# City of Prineville

## DEPARTMENT OF PLANNING & COMMUNITY DEVELOPMENT

## CITY COUNCIL STAFF REPORT

| | |
|---|---|
| **Date:** | February 27th, 2018 |
| **File No.:** | AM-2017-100 |
| **Applicant/Owner:** | City of Prineville |
| **Location:** | Citywide |
| **Notice to DLCD:** | May 15, 2017 |
| **Newspaper Notice:** | Planning Commission Notice - June 9, 2017<br>City Council Notice – February 13, 2018 |
| **Public Hearing:** | Planning Commission - June 20, 2017<br>City Council – February 27, 2018 |
| **Staff:** | Phil Stenbeck, Planning Director |
| **Proposal:** | City of Prineville Water Master Plan update. |

At the City Engineer's request, the City Council directed the City Engineer to update the City's Water Master Plan last updated in 2000 (City Water Facility Plan). The City Engineer Eric Klann has worked with engineering consultants on developing the master plan, Anderson Perry & Associates, DOWL, and GSI Water Solutions and is receiving grant funding support from the Oregon Department of Land Conservation and Development (DLCD).

A number of staff to staff meetings have occurred and there have been several Technical Advisory Committee (TAC) meetings as shown below:

- February 28, 2017 - TAC meeting #1.
- March 28, 2017 - Staff to staff meeting.
- April 25, 2017 - TAC meeting #2.
- May 23, 2017 - TAC meeting #3.
- June 20, 2017 - Planning Commission public hearing (recommendation to the City Council).

The City wants to ensure that investment and development of water resources for households and businesses within Prineville are supported by master planning so as to achieve the goal of having a dependable City water system and supply.

The Draft Master Plan attached, outlines the City's existing water facilities/resources and updates the 2000 plan. SDC methodology based on this master plan will be reviewed and approved separate from this document. A Wastewater Master Plan update is also being processed at this time and will come before the Council in the near future. Staff recommends adoption of the plan as written.

# *City of*
# *Prineville, Oregon*
## WATER SYSTEM MASTER PLAN
*2017*

GSI Water Solutions, Inc.

DOWL

anderson perry & associates, inc.
engineering · surveying · natural resources

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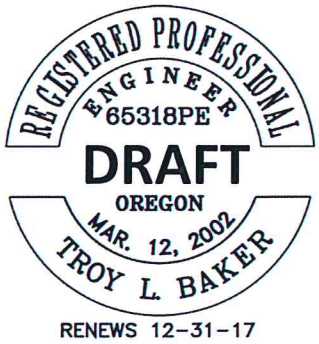
*Draft*

# WATER SYSTEM MASTER PLAN

# FOR

# CITY OF PRINEVILLE, OREGON

## 2017




The City of Prineville, Oregon, has reviewed this Water System Master Plan and adopted it.

**DRAFT** _____ _____

Signature and Title Date

ANDERSON PERRY & ASSOCIATES, INC.

Prineville, Oregon
La Grande, Oregon
Walla Walla, Washington



Job No. 1260-15

# Table of Contents

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# Chapter 1 - Introduction

## Purpose of Study

This Water System Master Plan (WSMP) is intended to provide current information on which future operation the City of Prineville's municipal water system can be based. This WSMP is also intended to satisfy the criteria of the Oregon Health Authority - Drinking Water Services (DWS) and Oregon Administrative Rule 333-061-0060. The City of Prineville's last WSMP was prepared in 2006. This WSMP is intended to fulfill the DWS requirements for a current master plan for the next 20 years. Preparation of this WSMP was authorized by an agreement between the City and Anderson Perry & Associates, Inc., dated September 1, 2016. The primary purposes for developing this WSMP were to establish water system design criteria for a 20-year planning period; evaluate the adequacy of the existing water supply, treatment, storage, and distribution systems; evaluate alternatives and priorities for improving the City's water system; and identify a financial plan for implementing the recommended improvements. This WSMP will also serve as the basis for developing a capital improvements plan based on the identified improvements and priorities.

## Organization of Study

This WSMP is divided into seven main chapters with an Executive Summary. Specifically, the WSMP includes the following:

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

B. Chapter 1, "Introduction," discusses the objectives of the WSMP, describes the community and environment, and provides a brief history of past development and operation of the City of Prineville's water system.

C. Chapter 2, "Water System Requirements," develops the data on which recommended improvements to the water system are based. Data relating to elements such as service area, population, land use, water use, fire flows, state and federal regulations, and the design criteria developed for this WSMP are presented. A description of the water quality and level of service goals (design criteria) for the water system considering existing and anticipated future regulatory requirements, non-regulatory water quality needs of water users, flow and pressure requirements, capacity needs related to water use, and fire flow needs is also provided.

D. Chapter 3, "Water Supply and Treatment," discusses the operation, capacity, and quality of the existing water supply and treatment systems with respect to existing and future system demands and regulations. Information concerning water rights and permits for the appropriation of water from various sources is presented. An evaluation of the existing water treatment system is also included, as well as alternatives to address current treatment system deficiencies. A comparison of alternatives to obtain additional water supply sources is also provided.

E. Chapter 4, "Water Storage," discusses the existing storage reservoirs, presents the four primary components of water storage relative to the City's design criteria, evaluates alternative storage facilities, and provides recommendations for storage improvements.

F. Chapter 5, "Distribution System," presents information related to the existing distribution system facilities, water quality test results, and fire protection information. Existing deficiencies and deficiencies likely to develop during the planning period are identified. Improvements including specific areas of piping, a water meter replacement program, and water conservation efforts are recommended.

G. Chapter 6, "Summary of Proposed Improvements and Capital Improvements Plan," presents information related to water supply, treatment, storage, and distribution system improvements developed through analysis of the system. Cost estimates are provided for each of the recommended water system improvements.

H. Chapter 7, "Project Financing and Implementation," provides a description of alternatives to finance water system improvements including local financing such as user rates, taxes, and financing assistance programs. Operation, maintenance, and replacement costs are projected for both the existing system and future system improvements. The number of residential, commercial, and industrial equivalent dwelling units is provided. Potential water rate needs are developed and rate implementation procedures are identified. A recommended water system improvement implementation process, including an evaluation of financing alternatives and identification of key implementation steps, is also provided.

I. The "Appendices" contain key materials referenced in this WSMP, which are provided for future reference by City staff. This information includes well log and water rights information, testing results, applicable ordinances, and other applicable water system information.

## Sources of Information

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

## Review and Updating of Study

This WSMP should be periodically reviewed and updated to stay current with population growth, water system demands, and changing state and federal regulations. This WSMP is recommended to be reviewed at 5-year intervals and be updated at 10-year intervals, or as growth dictates.

## Objectives of Study

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

1. Establish planning criteria including service area boundaries; population growth projections; past, present, and future water usage patterns; fire flow requirements; federal and state standards; system pressures; and service goals.

2. Analyze the individual components of the existing water supply system considering capacity, compliance with current water quality standards, water rights, condition of components, operational dependability, and cost of operation. Develop the water supply needs for the planning period and identify cost-effective alternatives for meeting long-term water supply and treatment needs including alternatives for correcting existing system deficiencies. Outline general operation and maintenance (O&M) requirements for the water supply system.

3. Analyze the existing water storage facilities considering capacity, condition of the reservoirs, and distribution system pressures. Assess the City's storage capacity considering emergency storage, operational storage, equalization storage, and fire flow storage. Identify the storage requirements of the water system for the planning period.

4. Develop a Geographic Information System-based map of the distribution system including line sizes, line types, valve and hydrant locations, etc., when known.

5. Utilizing existing distribution system maps, a computer model, and City records, review the condition and adequacy of the distribution system piping. Identify system deficiencies and alternatives for meeting current and future system needs. Provide estimated costs for implementation of recommended improvements. Outline general O&M requirements of the distribution system as well.

6. Analyze the hydraulic capacity and system pressures in the existing water distribution system under average daily and peak daily demand conditions using an existing computer model. Identify distribution system deficiencies such as low system pressures, low fire flow capacities, dead-end or undersized lines, etc. Identify opportunities for distribution system improvements to address any noted deficiencies.

7. Review the status of the existing Water Department financial condition considering historical water system revenues, O&M costs, and debt service including the adequacy of existing water user fees. Project the future cost of O&M, capital improvement investments, and debt service for the water system. Develop a finance plan for meeting the long-term system needs including general user rate charges and outside financial assistance.

8. 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.

9. Prepare a summary identifying current and future water system needs with their associated estimated cost. Make recommendations for meeting the water system needs for the planning period.

10. Provide an implementation schedule for recommended water system improvements outlining the key steps the City would need to undertake to implement the improvements.

## Regional Setting

The City of Prineville is located in central Oregon along the Crooked River, a major tributary of the Deschutes River that flows north into the Columbia River. The valley through which the river flows is bordered on the north by the slopes of the Ochoco Mountains and on the south by steep escarpments that rise to an extensive lava plateau south of the Prineville area. Location and vicinity maps and aerial photographs for the City are shown on Figures 1-1, 1-2A, and 1-2B. The City of Prineville is the County seat and the only incorporated city in Crook County, with a population of 9,253 at the 2010 Census. The 2015 estimated population for Prineville was 9,385, as estimated by the Population Research Center at Portland State University.

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

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

## Soils

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

## Location

The City of Prineville is located in central Oregon at the intersection of Highways 26 and 126, adjacent to the Crooked River in Crook County. The general location of the community is shown on Figure 1-1, Location and Vicinity Maps.

The area of analysis provided in this WSMP encompasses the entire area within the city limits and urban growth boundary (UGB), as shown on Figure 1-1.

## Water System History

### *General*

The majority of the historical information for the water system was obtained from City records; conversations with Eric Klann, Prineville City Engineer; the City's Water Management and Conservation Plan prepared in 2016 by GSI Water Solutions, Inc.; and the 2006 WSMP completed by Ace Consulting.

The City of Prineville owns and operates a municipal water system that obtains water from several wells distributed over the system. The water is then stored in ground-level storage reservoirs and distributed to residential, commercial, industrial, and public customers within the city limits and

approximately 120 residences outside the city limits but within the UGB. An estimated 421 residences exist within the city limits that are currently served by private wells and are not connected to the City's water system.

Historically, the City's water system was privately owned and operated by the Deschutes Power and Light Company until 1928 when it was acquired by Inland Power and Light Company and then resold to Pacific Power and Light in 1930. The City acquired the water system from Pacific Power and Light in January 1985. Approximately 10 percent of the water mains are 4-inch diameter and smaller, and some are galvanized steel pipe. Over the years, the City has replaced some undersized mains and installed new mains, additional wells, and storage tanks.

### *Previous Study*

The primary recommendations in the 2006 WSMP were to increase supply, storage, and distribution. These improvements included replacing existing undersized water mains and wood stave pipes, as well as developing several wells and constructing several tanks and a booster pump station. In response to the 2006 WSMP, the City constructed the 1 million gallon (MG) airport reservoir and four airport wells, and removed a significant amount of wood stave and undersized pipes.

### *Water Supply Sources*

Although the City holds surface water rights to the Crooked River, Prineville Reservoir, and Ochoco Creek, surface water is exclusively used for irrigation and livestock purposes. Municipal water for the City of Prineville is sourced from a total of 11 wells. Seven of the wells are located on the Prineville valley floor and appropriate water from an alluvial aquifer with a total reported production capacity of 1,440 gallons per minute (gpm). The other four wells are located west of the City and source water from the Airport Area Aquifer System with a reported production limit of 1,770 gpm. This aquifer is currently being monitored to determine its long-term reliability. All the wells in the system are controlled by telemetry with the exception of the Stearns Well, the 4th Street wells, and the Stadium Well, which are controlled manually. The well locations are shown on Figures 1-2A and 1-2B.

The Stearns Well is located off Highway 26. In January 1973, the well was drilled to a depth of 246 feet with a static water depth at 22.3 feet. A casing with diameters of 24 and 12 inches was installed to a depth of 225 and 226 feet, respectively, with cement grout from 32 to 75 feet. A stainless steel screen was installed from 226 to 246 feet. The materials observed during drilling included silty sand, clays, and gravel. An initial well test at the time of construction showed the well yield was 820 gpm with a 136-foot drawdown for 10 hours.

The 4th Street Deep Well is centrally located in the City approximately 525 feet from the intersection of S.E. Belknap Street and S.E. 4th Street. The well was drilled to a depth of 252 feet with a diameter of 12 inches. The static water level was measured to be 35 feet below ground surface (BGS) when the well was drilled on October 12, 1960. A stainless steel screen was installed from 222 to 242.5 feet. Casing was installed from the surface to 222 feet with diameters of 24 and 12 inches. Casing was also installed with a diameter of 12 inches from 242.5 feet to 252 feet. The materials observed during drilling included silty clay, silts, water-bearing sand, and gravel. An initial well test at the time of construction showed the well yield was 650 gpm with a 74-foot drawdown

after 12 hours. The well was rehabilitated in 2005, and the 50 horsepower (Hp) pump has a current capacity of 450 gpm.

The 4th Street Shallow Well is located adjacent to the 4th Street Deep Well. The well was drilled to a depth of 75 feet and cased to a depth of 61 feet. Construction was completed in August 1950. The aquifer was recorded to be gravel from 13 to 28 feet, and the well casing is perforated from 13 to 22 feet. Materials observed included clay, silt, gravel, and sand. The submersible pump has a rated capacity of 180 to 200 gpm. The well has not been utilized in recent history and is the City's backup source.

The Lamonta Well is located on Lamonta Road north of the City. Completed on September 4, 1957, the well was drilled to a depth of 256 feet with a diameter of 24 inches. Wire-wound screen was installed from 228 to 253 feet. The static water level is 17 feet BGS. An initial well test at the time of construction showed the well yield was 800 gpm with a 200-foot drawdown after 1 hour. Materials observed in the well included sand, sandstone, surface water, clay, sandy silt, sticky shale, and gravel. The 50 Hp turbine pump currently produces an average of 250 gpm with a rated capacity of 450 gpm.

Only well records exist for the Yancey Well, which is located north of Highway 26 on N.W. Fairmont Street. The well was drilled in 1917 to a depth of 228 feet and was later reconstructed in 1975. The well has an 8-inch casing to a depth of 239 feet. The static water level was recorded to be 16.2 feet BGS on October 26, 1944. The 40 Hp turbine pump has a capacity of 360 gpm. During a well pump test, the drawdown was reported to be 96 feet after 20 hours of pumping at 360 gpm. The current capacity averages 210 gpm.

The Stadium Well is located on 5th Street adjacent to the high school track and stadium. Construction was completed in February 1987, and the well was drilled to a depth of 259 feet. At the time of drilling, the static water level was found to be 31 feet BGS. The well is cased with a 12- and 10-inch diameter welded steel liner from 3.5 feet to 228 feet and 218 to 259 feet, respectively. Materials observed during drilling include clay, gravel, and sand. The 40 Hp turbine pump has a limited capacity of 240 gpm with significant drawdown. A filter has been installed in the well due to sand and iron problems. This well is utilized manually as a backup for emergencies and only used for short periods of time.

The Barney Well is located close to the Barnes Butte Reservoir Tank and Stearns Well on the east side of the City. Construction was completed in December 1994, and the well was drilled to a depth of 280 feet. The static water level was found to be 35 feet BGS at the time of drilling. During initial well tests, the yield was 700 gpm for 1 hour with a drawdown of 110 feet. Materials observed during drilling include gravel, clay, and coarse sand. The 75 Hp American Turbine pump, installed in 1999, has a rated capacity of 600 gpm. The well was rehabilitated in 2002.

The Ochoco Heights Well is located adjacent to the Ochoco Heights Tanks north of the City off Main Street. The well is currently inoperable. Presently, no well pump is installed, but there is a possibility of utilizing this well for monitoring if another well is constructed in the vicinity. The well was drilled to a depth of 1,002 feet and was cased to roughly 300 feet. Construction was completed in 1943 and, at that time, the water level was observed to be 52 feet BGS.

There are four airport wells, each of which is located southwest of the City neighboring the Prineville Airport. These wells appropriate water from a separate aquifer than the wells located in the

Prineville valley. The aquifer is still being monitored to determine whether the aquifer is a reliable source of water. The wells were drilled between 1980 and 2014. From information available from the well logs, the static water level appears to be deep at roughly 415 feet BGS.

### *Water Storage Reservoirs*

The City of Prineville has six aboveground covered water storage reservoirs. The total capacity of the reservoirs is 4.5 MG.

The Ochoco Heights reservoirs are identical and are located north of town. Ochoco Heights Reservoir No. 1 was constructed in 1955. The reservoir is an aboveground welded steel tank with a diameter of 41.5 feet and a height of 50 feet. The second reservoir, Ochoco Heights Reservoir No. 2, was built in 1964 directly adjacent to Reservoir No. 1 with the same material and dimensions. The Ochoco reservoirs are filled by the wells located on the valley floor. The reservoirs feed the Ochoco Heights Booster Pump Station, which feeds the Ochoco Heights pressure zone, the Valley pressure zone, and the American Pine Reservoir.

The American Pine Reservoir is located north of the Ochoco Heights reservoirs south of Peters Road. Constructed in 2002, this reservoir is an aboveground welded steel reservoir. The reservoir has a diameter of 73 feet and a height of 33 feet. The reservoir is fed by an altitude valve and provides water to the Northridge pressure zone, discussed further in Chapter 5.

The Barnes Butte Reservoir is located near the Barney and Stearns Wells north of Highway 26. The welded steel aboveground reservoir was constructed in 1978. The reservoir is 40 feet tall with a diameter of 47 feet. Because the City was unable to attain the property for a proposed Yellowpine Tank at the north end of Northridge area, the City elected to construct this reservoir with a booster pump station to provide water to the Northridge area.

The Airport No. 1 Reservoir is an aboveground bolted steel tank with a diameter of 85 feet and a wall height of 24 feet with an operating range of 22.5 to 23.8 feet. The Airport No. 2 Reservoir is an 80-foot diameter welded steel tank adjacent to the Airport No. 1 Reservoir. The operating range is set to match the Airport No. 1 tank.

The City's water sources are the alluvial aquifer beneath the Prineville valley floor and the Airport Area Aquifer System. The water is pumped from 11 groundwater wells into the distribution system to fill six aboveground reservoirs. Table 1-1 provides a summary of these reservoirs.

**TABLE 1-1**
**SUMMARY OF SYSTEM RESERVOIRS**

| Reservoir | Volume (MG) | Base Elevation (feet)* | Overflow Elevation (feet)* | Height (feet) | Completion Date |
|---|---|---|---|---|---|
| Ochoco Heights Reservoir No. 1 | 0.5 | 2,937 | 2,987 | 50 | 1955 |
| Ochoco Heights Reservoir No. 2 | 0.5 | 2,937 | 2,987 | 50 | 1964 |
| American Pine Reservoir | 1.0 | 2,951 | 2,984 | 33 | 2002 |
| Barnes Butte Reservoir | 0.5 | 3,064 | 3,104 | 40 | 1978 |
| Airport No. 1 Reservoir | 1.0 | 3,380 | 3,404 | 24 | 1996 |
| Airport No. 2 Reservoir | 1.0 | 3,378 | 3,404 | 26 | 2014 |
| **Total** | **4.5** | | | | |

** Elevations are based on the North American Vertical Datum 88 vertical datum.*

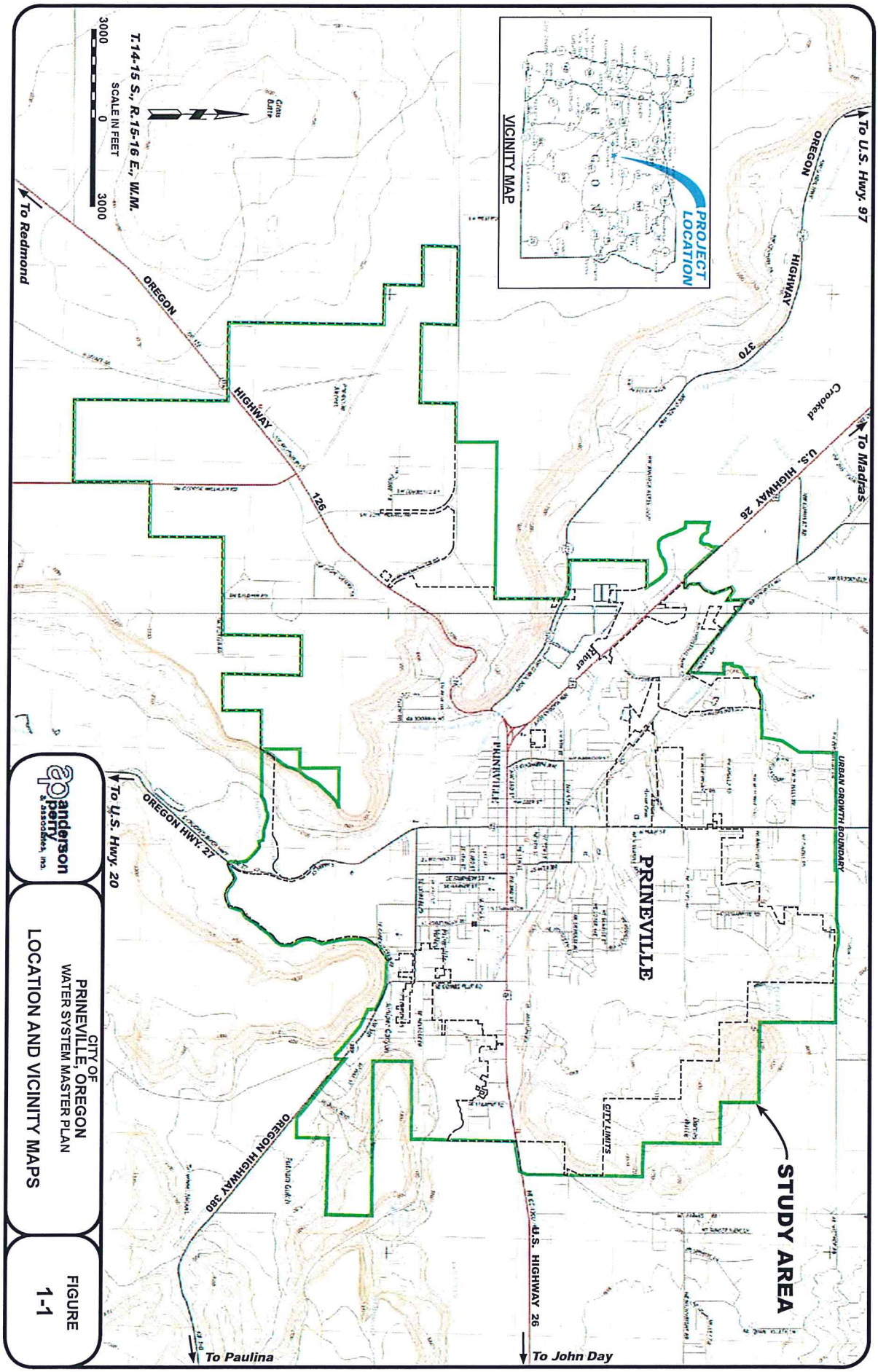
## *Distribution System*

The City's water distribution system consists of an assortment of pipe materials including asbestos cement, cast iron, ductile iron, steel, wood stave, and polyvinyl chloride pipe. Pipelines range in size from 1 inch to 18 inches in diameter. Table 1-2 provides a breakdown of the City's pipelines by pipe diameter. The City's distribution system main lines are primarily 6 to 12 inches in diameter, although there are also areas with smaller lines. However, distribution system improvements have been made in recent years to improve flow and pressure in the system. The distribution system is generally laid out with looped piping to assist with water circulation through the system. The City has indicated the water main lines in the distribution system are generally in fair condition. The distribution system is discussed in more detail in Chapter 5.

**TABLE 1-2**
**SUMMARY OF SYSTEM PIPELINES**

| Pipe Diameter (inches) | Total Length (feet) | Total Length (miles) | Percent of Total Pipeline |
|---|---|---|---|
| 2 or Less | 14,677 | 2.8 | 4 |
| 3 | 1,385 | 0.3 | 1 |
| 4 | 19,147 | 3.6 | 5 |
| 6 | 64,067 | 12.1 | 17 |
| 8 | 150,135 | 28.4 | 40 |
| 10 | 15,667 | 3.0 | 4 |
| 12 | 86,160 | 16.3 | 23 |
| 16 | 17,492 | 3.3 | 5 |
| 18 | 3,350 | 0.6 | 1 |
| **Total** | **372,080** | **70.4** | **100** |

Job# 1260-15-020 Nov. 11, 2016 lbauer

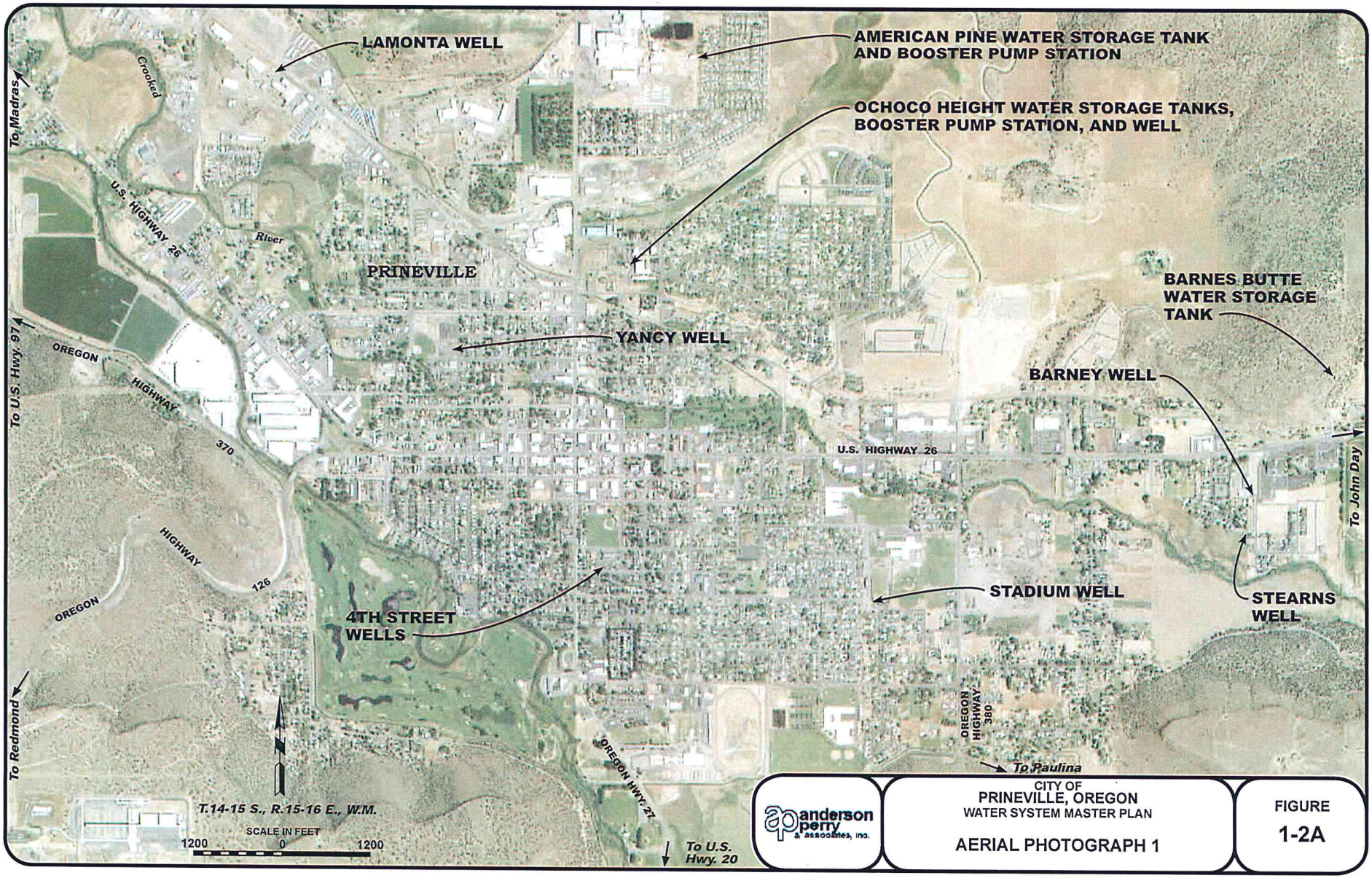



CITY OF PRINEVILLE, OREGON
WATER SYSTEM MASTER PLAN

LOCATION AND VICINITY MAPS

FIGURE 1-1

(23)

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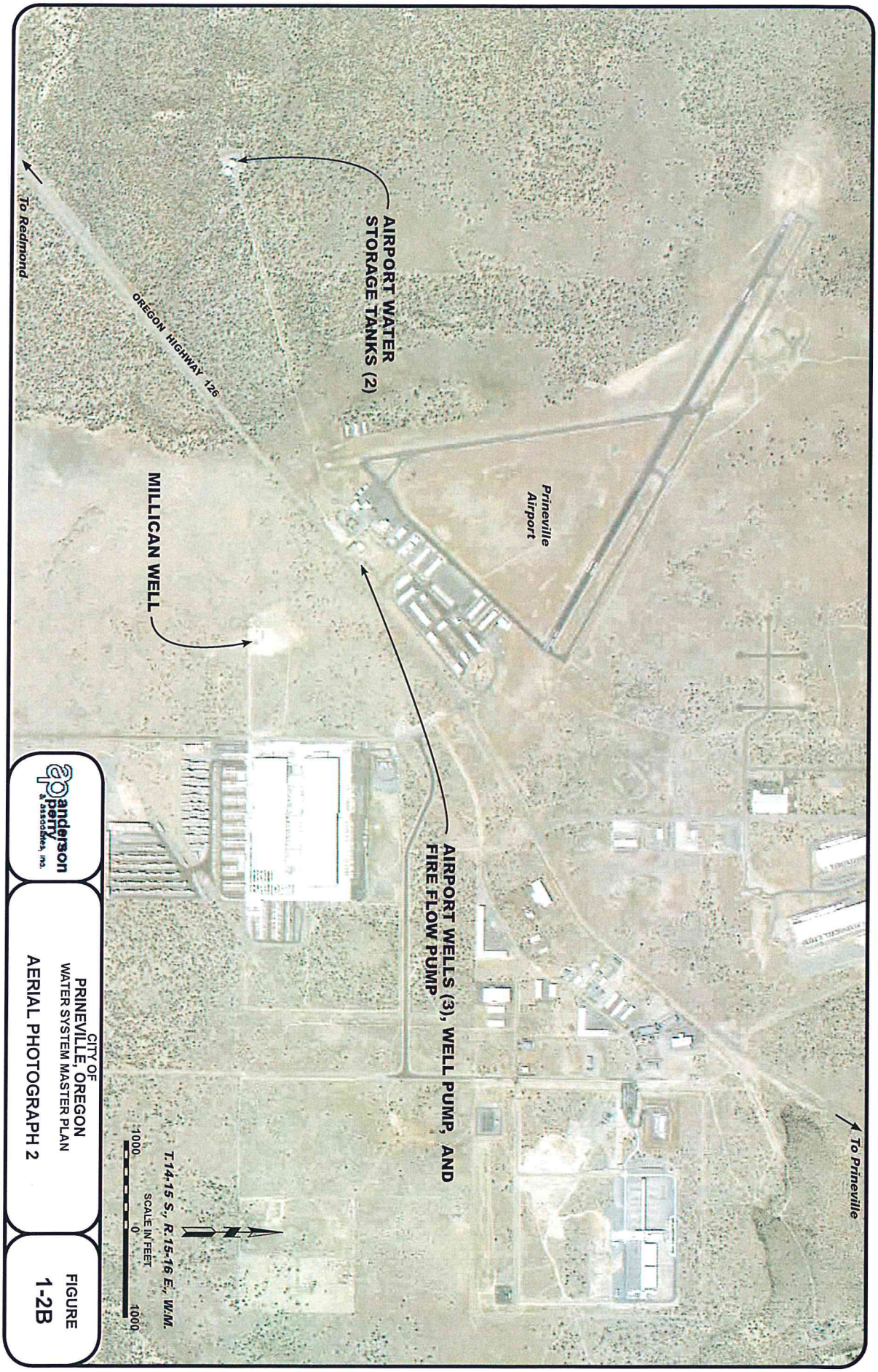


CITY OF PRINEVILLE, OREGON
WATER SYSTEM MASTER PLAN

AERIAL PHOTOGRAPH 2

FIGURE 1-2B

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