44.70
Total	**23.3**	**1,015,819**	**72.75**

Crop Usage Data - Alfalfa hay

Month	Precip. (in)	Evapotran.[7] (in)	Net Irrigation Req'd. (in)	85 Percent Efficiency (in)
Apr	1.36	2.01	0.65	0.76
May	1.28	4.25	2.97	3.49
Jun	1.01	5.12	4.11	4.84
Jul	0.74	6.18	5.44	6.40
Aug	0.67	4.88	4.21	4.95
Sep	0.71	3.66	2.95	3.47
Oct	1.42	0.00	0.00	0.00

Notes:

[1] Influent. Influent flows are based on average monthly flow from January 2010 to December 2014. Data obtained from Discharge Monitoring Reports (DMRs).
[2] Septage. Septage flows are based on average monthly flow from January 2010 to December 2014. Data obtained from DMRs.
[3] Precipitation. Utilized precipitation on record with the Western Regional Climate Center (WRCC) for the Wickiup Dam weather station from 1981 to 2010. Mean rainfall used for each month.
[4] Evaporation. Utilized pan evaporation data obtained from the WRCC for the Wickiup Dam station, with a pan coefficient of 0.70.
[5] Seepage. Existing lagoon seepage assumed to be 0 because the lagoons are lined.
[6] Total storage available in storage lagoon (Cell 4) estimated to be 44.70 million gallons.
[7] Evapotranspiration. Based on data from Oregon Crop Water Use and Irrigation Requirements, Oregon State University Extension Publication 8530.

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CITY OF
LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE
WATER BALANCE WITH EFFLUENT IRRIGATION 2035 POPULATION, PLUS CAGLE AND GLENWOOD ACRES AREAS

FIGURE
3-4

Chapter 4 - Evaluation of Improvement Options

General

In this chapter, options to improve the City of La Pine's wastewater collection, treatment, and effluent disposal facilities are developed and evaluated to address the deficiencies identified in Chapter 3. The wastewater collection system is discussed and treatment and effluent disposal improvement options considered in this Wastewater System Study (WWSS) Update are presented. Feasible options deserving further consideration are identified, and additional discussion and evaluation of the feasible treatment and disposal options are provided. Based on comparison of the feasible options, a recommended improvements project is presented.

Wastewater Collection System Improvements

As discussed in Chapter 3, the City's existing collection system is reportedly in good condition. A new collection system is needed to include the Cagle and Glenwood Acres areas in the wastewater system service area. Improvements to serve the Cagle and Glenwood Acres areas include septic tanks and associated piping, collection piping, and two lift stations. These improvements (except for the septic tanks and associated piping) are shown on Figure 4-1.

Several improvements are required to add the Cagle and Glenwood Acres areas to the City's wastewater system. The required improvements are summarized as follows:

- Upgrade the Wickiup Lift Station to increase the pumping flow rate to serve the Cagle and Glenwood Acres areas. These improvements are designed and are planned for construction in 2016.
- Replace or install septic tanks and associated piping, as required.
- Install collection system piping (as shown on Figure 4-1) to serve the Cagle and Glenwood Acres areas.

Other collection system improvements include the following items:

- Install a standby generator at the Industrial Park Lift Station.
- Upgrade the existing telemetry system at all lift stations.

The estimated construction cost of the collection system improvements is shown on Figure 4-2.

Wastewater Treatment Facility (Lagoon) Improvements

In this section, wastewater treatment facility (WWTF) options are discussed. As discussed in Chapter 3, the City has capacity and flexibility in the operation of the WWTF. This WWSS Update has shown that the City has the capacity in the WWTF to meet current demands, as well as the addition of the Cagle and Glenwood Acres areas if septage-receiving modifications are made. The five-day biochemical oxygen demand (BOD_5) loadings will exceed the treatment capacity of the lagoons before the 20-year design

period, assuming the City chooses to receive the maximum amount of septage allowed by its Water Pollution Control Facilities (WPCF) Permit. If the City chooses to operate the WWTF in this fashion for the 20-year design period, the City should monitor the BOD_5 loading levels to ensure proper treatment is being achieved.

If treatment of the City's wastewater and septage becomes a challenge, the City could elect to install additional aeration equipment to increase the capacity of the treatment system. Also, the City could elect to reduce the amount of septage received by outside sources. This would ultimately lower the BOD_5 loading coming into the WWTF, extending further into the future the time when the design capacity of the lagoon system is reached.

The City will still need to have the capability to receive septage from City of La Pine wastewater customers into the future. The current septage receiving station requires City employees to manually handle raw septage and is neither safe nor sanitary. The City should replace the existing septage receiving station with a new, card-lock automated septage receiving station to reduce operations and maintenance cost and to provide a safe and sanitary work environment for public works staff. A quote was obtained from a septage receiving station distributor, and the estimated construction cost for a new septage receiving station is approximately $250,000. This cost is included in the estimated costs for the effluent disposal options, discussed hereafter.

Wastewater Effluent Disposal Options

As discussed in Chapter 3, the City's existing wastewater disposal system does not have the capacity to serve the existing system and the Cagle and Glenwood Acres areas and also has relatively shallow groundwater levels. To provide service to these additional areas, as well as to address the 20-year population growth, the City will need to make improvements to the wastewater disposal system. Several options are available to the City to improve the wastewater disposal system. This chapter presents, develops, and analyzes wastewater disposal improvement options for the City. For the purpose of this WWSS Update, it has been assumed that the existing 75 acres of irrigated area would no longer be used for irrigation, since the City owns approximately 750 acres of land further to the east, which is intended to be used for effluent disposal. This will move the wastewater disposal away from development on Reed Road and will allow the City to utilize the existing 75 acres for other uses. The groundwater levels at the proposed site have been estimated at 48 feet below ground surface.

A water balance for each of the options was developed to determine the required storage volume, irrigation area needed, and other parameters to determine the costs associated with the improvements. Each water balance shows various means of inflow and outflow from the lagoon system (from natural means, such as precipitation and evaporation, to plant operational parameters, such as effluent flow to the irrigation area). Details on the assumptions used in the water balances are shown at the bottom of each water balance.

Description of Options

Following is a brief description of the wastewater disposal system improvement options considered for the City of La Pine to meet the anticipated year 2035 design criteria.

- A "do nothing" option with continued irrigation of the 75-acre irrigation area.
- Option 1 - Construct an evaporative lagoon system for disposal of treated effluent.

- Option 2 - Increase the irrigation area utilizing 300 acres of forested area (irrigate trees) and construct a storage lagoon.
- Option 3 - Increase the irrigation area utilizing 210 acres of hay crop irrigation and construct a storage lagoon.

The "Do Nothing" Option

This option was not considered feasible for treated wastewater effluent disposal for long-term planning. The City is required to irrigate at agronomic rates. With the addition of the Cagle and Glenwood Acres areas, plus the 20-year assumed population growth, the City will not be able to properly dispose of the treated wastewater and remain in compliance with its WPCF Permit.

Option 1 - Construct an Evaporative Lagoon System for Disposal of Treated Effluent

This option includes discontinuing irrigation of treated effluent and constructing evaporative lagoons that would store excess treated effluent and provide greater surface area for evaporation. The water balance developed for Option 1 is included as Figure 4-3. According to the water balance, the City would need to construct lagoons with a total surface area of at least 2,100 acres. The lagoons would be lined with an impermeable liner. Due to the large area that is needed and the significantly high construction cost to construct 2,100 acres of lagoons, this option was deemed unviable.

Option 2 - Increase Irrigation Area Utilizing 300 Acres of Forested Area

With this option, wastewater disposal by irrigation at agronomic rates would continue and the irrigation area would be relocated and expanded. The City owns approximately 750 acres east of the existing WWTF. This land was given to the City by the Bureau of Land Management for the purpose of wastewater disposal. This option includes increasing the irrigation area and utilizing the existing forested area for irrigation. To irrigate this area, a network of irrigation piping would be constructed. Irrigation zones, including control valves, would be required to operate the system efficiently and minimize the size of pumps required to serve the system. Pipes and sprinklers would be spaced approximately 100 feet apart to adequately irrigate the area. This option also includes additional effluent storage capacity by building a new storage lagoon to meet the design criteria requirements.

The water balance developed for Option 2 is included as Figure 4-4. The neighboring community of Sisters, Oregon, utilizes forested area for effluent disposal. They are permitted to irrigate approximately 14 inches of effluent per acre per year. This value was used in the water balance for Option 2 for the purpose of this WWSS Update. According to the water balance, the City would need to construct an irrigation area of approximately 300 acres of forested area and also construct a storage lagoon with a total storage capacity of approximately 10 million gallons (MG) to store the 2035 projected volume of effluent. The required improvements and conceptual layout of the new irrigation area are shown on Figure 4-5.

Cost

The total estimated cost for Option 2 is approximately $6,214,000 (in 2015 dollars). Figure 4-6 provides a breakdown of the total estimated costs for this option.

Advantage

This alternative was thought to be an ideal option due to potentially lower operations and maintenance costs associated with this system. However, after discussion with the Oregon Department of Environmental Quality and the City of Sisters, this system could potentially have a higher operation and maintenance cost due to regulatory monitoring requirements and the additional equipment required to operate the system.

Disadvantages

Disadvantages of this option include the higher initial capital cost and the uncertainty of regulatory requirements. Depending on soil monitoring results, the Oregon Department of Environmental Quality could require the City to lower the application rate of treated effluent and could require additional maintenance, such as mowing vegetation, on the irrigation site. This option also requires more City land to dispose of all treated effluent due to the lower allowable application rate. Finally, the system would be more complicated with many irrigation "zones" that would require control valve stations and additional piping.

Option 3 - Increase Irrigation Area Utilizing 210 Acres of Hay Crop Area

With this option, disposal by irrigation at agronomic rates would continue, and the irrigation area would be relocated and expanded. As previously mentioned, the City owns approximately 750 acres east of the existing WWTF, and this land would be utilized under this option. This option includes increasing the irrigation area, clearing the existing forested area, and planting a hay crop for irrigation. This option also includes constructing two new center pivot irrigation systems and providing additional effluent storage capacity by building a new storage lagoon to meet the 2035 design criteria requirements.

The water balance developed for Option 3 is included as Figure 3-4 in Chapter 3. According to the water balance, the City would need to construct an irrigation area of approximately 210 acres of hay crop area and also construct a storage lagoon with a total storage capacity of approximately 22.1 MG to store the 2035 projected volume of effluent. The required improvements and conceptual layout of the new irrigation area are shown on Figure 4-7.

Cost

The total estimated cost for Option 3 is approximately $4,370,000 (in 2015 dollars). Figure 4-8 provides a breakdown of the total estimated costs for this option.

Advantages

The major advantages of this option include the lower estimated capital costs compared to irrigation of the forested area, which requires a more intricate irrigation system, as well as less land being required to dispose of the City's effluent. Due to the higher allowable

application rate of the hay crop, this option requires less City land to dispose of all treated effluent. The irrigation system would be simpler to operate when compared to the system needed to irrigate forested area.

Disadvantages

The major disadvantage of this option includes the potential higher operation and maintenance costs associated with the annual harvest of the hay crop. However, harvest of the hay crop could generate revenue for the City's wastewater system.

Proposed Improvements

As indicated in previous chapters, the City of La Pine is evaluating the infrastructure needs to add the Cagle and Glenwood Acres areas to the City's wastewater system. In order to do so, several improvements will need to be completed to serve these areas. Collection system piping and lift stations will need to be constructed in the Cagle and Glenwood Acres areas to convey wastewater to the City's WWTF. The WWTF has capacity and operational flexibility to serve the Cagle and Glenwood Acres areas as well as the future population of La Pine. The City's existing effluent disposal system is not adequate to serve the addition of the Cagle and Glenwood Acres areas or to serve the future projected year 2035 population. The proposed improvements for the collection, treatment, and disposal systems are described as follows.

Collection System Improvements

To provide service to customers in the Cagle and Glenwood Acres areas, collection system improvements must be completed. Collection system piping should be constructed in these areas to serve residents. Due to the relatively flat topography in the area, two lift stations will be required to convey wastewater to the Wickiup Lift Station, which in turn will pump wastewater to the City's WWTF. The proposed collection system improvements are shown on Figure 4-9. Replacement septic tanks and piping from the residence to the septic tank will need to be provided. Small-diameter collection piping from existing septic tanks to large diameter collection piping will also need to be constructed. These improvements are not shown on Figure 4-9 but are included in the estimated project cost.

Wastewater Treatment Facility Improvements

As previously discussed, the City of La Pine's WWTF has capacity to serve the existing population as well as the addition of the Cagle and Glenwood Acres areas. The City may need to make improvements to the system to serve the 20-year population if the City elects to receive septage at the maximum allowable rate. Rather than construct expensive improvements at this time, the City could elect to limit septage intake from outside sources if treatment capacity becomes an issue in the future. In the short term, it is proposed that the City replace the existing septage receiving station with a new unit to provide a safe and sanitary working environment for staff members. This improvement is included in the proposed improvements cost estimate summarized on Figure 4-10.

Effluent Disposal System Improvements

As discussed in Chapter 3, the City's wastewater disposal system is currently able to dispose of the City's treated wastewater by irrigating at agronomic rates. However, with the addition of the Cagle and Glenwood Acres areas, the system will be unable to store and dispose of the additional effluent flows. The proposed improvements that will enable the City to store and dispose of treated wastewater into the future are to relocate and expand the irrigation area to approximately 210 acres of City-owned land east of the existing WWTF and to construct a 22 MG storage lagoon (Option 3). The City-owned property and proposed site for the facilities is shown on Figure 4-9. These improvements will allow the City to dispose of treated wastewater by irrigating at agronomic rates, minimizing the risk of adversely affecting shallow groundwater.

Summary of Total Estimated Project Costs

A summary of the total estimated costs for the proposed improvements is shown on Figure 4-10 and presented below.

Collection System Improvements	$7,757,000
Treatment and Effluent Disposal Improvements (Option 3)	$4,370,000
Other Project Costs	$210,000
Total Estimated Project Cost (2015 Dollars)	**$12,337,000**

Bidding for the project, if funding were secured by late 2016, would most likely occur in 2018. The above 2015 costs should be projected to the year bidding is anticipated to occur, assuming annual inflation. Assuming a 4 percent annual inflation rate for three consecutive years (from 2015 to 2018), the total estimated year 2018 project cost is $13,877,000.

TO GILCHRIST

1ST STREET LIFT STATION

HEATH DRIVE LIFT STATION

HWY 97

HUNTINGTON ROAD

REED ROAD

NEWBERRY LIFT STATION

INDUSTRIAL PARK LIFT STATION

BSNF RAILROAD

CITY LIMITS / URBAN GROWTH BOUNDARY

FINLEY BUTTE ROAD

WICKIUP LIFT STATION

TO BEND

LEGEND

- NEW 4" PRESSURE SEWER PIPE
- NEW 6" GRAVITY SEWER PIPE
- NEW 8" GRAVITY SEWER PIPE
- EXISTING SEWER PIPE (SIZE NOT SHOWN)
- NEW LIFT STATION
- EXISTING LIFT STATION

1000 0 1000 2000 3000
SCALE IN FEET

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CITY OF
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WASTEWATER SYSTEM STUDY UPDATE

PROPOSED
COLLECTION SYSTEM IMPROVEMENTS

FIGURE
4-1

R:\LaPINE\33-06 Wastewater Sytem Update\DRAFTING\Plot Files\020-WWS\33-06-020C-101F41.dwg, fig 4-1, 2/26/2016 8:40:15 AM, prichardson

CITY OF LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE
COLLECTION SYSTEM IMPROVEMENTS
PRELIMINARY COST ESTIMATE
(Year 2015 Costs)

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	$ 225,000	All Req'd	$ 225,000
2	Temporary Protection and Direction of Traffic/Project Safety and Quality Control	LS	50,000	All Req'd	50,000
Glenwood Acres Area Collection System Improvements					
3	8-inch Polyvinyl Chloride (PVC) Gravity Sewer Line	LF	50	5,800	290,000
4	6-inch PVC Gravity Sewer Line	LF	40	7,800	312,000
5	4-inch PVC Sewer Service Line	LF	30	3,100	93,000
6	4-inch Pressure Sewer Line	LF	25	4,500	112,500
7	Cleanouts	Each	800	40	32,000
8	Sewer Service Connection	Each	300	62	18,600
9	Lift Station	LS	300,000	All Req'd	300,000
10	Connection to Existing Main Line	Each	1,500	2	3,000
11	Gravel Surface Restoration	SY	6	16,000	96,000
12	Asphalt Surface Restoration	SY	50	5,400	270,000
	Glenwood Acres Subtotal Estimated Construction Cost				**$ 1,527,000**
Cagle Area Collection System Improvements					
13	8-inch PVC Gravity Sewer Line	LF	50	26,900	1,345,000
14	6-inch PVC Gravity Sewer Line	LF	40	6,750	270,000
15	4-inch PVC Sewer Service Line	LF	30	10,650	319,500
16	4-inch Pressure Sewer Line	LF	25	4,000	100,000
17	Cleanouts	Each	800	90	72,000
18	Lift Station	LS	300,000	All Req'd	300,000
19	Sewer Service Connection	Each	300	213	63,900
20	Connection to Existing Main Line	Each	1,500	2	3,000
21	Gravel Surface Restoration	SY	6	37,567	225,400
	Cagle Subtotal Estimated Construction Cost				**$ 2,699,000**
	Subtotal Estimated Construction Cost				**$ 4,501,000**
	Construction Contingency (10%)				450,000
	Total Estimated Construction Cost				**$ 4,951,000**
	Preliminary, Design, and Construction Engineering (20%)				990,000
	TOTAL ESTIMATED PROJECT COST (2015 DOLLARS)[1]				**$ 5,941,000**

[1] See Figure 4-10 for a summary of preliminary estimated project costs and other project costs for all of the proposed wastewater system improvements.

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CITY OF
LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE
COLLECTION SYSTEM IMPROVEMENTS
PRELIMINARY COST ESTIMATE

FIGURE
4-2

WATER BALANCE WITH EFFLUENT EVAPORATIVE LAGOON
2035 POPULATION, PLUS CAGLE AND GLENWOOD ACRES AREAS

Month	Influent[1] (MG)	Septage[2] (MG)	Precipitation[3] (in)	Precipitation[3] (MG)	Seepage[5] (MG)	Evaporation Crop: Acreage: (in)	Evaporation N/A 2102 (MG)	Storage Volume (+/-) (MG)	Cumulative Storage Volume[6] (MG)
January	9.86	0.04	3.11	179.47	0.00	0.00	0.00	189.36	587.38
February	8.32	0.07	2.55	147.15	0.00	0.00	0.00	155.54	742.92
March	8.62	0.10	1.74	100.41	0.00	0.00	0.00	109.13	852.06
April	8.00	0.13	1.36	78.48	0.00	2.09	120.78	-34.17	817.89
May	8.43	0.14	1.28	73.86	0.00	3.60	207.63	-125.19	692.70
June	8.45	0.12	1.01	58.28	0.00	4.52	260.95	-194.10	498.60
July	9.26	0.15	0.74	42.70	0.00	5.59	322.75	-270.64	227.96
August	9.50	0.18	0.67	38.66	0.00	4.79	276.30	-227.96	0.00
September	9.13	0.14	0.71	40.97	0.00	3.28	189.05	-138.80	0.00
October	9.21	0.12	1.42	81.94	0.00	1.72	99.37	-8.09	-8.09
November	8.82	0.10	3.08	177.74	0.00	0.00	0.00	186.66	178.57
December	8.76	0.07	3.65	210.63	0.00	0.00	0.00	219.45	398.02
TOTALS	**106.36**	**1.36**	**21.32**	**1230.30**	**0.00**	**25.59**	1,476.82	-138.80	

MG = Million gallons
in = inches

	Acres	Square Feet	MG
Cell 1 Area	4.79	208,652	13.27
Cell 2 Area	2.67	116,305	7.39
Cell 3 Area	2.67	116,305	7.39
Cell 4 Area	13.19	574,556	44.70
Evap. Lagoon	2102	91,561,013	7122.71
Total	**2125.3**	**92,576,832**	**72.75**

Crop Usage Data - Alfalfa hay

Month	Precip. (in)	Evapotran.[7] (in)	Net Irrigation Req'd. (in)	85 Percent Efficiency (in)
Apr	1.36	2.01	0.65	0.76
May	1.28	4.25	2.97	3.49
Jun	1.01	5.12	4.11	4.84
Jul	0.74	6.18	5.44	6.40
Aug	0.67	4.88	4.21	4.95
Sep	0.71	3.66	2.95	3.47
Oct	1.42	0.00	0.00	0.00

Notes:

[1] Influent. Influent flows are based on average monthly flow from January 2010 to December 2014. Data obtained from Discharge Monitoring Reports (DMRs).
[2]Septage. Septage flows are based on average monthly flow from January 2010 to December 2014. Data obtained from DMRs.
[3]Precipitation. Utilized precipitation on record with the Western Regional Climate Center (WRCC) for the Wickiup Dam weather station from 1981 to 2010. Mean rainfall used for each month.
[4]Evaporation. Utilized pan evaporation data obtained from the WRCC for the Wickiup Dam station, with a pan coefficient of 0.70.
[5]Seepage. Existing lagoon seepage assumed to be 0 because the lagoons are lined.
[6]Cumulative Storage Volume. Total storage available in storage lagoon (Cell 4) estimated to be 44.70 million gallons.
[7]Evapotranspiration. Based on data from Oregon Crop Water Use and Irrigation Requirements, Oregon State University Extension Publication 8530.

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CITY OF
LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE
WATER BALANCE WITH EFFLUENT EVAPORATIVE LAGOON 2035 POPULATION, PLUS CAGLE AND GLENWOOD ACRES AREAS

FIGURE
4-3

WATER BALANCE WITH FORESTED AREA EFFLUENT IRRIGATION
2035 POPULATION, PLUS CAGLE AND GLENWOOD ACRES AREAS

Month	Influent[1] (MG)	Septage[2] (MG)	Precipitation[3] (in)	Precipitation[3] (MG)	Evaporation[4] (in)	Evaporation[4] (MG)	Seepage[5] (MG)	Irrigation Crop: Acreage: (in)	Irrigation Pine Trees 300 (MG)	Storage Volume (+/-) (MG)	Cumulative Storage Volume[6] (MG)
January	9.86	0.04	3.11	1.97	0.00	0.00	0.00	0.00	0.00	11.86	34.87
February	8.32	0.07	2.55	1.61	0.00	0.00	0.00	0.00	0.00	10.01	44.88
March	8.62	0.10	1.74	1.10	0.00	0.00	0.00	0.00	0.00	9.83	54.70
April	8.00	0.13	1.36	0.86	2.09	1.33	0.00	1.00	8.15	-0.48	54.23
May	8.43	0.14	1.28	0.81	3.60	2.28	0.00	2.00	16.29	-9.19	45.04
June	8.45	0.12	1.01	0.64	4.52	2.86	0.00	3.00	24.44	-18.10	26.94
July	9.26	0.15	0.74	0.47	5.59	3.54	0.00	3.00	24.44	-18.10	8.84
August	9.50	0.18	0.67	0.42	4.79	3.03	0.00	2.00	16.29	-9.23	-0.39
September	9.13	0.14	0.71	0.45	3.28	2.07	0.00	2.00	16.29	-8.64	0.00
October	9.21	0.12	1.42	0.90	1.72	1.09	0.00	1.00	8.15	1.00	1.00
November	8.82	0.10	3.08	1.95	0.00	0.00	0.00	0.00	0.00	10.87	11.87
December	8.76	0.07	3.65	2.31	0.00	0.00	0.00	0.00	0.00	11.14	23.01
TOTALS	**106.36**	**1.36**	**21.32**	**13.50**	**25.59**	**16.20**	**0.00**	**14.00**	**114.05**	**-9.03**	

MG = Million gallons
in = inches

	Acres	Square Feet	MG
Cell 1 Area	4.79	208,652	13.27
Cell 2 Area	2.67	116,305	7.39
Cell 3 Area	2.67	116,305	7.39
Cell 4 Area	13.19	574,556	44.70
Total	**23.3**	**1,015,819**	**72.75**

Crop Usage Data - Alfalfa hay

Month	Precip. (in)	Evapotran.[7] (in)	Net Irrigation Req'd. (in)	85 Percent Efficiency (in)
Apr	1.36	2.01	0.65	0.76
May	1.28	4.25	2.97	3.49
Jun	1.01	5.12	4.11	4.84
Jul	0.74	6.18	5.44	6.40
Aug	0.67	4.88	4.21	4.95
Sep	0.71	3.66	2.95	3.47
Oct	1.42	0.00	0.00	0.00

Notes:

[1] Influent. Influent flows are based on average monthly flow from January 2010 to December 2014. Data obtained from Discharge Monitoring Reports (DMRs).
[2] Septage. Septage flows are based on average monthly flow from January 2010 to December 2014. Data obtained from DMRs.
[3] Precipitation. Utilized precipitation on record with the Western Regional Climate Center (WRCC) for the Wickiup Dam weather station from 1981 to 2010. Mean rainfall used for each month.
[4] Evaporation. Utilized pan evaporation data obtained from the WRCC for the Wickiup Dam station, with a pan coefficient of 0.70.
[5] Seepage. Existing lagoon seepage assumed to be 0 because the lagoons are lined.
[6] Cumulative Storage Volume. Total storage available in storage lagoon (Cell 4) estimated to be 44.70 million gallons.
[7] Evapotranspiration. Based on data from Oregon Crop Water Use and Irrigation Requirements, Oregon State University Extension Publication 8530.

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CITY OF
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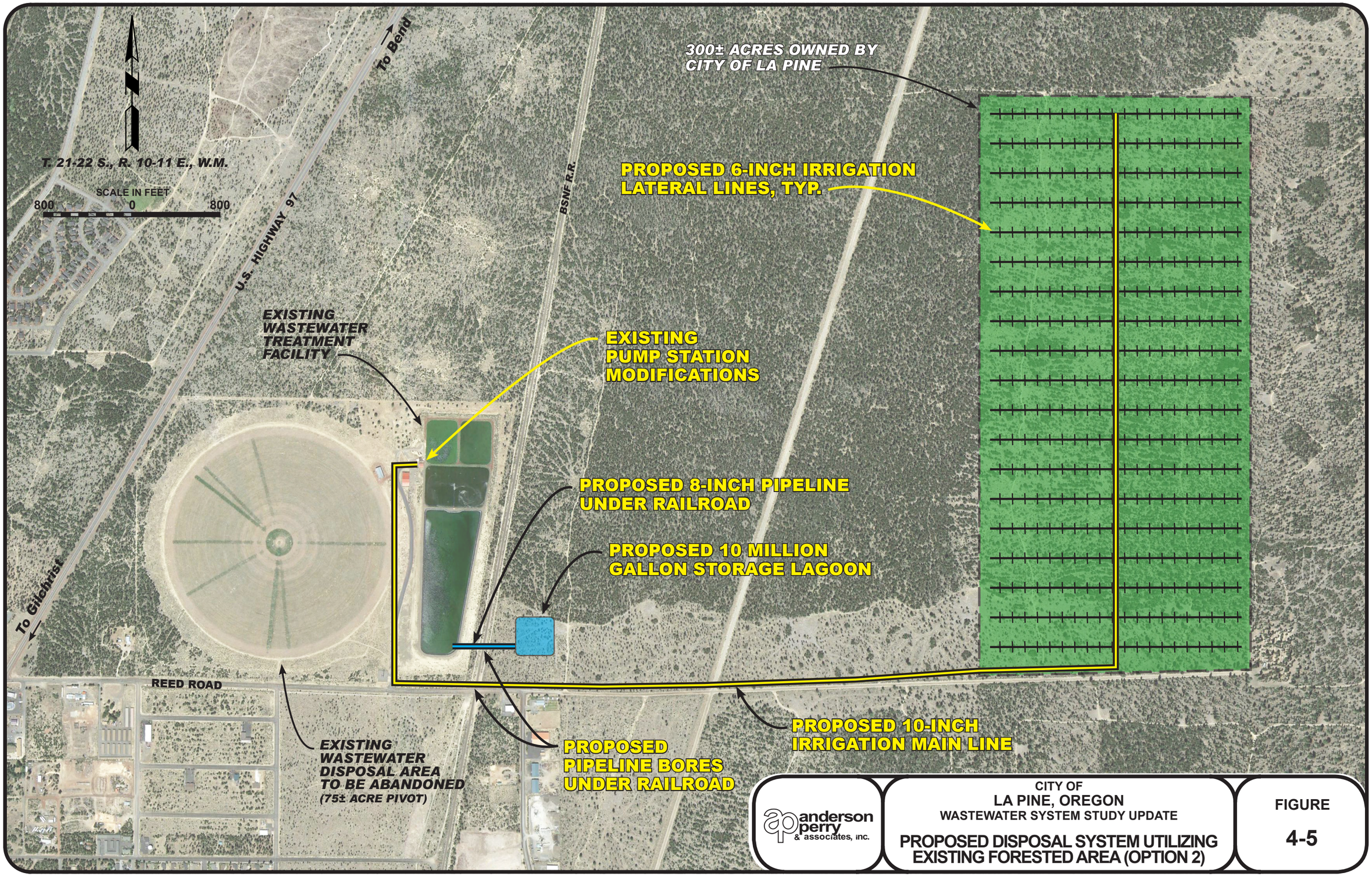
WASTEWATER SYSTEM STUDY UPDATE
WATER BALANCE WITH FORESTED AREA EFFLUENT IRRIGATION 2035 POPULATION, PLUS CAGLE AND GLENWOOD ACRES AREAS

FIGURE
4-4



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CITY OF
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WASTEWATER SYSTEM STUDY UPDATE

PROPOSED DISPOSAL SYSTEM UTILIZING EXISTING FORESTED AREA (OPTION 2)

FIGURE
4-5

Job# 33-06-020 Dec. 15, 2015 lbauer

CITY OF LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE
DISPOSAL SYSTEM UTILIZING EXISTING FORESTED AREA - OPTION 2
PRELIMINARY COST ESTIMATE
(Year 2015 Costs)

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	$ 235,000	All Req'd	$ 235,000
2	Project Safety and Quality Control	LS	12,500	All Req'd	12,500
3	Clearing and Grubbing	LS	30,000	All Req'd	30,000
4	Existing Pump Station Modifications	LS	100,000	All Req'd	100,000
5	6-inch Polyvinyl Chloride (PVC) Irrigation Pipeline, Including Valves	LF	40	50,000	2,000,000
6	10-inch PVC Irrigation Pipeline, Including Valves	LF	60	12,000	720,000
7	Electrical Conduit and Conductors	LF	35	13,700	479,500
8	Septage Receiving Station	LS	250,000	All Req'd	250,000
9	Backup Power for Industrial Park Lift Station	LS	60,000	All Req'd	60,000
10	10 Million Gallon Storage Lagoon	LS	250,000	All Req'd	250,000
11	Irrigation System Controls and Instrumentation	LS	100,000	All Req'd	100,000
12	Irrigation System Sprinklers and Control Valves	LS	200,000	All Req'd	200,000
13	Railroad and Darlene Way Borings	Each	40,000	3	120,000
14	Fencing	LF	10	15,000	150,000
				Subtotal Estimated Construction Cost	**$ 4,707,000**
				Construction Contingency (10%)	471,000
				Total Estimated Construction Cost	**$ 5,178,000**
				Preliminary, Design, and Construction Engineering (20%)	1,036,000
				TOTAL ESTIMATED PROJECT COST (2015 DOLLARS)[1]	**$ 6,214,000**

[1] See Figure 4-10 for a summary of preliminary estimated project costs and other project costs for the proposed improvements.

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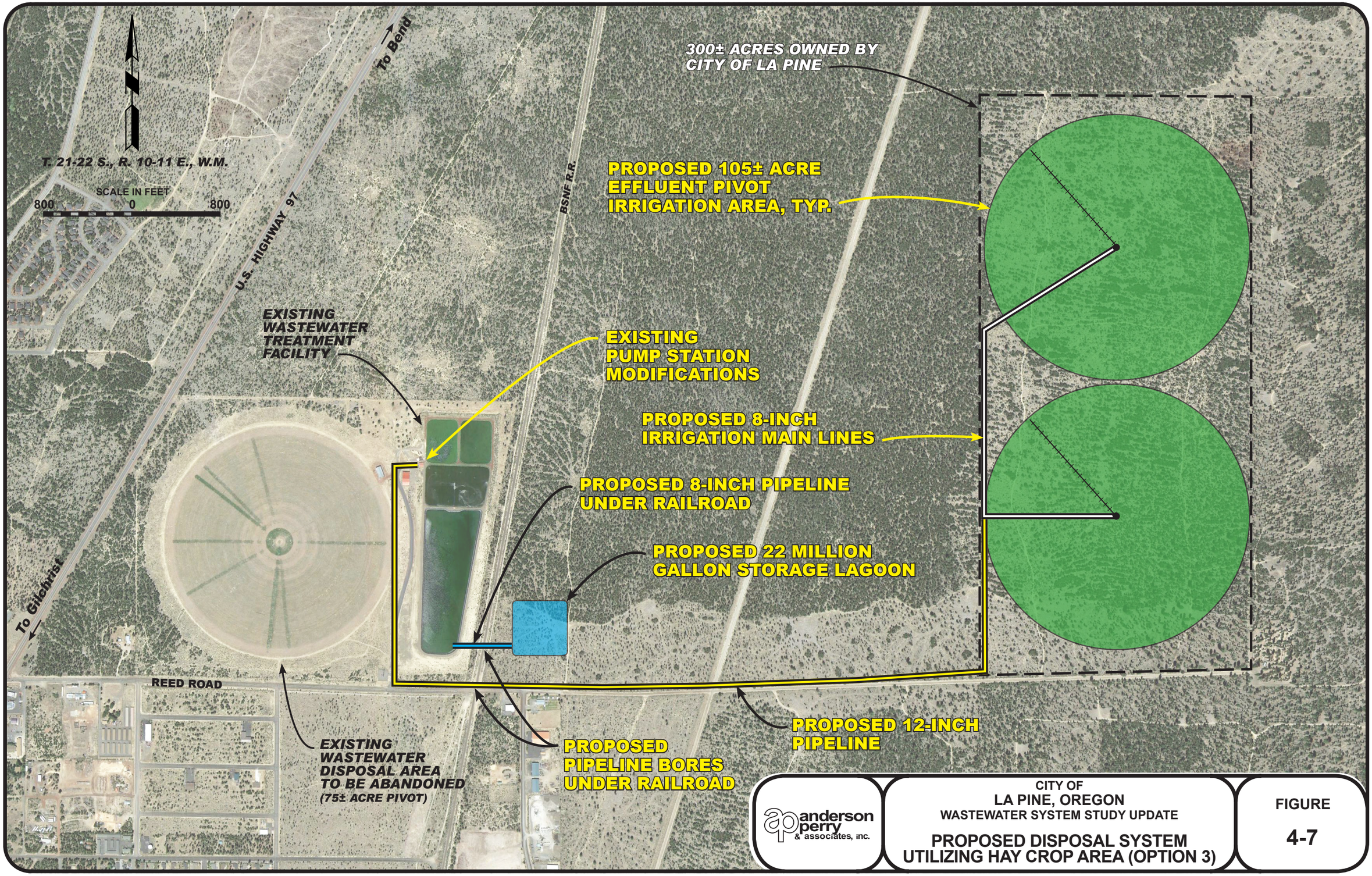
CITY OF
LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE
DISPOSAL SYSTEM UTILIZING EXISTING FORESTED AREA - OPTION 2
PRELIMINARY COST ESTIMATE

FIGURE
4-6



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CITY OF
LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE

PROPOSED DISPOSAL SYSTEM
UTILIZING HAY CROP AREA (OPTION 3)

FIGURE
4-7

Job# 33-06-020 Jan. 11, 2016 lbauer

CITY OF LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE
DISPOSAL SYSTEM UTILIZING HAY CROP AREA - OPTION 3
PRELIMINARY COST ESTIMATE
(Year 2015 Costs)

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	$ 165,000	All Req'd	$ 165,000
2	Project Safety and Quality Control	LS	20,000	All Req'd	20,000
3	Clearing and Grubbing	LS	250,000	All Req'd	250,000
4	Existing Pump Station Modifications	LS	100,000	All Req'd	100,000
5	8-inch Polyvinyl Chloride (PVC) Irrigation Pipeline, Including Valves	LF	45	6,500	292,500
6	12-inch PVC Irrigation Pipeline, Including Valves	LF	65	7,500	487,500
7	Electrical Conduit and Conductors	LF	35	13,700	479,500
8	Septage Receiving Station	LS	250,000	All Req'd	250,000
9	Irrigation System Controls and Instrumentation	LS	100,000	All Req'd	100,000
10	Backup Power for Industrial Park Lift Station	LS	60,000	All Req'd	60,000
11	Pivot Irrigation System	Each	110,000	2	220,000
12	22 million gallon Storage Lagoon	LS	550,000	All Req'd	550,000
13	Railroad and Darlene Way Borings	Each	40,000	3	120,000
14	Fencing	LF	10	15,000	150,000
15	Surface Restoration	SY	6	11,000	66,000
				Subtotal Estimated Construction Cost	**$ 3,311,000**
				Construction Contingency (10%)	331,000
				Total Estimated Construction Cost	**$ 3,642,000**
				Preliminary, Design, and Construction Engineering (20%)	728,000
				TOTAL ESTIMATED PROJECT COST (2015 DOLLARS)[1]	**$ 4,370,000**

[1] See Figure 4-10 for a summary of preliminary estimated project costs and other project costs for all of the proposed wastewater system improvements.

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CITY OF
LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE
DISPOSAL SYSTEM UTILIZING HAY CROP AREA - OPTION 3
PRELIMINARY COST ESTIMATE

FIGURE
4-8

TO GILCHRIST

HWY 97

HUNTINGTON ROAD

REED ROAD

75± ACRES TO BE ABANDONED

NEW SEPTAGE RECEIVING STATION

EXISTING PUMP STATION MODIFICATIONS

22 MG STORAGE LAGOON

BSNF RAILROAD

COLLECTION SYSTEM IMPROVEMENTS

PIPE BORE CROSSING

FINLEY BUTTE ROAD

12-INCH IRRIGATION PIPELINE

8-INCH IRRIGATION PIPE LINE

TO BEND

105± ACRE EFFLUENT PIVOT IRRIGATION AREA (210± ACRES TOTAL)

LEGEND

- NEW 4" PRESSURE SEWER PIPE
- NEW 6" GRAVITY SEWER PIPE
- NEW 8" GRAVITY SEWER PIPE
- EXISTING SEWER PIPE (SIZE NOT SHOWN)
- NEW LIFT STATION
- EXISTING LIFT STATION

1000 0 1000 2000 3000

SCALE IN FEET

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CITY OF
LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE

PROPOSED WASTEWATER SYSTEM IMPROVEMENTS

FIGURE
4-9

R:\LaPINE\33-06 Wastewater Sytem Update\DRAFTING\Plot Files\020-WWS\33-06-020C-101F49.dwg, fig 4-9, 2/26/2016 8:41:37 AM, prichardson

CITY OF LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE
PROPOSED WASTEWATER SYSTEM IMPROVEMENTS
SUMMARY OF ESTIMATED PROJECT COSTS
(Year 2015 Costs)

Estimated Improvements Costs		
Collection System Improvements	$	5,941,000
Treatment and Disposal Improvements		4,370,000
Total Estimated Improvements Costs (2015 Dollars)	**$**	**10,311,000**
Other Estimated Project Costs		
Legal	$	30,000
Labor Sandards		30,000
Grant Administration		25,000
Easements		10,000
Environmental Review Report		30,000
Archaeological Report		15,000
Cultural Resource Monitoring		75,000
Permits		20,000
Regulatory Agency Reporting and Review Fees		5,000
Subtotal Other Project Costs (2015 Dollars)	**$**	**240,000**
TOTAL ESTIMATED PROJECT COST (2015 DOLLARS)	**$**	**10,551,000**
TOTAL ESTIMATED PROJECT COSTS (2018 DOLLARS)[1]	**$**	**11,868,000**

[1]Estimated project costs extended to the year 2018 (anticipated bidding year) assuming 4 percent annual inflation for three consectutive years from 2015 to 2018.

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CITY OF
LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE
PROPOSED WASTEWATER SYSTEM IMPROVEMENTS SUMMARY OF ESTIMATED PROJECT COSTS

FIGURE
4-10

Chapter 5 - Project Financing and Implementation

General

This chapter evaluates the financial status of the City of La Pine's Sewer Department and outlines options for financing and implementing the proposed wastewater system improvements for the City. A summary of state and federal funding programs is presented, including a review of funding options potentially available to the City for the proposed wastewater system improvements project. To construct the proposed improvements, a financing plan that is acceptable to the citizens of La Pine must be developed to complete the improvements. Due to the high estimated cost of the improvements, financing resources will need to include low-interest loans coupled with grant funding, if available.

Although a detailed analysis of La Pine's current sewer rate structure is beyond the scope of this Wastewater System Study (WWSS) Update, some discussion of the existing rate structure and current and future sewer system budgets is included. A summary of potential sewer rate structures to provide project funding is also presented. As a general rule, most utility rate structures include funding for periodic minor system improvements and maintenance items, payroll costs for staff, and a set-aside for future improvements. A summary of the current sewer rate structure is presented hereafter.

Current Sewer Rates and Revenue

Operation and maintenance of the existing sewer system is financed through the City's annual budget. Revenue is obtained primarily from sewer user fees. The current monthly sewer rates at the time this WWSS Update was prepared are summarized on Table 5-1. Copies of the ordinance and rate schedule are included in Appendix B.

TABLE 5-1
MONTHLY SEWER RATE INFORMATION

Water Meter Size[1] (inches)	MCE Factor[2]	Cost per Meter	Cost per MCE	Total Monthly Fixed Charge
5/8	1	$10.27	$8.76	$19.03
3/4	1	$10.27	$8.76	$19.03
1	2.5	$10.27	$21.90	$32.17
1-1/2	5	$10.27	$43.81	$54.08
2	8	$10.27	$70.09	$80.36
3	16	$10.27	$140.18	$150.45
4	25	$10.27	$219.04	$229.31
6	50	$10.27	$438.07	$448.34
Volume Charge[3]				
Residential	$3.00 per 1,000 gallons of average winter water usage			
Commercial	$5.55 per 1,000 gallons of average winter water usage			

Notes:
[1]Accounts are charged based on size of water meter.
[2]MCE = Meter capacity equivalent factor.
[3]Average winter water usage is calculated as the average metered water usage between November and February of the previous fiscal year.

As of November 2015, the City of La Pine billed the following number of sewer service accounts. The data presented on Table 5-2 below were provided by the City.

TABLE 5-2
SEWER SERVICE ACCOUNTS

Account Type	Total Number of Accounts
Residential	475
Commercial	163
TOTAL	**638**

Current Financial Status

The annual revenue received and the cost of operating and maintaining the La Pine wastewater system are summarized on Figure 5-1. The costs presented on Figure 5-1 were obtained from the City's audited financial reports and include all costs for the wastewater system, such as operation, maintenance, and replacement (OM&R) and staff payroll. These data are presented to provide insight into the general costs required to operate the City's existing wastewater system. For funding and other financial analysis, it is recommended that the audited financial reports be obtained and reviewed in greater detail to refine the costs prior to considering potential available revenue for future debt purposes.

Historical and Projected Budget Trends

Based on information obtained from the City, Sewer Department revenue exceeded OM&R expenditures for the first two years since the City took ownership of the wastewater system. A plot of the City of La Pine's sewer system budget, with revenue and expenditures, is shown on Figure 5-2. The expenditures shown on Figure 5-2 are a limited data set due to the City's lack of historical data. To project future costs, an inflation rate of 5 percent per year was assumed. The proposed improvements are anticipated to be constructed in the budget year 2017-2018. As shown on Figure 5-2, the City's estimated OM&R costs will be approximately $350,000 per year in 2017-2018. This does not include any debt service associated with loans required to construct the proposed improvements. Further discussion on funding and debt service options are discussed later in this chapter.

Existing Debt

The City of La Pine currently does not have outstanding debt service for the sewer system. The City did acquire a loan from the former La Pine Sanitary Sewer District in the amount of $806,742. This note is held by Deschutes County, and the funds were given to the District to provide sewer service to the Crescent Creek subdivision. The agreement states that the loan will be repaid by system development charges (SDCs) collected from the Crescent Creek Subdivision. The agreement requires that all SDCs collected from the Crescent Creek subdivision be used to repay the loan until the loan is paid in full. No other loan payments are required. The loan terminates in 50 years, even if the loan is not paid in full at that time. Therefore, while the City is responsible for the repayment of the loan, it does not have an impact on sewer rate revenue.

Preliminary Equivalent Residential Unit Analysis

When projecting future revenue for a sewer system, an equivalent residential unit (ERU) analysis is usually completed. The City of La Pine does not use an ERU determination to bill for sewer service; the City bills sewer customers according to the size of their municipal water meter. Depending on the meter size, the customer's base rate is increased by a MCE factor, as outlined on Table 5-3 below. For the purpose of this WWSS Update, the sum of the MCEs for each user will be considered the same as ERUs. As an example, a connection in La Pine that has a 5/8-inch water meter would represent one ERU, while a connection that has a 2-inch water meter would represent eight ERUs, or eight base rates.

The City's sewer service accounts, as of November 2015, were analyzed to provide a preliminary ERU determination, as shown on Table 5-3. The number of ERUs has been estimated based on data provided by the City. There is an estimated 275 additional ERUs in the Cagle and Glenwood Acres areas. These users would be connected to the wastewater system if the improvements are implemented and, therefore, have been included in this analysis.

TABLE 5-3
PRELIMINARY ERU ANALYSIS

Water Meter Size (inches)	MCE Factor	Number of Customers	Total MCE (ERU)
5/8	1	688	688
3/4	1	85	85
1	2.5	59	148
1-1/2	5	17	85
2	8	27	216
3	16	4	64
4	25	2	50
6	50	0	0
TOTAL		**882**	**1,336**

Based on the ERU analysis above, the City of La Pine currently has 607 sewer system accounts and would have an estimated 882 accounts once the Cagle and Glenwood Acres areas are added. The anticipated 882 accounts represents 1,336 ERUs. Most funding agencies use this type of evaluation as a basis for estimating future yearly revenues and debt capabilities for a city. The ERU determination is intended to more equitably distribute sewer system costs among all users. The ERU determination helps funding agencies determine the maximum loan (debt) amount a city can afford to service. The analysis presented hereafter for the City of La Pine's future sewer rate revenue and estimated debt capacity is based on the preliminary determination of 1,336 ERUs, not the current estimate, which includes Cagle and Glenwood Acres of 882 accounts.

State and Federal Grant and Loan Programs

A number of state and federal grant and loan programs can provide assistance on municipal improvement projects to Oregon cities. 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), the Oregon Business Development Department - Infrastructure Finance Authority (IFA), 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 an increase in sewer rates to support a loan for wastewater system improvements, both as a condition of receiving monies and prior to being considered for grant funds. It should be noted that the monthly user rates discussed in this section can represent a combination of monthly usage fees and taxes.

The following section briefly summarizes the primary funding programs available to assist the City of La Pine with a wastewater system improvements project.

Summary of State Funding Programs

Infrastructure Finance Authority Finance Programs

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 greater than 51 percent. The City of La Pine's percentage of low to moderate income is 82.7 percent, based on the July 1, 2014, Low/Moderate Income Summary data used by the CDBG program, which would make the City very competitive for a CDBG grant. It is important to note that these data are updated annually and should be monitored to see if the City becomes ineligible for CDBG program funds in future years.

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 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. Loan amounts are 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 median household income (MHI) is equal to or greater than 100 percent of the state average MHI for the same year. The City of La Pine's annual MHI in 2013 was 55 percent of the statewide MHI, so a combination of loan and grant funding from this program may be possible.

Special Public Works Fund

The Special Public Works Fund program was established by the Oregon Legislature in 1985 to primarily provide loan funding for municipally owned infrastructure and other facilities that support economic and community development in Oregon. Loans and grants are available to municipalities for planning, designing, purchasing, improving, and constructing municipally owned facilities.

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 Special Public Works Fund 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.

For Infrastructure Finance Authority Programs - Contact Regional Coordinator

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

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 change quarterly based on a percentage of the national municipal bond rate. These percentages vary from 25 to 55 percent of the bond rate depending on the length of the repayment period. In 2015, loans for design and construction for small communities had an interest rate that varied from 1.0 to 2.0 percent with repayment over 20 years, depending on the MHI and other factors. According to the DEQ, repayment terms of 30 years may be available in the near future. In addition, fees were assessed to cover program administration costs by the DEQ. A servicing fee of 0.5 percent of the outstanding balance was added to the interest rate, and a loan reserve equal to 50 percent of the annual debt service was also to be set aside in a separate fund. This program has low-interest rates with variable repayment periods. 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 La Pine.

Summary of Federal Grant and Loan Programs

Rural Development

Through both loans and direct grants, RD can provide financial assistance to communities with populations under 10,000. Under the loan program, the agency purchases local bonds. The interest rate for these bonds is dependent on the MHI of the community and other factors, and varies from year to year based on other economic factors nationally. The interest rate is generally in the 3.0 to 4.0 percent range with a repayment period of up to 40 years. For the City of La Pine, the average reported MHI for 2009 through 2013 is $27,736, which will likely qualify the City for low-interest rates with a repayment period of up to 40 years through this program. Application 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 range. It should be noted that 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 OM&R 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 that is similar to what other communities are paying.

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). A loan from RD may be an option for the City of La Pine to implement wastewater system improvements.

U.S. Economic Development Administration

The EDA has grant and loan funds similar to those available through the IFA's Special Public Works Fund program. 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 helps fund public works improvement 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 under these EDA programs.

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

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

La Pine may meet these criteria, so a hardship grant through the EDA may be available.

Funding Summary

The IFA's CDBG and Water/Wastewater programs, the DEQ's CWSRF program, and RD appear to be the most attractive funding sources for La Pine's wastewater system improvements project. These programs appear to be funding sources that can provide the funds needed to potentially make the proposed improvements financially feasible for the City.

It is important for the City to consult with funding agencies early in the project development stages to understand which funding programs would provide the best funding package for the proposed improvements. This consultation with funding agencies is usually done at a One Stop meeting, which is described in more detail later in this section.

Debt Capacity

To determine the City's ability to fund a wastewater system improvements project, Figure 5-3 was prepared. This figure presents the potential amount of debt capacity available considering the existing OM&R and the estimated number of ERUs. The following assumptions were made:

- Wastewater user fee revenue is based on the preliminary determination of 1,336 ERUs, which includes the Cagle and Glenwood Acres areas.
- Wastewater system expenditures for the budget year 2017-2018 were set at $350,000 per year. The budget year 2017-2018 was used because this is estimated to be the time period in which construction would be completed, if project funding is pursued upon completion of this WWSS Update. The $350,000 figure includes the annual OM&R costs of operating the wastewater system.
- No existing debt service payment is included, as the City only pays toward one loan using SDC fees collected in the Crescent Creek subdivision.

The data shown on Figure 5-3 provide a general idea of the amount of debt the City could service at various average monthly wastewater costs. The total project cost is estimated to be $12,337,000 in 2015 dollars, projected to $13,877,000 in 2017-2018. As shown on Figure 5-3, wastewater base rates could be higher than $40 per month if the entire project was funded only with a loan. These potential rates confirm that it will be important for the City to pursue potential grant funds and/or loan forgiveness to assist with project financing.

It is important to note that the estimated loan capacities shown on Figure 5-3 are based on the current estimate of 1,336 ERUs. These figures may need to be verified as project funding proceeds. It should be recognized that this is only a preliminary analysis and the financial assumptions and figures presented in this WWSS Update should be refined as project implementation proceeds in the future and as

agreements are worked out with funding agencies. If the City incurs debt prior to obtaining funding, these figures will need to be adjusted accordingly to reflect the debt payment requirements for the overall City budget.

Project Funding Options

Of the various funding programs, the most likely sources of funding for the proposed wastewater system improvements project appear to be the IFA's CDBG and Water/Wastewater program, RD, or the DEQ's CWSRF program. To complete all recommended improvements, grant funds coupled with low-interest loan funds will most likely need to be acquired. Assuming the City was able to secure typically available grants coupled with low-interest loans, the City may be able to fund all of the recommended improvements with monthly sewer costs in the $40 range. It is recommended the City thoroughly investigate potential funding sources, as described previously, to ensure the best funding package is obtained for the project. Actual funding amounts and breakdowns will be based on a financial review completed by each agency and could vary from the estimated amounts shown herein. Other potential funding measures may be available to the City to reduce the potential rate increase impact on City customers. It will be important for the City to work directly with the IFA Regional Coordinator, RD Area Specialist, and DEQ Finance Administrators to evaluate these options.

One Stop Meeting

If the City chooses to finance the wastewater system improvements project through funding sources administered by IFA, a One Stop meeting must be scheduled. The One Stop meeting provides a forum to evaluate funding opportunities and find the most suitable funding package for the City. After the One Stop meeting with representatives of the major funding agencies, IFA and/or RD may invite the City to submit a funding application to the best fit funding program identified by IFA.

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: 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 IFA and CWSRF programs. Due to current tax measure limitations in the State of Oregon, careful consultation with experienced, licensed bonding attorneys needs to be made if the City

of La Pine 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.

Project Implementation

For La Pine to successfully implement the selected wastewater system improvements presented herein, the City will need to coordinate directly with the DEQ, RD, and IFA to aggressively pursue federal, state, and potentially local financing opportunities provided through low-interest loans and potential grants. It is recommended that the City pursue funding for the full project, to maximize potential grant and low-interest loan opportunities. A proposed implementation plan and schedule is summarized on Table 5-4.

TABLE 5-4
IMPLEMENTATION PLAN AND SCHEDULE

Item No.	Implementation Item	Time Frame
1	Submit draft WWSS Update to agencies for review.	January 2016
2	Finalize and adopt the WWSS Update.	March 2016
3	Initiate funding agency discussions and participate in a One Stop meeting.	Spring 2016
4	Conduct public information meeting(s), as required.	Spring 2016
5	Submit funding application(s) to appropriate agency(ies).	Spring 2016
6	Funding agency review of application(s).	Summer 2016
7	Finalize project funding.	Fall 2016
8	Conduct public information meeting(s), as required.	Fall 2016
9	Design system improvements.	Winter 2016 to Spring 2018
10	Environmental permitting process.	Winter 2016 to Spring 2018
11	Submit design documents for agency review.	Spring 2018
12	Advertise, bid, and award construction project.	Spring 2018
13	Project construction	Summer 2018 to Fall 2019
14	Project startup and construction completion.	Fall 2019
15	Project closeout.	Winter 2019

It should be noted that these implementation steps assume the City aggressively pursues project funding upon completion of this WWSS Update and that project funding is able to be secured relatively quickly. Should delays in completion of any of the identified implementation items occur, the completion of the project will likely be delayed.

The key to implementing the La Pine wastewater system improvements project, as outlined herein, is the City's ability to acquire low-interest loan funding and grant funds. The City will have to work closely with its citizens to inform them of the system needs and the need for an increase in sewer user costs.

Wastewater system improvements as outlined in this WWSS Update will provide the City with a reliable, quality wastewater system that will maintain regulatory compliance while meeting the needs of the City for many years to come.

CITY OF LA PINE, OREGON
HISTORICAL SEWER DEPARTMENT FUNDS

	Revenue			Expenditures							
Fiscal Year	Sewer Sales Revenue	Other Income[1]	Total Revenue	Personnel Services	Materials and Services	Systems Operations	Capital Outlay	Total OM&R Expenditures[2]	Debt Service	Total Expenditures	Net Operating Income (Loss)
2012-2013	$ 496,321	$ 46,949	$ 543,270	$ 127,648	$ 79,530	$ -	$ -	$ 207,178	-	$ 207,178	$ 336,092
2013-2014	$ 482,525	$ 8,121	$ 490,646	$ 131,322	$ 153,861	$ -	$ -	$ 285,183	-	$ 285,183	$ 205,463

Notes:

[1] Other Income is from connection/extension charges, interfund transfers, and other miscellaneous income.

[2] Refers to operation, maintenance, and replacement. Does not include transfers to other funds or Debt Service.

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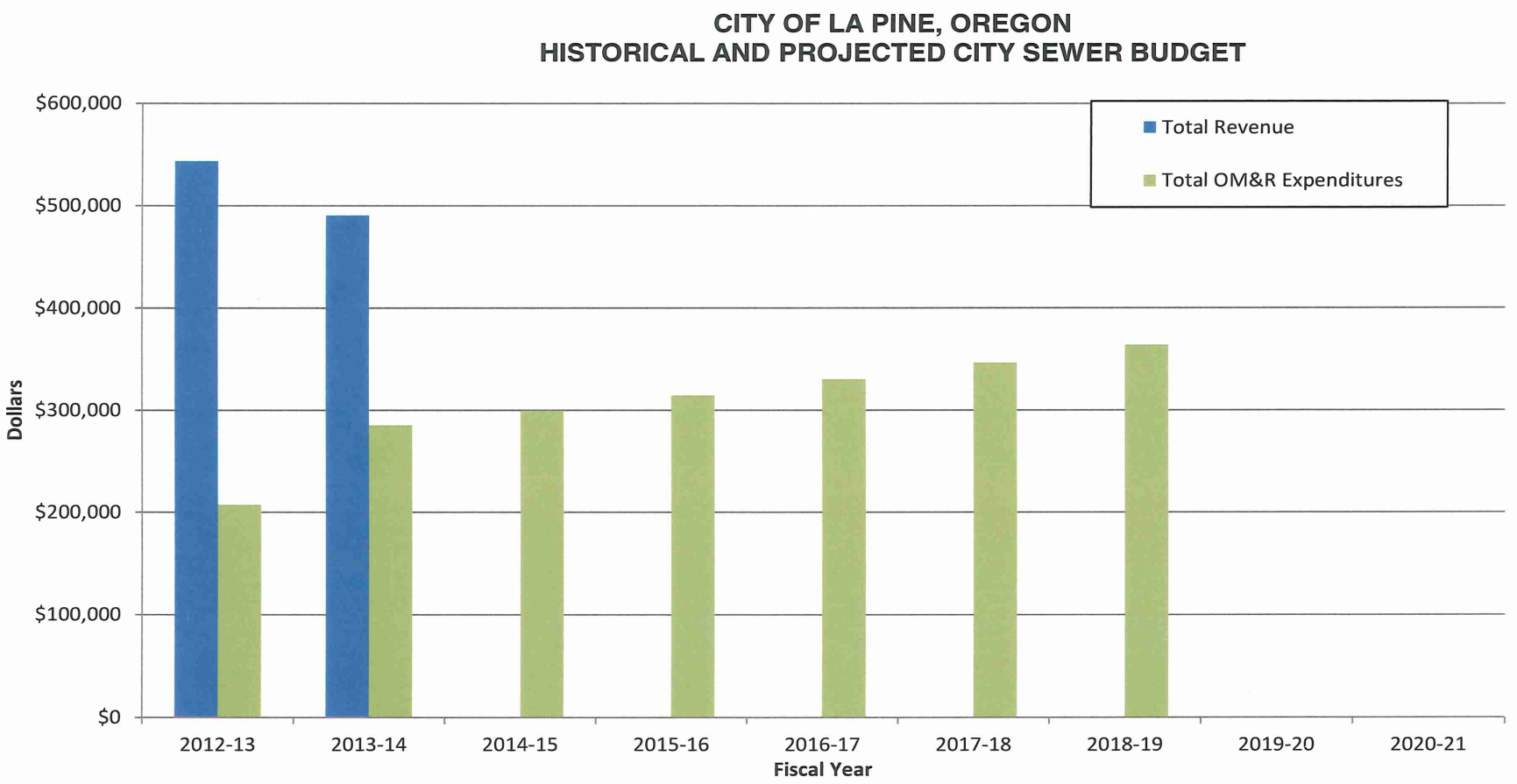
CITY OF
LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE
HISTORICAL SEWER DEPARTMENT FUNDS

FIGURE 5-1



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CITY OF
LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE
HISTORICAL AND PROJECTED CITY SEWER BUDGET

FIGURE 5-2

CITY OF LA PINE, OREGON
PRELIMINARY SEWER RATE ANALYSIS FOR LOAN CAPACITY
2017-2018 BUDGET YEAR

RATES[1,2]		REVENUE[3]					EXPENDITURES			FINANCING OPTIONS		
Meter Charge	Residential and Commercial Base Rate	Meter Charge Revenue	Base Rate Revenue	Residential Usage Revenue	Commercial Usage Revenue	Total Revenue	Estimated OM&R Costs[4]	Existing Debt Service [5]	Revenue Available for Future Debt Service[6]	RD Loan Capacity[7]	Typical IFA Loan Capacity[8]	CWSRF Disadvantaged Community Capacity[9]
$ 10.27	$ 8.76	$ 108,698	$ 140,388	$ 101,317	$ 209,148	$ 559,551	$ 350,000	$ -	$ 209,551	$ 3,733,000	$ 2,848,000	$ 3,118,000
$ 10.27	$ 10.00	$ 108,698	$ 160,260	$ 101,317	$ 209,148	$ 579,423	$ 350,000	$ -	$ 229,423	$ 4,087,000	$ 3,118,000	$ 3,413,000
$ 10.27	$ 12.00	$ 108,698	$ 192,312	$ 101,317	$ 209,148	$ 611,475	$ 350,000	$ -	$ 261,475	$ 4,658,000	$ 3,554,000	$ 3,890,000
$ 10.27	$ 14.00	$ 108,698	$ 224,364	$ 101,317	$ 209,148	$ 643,527	$ 350,000	$ -	$ 293,527	$ 5,229,000	$ 3,989,000	$ 4,367,000
$ 10.27	$ 16.00	$ 108,698	$ 256,416	$ 101,317	$ 209,148	$ 675,579	$ 350,000	$ -	$ 325,579	$ 5,800,000	$ 4,425,000	$ 4,844,000
$ 10.27	$ 18.00	$ 108,698	$ 288,468	$ 101,317	$ 209,148	$ 707,631	$ 350,000	$ -	$ 357,631	$ 6,371,000	$ 4,860,000	$ 5,321,000
$ 10.27	$ 20.00	$ 108,698	$ 320,520	$ 101,317	$ 209,148	$ 739,683	$ 350,000	$ -	$ 389,683	$ 6,942,000	$ 5,296,000	$ 5,797,000
$ 10.27	$ 22.00	$ 108,698	$ 352,572	$ 101,317	$ 209,148	$ 771,735	$ 350,000	$ -	$ 421,735	$ 7,513,000	$ 5,732,000	$ 6,274,000
$ 10.27	$ 24.00	$ 108,698	$ 384,624	$ 101,317	$ 209,148	$ 803,787	$ 350,000	$ -	$ 453,787	$ 8,084,000	$ 6,167,000	$ 6,751,000
$ 10.27	$ 26.00	$ 108,698	$ 416,676	$ 101,317	$ 209,148	$ 835,839	$ 350,000	$ -	$ 485,839	$ 8,654,000	$ 6,603,000	$ 7,228,000
$ 10.27	$ 28.00	$ 108,698	$ 448,728	$ 101,317	$ 209,148	$ 867,891	$ 350,000	$ -	$ 517,891	$ 9,225,000	$ 7,038,000	$ 7,705,000
$ 10.27	$ 30.00	$ 108,698	$ 480,780	$ 101,317	$ 209,148	$ 899,943	$ 350,000	$ -	$ 549,943	$ 9,796,000	$ 7,474,000	$ 8,182,000
$ 10.27	$ 32.00	$ 108,698	$ 512,832	$ 101,317	$ 209,148	$ 931,995	$ 350,000	$ -	$ 581,995	$ 10,367,000	$ 7,909,000	$ 8,659,000
$ 10.27	$ 34.00	$ 108,698	$ 544,884	$ 101,317	$ 209,148	$ 964,047	$ 350,000	$ -	$ 614,047	$ 10,938,000	$ 8,345,000	$ 9,135,000
$ 10.27	$ 36.00	$ 108,698	$ 576,936	$ 101,317	$ 209,148	$ 996,099	$ 350,000	$ -	$ 646,099	$ 11,509,000	$ 8,781,000	$ 9,612,000
$ 10.27	$ 38.00	$ 108,698	$ 608,988	$ 101,317	$ 209,148	$ 1,028,151	$ 350,000	$ -	$ 678,151	$ 12,080,000	$ 9,216,000	$ 10,089,000

OM&R = Operation, Maintenance, and Replacement
RD = Rural Development
IFA = Infrastructure Finance Authority
CWSRF = Clean Water State Revolving Fund

Notes:

[1] The current base sewer rate is $8.76 per meter capacity equivalent (MCE) factor or equivalent residential unit (ERU). A meter charge is also included, see Resolution No. 2015-03.

[2] Base rates are based on meter size. Base rate is multiplied by a MCE factor.

[3] Revenue is based on the 2013-2014 fiscal year number of sewer billing units and winter water consumption, and assumes 275 additional billing units in the Cagle and Glenwood Acres areas. Revenue is calculated as the product of the base rate times the number of total ERUs added to the product of the respective consumption rate times the average usage during the winter months of the 2013-2014 fiscal year.

[4] Estimated OM&R cost for the 2017-2018 budget year.

[5] La Pine does not currently have existing debt service. See Chapter 5 for further discussion.

[6] Revenue available for future debt service = total revenue - estimated OM&R costs - existing debt service.

[7] Assumes loan funding at 4.0 percent for 40 years (loan capacity determined after 10 percent reserve payment removed from revenue available for debt service). Values rounded to nearest $1,000.

[8] Assumes loan funding at 4.0 percent for 20 years. Values rounded to the nearest $1,000.

[9] Assumes loan funding at 3.0 percent for 20 years. Values rounded to the nearest $1,000.

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CITY OF
LA PINE, OREGON
WASTEWATER SYSTEM STUDY UPDATE
PRELIMINARY SEWER RATE ANALYSIS
FOR LOAN CAPACITY - 2017-2018 BUDGET YEAR

FIGURE
5-3

Appendices Table of Contents

APPENDIX A
WPCF Permit

WATER POLLUTION CONTROL FACILITIES PERMIT

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

Issued pursuant to ORS 468B.

ISSUED TO:

La Pine Special Sewer District
PO Box 2460
La Pine, OR 97739

SOURCES COVERED BY THIS PERMIT:

Type of Waste	Outfall Number	Method of Disposal
Domestic Wastewater	001	Evaporation
Recycled Water	002	Land Application
Recycled Water	003	Biomass Power Plant

FACILITY TYPE AND LOCATION:

Existing Facility:
Aerated Lagoons
Reed Rd., La Pine, Oregon

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

RIVER BASIN INFORMATION:

Basin: Deschutes
Sub-Basin: Little Deschutes
LLID: 1214536438546-20.3311-N
County: Deschutes
Nearest surface stream which would receive waste if it were to discharge: Little Deschutes River

Issued in response to Application No. 969466 received August 9, 2010.
This permit is issued based on the land use findings in the permit record.

Cheryll Hutchens-Woods, Water Quality Manger
Eastern Region

June 1, 2011
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 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 to waters of the state is prohibited, including discharge to an underground injection control system.

SCHEDULE A

Waste Disposal Limitations

1. The permittee is authorized to construct, operate, and maintain a sewage treatment and disposal system. Unless otherwise approved in writing by the Department, the monthly average dry weather design flow shall not exceed 0.25 MGD. Additionally, the District may transfer up to 250,000 gallons of domestic septage waste per month to the primary lagoon. Water may be beneficially reused either for land application for vegetative growth or as cooling water in a biomass conversion power plant.

2. **Recycled Wastewater – Land Application- Outfall 002**

   a. No discharge to state waters is permitted. Recycled water shall be distributed on land, for dissipation by evapotranspiration and controlled seepage by following sound irrigation practices so as to prevent:

      (1) Prolonged ponding of treated recycled water on the ground surface;

      (2) Surface runoff or subsurface drainage through drainage tile;

      (3) The creation of odors, fly and mosquito breeding or other nuisance conditions;

      (4) The overloading of land with nutrients, organics, or other pollutant parameters; and,

      (5) Impairment of existing or potential beneficial uses of groundwater.

   b. Unless otherwise approved in writing by the Department, irrigation shall be limited to the application rates approved in the recycled water use plan and shall not occur outside the normally accepted growing season for the crop being irrigated. The addition of commercial fertilizer is prohibited without approval from the Department.

   c. For beneficial reuse purposes requiring Class C treatment as defined in OAR 340-55, prior to land application, the quality of recycled water (Outfall No. 002) shall meet the following effluent limitations:

      (1) Total coliform shall not exceed a 7-day median of 23 organisms/100mls, based on results of the last seven days that analyses have been completed, with no two consecutive samples exceeding 240 organisms/100ml.

   d. Effluent reuse shall comply with all provisions of a Recycled Water Use Plan approved by the Department pursuant to OAR 340-55.

   e. No recycled water shall be applied to food crops destined for human consumption or shall otherwise be made available for a use that is inconsistent with the uses provided for in OAR 340-55.

   f. The period for land application will be generally from April 1st to November 1st of each year. Unless otherwise approved by the Department, wastewater shall not be applied to land that is frozen, snow covered or saturated.

g. Unless otherwise approved in writing by the Department, a vegetative cover shall be maintained on the land irrigation area at all times. Vegetation shall be periodically cut and removed to ensure maximum evapotranspiration and nutrient capture.

h. The lagoons must be lowered sufficiently by the end of the irrigation season to ensure maximum practicable storage capacity during the non-irrigation months.

i. No activities shall be conducted that could cause an adverse impact on existing or potential beneficial uses of groundwater. All wastewater and process related residuals shall be managed and disposed in a manner that will prevent a violation of the Groundwater Quality Protection Rules (OAR 340-040).

j. The permittee shall, during all times of treatment and disposal, provide personnel whose primary responsibilities are to assure the continuous performance of the disposal system in accordance with the conditions of this permit.

k. Based on additional information, the Department may reopen this permit, if necessary, to include groundwater parameters, concentration limits, and compliance points.

3. **Recycled Wastewater- Biomass Power Plant- Outfall 003**

a. For beneficial reuse purposes requiring Class C treatment as defined in OAR 340-55, prior to sending recycled water to the biomass power plant, the quality of recycled water (Outfall No. 003) shall meet the following effluent limitations:

(1) Total coliform shall not exceed a 7-day median of 23 organisms/100mls, based on results of the last seven days that analyses have been completed, with no two consecutive samples to exceed 240 organisms/100ml.

b.

Parameter	Limitation
Total Chlorine Residual	Shall not be less than 0.2 mg/l
pH	Shall be within the range of 6.0 - 9.0

SCHEDULE B

1. **Minimum Monitoring and Reporting Requirements**

The permittee shall monitor the parameters as specified below at the locations indicated. The laboratory used by the permittee to analyze samples shall have a quality assurance/quality control (QA/QC) program to verify the accuracy of sample analysis. If QA/QC requirements are not met for any analysis, the results shall be included in the report, but not used in calculations required by this permit. When possible, the permittee shall re-sample in a timely manner for parameters failing the QA/QC requirements, analyze the samples, and report the results.

a. Influent to Primary Lagoon:

Parameter	Minimum Frequency	Type of Sample
Total Flow	Daily	Measurement
Flow Meter Calibration	Annual	Verification
BOD_5	1/Month	Grab
TSS	1/Month	Grab
pH	2/week	Grab
Septage	Daily	Amount Received (gallons)

b. Blow Down From Biomass Facility (sample location shall be just prior to co-mingling with influent entering the lift station):

Parameter	Minimum Frequency	Type of Sample
Na, Ca, Mg, Fe as $CaCo_3$	1/Month	Grab (1/)
NO2+NO3-N	1/Month	Grab (1/)
Total Chlorine Residual	1/Month	Grab (1/)
Total Flow (MGD)	1/Month	Measurement (1/)
pH	1/Month	Grab (1/)
Temperature	1/Month	Grab (1/)
Metals (Ag, As, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Se, Zn) & Cyanide, measured as total in mg/L (See Note 5/ & 6/)	On 3 consecutive days between Monday and Friday, twice per year 6/	24-hour composite

c. Recycled Water to Irrigation Site- Outfall 002 (when irrigating):

Item or Parameter	Minimum Frequency	Type of Sample
Total Flow (gal./day)	Daily	Measurement
Flow Meter Calibration	Annual	Verification
Total Chlorine Residual (ppm)	Daily	Grab
Nutrients (TKN,NO2+NO3-N,NH3)	1/year	Grab
Total Coliform	1/week	Grab
pH	1/week	Grab
Quantity Irrigated (inches/year/acre)	1/year/crop season	Calculation
Total Nitrogen Applied (pounds/acre/year)	1/year/crop season	Calculation

d. Recycled Water to Biomass Power Plant- Outfall 003:

Item or Parameter	Minimum Frequency	Type of Sample
Total Flow (gal./day)	Daily	Measurement
Flow Meter Calibration	Annual	Verification
Total Chlorine Residual (ppm)	Daily	Grab
Nutrients (TKN,NO2+NO3-N,NH3)	1/year	Grab
pH	1/week	Grab
Total Coliform	1/week	Grab
Metals (Ag, As, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Se, Zn) & Cyanide, measured as total in mg/L (See Note 5/ & 6/)	On 3 consecutive days between Monday and Friday, twice per year[6/]	24-hour composite

e. Land Application Site (4/):

Item or Parameter	Minimum Frequency	Type of Sample
Soil (NO_3+NO_2-N , TKN, NH_3)[2/]	Spring/Fall	2-Composites (0 to 12 inches & 12 to 18 inches)[3/]
pH	Spring/Fall	Composite
Crop Yield	1/Year (Harvest)	Calculation
Crude Protein Analysis	1/Year (Harvest)	Composite

2. **Minimum Groundwater Monitoring and Reporting Requirements** -Groundwater Monitoring Wells (MW#1-MW#7)

The permittee shall comply with the Department of Environmental Quality approved Groundwater Monitoring Plan. Data collected, and submitted shall include but not be limited to the following parameters and minimum frequencies as established in the Groundwater Monitoring Plan. The Groundwater Monitoring Plan may include additional requirements.

Item or Parameter	Minimum Frequency	Type of Sample
$NO_2 + NO_3$ - N	Quarterly	Grab
Total Dissolved Solids	Quarterly	Grab
Sulfate	Quarterly	Grab
Chloride	Quarterly	Grab
Conductivity	Quarterly	Field Measurement
Temperature	Quarterly	Field Measurement
pH	Quarterly	Field Measurement
Water Level	Quarterly	Field Measurement

a. Groundwater Reporting Requirements

(1) Quarterly Reporting: Analytical results of groundwater monitoring shall be reported quarterly in a Department approved format. At a minimum, the report shall 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 shall be submitted to the Department by March 31st following each year of monitoring. The annual report shall

contain the annual data analysis and reporting information identified in the approved monitoring plan.

b. Groundwater Monitoring Resampling Requirements

(1) If monitoring indicates a significant increase (increase or decrease for pH) in the value of a parameter monitored, the permittee shall 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 shall:

(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.

3. Reporting Procedures

a. All monitoring results shall be reported on approved forms. The reporting period is the calendar month except for groundwater reporting which is described above. Reports must be submitted to the Department's Eastern Region - Bend office by the 15th day of the following month.

b. State monitoring reports shall identify the name, certificate classification and grade level of each principal operator designated by the permittee as responsible for supervising the wastewater collection and treatment systems(s) during the reporting period. Monitoring reports shall also identify each system classification as found on page one of this permit.

4. Report Submittal

a. By no later than January 15 of each year, the permittee shall submit to the Department an annual report describing the effectiveness of the recycled water system to comply with the approved recycled water use plan, the rules of Division 55, and the limitations and conditions of this permit applicable to reuse of recycled water.

Notes:

1/ The sampling location for these parameters shall be after the cooling towers but before blow down is mixed with influent entering the sewage treatment facility.

2/ Soil sampling must take place in spring and late fall or early winter after final crop harvest. Agronomic rates for the next year's crop are to be adjusted as necessary to account for nitrogen residual amounts. Results are to be expressed in pounds/acre.

3/ Divide up the irrigation site into a grid pattern containing at least 8 sections. Soil samples from the one foot depth shall be taken from each grid section and composited together. Likewise, samples at the 18-inch depth shall be taken at the same grid locations as the one foot depth samples and composited together for analysis.

4/ Upon written approval from the Department, the Permittee may discontinue soil monitoring no sooner than two years from the time the current irrigation site is no longer used for effluent reuse. If a new irrigation site is utilized, soil monitoring will continue at the new site.

5/ For influent and effluent cyanide samples, at least six (6) discrete grab samples shall be collected over the operating day. Each aliquot shall not be less than 100 mL and shall be collected and composited into a larger container which has been preserved with sodium hydroxide for cyanide samples to insure sample integrity. Mercury should be analyzed using the 200 series, or "ultra clean"- 1669 and 1631method. Monitoring for Ag, As, Cd, Cr, Cu, Mo, Ni, Pb, Se, and Zn shall be conducted using a 'clean' sampling method, an 'ultraclean' sampling method, EPA method 1669, or any other test method approved by the Department with a detection limit of 1 ug/l or less (1 microgram per liter). All metal analysis will be for total recoverable concentrations.

6/ After two full years of metals monitoring, and if approved in writing by the Department, metals monitoring may be waived for the remainder of the permit cycle.

SCHEDULE D

Special Conditions

1. Prior to constructing or modifying any wastewater control facilities, detailed plans and specifications shall be approved in writing by the Department. After approval of the plans, all construction shall be in strict conformance with the plans unless otherwise approved in writing by the Department.

2. All biosolids (or septage) shall be managed in accordance with the current biosolids (or septage) management plans approved by the Department of Environmental Quality. No substantial changes shall be made in biosolids management activities which significantly differ from operations specified under the approved plan without the prior written approval of the Department.

   a. This permit may be modified to incorporate any applicable standard for biosolids use or disposal promulgated under section 405(d) of the Clean Water Act, if the standard for biosolids use or disposal is more stringent than any requirements for biosolids use or disposal in the permit, or controls a pollutant or practice not limited in this permit.

3. The permittee shall comply with Oregon Administrative Rules (OAR), Chapter 340, Division 49, "Regulations Pertaining To Certification of Wastewater System Operator Personnel" and accordingly:

   a. The permittee shall have its wastewater system supervised by one or more operators who are certified in a classification and grade level (equal to or greater) that corresponds with the classification (collection and /or treatment) of the system to be supervised as specified on page one of this permit.

      Note: A "supervisor" is defined as the person exercising authority for establishing and executing the specific practice and procedures of operating the system in accordance with the policies of the permittee and requirements of the waste discharge permit. "Supervise" means responsible for the technical operation of a system, which may affect its performance or the quality of the effluent produced. Supervisors are not required to be on-site at all times.

   b. The permittee's wastewater system may not be without supervision (as required by Special Condition 3a above) for more than thirty (30) days. During this period, and at any time that the supervisor is not available to respond on-site (i.e. vacation, sick leave or off-call), the permittee must make available another person who is certified in the proper classification and at grade level II or higher.

   c. The permittee is responsible for ensuring the wastewater system has a properly certified supervisor available at all times to respond on-site at the request of the permittee and to any other operator.

   d. The permittee shall notify the Department of Environmental Quality in writing within thirty (30) days of replacement or redesignation of certified operators responsible for supervising wastewater system operation. The notice shall be filed with the Water Quality Division, Operator Certification Program at 2020 SW 4th Avenue, Suite 400 Portland, OR 97201. This requirement is in addition to the reporting requirements contained under Schedule B of this permit.

e. Upon written request, the Department 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 justification for the time needed, a schedule for recruiting and hiring, the date the system supervisor availability ceased, and the name of the alternate system supervisor(s) as required by 3b above.

4. The permittee shall meet the requirements for use of recycled water under Division 55, including the following:

(a) No recycled water shall be released by the permittee until a Recycled Water Use Plan is approved by the Department.
(b) All recycled water shall be managed in accordance with the approved Recycled Water Use Plan. No substantial changes shall be made in the approved plan without written approval of the Department.
(c) Any person having control over the treatment or distribution or both of recycled water may distribute recycled water only for the beneficial purposes identified in this permit and the associated Recycled Water Use Plan. Moreover, all reasonable steps must be taken to ensure that the recycled water is used only in accordance with the standards and requirements of the rules of Division 55, the conditions of this permit, and the Recycled Water Use Plan.
(d) The permittee shall notify the Department within 24 hours if it is determined that the treated effluent is being used in a manner not in compliance with OAR 340-055. When the Department offices are not open, the permittee shall report the incident of noncompliance to the Oregon Emergency Response System (telephone number: 800.452.0311)
(e) No recycled water shall be made available to a person proposing to use recycled water unless that person certifies in writing that they have read and understand the provisions in these rules. This written certification shall be kept on file by the sewage treatment system owner and be made available to the Department for inspection.

All recycled water used at the treatment plant site (or satellite facility operating under the same permit) for landscape irrigation or in plant processes is exempt from the Division 55 rules if:

(a) The recycled water is an oxidized and disinfected wastewater
(b) The recycled water is used at the site where it is generated or at an auxiliary wastewater or sludge treatment facility that is subject to the same NPDES or WPCF permit as the wastewater treatment system. Contiguous property to the parcel of land upon which the treatment system is located is considered the wastewater treatment system site if under the same ownership;
(c) Spray or drift or both from the use does not occur off the site; and
(d) Public access to the site is restricted.

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

6. Monitoring Well Management/Maintenance

a. The permittee shall monitor groundwater quality and report monitoring results in accordance with the Department approved Groundwater Monitoring Plan

b. The permittee shall protect and maintain each groundwater monitoring well so that samples representative of actual conditions can be collected.

c. All monitoring well abandonment's, replacements, and installations must be conducted to comply with the Water Resources Department Rules OAR Chapter 690, Division 240 and with the Department's Guidelines for Groundwater Monitoring Well Drilling, Construction, and Decommissioning. All monitoring well repairs, abandonment's replacements and installations must be documented in a report prepared by an Oregon registered geologist.

d. If a monitoring well becomes damaged or inoperable, the permittee shall notify the Department in writing within 14 days. The written report shall describe what problem has occurred, the remedial measures that have been taken to correct the problem, and the measures taken to prevent its recurrence. The Department may require the replacement of inoperable monitoring wells.

e. New or replacement monitoring well placement or design must be approved by the Department prior to installation. 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.

f. An abandonment plan for existing wells deemed unsuitable for groundwater monitoring must be submitted for Department approval prior to abandonment.

7. An adequate contingency plan for prevention and handling of spills and unplanned discharges shall be in force at all times. A continuing program of employee orientation and education shall be maintained to ensure awareness of the necessity of good operational control and quick and proper action in the event of a spill or accident.

8. Within three months of the issuance date of this permit, District personnel responsible for sampling the monitoring wells must be trained on the proper procedure for sampling monitoring wells by a registered professional with experience in sampling groundwater monitoring wells. The date and time of this training must be reported to the Department in advance.

SCHEDULE F

WPCF GENERAL CONDITIONS – DOMESTIC FACILITIES

SECTION A. STANDARD CONDITIONS

1. 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 grounds for an enforcement action. Failure to comply is also grounds for the Department to modify, revoke, or deny renewal of a permit.

2. Property Rights and Other Legal Requirements

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 rights, or any infringement of federal, tribal, state, or local laws or regulations.

3. Liability

The Department of Environmental Quality or its officers, agents, or employees may not sustain any liability on account of the issuance of this permit or on account of the construction or maintenance of facilities or systems because of this permit.

4. Permit Actions

After notice by the Department, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including but not limited to the following:

a. Violation of any term or condition of this permit, any applicable rule or statute, or any order of the Commission;

b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts.

5. Transfer of Permit

This permit may not be transferred to a third party without prior written approval from the Department. The Department may approve transfers where the transferee acquires a property interest in the permitted activity and agrees in writing to fully comply with all the terms and conditions of this permit and the rules of the Commission. A transfer application and filing fee must be submitted to the Department.

6. Permit Fees

The permittee must pay the fees required by Oregon Administrative Rules.

SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

At all times the permittee must maintain in good working order and properly operate as efficiently as possible all treatment or control facilities or systems installed or used by the permittee to comply with the terms and conditions of this permit.

2. Standard Operation and Maintenance

All waste collection, control, treatment, and disposal facilities or systems must be operated in a manner consistent with the following:

a. At all times, all facilities or systems must be operated as efficiently as possible in a manner that will prevent discharges, health hazards, and nuisance conditions.

b. All screenings, grit, and sludge must be disposed of in a manner approved by the Department to prevent any pollutant from the materials from reaching waters of the state, creating a public health hazard, or causing a nuisance condition.

c. Bypassing untreated waste is generally prohibited. Bypassing may not occur without prior written permission from the Department except where unavoidable to prevent loss of life, personal injury, or severe property damage.

3. Noncompliance and Notification Procedures

If the permittee is unable to comply with conditions of this permit because of surfacing sewage; a breakdown of equipment, facilities or systems; an accident caused by human error or negligence; or any other cause such as an act of nature, the permittee must:

a. Immediately take action to stop, contain, and clean up the unauthorized discharges and correct the problem.

b. Immediately notify the Department's Regional office so that an investigation can be made to evaluate the impact and the corrective actions taken, and to determine any additional action that must be taken.

c. Within 5 days of the time the permittee becomes aware of the circumstances, the permittee must submit to the Department a detailed written report describing the breakdown, the actual quantity and quality of waste discharged, corrective action taken, steps taken to prevent a recurrence, and any other pertinent information.

Compliance with these requirements does not relieve the permittee from responsibility to maintain continuous compliance with the conditions of this permit or liability for failure to comply.

4. Wastewater System Personnel

The permittee must provide an adequate operating staff that is duly qualified to carry out the operation, maintenance, and monitoring requirements to assure continuous compliance with the conditions of this permit.

5. 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 (e.g., public water systems) about the extent and nature of the discharge in accordance with the notification procedures developed under General Condition B.6. 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.

6. 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.

SECTION C. MONITORING AND RECORDS

1. Inspection and Entry

The permittee must at all reasonable times allow authorized representatives of the Department to:

a. Enter upon the permittee's premises where a waste source or disposal system is located or where any records are required to be kept under the terms and conditions of this permit;

b. Have access to and copy any records required by this permit;

c. Inspect any treatment or disposal system, practices, operations, monitoring equipment, or monitoring method regulated or required by this permit; or

d. Sample or monitor any substances or permit parameters at any location at reasonable times for the purpose of assuring permit compliance or as otherwise authorized by state law...

2. Averaging of Measurements

Calculations of averages of measurements required for all parameters except bacteria must use an arithmetic mean; bacteria must be averaged as specified in the permit.

3. Monitoring Procedures

Monitoring must be conducted according to test procedures specified in the most recent edition of **Standard Methods for the Examination of Water and Wastewater**, unless other test procedures have been approved in writing by the Department and specified in this permit.

4. Retention of Records

The permittee must retain records of all monitoring and maintenance information, including all calibrations, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. The Department may extend this period at any time.

SECTION D. REPORTING REQUIREMENTS

1. Plan Submittal

Pursuant to Oregon Revised Statute 468B.055, unless specifically exempted by rule, construction, installation, or modification of disposal systems, treatment works, or sewerage systems may not commence until plans and specifications are submitted to and approved in writing by the Department. All construction, installation, or modification shall be in strict conformance with the Department's written approval of the plans.

2. Change in Discharge

Whenever a facility expansion, production increase, or process modification is expected to result in a change in the character of pollutants to be discharged or in a new or increased discharge that will exceed the conditions of this permit, a new application must be submitted together with the necessary reports, plans, and specifications for the proposed changes. A change may not be made until plans have been approved and a new permit or permit modification has been issued.

3. Signatory Requirements

All applications, reports, or information submitted to the Department must be signed and certified by the official applicant of record (owner) or authorized designee.

4. 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 DEQ or to the 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 DEQ.

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 (e.g., 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 Department's Regional office within 24 hours, or during normal business hours, whichever is first:

a) The OERS incident number (if applicable) along with a brief description of the event.

(2) Written reporting within 5 days.

i. The following information must be provided in writing to the Department's 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.

The Department 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 the Department in this permit; and
iv. Any noncompliance that may endanger human health or the environment.

(2) During normal business hours, the Department's Regional office must be called. Outside of normal business hours, the Department must be contacted at 1-800-452-0311 (Oregon Emergency Response System).

(3) A written submission must be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission must contain:

i. A description of the noncompliance and its cause;
ii. The period of noncompliance, including exact dates and times;
iii. The estimated time noncompliance is expected to continue if it has not been corrected;
iv. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance; and
v. Public notification steps taken, pursuant to General Condition B.6.

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

SECTION E. DEFINITIONS

1. *BOD_5* means five-day biochemical oxygen demand.
2. *TSS* means total suspended solids.
3. *FC* means fecal coliform bacteria.
4. *NH_3-N* means Ammonia Nitrogen.
5. *NO_3-N* means Nitrate Nitrogen.
6. *NO_2-N* means Nitrite Nitrogen.
7. *TKN* means Total Kjeldahl Nitrogen.
8. *Cl* means Chloride.
9. *TN* means Total Nitrogen.
10. "*Bacteria*" includes but is not limited to fecal coliform bacteria, total coliform bacteria, and E. coli bacteria.
11. *Total residual chlorine* means combined chlorine forms plus free residual chlorine.
12. *mg/l* means milligrams per liter.
13. *ug/l* means micrograms per liter.
14. *kg* means kilograms.
15. *GPD* means gallons per day.
16. *MGD* means million gallons per day.
17. *Grab sample* means an individual discrete sample collected over a period of time not to exceed 15 minutes.
18. *Composite sample* means a combination of samples collected, generally at equal intervals over a 24-hour period, and based on either time or flow.
19. *Week* means a calendar week of Sunday through Saturday.
20. *Month* means a calendar month.
21. *Quarter* means January through March, April through June, July through September, or October through December.

APPENDIX B
Ordinance No. 2015-03

RESOLUTION NO. 2015-03

A RESOLUTION ESTABLISHING CERTAIN SEWER RATES, CHARGES, AND FEES EFFECTIVE AS OF JULY 1, 2015.

WHEREAS, on May 13, 2015, the City of La Pine, an Oregon municipal corporation ("City"), adopted the Sewer Use Regulations Ordinance, Ordinance No. 2015-05 (the "Ordinance"), pursuant to which the La Pine City Council (the "Council") is authorized to establish certain sewer rates, charges, fees, and system development charges from time to time by Council resolution; and

WHEREAS, the Council has determined that sewer fund revenue requirements necessitate an increase in sewer rates; and

WHEREAS, a duly noticed public hearing was held on February 17, 2015 concerning the contemplated increase in sewer rates.

NOW, THEREFORE, BE IT RESOLVED, by and through the Council meeting in regular session, the following:

1. The above-stated findings contained in this Resolution No. 2015-03 (this "Resolution") are hereby adopted.

2. Effective on July 1, 2015, City's sewer rates concerning property located within City's incorporated limits are as follows:

Meter Size	MCE Factor	$ / Meter	$ / MCE	Total Monthly Fixed Charge
5/8"	1.00	$ 10.27	$ 8.76	$ **19.03**
3/4"	1.00	10.27	8.76	**19.03**
1"	2.50	10.27	21.90	**32.17**
1 1/2"	5.00	10.27	43.81	**54.08**
2"	8.00	10.27	70.09	**80.36**
3"	16.00	10.27	140.18	**150.45**
4"	25.00	10.27	219.04	**229.31**
6"	50.00	10.27	438.07	**448.34**

Volume Charge			
Residential	$	**3.00**	per 1,000 gal of avg. winter water usage [a]
Commercial	$	**5.55**	per 1,000 gal of all water usage

[a] Average metered water usage between November and February of previous fiscal year

3. Each residential sewer customer will be charged the total monthly fixed charge applicable to each meter receiving metered water service, in addition to volume charges based on the customer's average winter water usage. Residential sewer customers with zero average winter water usage will be assessed volume charges according to the system's residential class average winter water usage. For purposes of this Resolution, "residential" sewer services consist of all services provided for domestic purposes concerning detached single family residences and duplexes (dwellings) designed for permanent occupation and which include kitchens and bathroom facilities; the term "winter" or "winter

months" means the most recent November through February period.

4. Each commercial customer will be charged the total monthly fixed charge applicable to each meter receiving metered water service, in addition to volume charges based on the customer's monthly metered water usage. For purposes of this Resolution, "commercial" sewer services consist of all sewer services that do not meet the residential services definition provided under Section 3 of this Resolution.

5. Effective on July 1, 2015, City's sewer fees, charges, fines, and penalties are as follows:

Outside Septage Dumping For dumping of septage not produced within the City sewer system.	$0.0475 per gallon
Temporary Disconnection Charge Charge for the temporary (less than 48 hours) shut-off of sewer services pursuant to an owner's request.	$75.00
Sand or Grease Trap Pumping For pumping additional tanks within the sewer system at the discretion and scheduling of the public works manager.	$125.00
Sewer Tank Lid Replacement For the replacement of a lid on a septic tank due to damage.	$75.00
Septic Tank Filter	$65.00

6. This Resolution (and the provisions contained herein) supersede any resolution (and the terms contained therein) in conflict with this Resolution. The provisions of this Resolution are severable. If any section, subsection, sentence, clause, and/or portion of this Resolution is for any reason held invalid, unenforceable, and/or unconstitutional, such invalid, unenforceable, and/or unconstitutional section, subsection, sentence, clause, and/or portion will (a) yield to a construction permitting enforcement to the maximum extent permitted by applicable law, and (b) not affect the validity, enforceability, and/or constitutionality of the remaining portion of this Resolution. This Resolution will be in full force and effect from and after its approval and adoption.

APPROVED and ADOPTED by the Council on May 13, 2015.

Ken Mulenex, Mayor

ATTEST:

Richard L. Allen, Interim City Manager

APPENDIX C
Wickiup Lift Station Evaluation

anderson perry & associates, inc.

1901 N. Fir Street, P.O. Box 1107
La Grande, OR 97850
(541) 963-8309, Fax (541) 963-5456
www.andersonperry.com

engineering ▪ surveying ▪ natural resources

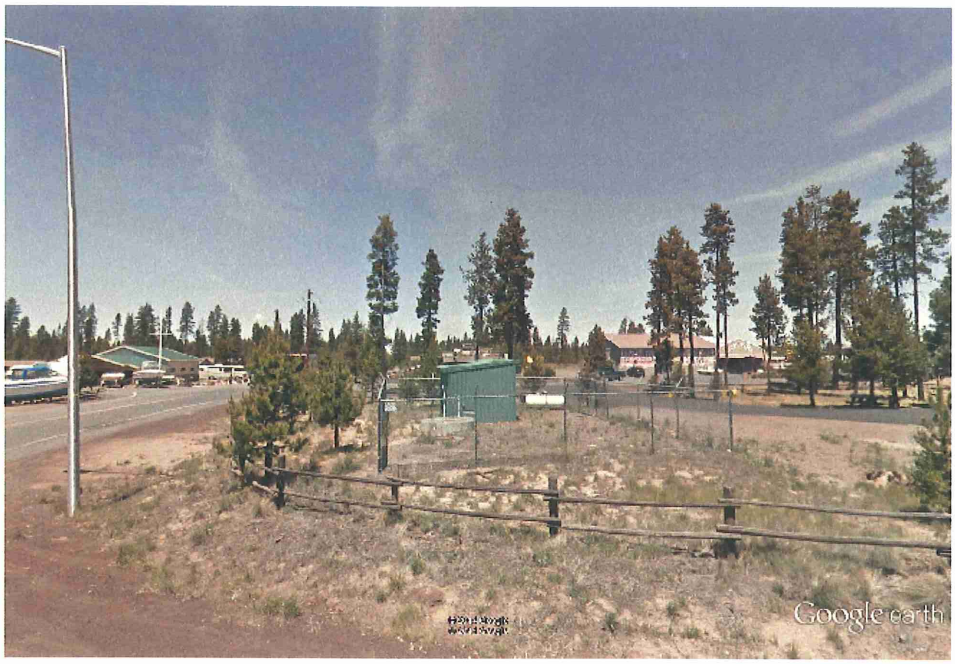
June 10, 2014

Mayor Ken Mulenex, City Manager Rick Allen, and City Council
City of La Pine
P.O. Box 2460
La Pine, Oregon 97739

RE: Wickiup Lift Station Evaluation

Dear Mayor Mulenex, Rick Allen, and City Council:

As requested, we have completed an evaluation of the City of La Pine's existing Wickiup lift station. The purpose and scope of the evaluation was to assess the condition of the existing system, determine and summarize possible improvement alternatives, develop estimated project costs of the identified improvement alternatives, and outline the recommended lift station improvement alternatives. This letter report presents the results of our evaluation and provides the City with improvement alternatives that will allow the system to meet current codes and standards as well as provide a reliable, long-term solution for the City's wastewater pumping needs.



EXISTING WICKIUP LIFT STATION OVERVIEW

The existing sewer system in the City of La Pine is a septic tank effluent gravity (STEG) system. Under this type of system, the effluent arriving at the wetwell is water without solids. The pumps currently used in the wetwell are submersible grinder pumps that are made to handle solids.

The existing Wickiup lift station consists of a concrete wetwell housing two submersible grinder pumps and a building housing the pump's electrical controls and a 35 kilowatt emergency generator. The wetwell has a measured inside diameter of 6.46 feet and is approximately 13.5 feet in depth from the top of the access hatch to the bottom. The capacity of the wetwell is 245 gallons per foot. The condition of the concrete in the wetwell is good, but the condition of the metal and wiring is poor. The pump rails are made of galvanized pipe and are in very poor condition. The existing electrical power service provided at the Wickiup lift station is 240-volt, single phase.

In December 2009, two new Myers WGX50H-21-35 submersible pumps were installed by Vic Russell Construction. After installation of the pumps, the pressure reading with one pump running was 48 pounds per square inch (psi) (111 feet of head). The Inspection Report, provided by WHPacific at the time of the Myers pump installation, stated that the design calculations anticipated the new pumps to operate at 46 gallons per minute (gpm) at 113 feet of head.

On April 14, 2014, between 9:30 and 11:00 a.m., measurements were taken of the pump performance. In order to get an accurate pressure on the existing system, a new pressure gauge was installed on the pump discharge pipe in the check valve vault. Previously, Scott Perkins, the City's public works manager, had measured the depth of the effluent in the wetwell from pump start to pump shut off to be 8 inches, which calculates to be a volume of 163 gallons. The pump run time was measured to be 3.25 minutes from pump start to pump shut off. The amount of time to fill the wetwell from pump shut off to pump start was 17.75 minutes, which calculates to be an inflow of 9 gpm. Adding 9 gpm to the volume pumped results in the pump performance being approximately 60 gpm at 38 psi, or 88 feet of head. This measured flow and pressure matches the pump curve for the 5 horsepower (Hp) Myers WGX50H pump.

CURRENT OPERATING CONDITIONS

Currently, the highest water usage area in the City is the southern residential area. This area uses 135 gallons per day (gpd) per equivalent dwelling unit (EDU) during winter periods. This flow was determined using the 2011 water flow data from the winter months when no irrigation occurred. The amount of water usage during the winter months closely reflects the amount of water going into the sewer system all months of the year. In order to be conservative, a flow of 150 gpd per EDU was used to calculate inflow entering the wetwell. To determine the number of EDUs for each area within the City of La Pine, information from the Wastewater System Capital Facilities Plan dated January 2006 was used. The number of lots shown on Figure 3.1 of the Facilities Plan was used to determine full build-out for each area to be served by the Wickiup lift station.

The current collection system connected to the Wickiup Junction wetwell has 95 EDUs at full build-out. Using 150 gpd per EDU, the average daily volume into the wetwell is 14,250 gpd, which converts to an

estimated average flow of 9.9 gpm. This flow could be higher or lower at any given time during the day. At this flow rate, the current pump start and pump shut off float setting works well for pump cycle times. The pump cycle time, as tested on April 14, 2014, is approximately 17.75 minutes to fill and 3.25 minutes of pump run time, for a total cycle time of 20 minutes.

The City has reported problems with the pump motors failing after a relatively short period of time. The two 5 Hp Myers WGX50H submersible pumps are operating at the maximum load conditions for that model of pump. The Hp requirement for pumping at the existing conditions is exactly 5 Hp, which leaves no room for any additional loads to be applied to the motors. The overload protectors in the pump control panel are set to the maximum 32-amp setting. An amperage reading was taken on the motor leads in the control panel, and the top ampere draw was just below the full-load amperes for a 5 Hp motor. The ampere reading on the motor lead with the highest reading was 27.4 amperes, and the reading on the second lead was 24.3 amperes. The amperage imbalance on the supply leads is greater than 5 percent. The full-load amperes for a 5 Hp, 230-volt, single-phase motor is calculated to be 28 amperes. Therefore, the existing pumps and controls are at maximum capacity. Myers pump motors are oil filled and may have a higher ampere draw due to the lower efficiency of that type of motor.

Under current operating conditions, the submergence level of the motors is relatively low. Fully submerged motors will have better cooling, and a cooler running motor will last longer and take less power to operate. The fluid level in the wetwell could be raised to provide for greater pump submergence.

FUTURE OPERATING CONDITIONS

Future modifications to the lift station should take into consideration the current Wickiup Junction connections plus the potential addition of the Cagle area to the north and west of the existing service area. Figure 1 shows the areas to be added to the Wickiup Junction collection system. The total EDUs at full build-out would be 420. This number includes the 95 current/available EDUs in the Wickiup Junction area, 239 future EDUs in the Cagle area to the northwest of the lift station, and 86 future EDUs in the area west of the new school. Using 150 gpd per EDU, the average flow into the wetwell is estimated to be (420 EDUs x 150 gpd) / 24 hours / 60 minutes = 43.75 gpm. To be conservative, 45 gpm will be used. To size new pumps for the system, a peaking factor of three is being applied to the estimated average inflow conditions under full build-out. New pumps will be designed to pump three times the estimated average inflow gpm, or 135 gpm. The calculated head required to pump 135 gpm through the 4-inch pressure sewer line to the lagoons is 280 feet.

Using a 135 gpm pump and a 20-minute cycle time, the projected storage volume in the wetwell is 675 gallons. The existing wetwell has a capacity of 245 gallons per foot of depth. Six hundred and seventy-five gallons is equivalent to 2.75 feet of depth in the wetwell. The current wetwell has adequate storage volume for the connection to the Cagle area. It should also be noted that these calculations are made for full build-out of the Cagle area. Most of the Cagle area, which is anticipated to be added to the system in the future, is made up of lots that are larger than the proposed lot size on the initial maximum build-out design, as shown in the Wastewater System Capital Facilities Plan. The probability of the existing lots being subdivided into small lots is believed to be low. To be conservative, full build-out EDU numbers consider small lot size per EDU since the potential to subdivide the existing larger lots exists.

RECOMMENDATION FOR CURRENT OPERATION

Until a decision can be made on system upgrades and funding can be secured, the recommendation for the existing pumps and wetwell is to raise the floats approximately 2 feet in the wetwell. This would provide better cooling of the pump motors and also minimize the possibility of vortexes forming in the wetwell. All four of the floats would be adjusted upward the same distance. The pump installation should be inspected to ensure the pumps are seated properly to the discharge pipes. During the site visit on April 14, 2014, it appeared that the connection was loose, resulting in bypass circulation going back into the wetwell from the pumps and decreasing pump efficiency.

Under current operating conditions the recommendation is to find a pump that will operate more efficiently. A new higher efficiency 5 Hp pump and rail system could be installed without any modifications to the existing power supply. One of the existing pumps may remain in service as a backup to the new, more efficient submersible pump. One new pump operating as the primary pump should have a service life of 10 to 15 years. Upgrading the lift station for future additional areas could be part of the Cagle addition project, with alternatives described hereafter.

ALTERNATIVES FOR WICKIUP LIFT STATION MODIFICATION

Alternatives to be considered for the Wickiup lift station operation when the Cagle area is added to the system are:

1. Increasing the size of the 4-inch force main to 6-inch and installing new submersible pumps.
2. Changing the pumping system to vertical turbine pumps using an attenuation unit for peak flow storage.
3. Changing the pumping system to vertical turbine pumps and sizing the pumps to operate at anticipated peak flows.

Alternative No. 1. Alternative No. 1 would replace approximately 12,000 feet of existing 4-inch pressure main line with a 6-inch pressure main line from the Wickiup lift station to the lagoons. The pipe replacement would significantly decrease the pumping head required for the lift station pumps. With this alternative, all of the pumps and appurtenances at the lift station would be updated with new equipment and controls. The pumps for this alternative could be submersible or be changed to higher efficiency, canned vertical turbine pumps with updated controls, which would also increase the efficiency of the system. The wetwell would be repaired and lined. The existing electrical supply and

emergency generator would not have to be changed. Table 1 shows the estimated cost for the installation of the 6-inch main line pipe and the lift station equipment upgrade, assuming vertical turbine pumps are used. In most areas, the 6-inch pipe could be installed alongside the existing 4-inch pipe.

Under the current STEG system there should be no requirement for grinder pumps or pumps that will pass large solids. Pump efficiency may be nearly doubled with the installation of vertical turbine or regular water handling pumps. For future conditions, grinder pumps, non-clog pumps, and vortex pumps would not be good options to consider due to the lower efficiency of the pumps. Under the STEG system, grinder and non-clog pumps are not a requirement and are not the best fit for this type of a system.

With the new 6-inch forcemain and new vertical turbine pump, it is estimated that the Wickiup lift station would have the capacity to service a total of 641 EDUs without any change to the existing electrical supply to the lift station. This option would allow the addition of another 221 EDUs after the Cagle expansion occurred.

Alternative No. 2. Alternative No. 2 would be designed to handle 420 EDUs, which is the combination of the present EDUs served in the Wickiup Junction area and the additional EDUs served when the Cagle area is added to the system. With this alternative, vertical turbine pumps would be installed with the capacity to pump twice the average flow into the system, and an attenuation chamber would be added to store peak flows. The combination of the pump capacity and the attenuation chamber would facilitate a peak flow three times the average inflow. With this alternative, the 4-inch pressure sewer line from the Wickiup lift station to the lagoons would not require any modification. The velocity of the effluent in the pipe would be approximately 2.3 feet per second, which is a velocity that will keep the pipe flushed out. This alternative would use a pump that would pump 90 gpm at 115 feet of head. High efficiency 5 Hp vertical turbine pumps would be used in this alternative.

Alternative No. 2 is shown on the attached conceptual sketch, and the cost estimate for this alternative is shown on Table 2. This alternative involves the installation of two canned vertical turbine pumps, a flowmeter, isolation valves, check valves, and a building to house the pump motors and appurtenances. The cans for the pumps would be installed outside the existing wetwell. All equipment except for the floats would be removed from the wetwell. There would be two connections made from the existing wetwell to the new pump cans. A screen would be installed over the outlets to the vertical turbine cans, which would keep any material that would not pass through the pumps from entering the cans. This screen would be installed in such a way to allow material to be flushed from the surface with a water spray wand operated from the surface. The wetwell should be vacuumed on a regular basis to ensure no solids would build up on the bottom of the wetwell. The repair and lining of the existing wetwell is included in the cost for this alternative

With this alternative, the existing 220-volt, single phase electrical service may be used, so there would be no additional expense for upgrading to 3-phase power service. New motor controls would be installed to match the new pump motors. The existing emergency generator would be used with the new pump installation.

The vertical turbine pump cans and electrical control enclosures should be sized to allow for larger pumps, as described in Alternative No. 3, to be installed without the requirement of major modifications to the facility.

Alternative No. 3. Alternative No. 3 would be designed to handle both the present flows and the additional flows when the Cagle area is added to the system. Under this alternative, an estimated total of 565 EDUs could be served. As more EDUs are added to the current collection system, only float position and variable frequency drive (VFD) adjustments would be required. No additional equipment expense would be required as EDUs are added to the collection system. The pumps would be designed to deliver 135 gpm, which is three times the average projected inflow into the system. The pumps would be required to produce high heads in order to use the existing 4-inch pressure main line.

This alternative would require the same physical installation of the canned vertical turbine pumps as Alternative No. 2, as shown on the attached sketch. The difference in this installation would be the size of the pumps and motors required to produce the additional flow and pressure required for the additional EDUs and a peaking factor of three for pump capacity. Alternative No. 3 would require 15 Hp motors with VFDs to be used on the larger pumps. The VFDs would be added in order to meet the flow requirements as the collection system expands. Under this alternative, the power supply would be upgraded to 480-volt, 3-phase. The emergency generator would have to be replaced in order to match the electrical requirements of the pumps and controls for the higher Hp pumps. The 4-inch pressure main would remain in place without any modifications. Table 3 shows the estimated cost for Alternative No. 3.

The pumps and controls for Alternative No. 3 could be installed at a later date than the Alternative No. 2 installation. By installing Alternative No. 2 first and changing the pumps and electrical supply described for Alternative No. 3 at a later date, an estimated additional 145 EDUs could be served with the existing 4-inch forcemain. This would be the maximum recommended flow from the Wickiup lift station without changing to a 6-inch forcemain.

It should be noted that none of the proposed alternatives include any of the collection system piping that will be required to add service areas to the system. Table 4 shows a summary of the total cost for each alternative and a cost per EDU serviced by the alternative. The attached sketch shows the proposed configuration for the installation of the vertical turbine pumps.

SUMMARY

The Wickiup lift station is a vital component of the City's existing and expanded future sewer collection system. The pumping system must work reliably 24 hours per day, 365 days per year. An unreliable system puts the City in jeopardy of failures with associated wastewater backup, which can result in undue liability. An unreliable system requires increased maintenance and operator attention to keep the system operating, which adds significantly to operating costs. With the potentially imminent requirement by the Oregon Department of Environmental Quality for the addition of the Cagle area to the system, modifications to the current system will be required in the near future.

The recommendation for the current system is to replace one of the existing submersible pumps with a more efficient pump that will meet the current flow requirements. One of the existing pumps could

remain in service as the backup pump. This modification to the current system will provide reliability for the system under current operating requirements. When extensions for the Cagle area are needed, the major upgrade to the piping and/or Wickiup lift station system could be completed as part of the overall expansion of the collection system.

When the Cagle area is added, the upgrade recommendation is Alternative No. 2. With the addition of an attenuation facility to store a portion of the peak flow, smaller pumps could be installed, which would allow for the existing electrical service and emergency generator to be used. The smaller pumps would save energy costs over the larger pumps. If the collection system were to expand beyond the addition of the Cagle area, larger pumps could be installed in the existing vertical turbine cans to provide for the additional pumping requirements of the system expansion.

We hope this letter report has provided the City with the needed information to make informed decisions regarding modifications to the Wickiup lift station. Please contact us if you need any additional information of have questions or concerns.

Sincerely,

ANDERSON PERRY & ASSOCIATES, INC.

By Brad D. Baird
Brad D. Baird, P.E.

BDB/cd

Enclosures

cc: File No. 33-01-24 (w/encl.)

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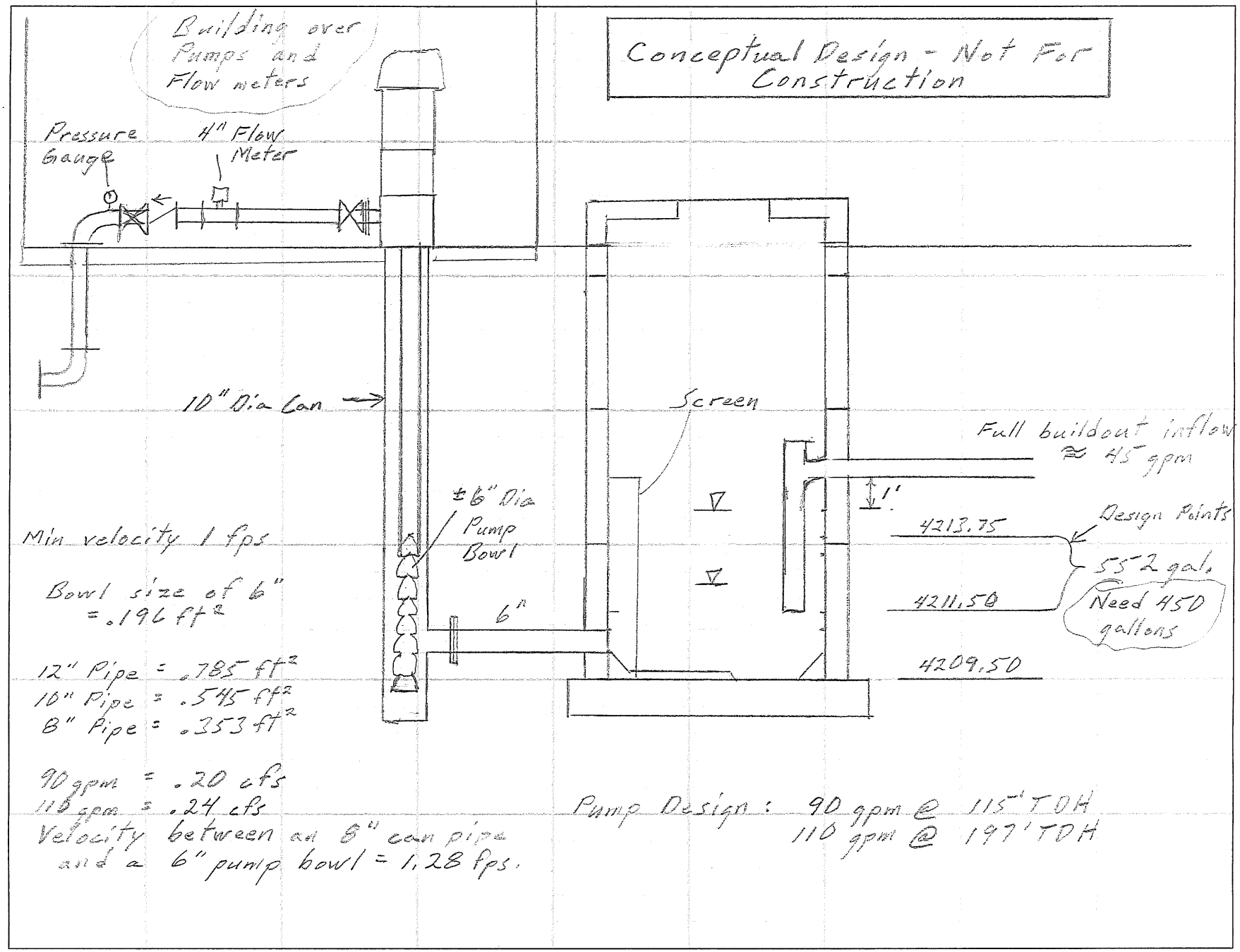
Client City of La Pine, OR Job No. 33-01

Project Wickiup Lift Station

Description Lift Station Modifications

Designed By LH Checked By BM Date 4-2014 Page 1 of 1

anderson perry & associates, inc.



City of La Pine, Oregon
Wickiup Lift Station
Alternative No. 1
Year 2014 Cost

NO.	ITEM	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization (5%)	LS	$ 80,000	All Req'd	$ 80,000
2	Trench Excavation Safety	LS	3,000	All Req'd	3,000
3	Wetwell Equipment Removal	LS	3,000	All Req'd	3,000
4	Check Valve Vault Removal	LS	2,000	All Req'd	2,000
5	Wetwell Lining and Modifications	LS	12,000	All Req'd	12,000
6	Canned Vertical Turbine Pumps	EA	18,000	2	36,000
7	Controls and Instrumentation	LS	15,000	All Req'd	15,000
8	Connection to Existing Pressure Sewer Line for Bypass Pumping	LS	3,500	All Req'd	3,500
9	Bypass Pumping	LS	8,000	All Req'd	8,000
10	Gravel Surface Restoration	SY	10	20	200
11	6-inch Polyvinyl Chloride Pressure Main Line	LF	25	12,000	300,000
12	State Highway Crossing	LS	30,000	All Req'd	30,000
				Subtotal Construction Costs	**$ 492,700**
				Administration, Legal, Engineering, and Contingency @ 35%	172,400
				TOTAL YEAR 2014 ESTIMATED COSTS	**$ 665,100**

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CITY OF
LA PINE, OREGON
WICKIUP LIFT STATION

ALTERNATIVE NO. 1
YEAR 2014 COST

TABLE
1

City of La Pine, Oregon
Wickiup Lift Station
Alternative No. 2
Year 2014 Cost

NO.	ITEM	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization (5%)	LS	$ 6,900	All Req'd	$ 6,900
2	Trench Excavation Safety	LS	3,000	All Req'd	3,000
3	Wetwell Equipment Removal	LS	3,000	All Req'd	3,000
4	Check Valve Vault Removal	LS	2,000	All Req'd	2,000
5	Wetwell Lining and Modifications	LS	12,000	All Req'd	12,000
6	Canned Vertical Turbine Pumps	EA	18,000	2	36,000
7	Pump Building	LS	40,000	All Req'd	40,000
8	Controls and Instrumentation	LS	15,000	All Req'd	15,000
9	Connection to Existing Pressure Sewer Line	LS	3,500	All Req'd	3,500
10	Attenuation Chamber	LS	18,000	All Req'd	18,000
11	Bypass Pumping	LS	8,000	All Req'd	8,000
12	Gravel Surface Restoration	SY	10	20	200
				Subtotal Construction Costs	$ 147,600
				Administration, Legal, Engineering, and Contingency @ 35%	51,700
				Total Year 2014 Estimated Cost	**$ 199,300**

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CITY OF
LA PINE, OREGON
WICKIUP LIFT STATION

ALTERNATIVE NO. 2
YEAR 2014 COST

TABLE
2

City of La Pine, Oregon
Wickiup Lift Station
Alternative No. 3
Year 2014 Cost

NO.	ITEM	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization (5%)	LS	$ 10,900	All Req'd	$ 10,900.00
2	Wetwell Equipment Removal	LS	3,000	All Req'd	3,000
3	Wetwell Lining and Modifications	LS	15,000	All Req'd	15,000
4	Trench Excavation Safety	LS	3,500	All Req'd	3,500
5	Canned Vertical Turbine Pumps	EA	25,000	2	50,000
6	Pump Building	LS	40,000	All Req'd	40,000
7	Power Upgrade to 480-volt, 3-Phase	LS	17,000	All Req'd	17,000
8	New Emergency Generator	LS	35,000	All Req'd	35,000
9	Controls and Instrumentation	LS	25,000	All Req'd	25,000
10	Connection to Existing Pressure Sewer Line	LS	3,500	All Req'd	3,500
11	Attenuation Chamber	LS	18,000	All Req'd	18,000
12	Bypass Pumping	LS	8,000	All Req'd	8,000
13	Gravel Surface Restoration	SY	10	20	200
				Subtotal Construction Costs	**$ 228,900**
				Administration, Legal, Engineering, and Contingency @ 35%	80,100
				TOTAL YEAR 2014 ESTIMATED COSTS	**$ 309,000**

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CITY OF
LA PINE, OREGON
WICKIUP LIFT STATION

ALTERNATIVE NO. 3
YEAR 2014 COST

TABLE
3

City of La Pine, Oregon
Wickiup Lift Station
Alternative Summary
Year 2014 Cost

NO.	ALTERNATIVE	TOTAL ESTIMATED COST	ESTIMATED EDUs SERVED	ESTIMATED COST PER EDU	SUMMARY OF ALTERNATIVE
1	Alternative No. 1	$ 665,000	641	$ 1,037	The EDUs served under this option are with the existing electrical service. By changing the electrical service to 3-phase and installing larger pumps, the estimated EDUs served may be increased to 850, which would allow for considerably more future development.
2	Alternative No. 2	199,000	420	474	This alternative would only serve full build-out of the existing Wickiup Junction area and the addition of the Cagle area.
3	Alternative No. 3	309,000	565	547	This alternative includes the conversion to 3-phase power in order to use larger pumps. The attenuation chamber is installed to allow for an additional 145 EDUs to be served.

EDU = Equivalent dwelling unit

EDU Totals:

Wickiup Area Currently Served	=	95 EDUs
Cagle Area EDUs	=	239 EDUs
West Area	=	86 EDUs
	Total	420 EDUs

(See Figure 1 for EDU areas.)

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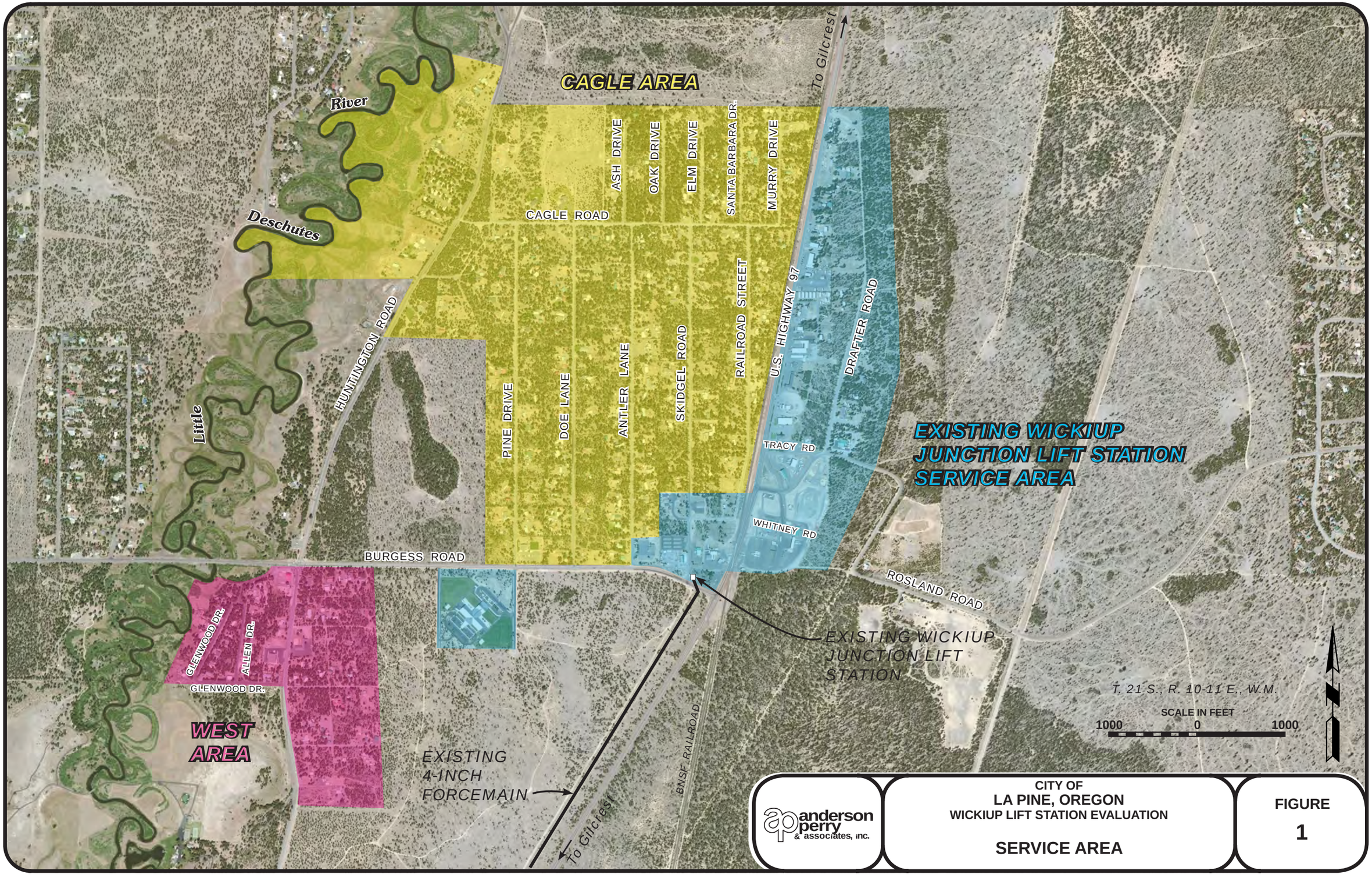
CITY OF
LA PINE, OREGON
WICKIUP LIFT STATION

ALTERNATIVE SUMMARY
YEAR 2014 COST

TABLE
4



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CITY OF
LA PINE, OREGON
WICKIUP LIFT STATION EVALUATION

SERVICE AREA

FIGURE
1

Job# 33-01-010 Jun. 9, 2014 lbauer