



City of *Sisters, Oregon*

WATER SYSTEM MASTER PLAN UPDATE

2023



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WATER SYSTEM MASTER PLAN UPDATE

FOR

CITY OF SISTERS, OREGON

NOVEMBER 2023



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ANDERSON PERRY & ASSOCIATES, INC.

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

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Acknowledgments

Anderson Perry & Associates, Inc., thanks the City of Sisters for the opportunity to provide this Water System Master Plan (WSMP) Update and especially wishes to thank City staff, City engineers, and the Public Works Advisory Committee who provided key information and guidance in the preparation of this WSMP Update.

Executive Summary

Introduction

This Executive Summary briefly summarizes the Water System Master Plan (WSMP) Update prepared by Anderson Perry & Associates, Inc., for the City of Sisters, Oregon. The recommendations outlined hereafter have been developed in cooperation with the City of Sisters' Public Works Department and direction from the Public Works Advisory Committee. This WSMP Update focuses on the City's water system components, including the water supply, treatment, storage, and distribution systems. This WSMP Update includes an analysis of the existing systems and their performance, an evaluation of system needs and improvement alternatives, and a summary of the City's current Water Department financial status and potential funding opportunities for improvements. Included in this Executive Summary is a brief discussion of the population, design criteria, evaluation and needs of water system components, categories of improvements and summary of costs, and potential action items related to this WSMP Update. For more detailed discussions of the information presented in this Executive Summary, refer to the individual chapters of this WSMP Update.

Objectives of this Water System Master Plan Update

The primary objectives of this WSMP Update are to accomplish the following:

1. Establish planning criteria.
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. Potential water supply system improvements to meet the planning criteria are identified.
3. Analyze the existing water storage facilities considering capacity, condition of reservoirs, and distribution system pressures. Potential reservoir improvements to meet the planning criteria are identified.
4. Update the existing water model, identify distribution system deficiencies and alternatives for meeting current and future water system needs. Provide an updated map of the City's existing distribution system based on the updated water model.
6. Prepare a summary of current and future water system needs, as well as recommended improvements with associated estimated costs and layout schematics. Estimated costs are presented with a prioritized Capital Improvements Plan (CIP).

Population

To estimate future water system demands, historical water use as a function of the population is determined, then projected into the future based on forecasted populations. The City of Sisters' 2020 Census population of 3,220 was used as the base year population for which per capita water use demands were developed for this WSMP Update.

Population projections for this WSMP Update are based on the proposed population forecasts prepared by the Population Research Center at Portland State University, dated June 30, 2022, through the planning year 2042, resulting in a population within the city limits of 6,917 by 2042. Chapter 2 of this WSMP Update presents more information on historic and projected populations for the City of Sisters.

Design Criteria

When establishing design standards for a water system, primary consideration must be given to state and federal rules and regulations governing water quality and construction standards for water systems. These regulations are set by both the U.S. Environmental Protection Agency (EPA) and Oregon Health Authority - Drinking Water Services (DWS). In addition to these public health and safety requirements, many other factors control the design parameters for municipal water systems, as discussed in Chapter 2.

Chapter 2 summarizes the water system design criteria for evaluating the existing water system and developing improvements to satisfy present and future needs for each. Application of these criteria is discussed further in the specific chapters that address the water supply, treatment, storage, and distribution system facilities.

Existing Water System

The City of Sisters utilizes water drawn from four volcanic and sedimentary rock aquifer supply wells to supply the City with water. The wells are referred to as Wells No. 1, 2, 3, and 4 and were built in 1975, 1991, 2007, and 2021, respectively. The need for Well No. 4 was identified in the City's 2017 Water Capital Facilities Plan to accommodate continuing growth. Existing source capacities are adequate to supply projected water demands through most of the planning period.

The City currently holds groundwater rights allowing up to 9.27 cubic feet per second (cfs) (4,161 gallons per minute [gpm]) to be withdrawn from City wells. The City currently holds surface water rights allowing up to 5.65 cfs (2,536 gpm) to be withdrawn from Pole Creek and Whychus Creek. However, due to the high cost of water treatment requirements and low summer streamflow in Whychus Creek, the City is unlikely to use surface water for future municipal use. The City's existing water rights are adequate to supply projected water demands through the planning period.

Well water is disinfected with chlorine at each source. Well No. 1 is disinfected with chlorine gas; all other wells are disinfected with sodium hypochlorite produced with on-site generation systems.

Currently, the City has one operating water storage reservoir, built in 1995, with a total available storage volume of 1.6 million gallons (MG). The existing reservoir is located approximately 1.8 miles outside of city limits at an elevation sufficient to provide adequate water delivery pressures without booster pump stations. The reservoir is adequately sized to provide the City's existing operational, equalization, and fire demand design storage volumes with additional reserve volume. To accommodate the City's projected growth, it is recommended additional storage be constructed within the planning period.

The City's distribution system consists of a piping network that provides water and system pressure to the City's users. The City has more than 200,000 feet of piping in its distribution system. The distribution system piping consists of asbestos cement (AC), polyvinyl chloride (PVC), high density polyethylene, cast iron, ductile iron (DI), galvanized steel, and carbon steel piping. Much of the original steel and AC distribution piping has been replaced over time. As of November 2022, approximately 90 percent of the

existing system consists of C900 PVC pipe. Piping within the distribution system generally ranges from 4- to 16-inch diameter, with the majority being 4-, 6-, 8-, 10-, and 12-inch diameter.

Water Quality Requirements

The City of Sisters' water system comes under the jurisdiction of the DWS. The DWS assumed primacy (responsibility) from the EPA in February 1986 for enforcement of the federal Safe Drinking Water Act. Therefore, the City works primarily with the DWS as the regulating agency with regard to their water system. The City has not received any regulatory violations from the DWS in the last five years.

The Deschutes County Environmental Health Division conducts water system sanitary surveys of communities on behalf of the DWS to assist with identifying potential contamination sources that may impact water quality. These surveys are generally scheduled to occur every three to five years.

The City of Sisters' latest sanitary survey was conducted on July 26, 2022. The only noted deficiency was a gap between the steel plate and the concrete pedestal on Well No. 1. The City has corrected this deficiency and reported the correction to the Deschutes County environmental specialist.

In summary, many regulations affect operation of the City of Sisters' water system. The City of Sisters has good water quality with an efficient well-maintained water system meeting federal and state water quality criteria.

Deficiencies

The City's water supply, treatment, storage, and distribution systems are generally in good condition, are operated efficiently, and have adequate capacity to meet current water demands and supply the City with good quality drinking water. Most existing deficiencies are due to aging infrastructure and do not pose critical risks. Certain systems will become deficient in capacity as demand increases with growth. Additional facilities and upsizing of transmission lines will be needed to accommodate such growth. Existing and future water system deficiencies are outlined hereafter.

Supply and Treatment

- Current water source capacity will not meet projected future demands under well operational design conditions developed during the preparation of this WSMP Update. Through discussions with City staff, the well operational design conditions assume the largest producing source is offline (maintenance, contamination, etc.) and the remaining sources are limited to a maximum operating time of 21 hours per day. Under these conditions, it is estimated that the City's maximum daily demand (MDD) will exceed the available supply capacity when the population reaches approximately 4,500 (near year 2028) and the existing source capacity would be approximately 2.1 million gallons per day below the system's MDD in year 2042. The need for additional source capacity is dependent on the storage reservoir's ability to make up the difference between the MDD and the available source capacity.
- The Well No. 1 mechanical building is approaching its useful service life. The building is also undersized to accommodate the on-site chlorination system, electrical equipment, and controls.

Storage

- Through discussions with the City, it was decided that storage facilities should be capable of providing all necessary operational needs and have a remaining emergency reserve storage of at least one day's storage of average daily demand (ADD). Under these parameters, the year 2022 storage is deficient by approximately 40,000 gallons, and this shortage would be exacerbated with continuing growth throughout the planning period.

Distribution

- A single 12-inch AC transmission line conveys water to and from the reservoir to a location referred to as Whychus Creek junction. The AC transmission line was constructed in the 1960s and is reaching the end of its service life. Since construction, nearby trees have grown to an extent that could potentially cause damage to the line should they fall. No redundancy in the transmission lines exists to maintain reservoir operation if this section of line is damaged or removed from service for another reason.
- The existing distribution system cannot adequately provide the planning year's projected peak hourly flow or recommended fire flow while maintaining a minimum residual system pressure of 20 pounds per square inch at all points of delivery.

Summary of Existing Water Supply and Treatment, Storage, and Distribution System Recommended Improvements

Supply and Treatment

To address potential water supply capacity deficiencies expected to arise toward the end of the planning period, it is recommended that the City develop a new source, increase the capacity of either Well No. 1 or 2, or do both. Assuming the City constructs additional storage (discussed further below and in Chapter 4) and assuming the largest producing source was offline, the City would need to construct and bring online a new source or increase the capacity of an existing source by year 2035. To exercise the City's full permitted withdrawal rate by either developing a new source or increasing the capacity of the existing sources, either a permanent water rights transfer or permit amendment from the Oregon Water Resources Department would be needed. A new permit to use groundwater could also be applied for to increase the total permitted groundwater withdrawal rate.

To add redundancy and operational flexibility to the system, it is recommended that the City install a variable frequency drive (VFD) and standby power to Well No. 3. This will reduce the chance of the City relying on only three of four sources during utility interruptions and will add the ability to run Well No. 3 based on a distribution set point pressure.

To maintain Well No. 1 in good working order and convert from gas chlorination to on-site generation of sodium hypochlorite, it is recommended the City construct a new Well No. 1 mechanical building. This will provide adequate space to install new electrical, instrumentation, and controls; install a new on-site sodium hypochlorite generator system; resolve aging infrastructure deficiencies; and reduce operation and maintenance costs and safety concerns associated with the existing chlorine gas disinfection system.

Storage

Based on findings of this WSMP Update and discussions with City staff, constructing an additional 2.2 MG of storage is recommended. This volume was determined based on design criteria for the planning year 2042. Based on lifecycle costs and resilience to seismic activity, the preferred type of reservoir is a prestressed concrete tank. The location of the new reservoir will be adjacent to the existing reservoir for ease of connection to the existing system and pre-arranged agreement with the U.S. Forest Service for the proposed land use. The reservoir should be constructed at the same elevation as the existing tank to allow a hydraulic connection without additional control mechanisms. The City currently has an emergency reserve capacity of 1,034,500 gallons, which is less than the current year's ADD. Based on current population forecasts and assuming no additional storage is constructed, the City's entire volume of storage will be utilized in approximately year 2035 with no remaining emergency reserve available at that time. To maintain the recommended emergency reserve, the new reservoir should be constructed as soon as reasonably possible.

Distribution

High Priority Improvements

1. Install a new 16-inch PVC transmission line from the existing reservoir to the city limits near the middle and high schools on Edgington Road.
2. Install a new 16-inch DI transmission line from the existing reservoir to the Whychus Creek junction.

Medium Priority Improvements

1. Replace existing AC distribution mains in the Edge O The Pines subdivision.
2. Install a new 12-inch PVC water main on Camp Polk Road Extension from East Barclay Drive to Sun Ranch Drive.
3. Install a new 12-inch DI transmission line from the Whychus Creek junction to the city limits and replace the existing 12-inch AC water main from East Tye Drive to East Hood Avenue with new 12-inch PVC pipe.
4. Install a new 12-inch PVC distribution main along the city limits from East Desperado Trail to Creekside Drive.
5. Reconnect existing Hood Avenue South Alley water services with new taps, lines, meter assemblies, and valve boxes from either West Hood Avenue or West Washington Avenue.

Long-Term/Future Development Improvements

No other long-term development improvements are needed. An ongoing meter replacement program to replace aging service meters should be implemented on an annual basis.

To meet the objectives of this WSMP Update, address identified deficiencies, and support growth and development in the City, recommended water system improvements have been identified and are summarized on Table ES-1.

**TABLE ES-1
 RECOMMENDED WATER SYSTEM IMPROVEMENTS PROJECTS, IMPLEMENTATION TIME FRAME, AND
 TOTAL ESTIMATED PROJECT COST¹**

Implementation Priority	Chapter	Improvement Type	Recommended Improvement	Total Estimated Project Cost and Implementation Time Frame (2023 Dollars)		
				2023 to 2027	2027 to 2032	2032 to 2042
1	3	Supply	Install VFD and backup power at Well No. 3.	\$372,000		
2	3	Supply, Treatment	Rebuild the Well No. 1 pump station building and install a new on-site generation system.	\$808,000		
3	4	Storage	Construct new 2.2 MG water storage tank and rehabilitate the existing 1.6 MG water storage tank.	\$6,283,000		
4	5	Distribution	Install a new 16-inch PVC transmission line on Edgington Road from the existing reservoir to city limits near the middle and high schools.	\$3,635,000		
5	5	Distribution	Install a new 16-inch DI transmission line from the existing reservoir to Whychus Creek junction.	\$1,466,000		
6	5	Distribution	Replace existing AC distribution mains in the Edge O The Pines subdivision.		\$1,567,000	
7	5	Distribution	Install new 12-inch PVC water main on Camp Polk Road Extension from East Barclay Drive to East Sun Ranch Drive.		\$319,000	
8	5	Distribution	Install a new 12-inch DI transmission line from the Whychus Creek junction to East Tye Drive and replace the existing 12-inch AC water main from East Tye Drive to East Hood Avenue with new 12-inch PVC pipe.		\$2,504,000	
9	5	Distribution	Install new 12-inch PVC main from East Desperado Trail to Creekside Drive.		\$654,000	

Implementation Priority	Chapter	Improvement Type	Recommended Improvement	Total Estimated Project Cost and Implementation Time Frame (2023 Dollars)		
				2023 to 2027	2027 to 2032	2032 to 2042
10	5	Distribution	Reconnect existing Hood Avenue South Alley water services with new taps, lines, meter assemblies, and meter boxes from either West Hood Avenue or West Washington Avenue.		\$103,000	
11	3	Supply	Construct new Well No. 5 and transmission line.			\$2,102,000
Annually	5	Distribution	Ongoing water service meter replacement.	50 per year at \$400 each = \$20,000 per year	50 per year at \$400 each = \$20,000 per year	50 per year at \$400 each = \$20,000 per year
TOTALS				\$12.6 M	\$5.2 M	\$2.1 M
TOTAL RECOMMENDED IMPROVEMENTS COST (2023 Dollars)						\$19.9 M
YEARS 2023 THROUGH 2042						

¹All costs shown are in 2023 dollars. Estimated project costs were prepared using methodology established by the City and City Engineers with reference to pre-pandemic itemized bids inflated by 4.5 percent from the referenced project bid date to year 2023. Total estimated project costs must be re-evaluated prior to the implementation time frame to account for inflation, supply chain cost escalations, contractor availability, and general market volatility. Due to the recent volatility of the market and supply chain shortages, actual costs may vary significantly.

M = million

Action Items and Implementation Schedule

To move forward with completing the water system improvements summarized in this WSMP Update, the following action items are recommended.

Action Item

The City will need to:

- Submit and obtain approval of this WSMP Update from the DWS.
- Finalize and adopt this WSMP Update and the recommended improvements once agencies review and approve the draft WSMP Update.
- Review and update its comprehensive plan to incorporate the findings of this WSMP Update.
- Inform the Public Works Advisory Board of the need for and scope of the improvements projects, to answer questions, and to explain the need for potential increases in user fees.
- Develop a funding plan for the desired improvements during the time frames indicated in the CIP (see Chapter 7).
- Develop the required permitting (e.g., boring under highways, river crossings, etc.)

- Prepare funding applications, as applicable, for the associated water system improvements projects and submit them to the appropriate funding agencies.

Recommended Improvements Summary Implementation Plan

To implement the recommended improvements, the City will need to secure monies to fund these improvements, while working closely with its citizens to inform them of the water system needs and the necessity for increased water user rates.

Water system improvements as outlined in this WSMP Update are intended to provide the City with a reliable, quality water system that will meet the needs of the City for the 20-year planning period and beyond. As development occurs, water system improvements will help the City meet these needs. With the CIP approach, projects will be implemented in a manner that distributes the use of funds throughout the 20-year period and prioritizes projects necessary to maintain adequate supply, treatment, storage, and distribution as the population grows.

Chapter 1 - Introduction

Purpose of Plan

This Water System Master Plan (WSMP) Update presents the results of a water system planning effort intended to provide information from which continued and future operation and future improvements to the City of Sisters' municipal water system can be based. This WSMP Update is intended to satisfy the criteria of the Oregon Health Authority - Drinking Water Services (DWS) and Oregon Administrative Rules 333-061-0060 and provide the City with a projected plan to meet water system needs for the next 20 years. The purpose of this WSMP Update is to develop water system design criteria for a 20-year planning period; evaluate the adequacy of the existing water supply, storage, and distribution systems; identify any deficiencies or operational issues in the existing water system; evaluate alternatives for improving the City's water system; and provide a summary of the current Water Department financial status and potential funding programs for improvement implementation.

Organization of this Water System Master Plan Update

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

- A. An Executive Summary of the overall WSMP Update that describes water quality and service goals (design criteria), present and future water system deficiencies, the Engineer's recommended alternatives for achieving the goals and correcting the deficiencies, and the recommended implementation plan for funding, designing, and constructing improvements.
- B. Chapter 1, "Introduction," discusses the objectives of the WSMP Update, describes the community and environment, and provides an overview of the City's existing water system.
- C. Chapter 2, "Water System Requirements," presents the data upon which recommended improvements to the water system are based. Data relating to current and 20-year elements such as service area, population, land use, water use, fire flows, state and federal regulations, and the design criteria developed for this WSMP Update are presented. Included in this section are additional design criteria associated with providing service to future commercial/industrial customers with higher than typical water demands. 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 are also provided.
- D. Chapter 3, "Water Supply and Treatment," discusses the operation and capacity 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. Potential alternatives to further develop the City's water supply system are also presented.
- E. Chapter 4, "Water Storage," discusses the existing storage reservoir, presents the four primary components of water storage relative to the City's design criteria, discusses alternative types of 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 flow information. Results from computer modeling of the water system are presented. Existing deficiencies and deficiencies likely to develop during the planning period are identified. Improvements are presented to address both existing and future anticipated limitations of the distribution system.
- G. Chapter 6, “Recommended System Improvements and Improvements Prioritization,” presents information related to water supply, storage, and distribution system improvements developed through analysis of the system. Recommended improvements are prioritized for inclusion in a Capital Improvements Plan with identified time frames for implementation. Cost estimates are presented for the high priority water system improvements.
- H. Chapter 7, “Current Financial Status and Project Financing,” provides a summary of the Water Department financial status and a description of alternatives to finance water system improvements, including local financing such as user rates and financing assistance programs.
- I. The “Appendices” contain key materials referenced in this WSMP Update, which are provided for reference by City staff. This information includes water rights information and other applicable water system information.

Sources of Information

The conclusions and recommendations outlined in this WSMP Update are based on data, information, and records provided by the City’s Public Works Department and City Engineer. This information includes, in part, past flow records (supply and usage), 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 in part on the completeness and accuracy of the information provided.

Previous plans, studies, databases, and standards for the City’s water system have been referenced with the development of this WSMP Update. These items include:

- 2017 Water Capital Facilities Plan Update (Becon Civil Engineering and Land Surveying)
- 2017 Water Management and Conservation Plan (GSI Water Solutions, Inc.)
- 2017 Public Protection Classification Summary Report (Insurance Services Office, Inc.)
- 2021 City of Sisters’ Water System GIS Database

Review and Updating of Water System Master Plan

This WSMP Update should be periodically reviewed and updated to stay current with population growth, water system demands, and changing state and federal regulations. The DWS requires WSMPs be updated every 20 years. However, due to the City’s projected growth over the next five to ten years, it is recommended this WSMP Update be reviewed at five-year intervals and be updated at ten-year intervals, or as growth dictates.

Objectives of this Water System Master Plan Update

The primary objectives of this WSMP Update are to accomplish the following:

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 and treatment systems 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 alternatives for meeting long-term water supply needs including alternatives for correcting existing system deficiencies. Evaluate the historic performance of the City's wells and the City's ability to maintain capacity and develop additional capacity. Evaluate water supply development/improvement options and associated capital and operation and maintenance costs.
3. Analyze the existing water storage facilities considering capacity, condition of the reservoir, and distribution system pressures. Assess the City's storage capacity considering operational storage, equalization storage, fire reserve storage, and emergency storage. Identify the storage requirements of the water system for the planning period. Evaluate water storage development/improvement options and associated costs.
4. Utilizing existing distribution system maps, GIS mapping, and City records, update the existing water model to depict current conditions and present future improvement options. Identify distribution system deficiencies and alternatives for meeting current and future system needs. Provide estimated costs for implementing recommended high priority improvements. Prepare proposed water distribution improvement figures or maps.
5. Prepare a summary of current and future water system needs as well as develop a Capital Improvements Plan with recommended improvements with associated estimated costs and layout schematics. Recommendations will be made for meeting the water system needs for the planning period, and an implementation schedule will be developed to outline a phased, prioritized plan to address any recommended system improvements to be implemented over the next ten years.
6. Provide a summary of the existing Water Department financial condition noted in previous studies completed for the City. Information is also provided about potential state and federal grant and loan programs that may be available to assist the City in implementing any identified water system improvements.

Regional Setting

The City of Sisters lies in the northwestern portion of Deschutes County, Oregon, east of the Cascade Range. Whychus Creek runs through the southeast corner of the City, flowing from southwest to northeast.

Topography

The County generally slopes northeast, with major drainages flowing east and northeast. Whychus Creek, which runs through the southeastern section of the City, flows northeast to the confluence with the Deschutes River. Elevations rise heading west toward the Cascade Range. The elevation of the City of Sisters ranges from approximately 3,150 to 3,225 feet above mean sea level.

Weather Conditions

In the Sisters' area, summers are typically dry with clear days. Winters bring rain, snow, and frozen soils. Temperatures vary from an average high temperature in summer of 84.3° Fahrenheit (F) to an average low temperature in winter of 21.1°F. According to data compiled by the Western Regional Climate Center, the annual average precipitation is approximately 13.62 inches per year. Santiam Pass, located approximately 17 miles northwest of the City in the Cascade Range, receives an average of approximately 85 inches of precipitation per year. The variation in precipitation from the Cascade Range to the City is due to a rain shadow effect.

Transportation

U.S. Route 20 and Oregon Route 126 merge in Sisters to form Cascade Avenue, the main thoroughfare through the city center. The two highways split east of Sisters, with Oregon Route 126 heading to Redmond and U.S. Route 20 heading to Bend. West of Sisters, Oregon Route 242 splits off the combined Oregon Route 126 and U.S. Route 20.

Location and Study Area

The City of Sisters is situated at the convergence of U.S. Route 20 and Oregon Route 126 and bordered on the west by the lower eastern slopes of the Cascade Range. Surrounding communities to the east include Bend and Redmond, Oregon. The location of the community and layout of the City relative to surrounding physical features are shown on Figure 1-1.

The study area for this WSMP Update encompasses the entire area within the Sisters' city limits. The city limits and UGB are also shown on Figure 1-1.

Soils

The City's soils are generally composed of a sandy loam. Based on a Natural Resources Conservation Service soil survey, most of the soils in and around the City fall into three categories: 85A-Lundgren sandy loam, 47A-Ermabell loamy fine sand, and 157C-Wanoga-Fremkle-Rock outcrop complex. These soils slowly convey runoff and have a slight risk of erosion. All three soil types are well drained and are not prone to flooding following precipitation.

Waterways and Wetlands

Whychus Creek is the largest perennial stream in the surrounding area, flowing from southwest to northeast through the southeast region of Sisters. Most of the developed areas of the City lie outside the Whychus Creek 100-year floodplain, with only a few structures located near the floodplain. Well No. 1 is located outside the 100-year floodplain as shown on the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map panel, but the ground surface elevations at the well are very near 100-year flood levels reported by FEMA.

Irrigation pipes, canals, and ditches in the Sisters area route surface water to surrounding agricultural fields. These irrigation conveyance systems are primarily served by Whychus Creek, although many are currently not used, as many surface water rights in the region have been transferred to in-stream leases.

Multiple wetlands exist in and around the City, primarily within the riparian zone of Whychus Creek. A few other wetlands are mapped on Deschutes County's National, Local, and State Wetland Inventory mapper, including multiple intermittent streams and manmade ponds. These appear to have very little or no flow for most of the year.

Existing Water System

Overview

The City of Sisters' water system generally serves the area within its city limits. The City also provides water to a Sisters-Camp Sherman Fire District training facility. Existing water facilities include four volcanic and sedimentary rock aquifer supply wells and associated pump stations, one water storage reservoir, and water distribution piping. The water storage reservoir is located outside city limits at a higher elevation. Three of the wells are within city limits, and one is located approximately 500 feet south of city limits adjacent to Whychus Creek. All of the wells are connected directly to the distribution system. The water storage reservoir is both filled and drained through a transmission line network. No water treatment is currently required; however, the City uses chlorine disinfection at each supply well to maintain a residual in the system. A surface water diversion from Pole Creek was used historically and remains in place but is no longer used. The Pole Creek diversion system is composed of an embankment dam and sand filter. Piping from the sand filter to the existing transmission line has been disconnected. The City has no booster pump stations. The distribution system pressure is maintained by the water storage reservoir level and is affected by pipe friction losses in the reservoir transmission line. During high demands when no supply wells are running, distribution system pressure falls due to friction losses in the reservoir transmission line. When system pressure drops below supply well set points, the wells turn on, adding supplemental water to the system and assisting in maintaining system pressure. The locations of the main water system components are shown on Figure 1-1. Figure 1-2 presents a water system schematic diagram depicting the existing water system components and process flows. The City's water system components are discussed briefly hereafter. Each system component is discussed in greater detail in subsequent chapters of this WSMP Update.

Water Supply

The City obtains all of their municipal water supply from four wells constructed in a volcanic and sedimentary rock aquifer. The combined water rights for potable water from these sources allow more than 4.7 million gallons per day (3,300 gallons per minute) of water to be provided to the City. Additional surface water rights from Pole Creek and Whychus Creek allow 5.65 cubic feet per second; however, these rights are no longer exercised due to costly practices associated with treating surface water. Groundwater is treated at each source with either chlorine gas or sodium hypochlorite prior to distribution throughout the system. A summary of the City's water supply wells is shown on Table 1-1.

**TABLE 1-1
 SUMMARY OF WATER SUPPLY SOURCES**

Well Number	General Location/Land Ownership
Well No. 1	On Three Creeks Road south of East Tye Drive outside city limits. The well is in an existing easement.
Well No. 2	On West McKinney Butte Road, on the northeast corner of the middle school's ballfield.
Well No. 3	On South Sun Ranch Drive in the Grand Peaks at Sisters subdivision. Well No. 3 is on City-owned land.
Well No. 4	At 504 South Locust Street in Sisters Creekside Campground on City-owned land.

Water Storage

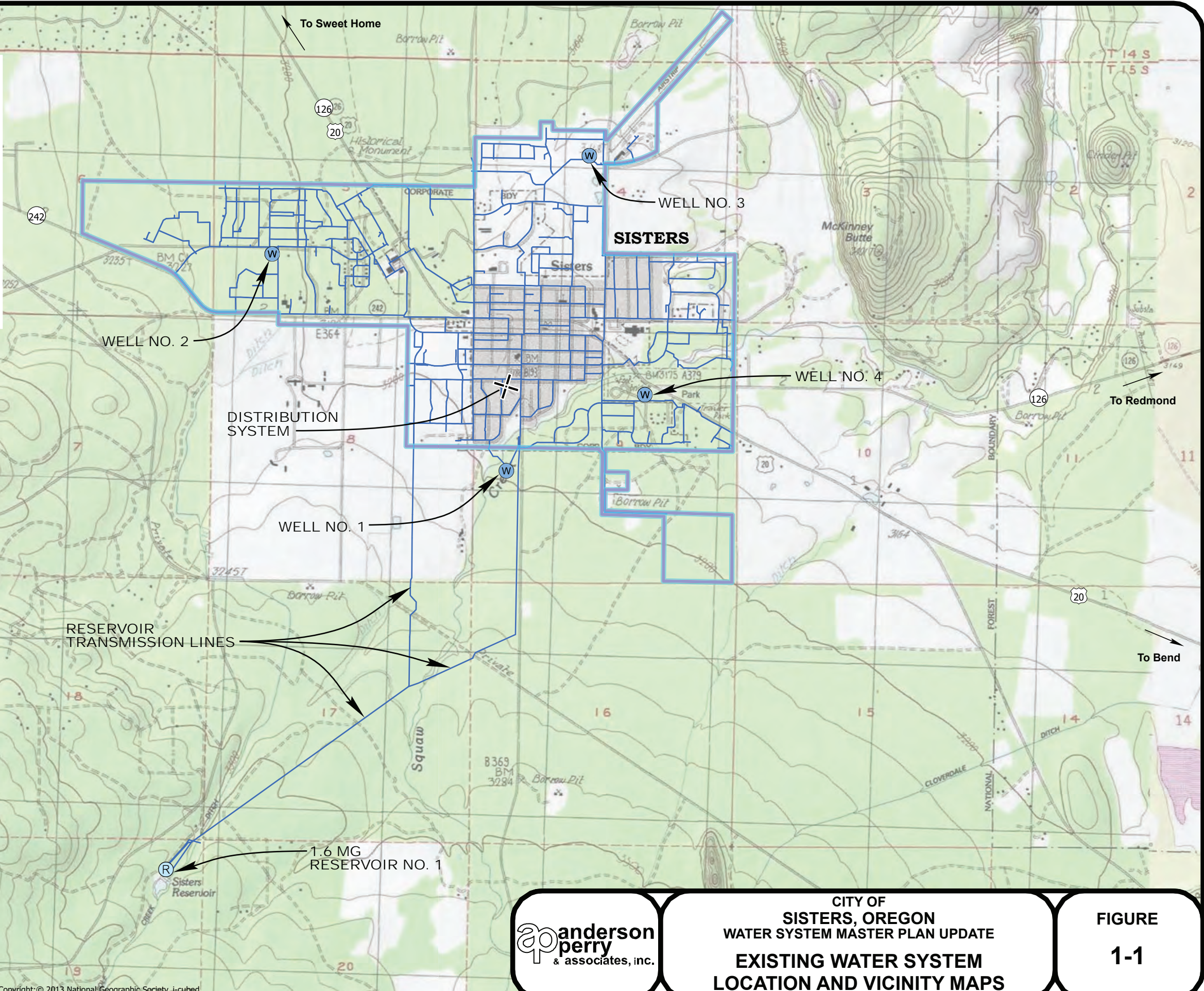
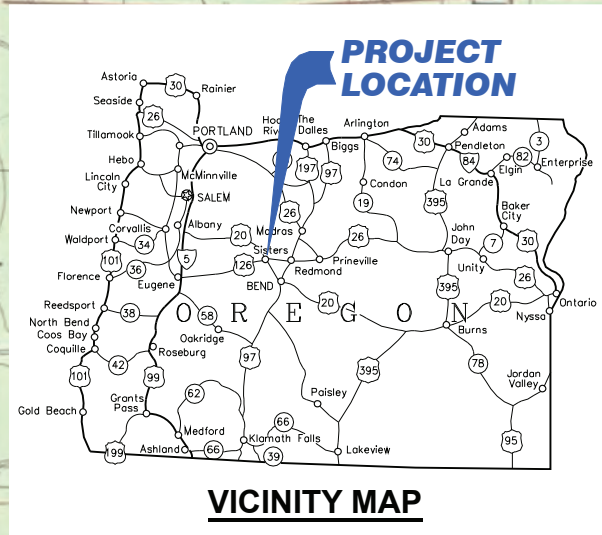
The storage facilities within the City's water system include a totally enclosed 1.6 million gallon (MG) partially buried concrete reservoir and an embankment dam open air reservoir. Only the enclosed concrete reservoir remains in service. The reservoirs are adjacent to each other and located approximately 1.8 miles south of the city limits. Table 1-2 provides general location information.

**TABLE 1-2
 SUMMARY OF WATER STORAGE FACILITIES**

Reservoir Description	General Location/Land Ownership
1.6 MG Concrete Tank	Approximately 1.8 miles south of Sisters.
Abandoned embankment dam open air reservoir	Adjacent to the 1.6 MG concrete tank.

Distribution System

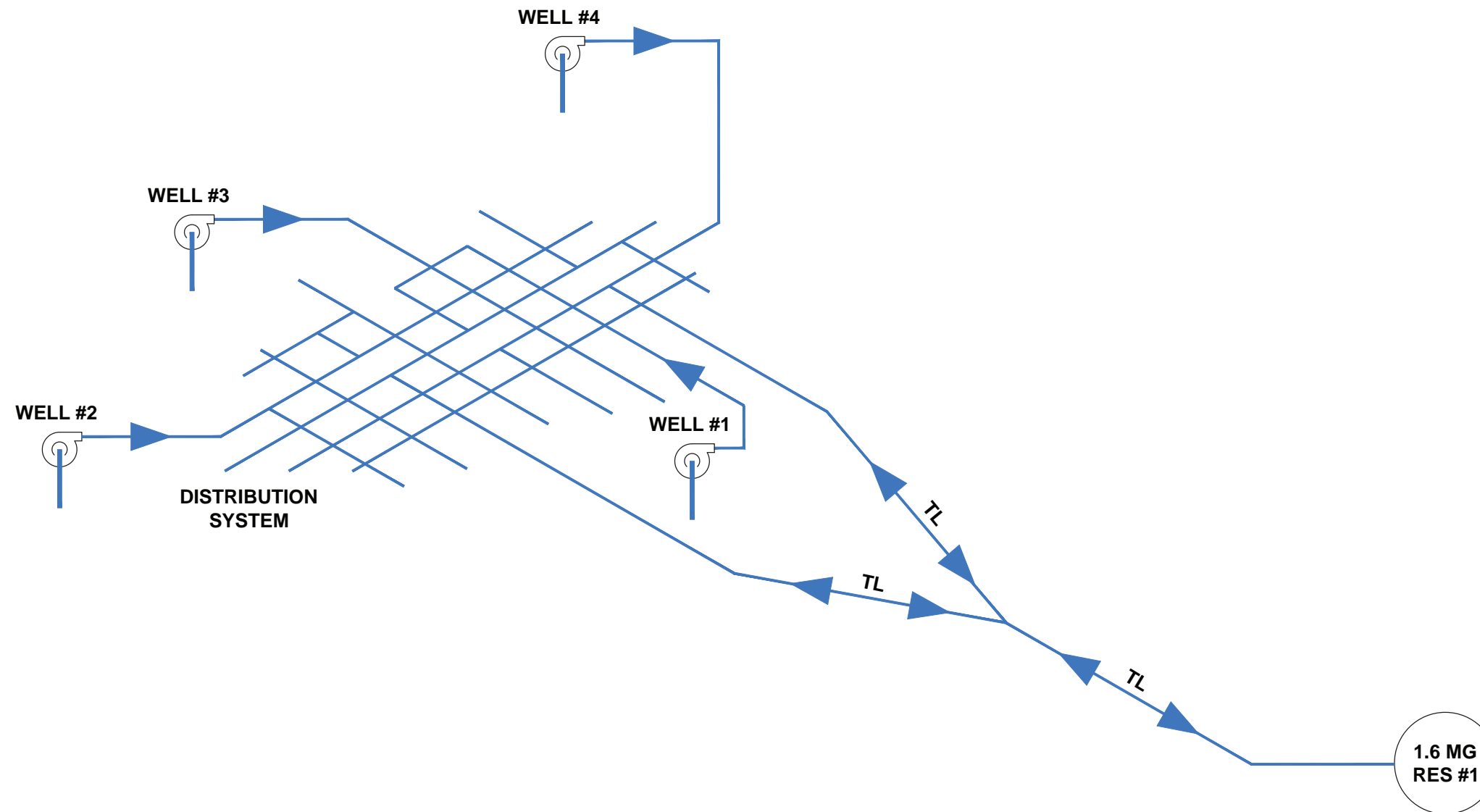
The City has approximately 190,000 linear feet (LF) of 6-inch diameter or larger piping in its distribution system, with an additional 9,000 LF of 4-inch diameter and smaller pipe. The distribution system piping consists of asbestos cement, polyvinyl chloride, high density polyethylene, cast iron, ductile iron, galvanized steel, and carbon steel piping. Piping within the distribution system generally ranges from 4- to 16-inch diameter, with the majority being 6-, 8-, 10-, and 12-inch diameter.



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<p>anderson perry & associates, inc.</p>	<p>CITY OF SISTERS, OREGON WATER SYSTEM MASTER PLAN UPDATE EXISTING WATER SYSTEM LOCATION AND VICINITY MAPS</p>	<p>FIGURE 1-1</p>
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ABBREVIATIONS

RES	RESERVOIR
TL	TRANSMISSION LINE



CITY OF
 SISTERS, OREGON
 WATER SYSTEM MASTER PLAN UPDATE
**OPERATIONAL OVERVIEW
 WATER SYSTEM**

FIGURE
1-2

Chapter 2 - Water System Requirements

Introduction

This chapter of the Water System Master Plan (WSMP) Update presents basic information from which criteria have been developed for evaluating the City's water system. These criteria are used to determine the needed size or capacity of system improvements to serve the City for the 20-year planning period. Information concerning the service area, population projections, land use, water use, and state and federal requirements is presented.

Service Area

The term "service area" refers to the area being served with water from the City's water system. The present service area primarily consists of developed lands within the city limits. For the purposes of this WSMP Update, the future service area consists of the present service area and undeveloped areas within the urban growth boundary (UGB) as shown on Sisters' Planning and Zoning Map located in Appendix A. Land within the City's UGB is mostly developed with relatively small vacant lots distributed fairly evenly through the city limits.

The City is expecting residential, commercial, and industrial growth to continue, but the annexation of additional land beyond the available land within the UGB may or may not be required. In response to recent growth, the need for up to 100 acres but as little as no additional buildable land outside the City's current UGB has been identified.

Service Population and Planning Period

To estimate the demands that may be placed on a municipal water 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 based on an annual percentage increase estimated from past growth rates, while considering future growth expectations. The addition or deletion of a major business, industry, or recreation use in the area could significantly affect the population and overall water system needs.

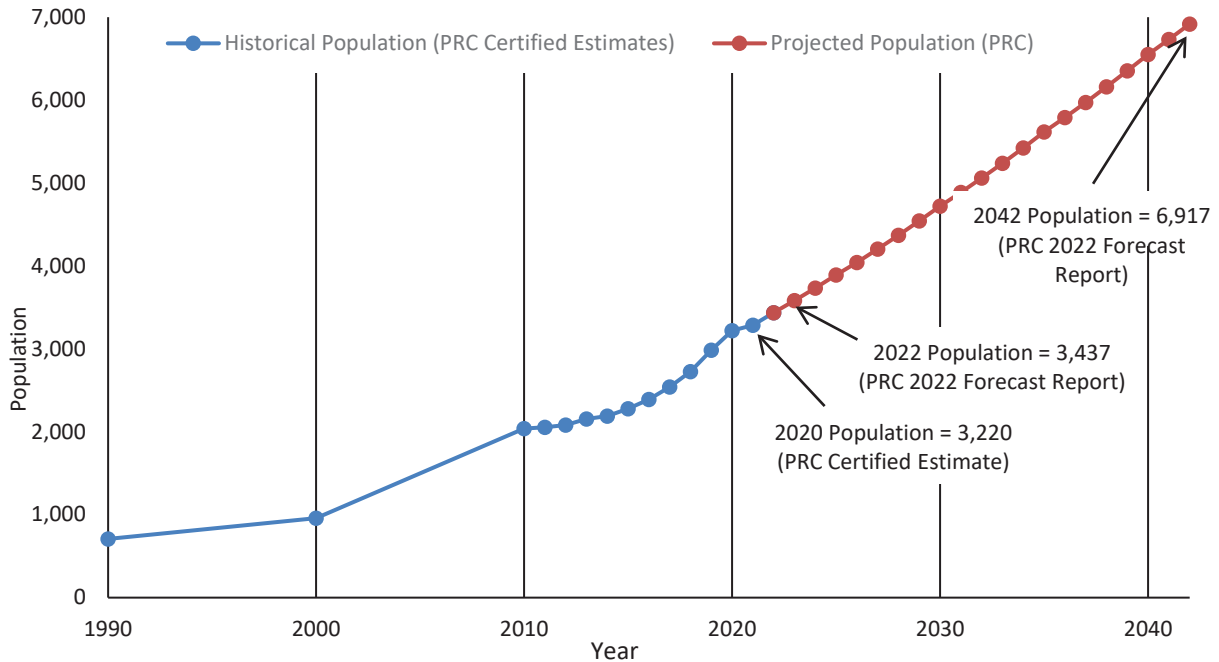
The period over which the population is to be projected usually depends on the type of improvements being considered. Improvements requiring long-term financing should be designed for no less than the term of the financing. Facilities that are readily expanded or modified normally have a ten- to 20-year design life. Facilities that are not easily modified or expanded, such as buried pipelines and storage reservoirs, may be designed for their expected life, which is usually 40 to 50 years, or more.

The historical population data for the City of Sisters, shown on Chart 2-1, were provided by the Population Research Center (PRC) located at Portland State University (PSU). This agency is the recognized primary source of population data available in Oregon between the official Census data generated at the beginning of each decade. Past population figures from the PRC and the Census show the City's population has increased steadily from 708 in 1990, to 959 in 2000, and 3,220 in 2020, respectively. This represents a historical growth rate between 1990 and 2000 of approximately 3.1 percent per year, and between 2000 and 2020 of approximately 6.2 percent per year. The City has experienced average annual growth rates of 6 to 10 percent between 2016 and 2020, which is a significantly higher rate than projected by the PRC. The PRC's population estimate for 2020 of 3,220 was

used as the base population to determine water system demands on a per capita basis in the development of this WSMP Update.

The PRC forecasts that the City of Sisters’ population will increase to 6,551 and 7,505 in year 2040 and 2045, respectively. This equates to an annual rate of 2.75 percent between 2040 and 2045. Applying these growth rates to the design year results in a projected population of 6,917 in year 2042.

**CHART 2-1
 HISTORICAL AND PROJECTED POPULATION**



In 2013, the Oregon Legislature passed House Bill (HB) 2253, which was signed by the governor. HB 2253 removed the responsibility for developing population projections from counties and assigned coordinated population forecasting to the PRC for cities and counties in Oregon outside the Portland metro boundary. HB 2253 was codified under Oregon Revised Statutes Chapter 195 and is further implemented under Oregon Administrative Rules (OAR) Chapter 660, Division 032. OAR 660-032-0020(1) requires local governments to use the most recent final population forecast when changing a comprehensive plan when the change is based on a population forecast. The PRC completed population projections for Deschutes County and all cities within the County, including the City of Sisters, in 2022.

Land Use

This WSMP Update has been prepared to consider water use requirements within the Sisters city limits and UGB. The City has established zoning within the city limits and within areas adjacent to the city limits in the UGB. The City’s UGB currently has only a single plot of City-owned land, which is zoned as Public Facility (PF).

Within the city limits and UGB, the City has developed the zoning designations noted on Table 2-1.

**TABLE 2-1
 LAND USE DISTRICTS
 WITHIN THE CITY LIMITS AND URBAN GROWTH BOUNDARY**

City Zone	UGB Outside of City Limits
Airport (A)	UAR10
Downtown Commercial (DC)	
Highway Commercial (HC)	
Tourist Commercial (TC)	
Open Space (OS)	
Public Facility (PF)	
Light Industrial (I1)	
North Sisters Business Park (NSBP)	
Multi-Family Residential (MFR)	
Residential (R)	
Sun Ranch Residential (SRR)	
Pine Meadow Village Residential (R-PMV)	
Urban Area Reserve (UAR)	
Urban Area Reserve 10 Acre Min. (UAR10)	

The zoning classifications in the city limits and the UGB are shown on the City’s Planning and Zoning Map located in Appendix A.

Regulatory Requirements

The City of Sisters’ water system comes under the jurisdiction of the Oregon Health Authority - Drinking Water Services (DWS). The DWS assumed primacy (responsibility) from the U.S. Environmental Protection Agency (EPA) in February 1986 for enforcement of the federal Safe Drinking Water Act (SDWA). Therefore, the City is currently, and will principally be, working with the DWS as the regulating agency with regard to their water system.

Regulatory Background

The SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation’s public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and groundwater wells. The primary regulations associated with the SDWA address requirements concerning trace minerals, compounds, and microorganisms that may affect the health of water consumers. The SDWA provides for monitoring, testing requirements, reporting, record keeping, and public notification procedures in the event of non-compliance.

The 1986 amendments to the SDWA included provisions for wellhead protection, new monitoring for certain substances, filtration for certain surface water systems, disinfection for certain groundwater systems, and restrictions on lead content in pipe solder and plumbing.

The 1996 amendments to the SDWA included provisions for consumer confidence reporting, stronger protection for microbial contaminants and disinfection byproducts, operator certification, lowering maximum contaminant levels (MCLs), and source water assessments.

Enacted in 1981, the Oregon Drinking Water Quality Act established periodically amended statutes and subsequent administrative rules to enforce, at a minimum, the federal SDWA requirements. The DWS administers and enforces drinking water quality standards for public water systems in the state of Oregon. The agency focuses resources in the areas of highest public health benefit and promotes voluntary compliance with state and federal drinking water standards. The DWS also emphasizes prevention of contamination through source water protection, provides technical assistance to water system owners, and provides water system operator training. They also work closely with public water systems to make sure public notification is made in accordance with regulatory guidelines when required. If the City is unaware of their compliance status or in need of regulatory guidance, it is recommended that the regional DWS office be contacted.

Recent Regulatory History (Past 15 Years)

Following is a list of regulations that have been enacted in the past 15 years:

- 1. Reduction of Lead in Drinking Water Act.** This requires any new installation or purchase of materials used in potable locations to be “lead-free.” Lead-free has been redefined as “(A) not containing more than 0.2 percent lead when used with respect to solder and flux; and (B) not more than a weighted average of 0.25 percent lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures.” This law was enacted on January 4, 2014. Oregon requires drinking water components to be National Sanitation Foundation/American National Standards Institute Standard 61 compliant to meet the intent of this law.
- 2. Stage 2 Disinfectants and Disinfection Byproduct Rule (D/DBPR).** This rule focuses on public health protection by limiting exposure to disinfection byproducts. The D/DBPR specifically targets total trihalomethanes and five haloacetic acids, which can form in water through disinfectants used to control microbial pathogens. This rule applies to all community water systems (CWSs) and non-transient non-community (NTNC) water systems that add a primary or residual disinfectant other than ultraviolet light. Stage 2 of the D/DBPR was enacted in 2012 for large CWSs and NTNCs and in October 2013 for all CWSs and NTNC water systems.
- 3. Unregulated Contaminant Monitoring Rule (UCMR) 3.** The EPA uses the UCMR program to collect data for contaminants suspected to be present in drinking water but that do not have health-based standards set under the SDWA. Every five years, the EPA develops a new list of UCMR contaminants, largely based on the Contaminant Candidate List. OAR 333-061-0043 requires CWSs to report detection of unregulated contaminants in their annual Consumer Confidence Report.
- 4. Revised Coliform Monitoring Requirements.** This rule requires that total coliform samples be collected by public water systems at sites representative of water quality throughout the distribution system according to a written sample site identification plan. Total coliform occurrence will continue to be investigated; however, it is no longer associated with an MCL. Emphasis will not be placed on the MCL for *E. coli* because it is a reliable indicator of fecal contamination. Monitoring changes were made that include reducing the number of repeat samples to collect after a routine coliform positive from four to three.

Potential Regulatory Changes

Following is a list of regulations that may be enacted in the future:

- 1. Lead and Copper Rule Improvements (LCRI).** The LCRI is a new regulation to better protect communities from exposure to lead in drinking water. The EPA intends to promulgate the LCRI prior to October 16, 2024, which will require that all lead service lines be replaced as quickly as feasible. Water systems will be required to prepare and maintain an inventory of service line materials by October 16, 2024.
- 2. Radon in Drinking Water Rule.** This rule would attempt to reduce airborne and waterborne radon concentrations to limit exposure levels. This rule would apply to CWSs that use groundwater or mixed groundwater and surface water. The proposal is currently on hold, and the EPA has no timeline for publishing this rule.
- 3. Fourth Contaminant Candidate List (CCL4) Regulatory Determinations.** The CCL4 is currently in draft form. The EPA has made a preliminary determination to regulate strontium, which is currently still pending. Two new nominated contaminants, manganese and nonylphenol, have been added for the final publication.
- 4. Carcinogenic Volatile Organic Chemicals (cVOC) Rule.** The EPA is developing a proposed national primary drinking water regulation for a group of 16 known cancer-causing compounds, including eight currently regulated cVOCs and up to eight from the Third Contaminant Candidate List.
- 5. Perchlorate Rule.** The EPA is developing a proposed national primary drinking water regulation for perchlorate. Perchlorate may cause adverse health effects. Scientific research indicates this contaminant can disrupt the thyroid's ability to produce hormones needed for normal growth and development.
- 6. Hexavalent Chromium.** The EPA currently regulates hexavalent chromium as part of the total chromium drinking water standard. New information on health effects has become available since the original standard was set, and the EPA is reviewing this information to determine whether new health risks need to be addressed. The State of California has already implemented a hexavalent chromium-specific MCL.
- 7. Fluoridation.** Fluoride MCLs may be lowered in the future as the health impacts of fluoride are fully realized. The current MCL of 4 parts per million could be reduced to 1 or less. This lower MCL could require systems with naturally occurring fluoride above the MCL to treat to reduce levels.
- 8. Cybersecurity.** Executive Order 13636: Improving Critical Infrastructure Cybersecurity was established in February 2013. The order calls for the development of a voluntary, risk-based cybersecurity framework. The EPA will evaluate whether any additional authority and/or regulations to address cybersecurity in the water sector are needed.

Regulatory Requirements Summary

In summary, many regulations affect the operation of the City of Sisters' water system. The City has good water quality with a well-run water system meeting federal and state water quality criteria. The City's water quality testing history is documented on the DWS's publicly available Drinking Water Data Online website. On their website, the DWS has noted that the City has not had any regulatory violations in the past five years. The City's water system information as shown on the website is included in Appendix B.

The information presented herein is intended to provide the City with a brief summary of the regulations and possible future regulations that will likely affect the operation of the City's water system. These regulations continue to expand and will require careful attention to maintain compliance. It is recommended that the City consult periodically with the DWS to ensure compliance with current regulatory requirements and to address any regulatory questions or issues.

Seismic Risk Assessment and Mitigation Plan

To reduce risk and improve recovery for the next Cascadia earthquake and tsunami, the Oregon Resilience Plan (ORP) was developed in 2013 by the Oregon Seismic Safety Policy Advisory Commission. The goals of the ORP are to address critical infrastructure needed to supply water in the event of an emergency and identify projects that need to be completed in the next 50 years to ensure water can be supplied to a community in the event of a strong earthquake. Scientists have recognized the Cascadia subduction zone as an active fault that poses a major geological hazard to Oregon. The ORP addresses vulnerabilities of pipelines, treatment plants, water storage reservoirs, supply wells, and pump stations that compose Oregon's water and wastewater systems and discusses the intervention required to increase the resilience of infrastructure in the event of a Cascadia earthquake.

To assist in the goal of preparing communities, water systems that submit a WSMP to the DWS after January 10, 2018, are required to follow seismic assessment guidelines put forth by the DWS. CWSs with more than 300 connections must conduct a Seismic Risk Assessment and Mitigation Plan if any of their existing or proposed facilities are located in areas with moderate to very heavy damage potential as determined by the Oregon Department of Geology and Mineral Industries.

According to the ORP, the City of Sisters is located in a region of light impact resulting from a simulated magnitude 9 Cascadia earthquake. Therefore, a Seismic Risk Assessment and Mitigation Plan was not conducted as part of this WSMP Update.

Water System Sanitary Survey

The Deschutes County Environmental Health Division conducts water system sanitary surveys of communities on behalf of the DWS to assist with identifying potential contamination sources that may impact water quality. These surveys are generally scheduled to occur every three to five years.

The City of Sisters' latest sanitary survey was conducted on July 26, 2022. The only noted deficiency was a gap between the steel plate and the concrete pedestal on Well No. 1. The City has corrected this deficiency and reported the correction to the Deschutes County environmental specialist. A copy of the full July 26, 2022, sanitary survey is included in Appendix C.

Water Demand

Future water demands, for the purpose of identifying needed future water system improvements, can be estimated from past water use data and population projections. Water use data are usually expressed in terms of various rates of water used for various periods of time. This allows components of the water system to be sized for the maximum demands that will be placed on them. The rates of water use that are important in evaluating a water supply system are the average daily demand (ADD), which is the total amount of water used during a one-year period divided by 365 days; the maximum daily demand (MDD), which is the maximum total amount of water used during any 24-hour period; and the peak hourly or peak instantaneous demand, which is a measure of the maximum demand for water at any given time.

Water supply facilities are normally designed to provide enough capacity to meet the MDD. As a general rule, a water supply pump would be sized to supply the needed water during the MDD without continuous 24-hour operation. For example, if the water usage during high demand summer months required a water supply pump to operate 21 hours or more per day to keep up with the MDD, the situation may warrant the addition of another water supply source to provide some backup capability to avoid over-stressing the pumping equipment. Booster pumps and distribution pipelines are generally sized to deliver peak instantaneous demands (or peak hourly demands [PHD]) because they must be capable of meeting the highest system demand. Storage reservoirs are sized to make up the difference between water supply capacity and peak water use rates, at a minimum. Additional capacity (reserve) is usually provided in water storage reservoirs for both emergencies and fire suppression, as discussed in Chapter 4.

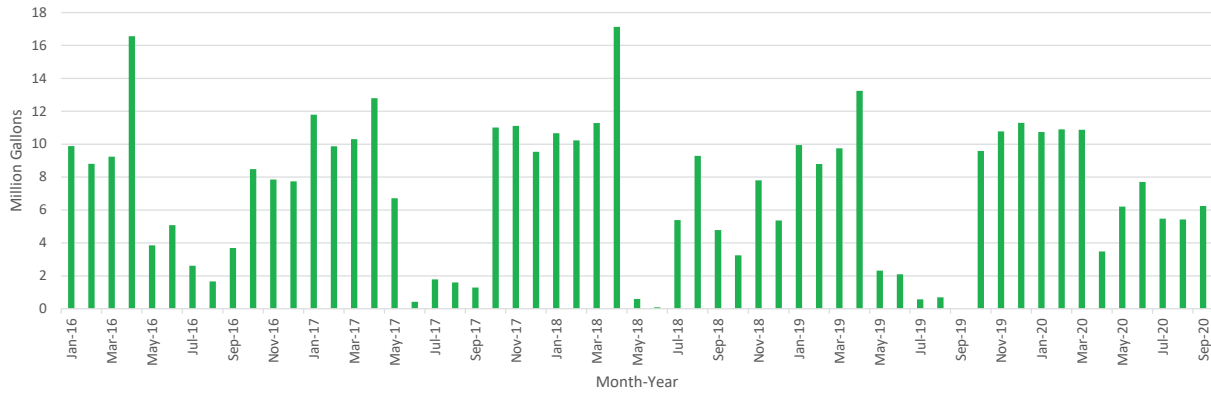
Per Capita Water Use

To be utilized for projecting future water demands, past water use data must be converted to a per capita (per person) rate of use. This is done by dividing the average daily, peak daily, and peak instantaneous water use rates by the number of people being served by the water system. These water demand rates are expressed as gallons per capita day (gpcd). These values multiplied by a population projected for some future year can provide estimated total demand rates for that year, assuming water use characteristics do not significantly change.

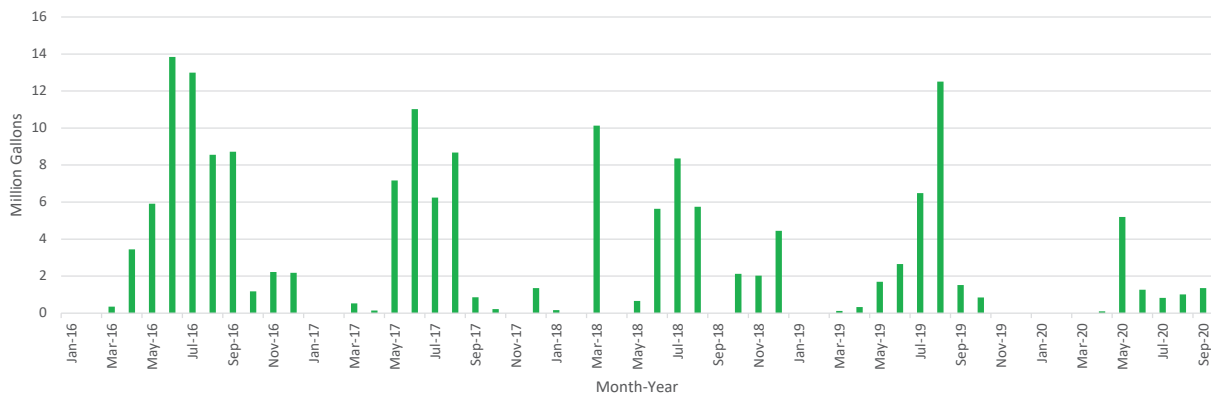
Historical Average Water Use

To determine current water demands, production records for the City's water supply system were reviewed from 2015 through 2020. Production volumes for Well No. 1 were reduced by 3.6 percent to account for a meter inaccuracy that was corrected in 2022. Production volumes for Well No. 4 were not available during the study period of this WSMP Update. Charts 2-2 through 2-4 present the total monthly production for each of the City's wells. It is important to note that the volume scale depicted on the left side of the charts has been adjusted based on the volume supplied by each well.

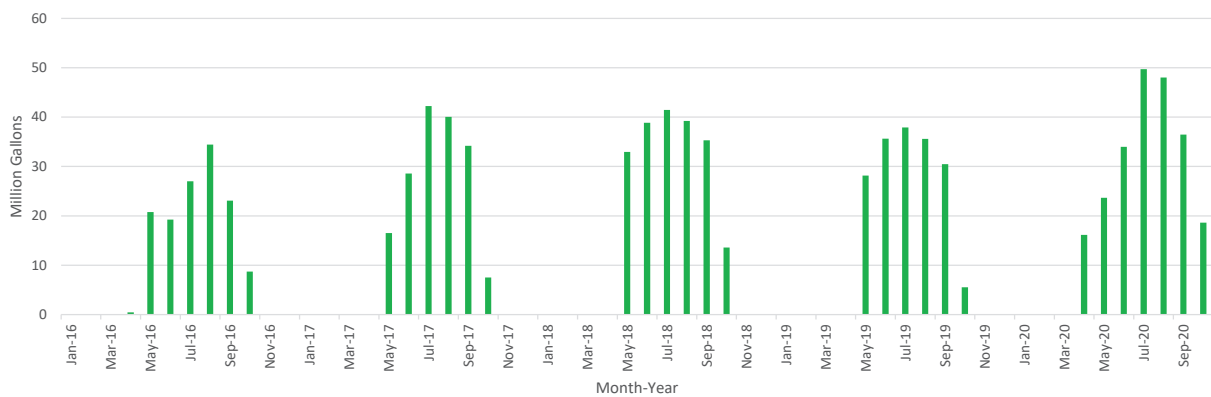
**CHART 2-2
 WELL NO. 1 MONTHLY PRODUCTION**



**CHART 2-3
 WELL NO. 2 MONTHLY PRODUCTION**

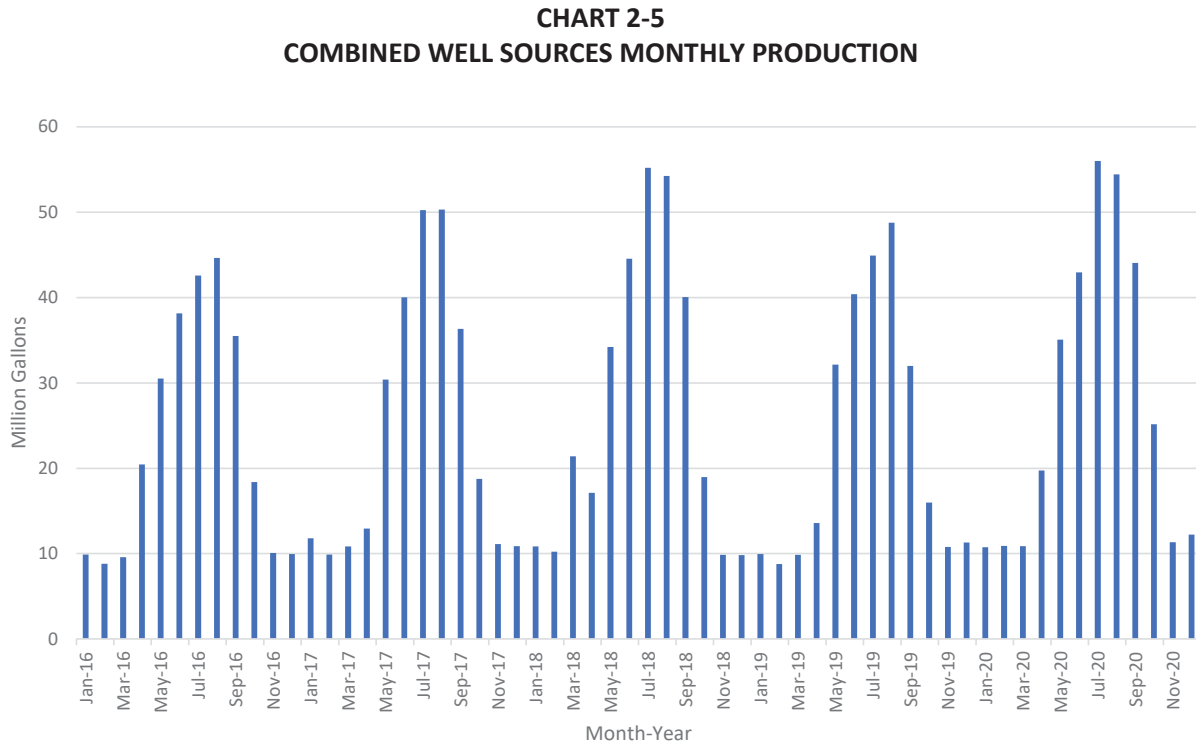


**CHART 2-4
 WELL NO. 3 MONTHLY PRODUCTION**



As shown in the charts, the majority of the City’s water supply is from Wells No. 1 and 3. Well No. 1 is primarily used for supply during winter months, while Well No. 3 is primarily used during summer months. Well No. 4, which was brought online in December 2021, is currently used for supply during periods of high demand and during transition periods in the spring and fall of each year.

The combined monthly production from the City’s surface water source and wells is shown on Chart 2-5.

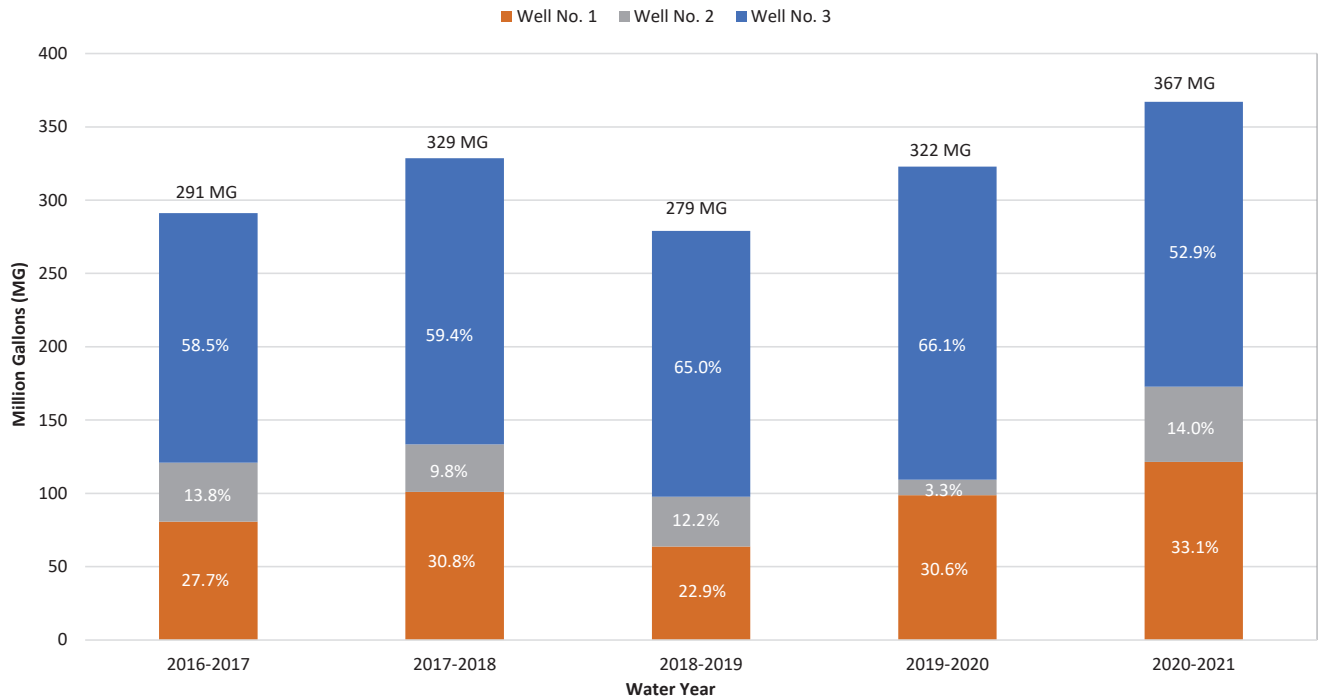


The total production records show typical patterns of high summer demand, increasing and decreasing spring and fall demand, respectively, and low winter demand. The data depicted on Chart 2-5 show that typical summer demands are generally more than 4.5 times higher at their peak than winter demand. This winter to summer variance, which is typical of many central and eastern Oregon cities, is likely due to the dry summers where City water is the only means of irrigation within city limits. The peak could also be magnified by the large influx of tourism during warm summer months.

The highest water production month between January 2016 and December 2020 occurred in July 2020 with 56.0 million gallons (MG) of water produced, or an average production rate of 1.81 million gallons per day (MGD). The lowest water production month occurred in February 2019 with 8.9 MG produced. Water production consistently falls to approximately 10.0 MG per month during winter months.

The total annual production from all City water supply sources was further broken into a percentage supplied by each source between October 2016 and September 2021, as shown on Chart 2-6. It should be noted that the volumes presented on Chart 2-6 are for the water year as reported on the Oregon Water Resources Department water use reporting website, starting October 1 and ending September 30 (example: the 2016 water year begins October 1, 2015, and ends September 30, 2016).

**CHART 2-6
 TOTAL ANNUAL WATER PRODUCTION**



As shown on Chart 2-6, total annual production for the five years analyzed has averaged approximately 318 MG per year. The following annual production trends were noted:

- The majority of the City’s water produced (approximately 60 percent) is from Well No. 3. Well No. 3 is generally not used during winter months.
- Well No. 1 produces approximately 29 percent of the City’s water supply. Well No. 1 is primarily used to produce the City’s winter water demand.
- The least of the City’s water supply (approximately 11 percent) is from Well No. 2. Well No. 2 is more consistently used year-round apart from a few winter months when demand is at its lowest.

Average Daily Demands

The ADD is a measure of the overall annual average rate of consumption. It is derived, in general, by dividing the total water produced during the year by the estimated population for that year. The ADDs for years 2016 to 2020 are noted on Table 2-2 and stated in various units for comparison purposes.

**TABLE 2-2
AVERAGE DAILY DEMAND**

Year	Total Production (MG)	Population*	ADD		
			gpd	gpm	gpcd
2016	279	2,390	763,368	530	319
2017	294	2,540	804,225	558	317
2018	327	2,725	894,704	621	328
2019	278	2,985	762,985	530	256
2020	334	3,220	913,842	635	284

*Annual population data from PSU PRC.

gpd = gallons per day

gpm = gallons per minute

The ADD for all customer water use for the years 2016 through 2020 was determined to be 301 gpcd. Of this, approximately 60 percent has been calculated to be associated with residential water use. The remaining water demand is attributed to municipal, bulk water, irrigation, commercial businesses, and industry. Applying the ADD current year (2022) and planning year (2042) populations, the ADDs for these years are 1.035 MGD and 2.082 MGD, respectively.

Maximum Daily Demands

The MDD values presented on Table 2-3 represent the one day of the year with the highest daily production. MDDs usually occur during a particular day from June through September, which is when water use is normally at its greatest due to warmer weather and irrigation needs. Peak daily flows can occur in other months but normally occur during the hottest period of the year. Records of peak daily flows and the associated total production from January 2016 through December 2020 were obtained from the City. The highest MDD from the period of January 2016 through December 2020 occurred on August 5, 2020. A MDD peaking factor is the MDD divided by the ADD for a given year. The highest MDD peaking factor from the period of January 2016 through December 2020 occurred on August 5, 2020, and was 3.00. Table 2-3 shows the peak daily use of each year from 2016 through 2020 and its associated peaking factor.

**TABLE 2-3
MAXIMUM DAILY DEMAND**

Year	Day of Peak Flow	Total Daily Production (MG)	Population	MDD (gpcd)	ADD (gpcd)	MDD Peaking Factor (PDD/ADD)
2016	June 30	1.987	2,390	831	319	2.60
2017	August 3	2.367	2,540	932	317	2.94
2018	July 28	2.562	2,725	940	328	2.86
2019	July 15	2.191	2,985	734	256	2.87
2020	August 5	2.740	3,220	851	284	3.00

The average MDD peaking factor for years 2016 through 2020 shown on Table 2-3 is 2.85. On a per capita basis, the MDD is 855 gpcd. Applying the average peaking factor to the ADD of the current

year (2022) and planning year (2042), the MDD for these years are 2.95 MGD and 5.93 MGD, respectively.

Generally, a water supply system, at a minimum, needs to be able to supply water to meet the system’s MDD. In the City’s case, where water supply is taken from several wells, it is desirable to be able to meet the MDD with the largest source offline and other sources pumping a maximum of 21 hours per day. This allows a three-hour rest period to provide the pumps adequate rest time between cycles and allows some recharge of the wells during the non-pumping period.

Comparison of Water Demands

The City’s ADD of 301 gpcd is higher than most other water systems in central and eastern Oregon. However, the 855 gpcd MDD is similar to several other communities in central and eastern Oregon. The higher ADD may be attributed to the City’s large commercial/industrial water users. Refer to Table 2-4 for a comparison of the City of Sisters’ demands compared to other central and eastern Oregon communities. Table 2-4 is sorted by ADD in ascending order.

**TABLE 2-4
 COMPARATIVE WATER USAGE TYPICAL FOR
 METERED WATER SYSTEMS IN CENTRAL AND EASTERN OREGON**

City	ADD (gpcd)	MDD (gpcd)	Peak Factor (maximum daily)	Population ¹
Echo, Oregon	175	525	3.0	700
Prineville, Oregon	176	405	2.3	8,889
Ice Fountain Water District, Oregon	207	621	3.0	1,921
Umatilla, Oregon	210	483	2.3	4,686
Baker City, Oregon	227	834	3.7	10,035
La Grande, Oregon	230	667	2.9	13,238
Union, Oregon	230	890	3.9	2,121
Vale, Oregon	250	625	2.5	1,890
Hermiston, Oregon	250	600	2.4	17,730
John Day, Oregon	270	865	3.2	2,010
Boardman, Oregon ²	275	960	3.5	3,445
Stanfield, Oregon	275	660	2.4	2,130
Enterprise, Oregon	284	582	2.0	1,940
Irrigon, Oregon	290	800	2.8	1,790
Ontario, Oregon ³	296	533	1.8	11,485
Milton-Freewater, Oregon	300	750	2.5	6,550
Sisters, Oregon	301	855	2.9	3,220
Hines, Oregon	350	1,600	4.6	1,700
Ontario, Oregon ⁴	515	840	1.6	11,485

¹Population estimates reflect the time period when demands were calculated.

²Includes only City water use (does not include Port of Morrow).

³Includes all users except Heinz.

⁴Includes all users.

Description of Customers Served

The City of Sisters’ water service accounts as of the end of 2020 are summarized on Table 2-5. These data were obtained from City staff and included water use data from January 2016 to September 2021.

**TABLE 2-5
 YEAR 2020 WATER ACCOUNT INFORMATION**

Account Type ¹	2020 Number of Accounts ²	2020 Total Annual Use (MG)	2020 Average Annual Use Per Account (gallons)	Percentage of Total Water Use
Residential Single-Family	1,445	154.3	106,785	55
Residential Multi-Family	32	14.0	437,567	5
Industrial/Commercial	231	63.0	272,547	23
City-Owned	44	9.2	208,740	3
Irrigation	45	36.6	812,867	13
Other	23	3.0	130,245	1
Total	1,820	280.1	-	100

¹ Account types were consolidated from City designations into general type.

² The number of accounts by account type was taken from December 2020 of the City-provided summary of Consumption by Size and Class, 2016 to 2021.

As shown on Table 2-5, residential water use accounts for approximately 60 percent of the total water use in the City, while industrial and commercial water use accounts for approximately 23 percent. Irrigation services, which account for 13 percent of the City’s water use, allow some developments to manage irrigation through a larger area, opposed to individual users being responsible for their own irrigation.

For residential single-family water service accounts, which is also considered an equivalent dwelling unit (EDU), the average usage for years 2016 through 2020 is approximately 300 gallons per account per day. Using these data, the number of EDUs within the City in the current year and planning year is 3,448 and 6,940, respectively. It is noted that the total volume of water consumed is less than supplied for year 2020. The difference between supply and consumption is referred to as non-revenue or unaccounted for water. Sources of non-revenue water include, but are not limited to, leaks, pumping to waste during well pump starts, unmetered usage by fire districts and/or the City, storage tank overflows, meter inaccuracies, and unauthorized use. Non-revenue water is discussed further in Chapter 5

Peak Hourly Demand

PHD is the highest water demand of the year during any 24-hour period and does not include fire demand. As hourly consumptive use data are not available for the City, the PHD was calculated using the Washington State Department of Health - Water System Design Manual (2020), equation 3-1. Using this method, the estimated PHD for the current year and planning year are 3,428 and 6,745 gpm, respectively.

Estimated Buildable Lands Capacity

In recognizing the potential need to provide additional water service to undeveloped areas within the UGB, a comparison of a potential population increase associated with future developed land within the City's UGB was undertaken. The 2019 City of Sisters Housing Needs Analysis prepared by Johnson Economics estimated that within the UGB there were a total of 835 potentially developable residential lots. Using an average persons per household of 2.4, this equates to a growth of approximately 2,004 persons from 2019. In comparison with the population projections shown on Chart 2-1, the City could anticipate completing this full buildout within the UGB by year 2031, which is prior to the design year of 2042.

It should be recognized that over the planning period of this WSMP Update, actual growth could exceed or fall below the projections presented on Chart 2-1 and discussed herein.

Fire Demand

Fire Protection Ratings

Flow rates for fire suppression in residential, commercial, and industrial areas within developed communities are usually determined from the size, density, and occupancy of buildings, type of construction materials, and desired fire insurance rating. Incorporated cities and some rural areas are given a fire suppression rating by Insurance Services Office, Inc. (ISO). The rating is used by insurance companies to determine the cost for providing fire insurance to home and business owners. ISO's fire suppression rating schedule is used to review those features of available public fire protection that have a significant influence on minimizing damage once a fire has begun. These features include the receiving and handling of fire alarms; the fire district's manpower, equipment, and training; and the capability of the water system to provide the needed fire flows (NFF).

ISO periodically evaluates fire suppression capabilities of incorporated cities and fire departments. The numerical ratings range from Class 1 down to Class 10, with Class 1 indicating the highest fire suppression capability and Class 10 the lowest. A Class 10 rating is reserved for unprotected areas that have no fire department and no water supply system. Most protected areas outside of cities have a Class 9 rating, and cities with fire departments serving communities with populations between 10,000 and 20,000 generally have class ratings between 4 and 6. The ISO rating for Sisters, based on the 2017 evaluation, is Class 3. It is recommended the City obtain an updated ISO evaluation and report if any large water system or fire department improvements have occurred, as this could result in an improved fire suppression rating.

ISO's fire suppression rating schedule evaluates a city's fire department capabilities and the domestic water supply capacity on an approximately equal basis (50 percent and 40 percent of the rating schedule, respectively). To reduce the cost of fire insurance in a community, improvements usually must be made to the fire department, the water system, or both, depending on their present condition. It is difficult to determine possible fire insurance savings on commercial buildings because the insurance costs are determined by many other factors related to the type of occupancy and the type of building construction.

Needed Fire Flows

ISO also recommends fire flows for various conditions in both residential and commercial settings. NFF for residential areas are set forth in the 2012 ISO Fire Suppression Rating Schedule and shown on Table 2-6, below.

**TABLE 2-6
INSURANCE SERVICES OFFICE, INC.,
NEEDED RESIDENTIAL FIRE FLOWS**

Distance Between Buildings	Needed Fire Flows
More than 30 feet	500 gpm
21 to 30 feet	750 gpm
11 to 20 feet	1,000 gpm
10 feet or less	1,500 gpm

Needed fire flows for commercial buildings are based on many factors including building size, construction materials used, and what is housed in the building.

The Oregon Fire Code (OFC) requires a minimum flow of 1,000 gpm in residential areas and a minimum of 1,500 gpm for a minimum of two hours in all other occupancies. These requirements increase with square footage of the building and can be quite large for commercial and institutional buildings (schools). These fire flows must be maintained with a system-wide minimum of 20 pounds per square inch residual pressure. Attaining the required fire flow for commercial areas may not be realistically achievable. The OFC has an allowance for decreases in fire flow for small communities (if approved by the local fire chief), where development of full fire flow is impractical.

ISO reports typically include a Hydrant Flow Data Summary that recommends NFF protection rates for both residential and commercial districts to receive full credit ratings. ISO does not consider NFFs over 3,500 gpm in determining the public protection classification for cities. Specific properties with an NFF in excess of 3,500 gpm are evaluated separately and assigned an individual public protection classification. Based on discussions with the City Public Works Department and City engineers, the following fire flow design criterion for this WSMP Update was developed:

- Public facility zones: 2,500 gpm for two hours
- Commercial and industrial areas: 2,000 gpm for two hours
- Residential zones: 1,500 gpm for two hours

As discussed further in Chapters 4 and 5, the NFF of 2,500 gpm for two hours was used to evaluate existing and future water storage requirements, while flows ranging from 1,500 gpm to 2,500 gpm were applied within specific land use zones to evaluate the distribution system's ability to deliver such flows to those zones.

Design Criteria

In establishing design standards for a water system, primary consideration must be given to state and federal rules and regulations governing water quality and construction standards for water systems. These regulations are set by both the EPA and the DWS. In addition to public health and safety requirements, many other factors control the design parameters for municipal water systems. The City

must evaluate factors such as financial feasibility, philosophy and policies of the City Council, past system performance and service, and expectations of the water users. All these factors are important and influence the standards by which water system improvements are made.

Figure 2-1 presents a summary of the water system design criteria developed based on the population projections from the PRC and historical per capita demands through the study period. These criteria have been used to evaluate the existing water system and develop potential improvement options to satisfy present and future water system needs. Application of these criteria is discussed further in the specific chapters that address the water supply, storage, and distribution system facilities. Figure 2-1 presents design criteria based on a service population in 2022 of 3,437, and the corresponding calculated ADD, MDD, and PHD plus NFF. Design criteria are also shown for the design year 2042 with a population of 6,917. The design criteria presented on Figure 2-1 are used as base information in later chapters for evaluating existing and future system needs and capacity.

SUMMARY OF DESIGN CRITERIA

	Base Year 2020	Year 2022	Design Year 2042
Design Population ¹	3,220	3,437	6,917
Supply			
Average Daily Demand ² (ADD) (gpcd)	301	301	301
ADD (gpd)	969,200	1,034,500	2,082,000
ADD (gpm)	670	720	1,450
Maximum Month ADD ³ (gpcd)	632	632	632
Maximum Month ADD (gpd)	2,035,400	2,172,500	4,372,200
Maximum Month ADD (gpm)	1,410	1,510	3,040
Maximum Daily Demand ⁴ (MDD) (gpcd)	858	858	858
MDD (gpd)	2,762,300	2,948,400	5,933,700
MDD (gpm)	1,920	2,050	4,120
EDU ⁵ (units)	3,447	3,448	6,940
EDU _{MDD} ⁶ (gpd)	801	855	855
Peak Hourly Demand ⁷ (gpm)	3,212	3,428	6,745
Peak Hourly Demand Factor	4.8	4.8	4.7
Fire Demand			
Residential Zones (gpm)	1,500	1,500	1,500
Commercial/Industrial Zones (gpm)	2,000	2,000	2,000
Public Facility Zones (gpm)	2,500	2,500	2,500
Duration (hour)	2	2	2
Minimum Residual Line Pressure Under Peak Demands Plus Fire Flow (psi)	20	20	20
MDD plus Fire Flow ⁸ (gpm)	4,420	4,550	6,620

¹Population estimate and projections are from the Population Research Center at Portland State University.

²ADD calculated from historical records provided by City staff for years 2016 to 2020.

³Maximum month ADD peaking factor of 2.10 x ADD calculated from historical records provided by City staff from year 2018.

⁴MDD peaking factor of 2.85 x ADD calculated from historical records provided by City staff for years 2016 to 2020.

⁵EDUs calculated as ADD/average consumption per single-family residential account from 2016 to 2020 of 300 gpd per account.

⁶MDD divided by EDUs.

⁷Estimated peak hourly demand exclusive of fire flow. EDU-based peaking factor from Water System Design Manual, Washington Department of Health, 2020.

⁸Peak daily demand plus City Engineer-recommended fire flow of 2,500 gpm.

EDU = Equivalent Dwelling Unit

gpd = gallons per day

EDU_{MDD} = Maximum day demand per EDU

gpm = gallons per minute

gpcd = gallons per capita per day

psi = pounds per square inch



CITY OF
SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE

SUMMARY OF DESIGN CRITERIA

FIGURE
2-1

Chapter 3 - Water Supply and Treatment

This chapter includes a description of the City of Sisters' current water supply and treatment system and a discussion of its capacity to meet present and future needs. Alternatives for addressing deficiencies within the present system and for meeting future needs are outlined herein. Water rights, well water levels, and water supply quality are also discussed in this chapter. Cost estimates for potential viable water supply alternatives are discussed herein and summarized in Chapter 6.

Water Supply Sources and Treatment

Currently, the City of Sisters' water supply comes from one groundwater source in the Upper Deschutes Basin and is supplied by four wells. The locations of the City's production wells are shown on Figures 1-1 and 1-2 in Chapter 1. A description of each water supply source and the treatment process used for each source is discussed herein. *Ground-Water Hydrology of the Upper Deschutes Basin, Oregon*, prepared by the U.S. Department of the Interior and the U.S. Geological Survey (USGS) in 2001, was referenced for background water supply information.

Although the City also holds surface water rights for the use of water from Pole Creek and Whychus Creek, surface water is not currently used as a source for the City's municipal water supply system. The City does not have any interconnections with other municipal water supply systems.

Regional Aquifer System

The City's wells produce water from a volcanic and sedimentary rock aquifer, which is likely correlative to the Deschutes Formation. Groundwater flow direction in the region is generally to the northeast, driven by a groundwater hydraulic gradient fed by rainfall and snowmelt recharge originating in the Cascade Range from the southwest and smaller amounts locally. The aquifer's composition of volcanic rock consists primarily of Pliocene and younger basaltic rocks, as well as unconsolidated volcanic deposits including ash and cinders. The permeability of the various rock types is variable and may include interflow zones and faults in basaltic lava flows.

In 1998, USGS completed a study demonstrating that existing and new uses of groundwater in the Deschutes Basin Study Area impact the flows in the Lower Deschutes River Scenic Waterway. As a result, the Oregon Water Resources Department (OWRD) developed the Deschutes Basin Groundwater Mitigation Program in 2002, and any groundwater permits issued after 2022 have required the City to provide mitigation to offset the effects of groundwater pumping on surface water. The City holds one permit, G-16794, which requires mitigation in the Whychus Creek Zone of Impact.

Mitigation for new groundwater uses is provided by completing mitigation projects that result in water being legally protected in-stream, such as a permanent in-stream water rights transfer. To meet the mitigation obligation for a new groundwater permit, the applicant can either complete their own mitigation project or obtain mitigation credits from a mitigation bank or other credit holder that has already completed a project. Historically, the City has established mitigation credits

via in-stream transfer of its existing municipal water rights in the Pole Creek watershed and by cancellation or in-stream transfer of water rights for the Lazy Z Ranch. Generally, each acre-foot (AF) of water legally protected in-stream equals one mitigation credit.

Groundwater Supply

Currently, the City utilizes four wells for all of its production. The four City wells are constructed in unconfined volcanic and sedimentary rock aquifers. Well No. 4 was brought online in December 2021, and a reference static water surface level for Well No. 4 has not yet been established. General information for each well is summarized on Table 3-1.

**TABLE 3-1
 WELL INFORMATION¹**

Parameter/Well	No. 1	No. 2	No. 3	No. 4
Date Drilled	1975	1991	2007	2021
Depth, feet	211	302	293	293
Static Water Level ¹ , feet BGS	85	101	73	77
Pumping Water Level ¹ , feet BGS	90	101	79	90
Drawdown, feet	5	0.3	6	13
Reported Sustainable Withdrawal Rate ¹ , gpm	1,315	1,200	2,500	1,970
Specific Capacity ² , gpm/ft	260	4,000	415	150
Pump Type	LST	LST	LST	LST
Installed Hp	75	75	150	150
Pump Setting (feet BGS)	150	158	150	160
Reference Static WSL (feet BGS)	107	118	73	N/A

¹As reported on the OWRD Well Driller Report.

²Capacity is a measure of the well production per foot of water drawdown in the well while pumping.

BGS = below ground surface

gpm = gallons per minute

gpm/ft = gallons per minute per foot

Hp = horsepower

LST = line shaft turbine

N/A = not available

WSL = water surface level

Data Source: OWRD Well Report Query, State of Oregon Water Supply Well Report

Each wellhead is enclosed within mechanical buildings at each site and equipped with a human machine interface, programmable logic controller, and radio telemetry units and antenna. The transmission of information between each source and the City’s supervisory control and data acquisition (SCADA) master station located in the wastewater operations building allows operators to monitor and control well pump operations remotely from the master computer. Operators can use mobile devices to monitor pump operations remotely.

A brief description of each well and installed equipment currently being used by the City to supply drinking water is presented hereafter. Well construction information was obtained from OWRD well logs. More information about each well obtained from the OWRD and City records can be found in Appendix D.

Well No. 1

Well No. 1 is located approximately 0.5 mile south of U.S. Route 20 off Three Creeks Road. The well was constructed in 1975 to a depth of 211 feet. A 14-inch casing is present from 2 feet above ground surface to 100 feet BGS, a 12-inch diameter casing is present from 25 feet BGS to 111 feet BGS, and a 10-inch casing is present from ground surface to 195.6 feet BGS. Perforations in the casing begin at 50 feet BGS and are 1/4-inch by 6-inch and 1/4-inch by 2-inch in size. The well was sealed with cement and bentonite from the ground surface to 40 feet BGS. The original well test reported a yield of 1,315 gpm and a drawdown of 5.25 feet.

Well No. 1 Equipment and Enclosure

Well No. 1 is equipped with a 75-Hp LST pump set at approximately 150 feet BGS, a propeller-type flowmeter, a pump-to-waste valve and piping arrangement, and chlorine injection line. The pump motor was rebuilt most recently in 2011, at which time the pump was also replaced. A soft starter was installed in 1995, which can be operated remotely via the SCADA system. The concrete masonry unit (CMU) wellhouse was constructed in 1976. The building needs to be rebuilt, lacks adequate space for current electrical installations, and is not adequately ventilated. The building has a separate chlorine gas room. Both rooms are spatially constrained, which hinders major maintenance activities. A Detroit Diesel 125-kilowatt (kW) diesel-fueled standby power generator set was installed circa 2005 with a subbase fuel storage of 100 gallons. The City maintains a full 700-gallon fuel trailer that can be used to refill generators in a sustained outage situation.

Well No. 2

Well No. 2 is located near Sisters Middle School at the intersection of McKinney Butte Road and North Freemont Street. The well was constructed in 1991 to a depth of 302 feet. An 18-inch diameter casing is present from 1 foot above ground surface to 39 feet BGS. Inside the 18-inch casing is a 14-inch diameter liner present from 1.5 feet above ground surface to 244 feet BGS. Within the 14-inch diameter liner is a 10-inch diameter liner present from 238 feet to 302 feet BGS. Perforations in the casing are located from 242 feet to 302 feet BGS and are 1/8-inch by 3-inch. The well casing is sealed with cement from the ground surface to 39 feet BGS. The original well was reported to have a yield of 1,200 gpm with 0.3 foot of water level drawdown.

Well No. 2 Equipment and Enclosure

Well No. 2 is equipped with a 75 Hp LST pump set at approximately 160 feet BGS, a propeller-type flowmeter, a deep well pump control valve, a pump-to-waste valve and piping arrangement, and chlorine injection line. The pump motor was rebuilt in 2011. The CMU wellhouse was constructed in 1992 with two rooms and is generally in good condition. One room houses the piping, valving, metering, and electrical controls. The other room houses an on-site sodium hypochlorite generation system. Electrical equipment includes a soft starter and radio-controlled telemetry system that allows remote operation. The electrical controls were replaced in 1995. A Detroit Diesel 125 kW diesel-fueled standby power generator set was installed circa 2005 with a subbase fuel storage of 100 gallons.

Well No. 3

Well No. 3 is located southwest of the Sisters Eagle Airport at the intersection of Sun Ranch Drive and West Heising Drive. The well was constructed in 2007 to a depth of 293 feet. A 16-inch diameter steel casing is present from 2 feet above ground surface to 195 feet BGS. A 14-inch stainless steel wire wrap screen is present from 188 feet to 268 feet BGS followed by a 14-inch diameter steel liner from 268 feet to 283 feet BGS. The well casing is sealed with cement from ground surface to 130 feet BGS, followed by bentonite chips from 130 feet to 170 feet BGS, followed by cement from 170 to 195 BGS. The original well yield is reported to be 2,500 gpm with 6 feet of water level drawdown.

Well No. 3 Equipment and Enclosure

Well No. 3 is equipped with a 150 Hp LST pump set at approximately 150 feet BGS, an electromagnetic flowmeter, a deep well pump control valve, a pump-to-waste valve and piping arrangement, a check valve, an air release valve, a sample tap, and a chlorine injection line. The CMU wellhouse was constructed in 2007 with a single room that houses the piping, valving, metering, electrical controls, and an on-site sodium hypochlorite generation system. Electrical equipment consists of a soft starter, well level monitoring system, and radio-controlled telemetry system that allows remote operation. Disinfection is provided with a 0.8 percent hypochlorite solution generated on site by an Evoqua OSEC system, injected into the discharge manifold with one of two Grundfos chemical metering pumps. Well No. 3 does not have backup power.

Well No. 4

Well No. 4 is located off Locust Street within the Sisters Creekside Campground near the east entrance. The well was constructed in 2021 to a depth of 293 feet. A 16-inch diameter steel casing was installed 4 feet above ground surface to 200 feet BGS. A 12-inch diameter continuous wire wrap stainless steel screen was installed from 190 to 290 feet BGS, followed by a 12-inch diameter steel sump from 290 to 293 feet BGS. The well casing is sealed with bentonite chips from ground surface to 115 feet BGS and cement with 5 percent bentonite chips from 115 to 137 BGS. The original well yield was reported to be 1,970 gpm with 13 feet of water level drawdown.

Well No. 4 Equipment and Enclosure

Well No. 4 is equipped with a 150-Hp LST pump set at approximately 160 feet BGS, an electromagnetic flowmeter, a deep well pump control valve, a pump-to-waste valve and piping arrangement, a check valve, an air release valve, a sample tap, and a chlorine injection line. The CMU wellhouse was constructed in 2021 with a single room that houses all components and equipment other than the generator set. Electrical equipment includes a VFD, well level monitoring system, and radio-controlled telemetry system that allows remote operation. A Kohler 250 kW diesel-fueled standby power generator set was installed in 2021 with a subbase fuel storage of 500 gallons.

Water Levels in Wells

Periodical monitoring of well water levels provides the ability to determine if any trends show decreased capability of an aquifer or a specific well to provide the desired water flow. The City measures and reports well water levels every year and has a robust water level dataset. The City has recorded water levels in the recently constructed Well No. 4, but available water level data are limited.

Groundwater recharge is primarily affected by annual precipitation in the Cascade Range to the west on the eastern slopes of the Cascade Range. Snowmelt and rain percolate down to the water table, where it then flows down the hydraulic gradient to the north and east toward the Deschutes River. Groundwater level monitoring data on four wells near the region of the City show varying levels that correlate with climate trends with an observable lag of a few years. Groundwater level data from OWRD Observation Well DESC 3016, which is located in the City, documents the typical water level fluctuations over time in the City's vicinity. The City's wells water level fluctuations all correlate with the trend recorded by Observation Well DESC 3016. Groundwater levels have been declining since approximately 2015; however, the current levels are near or above those measured in 1996. Currently, only Well No. 2 has a water level lower than that measured during the original well construction.

A summary of historic water levels and associated trends in each City well is graphically presented for Wells No. 1, 2, and 3 on Charts 3-1, 3-2, and 3-3, respectively. During the preparation of this Water System Master Plan (WSMP) Update, Well No. 4 had only two years of limited documented water level measurements, which is too short of a duration to evaluate long-term trends. The well reference elevation (Ref El.) refers to the level of which any water level decline will be compared. A static water surface level decline of 25 feet or more below the reference elevation requires action by the City, including discontinued or reduced use of the source until the water level recovers. Currently, no City wells have static water levels that are more than 25 feet below the reference levels.

CHART 3-3
WELL NO. 3 - DESC 57902 AND STATE OBSERVATION WELL WATER LEVEL HYDROGRAPH



Well Operations and Rotation

Currently, the City rotates use of their wells throughout the year to alleviate pressure on any single well. Well No. 1 is typically used year-round, with higher use during winter months and lower use during summer months. From 2015 to 2020, Well No. 1 supplied approximately 30 percent of the total water used. Well No. 2 is typically used most of the year with the exception of the coldest winter months. The highest demand on Well No. 2 is typically during mid-summer. From 2015 to 2020, Well No. 2 supplied approximately 12 percent of the total water used. Well No. 3 is primarily used from May to October of each year and supplies the majority of the water used during these months. From November to April of each year, Well No. 3 is generally not used. From 2015 to 2020, Well No. 3 supplied approximately 58 percent of the total water used.

All City wells currently in operation have experienced some level of operational changes from 2015 to 2020. The static WSL of Well No. 1 has remained relatively constant since 2012 and is currently higher than the static WSL measured during construction. The static WSL of Well No. 2 has experienced a minor increase since 2012 and is currently slightly lower than the static WSL measured during construction. Well No. 3 experienced an increase in static WSL after construction from 2007 to 2013. Since 2013, the static WSL of Well No. 3 has been gradually decreasing. The City is planning to use Well No. 4 primarily during periods of high demand and for supplemental water during the spring and fall.

Water Rights

The City of Sisters holds several municipal and irrigation water rights issued by the State of Oregon for its groundwater sources and surface water sources. The City's existing municipal and irrigation water rights certificates and permits are summarized on Table 3-2. Copies of the City's water rights permits, certificates, and transfers are presented in Appendix E.

**TABLE 3-2
WATER RIGHTS INFORMATION**

Point of Appropriation/ Diversion	Application/ Permit No.	Certificate No.	Priority Date	Transfers	Maximum Authorized Rate	
					Flow (cfs)	Flow (gpm)
Municipal Groundwater Rights						
Well No. 1 Well No. 3	G-10545/G-9979	88184	2/24/1983	T-11284 (complete)	1.78	799
Well No. 3	G-12591/ G-11418	87247	6/25/1991	T-10766 (complete)	1.78	799
Well No. 2 (Adding Well No. 3 under review) (Adding Well No. 4 under review)	G-12591/ G-11418	93889	6/25/1991	T-13840 ¹ (under review)	1.56	700
Well No. 1 Well No. 2 Well No. 3 Well No. 4	G-17058/ G-16794	-	5/27/2008 (Completion Date: 9/9/30)	-	2.00 ²	898 ²
Well No. 4	G-14486/ G-18270	COBU Submitted May 2022	3/27/1997	T-12767 (approved)	2.15	965
Total Municipal Groundwater Allocation					9.27	4,161
Municipal Surface Water Rights						
Whychus Creek	S-5551/S-3384	3227	5/18/1917	IL-1243	1.5	673
Whychus Creek	S-12560/S-8906	10028	2/11/1929	IL-1243	0.2	90
Whychus Creek	S-16404/S-12597	13501	4/7/1937	IL-1243	1.25	561
Whychus Creek	S-17149/S-12869	13509	11/1/1937	IL-1243	1.25	561
Pole Creek	S-44263/S-32854	65091	11/17/1967	IL-1243	1.45	651
Total Municipal Surface Water Allocation					5.65	2,536
Primary Irrigation Water Rights						
Whychus Creek	-	93680	1880	T-11318 (complete)	2.028	910
Whychus Creek	-	93681	12/31/1881	T-11318 (complete)	0.554	249
Whychus Creek	-	93683	1886	T-11318 (complete)	0.109	49
Total Primary Irrigation Water Allocation					2.691	1,208

Point of Appropriation/ Diversion	Application/ Permit No.	Certificate No.	Priority Date	Transfers	Maximum Authorized Rate	
					Flow (cfs)	Flow (gpm)
Supplemental Irrigation Water Rights						
A Well	G-8548/G-8148	82875	11/25/1977	T-8902 (remaining)	0.110	49
Three Wells	G-3489/G-3095	87347	5/13/1966	T-11201 (remaining)	0.157 ³	70 ³
A Well	G-3489/G-3095	85254	5/13/1966	T-8900 (remaining)	0.246 ³	110 ³
Four Wells	G-5295/G-4841	91703	8/25/1970	T-12188 (remaining)	0.108 ³	48 ³
Total Supplemental Irrigation Water Allocation					0.621	277
Surface Water Storage Rights						
Point of Diversion	Application/ Permit No.	Certificate No.	Priority Date	Transfers	Allocation	
					AF	MG
Pole Creek	R-43919/R-5054	65090	8/10/1967	IL-1243	6.3	2.05
Total Municipal Surface Water Storage					6.3	2.05

¹ Transfer application T-13840 was submitted October 6, 2021, requesting to add Wells No. 3 and 4 as authorized points of appropriation to Certificate No. 93889. The transfer application is under review.

² Appropriation of water for Permit G-16794 is further limited to no more than 604.6 AF per year.

³ One-eightieths of one cfs, or its equivalent for each acre irrigated, and shall be further limited to a diversion of not to exceed 3.0 AF for each acre irrigated during the irrigation season of each year.

cfs = cubic feet per second

COBU = Claim of Beneficial Use

MG = million gallons

The existing water rights authorize the City to instantaneously withdraw a total of 9.27 cfs, or approximately 4,161 gpm, for municipal use. The City also holds surface water rights authorizing the use of up to 5.65 cfs (2,536 gpm) from the Pole Creek and Whychus Creek watersheds for municipal use. The City's surface water rights are not currently in use and are currently leased in-stream.

The City also holds surface water irrigation rights for Whychus Creek, for which water is delivered via the Three Sisters Irrigation District. A portion of the rights is leased in-stream while a portion is used for irrigation on the City's Lazy Z Ranch property. Groundwater rights authorizing the use of water for supplemental irrigation on the Lazy Z Ranch property are not currently in use.

Municipal Groundwater Water Rights

The City's groundwater rights authorize the City to withdraw a total of 9.27 cfs or approximately 4,161 gpm. Permit G-16794, which authorizes the use of up to 2.0 cfs, is further limited to 604.6 AF per year. Additionally, the permit requires a total of 241.8 mitigation credits to fully exercise the annual withdrawal rate. To date, 88.4 mitigation credits have been provided, authorizing the use of up to 221 AF of water per year under Permit G-16794.

Municipal Surface Water Rights

The City has multiple municipal surface water rights. The allocations associated with the City's surface rights provide the City with the ability to withdraw a total of 5.65 cfs from various surface water sources in the Pole Creek and Whychus Creek watersheds. Due to the high cost of water treatment requirements and low summer streamflow in Whychus Creek, the City is unlikely to use surface water for future municipal use. These surface water rights are currently leased in-stream.

Summary of Water Rights Transfers

Several water rights transfers have occurred over the years, changing the point of appropriation, place of use, or character of use authorized under an existing water right. The City's only transfer under review is a transfer application to change the points of appropriation under Certificate 93889.

Greenlight Water

The OWRD has developed the Municipal Water Management and Conservation Planning program, which provides a process for municipal water suppliers to develop plans to meet future water needs. To obtain long-term permit extensions, the City of Sisters is required to prepare plans that demonstrate the community's need for increased diversions of water under the permits as their demands grow. Restricting diversion rates until the City can prove their need for additional water is known as "greenlight water." This program affects Permit G-16794, which allocates 2.0 cfs of instantaneous withdrawal, further limited to 604.6 AF per year. Permit G-16794 requires a total of 241.8 AF of mitigation water within the Whychus Creek Zone of Impact be provided to exercise the maximum permitted annual withdrawal rate. The maximum instantaneous withdrawal rate of 2.0 cfs is permitted regardless of the amount of mitigation provided. The total volume withdrawn each year is limited by the amount of mitigation provided. The City must submit an annual Incremental Development Plan to the OWRD as required by the permit's conditions. The permit requires the permittee submit a Water Management and Conservation Plan (WMCP) within five years of permit issuance; the WMCP was submitted February 1, 2011. This was followed by a WMCP progress report. Permit G-16794 also requires that the permittee provide mitigation prior to each stage of development under the permit in accordance with an Incremental Development Plan. The City submitted a WMCP Update in April 2017. A progress report was due no later than April 27, 2022. An updated WMCP is due no later than October 30, 2026. To date, the City has provided 88.4 mitigation credits for Permit G-16794, allowing a maximum withdrawal rate of 221 AF per year.

Source Capacity Assessment

For the purposes of this WSMP Update, the ability of the City's existing sources, in their current configuration, to meet current and projected peak daily flows with existing capacity and water rights was evaluated. Demands in this section are based on historical water usage and projected future water demand as presented in Chapter 2.

The pumping capacities shown on Table 3-3 were provided by the City and are used to assess current source production from the City's supply sources. The pumping capacities shown are less than the sustainable well withdraw rates determined during initial well yield tests following construction of each well, as shown on Table 3-1. Pumping capacity could be increased in the future with the installation of larger capacity pumps, but careful attention to production volumes would need to be provided to

ensure the City does not exceed the maximum permissible flow rates allowed by their water rights permits and certificates. Currently, the maximum combined operational pumping capacity of the City's existing wells is greater than the maximum municipal groundwater allocation of 4,161 gpm.

**TABLE 3-3
 CURRENT WATER SUPPLY OPERATIONAL CAPACITY**

Water Supply Source	Installed Pump (Hp)	Pumping Capacity (gpm)
Well No. 1	75	800
Well No. 2	75	750
Well No. 3	150	1,550
Well No. 4	150	1,500
Total		4,600

The hours of operation for each supply source currently used in the system may vary, but it is recommended that sources do not operate for more than 21 hours per day. The source production values for the wells listed above are considered to be the City's current sustainable well production flows.

Source capacity with respect to water rights was assessed with only certificated and permitted water rights. Evaluations of the City's source capacity and water rights compared to the current and projected water demand are shown on Table 3-4.

**TABLE 3-4
 SOURCE CAPACITY EVALUATION**

Parameter/Year	2022	2042
Water Demand		
Average Daily Demand (ADD), million gallons per day (MGD)	1.0	2.1
Maximum Daily Demand (MDD), MGD	2.8	5.9
Source Capacity - All Wells Online		
All Current Well Production Sources, gpm	4,600	4,600
Well Production Capacity ¹ , MGD	5.8	5.8
Sustainable Total Supply Capacity Compared to MDD¹, MGD	2.9	-0.1
Source Capacity - Wells No. 1, 2, and 4²		
Groundwater Source Production, gpm	3,050	3,050
Current Surface Water Capacity ^{1,2} , MGD	3.8	3.8
Sustainable Total Supply Capacity Compared to MDD^{1,2}, MGD	1.0	-2.1
Groundwater Water Rights		
Groundwater Right Allocation ³ , gpm	4,161	4,161
Groundwater Right Allocation ³ , MGD	6.0	6.0
Total Supply Water Right Permit Capacity Compared to MDD, MGD	3.2	0.1

¹Twenty-one hours per day supply source operation.

²Excludes Well No. 3 for evaluation of source capacity with the largest source offline.

³Maximum permissible combination of water right withdrawal rates.

The City entirely relies on groundwater supply to meet customer demands. No surface water rights are currently, or planned to be, utilized by the City for municipal water supply and, therefore, are negated

from this analysis. Well No. 3 is the City's largest producing source in addition to being the only well that is not equipped with emergency backup power. The City's design source capacity should assume either utility power is down or the largest producing source is offline, and the remaining sources are allowed to operate for only a maximum of 21 hours per day. Both scenarios should consider Well No. 3 to be offline.

Assuming all sources are online and each well pump is allowed to operate for no more than 21 hours per day, the source capacity is adequate to supply the City's current demand and deficient by approximately 0.1 MGD to supply the City's projected MDD through the planning year 2042. Assuming Well No. 3 is offline and each well pump is allowed to operate for no more than 21 hours per day, the remaining source capacity is deficient by approximately 2.1 MGD to supply the City's projected MDD through the planning year 2042.

The City's existing allocated groundwater right withdrawal rates are adequate to supply the projected MDD through the planning year 2042. However, the City's total source capacity with all wells running at full speed is greater than the combined permissible groundwater withdrawal rate of 4,161 gpm. Assuming the VFD motor control was utilized on Well No. 4 to reduce the pumping rate to 1,061 gpm, the City could exercise the total combined groundwater withdrawal rate of 4,161 gpm. Ideally, the City would be able to exercise the full water right allocation with the largest producing source offline and rotation of the remaining wells such that no well was required to operate for more than 21 hours per day.

To supply the MDD through the planning year with the adopted design source capacity, either a new source will need to be added to the system, or the capacities of Wells No. 1 and/or 2 would need to be increased. The additional source will need to add a yield of approximately 1,670 gpm (2.1 MG per 21 hours) for the City to exercise the full water right allocation with the largest source offline and 21 hours of operation per day. No new water rights will be needed for the additional source, but the new sources will need to be added to the existing certificates and permit as an additional point of appropriation. Assuming the City's growth rate coincides with the Population Research Center-published values and no other changes to average consumption are made, the City's MDD is anticipated to exceed the design source supply in year 2028. When peak demands exceed available source supply, the difference must be supplied by water storage facilities. Under these circumstances, the ability of storage to accommodate peak demand periods above the available source supply must be carefully evaluated. Refer to Chapter 4 for a discussion on proposed storage and resulting dates for necessary improvements.

Water Conservation

Although it does not impact system capacity, water conservation can create water savings and reduction in water demand that can eliminate or delay the need for developing new water sources or treatment plants. The City has implemented a number of conservation measures, as outlined in the City's 2017 WMCP prepared by GSI Water Solutions, Inc. Water conservation can be achieved by educating the public on irrigation best practices, restricting irrigation to specific hours or days, and implementing a leak detection program. Leaks can contribute to non-revenue water, which are quantities of water either lost between the points of source and delivery or unmetered and unpaid for water used. Based on the volumes of water produced and billed as stated in the 2017 WMCP, the total apparent non-revenue water within the system was approximately 15 percent during the five-year period from 2010 to 2015. Refer to Chapter 5 for further discussion on unaccounted for water.

The City has employed several basic conservation programs, including annual water audits, system-wide radio read metering, a unit-based water rate structure, leak detection and repair, and public education processes.

Water Supply and Treatment Deficiencies

Recommended Fire Flow

The City's ability to provide recommended fire flow depends on supply from supplemental well sources. The City's water reservoir is unable to provide the needed fire flows (NFF) with all sources offline, as the transmission line is incapable of delivering the required flow alone. In general, with three sources online, adequate fire flow can be delivered throughout the system other than in a few localized regions that are slightly deficient. Various improvement alternatives and/or combinations of alternatives could resolve this deficiency, including adding an additional source, increasing the water reservoir transmission line capacity, or a combination of both.

Maximum Daily Demand

Assuming the largest source is offline, the ability to supply the projected MDD in year 2042 is deficient by approximately 2.1 MGD. Adding emergency backup power to Well No. 3 would decrease the risk of experiencing such a situation; however, the scenario should still be considered due to other risks that could result in a lost source, such as equipment failure, maintenance, contamination, etc. An additional source with a capacity of 1,670 gpm would allow the City to exercise their full water right withdrawal rate with the largest source offline and the remaining sources operating no more than 21 hours per day. Increasing the capacity of either Well No. 1 or 2 would give the ability to provide the MDD up to but not long beyond the planning year.

Any new source should have adequate emergency backup power. Adding a new source would require that a transfer application adding the additional point of appropriation to the City's various other water rights certificates and permits, or new water right permit, be approved by the OWRD.

Well No. 1 Mechanical Building

The Well No. 1 mechanical building is showing significant signs of deterioration due to age. Additionally, both rooms are undersized and spatially constrained. Due to the increased price of chlorine gas, unreliable supply of chlorine gas and sodium hypochlorite, and safety concerns associated with the existing chlorine gas disinfection system, the City is considering switching to on-site generation of sodium hypochlorite for drinking water disinfection. Neither the existing chlorine gas room or wellhead mechanical room has adequate space to accommodate the installation of new systems. Therefore, the City is considering replacing the structure entirely to provide adequate space for the installation of new electrical equipment.

Well No. 3 Electrical, Instrumentation, and Controls

Currently, Well No. 3 is equipped with a soft starter and does not have standby power. While providing backup power and a VFD is not required, doing so will increase the source's reliability and operational flexibility. Standby power will reduce the risk of losing the source during utility outages. Replacing the soft starter with a VFD would allow the City to maintain distribution system pressure while taking the water storage reservoir and/or transmission line offline for maintenance or replacement.

Water Supply and Treatment Considerations

The City of Sisters' existing water supply and treatment systems currently meet residential, commercial, and industrial water demands. The City currently relies on supplemental well water in conjunction with available storage to provide NFF. As the City continues to grow, the increase in demand will reduce the amount of well water available to supplement NFF. If no additional source capacity is added to the system, the increase in demand from continued growth will reduce available fire flows during peak demand periods. Options to avoid this deficiency include increasing well pumping capacities and/or the construction of a new well. However, these improvements may not be necessary if other improvements, such as the installation of new and/or upsizing water supply lines, are made.

According to the Oregon Water Resources memo, "Response to Technical Assistance Request: Groundwater Mitigation Program - Purpose in Relation to Observed Groundwater Level Trends," the City of Sisters is located in an area in which groundwater levels trend with climate. The primary source of the local groundwater level and hydraulic gradient (flow direction) is groundwater recharge on the eastern slopes of the Cascade Range from rainfall and snowmelt. Existing aquifer levels are shown to change with time in response to local and mountain precipitation and, in general, are currently higher than when groundwater level recording began. While long-term climate predictions may not be adequately demonstrated, prolonged droughts and low mountain snowfalls could negatively impact groundwater levels in the City. If groundwater levels decline, the City could see a reduction in well production, and the elevation of pump intakes may need to be reduced.

Point of entry treatment systems at each source are adequate for the City's needs. However, conversion to on-site generation of sodium hypochlorite from chlorine gas systems would improve reliability and reduce annual operation and maintenance (O&M) costs for the City.

Alternative water sources and associated treatment measures are discussed herein. The following criteria have been considered for each water supply alternative:

- Water quality and water quality consistency
- Source capacity
- O&M requirements
- Impact on system reliability
- Operation with existing storage reservoirs

Supply and Treatment Development Alternatives

Well No. 1 Improvement Alternative

Well No. 1 is the only source with a chlorine gas disinfection system. The existing mechanical building is undersized and, due to spatial constraints, cannot accommodate the installation of new mechanical and electrical equipment or an on-site generation system. Well No. 1 is a reliable production well with good water quality that will continue to provide drinking water for the City. Converting to an on-site sodium hypochlorite generation system would increase the reliability and safety of the source, in addition to reducing O&M costs.

Well No. 1 Pump Station Improvements

Under this alternative, the existing CMU building, including its foundation, would be entirely demolished, while protecting the wellhead. The existing generator set, automatic transfer switch (ATS), flowmeter, and pump motor would be salvaged and reinstalled with the new facility. An entirely new CMU building would be constructed around the existing well. The building would have a layout similar to the buildings at Wells No. 3 and 4, with a single room housing the well discharge head, motor, discharge manifold, on-site generation system, and all electrical, instrumentation, and controls (EI&C). The existing generator set, ATS, and flowmeter would be salvaged and reinstalled outdoors, and a new well water level monitoring system would be included.

The anticipated year 2023 project cost to complete the work described is \$808,000. A detailed cost estimate is presented on Figure 3-1.

New Groundwater Source Development Alternatives

With the largest producing source offline and remaining sources limited to 21 hours of operation per day, it was determined that the City's MDD is projected to exceed the design source supply in year 2028. Assuming a new 2.2 MG reservoir is constructed (see Chapter 4 for discussion regarding reservoir capacity), the equalization storage should be capable of accounting for periods of peak demand until approximately 2035 while retaining an emergency reserve volume equal to one day of ADD. Additional supply will then be needed. Either an entirely new source could be developed, or the capacity of one of the existing sources could be increased. Adding a new source would allow the City to exercise their full certified withdrawal rate and provide water beyond the planning period. Increasing the capacity of one of the existing sources could defer the requirement of a new source to the end of the planning period, but eventually a new source will be needed. To exercise the City's full permitted withdrawal rate by either developing a new source or increasing the capacity of the existing sources, either a permanent water right transfer or permit amendment from the OWRD would be needed. A new permit to use groundwater could also be applied for to increase the total permitted groundwater withdrawal rate.

Construct a New Well No. 5

Under this alternative, a new source would be constructed and connected to the system with approximately 600 linear feet of 12-inch transmission line, assuming the Edgington Road Transmission Line Improvement project, which is discussed further in Chapter 5, is completed prior to development of the new source. The City has already obtained a parcel adequate for the new source southwest of the city limits. Figure 3-2 shows the location of the proposed source and connection to the existing distribution system. The project would include a new mechanical building, standby power, on-site generation system, and all necessary EI&C. Assuming the new source is constructed with a sustainable yield of 1,670 gpm, the City would be able to exercise their full water right allocation with the largest source offline and the remaining sources operating for no more than 21 hours per day.

The anticipated year 2023 project cost to complete the work described is \$2,102,000. A detailed cost estimate is presented on Figure 3-3.

Increase the Capacity of Well No. 2

Under this alternative, the Well No. 2 pumps would be replaced with a higher capacity pump and motor, and the pump setting would be reduced in elevation (set deeper in the well) to accommodate potential declines in static groundwater levels. The extent of increased capacity and associated improvements would require further investigation, including aquifer and well pump tests to confirm the well's sustainable yield. Additionally, the City would need to add Well No. 2 as an additional point of appropriation to other existing water rights. Because the viability of this alternative is uncertain at this time, no detailed improvement work item list or cost estimate has been developed. The City may wish to explore the viability of this option in the future.

Well No. 3

Well No. 3 is a good producing source with a capacity of approximately 1,550 gpm under normal conditions. The well is equipped with a soft starter, which does not allow for the pump rate to be adjusted to maintain a specific discharge pressure. The source does not have standby power and will not operate during utility outages.

Well No. 3 Pump Station Improvements

A VFD and standby power would be installed at Well No. 3. This would reduce the risk of losing the source during utility outages and provide operational flexibility. These improvements would allow the City to take the existing reservoir and transmission lines offline temporarily for maintenance or replacement.

The anticipated year 2023 project cost to complete the work described is \$372,000. A detailed cost estimate is presented on Figure 3-4.

Water Supply and Treatment Recommendations

To address potential water supply capacity deficiencies to meet projected future water demand expected to arise within the planning period, it is recommended that the City either develop a new source, increase the capacity of either Well No. 1 or 2, or both. Assuming the City constructs an additional 2.2 MG of storage (discussed in Chapter 4) and assuming the largest producing source was offline, the City would need to construct and bring online a new source or increase the capacity of an existing source by year 2035.

To add redundancy and operational flexibility to the system, it is recommended that the City install a VFD and standby power to Well No. 3. This will reduce the chance of the City relying on only three of four sources during utility interruptions, and add the ability to run Well No. 3 based on a distribution set point pressure.

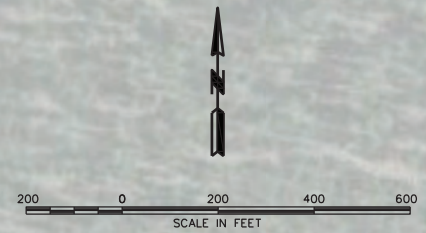
To maintain Well No. 1 in good working order and convert from gas chlorination to on-site generation of sodium hypochlorite, it is recommended the City reconstruct the Well No. 1 mechanical building in its entirety. This will provide adequate space to install new EI&C, resolve aging infrastructure deficiencies, and reduce O&M costs and safety concerns associated with the existing chlorine gas disinfection system.

**CITY OF SISTERS, OREGON
 WATER SYSTEM MASTER PLAN UPDATE
 WELL NO. 1 PUMP STATION IMPROVEMENTS
 PRELIMINARY COST ESTIMATE
 (YEAR 2023 COSTS)**

NO.	DESCRIPTION	UNIT	UNIT PRICE ¹	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	\$ 27,500	All Req'd	\$ 27,500
2	Project Safety, Temporary Traffic Control, and Quality Control	LS	20,000	All Req'd	20,000
3	Construction Survey	LS	8,000	All Req'd	8,000
4	Demolition of Existing Facilities	LS	25,000	All Req'd	25,000
5	Site Work and Landscaping	LS	15,000	All Req'd	15,000
6	Concrete Masonry Unit Building	SF	370	400	148,000
7	Painting	LS	10,000	All Req'd	10,000
8	Electrical Work	LS	70,000	All Req'd	70,000
9	Heating, Ventilation, and Air Conditioning	LS	35,000	All Req'd	35,000
10	Plumbing	LS	7,500	All Req'd	7,500
11	Instrumentation and Controls	LS	50,000	All Req'd	50,000
12	On-site Hypochlorination Generation System	LS	110,000	All Req'd	110,000
13	Mechanical Work	LS	80,000	All Req'd	80,000
Subtotal Estimated Construction Cost					\$ 606,000
Construction Contingency (15%)					91,000
Total Estimated Construction Cost					\$ 697,000
Preliminary, Design, and Construction Engineering (15%)					105,000
TOTAL ESTIMATED IMPROVEMENTS COST (2023 DOLLARS)					\$ 802,000
Other Estimated Project Costs					
Oregon Health Authority Plan Review					\$ 1,000
Deschutes County Permitting (Land use, Building, Plumbing)					5,000
Subtotal Other Estimated Project Costs (2023 Dollars)					\$ 6,000
TOTAL ESTIMATED PROJECT COST					\$ 808,000

¹All costs shown are in 2023 dollars. Estimated project costs were prepared using methodology established by the City and City Engineers with reference to pre-pandemic itemized bids inflated by 4.5 percent from the referenced project bid date to year 2023. Total estimated project costs must be re-evaluated prior to the implementation time frame to account for inflation, supply chain cost escalations, contractor availability, and general market volatility. Due to the recent volatility of the market and supply chain shortages, actual costs may vary significantly.





EDGINGTON RD.
TO CITY LIMITS
EDGINGTON ROAD
TRANSMISSION
LINE EXTENSION

PROPOSED WELL NO. 5. SEE
PROPOSED WELL NO. 5 PUMP STATION
SCHEMATIC PLAN, THIS SHEET

PROPOSED 12" W

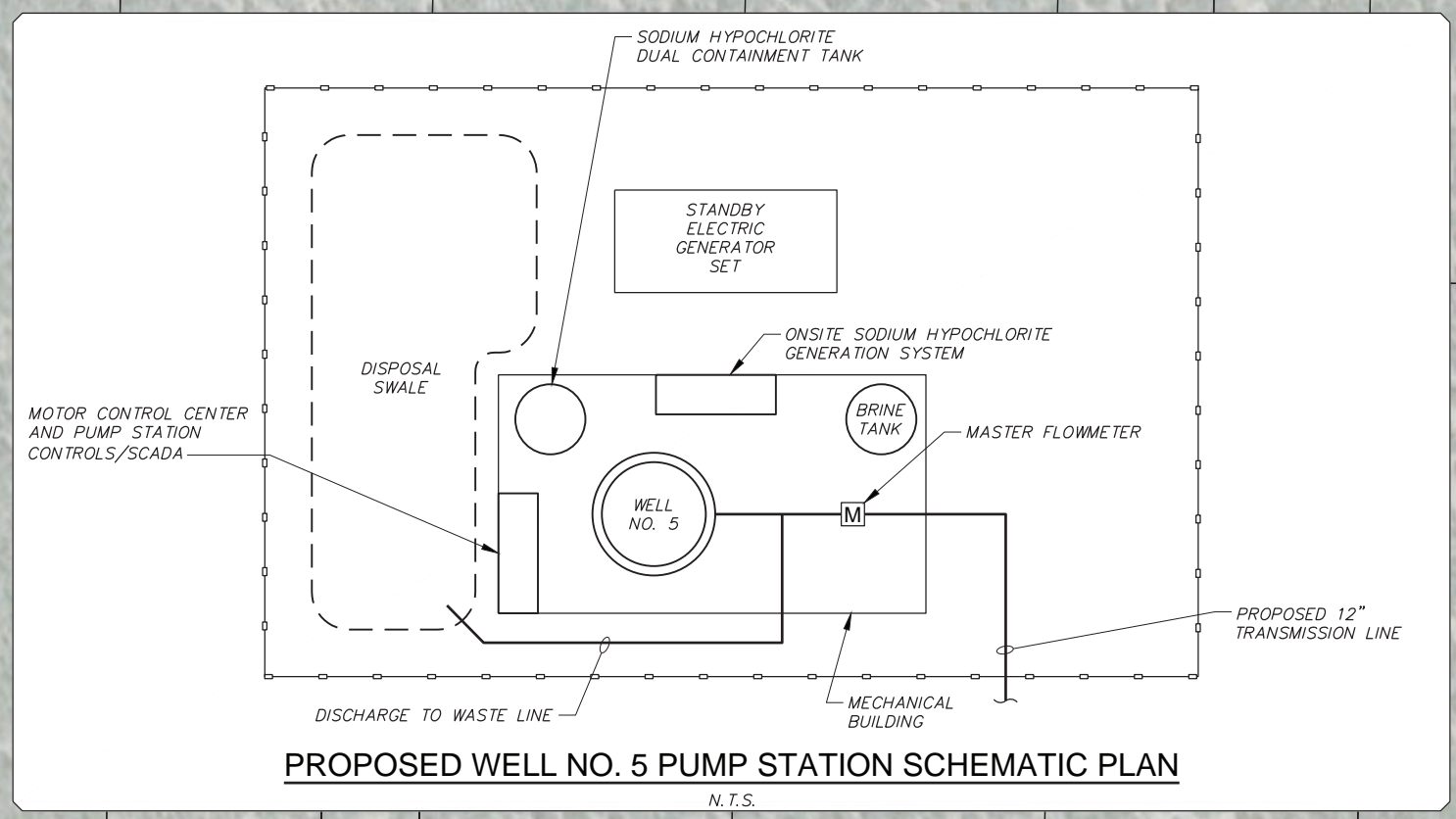
EDGINGTON ROAD
TRANSMISSION
LINE EXTENSION

EDGINGTON RD.

TO RESERVOIR

LEGEND

- WELL
- IMPROVEMENTS
- TAX LOT BOUNDARY



PROPOSED WELL NO. 5 PUMP STATION SCHEMATIC PLAN

N.T.S.

X:\Clients\Sisters OR\446-08 WSMPCAD\WMP-446-08-FIG3-2.dwg, Layout1, 3/28/2023 9:21 AM, dchristman

**CITY OF
SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE
GROUNDWATER SOURCE DEVELOPMENT
CONSTRUCT A
NEW WELL NO. 5**

**FIGURE
3-2**

**CITY OF SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE
CONSTRUCT A NEW WELL NO. 5
PRELIMINARY COST ESTIMATE
(YEAR 2023 COSTS)**

NO.	DESCRIPTION	UNIT	UNIT PRICE ¹	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	\$ 73,750	All Req'd	\$ 73,750
2	Project Safety, Temporary Traffic Control, and Quality Control	LS	30,000	All Req'd	30,000
3	Construction Survey	LS	15,000	All Req'd	15,000
4	Clearing and Grubbing	ACRE	7,500	0.5	3,750
5	Drilling and Construction of New Well	LS	450,000	All Req'd	450,000
6	Well Development	HOURL	500	24	12,000
7	Aquifer Testing	LS	45,000	All Req'd	45,000
8	Well Pump, Column, Discharge Head, and Motor	LS	140,000	All Req'd	140,000
9	Site Work and Landscaping	LS	20,000	All Req'd	20,000
10	Generator Set and Automatic Transfer Switch	LS	80,000	All Req'd	80,000
11	Concrete Masonry Unit Building	SF	370	400	148,000
12	Painting	LS	10,000	All Req'd	10,000
13	Electrical Work	LS	85,000	All Req'd	85,000
14	Heating, Ventilation, and Air Conditioning	LS	35,000	All Req'd	35,000
15	Plumbing	LS	7,500	All Req'd	7,500
16	Instrumentation and Controls	LS	100,000	All Req'd	100,000
17	On-site Hypochlorination Generation System	LS	110,000	All Req'd	110,000
18	Mechanical Work	LS	80,000	All Req'd	80,000
19	Gravel Access Drive	SY	15	400	6,000
20	Chain Link Fence and Gates	LF	30	200	6,000
21	Install 12-inch Polyvinyl Chloride Pipe	LF	180	600	108,000
22	12-inch Butterfly Valve	EA	3,000	1	3,000
23	Connect to Existing Water Line	EA	2,000	1	2,000
24	Surface Restoration	SY	12	1,000	12,000
Subtotal Estimated Construction Cost					\$ 1,582,000
Construction Contingency (15%)					237,000
Total Estimated Construction Cost					\$ 1,819,000
Preliminary, Design, and Construction Engineering (15%)					273,000
TOTAL ESTIMATED IMPROVEMENTS COST (2023 DOLLARS)					\$ 2,092,000
Other Estimated Project Costs					
Oregon Health Authority Plan Review					\$ 5,000
Deschutes County Permitting (Land use, Building, Plumbing)					5,000
Subtotal Other Estimated Project Costs (2023 Dollars)					\$ 10,000
TOTAL ESTIMATED PROJECT COST					\$ 2,102,000

¹All costs shown are in 2023 dollars. Estimated project costs were prepared using methodology established by the City and City Engineers with reference to pre-pandemic itemized bids inflated by 4.5 percent from the referenced project bid date to year 2023. Total estimated project costs must be re-evaluated prior to the implementation time frame to account for inflation, supply chain cost escalations, contractor availability, and general market volatility. Due to the recent volatility of the market and supply chain shortages, actual costs may vary significantly.



**CITY OF SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE
WELL NO. 3 PUMP STATION IMPROVEMENTS
PRELIMINARY COST ESTIMATE
(YEAR 2023 COSTS)**

NO.	DESCRIPTION	UNIT	UNIT PRICE ¹	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	\$ 13,000	All Req'd	\$ 13,000
2	Construction Survey	LS	3,500	All Req'd	3,500
3	Generator Set and Automatic Transfer Switch	LS	135,000	All Req'd	135,000
4	150 Horsepower Variable Frequency Drive	LS	40,000	All Req'd	40,000
5	Site Work	LS	15,000	All Req'd	15,000
6	Electrical Work	LS	40,000	All Req'd	40,000
7	Controls and Instrumentation Work	LS	30,000	All Req'd	30,000
8	Fencing	LF	30	100	3,000
Subtotal Estimated Construction Cost					\$ 279,500
Construction Contingency (15%)					42,000
Total Estimated Construction Cost					\$ 321,500
Preliminary, Design, and Construction Engineering (15%)					48,200
TOTAL ESTIMATED IMPROVEMENTS COST (2023 DOLLARS)					\$ 369,700
Other Estimated Project Costs					
General Permitting					\$ 2,000
Subtotal Other Estimated Project Costs (2023 Dollars)					\$ 2,000
TOTAL ESTIMATED PROJECT COST					\$ 372,000

¹All costs shown are in 2023 dollars. Estimated project costs were prepared using methodology established by the City and City Engineers with reference to pre-pandemic itemized bids inflated by 4.5 percent from the referenced project bid date to year 2023. Total estimated project costs must be re-evaluated prior to the implementation time frame to account for inflation, supply chain cost escalations, contractor availability, and general market volatility. Due to the recent volatility of the market and supply chain shortages, actual costs may vary significantly.



Chapter 4 - Water Storage

Introduction

This chapter presents information on the City of Sisters' water storage facilities. The purpose for storage in municipal water systems is discussed. The condition and needs of the City's existing water storage reservoirs are outlined, and recommended storage improvements to meet current and projected year 2042 design criteria are presented. Different types and locations for storage facility improvements are outlined.

General

Water storage facilities are constructed to meet several purposes. First, storage reservoirs are often used to provide control for well or booster pump station operation. When a reservoir drops a few feet or more from the full level, the water level can be used as a control for water supply pump activation. The amount of storage required for this type of control is called "operating storage." Second, stored water must be available to supply water during periods in which the demand for water exceeds the available water supply. This reserve is called "equalization storage." An example of this would be where system demands exceed the capacity of the water supply to the reservoir. Third, reserve storage is usually provided to supply unusually high, short-duration demands, such as fire flows. This is referred to as "fire reserve." Finally, reserve storage is often provided for emergencies that may arise and interfere with production from water supply sources. Such emergencies could be created by power outages, mechanical equipment failure, or sudden water contamination. The amount of storage to be provided for an emergency depends on the likelihood and the impact of such an occurrence. The amount of emergency storage provided usually becomes a balance between need and affordability. This storage allowance is called "emergency reserve."

Storage facilities can be located at approximately the same elevation as the entrance to the water distribution system. Storage facilities of this type require continuous operation of a booster pump station to maintain distribution system pressure. Storage facilities can also be elevated, in which case the water is stored at an elevation considerably above the distribution system to generate adequate system pressure. For example, a water elevation of 120 feet above a distribution system would generate a static pressure of approximately 50 pounds per square inch (psi). Reservoirs may be elevated by locating them on natural ground elevated above the service area or by construction on top of a structural support system.

Storage reservoirs are generally constructed of either steel, reinforced concrete, or prestressed concrete. The choice of construction material is usually based on an economic analysis. Reservoirs may be constructed either aboveground or buried, with the choice based on cost, location, and appearance.

The remainder of this chapter reviews the City's existing storage facilities, presents a discussion of future storage needs, and provides options for satisfying those needs.

Preserving Water Reservoir Water Quality

To preserve water quality, water needs to adequately circulate in and out of the storage reservoir. This is often done by providing separate inlet and outlet pipes to and from reservoirs, providing continuous

mechanical mixing, and, when possible, connecting a water supply source directly to the reservoir. The recommended complete water storage turnover time is three to five days. When estimating turnover using volume calculations, consideration should be given to potential short-circuiting and stagnation that affect the actual turnover duration.

Where water sources are located remotely from water reservoirs, water turnover also needs to account for volume within pipelines that convey water between the facilities. This is the case in the City of Sisters, where sources are located at the distribution system and a transmission line approximately 2 miles long conveys water between the sources and the water reservoir. When the sources are off, water flows out of the reservoir to the system, resulting in a declining water level in the reservoir. Eventually, a water supply pump is called to operate to fill the reservoir, which reverses the flow in the transmission main to fill the reservoir back up. Unless a significant volume of water is taken from the reservoir in each cycle, the water does not get fully exchanged in the transmission line. This could lead to water stagnation and water quality issues. Fresh supply water could simply be moved back and forth in the transmission line and not actually be delivered to the reservoir. This concept is visually presented on Figure 4-1. Stagnant water that is not properly exchanged in the reservoir will show a drop in chlorine levels, potentially allowing bacteria and other organisms to develop in the water and potentially cause taste and odor issues.

To determine the operational volumes based on turnover time, typically one fill cycle per day is assumed. Because all City water sources are groundwater with good water quality, a turnover time of five days is assumed to be an adequate starting point for this system. To provide a complete turnover in five days, the operational volume must be at least the total reservoir volume divided by five days plus the volume stored in the transmission line between the reservoir and distribution system. Currently, the volume of water in the Sisters transmission line is approximately 105,000 gallons. Given these conditions, the recommended operational volume of the existing reservoir is 425,000 gallons. Based on continuous monitoring of water quality, the turnover time can be adjusted by increasing or decreasing the operational volume of the reservoir.

The City should continuously monitor fill cycle frequency and adjust the operational storage accordingly. With any improvements made, it is important to maintain the quality of water stored in a reservoir and set water supply pump operations to allow adequate circulation of fresh water into the reservoir with each pump cycle and adequate water storage turnover.

Existing Facilities

The City's water storage system consists of one 1.6 million gallon (MG) enclosed concrete tank storage reservoir. A 2.5 MG open air storage reservoir adjacent to the concrete tank remains empty after discontinued use following the Surface Water Treatment Rule enacted in 1989 and is no longer connected to the City's water system. The City has no plans to restore the open air storage reservoir. The City's reservoir location is shown on Figure 1-1 in Chapter 1. The following section summarizes the operational characteristics of the City's existing storage reservoirs.

Pole Creek Reservoir

The Pole Creek Reservoir is an embankment dam open air reservoir originally used to store water diverted from Pole Creek. The dam was constructed in the 1960s with an embankment approximately 16 feet high and a total storage volume of 2.5 MG. Circa 2000, the surface water

system was taken offline due to the high treatment and disinfection costs to meet requirements of the Surface Water Treatment Rule enacted in 1989. The reservoir is currently not used, and the site may be used for construction of a new water storage reservoir. The reservoir is located on land owned by the federal government managed by the U.S. Forest Service (USFS).

1.6 Million Gallon Concrete Reservoir

The City’s single 1.6 MG enclosed concrete reservoir was constructed in 1995. The reservoir is a partially buried, prestressed concrete tank manufactured by Morse Bros., Inc., in Harrisburg, Oregon, which later became a member of Knife River in 1998. The reservoir is built of 40 precast wall panels and 40 precast roof panels. The panels were delivered to the site, assembled, and prestressed on a cast-in-place concrete floor. The closure strips were infilled, and a shotcrete overlay was applied to the wall sections. The reservoir is in a timbered area located on USFS land. The City was granted a conditional use permit for the construction and continued operation of the storage reservoir, piping, and building structure on the site. The site is fenced and topped with barbed wire, with access through a locked gate.

The cylindrical reservoir has a 112-foot inner diameter with a finished floor elevation at 3,327 feet (National Geodetic Vertical Datum of 1929 [NGVD 29]). The reservoir is furnished with a 12-inch inlet pipe, a 12-inch outlet pipe, a 12-inch floor drain, and a 12-inch overflow drain. The outlet pipe is set vertically 6 inches above the finished floor to provide a silt stop. The overflow drainpipe is set horizontally with the invert elevation at 3,349 feet (NGVD 29). The reservoir roof is accessed by an exterior ladder that extends to a fenced catwalk on one access hatch. A second access hatch located on the opposite side of the tank has a single safety railing near the roof edge. A roof vent provides atmospheric air pressure equalization. The reservoir is equipped with one ultrasonic level transmitter and one submersible pressure transducer, which are used to control the City’s wells. A chlorination system in the adjacent control house can be used in case of an emergency.

The reservoir was rehabilitated in 2003 by replacing the original closure pours and reconditioning the entire roof structure. The interior was also cleaned prior to being placed back in service. At the time (after nine years of service), there was very little sediment accumulation. During a site inspection in 2021, efflorescence was observed on the reservoir wall’s exterior shotcrete application. In most locations the efflorescence appears to be the result of rainwater runoff from the roof and is concentrated below roof panel joints. The damage is very minor, and the inspection report indicates the reservoir is in “very good condition” overall. The City should conduct regular inspections of the shotcrete to address any areas found to have excessive efflorescence or spalling.

The reservoir is connected to the distribution system through a single 12-inch asbestos cement (AC) pipe that allows flow in either direction depending on whether the reservoir is filling or draining. Near the reservoir, the 12-inch AC pipe splits to various lines utilizing various check valves to allow the reservoir to be filled from one end and drained from the other.

**TABLE 4-1
 EXISTING STORAGE FACILITIES**

Reservoir Capacity (MG)	Construction Material	Reservoir Diameter (feet)	Reservoir Height (feet)	High Operating Level (feet)	Low Operating Level (feet)	Backup Water Supply Wells Start (feet)	Year of Construction
1.6	Concrete	112	25	23	16	15 and 14	1995

Storage Requirements

Water storage is usually provided for several purposes. Various methods are used to calculate the volumes of each type of storage component required. Most involve a rational approach to estimating the volume of each storage component, consisting of operation, equalization, fire reserve, and emergency. The decision can then be made as to which component controls and what storage volumes will actually be necessary. For example, the decision may be made to provide storage for operation, equalization, and fire reserve only, assuming any emergency storage would be available from the fire reserve. If this option were selected, there may not be adequate fire storage available if there is a sustained power outage or if a well pump is out of service. For this reason, it is recommended that all four of the storage components be considered when evaluating the City's potential storage needs. Figure 4-2 shows typical, existing, and proposed reservoir storage components. Based on population forecasts and rational approaches to reservoir component sizing, it is recommended that the City construct an additional 2.2 MG of storage for a total of 3.8 MG to provide adequate storage through the planning year. A quantification for each storage component is described in the following sections and shown on Figure 4-3.

Operating Storage

Operating storage is generally provided to facilitate operation of water supply pumps in a water system. For example, when water system demands result in the water level lowering in a reservoir, the water level will reach a certain point that can be used to trigger activation of the supply well pumps to refill the reservoir. The storage needed to activate water supply sources is typically referred to as operating storage. This zone of operation can be set as desired but is often set to help ensure circulation occurs during each pump run cycle, allowing water to cycle through the reservoir to help maintain water quality while keeping the reservoir as full as possible. As discussed previously, due to the long transmission line between the reservoir and the City, operational storage in this case is based on turnover. At the existing reservoir site, operational storage should be at least the total reservoir volume divided by five days plus the volume of water within the reservoir transmission line.

Existing Operating Storage

As discussed previously, the minimum recommended operating storage for the existing reservoir is one-fifth of the total storage volume plus the volume within the reservoir transmission lines, or 425,000 gallons. The reservoir is currently set to lower 7 feet from the full level before the primary water supply pump is called to operate and fill the reservoir. This corresponds to an operational storage volume of approximately 516,000 gallons, which is approximately 32 percent of the total available storage. If the level drops an additional 1 or 2 feet, the first and second backup water supply pumps will be called to run, respectively. During normal demand, the reservoir feeds the City by gravity flow for approximately 18 to 24 hours before wells are called to run. Filling the reservoir then takes between 12 and 16 hours. This practice currently exchanges approximately 500,000 gallons in the reservoir each cycle, which is adequate to meet the recommended turnover time.

Proposed Operating Storage

As discussed further in Chapter 5, multiple phases of improvements to the reservoir transmission lines are proposed. Assuming all improvements proposed in Chapter 5 will be completed, the volume within the proposed transmission lines would be approximately 250,000 gallons. The total volume of the existing and proposed reservoirs is 3.8 MG. Based on preserving water quality with a turnover of five days, the minimum recommended operating volume of the proposed facilities is 1.0 MG.

Equalization Storage

Equalization storage must be provided to balance the difference between periods of peak demand and available water supply capacity. Depending on the available source supply compared with the peak period demand, this may occur during a two-hour fire flow scenario or during the MDD, depending on which scenario results in the highest equalization volume. These are shown on Table 4-3 as Equalization Method Scenarios 1 and 2, respectively. Each method takes the difference between the peaking periods' average demand and available source supply and multiplies that rate by the peaking period duration to calculate the total equalization storage volume required.

Existing Equalization Storage

Based on providing the current (year 2022) estimated maximum daily demand (MDD) (2,050 gallons per minute [gpm]) plus the NFF (2,500 gpm) of 4,550 gallons per minute (gpm) for two hours and using the available supply capacity of 3,050 gpm, 180,000 gallons must come from the reservoirs.

Interim Year 2035 Equalization Storage

The interim year is that in which the reservoir's equalization storage can no longer provide the difference between periods of peak demand and available source supply while maintaining a minimum emergency reserve allocated volume discussed below. Assuming the City's storage is increased to a total of 3.8 MG, this is the year that construction of a new source or an increase in available source supply must be brought online. Under these conditions, the equalization storage needed is the difference between the MDD and the supply flow available, or approximately 1,060,000 gallons.

Year 2042 Equalization Storage

It is anticipated that by year 2042 a new source will have been developed and the City will be capable of exercising the full water right withdrawal rate. It is shown that under these assumptions the equalization storage needed is the difference between the MDD and the supply flow available, or approximately 692,000 gallons.

Fire Reserve

Reserve storage for fire suppression is usually determined by the maximum needed fire flow rate and duration. However, because NFF has already been accounted for in equalization storage Method 1, on Table 4-2 fire reserve is shown as zero.

Emergency Storage

Emergency storage reserve is usually provided for a minimum of one to three days of average daily demand (ADD) to supply demand during a power outage, mechanical problems, or other problems that would interrupt the reliable supply of water. In most cases, this reserve would be sized to provide water for the amount of time needed to repair or replace a well pump, water supply source pump, or other equipment. Emergency storage can be reduced by discretion when multiple water supply sources are available and equipped with adequate standby power. Due to the number of water supply sources with backup power available in Sisters, Public Works staff believe that emergency reserves based on one day of ADD would be appropriate. Emergency reserves below one day of ADD are not considered a critical deficiency as typical water system function is not dependent on emergency storage. However, an emergency reserve of less than one day of ADD does not provide the level of safety the City deems necessary.

Table 4-2 shows the City’s current (year 2022) and future (year 2042) recommended storage capacities.

**TABLE 4-2
 RECOMMENDED CITY STORAGE VOLUMES**

Type of Storage	Volume (gallons)	
	Current Year 2022	Planning Year 2042
Operational Storage	425,000	1,000,000
Equalization Storage	180,000	692,000
Fire Reserve ¹	0	0
Emergency Reserve	1,034,500	2,082,000
Total Recommended Storage	1,640,000	3,794,000
Available Storage	1,600,000	3,800,000 ²
Additional Recommended Storage	40,000	0

¹Fire reserve accounted for in equalization storage.

²Assuming an additional 2.2 MG of storage is constructed.

Storage Requirements Summary

The four storage components described herein require a total of approximately 1,640,000 gallons for the current year, indicating that the existing storage capacity has just recently become insufficient to be able to provide the City’s emergency reserve allocation of one day of ADD. Assuming an additional 2.2 MG of storage is constructed for a total of 3.8 MG, the available storage will become inadequate to provide water in periods of peak demand in year 2035, in which the source capacity must be increased. Assuming an additional source is constructed such that the City can withdraw their full water right, the 3.8 MG of recommended storage will remain adequate through year 2042. At that time, the City may consider either constructing more storage, or reevaluating the recommended reservoir storage components to determine if the construction of additional storage may be deferred.

Existing Water Reservoir Condition

To evaluate potential existing water reservoir deficiencies or operational issues that could affect the City's storage needs, a reservoir inspection and assessment was provided by DN Tanks, Inc., for inclusion in this Water System Master Plan (WSMP) Update. A summary of the inspection report and related existing reservoir improvements are also discussed.

Summary of Inspection Report

A thorough interior and exterior inspection of the City's water reservoir was completed on May 16, 2022, by DN Tanks, Inc. A copy of the 2022 inspection report for the Morse Bros., Inc., 1.6 MG prestressed concrete storage tank is included in Appendix F.

In general, the inspection found that prestressed reinforcement and structural concrete walls and columns were in excellent condition with limited or no signs of corrosion or deterioration. Efflorescence was visible on the exterior of the tank where shotcrete was applied. A prior repair visible on the tank floor is showing signs of failure with a loss of material. Daylighting was visible in the tank, indicating loss of filler materials in the construction joints. The exterior roof is in fair condition with visible deterioration of a previously applied coating.

Items that are Acceptable

- Interior concrete columns are not cracking or spalling and no visible deficiencies were identified.
- Interior concrete walls are in excellent condition.
- Prestressed steel is not showing signs of corrosion.

Inspection Items Repaired During the Development of this WSMP Update

- Construction joints on the tank roof.

Items Needing Repair or Replacement

- Remove epoxy repair coating on tank floor and replace it with elastomeric coating.
- Repair concrete spalls on the underside of the tank roof.
- Apply protective coating to exterior roof.
- Recoat exterior walls with paint system.

The City should continue to monitor for settling cracks along the tank roof, walls, and floor; and delaminating shotcrete; and conduct repairs if necessary. The coating failures should also be monitored and repaired, if necessary. Steps should be taken to prevent or repair further deterioration of the exterior roof and concrete joints. The repairs noted in the inspection could help extend the service life and avoid potential water quality concerns with water intrusion.

Water Quality-related Improvements

The existing water reservoir does not have an effective means of circulating water, which can lead to stratification. Stratification of water can depress chlorine residuals in the reservoir, which can give treated water unpleasant odors or tastes and may even pose health risks to customers. Sufficient chlorine residuals are also important for maintaining good water quality within the distribution system and preventing organic buildup in pipes.

The City should continue to monitor water reservoir water quality. If stratification is observed, it is recommended the City install mixers to maintain sufficient chlorine residuals. Due to the variation in flows between winter and summer seasons, when the total storage is increased to the proposed 3.8 MG, the City should monitor reservoir turnover times and consider reducing the stored volume during low demand periods to maintain average turnover times to less than five days.

Recommended Water Reservoir Maintenance Improvements

Structural and cosmetic maintenance improvements should be completed regularly to extend the useful life of storage tanks and reduce repair costs. The City's forthcoming Capital Improvements Plan includes several maintenance-related projects for the existing water reservoir and are presented below.

- Rehabilitate the roof surface and reapply the protective coating.
- Remove existing epoxy repair and replace it with elastomeric coating.
- Repair construction joint fill material.
- Repair spalling concrete.
- Recoat exterior walls with paint system.

The total estimated maintenance/repair cost for the existing water reservoir is \$250,000.

Potential Reservoir Capacity Improvement Options

This section discusses potential reservoir improvement options for consideration to serve the long-term water storage needs of the City of Sisters.

Reservoir Types

As previously discussed, storage reservoirs may be constructed of either steel, reinforced concrete, or prestressed concrete and have different configurations. Examples of typical storage reservoir types are shown on Figure 4-4. The choice is usually based on an economic analysis of both capital and operational costs and aesthetics associated with the particular installation. Further discussion of reservoir types follows.

For ground-level type reservoirs of 1.0 MG or less, steel reservoirs are usually less expensive to construct when compared to concrete reservoirs. There are two primary types of steel reservoirs: glass-fused bolted steel reservoirs and painted welded steel reservoirs. Glass-fused bolted steel reservoirs are comparable in cost to painted welded steel reservoirs and can result in less

maintenance costs over the life of the reservoir because sandblasting and recoating are normally not needed. However, glass-fused bolted steel reservoirs are susceptible to leaking due to the many bolts and mastic seals, and the appearance of glass-fused bolted steel reservoirs cannot be changed after installation. The long-term life cycle of glass-fused bolted steel reservoirs is also not known as they were introduced to the municipal water supply market in the late 1970s and early 1980s.

It is often desirable for reservoirs to serve the distribution system by gravity flow. Two options to achieve this include constructing a ground-level storage reservoir at a higher elevation than the service area or constructing an elevated reservoir in the vicinity of the service area. Elevated reservoirs are more expensive than ground-level reservoirs when providing similar storage volumes. However, transmission main lengths can often be reduced and the cost of additional transmission main lengths should be considered when comparing reservoir construction costs.

Elevated reservoir types include:

- Standpipe style, in which the height significantly exceeds the diameter and water is stored throughout the entire height of the tank.
- Spherical style, with a water storage sphere placed atop a single structural pedestal.
- Pillar style, which are similar to spherical tanks but have a larger diameter center pillar that can be utilized to house equipment, storage, or offices.

Refer to Figure 4-4 for pictures of each reservoir type.

Standpipe style reservoirs can be constructed of bolted steel or coated, welded steel. Storage from the lower portion of a standpipe reservoir is not always available to fully pressurize the system by gravity flow and sometimes requires booster pumps to maintain distribution system pressure when reservoir levels are low. Depending on site soil and seismic characterizations, standpipe style reservoirs are generally limited to a maximum height of 120 feet. This results in a maximum system pressure in the immediate vicinity of the standpipe reservoir of approximately 50 psi.

Both spherical and pillar style reservoirs have the benefit (over standpipe style) of storing more volume at a higher elevation near the top of the structure. Spherical reservoirs are generally welded steel that is epoxy or polyurethane coated. The pillar style reservoirs can either have a concrete pillar and steel storage area (composite tank) or consist of all-steel construction. Spherical and pillar style elevated storage reservoirs normally have higher capital costs than standpipe style reservoirs.

Water Storage Reservoir Type Life Cycle Cost Analysis

Consideration should be taken by the City when selecting the type of water storage reservoir to best meet the City's short- and long-term needs. Each type of storage reservoir has distinct advantages that can be demonstrated through determining present worth costs over a specific future time period. The life cycle cost analysis discussed hereafter considered all costs associated with the construction and maintenance of each reservoir type over a lifespan of 75 years. For the purpose of this analysis, the proposed reservoir was assumed to have the same height as the City's existing 1.6 MG reservoir and a volume of 2.2 MG. It should be noted that the design life of welded steel and prestressed concrete reservoirs was estimated to be 75 years, while the glass-fused bolted steel reservoir's design life was estimated to be 50 years, though a bolted steel reservoir may last longer than 50 years. To account for the disproportionate design life of the reservoir types, a replacement investment cost was included in

the analysis at five-year intervals equal to the initial construction cost divided by the estimated design life. The construction cost inflation percentage was set to exceed the interest rate percentage associated with the value of improvement (present worth rate) to accurately reflect increased costs over time. Only the direct cost of the reservoir is included in this analysis, including foundation work and painting. Other work including yard piping, fencing, etc., was negated as it is assumed these costs will be similar amongst the various reservoir types. Figure 4-5 presents a summary table of the life cycle cost analysis. Descriptions of each water storage reservoir type are provided below.

Welded Steel Reservoir

A 2.2 MG welded steel reservoir is estimated to cost approximately \$2,550,000 to construct based on previous water storage reservoir projects completed by Anderson Perry & Associates, Inc. The cost of constructing a welded steel storage reservoir falls between the other two reservoir types; however, significant maintenance costs are required to maintain storage performance and water quality. Maintenance costs include cleaning the reservoir every five years, maintaining the cathodic protection system, replacing sacrificial anodes every 25 years, and repairing potential damage to the reservoir walls. The most expensive maintenance cost would be to recoat the interior and exterior walls, which would cost approximately \$750,000 every 30 years. A welded steel reservoir provides the highest 75-year present worth cost.

Glass-Fused Bolted Steel Reservoir

A 2.2 MG glass-fused bolted steel reservoir would have the lowest construction cost of cost approximately \$2,350,000. This reservoir would follow the same maintenance procedures as a welded steel reservoir, excluding wall recoating. The roof of this reservoir is supported by a metal (usually aluminum) web truss. Depending on the ambient conditions inside the reservoir, the web truss will eventually exceed its service life and require replacement. For this analysis, the web truss life cycle was estimated at 25 years. A glass-fused bolted steel reservoir provides a 75-year present worth cost that is approximately \$846,000 less than the welded steel reservoir based on this analysis.

Prestressed Concrete Reservoir

A 2.2 MG prestressed concrete reservoir is estimated to cost approximately \$2,950,000 to construct, making it the most expensive storage reservoir option; however, maintenance costs over the service life of the reservoir would be minimal in comparison to the reservoir types previously discussed. Required maintenance would include cleaning the reservoir as needed, repairing damage that may occur to the tank exterior (cracking), and recoating the exterior as required. The lifespan of the exterior coat will depend on the conditions and climate the reservoir is exposed to but was estimated at 30 years for this analysis. Potential repairs are associated with concrete reservoirs that routine maintenance would not account for. An additional \$100,000 was added for miscellaneous repairs that may be needed approximately halfway through the reservoir's 75-year design life. A prestressed concrete reservoir provides the lowest 75-year present worth cost.

Based on the storage reservoir type life cycle cost analysis performed, glass-fused bolted steel and welded steel reservoirs should be considered if low initial construction costs are desired. However, projecting over a 75-year operational period, these tanks will require significant investments toward

maintenance. A prestressed concrete reservoir would have a larger initial construction cost but would be less expensive over the 75-year design life due to less required maintenance.

Reservoir Options

The amount of future storage needed depends on the amount of emergency reserve the City determines is adequate to provide for emergency and unforeseen circumstances. It was determined that approximately 2.2 MG of additional storage would be adequate to meet the year 2042 projected growth while providing a reasonable amount of emergency reserve. One site option was identified for construction of the needed storage reservoir, which is directly adjacent to the existing 1.6 MG water reservoir. This site is more ideal than any other location, as it does not need to be elevated or constructed with a booster pump station to provide adequate distribution system pressure, the City has a pre-existing special use permit with the USFS for the land-use approval, and it can be easily connected to the existing system without additional transmission lines.

Recommended Storage Improvements and Cost

Based on discussions with City staff, a prestressed concrete reservoir is the preferred method of construction for any new water reservoir, as it has the lowest 75-year present worth cost, highest resilience to seismic activity, and will match better aesthetically with the existing tank. The site for the new reservoir, which is adjacent to the existing reservoir, is ideal, as its elevation in relation to the City provides adequate pressure without the need for booster pump stations.

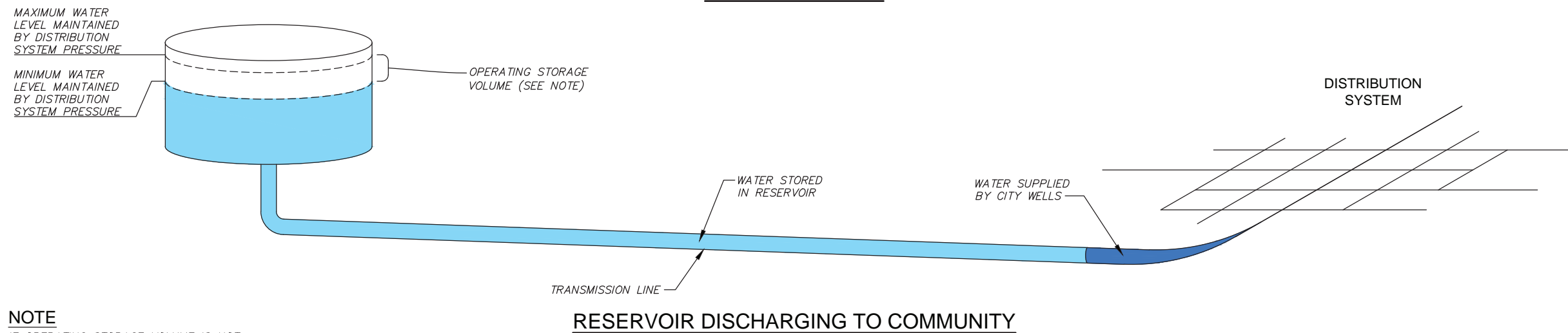
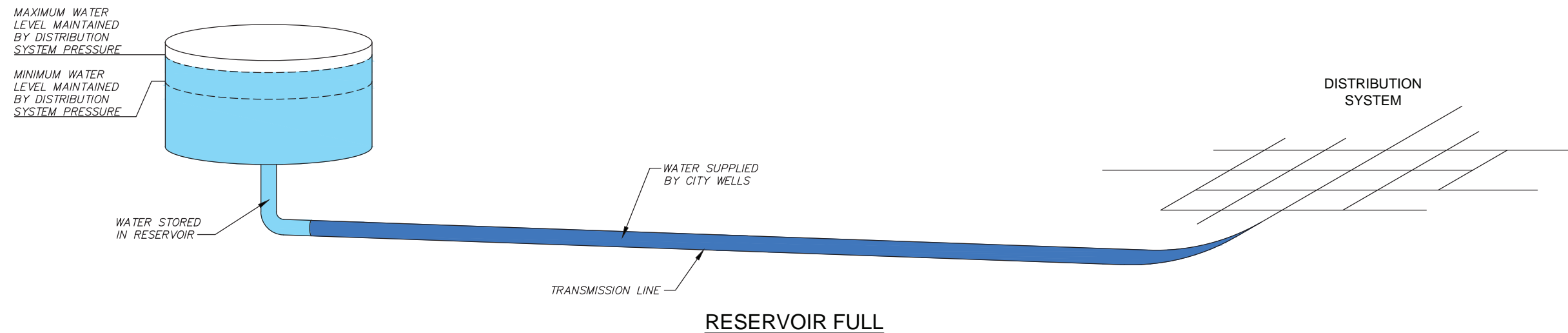
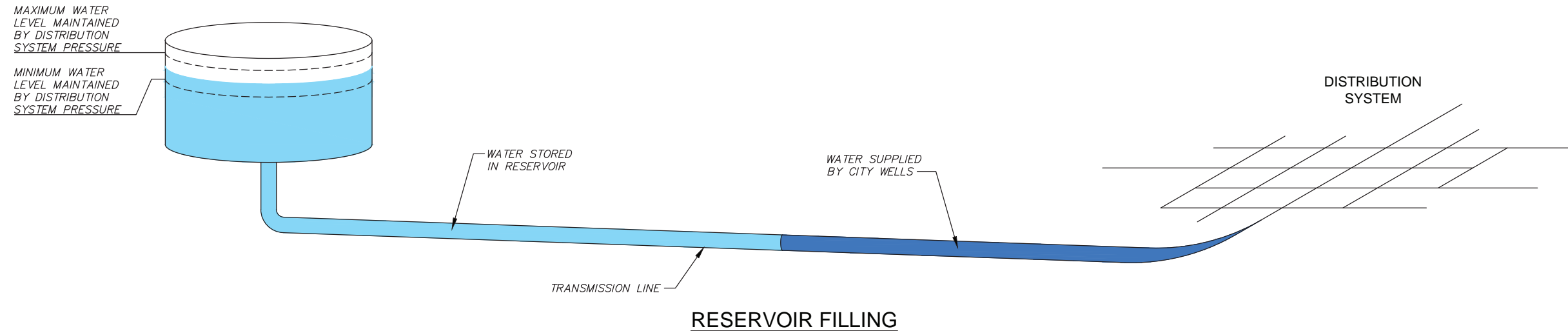
New 2.2 Million Gallon Prestressed Concrete Water Storage Reservoir and Site Improvements

Under this alternative, the City would construct a new ground-level, partially buried 2.2 MG prestressed concrete water storage reservoir and piping connecting the new reservoir to both the existing 1.6 MG concrete tank and transmission line. The total volume of the two tanks (3.8 MG combined) would accommodate the projected MDD during year 2042 with three-quarters of a day of ADD emergency reserve storage. This alternative assumes a new source is added to the system within the planning period prior to 2035. The new water storage reservoir would be constructed adjacent to and hydraulically connected to the existing concrete tank. Backflow prevention valves would be incorporated so when the tanks are filling and emptying, water would enter the inlet of the existing 1.6 MG tank and exit the new 2.2 MG tank. This operational process would ensure water is continuously cycled through both water reservoirs. Isolation valves would also be incorporated such that either tank could be taken offline while the other remains in service. Automatically actuated control valve(s) may be included, allowing simultaneous flow from both tanks into the transmission line during periods of peak demand. Rehabilitation of the existing 1.6 MG reservoir as previously discussed would be completed after the new tank is brought online.

The proposed location for the reservoir, connection lines, and valve control boxes are shown on Figure 4-6. The reservoir base elevation and sidewall heights would be set to those of the existing reservoir so the tanks could be hydraulically connected without the need for additional control valves. The anticipated year 2023 project cost for the work described is \$6,283,000 and includes rehabilitation of the existing reservoir. A detailed cost estimate is presented on Figure 4-7.

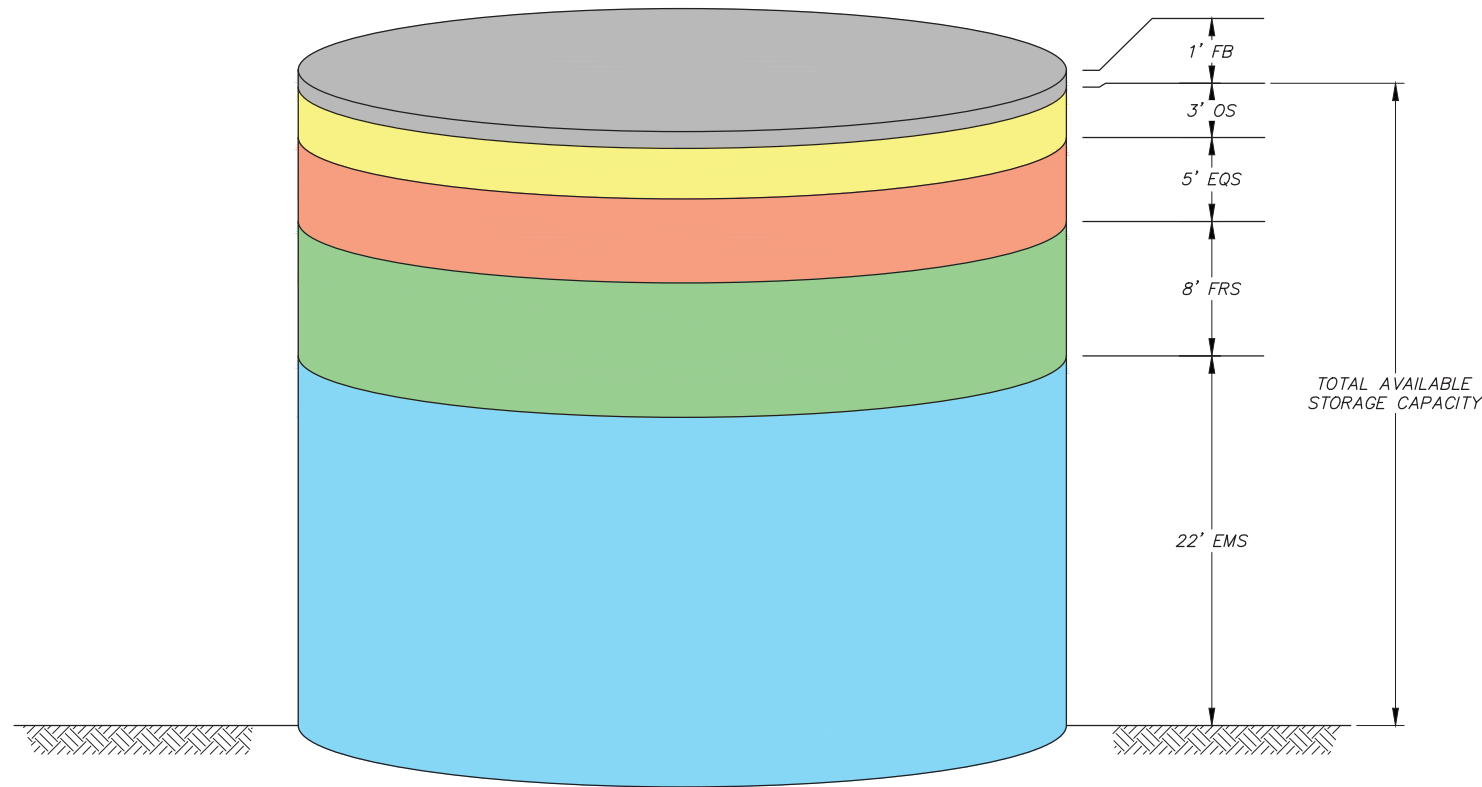
Recommended Storage Improvements

Based on findings of this WSMP Update and discussions with City staff, it is recommended an additional 2.2 MG of storage be constructed. The preferred type of reservoir based on life cycle costs is a prestressed concrete tank. Tank resilience to seismic activity is another benefit of this type of construction, though potential structural damage during the anticipated Cascadia earthquake is anticipated to be low. The location of the new reservoir will be adjacent to the existing reservoir for ease of connection to the existing system and per the pre-arranged agreement with the USFS for the proposed land use. The reservoir should be constructed at the same elevation as the existing tank to allow a hydraulic connection without additional control mechanisms. The new reservoir will need to be constructed prior to 2035 (or equivalent population of 5,715) or the City risks being unable to provide adequate flow during peak demand periods. To maintain adequate emergency reserve, the new reservoir should be constructed immediately.

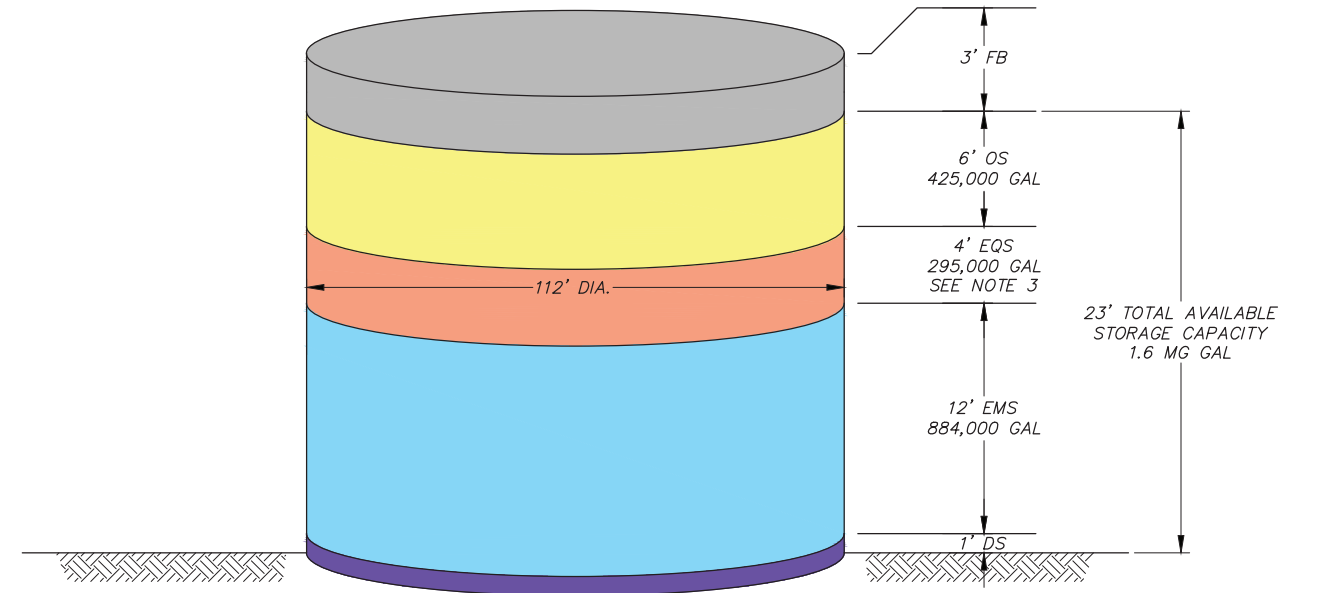


NOTE
 IF OPERATING STORAGE VOLUME IS NOT LARGE ENOUGH, THE WATER STORED IN THE RESERVOIR MAY NOT BE EXCHANGED WITH FRESH WATER SUPPLIED BY THE BOOSTER PUMP STATIONS THROUGH THE DISTRIBUTION SYSTEM.

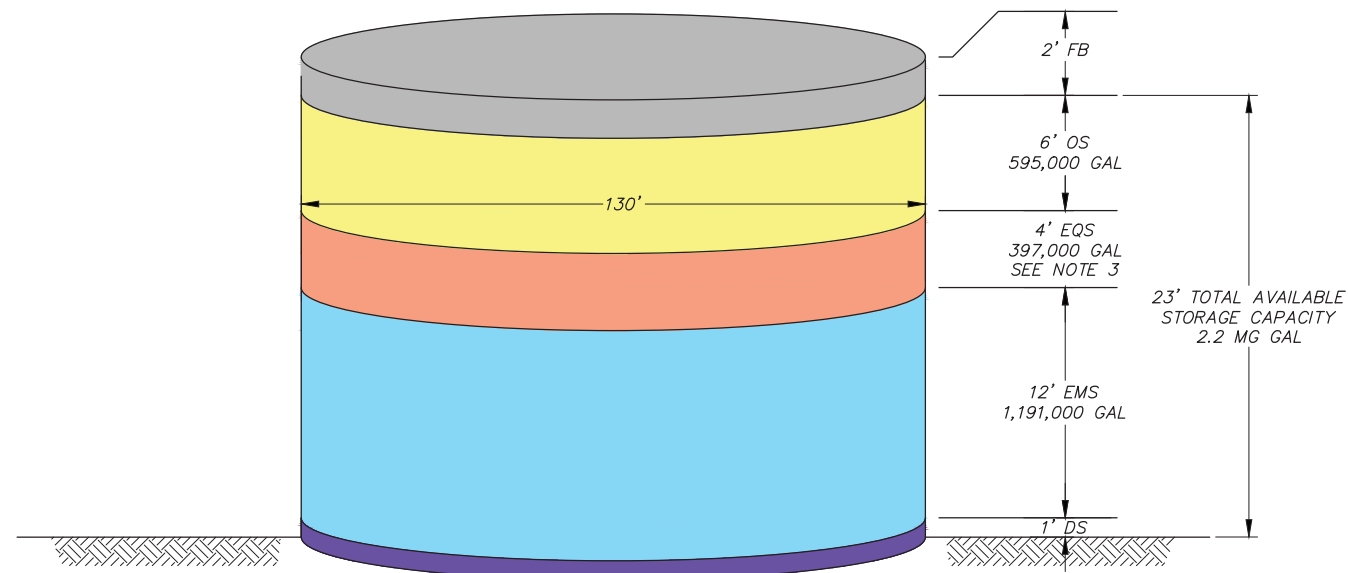
	<p>CITY OF SISTERS, OREGON WATER SYSTEM MASTER PLAN UPDATE EXAMPLE RESERVOIR WATER EXCHANGE SCHEMATIC</p>	<p>FIGURE 4-1</p>
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EXAMPLE RESERVOIR OPERATING RANGES



1.6 MG RESERVOIR NO. 1 OPERATING RANGES
(CONSTRUCTED IN 1995)



PROPOSED 2.2 MG RESERVOIR

LEGEND

- FREEBOARD (FB)
- OPERATING STORAGE (OS)
- EQUALIZING STORAGE (EQS)
- FIRE RESERVE STORAGE (FRS)
- EMERGENCY STORAGE (EMS)
- DEAD STORAGE (DS)

ABBREVIATIONS

- FB - FREEBOARD
- OS - OPERATING STORAGE
- EQS - EQUALIZING STORAGE
- FRS - FIRE RESERVE STORAGE
- EMS - EMERGENCY STORAGE
- MG - MILLION GALLON
- GAL - GALLON
- DS - DEAD STORAGE

NOTES

1. OPERATING RANGES ARE FOR PRESENTATION PURPOSES AND ARE APPROXIMATE.
2. STORAGE VOLUMES ARE BASED ON BOTH DESIGN CRITERIA AND TOTAL SYSTEM AVAILABLE STORAGE. VOLUMES SHOWN MAY NOT REFLECT ACTUAL RESERVOIR OPERATION.
3. FIRE RESERVE STORAGE NOT SHOWN AS FRS IS INCORPORATED IN EQUALIZING STORAGE.

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**CITY OF
SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE**

**RESERVOIR STORAGE
VOLUME SCHEMATIC**

**FIGURE
4-2**

SUMMARY OF STORAGE DESIGN CRITERIA

	Year 2022	Interim Year 2035 (Increase Source Supply)	Planning Year 2042 (with new source)
Design Population ¹	3,437	5,715	6,917
Supply			
Average Daily Demand ² (ADD) (gpcd)	301	301	301
ADD (gpd)	1,034,500	1,720,200	2,082,000
ADD (gpm)	720	1,190	1,450
Maximum Daily Demand ³ (MDD) (gpcd)	858	858	858
MDD (gpd)	2,948,400	4,902,600	5,933,700
MDD (gpm)	2,050	3,400	4,120
Estimated Supply Flow Available ⁴ (gpm)	3,050	3,050	4,160
Estimated Supply Flow Available ⁵ (gpd)	3,843,000	3,843,000	5,241,600
Needed Fire Flow (NFF) (gpm)	2,500	2,500	2,500
Fire Flow Duration (hour)	2	2	2
MDD plus NFF (gpm)	4,550	5,900	6,620
Storage			
Operating Storage ⁶ (gal)	425,000	1,000,000	1,000,000
Equalization Method Scenarios			
Method 1 - MDD plus NFF ⁷	180,000	342,000	295,200
Method 2 - MDD ⁸ (gal)	0	1,060,000	692,000
Fire Reserve ⁹	0	0	0
Emergency Reserve ¹⁰ (gal)	1,034,500	1,720,200	2,082,000
Total Recommended Storage (gal)	1,640,000	3,781,000	3,774,000

¹Population estimate and projections from the Population Research Center at Portland State University.

²ADD calculated from historical records provided by City staff for years 2016 to 2020.

³MDD peaking factor of 2.85 x ADD calculated from historical records provided by City staff for years 2016 to 2020.

⁴Assumes the largest producing well is offline.

⁵Assumes a maximum operation of 21 hours per day.

⁶Transmission line volume plus total storage divided by five days.

⁷Difference between MDD plus NFF and estimated instantaneous supply flow available for three hours.

⁸Difference between MDD and estimated daily supply flow available.

⁹Fire flow is accounted for in equalization storage evaluation. No separate fire flow storage is needed for this evaluation.

¹⁰One-day supply at ADD, assuming only storage is used.

gal = gallons

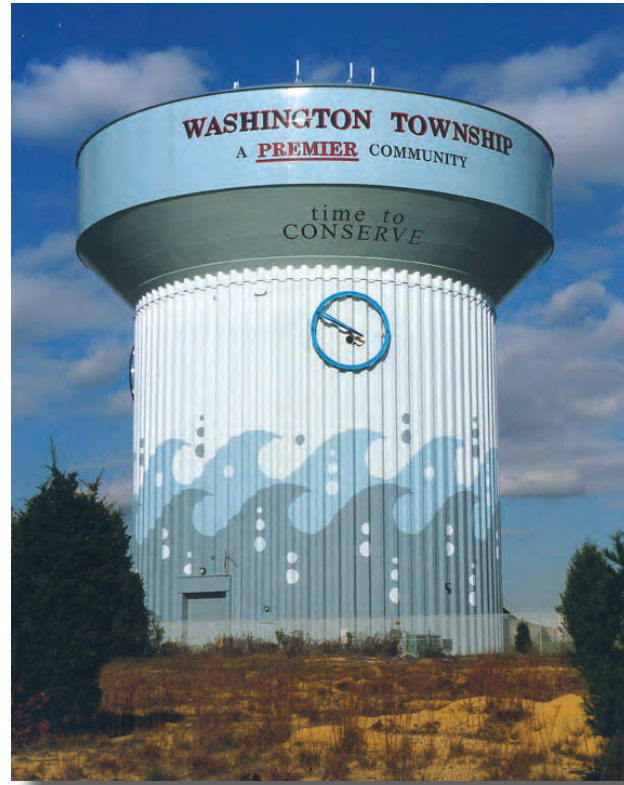
gpcd = gallons per capita per day

gpd = gallons per day

gpm = gallons per minute



Pillar Style Elevated Composite (Concrete/Steel) Reservoir - Plano, Texas (Courtesy of CB&I)



Pillar Style Elevated Steel Reservoir Washington Township, Pennsylvania (Courtesy of CB&I)



Spherical Elevated Steel Reservoir Clanton, Alabama (Courtesy of CB&I)



Standpipe Style Welded Steel Reservoir Moses Lake, Washington (courtesy of Rocamia Design)



Prestressed Concrete Reservoir Cypress College in Cypress, CA (courtesy of DN Tanks)



Ground Level Bolted Steel Reservoir - Cove, Oregon



**CITY OF SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE
STORAGE RESERVOIR TYPE LIFE CYCLE COST ANALYSIS**

Tank Characteristics	Diameter, ft	130
	Height, ft	24
	Capacity, MG	2.2
Time Value	Annual Inflation Rate	4.0%
	Present Worth Rate	3.0%

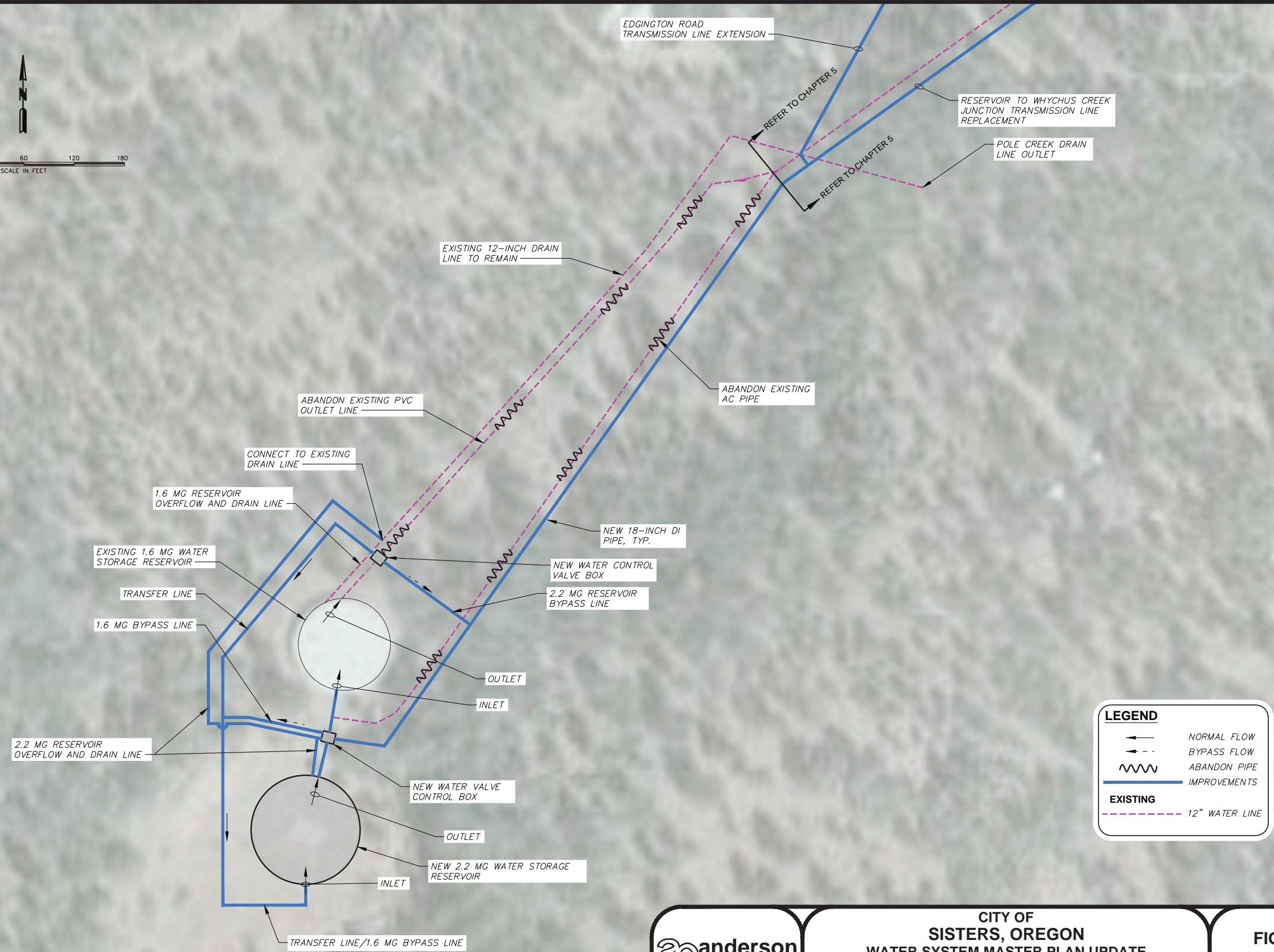
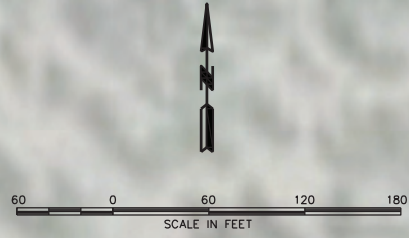
Maintenance Type	Data Description	Type of Tank		
		Welded Steel	Glass-Fused Bolted Steel	Prestressed Concrete
Design Life		75	50	75
1	Estimated Cost for Constructing New Tank ¹	\$ 2,550,000	\$ 2,350,000	\$ 2,950,000
2	Repainting Cycle, years	30	N/A	30
	Interior Surface Area, SF	38,000	N/A	N/A
	Exterior Surface Area, SF	24,000	N/A	10,200
	Interior Repainting Cost, \$/SF	\$ 12	N/A	N/A
	Exterior Repainting Cost, \$/SF	\$ 12	N/A	\$ 12
3	Reservoir Cleaning Cycle, years	5	5	5
	Cost for Cleaning Reservoir with Divers	\$ 7,500	\$ 7,500	\$ 7,500
4	Check and Clean Cathodic Protection System, years	5	5	N/A
	Cost to Check and Clean Cathodic Protection System	\$ 1,000	\$ 1,000	N/A
5	Replace Sacrificial Anode, years	20	20	N/A
	Cost for Replacing Sacrificial Anode	\$ 20,000	\$ 10,000	N/A
6	Repair Tank Wall, years	10	10	10
	Cost for Repairing Tank Wall	\$ 1,200	\$ 1,000	\$ 800
7	Replace Web Truss on Bolted Steel Tank, years	N/A	20	N/A
	Cost for Replacing Web Truss	N/A	\$ 30,000	N/A
8	Miscellaneous Repairs, years	N/A	N/A	40
	Cost for Miscellaneous Repairs	N/A	N/A	\$ 100,000
9	Replacement Investment Deposit, years	5	5	5
	Deposit Amount	\$ 170,000	\$ 235,000	\$ 197,000

Expenditure Costs						
Years in the Future	Welded Steel Maintenance Type	Welded Steel Expense	Glass-Fused Bolted Steel Maintenance Type	Glass-Fused Bolted Steel Expense	Prestressed Concrete Maintenance Type	Prestressed Concrete Expense
0	1,9	\$ 2,720,000	1,9	\$ 2,585,000	1,9	\$ 3,147,000
5	3,4,9	\$ 187,335	3,4,9	\$ 255,552	3,9	\$ 214,622
10	3,4,6,9	\$ 197,929	3,4,6,9	\$ 269,302	3,6,9	\$ 226,126
15	3,4,9	\$ 206,338	3,4,9	\$ 281,476	3,9	\$ 236,393
20	3,4,5,6,9	\$ 242,270	3,4,5,6,7,9	\$ 345,147	3,6,9	\$ 249,064
25	3,4,9	\$ 227,269	3,4,9	\$ 310,029	3,9	\$ 260,373
30	2,3,4,6,9	\$ 1,234,282	3,4,6,9	\$ 326,710	2,3,6,9	\$ 437,885
35	3,4,9	\$ 250,324	3,4,9	\$ 341,478	3,9	\$ 286,786
40	3,4,5,6,9	\$ 293,916	3,4,5,6,7,9	\$ 418,723	3,6,9	\$ 449,336
45	3,4,9	\$ 275,717	3,4,9	\$ 376,118	3,9	\$ 315,877
50	3,4,6,9	\$ 291,309	3,4,6,9	\$ 396,355	3,6,9	\$ 332,809
55	3,4,9	\$ 303,686	3,4,9	\$ 414,272	3,9	\$ 347,920
60	2,3,4,5,6,9	\$ 1,685,004	3,4,5,6,7,9	\$ 490,128	2,3,6,9	\$ 585,118
65	3,4,9	\$ 334,492	3,4,9	\$ 512,513	3,9	\$ 383,213
70	3,4,6,9	\$ 353,408	3,4,6,9	\$ 500,514	3,6,9	\$ 403,754
75	3,4,9	\$ 368,423	3,4,9	\$ 502,583	3,9	\$ 422,087
Present Worth Cost:		\$ 9,172,000		\$ 8,326,000		\$ 8,299,000

¹Includes tank foundation, materials, construction/installation, and painting only. All other project costs typical of all reservoir types (clearing and grubbing, fencing, yard piping, etc.) are excluded from this comparison.

ft = feet
 MG = million gallons
 SF = square feet
 \$/SF = Cost per square foot





LEGEND	
	NORMAL FLOW
	BYPASS FLOW
	ABANDON PIPE
	IMPROVEMENTS
EXISTING	
	12" WATER LINE

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	CITY OF SISTERS, OREGON WATER SYSTEM MASTER PLAN UPDATE	FIGURE 4-6
	NEW 2.2 MG RESERVOIR SCHEMATIC SITE PLAN	

**CITY OF SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE
NEW 2.2 MG PRESTRESSED CONCRETE WATER STORAGE RESERVOIR
AND SITE IMPROVEMENTS
PRELIMINARY COST ESTIMATE
(YEAR 2023 COSTS)**

NO.	DESCRIPTION	UNIT	UNIT PRICE ¹	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	\$ 225,750	All Req'd	\$ 225,750
2	Project Safety, Temporary Traffic Control, and Quality Control	LS	100,000	All Req'd	100,000
3	Construction Survey	LS	15,000	All Req'd	15,000
4	Clearing and Grubbing	ACRE	7,500	2	15,000
5	Rehabilitate existing 1.6 Million Gallon (MG) Reservoir	LS	250,000	All Req'd	250,000
6	Site Work including Excavation, Embankment, etc.	LS	190,000	All Req'd	190,000
7	Reservoir Pad	SY	65	1,500	97,500
8	2.2 MG Prestressed Concrete Reservoir	GAL	1.30	2,200,000	2,860,000
9	18-inch Ductile Iron Reservoir Site Piping	LF	240	2,300	552,000
10	Connect to Existing Water Line	EA	2,250	3	6,750
11	Control Valves, Vaults, Fittings, etc.	LS	180,000	All Req'd	180,000
12	Exterior Tank Wall Painting	SF	10	10,200	102,000
13	Appurtenances	LS	55,000	All Req'd	55,000
14	Gravel Access Drive	SY	15	600	9,000
15	Chain Link Fence and Gates	LF	30	600	18,000
16	Electrical Work	LS	35,000	All Req'd	35,000
17	Instrumentation and Controls	LS	35,000	All Req'd	35,000
Subtotal Estimated Construction Cost					\$ 4,746,000
Construction Contingency (15%)					712,000
Total Estimated Construction Cost					\$ 5,458,000
Preliminary, Design, and Construction Engineering (15%)					819,000
TOTAL ESTIMATED IMPROVEMENTS COST (2023 DOLLARS)					\$ 6,277,000
Other Estimated Project Costs					
Oregon Health Authority Plan Review					\$ 3,300
General Permitting					2,700
Subtotal Other Estimated Project Costs (2023 Dollars)					\$ 6,000
TOTAL ESTIMATED PROJECT COST					\$ 6,283,000

¹All costs shown are in 2023 dollars. Estimated project costs were prepared using methodology established by the City and City Engineers with reference to pre-pandemic itemized bids inflated by 4.5 percent from the referenced project bid date to year 2023. Total estimated project costs must be re-evaluated prior to the implementation time frame to account for inflation, supply chain cost escalations, contractor availability, and general market volatility. Due to the recent volatility of the market and supply chain shortages, actual costs may vary significantly.



CITY OF
SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE
NEW 2.2 MG PRESTRESSED CONCRETE
WATER STORAGE RESERVOIR
AND SITE IMPROVEMENTS
PRELIMINARY COST ESTIMATE

**FIGURE
4-7**

Chapter 5 - Distribution System

Introduction

This chapter discusses the City of Sisters' existing water distribution system, which delivers water to residential, commercial, and industrial users. Components of the distribution system include pipelines, valves, fittings, water meters, water service lines, and fire hydrants. The City's distribution system has been evaluated for both present and future needs. Recommended distribution system improvements have been developed to address existing identified deficiencies and provide future service to help meet both Oregon Health Authority - Drinking Water Services (DWS) requirements and Oregon Fire Code (OFC) fire flow requirements.

Existing Distribution System

The City's water distribution system dates to the 1930s, with the majority of the City's water lines being installed in the 1980s and later. The majority of the original water system was upgraded in 1993 with C900 polyvinyl chloride (PVC) mains. Since 1993, the City has continued replacing portions of galvanized and asbestos cement (AC) lines with C900 PVC. Only a few localized areas are still served by old undersized pipe. Currently, the City has one pressure zone. The City's four wells pump directly into the distribution system. The City's single water storage reservoir is connected to the distribution system through a transmission line network with one section of a single 12-inch AC pipe and a second section of a 12-inch PVC pipe in parallel with a 12-inch AC pipe.

The existing distribution system layout, including fire hydrant locations and pipe size and locations, is shown on the Existing Water System Map included at the end of this Water System Master Plan (WSMP) Update. The City maintains an ArcGIS Online subscription with Esri to support the City's mapping, visualization, and analysis needs. The water system mapping application, which includes location and attribute information of City-owned assets, is maintained and administered by Anderson Perry & Associates, Inc. (AP). The GIS network was utilized to create the Existing Water System Map and was checked for accuracy by the City's Public Works Department. Additional information for the City's water distribution system was obtained from previous WSMPs and water system improvements Record Drawings provided by the City.

Piping

The City has approximately 200,000 feet of piping in its distribution system. The distribution system piping consists of steel, AC, ductile iron (DI), high density polyethylene (HDPE), and PVC. Piping within the distribution system generally ranges from 4- to 16-inch diameter, with the majority being 4-, 6-, 8-, 10-, and 12-inch piping. No existing fire hydrants are served by a 4-inch or smaller water line. A summary of majority pipe sizes and their approximate associated lengths is provided on Table 5-1.

**TABLE 5-1
 WATER DISTRIBUTION SYSTEM PIPING**

Size	Length (feet)	Percentage
4-inch	7,481	3.8
6-inch	9,239	4.7
8-inch	65,494	33.2
10-inch	36,498	18.5
12-inch	78,711	39.8
Total	197,423	100

Currently, seven buried and one suspended water line creek crossings are located throughout the system. One crossing on Pole Creek near the water storage reservoir consists of AC pipe installed in the 1960s spanning the creek diagonally. Whychus Creek has seven water line crossings consisting of two AC pipe under-creek crossings installed in the 1960s, three PVC and one HDPE under-creek crossings, and one DI bridge crossing on South Creekside Drive.

Booster Pump Stations

The City of Sisters does not have a booster pump station. The City is not considering installing a booster pump station. The only need for a booster pump station will arise if a future water storage reservoir is constructed below the elevation of the existing reservoir or the need arises that requires the creation of an additional pressure zone.

Water Meters

The City of Sisters’ system has approximately 2,049 water service connections as of September 2022. All service connections are metered. The City’s current Public Works Standards and Specifications require that all new meter installations include meter transceiver units (MXUs) that permit off-site meter reading via radio signals. Water meters will deteriorate, wear, or become damaged with time, thus producing inaccurate readings. Inaccurate meters tend to under-register water consumption or record no water use at all. Oversized meters for a customer’s level of usage will also tend to under-register water use. Due to the system’s non-revenue water (discussed later in this chapter), which may be in part the result of meter inaccuracies, the City is considering introducing a meter replacement program. The program would replace inaccurate meters, registers, and endpoints that have been in service for 15 or more years. The meter replacement program will replace old, worn-out meters with new units equipped with MXUs. Meters between 10 to 15 years of age will be tested, calibrated, or replaced as needed. The City has an active water meter testing program with an eight-bay testing bench at the Public Works Department headquarters.

Following implementation of the meter replacement program, the City will monitor and replace water meters in the system as they fail. It is important to replace old water meters so the City continues to obtain accurate water usage readings and associated customer billings. The City should plan and budget for replacing meters based on a 20-year life.

Distribution System Pressure

The City of Sisters is relatively uniform in elevation and, therefore, does not have the need for separate pressure zones. The distribution system usually operates with system pressures between 55 and 80 pounds

per square inch (psi). Distribution system pressure is generally established by the level in the water storage reservoir, with major variations produced by friction losses in the reservoir transmission line and minor variations produced by friction losses in the distribution system. Discussions herein will refer to system baseline pressure. This is the pressure that would be experienced at any reference point in the system with no demand, all City wells off. This baseline pressure is the difference between the reservoir level and the reference point.

Major variations in system pressure occur when the reservoir is either being filled or withdrawn from. This is a result of the diameter and length of the reservoir transmission line network. System pressure will either rise above or drop below the baseline pressure, depending on whether the reservoir transmission line is filling or drawing from the reservoir, respectively.

With all City wells off, system pressure is the product of the reservoir level static head minus friction losses through the reservoir transmission line and distribution system. As system demand increases from zero, system pressure will reduce from the baseline pressure due to friction losses from the reservoir to the places of use.

During periods when one or more wells are on and system demand is greater than source production, places of use will be drawing from a combination of well source supply and storage from the reservoir. In this scenario, system pressure will reduce from the baseline pressure, but less than when all wells are off.

With one or more wells on and no system demand, system pressure will increase from the baseline pressure as friction losses develop due to flow in the reservoir transmission line as the reservoir is filled. In this scenario, system pressure will be the product of the reservoir level static head plus the friction losses through the reservoir transmission line.

During periods when one or more wells are on and system demand is lower than source production, places of use will be drawing from well water only at the same time the reservoir is being filled. In this scenario, system pressure will increase from the baseline pressure, but less than when system demand is higher.

This section outlines the fact that system pressure will both rise above and drop below a reference point's baseline pressure depending on system demand and well operations at a given point in time. The highest pressures will develop when system demand is low and the reservoir is filling during well pumping. The lowest pressures will develop when all wells are off and system demand is high. The resulting variations in system pressure are high and noticeable by users. This fluctuation in pressure could be reduced by increasing reservoir transmission line network pipe sizes.

Refer to the Water System Modeling section of this chapter for further discussion.

Distribution System Water Quality

Coliform Bacteria

The City routinely obtains three samples each month from the distribution system and one sample taken at each source for analysis of total coliform and *E. coli*. Routine sample results are on file with the DWS from 1997. In the City's distribution system, total coliforms and *E. coli* were absent in all samples to date.

Lead and Copper

The City has also obtained samples from the distribution system to satisfy chemical analysis requirements for total lead and copper. The action levels for lead and copper are 0.015 and 1.3 milligrams per liter (mg/L), respectively, based on the 90th percentile of 10 to 20 samples taken from taps throughout the distribution system. All 90th percentile sample results available through the DWS have been below the action level for lead or copper. Two 20-count samples taken in January and July 2022 resulted in 90th percentile lead concentrations of 0.0068 and 0.0017 mg/L, respectively. The City is currently required to perform sample rounds annually. Corrosion control facilities are typically only considered when the action level for either lead or copper is exceeded. The City's water does not have corrosive properties.

Disinfection Byproducts

The City takes routine samples for disinfection byproducts that include total haloacetic acids (HAA5) and total trihalomethanes (TTHM). Records for both HAA5 and TTHM date back to September 2004. No sampling events for HAA5 or TTHM exceeded the maximum contaminant level of 0.060 mg/L and 0.080 mg/L, respectively. HAA5 and TTHM analytical results are available on DWS's Drinking Water Data Online website. Because all of the City's water is produced by groundwater wells with very low levels of natural organic materials, the formation of TTHM and HAA5 is unlikely.

Fire Protection

General

The City is responsible for maintaining fire hydrants within city limits, while the Sisters-Camp Sherman Fire District is responsible for providing fire protection within city limits. The City's water distribution system supplies pressure and flow capacity in support of fire protection throughout the City. DWS regulations and the 2019 OFC require the entire water system maintain a minimum 20 psi residual pressure at all times (i.e., high demand periods, fire flow events, etc.). As discussed in Chapter 2, the recommended fire flow is 2,500 gallons per minute (gpm) in public facility zones, 2,000 gpm in general commercial and light industrial zones, and 1,500 gpm in residential zones. Per the 2019 OFC, the existing elementary school requires a fire flow higher than 3,500 gpm due to a combination of floor area and building construction. However, the school is being replaced and the City engineer informed Anderson Perry & Associates, Inc., that the new school has a needed fire flow of less than 2,000 gpm. The 2017 Insurance Services Office, Inc., Public Protection Classification summary report included as Appendix G identified the existing elementary school area as deficient for available fire flow. Fire hydrant spacing was not mentioned in the memorandum.

Generally, the City's water system provides the City engineer-recommended fire flows to the majority of the City with supplemental well water. The discussion presented herein is intended to provide caution concerning the actual available fire flows from the City's distribution system and fire hydrants. The available fire flows as calculated by the hydraulic model, assuming recommended improvements are in place, will continue to provide such flows as the City grows, and are discussed in more detail later in this chapter.

Fire Hydrant Flow Tests

In January 2022, the City and the Sisters-Camp Sherman Fire District conducted fire hydrant flow tests on four fire hydrants in the distribution system with special instruction from AP and in accordance with American Water Works Association (AWWA) Manual M17. The hydrant flow test results are included in Appendix H for reference. Based on the hydrant flow test results, the City's water system is able to deliver fire flows ranging from approximately 1,400 to 2,100 gpm, with no wells in operation.

Fire Hydrant Limitations

Field system pressures may differ from the reported pressures in the fire hydrant flow tests due to varying system operating conditions such as demand, reservoir levels, well pump settings, and the elevation and piping configuration supplying a specific fire hydrant.

Generally, the fire flow tests are conducted by opening one fire hydrant at a time. If large enough main lines and system pressures are present, individual fire hydrants can typically provide flows in the range of 800 to 1,200 gpm from a small port and nearly 2,000 gpm from both small ports and the larger "pumper" port, assuming the hydrant has a large port. The system residual pressures, main line sizes, and looping likely dictate what fire flows are available as opposed to the physical limitations of the fire hydrants. To achieve the maximum flow available in an area during a fire, more than one fire hydrant would need to be used to approach the maximum expected main capacity shown by the water system computer model.

Generally, the City's water system is capable of providing adequate fire flows to all areas. As the City grows, some improvements will be necessary to maintain existing fire flow capacities. Those improvements are discussed later in this chapter.

Fire Hydrant Coverage

The OFC outlines maximum recommended fire hydrant spacing depending on several factors, such as fire flow requirements of the area, the number of fire hydrants in the area, if the area is on a dead-end street or has limited access, etc. As required by the 2019 OFC, the maximum spacing between any two hydrants for a fire flow requirement of 1,750 gpm or less is 500 feet, and as little as 350 feet for a fire flow requirement of 3,500 to 4,000 gpm. The maximum required distance from any point of a street or road frontage to a hydrant is 250 feet for 1,750 gpm or less and 210 feet for 3,500 to 4,000 gpm.

The Sisters-Camp Sherman Fire District takes responsibility for fire hydrant coverage and informs the City's Public Works Department of any areas that need additional fire hydrants. No areas have been identified by the Fire District as needing additional fire hydrants at this time. Fire hydrant spacing was not determined as part of this WSMP Update effort.

Theoretical Fire Flows

In some cases, the available flow from a fire hydrant is calculated using a theoretical formula. The formula assumes the water supply "feeding" the tested area is generally not limited and the 20 psi residual pressure resulting from the fire flow occurs where the hydrants are being tested. In reality, there are likely other connections in the distribution system, such as users in the City on small

diameter main lines or at higher elevation areas, that would fall below 20 psi sooner than the formula predicts. Considering this, the theoretical formula can overestimate available fire flows at 20 psi. The hydraulic computer modeling completed as part of this WSMP Update, as discussed later in this chapter, will present more accurate available fire flows than theoretical formulas would.

Water System Modeling

General

A computer hydraulic model evaluates distribution system pressure and flows during a simulated water use demand scenario. As part of this WSMP Update, a detailed computer hydraulic water model of the City's water system was utilized to analyze system pressures, and available fire flows from the City's distribution system. A general description and the results of each computer run performed for both the existing and improved water systems are discussed herein.

Available system fire flows are determined under maximum daily demand (MDD) conditions. Hydraulic computation of system fire flows does not evaluate individual hydrant capacities but indicates the maximum flow the system can provide to a specific location while maintaining a minimum residual pressure of 20 psi to all points of delivery. Typical water system demands used for the computer model include the peak hourly demand (PHD), the MDD, and fire flow demands discussed herein and in Chapter 2.

The computer model also utilizes detailed information about the distribution system pipes. Each individual pipe was assigned a roughness coefficient based on the pipe material (PVC, DI, AC, steel, etc.). This allows the water model program to calculate water main line pressure losses under any demand condition desired, including fire flow analyses. Junctions were identified in the water model that allowed the model to compute where and at what elevation pipe intersections occur. Water demands can then be placed on the distribution system at each junction to simulate PHD or MDD use demands.

Calibration Model Development

The water model for this WSMP Update was developed using the Innowatc InfoWater Pro 2023.3 modeling software. The model utilized a GIS geodatabase exported from the ArcGIS Online subscription that the City maintains with Esri. This geodatabase provided pipe locations, length, size, and material for the entire distribution system including well and reservoir transmission lines. The reservoir was modeled using parameters from the Record Drawings. Each of the City's four wells was modeled using available data, which included the approximate water level of the aquifer and well pump curves and set points provided by the City. Elevations were assigned to all near ground-level facilities using publicly available light detection and ranging (LiDAR) data available through the Oregon Department of Geology and Mineral Industries, Oregon LiDAR Consortium.

The model was calibrated using fire hydrant test with all wells shut off, simulating flow from the reservoir only. Pipe roughness coefficients were adjusted until the simulated static and residual pressures at a specific location best matched those reported in the January 2022 fire hydrant flow tests (refer to Appendix H). The calibrated model simulates field-observed conditions within 10 percent of field-tested fire flow data. The best fit model was developed by applying Hazen-

Williams roughness coefficients ranging from 125 and 150. The roughness coefficient of 125 was used for AC transmission lines, which had the greatest effect on model results.

Model Water Demands

System water demands for years 2020, 2022, and 2042 were derived from the design criteria presented in Chapter 2. Demands for specific service accounts were not provided for this WSMP Update. Therefore, demands for each scenario were distributed evenly throughout the distribution system at junctions representing tees and crosses. These locations are referred to as “Demand Nodes” in the model. Demand was removed from junctions in close proximity on a case by case basis to prevent high concentrations of demand from being applied in localized areas within the model.

Five demand scenarios were modeled:

1. Base year 2020 with average daily demand (ADD)
2. Existing year 2022 with PHD
3. Existing year 2022 with MDD
4. Planning year 2042 with PHD
5. Planning year 2042 with MDD

Available fire flow was determined for each hydrant lateral for MDD scenarios and compared with recommended fire flow based on the underlying zone. The demand conditions used in modeling the system are described on Table 5-3.

**TABLE 5-3
 WATER MODEL SYSTEM DEMAND SCENARIOS**

Demand Scenario	System Demand (gpm)	Junction Demand ¹ (gpm)
2020 ADD	670	2.38
2022 PHD	3,428	12.16
2022 MDD with NFF	2,050	7.27
2042 PHD	6,745	23.92
2042 MDD with NFF	4,120	14.61

¹Demand applied to each of the 282 “Demand Node” junctions.

Model Scenarios

2020 Calibration Scenario - Average Daily Demand with Hydrant Tests

The calibration model was used as the base model. The year 2020 ADD was distributed evenly throughout the model. The reservoir level was set to 20 feet above finish floor, and all wells were set to off. The static and residual pressures at each of the four hydrant locations were

analyzed by applying the measured test flow to the specific junction representing the hydrant. Pipe roughness coefficients were adjusted until static and residual pressures at each location were within 10 percent of the measured tests.

2022 Peak Hourly Demand - System Pressure

The 2020 calibration model above was used as the base model. The 2022 PHD was distributed evenly throughout the model. The reservoir level was set to 17.0 feet above finish floor to represent a level indicative of the low operating level just prior to the well pumps being called to run. All four wells were set with an initial condition of off and pressure-dependent start and stop set points provided by the City representing current operations. The modeled results were evaluated for residual system pressure at all locations of delivery.

2022 Maximum Daily Demand - Available Fire Flow

The 2020 calibration model above was used as the base model. The 2022 MDD was distributed evenly throughout the model. The reservoir level was set to 12.6 feet above finish floor to represent a level indicative of the emergency reserve level. Well No. 3 was set to off to represent the largest producing source offline. The remaining wells were set with an initial condition of off and pressure-dependent start and stop set points provided by the City representing current operations. Available fire flow was determined at the location of all hydrant laterals. Available fire flow represents the maximum flow that the system can deliver to a specific location while maintaining a minimum residual pressure of 20 psi throughout the system at all places of delivery during the MDD.

2042 Scenario 1 Peak Hourly Demand - System Pressure

The 2020 calibration model above was updated with planned main line improvements including the Creekside Drive Extension, Edgington Road Transmission Line Extension, and the reservoir to Whychus Creek Tee Transmission Line Replacement with Upsizing. The transmission line from the Whychus Creek tee to the city limits near Well No. 1 was removed to represent a scenario where this line was removed from service. The 2042 PHD was distributed evenly throughout the model. The reservoir level was set to 12.6 feet above finish floor to represent a level indicative of the emergency reserve level. All Wells were set with an initial condition of off and pressure-dependent start and stop set points provided by the City representing current operations. The modeled results were evaluated for residual system pressure at all locations of delivery.

2042 Scenario 2 Peak Hourly Demand - System Pressure

The 2042 Scenario 1 PHD model above was updated with a transmission line replacement from the Whychus Creek tee to the city limits near Well No. 1, a new Well No. 5 with a capacity of 1,670 gpm, and a low pressure start set point of 42 psi. The modeled results were evaluated for residual system pressure at all locations of delivery. This scenario represents conditions where all recommended improvements projects are complete.

2042 Scenario 1 Maximum Daily Demand - Available Fire Flow

The 2042 Scenario 1 PHD model above was used as the base model. The 2042 MDD was distributed evenly throughout the model. Well No. 3 was set to off to represent the largest

producing source offline. Available fire flow was determined at the location of all hydrant laterals.

2042 Scenario 2 Maximum Daily Demand - Available Fire Flow

The 2042 Scenario 2 PHD model above was used as the base model. The 2042 MDD was distributed evenly throughout the model. Well No. 3 was set to off to represent the largest producing source offline. Available fire flow was determined at the location of all hydrant laterals.

Model Results

System Pressure

The following paragraphs address system pressures under various demand and improvement scenarios.

2022 Peak Hourly Demand - Residual System Pressures

The system pressure ranges under the 2022 PHD demand scenario are presented on Figure 5-1. The system provides pressures ranging from approximately 51 to 91 psi. The City has adequate pressure to meet DWS regulations, and improvements are not required to provide additional pressure to the system under this scenario. In this scenario, it was observed that low pressure set points called Wells No. 2, 3, and 4 to run. The pressures shown on Figure 5-1 represent residual system pressure with Wells No. 2, 3, and 4 being on, and Well No. 1 being off.

2042 Scenario 1 Peak Hourly Demand - Residual System Pressure

The system pressures under the 2042 Scenario 1 PHD demand scenario are presented on Figure 5-2. This scenario incorporates the 16-inch transmission line extension from the reservoir to city limits on Edgington Road and the replacement of the existing 12-inch AC transmission line from the reservoir to the Whychus Creek tee with 16-inch DI pipe. As shown on Figure 5-2, the system provides pressures ranging from approximately 42 to 82 psi. In this scenario, it was observed that Wells No. 2, 3, and 4 were all called to run by their low pressure set points. Assuming the transmission line upgrades included in this scenario have been completed, the City has adequate pressure to meet DWS regulations through the planning year, and additional improvements are not required to provide additional pressure to the system.

2042 Scenario 2 Peak Hourly Demand - Residual System Pressure

The system pressures under the 2042 Scenario 2 PHD demand scenario are presented on Figure 5-3. This scenario incorporates all improvements included in Scenario 1 with the addition of a new Well No. 5 and a transmission line replacement from the Whychus Creek tee to city limits near Well No. 1. As shown on Figure 5-3, the system provides pressures ranging from approximately 45 to 85 psi. In this scenario, it was observed that Wells No. 2, 3, and 4 were all called to run by their low pressure set points.

Fire Flows

Available fire flows were evaluated at each fire hydrant to help calculate the water system's ability to deliver flow to that node while maintaining a residual pressure of 20 psi at all other places of delivery in the distribution system. Many fire nodes have available fire flows greater than the associated hydrant can provide. As discussed previously in this chapter, typically multiple hydrants are needed to withdraw the total available fire flow. The available fire flow presented here implies the water system's ability to deliver the indicated flow to a general area and not specific capacities of individual hydrants.

Available Fire Flow at 2022 Maximum Daily Demand

Figure 5-4 shows the available fire flow at existing fire nodes under the 2022 MDD. As shown on Figure 5-4, available fire flows at fire nodes range from approximately 750 gpm to more than 3,500 gpm.

Available Fire Flow at 2042 Maximum Daily Demand Scenario 1

Figure 5-5 shows the available fire flow at existing fire nodes under the 2042 MDD with the recommended improvements (not including a new Well No. 5) and assuming the transmission line from the Whychus Creek tee to city limits near Well No. 1 is offline. As shown on Figure 5-5, available fire flows at fire nodes range from approximately 1,450 gpm to more than 3,500 gpm.

Available Fire Flow at 2042 Maximum Daily Demand Scenario 2

Figure 5-6 shows the available fire flow at fire nodes under the 2042 MDD with the addition of a new Well No. 5 and the transmission line replacement from the Whychus Creek tee to city limits near Well No. 1. As shown on Figure 5-6, available fire flows at fire nodes range from approximately 1,500 gpm to more than 3,500 gpm.

Limitations of Distribution Water Model Results

Available fire flows reported from the water model analysis indicate theoretical distribution system piping capacity. Actual field conditions and headloss in fire hydrants may reduce fire flows beyond what is indicated. Additionally, full capacity hydrant tests may be needed to verify available flows greater than 2,000 gpm because the theoretical fire flows modeled depend on system pressure to drop to an extent that multiple well pumps are called to run, which provide supplemental water and increase system capacity. Single hydrant tests that utilize the AWWA M17 method will not account for additional capacity provided by wells that pump directly into the distribution system when called to run.

Recommended Distribution System Improvements

The following provides a summary of model results observed for various components of the proposed system improvements presented in Chapters 3, 4, and 5. It is important that proposed water supply, storage, and distribution system improvements are modeled together. This helps to verify future system operation and avoids potential oversizing of some system components without accounting for improvements in other areas of the system. The discussion below is intended to

focus on system performance measures associated with specific water supply, storage, or distribution system improvements.

New 12-inch and 16-inch Transmission Lines

During the development and evaluation of water model scenarios, it was determined that under the 2042 MDD, the existing distribution system is not able to provide the recommended fire flows to industrial, commercial, and public facility zones. The available fire flows declined with increased demand and fell below 2,000 gpm systemwide as demands approached the 2042 MDD. During development and evaluation of the year 2042 available fire flow scenarios, it was determined that either an additional transmission line would be needed or the existing transmission lines would need to be replaced with larger diameter pipes. Through discussions with City staff, the preferred alternative was determined to be to construct a new transmission line aligned on Edgington Road. A new transmission line would provide system redundancy, increased flow capacity to the west side of the City where higher fire flows are recommended, and add the ability to stage other transmission line improvement projects with the reservoir online. It is also recommended that the existing 12-inch AC transmission lines be replaced with DI pipe, due to age and the risk of being damaged from uprooting by encroaching tree roots.

The hydraulic modeling exercise showed that if all of the above recommended transmission line improvements were complete, using 12-inch pipe would effectively provide the recommended fire flow through year 2042. However, to continue to operate the system while staging improvements where one or more sections of transmission line may be offline, add a degree of redundancy, and allow for future growth beyond the 20-year horizon, it is recommended that the Edgington Road extension and a portion of AC pipe replacement from the reservoir to the Whychus Creek tee junction use 16-inch pipe. At the lower portion of AC pipe replacement below the Whychus Creek tee junction where a newer portion of parallel 12-inch PVC transmission line exists, a 12-inch pipe would suffice. It is recommended that all sections added or replaced in forested areas utilize DI pipe to mitigate susceptibility to damage caused by wildfires. When wildfires burn over areas with PVC pipe, the ground can become hot enough that the PVC pipe melts and allows chemicals to be released into the water system, which can cause contamination requiring a complete replacement of melted pipe. This hazard would be mitigated by utilizing DI pipe.

It is recommended the Edgington Road extension be completed first to allow the other portions of work to be completed with the reservoir online, followed by the reservoir to Whychus Creek tee junction.

Replacement of Aging Water Lines

The City of Sisters' distribution system has been well-maintained, and improvements replacing old pipe with new PVC since the year 2000 have resulted in the majority of the distribution system having a sufficient remaining useful life. Older piping in the system consisting of AC and steel was installed in the 1960s. Existing steel pipe is approaching the end of its original useful life while AC pipe is inherently brittle, with special training and equipment needed to repair or tap such lines. The City should plan on replacing any remaining sections of AC pipe within the 20-year planning period of this WSMP Update. The remaining steel pipes should be monitored for corrosion and leaks by the City, as this can lead to water quality issues. Two additional areas

of AC pipe aside from the 12-inch transmission lines discussed previously are identified as follows:

1. The 12-inch distribution main on South Elm Street from East Tye Drive to East Hood Avenue.
2. Multiple 4-inch AC lines within the Edge O The Pines subdivision from East Cascade Avenue to East Black Butte Avenue on North Locust Lane, North Maple Lane, and North Tamarack Street. When replaced, these lines should be upsized to 8-inch PVC.

Undersized Main Lines

Undersized main lines with diameters of 6 inches or less in a distribution system can cause problems with system capacity, pressures, and water quality. Undersized mains can become a particular problem in industrial and commercial areas where higher fire flows are required. A minimum water line size of 8-inch diameter is recommended for new water main installations in residential areas. Large residential, commercial, or industrial developments may require larger pipe sizes depending on specific development needs.

For the purposes of this WSMP Update, undersized main lines have been identified as those that do not allow the recommended fire flow capacity at existing fire hydrants and the minimum pressure criteria as shown on Figure 2-1 in Chapter 2. The only undersized main line resulting in inadequate fire flow capacities is a 2,550 linear foot line providing water to the wastewater treatment plant pump station.

Dead-End Main Lines and Internal Looping

Similar to undersized main lines, dead-end main lines in a distribution system can cause problems with fire flow capacity, pressures, and water quality. The City's distribution system is well-looped and only a few dead-end main lines exist. It is difficult to eliminate all dead-end main lines from a system. Physical limitations, such as stream crossings and undeveloped land, or other limitations, such as no customers in the area, can result in dead-end lines. It is recommended that lines be continuously looped to the extent possible as expansion occurs or physical constraints allow.

Providing additional looping would benefit two locations within the system through increasing water circulation and available fire flow. These were incorporated in the 2042 water model scenarios as follows:

1. The 12-inch PVC on Camp Polk Road from East Barclay Drive to Sun Ranch Drive.
2. The 12-inch PVC along the city limits from East Desperado Trail to Creekside Drive.

Meter Replacements

Most of the City's water service meters are located within the landscaping strip or the back of the sidewalk on property frontages tapped from adequately sized mains. One location remains on Hood Avenue Alley where older meters are on an undersized 4-inch steel main line. It is

recommended the 4-inch alley main line be abandoned and these meters be replaced with new facilities on West Hood Avenue and West Washington Avenue.

Recommended Distribution System Improvements Summary and Estimated Total Project Cost

Chapter 6 summarizes each recommended water system capital improvements project with figures showing the location, extent, and priority of each. Presented hereafter is a summary and cost estimate for each recommended distribution system project.

Edge O The Pines Main Replacements

This project will include replacing approximately 3,850 linear feet (LF) of 4-inch AC main lines from East Cascade Avenue to East Black Butte Avenue on North Locust Lane, North Maple Lane, and North Tamarack Street. The new lines will be upsized to 8-inch PVC, and asphalt surface will be required in paved areas. The anticipated year 2023 project cost is \$1,567,000. A detailed cost estimate is presented on Figure 5-7.

Edgington Road Transmission Line Extension

This project will include installing approximately 12,100 LF of 16-inch PVC pipe. Butterfly valves will be spaced no more than 1,000 LF apart. The location of the new installation will be along Edgington Road from the reservoir connection point to city limits near the middle and high schools. The installation cost assumes the full depth of backfill is Class B backfill. The anticipated year 2023 project cost is \$3,635,000. A detailed cost estimate is presented on Figure 5-8.

Reservoir to Whychus Creek Junction Transmission Line Replacement

This project will include installing approximately 5,425 LF of 16-inch DI pipe. Butterfly valves will be spaced no more than 1,000 LF apart. The location of the new installation will be parallel to the existing 12-inch AC pipe. The installation cost assumes Class B backfill will be placed to 1 foot above the top of pipe with the remaining backfill material being unprocessed Class A native material. The anticipated year 2023 project cost is \$1,466,000. A detailed cost estimate is presented on Figure 5-9.

Whychus Creek Junction to West Hood Avenue Transmission Line Replacement

This project will include installing approximately 6,910 LF of 12-inch DI pipe from the Whychus Creek junction to the city limits with Class A native backfill from 1 foot above the top of the pipe and 2,300 LF of 12-inch PVC pipe from the city limits to West Hood Avenue with full depth Class B backfill. Butterfly valves will be spaced no more than 1,000 LF apart. The project crosses areas of mapped wetlands and waterways and, therefore, will likely require a temporary stream channel diversion, waterway enhancement, and riparian plantings. Asphalt surface restoration will be required in areas of existing pavement. The anticipated year 2023 project cost is \$2,504,000. A detailed cost estimate is presented on Figure 5-10.

Creekside Drive Extension

This project will include installing approximately 1,160 LF of 12-inch PVC pipe from the end of South Creekside Drive to Desperado Trail. The extension crosses both Highway 126 and Highway 20, which

will likely require trenchless pipe installation by boring or jacking. Fire hydrants will be spaced no more than 500 feet apart. The anticipated year 2023 project cost is \$654,000. A detailed cost estimate is presented on Figure 5-11.

Hood Avenue South Alley Service Reconnections

This project will include relocating six water services on Hood Avenue Alley between Pine Street and Ash Street with new meters. The work will include tapping of mains, new water service lines, new meter assemblies and valve boxes, and various types of surface restoration. The anticipated year 2023 project cost is \$103,000. A detailed cost estimate is presented on Figure 5-12.

Camp Polk Road Extension

This project will include installing approximately 825 LF of 12-inch PVC pipe on Camp Polk Road from East Barclay Drive to Sun Ranch Drive. The anticipated year 2023 project cost is \$319,000. A detailed cost estimate is presented on Figure 5-13.

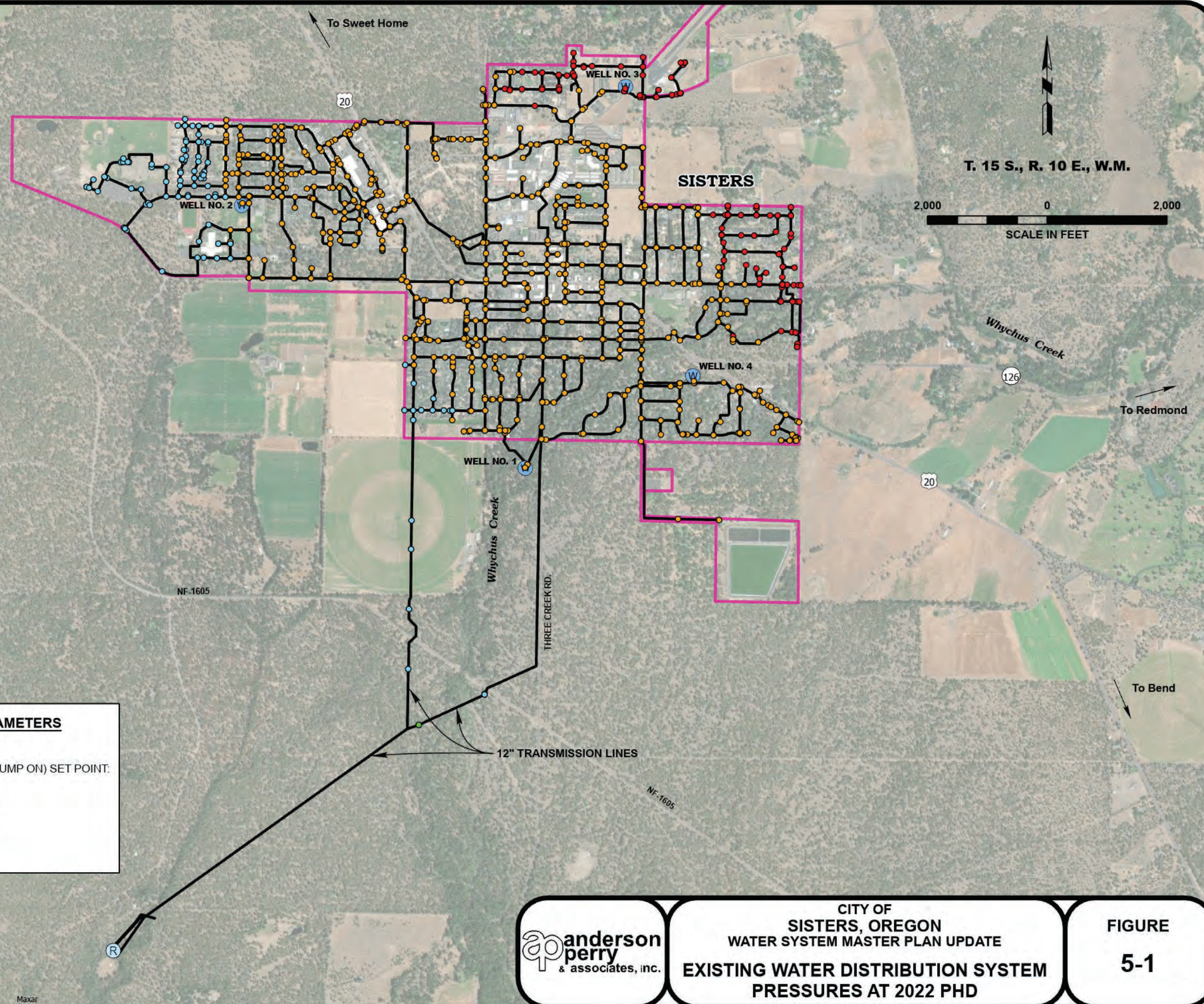
Maintenance Records

One of the important operational functions regarding the City's distribution system is to keep accurate records of various system components. Currently, the City does not have an asset management system in place to assist with recordkeeping and maintenance task scheduling but does keep all records electronically. Recordkeeping becomes increasingly valuable as time passes in terms of planning future improvements and replacing old or deteriorated components. It is recommended the City continue to keep and improve upon recordkeeping. For example, accurate records should be kept on all water meters installed so, in the future, these meters can be periodically pulled, checked for accuracy, and replaced as needed. The City should continue to keep records of all hydrants, valves, and other distribution system components. The distribution system evaluation in this WSMP Update did not include determining existing fire hydrant, valve, and water meter condition. Hydrants should be checked, at least annually, for proper operation, and all water valves should be exercised, at least annually, with records kept on the operating condition, location, etc.

Summary

In general, the City's distribution system is in good condition and areas within the system have been identified for expansion and improvement as industrial and commercial growth occurs. Few areas were identified to have undersized and dead-end water lines. The City's existing system relies heavily on supplemental well water to provide recommended fire flow in conjunction with stored water. After completing the recommended improvements, the City's water system will have almost no aging lines or undersized mains and should be able to provide recommended fire flow throughout the City through the planning year and beyond.

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LEGEND

- 20 TO 40 PSI
- 40 TO 60 PSI
- 60 TO 80 PSI
- 80 TO 100 PSI
- Ⓡ RESERVOIR
- Ⓜ WELL
- DISTRIBUTION SYSTEM PIPING
- ▭ CITY LIMITS

NOTES

1. SYSTEM PRESSURES SHOWN ARE BASED UPON A COMPUTER HYDRAULIC MODEL. FIELD VERIFY SYSTEM PRESSURE PRIOR TO MAKING IMPROVEMENTS.
2. PHD = PEAK HOURLY DEMAND

HYDRAULIC MODEL SCENARIO PARAMETERS

TOTAL SYSTEM DEMAND: 4.94 MGD

WELL INITIAL STATUS AND LOW PRESSURE (PUMP ON) SET POINT:

- WELL NO. 1: STANDBY-34 PSI
- WELL NO. 2: STANDBY-38 PSI
- WELL NO. 3: STANDBY-47 PSI
- WELL NO. 4: STANDBY-42 PSI

RESERVOIR TANK LEVEL: 17.0 FT

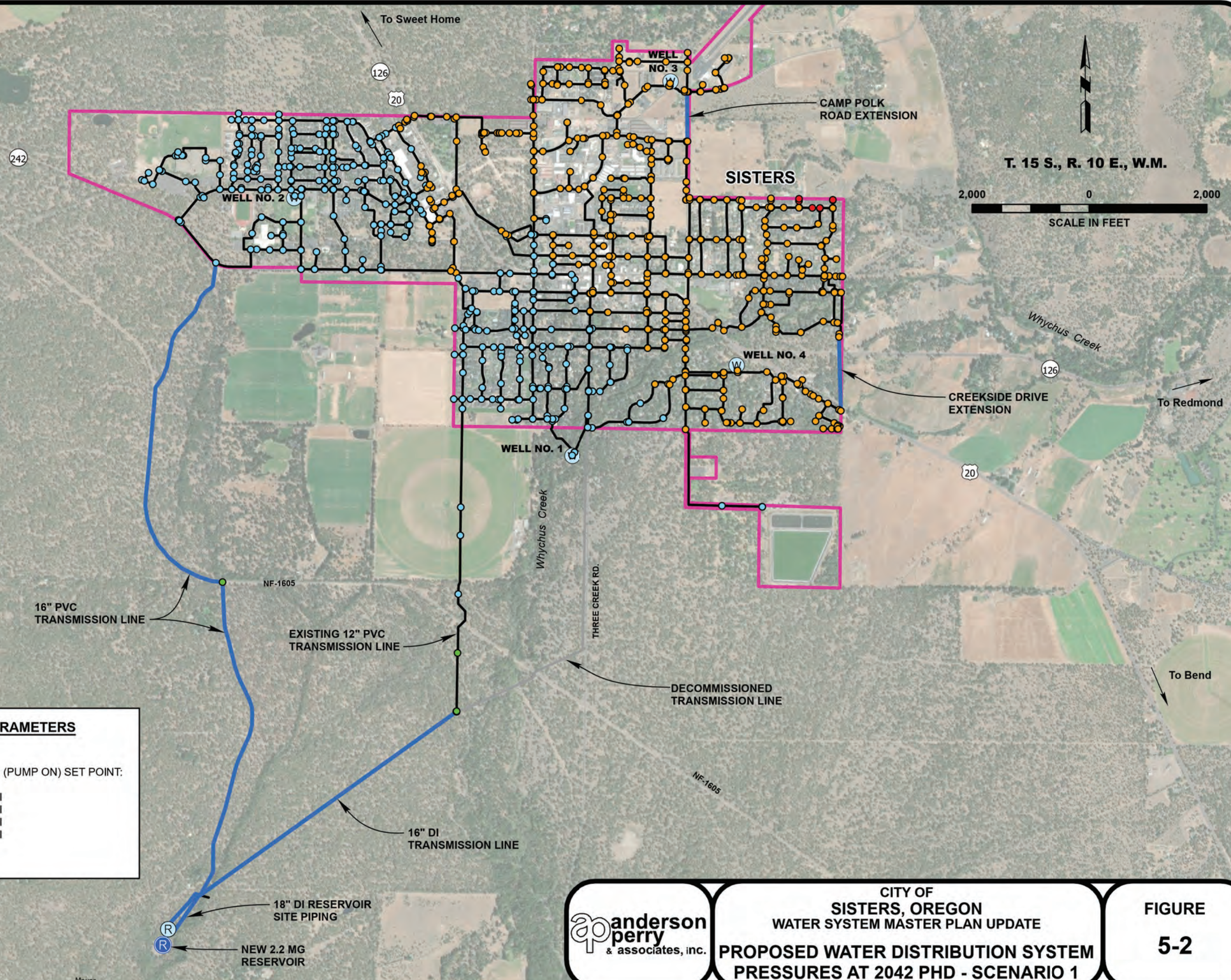
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CITY OF
SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE

**EXISTING WATER DISTRIBUTION SYSTEM
PRESSURES AT 2022 PHD**

FIGURE
5-1

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LEGEND

- 20 TO 40 PSI
- 40 TO 60 PSI
- 60 TO 80 PSI
- 80 TO 100 PSI
- Ⓡ EXISTING RESERVOIR
- Ⓢ EXISTING WELL
- Ⓡ NEW RESERVOIR
- EXISTING DISTRIBUTION SYSTEM PIPING
- CAPITAL IMPROVEMENTS PROJECT RECOMMENDED
- DECOMMISSIONED PIPE
- ▭ CITY LIMITS

NOTES

1. SYSTEM PRESSURES SHOWN ARE BASED UPON A COMPUTER HYDRAULIC MODEL. FIELD VERIFY SYSTEM PRESSURE PRIOR TO MAKING IMPROVEMENTS.
2. PHD = PEAK HOURLY DEMAND

HYDRAULIC MODEL SCENARIO PARAMETERS

TOTAL SYSTEM DEMAND: 9.71 MGD

WELL INITIAL STATUS AND LOW PRESSURE (PUMP ON) SET POINT:

- WELL NO. 1: STANDBY-34 PSI
- WELL NO. 2: STANDBY-38 PSI
- WELL NO. 3: STANDBY-47 PSI
- WELL NO. 4: STANDBY-42 PSI

RESERVOIR TANK LEVEL: 12.6 FT

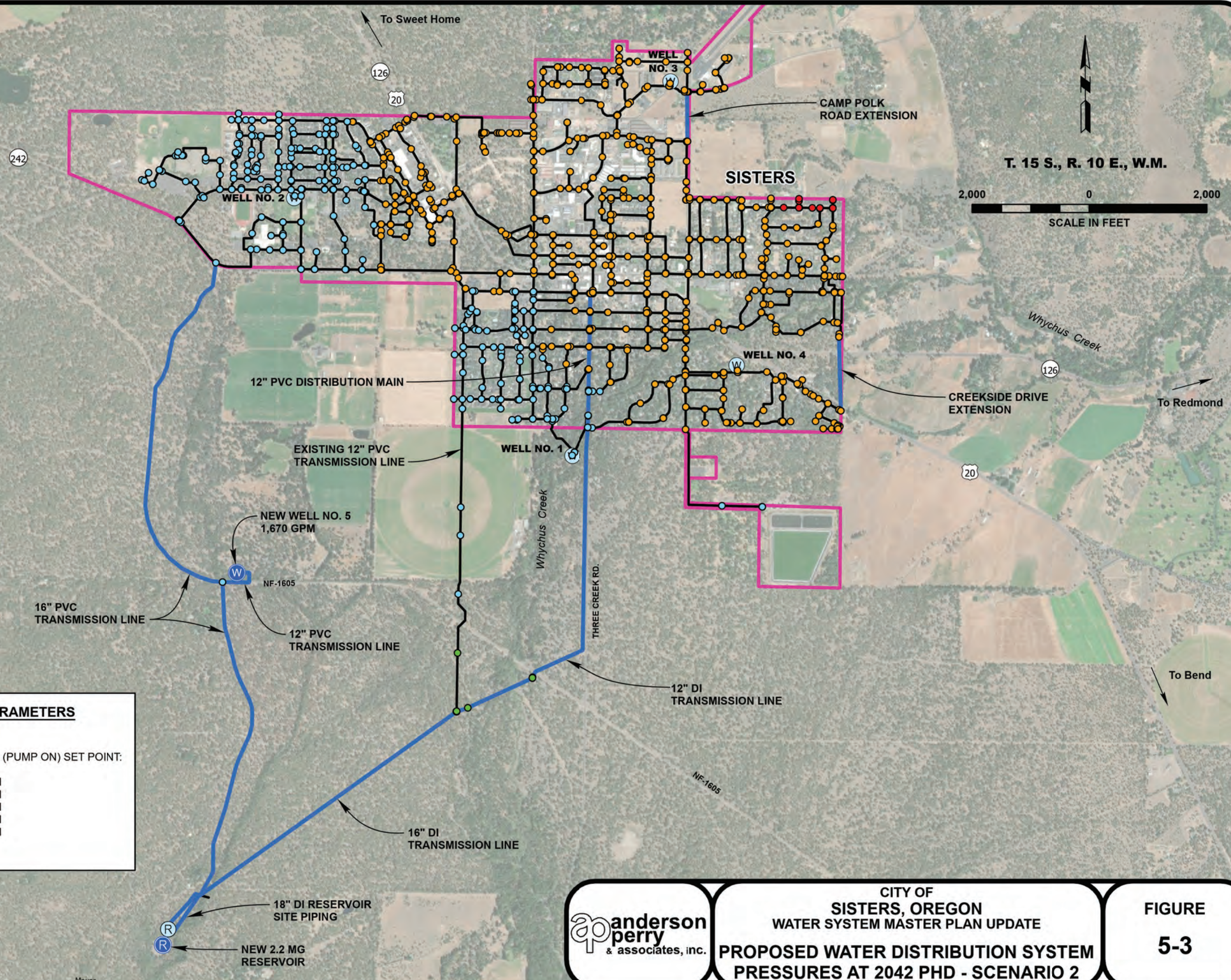
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CITY OF
SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE

**PROPOSED WATER DISTRIBUTION SYSTEM
PRESSURES AT 2042 PHD - SCENARIO 1**

**FIGURE
5-2**

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LEGEND

- 20 TO 40 PSI
- 40 TO 60 PSI
- 60 TO 80 PSI
- 80 TO 100 PSI
- ⊙ (W) EXISTING WELL
- ⊙ (R) EXISTING RESERVOIR
- ⊙ (R) NEW RESERVOIR
- ⊙ (W) NEW WELL
- EXISTING DISTRIBUTION SYSTEM PIPING
- CAPITOL IMPROVEMENTS PROJECT RECOMMENDED
- CITY LIMITS

NOTES

1. SYSTEM PRESSURES SHOWN ARE BASED UPON A COMPUTER HYDRAULIC MODEL. FIELD VERIFY SYSTEM PRESSURE PRIOR TO MAKING IMPROVEMENTS.
2. PHD = PEAK HOURLY DEMAND

HYDRAULIC MODEL SCENARIO PARAMETERS

TOTAL SYSTEM DEMAND: 9.71 MGD

WELL INITIAL STATUS AND LOW PRESSURE (PUMP ON) SET POINT:

- WELL NO. 1: STANDBY-34 PSI
- WELL NO. 2: STANDBY-38 PSI
- WELL NO. 3: STANDBY-47 PSI
- WELL NO. 4: STANDBY-42 PSI
- WELL NO. 5: STANDBY-42 PSI

RESERVOIR TANK LEVEL: 12.6 FT

T. 15 S., R. 10 E., W.M.

2,000 0 2,000

SCALE IN FEET

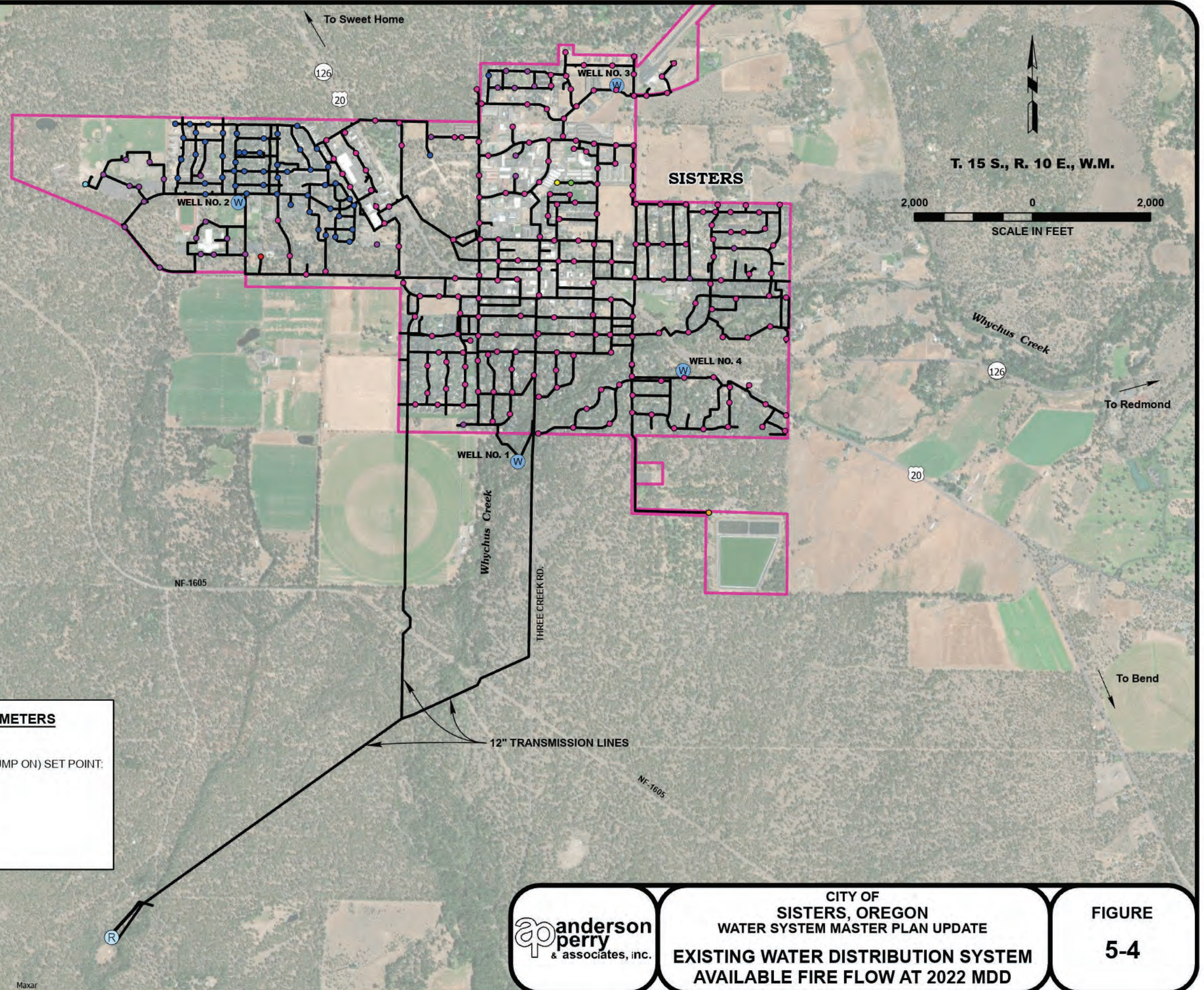
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CITY OF SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE

PROPOSED WATER DISTRIBUTION SYSTEM PRESSURES AT 2042 PHD - SCENARIO 2

FIGURE 5-3

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LEGEND

- 0 TO 500 GPM
- 500 TO 1,000 GPM
- 1,000 TO 1,500 GPM
- 1,500 TO 2,000 GPM
- 2,000 TO 2,500 GPM
- 2,500 TO 3,000 GPM
- 3,000 TO 3,500 GPM
- >3,500 GPM
- Ⓜ WELL
- Ⓡ RESERVOIR
- DISTRIBUTION SYSTEM PIPING
- ▭ CITY LIMITS

NOTES

1. FIRE FLOWS SHOWN ARE BASED UPON A COMPUTER HYDRAULIC MODEL. FIELD VERIFY SYSTEM PRESSURE PRIOR TO MAKING IMPROVEMENTS.
2. MDD = MAXIMUM DAILY DEMAND


HYDRAULIC MODEL SCENARIO PARAMETERS

STATIC SYSTEM DEMAND: 2.95 MGD

WELL INITIAL STATUS AND LOW PRESSURE (PUMP ON) SET POINT:

- WELL NO. 1: STANDBY-34 PSI
- WELL NO. 2: STANDBY-38 PSI
- WELL NO. 3: OFF
- WELL NO. 4: STANDBY-42 PSI

RESERVOIR TANK LEVEL: 12.6 FT



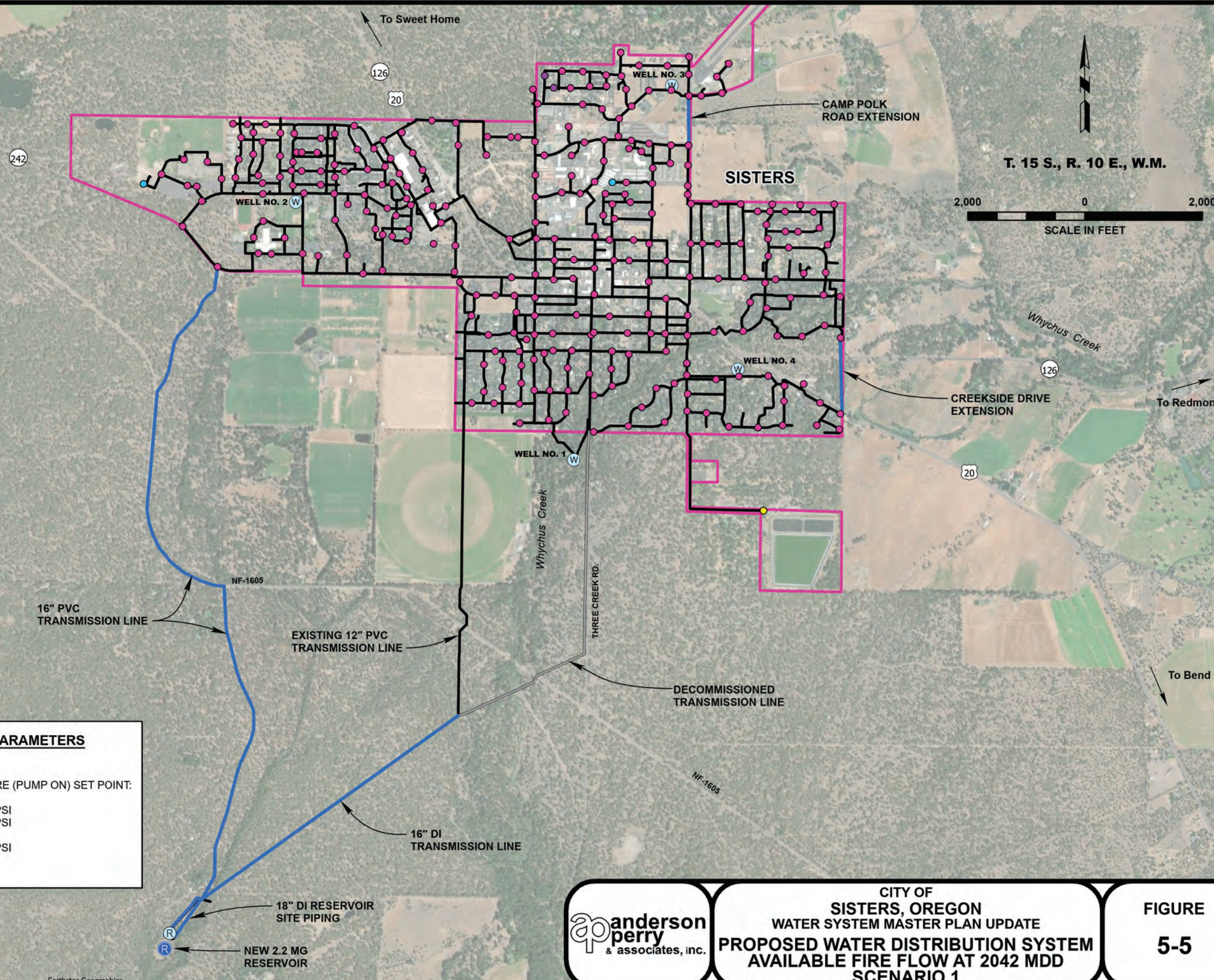
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perry
& associates, inc.

CITY OF
SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE

**EXISTING WATER DISTRIBUTION SYSTEM
AVAILABLE FIRE FLOW AT 2022 MDD**

FIGURE
5-4

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LEGEND

- 0 TO 500 GPM
- 500 TO 1,000 GPM
- 1,000 TO 1,500 GPM
- 1,500 TO 2,000 GPM
- 2,000 TO 2,500 GPM
- 2,500 TO 3,000 GPM
- 3,000 TO 3,500 GPM
- >3,500 GPM
- Ⓜ EXISTING WELL
- Ⓜ EXISTING RESERVOIR
- Ⓜ NEW RESERVOIR
- DISTRIBUTION SYSTEM PIPING
- CAPITOL IMPROVEMENTS PROJECT RECOMMENDED
- DECOMMISSIONED PIPE
- ▭ CITY LIMITS

NOTES

1. FIRE FLOWS SHOWN ARE BASED UPON A COMPUTER HYDRAULIC MODEL. FIELD VERIFY SYSTEM PRESSURE PRIOR TO MAKING IMPROVEMENTS.
2. MDD = MAXIMUM DAILY DEMAND

HYDRAULIC MODEL SCENARIO PARAMETERS

STATIC SYSTEM DEMAND: 5.93 MGD

WELL INITIAL STATUS AND LOW PRESSURE (PUMP ON) SET POINT:

- WELL NO. 1: STANDBY-34 PSI
- WELL NO. 2: STANDBY-38 PSI
- WELL NO. 3: OFF
- WELL NO. 4: STANDBY-42 PSI

RESERVOIR TANK LEVEL: 12.6 FT

anderson perry & associates, inc.

CITY OF
SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE
**PROPOSED WATER DISTRIBUTION SYSTEM
AVAILABLE FIRE FLOW AT 2042 MDD
SCENARIO 1**

**FIGURE
5-5**

X:\Clients\Sisters OR\446-08 WSMP\GIS\446-08 WSMP.aprx, WSMP-446-08-Fig5-6, 5/2/2023 11:00 AM, jvamroggen

LEGEND

- 0 TO 500 GPM
- 500 TO 1,000 GPM
- 1,000 TO 1,500 GPM
- 1,500 TO 2,000 GPM
- 2,000 TO 2,500 GPM
- 2,500 TO 3,000 GPM
- 3,000 TO 3,500 GPM
- >3,500 GPM
- Ⓡ NEW RESERVOIR
- Ⓜ NEW WELL
- Ⓜ EXISTING WELL
- Ⓡ EXISTING RESERVOIR
- CAPITOL IMPROVEMENTS PROJECT RECOMMENDED
- DISTRIBUTION SYSTEM PIPING
- ▭ CITY LIMITS

NOTES

1. FIRE FLOWS SHOWN ARE BASED UPON A COMPUTER HYDRAULIC MODEL. FIELD VERIFY SYSTEM PRESSURE PRIOR TO MAKING IMPROVEMENTS.
2. MDD = MAXIMUM DAILY DEMAND

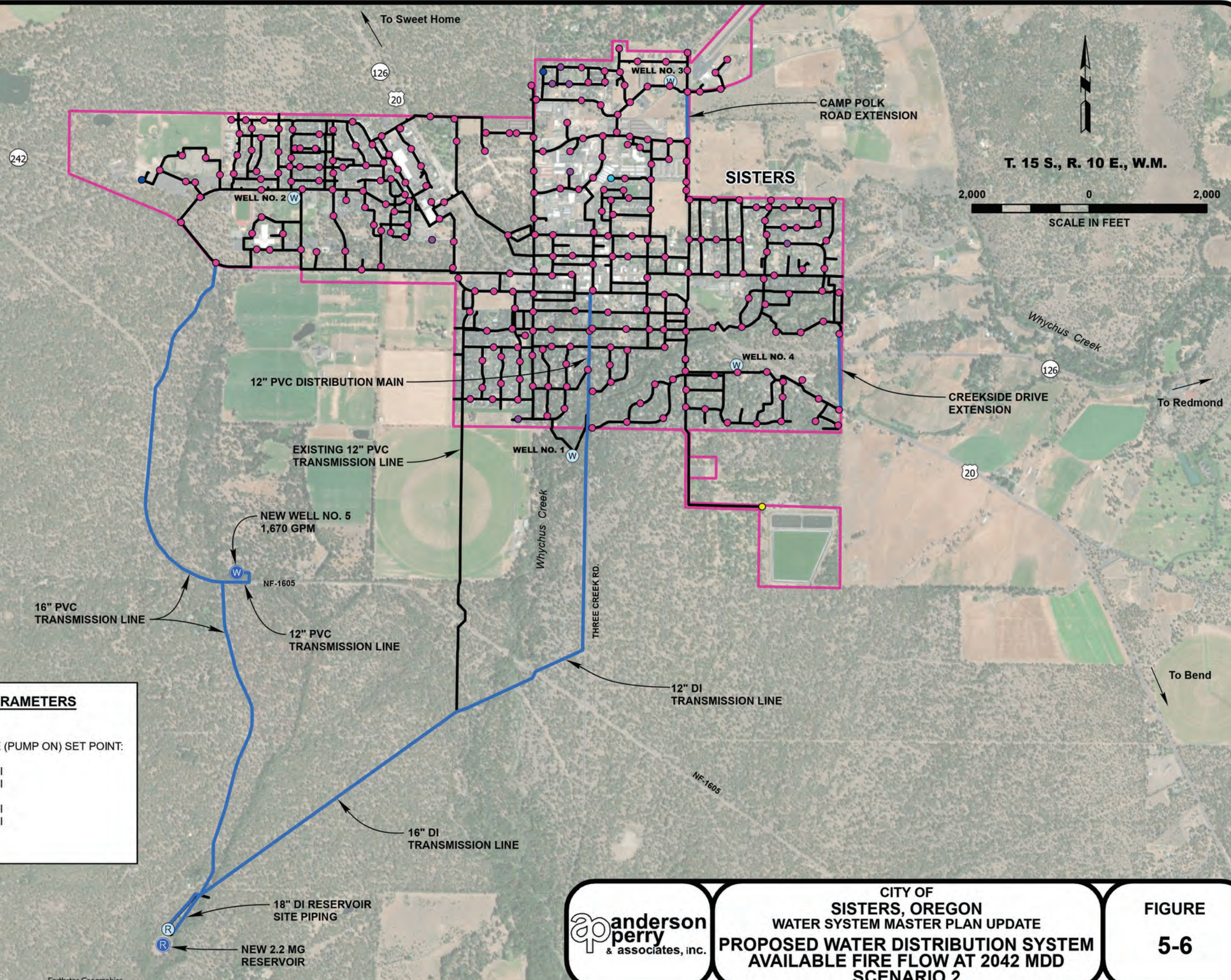
HYDRAULIC MODEL SCENARIO PARAMETERS

TOTAL SYSTEM DEMAND: 5.93 MGD

WELL INITIAL STATUS AND LOW PRESSURE (PUMP ON) SET POINT:

- WELL NO. 1: STANDBY-34 PSI
- WELL NO. 2: STANDBY-38 PSI
- WELL NO. 3: OFF
- WELL NO. 4: STANDBY-42 PSI
- WELL NO. 5: STANDBY-42 PSI

RESERVOIR TANK LEVEL: 12.6 FT



T. 15 S., R. 10 E., W.M.

2,000 0 2,000

SCALE IN FEET

anderson
perry
& associates, inc.

CITY OF
SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE
**PROPOSED WATER DISTRIBUTION SYSTEM
AVAILABLE FIRE FLOW AT 2042 MDD
SCENARIO 2**

FIGURE
5-6

**CITY OF SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE
EDGE O THE PINES MAIN REPLACEMENTS
PRELIMINARY COST ESTIMATE
(YEAR 2023 COSTS)**

NO.	DESCRIPTION	UNIT	UNIT PRICE ¹	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	\$ 51,500	All Req'd	\$ 51,500
2	Project Safety, Temporary Traffic Control, and Quality Control	LS	65,000	All Req'd	65,000
3	Construction Survey	LS	12,000	All Req'd	12,000
4	Water Service Meter Assembly	EA	2,250	110	247,500
5	Water Service Line	LF	30	1,650	49,500
6	Water Service Line Tap	EA	350	110	38,500
7	Install 8-inch Polyvinyl Chloride Water Line	LF	135	3,850	519,750
8	Trench Resurfacing in Existing Asphalt Concrete Pavement (Full Lane Restoration)	TON	130	1,200	156,000
9	Connect to Existing Pipe	EA	3,000	12	36,000
10	Fire Hydrant Assembly	EA	6,500	1	6,500
Subtotal Estimated Construction Cost					\$ 1,182,250
Construction Contingency (15%)					177,000
Total Estimated Construction Cost					\$ 1,359,250
Preliminary, Design, and Construction Engineering (15%)					204,000
TOTAL ESTIMATED IMPROVEMENTS COST (2023 DOLLARS)					\$ 1,563,250
Other Estimated Project Costs					
Oregon Health Authority Plan Review					\$ 3,300
Subtotal Other Estimated Project Costs (2023 Dollars)					\$ 3,300
TOTAL ESTIMATED PROJECT COST					\$ 1,566,550

¹All costs shown are in 2023 dollars. Estimated project costs were prepared using methodology established by the City and City Engineers with reference to pre-pandemic itemized bids inflated by 4.5 percent from the referenced project bid date to year 2023. Total estimated project costs must be re-evaluated prior to the implementation time frame to account for inflation, supply chain cost escalations, contractor availability, and general market volatility. Due to the recent volatility of the market and supply chain shortages, actual costs may vary significantly.



**CITY OF SISTERS, OREGON
 WATER SYSTEM MASTER PLAN UPDATE
 EDGINGTON ROAD TRANSMISSION LINE EXTENSION
 PRELIMINARY COST ESTIMATE
 (YEAR 2023 COSTS)**

NO.	DESCRIPTION	UNIT	UNIT PRICE ¹	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	\$ 133,300	All Req'd	\$ 133,300
2	Project Safety, Temporary Traffic Control, and Quality Control	LS	30,000	All Req'd	30,000
3	Construction Survey	LS	20,000	All Req'd	20,000
4	Clearing and Grubbing	ACRE	500	4	2,000
5	Connect to Existing Water Line	EA	3,500	2	7,000
6	Install 16-inch Polyvinyl Chloride Water	LF	200	12,100	2,420,000
7	16-inch Butterfly Valve	EA	4,500	13	58,500
8	Fire Hydrant Assembly	EA	6,500	2	13,000
9	Gravel Surface Restoration	TON	20	3,110	62,200
Subtotal Estimated Construction Cost					\$ 2,746,000
Construction Contingency (15%)					412,000
Total Estimated Construction Cost					\$ 3,158,000
Preliminary, Design, and Construction Engineering 15%					474,000
TOTAL ESTIMATED IMPROVEMENTS COST (2023 DOLLARS)					\$ 3,632,000
Other Estimated Project Costs					
Oregon Health Authority Plan Review					\$ 3,300
Subtotal Other Estimated Project Costs (2023 Dollars)					\$ 3,300
TOTAL ESTIMATED PROJECT COST					\$ 3,635,000

¹All costs shown are in 2023 dollars. Estimated project costs were prepared using methodology established by the City and City Engineers with reference to pre-pandemic itemized bids inflated by 4.5 percent from the referenced project bid date to year 2023. Total estimated project costs must be re-evaluated prior to the implementation time frame to account for inflation, supply chain cost escalations, contractor availability, and general market volatility. Due to the recent volatility of the market and supply chain shortages, actual costs may vary significantly.



CITY OF
 SISTERS, OREGON
 WATER SYSTEM MASTER PLAN UPDATE
 EDGINGTON ROAD TRANSMISSION
 LINE EXTENSION
 PRELIMINARY COST ESTIMATE

**FIGURE
 5-8**

**CITY OF SISTERS, OREGON
 WATER SYSTEM MASTER PLAN UPDATE
 RESERVOIR TO WHYCHUS CREEK JUNCTION
 TRANSMISSION LINE REPLACEMENT
 PRELIMINARY COST ESTIMATE
 (YEAR 2023 COSTS)**

NO.	DESCRIPTION	UNIT	UNIT PRICE ¹	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	\$ 48,700	All Req'd	\$ 48,700
2	Project Safety, Temporary Traffic Control, and Quality Control	LS	30,000	All Req'd	30,000
3	Construction Survey	LS	20,000	All Req'd	20,000
4	Clearing and Grubbing	ACRE	7,500	2.5	18,750
5	Connect to Existing Water Line	EA	3,500	3	10,500
6	Install 16-inch Ductile Iron Water Line	LF	170	5,425	922,250
7	16-inch Butterfly Valve	EA	4,500	6	27,000
9	Seeding, Fertilizing, and Mulching	ACRE	3,500	2.8	9,800
Subtotal Estimated Construction Cost					\$ 1,087,000
Construction Contingency (15%)					163,000
Total Estimated Construction Cost					\$ 1,250,000
Preliminary, Design, and Construction Engineering (15%)					188,000
TOTAL ESTIMATED IMPROVEMENTS COST (2023 DOLLARS)					\$ 1,438,000
Other Estimated Project Costs					
Oregon Health Authority Plan Review					\$ 3,300
Wetland Delineation, Stream Function Assessment Method, and Joint Permit Application					25,000
Subtotal Other Estimated Project Costs (2023 Dollars)					\$ 28,300
TOTAL ESTIMATED PROJECT COST					\$ 1,466,000

¹All costs shown are in 2023 dollars. Estimated project costs were prepared using methodology established by the City and City Engineers with reference to pre-pandemic itemized bids inflated by 4.5 percent from the referenced project bid date to year 2023. Total estimated project costs must be re-evaluated prior to the implementation time frame to account for inflation, supply chain cost escalations, contractor availability, and general market volatility. Due to the recent volatility of the market and supply chain shortages, actual costs may vary significantly.



**CITY OF SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE
WHYCHUS CREEK JUNCTION TO WEST HOOD AVENUE
TRANSMISSION LINE REPLACEMENT
PRELIMINARY COST ESTIMATE
(YEAR 2023 COSTS)**

NO.	DESCRIPTION	UNIT	UNIT PRICE ¹	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	\$ 80,500	All Req'd	\$ 80,500
2	Project Safety, Temporary Traffic Control, and Quality Control	LS	130,000	All Req'd	130,000
3	Construction Survey	LS	15,000	All Req'd	15,000
4	Clearing and Grubbing	ACRE	7,500	4	30,000
5	Asphalt Pavement Sawcutting	LF	2	4,600	9,200
6	Connect to Existing Water Line	EA	2,000	13	26,000
7	12-inch Ductile Iron Water Line	LF	130	6,910	898,300
8	12-inch Polyvinyl Chloride Water Line	LF	160	2,300	368,000
9	Temporary Stream Channel Diversion	LS	30,000	All Req'd	30,000
10	Waterway Enhancement	LS	60,000	All Req'd	60,000
11	Riparian Plantings	LS	30,000	All Req'd	30,000
12	Seeding, Fertilizing, and Mulching	ACRE	3,500	3	10,500
13	Trench Resurfacing in Existing Asphalt Concrete Pavement (Full Lane Restoration)	TON	130	700	91,000
14	12-inch Butterfly Valve	EA	3,000	19	57,000
15	Fire Hydrant Assembly	EA	6,500	1	6,500
Subtotal Estimated Construction Cost					\$ 1,842,000
Construction Contingency (15%)					276,000
Total Estimated Construction Cost					\$ 2,118,000
Preliminary, Design, and Construction Engineering (15%)					318,000
TOTAL ESTIMATED IMPROVEMENTS COST (2023 DOLLARS)					\$ 2,436,000
Other Estimated Project Costs					
Oregon Health Authority Plan Review					\$ 3,300
Wetland Delineation, Stream Function Assessment Method, and Joint Permit Application					65,000
Subtotal Other Estimated Project Costs (2023 Dollars)					\$ 68,300
TOTAL ESTIMATED PROJECT COST					\$ 2,504,000

¹All costs shown are in 2023 dollars. Estimated project costs were prepared using methodology established by the City and City Engineers with reference to pre-pandemic itemized bids inflated by 4.5 percent from the referenced project bid date to year 2023. Total estimated project costs must be re-evaluated prior to the implementation time frame to account for inflation, supply chain cost escalations, contractor availability, and general market volatility. Due to the recent volatility of the market and supply chain shortages, actual costs may vary significantly.



CITY OF
SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE
WHYCHUS CREEK JUNCTION TO WEST
HOOD AVENUE TRANSMISSION LINE
REPLACEMENT PRELIMINARY
COST ESTIMATE

**FIGURE
5-10**

**CITY OF SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE
CREEKSIDE DRIVE EXTENSION
PRELIMINARY COST ESTIMATE
(YEAR 2023 COSTS)**

NO.	DESCRIPTION	UNIT	UNIT PRICE ¹	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	\$ 22,500	All Req'd	\$ 22,500
2	Project Safety, Temporary Traffic Control, and Quality Control	LS	35,000	All Req'd	35,000
3	Construction Survey	LS	6,000	All Req'd	6,000
4	Connect to Existing Water Line	EA	3,500	2	7,000
5	Install 12-inch Polyvinyl Chloride Water Line	LF	160	1,160	185,600
6	Boring Tool Setup	EA	40,000	2	80,000
7	Highway Jack, Bore, Casing, and Ductile Iron Pipe	LF	725	180	130,500
8	Fire Hydrant Assembly	EA	6,500	2	13,000
9	12-inch Butterfly Valves	EA	3,000	3	9,000
10	Surface Restoration	SY	10	140	1,400
Subtotal Estimated Construction Cost					\$ 490,000
Construction Contingency (15%)					74,000
Total Estimated Construction Cost					\$ 564,000
Preliminary, Design, and Construction Engineering (15%)					85,000
TOTAL ESTIMATED IMPROVEMENTS COST (2023 DOLLARS)					\$ 649,000
Other Estimated Project Costs					
Oregon Health Authority Plan Review					\$ 3,300
General Permitting					2,000
Subtotal Other Estimated Project Costs (2023 Dollars)					\$ 5,300
TOTAL ESTIMATED PROJECT COST					\$ 654,000

¹All costs shown are in 2023 dollars. Estimated project costs were prepared using methodology established by the City and City Engineers with reference to pre-pandemic itemized bids inflated by 4.5 percent from the referenced project bid date to year 2023. Total estimated project costs must be re-evaluated prior to the implementation time frame to account for inflation, supply chain cost escalations, contractor availability, and general market volatility. Due to the recent volatility of the market and supply chain shortages, actual costs may vary significantly.



**CITY OF SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE
HOOD AVENUE SOUTH ALLEY SERVICE RECONNECTIONS
PRELIMINARY COST ESTIMATE
(YEAR 2023 COSTS)**

NO.	DESCRIPTION	UNIT	UNIT PRICE ¹	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	\$ 2,100	All Req'd	\$ 2,100
2	Project Safety, Temporary Traffic Control, and Quality Control	LS	35,000	All Req'd	35,000
3	Construction Survey	LS	3,500	All Req'd	3,500
4	Water Service Meter Assembly	EA	2,250	6	13,500
5	Water Service Line	LF	30	360	10,800
6	Water Service Line Tap	EA	350	6	2,100
7	Cap Existing Tee	EA	1,500	2	3,000
8	Asphalt, Curb, and Sidewalk Repair	EA	600	6	3,600
9	Surface Restoration	SY	20	120	2,400
Subtotal Estimated Construction Cost					\$ 76,000
Construction Contingency (15%)					11,000
Total Estimated Construction Cost					\$ 87,000
Preliminary, Design, and Construction Engineering (15%)					13,000
TOTAL ESTIMATED IMPROVEMENTS COST (2023 DOLLARS)					\$ 100,000
Other Estimated Project Costs					
Oregon Health Authority Plan Review					\$ 825
General Permitting					2,000
Subtotal Other Estimated Project Costs (2023 Dollars)					\$ 2,825
TOTAL ESTIMATED PROJECT COST					\$ 103,000

¹All costs shown are in 2023 dollars. Estimated project costs were prepared using methodology established by the City and City Engineers with reference to pre-pandemic itemized bids inflated by 4.5 percent from the referenced project bid date to year 2023. Total estimated project costs must be re-evaluated prior to the implementation time frame to account for inflation, supply chain cost escalations, contractor availability, and general market volatility. Due to the recent volatility of the market and supply chain shortages, actual costs may vary significantly.



**CITY OF SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE
CAMP POLK ROAD EXTENSION
PRELIMINARY COST ESTIMATE
(YEAR 2023 COSTS)**

NO.	DESCRIPTION	UNIT	UNIT PRICE ¹	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	\$ 11,000	All Req'd	\$ 11,000
2	Project Safety, Temporary Traffic Control,	LS	35,000	All Req'd	35,000
3	Construction Survey	LS	2,500	All Req'd	2,500
4	Connect to Existing Water Line	EA	3,500	2	7,000
5	Install 12-inch Polyvinyl Chloride Water Line	LF	160	825	132,000
6	Fire Hydrant Assembly	EA	6,500	2	13,000
7	12-inch Butterfly Valve	EA	3,000	2	6,000
8	Trench Resurfacing in Existing Asphalt Concrete Pavement (Full Lane Restoration)	TON	130	250	32,500
Subtotal Estimated Construction Cost					\$ 239,000
Construction Contingency (15%)					36,000
Total Estimated Construction Cost					\$ 275,000
Preliminary, Design, and Construction Engineering (15%)					41,000
TOTAL ESTIMATED IMPROVEMENTS COST (2023 DOLLARS)					\$ 316,000
Other Estimated Project Costs					
Oregon Health Authority Plan Review					\$ 3,300
Subtotal Other Estimated Project Costs (2023 Dollars)					\$ 3,300
TOTAL ESTIMATED PROJECT COST					\$ 319,000

¹All costs shown are in 2023 dollars. Estimated project costs were prepared using methodology established by the City and City Engineers with reference to pre-pandemic itemized bids inflated by 4.5 percent from the referenced project bid date to year 2023. Total estimated project costs must be re-evaluated prior to the implementation time frame to account for inflation, supply chain cost escalations, contractor availability, and general market volatility. Due to the recent volatility of the market and supply chain shortages, actual costs may vary significantly.



Chapter 6 - Recommended System Improvements and Improvements Prioritization

Introduction

This chapter summarizes the proposed improvements to the water system identified in this Water System Master Plan (WSMP) Update to address deficiencies and support anticipated growth and increased demands.

Summary of Improvements

Presented hereafter is a summary of the recommended improvements that have been identified based on the evaluation and computer water modeling efforts completed as part of this WSMP Update. For a more comprehensive discussion with respect to the different elements (supply, storage, and distribution) of the water system and detailed evaluation, the reader is encouraged to reference other chapters in this WSMP Update. Figures 6-1 and 6-2 provide the priority, location, and extent of each capital improvement project discussed herein.

Water Supply and Treatment

To accommodate population growth, update equipment nearing the end of its useful life, protect source water capacity, and enhance the operational safety of disinfection systems, it is recommended the City implement the following measures. These recommendations, with notes related to the implementation, are listed in order of priority.

- Rebuild the Well No. 1 Mechanical Building and Install an On-site Generation System
 - Obtain land use approval from Deschutes County for the existing non-conforming facility. Non-conforming implies the existing facility was constructed and operational prior to the adoption and implementation of current land use ordinances.
 - Design and construct selected facility improvements including an on-site generation system to replace the existing chlorine gas system, which will enhance the operational safety of the facility.
- Install Backup Power and a Variable Frequency Drive (VFD) on Well No. 3
 - Procure and install selected equipment at the existing facility.
- Construct Well No. 5 and Transmission Line Extension
 - Submit a water right transfer to add an additional point of appropriation to the City's various permits and certificates.
 - Obtain Deschutes County land use approval for the proposed facility.

- Design and construct the facilities.
- “Prove up” to obtain certificated water rights for the transferred groundwater rights.

Water Storage

The City’s water storage system consists of one storage reservoir with a total available storage volume of 1.6 million gallons (MG). The recommended storage is based on the amount of emergency reserve the City believes is necessary to accommodate unforeseen circumstances and emergencies. Through various discussions between consultants and City operators, it was concluded one day of average daily demand would adequately prepare the City for such circumstances. Adopting this methodology, it is seen that the City’s existing storage is currently inadequate by approximately 40,000 gallons. Assuming an additional source is brought online by year 2035 such that the City can exercise their full water right withdrawal rates with the largest producing source offline, the total recommended storage for the planning year 2042 is approximately 3.8 MG. It was decided among City staff and Anderson Perry & Associates, Inc., that an additional 2.2 MG of storage should be constructed, for a total of 3.8 MG available.

Another element of storage is redundancy. The City currently relies on their only existing reservoir and is unable to take the tank offline for any reason. It is recommended the City have at least two reservoirs so either one can be taken offline when necessary for cleaning, inspection, maintenance, and repair. Due to the existing emergency reserve storage inadequacy and lack of redundancy, it is recommended the City construct additional storage as soon as possible. Once the new reservoir is completed and online, the existing concrete reservoir should be rehabilitated.

Water Distribution

In general, the City’s distribution system is well-looped and has few dead-end lines. Currently, a single 12-inch asbestos cement (AC) transmission line exists from the reservoir to the Whychus Creek tee junction. This line is susceptible to damage due to uprooting should a nearby tree fall and does not have redundancy to keep the reservoir online if the existing line needs to be taken offline. Recommended distribution system improvements have been separated into three categories: high priority improvements, medium priority improvements, and long-term/future development improvements. The following provides a general description of the improvements included in each category.

High Priority Improvements

1. Install a new 16-inch polyvinyl chloride (PVC) transmission line from the existing reservoir to city limits near the middle and high schools on Edgington Road.
2. Install a new 16-inch ductile iron (DI) transmission line from the existing reservoir to the Whychus Creek junction.

Medium Priority Improvements

1. Replace existing AC distribution mains in the Edge O The Pines subdivision.
2. Install a new 12-inch PVC water main on Camp Polk Road from East Barclay Drive to East Sun Ranch Drive.
3. Install a new 12-inch DI transmission line from the Whychus Creek junction to the city limits and replace the existing 12-inch AC water main from East Tye Drive to East Hood Avenue with new 12-inch PVC pipe.
4. Install a new 12-inch PVC distribution main along the city limits from the end of South Creekside Drive to East Desperado Trail.
5. Reconnect existing Hood Avenue South Alley water services with new taps, lines, meter assemblies, and valve boxes from either West Hood Avenue or West Washington Avenue.

Long-Term/Future Development Improvements

No other long-term development improvements are needed. An ongoing meter replacement program to replace aging service meters should be implemented.

Capital Improvements Plan

Introduction

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

As part of this WSMP Update, the City developed a CIP based on identified deficiencies and improvements required to address the water system needs of the City for the next 20 years. The CIP will need to be reviewed and updated periodically (at least every five years) to accommodate changing community needs, additional improvements that may be identified through time, and changes in financial resources. The CIP lists the City's capital improvements projects, places the projects in a priority order (subject to periodic review), and schedules the projects for funding and construction.

The CIP is a tool to be used in the development of responsible and progressive financial planning. The CIP forms the basis for making annual capital budget decisions and supports the City's continued commitment to sound, long-term financial planning and direction.

The CIP identifies and prioritizes short-, medium-, and long-term capital projects of all types based on the water system master planning process. Capital water system improvements projects will be coordinated with the annual budget process to maintain full utilization of available resources. For each capital improvements project, the CIP provides a variety of information including a project

description and the service need to be addressed, a proposed timetable, and proposed funding levels. Capital water system improvements projects will be prioritized with the most urgent projects first. Ongoing operation costs are not included in the CIP estimated project costs.

Identified Improvements Estimated Costs and Implementation Time Frames

The year 2023 estimated costs for the recommended water system improvements are summarized on Table 6-1. Detailed cost estimates for each component of the system (water supply, storage, and distribution) are included in figures referenced in Chapters 3, 4, and 5. It is recommended the estimated costs be increased by an annual inflation rate to account for potential increases in project costs to the year the improvements are actually completed.

**TABLE 6-1
 RECOMMENDED WATER SYSTEM IMPROVEMENT PROJECTS, IMPLEMENTATION TIME FRAME, AND
 TOTAL ESTIMATED PROJECT COST¹**

Implementation Priority	Chapter	Improvement Type	Recommended Improvement	Total Estimated Project Cost and Implementation Time Frame (2023 Dollars)		
				2023 to 2027	2027 to 2032	2032 to 2042
1	3	Supply	Install VFD and backup power at Well No. 3.	\$372,000		
2	3	Supply, Treatment	Rebuild the Well No. 1 pump station building and install a new on-site generation system.	\$808,000		
3	4	Storage	Construct new 2.2 MG water storage tank and rehabilitate the existing 1.6 MG water storage tank.	\$6,283,000		
4	5	Distribution	Install a new 16-inch PVC transmission line on Edgington Road from the existing reservoir to city limits near the middle and high schools.	\$3,635,000		
5	5	Distribution	Install a new 16-inch DI transmission line from the existing reservoir to Whychus Creek junction.	\$1,466,000		
6	5	Distribution	Replace existing AC distribution mains in the Edge O The Pines subdivision.		\$1,567,000	
7	5	Distribution	Install new 12-inch PVC water main on Camp Polk Road Extension from East Barclay Drive to East Sun Ranch Drive.		\$319,000	

Implementation Priority	Chapter	Improvement Type	Recommended Improvement	Total Estimated Project Cost and Implementation Time Frame (2023 Dollars)		
				2023 to 2027	2027 to 2032	2032 to 2042
8	5	Distribution	Install a new 12-inch DI transmission line from the Whychus Creek junction to East Tye Drive and replace the existing 12-inch AC water main from East Tye Drive to East Hood Avenue with new 12-inch PVC pipe.		\$2,504,000	
9	5	Distribution	Install new 12-inch PVC main from East Desperado Trail to Creekside Drive.		\$654,000	
10	5	Distribution	Reconnect existing Hood Avenue South Alley water services with new taps, lines, meter assemblies, and meter boxes from either West Hood Avenue or West Washington Avenue.		\$103,000	
11	3	Supply	Construct new Well No. 5 and transmission line.			\$2,102,000
Annually	5	Distribution	Ongoing water service meter replacement.	50 per year at \$400 each = \$20,000 per year	50 per year at \$400 each = \$20,000 per year	50 per year at \$400 each = \$20,000 per year
			TOTALS	\$12.6 M	\$5.2 M	\$2.1 M
TOTAL RECOMMENDED IMPROVEMENTS COST (2023 Dollars)						\$19.9 M
YEARS 2023 THROUGH 2042						

¹All costs shown are in 2023 dollars. Estimated project costs were prepared using methodology established by the City and City Engineers with reference to pre-pandemic itemized bids inflated by 4.5 percent from the referenced project bid date to year 2023. Total estimated project costs must be re-evaluated prior to the implementation time frame to account for inflation, supply chain cost escalations, contractor availability, and general market volatility. Due to the recent volatility of the market and supply chain shortages, actual costs may vary significantly.

M = million

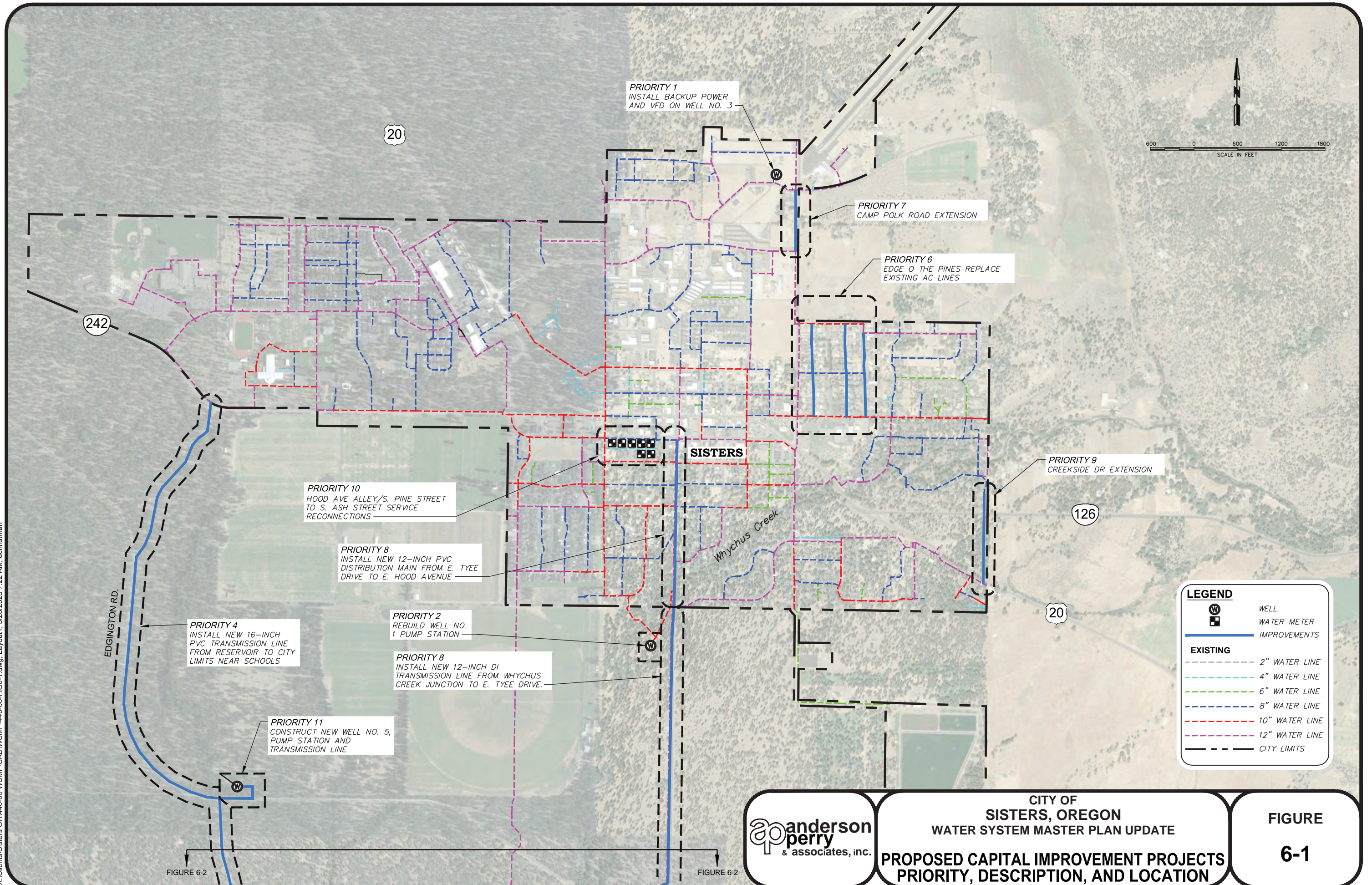
Action Items

The following action items and implementation steps will need to be made by the City of Sisters to implement the desired water system improvements projects. The steps outlined are general in nature and include the major steps that need to be undertaken. It should be noted that these implementation steps, as presented hereafter, may be different if the City elects to delay projects and pursue improvements in the future.

Implementation Steps

- The City will need to submit and obtain approval of this WSMP Update from the Oregon Health Authority - Drinking Water Services.
- The City will need to finalize and adopt this WSMP Update and the recommended improvements once agencies review and approve the draft WSMP Update.
- The City will need to schedule a One Stop meeting with the funding agencies to discuss potential funding options for recommended improvements where project costs exceed the amount of which the City could self-fund the project.
- If Business Oregon funding is identified as a potential source in the One Stop meeting, the City and Business Oregon will draft a Project Notification and Intake Form.
- The City will need to hold public information meetings to inform citizens of the need for and scope of the improvements projects, answer questions, and explain the need for increases in user fees as presented in Chapter 7.
- The City will need to develop a funding plan for the desired improvements at the time frames indicated in the CIP.
- Working with various funding agencies, the City will need to prepare funding applications, as applicable, for the associated water system improvements projects and submit them to the appropriate funding agencies.

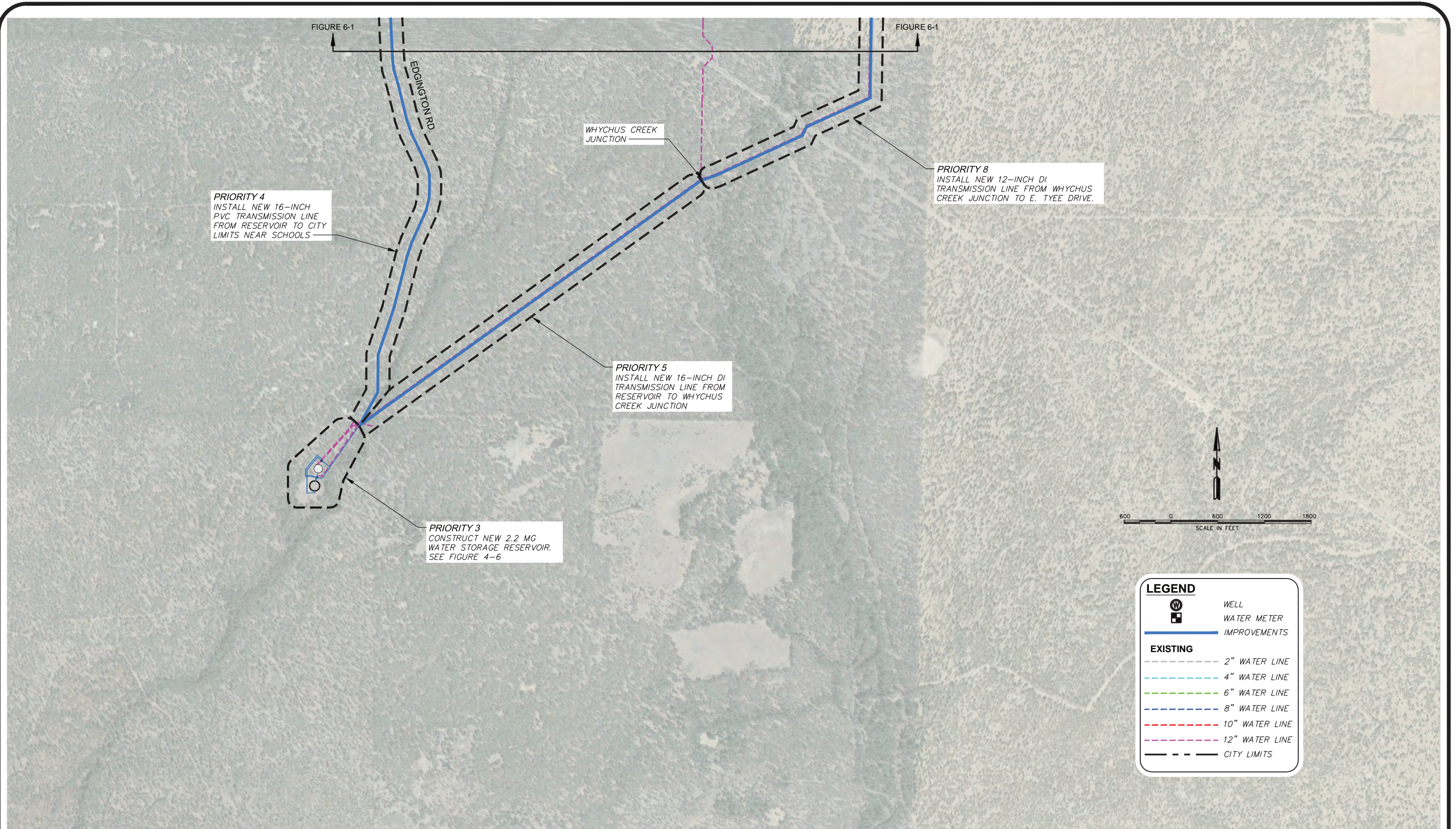
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CITY OF SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE
PROPOSED CAPITAL IMPROVEMENT PROJECTS
PRIORITY, DESCRIPTION, AND LOCATION

FIGURE
6-1

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CITY OF
SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE

**PROPOSED CAPITAL IMPROVEMENT PROJECTS
PRIORITY, DESCRIPTION, AND LOCATION**

**FIGURE
6-2**

Chapter 7 - Current Financial Status and Project Financing

Introduction

This chapter summarizes the financial status of the City of Sisters' Water Department, identifies alternatives for financing water system improvements, and discusses the use of System Development Charges (SDCs) to finance eligible existing and future improvements. A summary of state and federal funding programs is presented, including a review of funding options potentially available to the City for water system improvements. To construct some or all the recommended improvements, it is important for the City of Sisters to develop a project financing and implementation plan (or Capital Improvements Plan [CIP] as identified in Chapter 6). Finally, of the CIP projects proposed, a list of SDC-eligible projects is provided.

Current Water Use Rates and Revenues

Operation and maintenance of the existing water system is financed through the City's annual budget. Revenue is obtained from monthly water user fees, account setup fees, and service connection fees.

Water Use Rates

A summary of the existing water rate structure is shown on Table 7-1.

**TABLE 7-1
EXISTING WATER RATE STRUCTURE¹**

Meter Size	Monthly Allotment (cubic feet)	Monthly Base Rate	Consumption Rate (per 100 cubic feet)
5/8-inch	0	\$18.69	\$1.00
3/4-inch	0	\$18.69	\$1.00
1-inch	0	\$20.96	\$1.00
1-1/2-inch	0	\$20.96	\$1.00
2-inch	0	\$23.22	\$1.00
3-inch or Larger	0	\$56.64	\$1.00

¹ Based on rates established in Resolution No. 2022-15 effective July 1, 2022.

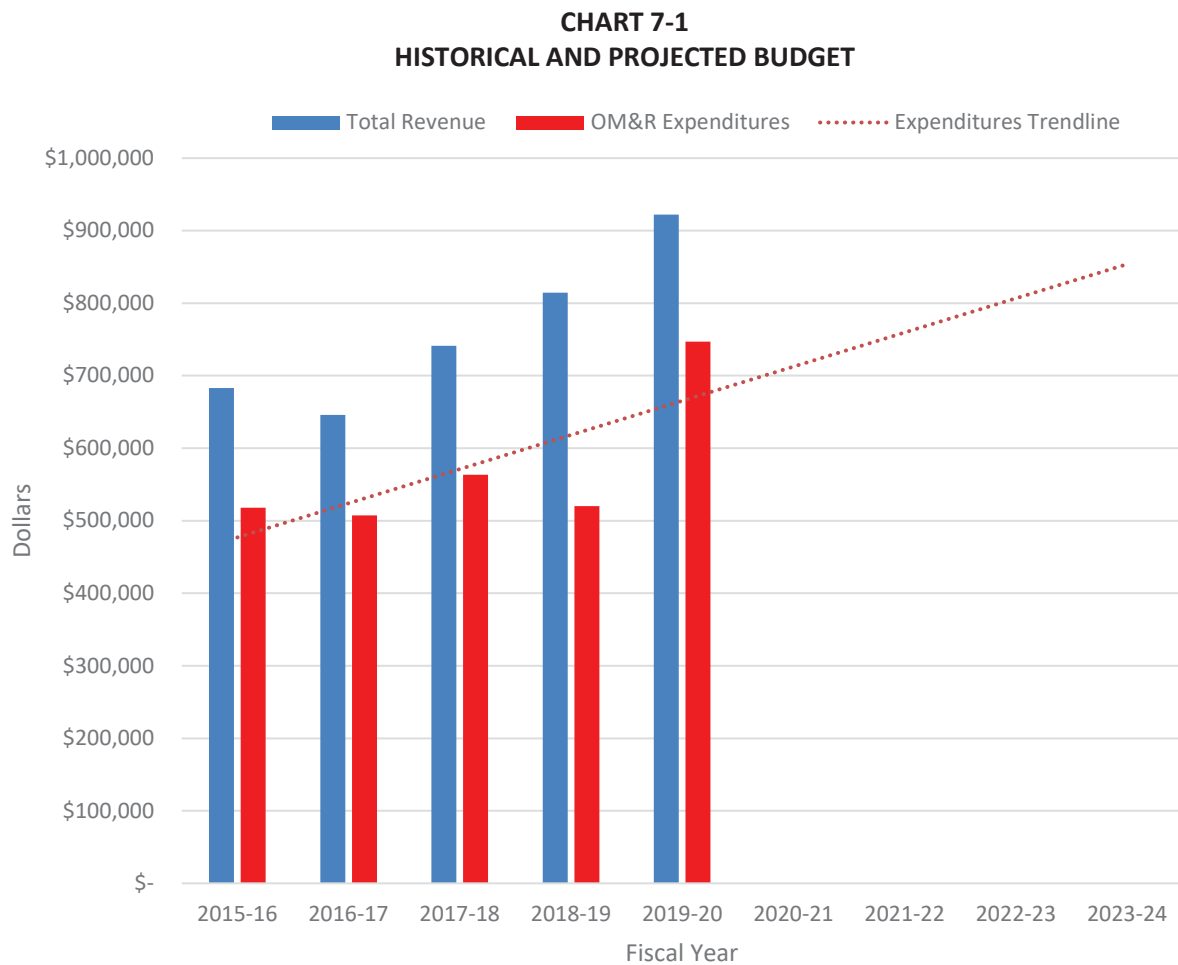
The City's current rate structure is based on a uniform base rate (no volume) and additional charge for consumption. This means that the customer is charged a base rate once, plus a flat rate for every 100 cubic feet used. Currently, the City's monthly base rate for all customers varies from \$18.69 to \$56.64, depending on meter size. For every 100 cubic feet used, customers pay \$1.00.

Current Financial Status

The annual cost of operating and maintaining the City’s water system is summarized on Figure 7-1. The costs presented were obtained from the City’s audited financial statements and include all costs for the water system, materials and services, capital improvements, and debt service.

Historical and Projected Budget Trends

The City’s Water Department revenues have exceeded annual operation, maintenance, and replacement (OM&R) for all five years for which data were available. A graphical plot of the City of Sisters’ water system budget for the Water Department funds, showing total revenue and total expenditures, is presented on Chart 7-1.



Capital Improvements Plan

During development of this Water System Master Plan (WSMP) Update, the City elected to take a CIP approach for the less expensive maintenance and existing system replacement-related work with the potential to pursue outside funding for the more expensive water system improvements projects. The CIP approach requires City funds to be allocated each year within the Water Department to complete necessary repairs and upgrades to the water system. If the City seeks outside funding, customer water

rates would likely need to be raised to allow loans to be paid back over time. Projects that may require outside funding include the construction of new water supply sources, transmission and distribution pipelines, and storage reservoirs, as discussed in previous chapters of this WSMP Update. Water system improvements outlined in Chapter 6 have been prioritized so the most critical projects, related to the quality and reliability of the existing water system, are recommended to be completed first.

Water System Improvements Funding

To pursue the potential larger recommended water system improvements projects presented in Chapter 6, the City may choose to obtain outside funding assistance. Outside funding assistance would enable a needed water system improvements project to be implemented sooner than a CIP approach would normally allow. For informational purposes, a summary of state and federal grant and loan programs that can provide financial assistance for municipal improvement projects is included herein. These programs offer various levels of funding aimed at different types of projects. These include programs administered by the U.S. Economic Development Administration (EDA), Business Oregon, United States Department of Agriculture - Rural Development (RD), and others.

These agencies can provide low interest loan funding and, possibly, grant funding for assisting communities on public works projects. Some of the funding programs provide funding only if the improvements address documented water quality compliance issues. A summary of potential funding programs follows.

Summary of Potential Funding Programs

The following section briefly summarizes the primary funding programs available to assist the City with a water system improvements project. Most of these agencies require an evaluation of water rates needed to support a loan for water system improvements both as a condition of receiving monies and prior to being considered for grant funds. The monthly user rates discussed in this section can represent a combination of monthly usage fees and/or taxes.

State Grant and Loan Programs

Business Oregon

Special Public Works Fund

The Special Public Works Fund (SPWF) 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, replacing owned essential community facilities, and emergency projects because of a disaster.

For design and construction projects, loans are primarily available; however, grants are available for and limited to 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. 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. Loans range in size from less than \$100,000 to \$10 million. The

SPWF can offer very attractive interest rates that reflect tax-exempt market rates for creditors. Loan terms can be up to 25 years or the useful life of the project, whichever is less. If the City of Sisters can tie the needed improvements to job creation, the SPWF may be an available funding source for water system improvements.

Community Development Block Grant Program

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

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

Eligibility for the CDBG program requires that greater than 51 percent of persons within the community fall into the low to moderate income (LMI) category. According to the City and Deschutes County demographics utilized by Business Oregon, which was based on 2019 data available from Business Oregon, the City of Sisters had approximately 42 percent of the population within the LMI category. This puts the City below the threshold to qualify for CDBG funds. However, several communities have completed local income surveys, showing that, in fact, 51 percent or more of the population was in the LMI category.

Safe Drinking Water Revolving Loan Fund

The Safe Drinking Water Revolving Loan Fund (SDWRLF) is primarily a loan program for the construction and/or improvement of public and private water systems to address regulatory compliance issues. This is accomplished through two separate programs: the SDWRLF for collection, treatment, distribution, and related infrastructure, and the Drinking Water Source Protection Fund for protection of sources of drinking water prior to system intake. The SDWRLF program can lend a significant portion to projects, depending on the City's financial capability. Loan amounts greater than \$3 million or with more than \$750,000 principal forgiveness require approval through Business Oregon's Infrastructure Finance Authority Board. The standard SDWRLF loan term is 20 years or the useful life of project assets, whichever is less. Loan terms up to 30 years may be available for "disadvantaged communities." This program offers subsidized interest rates for all successful projects. Interest rates for a standard loan start at 80 percent of the state/local bond rate. Interest rates for loans to disadvantaged communities are based on a sliding scale between the interest rate for a standard loan and 1 percent. Communities may be eligible for some of the principal on their SDWRLF loan to be "forgiven." This forgivable loan feature is like a grant and is offered to disadvantaged communities. Special consideration, including partial principal forgiveness, is provided to projects qualifying or having Green Project Reserve components. The SDWRLF program appears to be a potential funding source available to the City, provided a potential regulatory requirement can be addressed with the improvements.

Water/Wastewater Financing Program

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

While primarily a loan program, grants are available for municipalities that meet eligibility criteria. The loan/grant amounts are determined by financial analysis of the applicant's ability to afford a loan (debt capacity, repayment sources, current and projected utility rates, and other factors). The maximum loan term is 25 years or the useful life of the infrastructure financed, whichever is less. The maximum loan amount is \$10 million per project and is determined by financial review and may be offered through a combination of direct and/or bond-funded loans. Loans are generally repaid with utility revenues or voter-approved bond issues. A limited tax general obligation pledge may also be required. Creditworthy applicants may be funded through the sale of state revenue bonds. The maximum grant is \$750,000 per project based on a financial analysis. An applicant is not eligible for grant funds if the applicant's annual median household income (MHI) is equal to or greater than 100 percent of the state average MHI for the same year.

Business Oregon - Regional Development Officer

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

Federal Grant and Loan Programs

Rural Development

This agency can provide financial assistance to communities with a population of less than 10,000 through both loans and direct grants. 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 fixed interest rate varies but is generally approximately 3.0 to 4.0 percent with a repayment period of up to 40 years. Applying for this type of funding is a lengthy process involving development of an environmental report and a detailed funding application.

The agency presently requires communities to establish average residential user costs in the range of similar systems with similar demographics before the community qualifies for grant funds. 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 because of the project. All project costs above this level may be paid for by grant funds, up to given limits, which are usually not more than 45 percent of the total project cost. The objective of the RD loan/grant program is to keep the cost for utilities in small, rural communities at a level similar to what other communities 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 ten 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 section of this chapter for further discussion). These bonds can usually be purchased for a period of 40 years if desired. A combination loan and grant from RD may be an option for the City of Sisters to implement water system improvements.

U.S. Economic Development Administration

The EDA has grant and loan funds like those available through Business Oregon's SPWF 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 has invested a great deal of money in Oregon to fund public works improvement projects in areas where new industries were locating or planned 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 also received an increased federal funding allocation through the CARES Act in 2020. This program is targeted toward creating additional jobs and reducing the unemployment rate in the area. If the City's water system improvements can be linked directly to industrial expansion or job retention/expansion, the City could be in a competitive position to receive funding under EDA programs.

Pursuing Potential Outside Project Funding Assistance

Based on the estimated costs provided herein, the City may elect to pursue loan funding for large capital improvements projects. If a water system improvements project is pursued, it is recommended the City thoroughly investigate potential available funding sources to verify the best funding package is obtained for the project. The following sections provide information on pursuing funding through Business Oregon or other local financing sources. This assumes the City is looking for outside funding assistance to fund large capital improvements projects as discussed in this WSMP Update.

Preliminary Equivalent Dwelling Units

When projecting future revenue for a water system, an equivalent dwelling unit (EDU) analysis is usually completed. One EDU is intended to represent the average residential water use for a given city. As an example, a residential account would represent one EDU. A commercial or industrial account with similar water usages to the average residential use would also be considered one EDU. A commercial account such as a restaurant with three times the typical water usage as an average residential account would be considered three EDUs.

The City of Sisters does not use EDUs to bill customers. The City bills according to meter size and consumption as defined in Resolution No. 2022-15. The meter size the City utilizes to determine the base rate for each customer is shown on Table 7-1. Table 7-2 below shows the relationship between the base rate for each meter size compared to a standard residential meter (5/8-inch or 3/4-inch). The meter size factor is determined by taking the base rate for the given meter size and dividing that number by the base rate for a standard residential meter.

**TABLE 7-2
 BASE RATE COMPARISON**

Meter Size	Connections ¹	Monthly Base Rate	Meter Size "Factor"	Total Base Rates (EDU)
5/8-inch	-	\$18.69	1.0	-
3/4-inch	1,563	\$18.69	1.0	1,563
1-inch	234	\$20.96	1.1	257
1-1/2-inch	36	\$20.96	1.1	40
2-inch	44	\$23.22	1.2	53
3-inch or Larger	9	\$56.64	3.0	27
Total	1,886			1,940

¹Number of connections as of September 2021.

In lieu of a typical EDU analysis, where average residential water consumption is the main factor behind a “base rate,” a meter size factor can be considered an equivalent analysis. Most funding agencies will use EDUs as a basis for estimating future annual revenue and debt capacity for a city. The EDU determination is intended to equitably distribute water costs among all users. The EDU determination helps funding agencies determine the maximum loan (debt) amount a city can incur prior to being considered for grant funds for their water system improvements project. The analysis presented hereafter for the City’s future water rate revenue and estimated debt capacity is based on the preliminary determination of 1,940 EDUs.

One Stop Meeting and Project Notification and Intake Form

To evaluate all potential project funding options, a One Stop meeting is generally requested of Business Oregon and other funding agencies that then meet with City staff to discuss the project and funding needs and identify the funding program best suited for the project. To avoid requiring city representatives to travel to Salem, Business Oregon has recently been holding these meetings locally or through video or telephone conferencing. Business Oregon utilizes a Project Notification and Intake Form (PNIF) to outline a city’s project, including the needs, project requirements, affected area, estimated project cost, time frame, schedule, etc. Business Oregon evaluates the project based on information presented on the PNIF and the results of the One Stop meeting to determine the best funding program suited to the project. The city is usually invited to submit a funding application to the best funding program(s) identified in the One Stop meeting.

Local Financing Options

Regardless of the ultimate project scope and agency from which funds are obtained, the City of Sisters may need to develop authorization to incur debt (i.e., bonding) for the recommended improvements. The need to develop authorization to incur debt depends on funding agency requirements and provisions in the City Charter. The need for bonding by the City has been eliminated by most state funding programs. However, if a bond election is required, there are generally two options the 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, water revenues, or a combination of both. The City’s taxing authority provides the guarantee for the debt. Revenue bonds are financed through revenues of the water 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 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.

Oregon law currently requires a 50 percent voter turnout to pass a bonded debt tax measure unless the election is held in May or November. May and November elections require only a majority of those who voted to pass a bonded debt tax measure. Due to current tax measure limitations in Oregon, careful consultation with experienced, licensed bonding attorneys should occur if the City begins to obtain bonding authority for the recommended water system improvements.

System Development Charges Review

State law creates a framework for local SDCs and specifies how, when, and for which improvements they can be imposed. SDCs may consist of a reimbursement fee, an improvement fee, or both. Improvement fees are associated with capital improvements to be constructed, while reimbursement fees are designed to recover the costs associated with capital improvements already constructed or under construction. SDC revenues may only be used for capital costs; they cannot be used for ongoing facility or system maintenance or for projects that either correct existing system deficiencies or replace existing capacity. The statutes put some constraints on the costs that may be included in each fee component:

- Reimbursement fees exclude existing facility costs funded by gifts or grants and costs associated with “used capacity” (facility capacity needed to meet existing development service demands).
- Improvement fees are based on the projected costs of capital improvements included on an SDC capital project list that expand capacity to meet the service demands of future system users.

An SDC methodology based on a combined reimbursement and improvement fee structure must demonstrate that the charge is not based on providing the same system capacity. Beyond these constraints, the statutes provide flexibility in determining SDC amounts and methodologies, provided that new users contribute no more than an equitable share of costs.

Local governments must establish SDCs by ordinance or resolution and through a public process. They must have a methodology to calculate reimbursement and improvement fees and provide a credit if a developer finances certain improvements. Local governments must also provide a review procedure through which anyone may challenge an expenditure of SDC revenue if it is out of compliance with state requirements.

Local governments are required to prepare a capital improvements program or comparable plan, prior to the establishment of an improvement SDC, that includes a list of the improvements the jurisdiction intends to fund with improvement fee revenues and the estimated timing, cost, and eligible portion of each improvement. This requirement was an added provision to the original statute to provide greater transparency on the basis for improvement fee costs and expenditures. Since reimbursement fees are based on facilities already constructed or under construction, the project list requirement is not applicable.

A list of SDC-eligible project costs proposed by this WSMP Update is shown on Table 7-3. As shown, roughly \$13.0 million of proposed capital improvements project costs are eligible to be financed with SDC fees.

**TABLE 7-3
 SDC-ELIGIBLE PROJECTS AND ASSOCIATED COSTS**

Project	Total Estimated Project Cost (2022 Dollars)	Portion of Project Cost Eligible for Funding by SDCs	SDC-eligible Cost	Explanation
Construct a new 2.2 MG water storage tank and rehabilitate the existing 1.6 MG water storage tank.	\$6,283,000	100 percent	\$6,283,000	Needed to provide additional storage capacity for fire flow and flow equalization resulting from forecasted growth.
Install a new 16-inch PVC transmission line from the reservoir to the Whychus Creek junction.	\$3,635,000	100 percent	\$3,635,000	Increased flow capacity needed to meet peak demands and fire flow rates due to forecasted growth.
Install a new 12-inch PVC water main on Camp Polk Road Extension from East Sun Ranch Drive to East Barclay Drive.	\$319,000	100 percent	\$319,000	Needed to compensate for the reduction in available fire flow rates due to forecasted growth.
Install a new 12-inch PVC main from East Desperado Trail to Creekside Drive.	\$654,000	100 percent	\$654,000	Needed to compensate for the reduction in available fire flow rates due to forecasted growth.
Construct a new Well No. 5 and transmission line.	\$2,102,000	100 percent	\$2,102,000	Needed to provide additional supply capacity resulting from forecasted growth.
Total SDC-Eligible Portion of Total CIP Costs:			\$12,993,000	

MG = million gallons
 PVC = polyvinyl chloride

Recommended Improvements Summary

The key to implementing the recommended improvements outlined in this WSMP Update is the ability of the City to secure monies to fund these improvements, while working closely with its citizens to inform them of the water system needs and the necessity for increased water user rates.

Water system improvements as outlined in this WSMP Update are intended to provide the City with a reliable, quality water system that will meet the needs of the City for the planning period and beyond. With the CIP approach, the City may reduce the need to borrow additional funds while completing the CIP-identified improvements projects. However, this approach can limit the speed at which more expensive improvements are implemented. If the City requires the immediate implementation of water

system improvements due to rapid growth or aging infrastructure, funding from the programs summarized herein may be sought. Both options may require water rates to be raised to adequately fund the recommended system improvements over the 20-year planning period.

**CITY OF SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE
WATER DEPARTMENT FUNDS**

Fiscal Year	Revenue			Expenditures						Excess Revenue Over (Under) Expenditures
	Charges for Services	Other Income ¹	Total Revenue	Personal Services	Materials and Services	Capital Improvements	Debt Service	Total Expenditures		
2015-2016	\$ 610,778	\$ 72,255	\$ 683,033	\$ 220,912	\$ 224,354	\$ 72,597	\$ -	\$ 517,863	\$ 165,170	
2016-2017	\$ 629,736	\$ 16,328	\$ 646,064	\$ 220,721	\$ 285,446	\$ -	\$ 1,254	\$ 507,421	\$ 138,643	
2017-2018	\$ 717,290	\$ 23,986	\$ 741,276	\$ 234,893	\$ 280,098	\$ 44,445	\$ 4,023	\$ 563,459	\$ 177,817	
2018-2019	\$ 775,870	\$ 38,674	\$ 814,544	\$ 264,064	\$ 252,349	\$ 3,216	\$ 657	\$ 520,286	\$ 294,258	
2019-2020	\$ 882,099	\$ 40,230	\$ 922,329	\$ 302,340	\$ 285,750	\$ 158,183	\$ 656	\$ 746,929	\$ 175,400	

¹Other Income comes from licenses and fees, intergovernmental, interest on investments, and miscellaneous.



CITY OF
SISTERS, OREGON
WATER SYSTEM MASTER PLAN UPDATE

WATER DEPARTMENT FUNDS

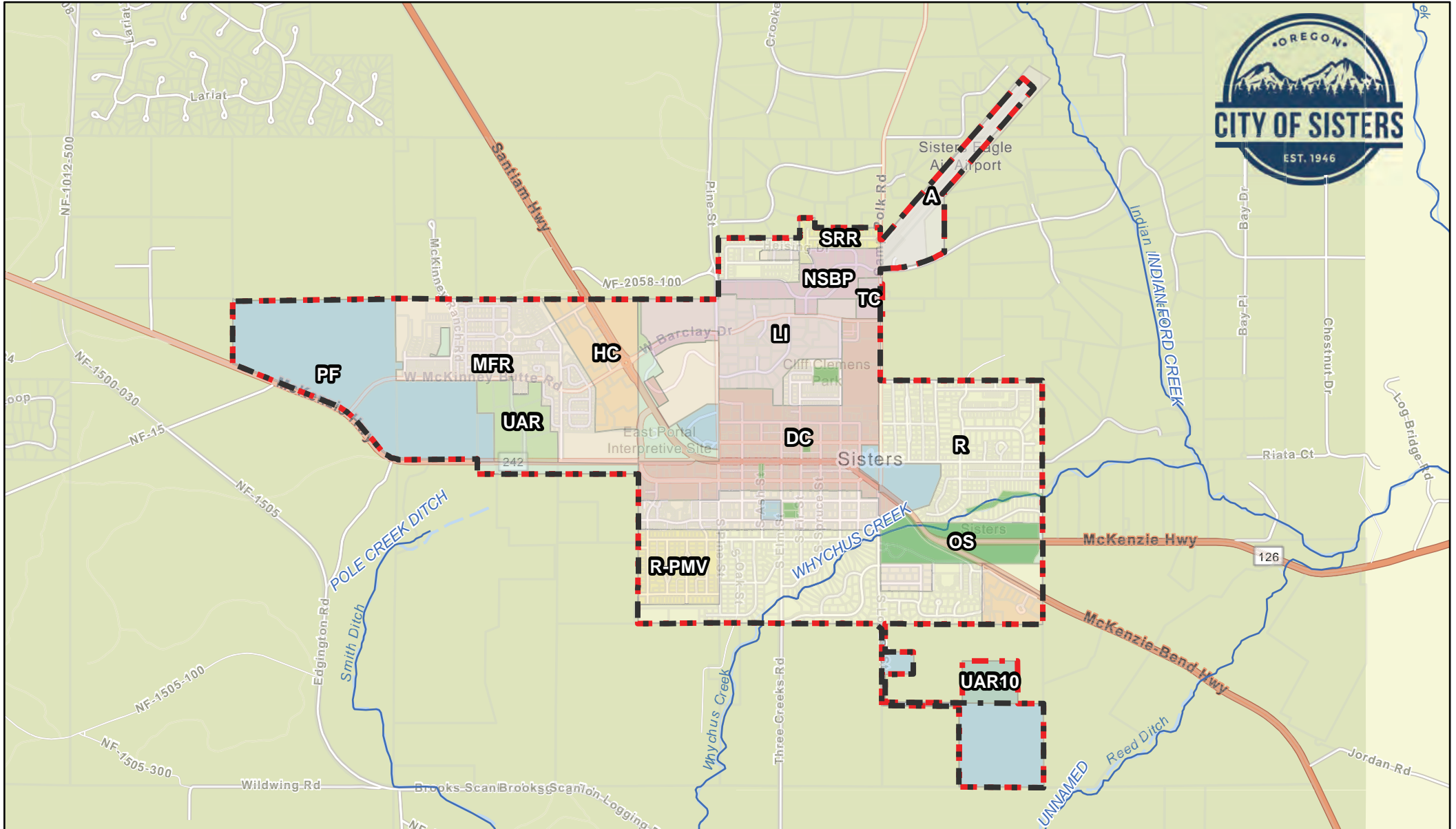
**FIGURE
7-1**

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Appendix F	Inspection Memo - 1.6 MG Prestressed Concrete Water Storage Tank
Appendix G	Public Protection Classification Summary Report - Sisters Camp Sherman FD - Oregon
Appendix H	2022 Camp Sherman Fire District Fire Hydrant Capacity Flow Test Results

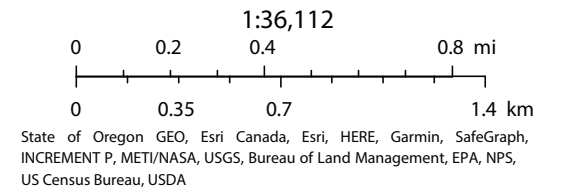
APPENDIX A
Planning and Zoning Map

City of Sisters Zoning Map



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- | | | | | |
|-------------|---------------------|--------------------|--------------------------|-------------------------|
| City Limits | Taxlots | Highway Commercial | Light Industrial | Sun Ranch Residential |
| UGB | Zoning | Tourist Commercial | N. Sisters Bus. Park | R - Pine Meadow Village |
| Parks | Airport | Open Space | Multi-Family Residential | Urban Area Reserve |
| Streams | Downtown Commercial | Public Facility | Residential | Urban Area Reserve 10 |



APPENDIX B
Oregon Health Authority - Water System
Information

OHA Drinking Water Services

OR41 00826

SISTERS, CITY OF

Classification: COMMUNITY

Contact: PAUL BERTAGNA
PO BOX 39
SISTERS, OR 97759

Phone: 541-323-5212
County: DESCHUTES
Activity Status: ACTIVE -- [History](#)

Population: 3,235

Number of Connections: 2,028

Operating Period: January 1 to December 31

Regulating Agency: [DESCHUTES COUNTY](#)

Certified Operator(s)

Owner Type: LOCAL GOVERNMENT

Required: Y

Licensed By: N/A

Distribution class: 1

Approved Drinking Water Protection Plan: No

Treatment class: None

Source Water Assessment: Yes

Filtration Endorsement Required: No

Last Survey Date: [Jul 26, 2022](#)

Sources

Facility ID	Facility Name - Well Logs	Activity Status	Availability	Source Type
EP-B	EP FOR CITY WELL	A		GW
SRC-BA	CITY WELL - DESC3023	A	Permanent	GW
EP-C	EP FOR HIGH SCHOOL WELL	A		GW
SRC-CA	HIGH SCHOOL WELL - DESC1034	A	Permanent	GW
EP-D	EP FOR SUN RANCH WELL	A		GW
SRC-DA	SUN RANCH WELL - L84019	A	Permanent	GW
EP-E	EP FOR WELL #4	A		GW
SRC-EA	WELL #4 - L138648	A	Permanent	GW

[Show Disconnected and Abandoned Sources](#)

[Find Purchasers/Sellers](#)

Treatment

Facility ID	Facility Name	Filter Type	Giardia Removal Credit	Treatment Process	Treatment Objective
WTP-B	TP FOR CITY WELL			RESID. MAINT. GAS CHLORINATION	OTHER
WTP-C	TP FOR HIGH SCHOOL WELL			RESID. MAINT. HYPOCHLORINATION	OTHER
WTP-D	TP FOR SUN RANCH WELL			RESID. MAINT. HYPOCHLORINATION	OTHER
WTP-E	TP FOR WELL #4			RESID. MAINT. HYPOCHLORINATION	OTHER

Consumer Confidence Reports (Last 5 Years)

For Year	Date Received	Date Certified
2021	<i>Due 7/1/2022</i>	Jul 26, 2022
2020	Mar 17, 2021	Mar 17, 2021
2019	Apr 23, 2020	Apr 23, 2020
2018	May 09, 2019	May 09, 2019
2017	Feb 15, 2019	Jul 17, 2018

Cross Connection/Backflow Prevention Information (Last 3 Records)

Enabling Authority Received	Annual Summary Report Received	Fee Invoice Paid
Yes (PDF)	2021 (PDF)	2022
	2020 (PDF)	2021
	2019 (PDF)	2020

APPENDIX C
Water System Survey for City of Sisters,
PWS #41-00826



HEALTH SERVICES

1550 Williamson Blvd, Suite 100, Bend, Oregon 97701
Public Health (541) 322-7400, Fax (541) 322-7465

www.deschutes.org

July 27, 2022

Paul Bertagna
Josh Stotts
City of Sisters Water System, PWS #00826
PO Box 39
Sisters, OR, 97759

Re: Water System Survey for City of Sisters, PWS **#41-00826**

Dear Mr. Bertagna and Mr. Stotts,

Thank you for your time and assistance in conducting a **Water System Survey at City of Sisters on 7/26/2022**. The main purpose of the survey was to evaluate the entire water system in terms of supplying safe drinking water to the public. I have enclosed a copy of the report for your records.

Significant deficiencies and rule violations must be corrected as soon as possible but no later than November 30, 2022. Contact this office within 30 days to confirm receipt or propose an approvable correction schedule. Once the deficiencies and rule violations have been corrected, submit written verification or photographs and date of correction.

If the water system fails to act within the required time frame, you must notify all persons served by the water system. A repeat public notice will be required every three months until all deficiencies are corrected, or you are in compliance with an approved corrective action plan. You must forward a copy of the public notice to Data Management, Compliance, and Enforcement (DMCE) at P.O. Box 14450, Portland, OR 97293-0450. You may also fax the report to 971-673-0694 or email to dwp.dmce@dhsosha.state.or.us.

Significant deficiencies and rule violations noted during the survey:

- **Caulk or otherwise seal the gap between the steel plate and the concrete pedestal at the City Well. The concrete grout has broken loose creating a gap and potential entry point for contaminants.**

Comments and recommendations:

- Take annual raw assessment samples from all 4 wells prior to treatment and label them "assessment".
- Update your protocol for under-certified operators as discussed
- provide AVBs for any hose attached or disconnect after use

Chemical sampling due this year:

20 Lead and Copper samples – (Second of two 6-month rounds being taking now). If results are low, schedule will be reduced to 10 every 3 years

Eastside Well #4

Radionuclides 3rd quarter 2022 (and 1st, 2nd quarter 2023).
Arsenic, VOC, SOC.

Sun Ranch Well #3

IOC (including arsenic), VOC, SOC

High School Well #2

Arsenic, VOC, SOC

City Well #1

Arsenic, VOC, SOC

Nitrate for all 4 wells

Drinking Water Services has established criteria for determining whether a system has demonstrated "outstanding performance." Systems designated Outstanding Performers may have the frequency of their water system surveys reduced from every three years to every five years. Although your water system did not meet the criteria, I encourage you to take steps toward receiving this designation in the future.

A summary of your monitoring requirements appears on pages 13-16.
Please cross-check this schedule with your laboratory and maintain a copy
for future monitoring.

If you have any questions or would like the survey report in an alternate
format, please contact me at 541-388-6563 or jeff.freund@deschutes.org.

Thank you for your assistance and cooperation.

Sincerely,

A handwritten signature in black ink, appearing to read 'Jeff Freund', with a long horizontal flourish extending to the right.

Jeff Freund, REHS/RS

Enclosure

Cc: ODWP

JEF/jef

Deficiency Summary

Surveyor: Jeff Freund

Date Corrective Action Plan is due: _____

County: Deschutes

Yes	No	Significant Deficiencies and Rule Violations:	Date to be corrected	Date corrected
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Source: <i>Well construction:</i> City Well - gap between steel well plate and concrete pedestal where cement grout missing <i>Spring/other source:</i>	11/30/2022	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Treatment: <i>Surface water treatment:</i> <i>Disinfection:</i> <i>Other treatment:</i>		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Finished Water Storage:		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Distribution: Annual Summary Report for 2021 not submitted (provided during survey)	√ corrected	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Monitoring:		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Management & Operations:		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Operator Certification:		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Other Rule Violations:		

Database Updates: None Inventory Treatment Monitoring Page:

Comments:

Source Deficiencies:

Well Construction Deficiencies:

- + Sanitary seal and casing not watertight
- + Does not meet setbacks from hazards
- + Wellhead not protected from flooding
- + No raw water sample tap
- + No treated sample tap (if applicable)
- + No screen on existing well vent

Spring Source Deficiencies:

- + Springbox not impervious durable material
- + No watertight access hatch/entry
- + No screened overflow
- + Does not meet setbacks from hazards
- + No raw water sample tap
- + No treated sample tap (if applicable)

Treatment Deficiencies/Violations:

Surface Water Treatment Deficiencies:

- + Turbidity standards not met - 0030(3)
- + Turbidimeters not calibrated per manufacturer or at least quarterly - 0036(5)(b)(A)(ii)
- + Incorrect location for turbidity monitoring
- + If serving > 3,300 people no alarm or auto plant shut off for low chlorine residual
- + For conventional or direct filtration: No alarm or plant shut off for high turbidity
- + For conventional filtration: Settled water not measured daily
- + For conventional or direct filtration: Turbidity profile not conducted on individual filters at least quarterly
- + For cartridge filtration: Filters not changed according to mfg. rec. pressure differential
- + For cartridge filtration: No pressure gauges before and after cartridge filter
- + For membrane filtration: Direct integrity testing does not meet requirements under -0036(5)(d)(B)
- + For membrane filtration: Indirect integrity testing does not meet requirements under -0036(5)(d)(C)
- + For diatomaceous earth filtration: Body feed not added with influent flow.

Disinfection Deficiencies/Violations:

- + DPD/EPA approved method not used - 0036(9)(e)
- + Free chlorine residual not maintained - 0032(3/5)
- + Chlorine not measured & recorded - 0036(9)
- + Minimum CT required not met all times - 0032(3/5)
- + No means to adequately determine flow rate on contact chamber effluent line
- + pH, Temperature, and chlorine residual not measured daily at first user - 0036(5)(a/b)

- + Failure to calculate CT values correctly
- + No means to adequately determine disinfection contact time under peak flow and minimum storage conditions

UV Disinfection Violations (OAR 333-0050(5)(k)):

- + Bypass around UV system
- + Lamp sleeve not cleaned
- + Lamp not replaced per manufacturer
- + No intensity sensor with alarm or shut-off

Other Treatment Violations:

- + Non-NSF approved chemicals - 0087(6)
- + Corrosion control parameters not met - 0034

Distribution System Violations:

- + System pressure < 20 psi - 0025(7)

Cross Connection (OAR 333-061-0070):

- + No ordinance or enabling authority (CWS)
- + Annual Summary Report not issued (CWS)
- + Testing records not current (CWS, NTNC, TNC)
- + No Cross Connection Control Specialist (CWS ≥ 300 connections)

Finished Water Storage Deficiencies:

- + Hatch not locked or adequately secured
- + Roof and access hatch not watertight
- + No flap valve, screen, or equivalent on drain
- + No screened vent

Monitoring Violations:

- + Monitoring not current - 0025(1)
- + Unaddressed MCL violations or LCR AL exceedances - 0030
- + No Coliform Sampling Plan - 0036(6)(a)(l)

Management & Operations Violations:

- + No operations and maintenance manual - 0065(4)
- + Emergency response plan not completed - 0064(1)
- + Major modifications not approved (plan review) - 0050
- + Master plan not current (≥ 300 con.) - 0060(5)
- + Annual CCR not distributed (CWS) - 0043(1)(a)
- + PNC or out of compliance with AO
- + Public notice not issued as required - 0042

Operator Certification Violations:

- + No certified operator at required level - 0065(2)
- + No protocol for under certified operator - 0225(2)

Other Rule Violations: _____

⊕ Significant deficiency per OAR 333-061-0076
 + Rule violation per OAR 333-061-XXX

Inventory and Narrative

<input type="checkbox"/> Outstanding Performer				
Type:	Status	Size	Season:	<input checked="" type="checkbox"/> All year <input type="checkbox"/> Seasonal
<input checked="" type="checkbox"/> Community (C)	Population:	3235	Begins: (mm/dd)	/
<input type="checkbox"/> Non-Transient Non-Community (NTNC)	Connections:	2028	Ends: (mm/dd)	/
<input type="checkbox"/> Transient Non-Community (TNC)	License:			<input checked="" type="checkbox"/> Not Lic. <input type="checkbox"/> Health Dept. <input type="checkbox"/> Ag
<input type="checkbox"/> Non-EPA (NP)	Service Area Characteristics:			SU
Responsible Agency:	<input type="checkbox"/> State <input checked="" type="checkbox"/> County <input type="checkbox"/> Ag	Owner Type:		2
Minimum WS Certification Requirements:	WD: 1	WT:	<input type="checkbox"/> FE	<input type="checkbox"/> Small WS <input type="checkbox"/> N/A

For changes in operations staff contact Operator Certification: dws.opcert@dhsosha.state.or.us

Primary Administrative Contact (mailing address):

Contact Name:	Paul Bertagna	Phone:	(541) 323-5212
Title:	Public Works Director	Cell:	(541) 610-6340
Street Address:	PO Box 39	Emergency #:	()
City/State/Zip:	Sisters, OR 97759	Email:	pbertagna@ci.sisters.or.us

Center of Service Area (for public maps):

decimal degrees (e.g., 45.894357, -123.960433) or address	
---	--

Legal/Owner/Secondary Contact (optional/not entered in SDWIS):

Contact Name:	City of Sisters	Phone:	(541) 383-5212
Title:	Josh Stotts	Cell:	(541) 419-0975
Street Address:	520 East Cascade Ave.	Emergency #:	()
City/State/Zip:	Sisters, OR 977590	Email:	

System Physical Address (optional/not entered in SDWIS):

Contact Name:	Gus Johnson	Phone:	(541) 536-8670
Title:		Cell:	(541) 588-0919
Street Address:	Sugar Pine and Ponderosa	Emergency #:	()
City/State/Zip:		Email:	

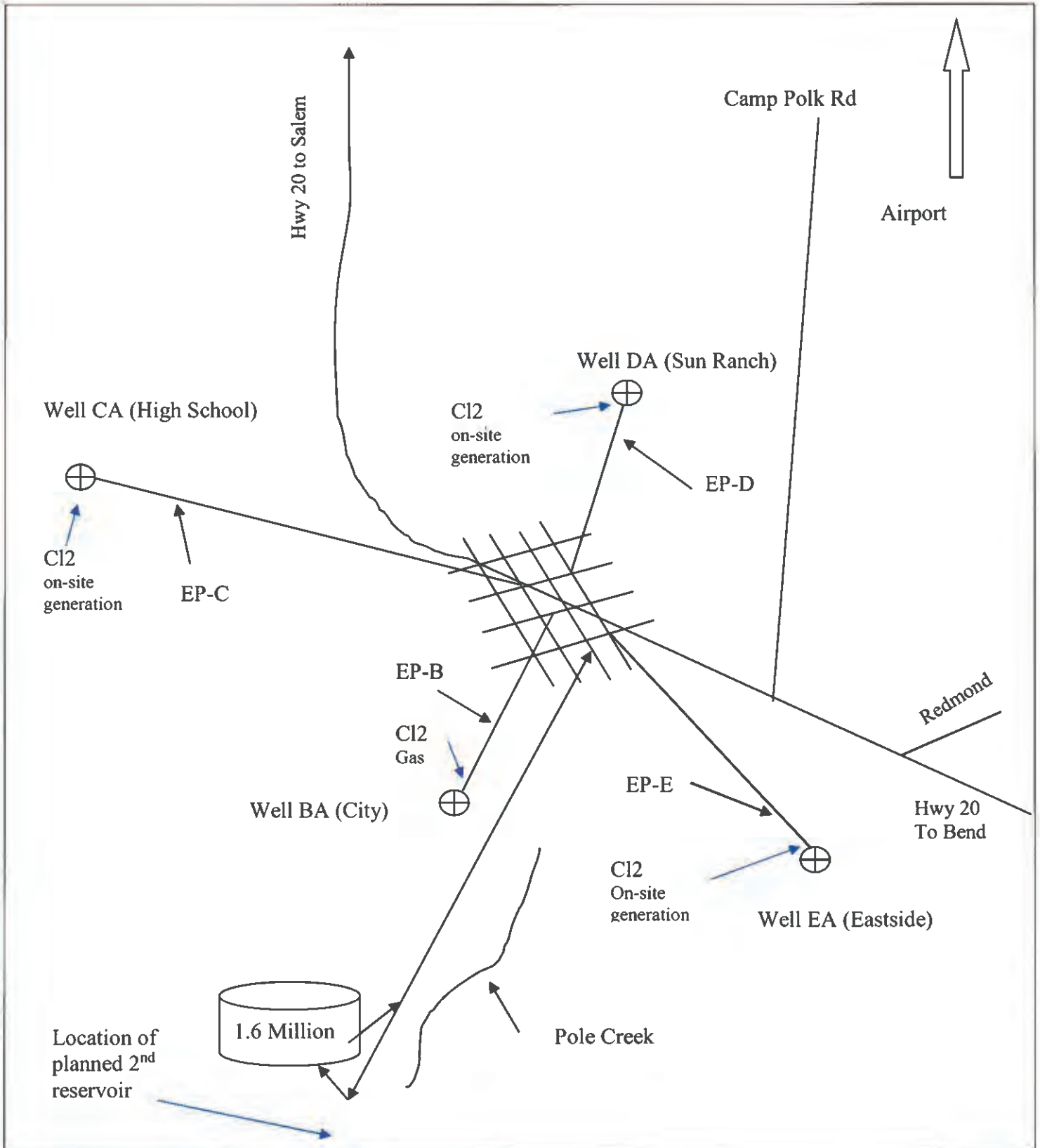
Emergency Systems Available:

Name:	None	PWS ID#:	41
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Narrative:

This community system comprises 4 wells, 1 large reservoir and distribution. Chlorine is added for residual maintenance in the form of on-site generated sodium hypochlorite for three wells and chlorine gas at the other. System supplies water to the city of Sisters which includes residential, commercial and industrial facilities. There are approximately 30 licensed food establishments in the city. Chlorine residual is monitored daily in the distribution and averages .20 mg/L.

Water System Schematic

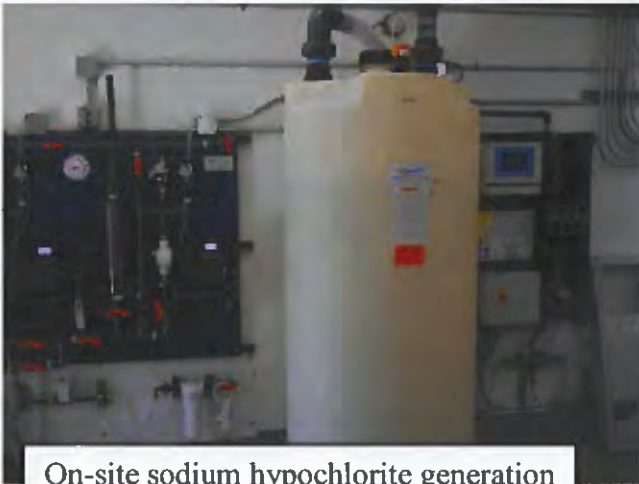




Eastside Well #4 pump house looking north



Eastside well #4



On-site sodium hypochlorite generation



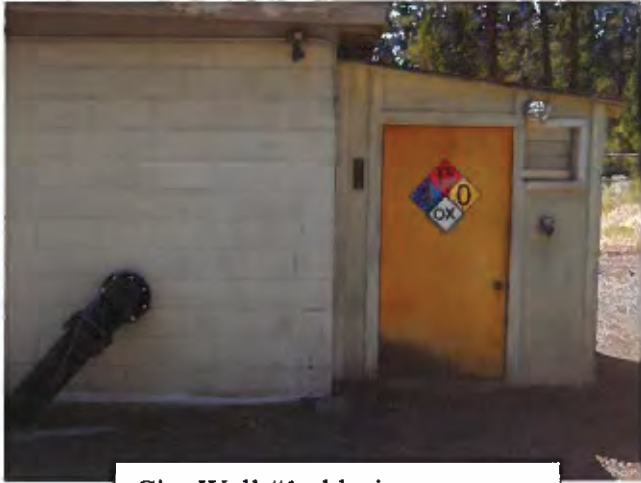
Well #4 control panel



Chlorine generator



Back-up diesel generator for well #4



City Well #1 chlorine room



City well #1 chlorine gas



Dedicated sample station
1 of 3 in distribution



Dedicated sample station

Source Information

ID	Entry Points (Location where water enters distribution and is sampled)	Source Type (Ground, Surface, GWUDI, Purchased ground, Purchased surface)	Availability (Permanent, Seasonal*, Emergency) <i>*If seasonal, indicate begin/end dates</i>			
			Begin (M/D)	End (M/D)		
B	City Well (#1)	Groundwater	Permanent			
C	High School Well (#2)	Groundwater	Permanent			
D	Sun Ranch Well (#3)	Groundwater	Permanent			
E	Eastside well (#4)	Groundwater	Permanent			

ID	Sources (Contributing to Entry Point)	Land Use*	Capacity (GPM)	Source Type (Ground, Surface, GWUDI, Purchased ground, Purchased surface)	Availability (Permanent, Seasonal, Emergency, Abandoned, Disconnected)
BA	City Well (Desc 3023)	KM		Groundwater	Permanent
CA	High School (Desc1034)	GLI		Groundwater	Permanent
DA	Sun Ranch (L84019)	GLI		Groundwater	Permanent
EA	Eastside Well #4	GLI		Groundwater	Permanent

*Land Use Codes: (A) Pristine Forest (B) Irrigated Crops (C) Non-Irrigated Crops (D) Pasture (E) Light Industry (F) Heavy Industry (G) Urban-Sewered Area (H) Rural On-Site Sewage Disposal (I) Urban On-Site Sewage Disposal (J) Rangeland (K) Managed Forest (L) Commercial (M) Recreational Use

Yes No

- Has the water system implemented strategies to protect their drinking water sources? (e.g., posting source area signs, notifying residents of hazardous waste collection events, provide residents information about maintaining their septic systems, abandoning unused wells, etc.)
- Is the water system interested in protecting their drinking water sources from contamination? If yes, contact regional geologist at 541-726-2587.

Comments:

Pump house #1 City Well planned to be remodelled and gas chlorination replaced with on-site generation

Disinfection

No #	Disinfection Method (Chlorine Gas, Sodium Hypochlorite, On-site Generated Sodium Hypochlorite, Calcium Hypochlorite, Chloramines, Ozone, UV, Mixed Oxidants, Other)	Location	Disinfection Source Water	Residual Maintenance	Other Purpose	Proportional to Flow	Dosage Recorded
1	Chlorine Gas	City well #1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Sodium Hypo - on site generated	High school well #2	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Sodium Hypo- on site generated	Sun ranch well #3	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	Sodium Hypo- on site generated	Eastside well #4	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>

Yes No Chlorine residuals N/A

- Is a DPD or other EPA approved method used?
- NSF 60/61 certified (or equivalent)?
- Are entry point residuals recorded at least once per day (SWTR, GWR 4-log)? N/A
- Is entry point residual monitoring continuous if population > 3,300 (SWTR, GWR 4-log)? N/A
- Are distribution residuals recorded at least twice weekly?
- Are on-line chlorine analyzers verified weekly with DPD type or EPA approved test kit? N/A

Yes No Chlorine gas N/A

- Separate room for gas storage and feeder?
- Fan with on/off switch outside?
- Vent located next to the floor?
- Door with a window?

Yes No

- Gas cylinders properly secured?
- Door that opens out?
- Self-contained breathing apparatus?
- Air scrubber system?

Yes No UV N/A

- Does all water contact UV (no bypass)?
- Is lamp sleeve cleaned?
- Is lamp replaced per manufacturer?
- Intensity sensor with alarm or shut-off?

CT evaluation for disinfection N/A

Disinfection Requirement:

- (sw) 0.5 log inactivation Giardia
- (gw) 4.0 log inactivation viruses
- (sw) 1.0 log inactivation Giardia
- (sw) log inactivation Crypto: _____
- (gw) Minimum chlorine residual: _____ mg/l

Yes No

- Does the contact chamber have effluent flow meter or adequate alternative?

If no, how is peak flow determined for CT calculations? _____

- Has a tracer study been conducted or adequate alternative?

Tracer Study Date: _____

Demand flow (gpm): _____

Baffling factor (%): _____

Volume used (gal): _____

Results (min): _____

- Adequate alternate method for contact time?

Describe:

Peak hour demand flow over the past 12 months: gpm = _____

Lowest operating volume over the past 12 months: gallons = _____

Yes No

- Is tracer study still valid?
- (SW only) Are pH, temp, and chlorine residual measured daily before or at the first user?
- Are CT values being calculated correctly?
- Are CT values met at all times (SWTR, GWR 4-log)?

Comments:

Treatment

Process Used*	Chemical Added**	Purpose	Location in System	Code***
Gas Chlorination	Chlorine Gas	Residual Maintenance	City Well	X401
Hypochlorination	Sodium hypochlorite	Residual Maintenance	High School Well	X421
Hypochlorination	Sodium hypochlorite	Residual Maintenance	Sun Ranch Well	X421
Hypochlorination	Sodium hypochlorite	Residual Maintenance	New Well #4	X421

*See "Treatment Plant Inspection" page for details on filtration. **See "Disinfection" page for details on disinfection equipment. ***See Treatment Codes on back.

Yes No

- Is treatment the same as last survey? (if no, explain in comments) _____
- Is lab equipment for on-site analysis appropriate? _____
- Is equipment maintained properly? _____
- Is redundant equipment available? _____
- Are chemicals NSF Standard 60 certified or equivalent? (N/A - no chemicals are used)
- If bypass piping is present, is there a physical separation? (SWTR, GWR 4-log, chemical MCL) N/A
- Does system practice corrosion control?
- Is corrosion control operated within parameters set by DWS? N/A

Describe method of corrosion control (if applicable)

Using a Hach electric colorimeter

Records Kept:

Yes / No

- Dosages
- Raw pH
- Raw temperature
- Raw turbidity and/or particle counts

Yes / No

- Flowrate
- Treated pH
- Treated temperature
- Treated turbidity

Comments:

Well Information

Source ID#: SRC-	BA		CA		DA		EA					
Source Name:	City Well		High School		Sun Ranch		New #4					
Well log available?*	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N
Well log ID (e.g., COLU123, L12345)	Desc3023		Desc1034		L84019		L138648					
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Well active?.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pitless adaptor?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
● Sanitary seal & casing watertight?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
● Raw water sample tap?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
● Treated water sample tap? <input type="checkbox"/> N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
● If vented, properly screened?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
● Wellhead protected from flooding?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Concrete slab around casing?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Casing height ≥12-in. above slab/grade?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flowmeter?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pressure gauge?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pump to waste piping?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
● Well meets setbacks from hazards?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If no, identify list of hazard(s) within the setback and the distance to the hazard.....												
HAZARD:												
DISTANCE (ft.):												
Protective housing?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If yes, does it have:												
Heat?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Light?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Floor drain?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Well pump removal provision?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pump Type: (vertical turbine, submersible, centrifugal, shallow jet, deep jet)	VT		VT		VT		VT					
Bearing lubrication: (oil, or water).....	Oil		Oil		Oil		Oil					
Pumping capacity (gpm).....					1507							

*If no well log available, record any known information regarding depth of well, depth of grout seal, year of installation, or casing diameter in the comments section below.

Comments:

Storage and Pressure Tanks

Number	Name	Tank Type (G)round, (E)levated, (P)ressure	Tank Material (Concrete, Steel, Redwood, Plastic, Other)	Year Built	Volume (gal.)
1	Reservoir	Ground	Concrete	1994	1.6M

Total Volume: 1.6M

Reservoir Features	Reservoir Number: 1										
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	
Fence/gate?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
● Hatch secured (e.g. locked, bolted, etc.)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
● All tank access points watertight?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
● Screened vent?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Overflow?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
● Overflow protected (screen/flap/valve)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Drain to daylight?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Water level gauge?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Bypass piping? (● if used for contact time).....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Alarm for high or low levels?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Separate inlet/outlet?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Approved interior coating?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Exterior in good condition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Annual interior/exterior inspection?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Cleaning schedule?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Continuously disinfected? (● post '81 redwood)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Pressure Tanks											
Accessible for maintenance?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Bypass piping?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Drain?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Pressure relief device?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Air bladder/diaphragm?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Valve for adding air?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Comments
Second reservoir planned upslope of existing

Distribution System Information

Service Area and Facility Map

Yes	No		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Does the system have a service area and facility map (indicate features on map):	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> Water lines (including size and material)	<input checked="" type="checkbox"/> Sources-wells & withdrawal points
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> Treatment facilities	<input type="checkbox"/> Pressure zones
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> Storage facilities (reservoirs)	<input type="checkbox"/> Pressure regulating valves
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> Sampling points	<input type="checkbox"/> Booster pumps

Distribution Data

Yes	No		Comments
<input checked="" type="checkbox"/>	<input type="checkbox"/>	● System pressure ≥ 20 psi?	60-75 psi
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Water system leakage <10%?	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Hydrants or blowoffs on all dead ends? <input type="checkbox"/> N/A	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Routine flushing? (How often)	Annually
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Adequate valving?	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Routine valve turning? (How often)	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Does the distribution system have asbestos cement (AC) pipe?	

If yes, verify asbestos sampling is completed on Water Quality Monitoring Page (CWS, NTNC).

Cross Connection Control (CWS, NTNC, and TNC)

Yes	No	N/A		Comments
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	● Assemblies tested annually? (CWS, NTNC, TNC)	90%
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	● Ordinance or enabling authority? (CWS)	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	● Annual Summary Report submitted? (CWS)	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	● Certified Cross Connection Control Specialist? (CWS > 300 connections)	Contract with Olson LLC

Comments:
All high hazard connections, commercial/industrial, fire and underground irrigation have premise isolation, DCVA/RP

Water Quality Monitoring EP-B (City Well)

Contaminant	N/A	Number & Frequency	Next Tests Due
Entry Point Sampling:			
Arsenic	<input type="checkbox"/>	3 yrs	1/1/2020-12/31/2022
Inorganic Chemicals (Including Nitrite) (sw)	<input checked="" type="checkbox"/>		
Inorganic Chemicals (Including Nitrite) (gw)	<input type="checkbox"/>	9 yrs	1/1/2020-12/31/2028
Nitrate	<input type="checkbox"/>	Annually	2022
Radionuclides (Community Water Systems Only):			
Gross Alpha	<input type="checkbox"/>	9 yrs	1/1/2017-12/31/2025
Radium 226/228	<input type="checkbox"/>	9 yrs	1/1/2017-12/31/2025
Uranium	<input type="checkbox"/>	9 yrs	1/1/2020-12/31/2028
SOCs	<input type="checkbox"/>	3 yrs	1/1/2020-12/31/2022
VOCs (sw)	<input checked="" type="checkbox"/>		
VOCs (gw)	<input type="checkbox"/>	3 yrs	1/1/2020-12/31/2022
Distribution System Sampling:			
Coliform Bacteria	<input type="checkbox"/>	3/month	August 2022
Asbestos (for AC pipe/asbestos geologic areas) ..	<input type="checkbox"/>		
TTHMs and HAA5s	<input type="checkbox"/>	Annually	August 2022
Lead and Copper # sites: 20	<input type="checkbox"/>	2- 6 month rounds	July/August 2022
Other Sampling:			
TOC	<input checked="" type="checkbox"/>		
Turbidity	<input checked="" type="checkbox"/>		
Source Water Coliform	<input type="checkbox"/>	Annually	2022
Other (specify) _____	<input checked="" type="checkbox"/>		

- Yes** **No** ● Is all required monitoring current?
 Yes **No** ● Are samples collected at the correct locations in the system?

- Yes** **No** ● Have all MCL violations or LCR AL exceedances been addressed? N/A
 Yes **No** ● DBP's collected at correct locations? N/A
 Yes **No** ● Does the system have a written coliform sampling plan?
 Does the plan include:
- | | | | |
|-------------------------------------|--------------------------|-------------------------------------|--------------------------|
| Yes | No | Yes | No |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
- Sample collection protocol Rotation schedule
 Distribution map Repeat locations
 Sample site locations Source locations N/A

Comments:
 Round of 20 L & C taken 1/12/2022. Will need at least one more round of 20 July/August of 2022. If results below DL of .005Pb/.65Cu can go to 10 every 3 yrs.

Water Quality Monitoring EP-C (High School Well)

Contaminant	N/A	Number & Frequency	Next Tests Due
Entry Point Sampling:			
Arsenic	<input type="checkbox"/>	3 yrs	1/1/2020-12/31/2022
Inorganic Chemicals (Including Nitrite) (sw)	<input checked="" type="checkbox"/>		
Inorganic Chemicals (Including Nitrite) (gw)	<input type="checkbox"/>	9 yrs	1/1/2020-12/31/2028
Nitrate	<input type="checkbox"/>	Annually	2022
Radionuclides (Community Water Systems Only):			
Gross Alpha	<input type="checkbox"/>	9 yrs	1/1/2017-12/31/2025
Radium 226/228	<input type="checkbox"/>	9 yrs	1/1/2017-12/31/2025
Uranium	<input type="checkbox"/>	9 yrs	1/1/2020-12/31/2028
SOCs	<input type="checkbox"/>	3 yrs	1/1/2020-12/31/2022
VOCs (sw)	<input checked="" type="checkbox"/>		
VOCs (gw)	<input type="checkbox"/>	3 yrs	1/1/2020-12/31/2022
Distribution System Sampling:			
Other Sampling:			
TOC	<input checked="" type="checkbox"/>		
Turbidity	<input checked="" type="checkbox"/>		
Source Water Coliform	<input type="checkbox"/>	Annually	
Other (specify) _____	<input checked="" type="checkbox"/>		

Yes **No** ● Is all required monitoring current?
 Yes **No** ● Are samples collected at the correct locations in the system?

Comments:

Water Quality Monitoring EP-D (Sun Ranch Well)

Contaminant	N/A	Number & Frequency	Next Tests Due
Entry Point Sampling:			
Arsenic.....	<input type="checkbox"/>	3 yrs	1/1/2020-12/31/2022
Inorganic Chemicals (Including Nitrite) (sw)	<input checked="" type="checkbox"/>		
Inorganic Chemicals (Including Nitrite) (gw)	<input type="checkbox"/>	3 yrs	1/1/2020-12/31/2022
Nitrate	<input type="checkbox"/>	Annually	2022
Radionuclides (Community Water Systems Only):			
Gross Alpha	<input type="checkbox"/>	9 yrs	1/1/2020-12/31/2028
Radium 226/228	<input type="checkbox"/>	9 yrs	1/1/2020-12/31/2028
Uranium	<input type="checkbox"/>	9 yrs	1/1/2020-12/31/2028
SOCs	<input type="checkbox"/>	3 yrs	1/1/2020-12/31/2022
VOCs (sw)	<input checked="" type="checkbox"/>		
VOCs (gw)	<input type="checkbox"/>	3 yrs	1/1/2020-12/31/2022
Distribution System Sampling:			
Other Sampling:			
TOC	<input checked="" type="checkbox"/>		
Turbidity	<input checked="" type="checkbox"/>		
Source Water Coliform	<input type="checkbox"/>	Annually	
Other (specify) _____	<input checked="" type="checkbox"/>		

Yes No

● Is all required monitoring current?

Are samples collected at the correct locations in the system?

Comments:

Water Quality Monitoring EP-E (New Well #4)

Contaminant	N/A	Number & Frequency	Next Tests Due
Entry Point Sampling:			
Arsenic	<input type="checkbox"/>	3 yrs	1/1/2020-12/31/2022
Inorganic Chemicals (Including Nitrite) (sw)	<input checked="" type="checkbox"/>		
Inorganic Chemicals (Including Nitrite) (gw)	<input type="checkbox"/>	3 yrs	1/1/2023-12/31/2025
Nitrate	<input type="checkbox"/>	Annual	2022
Radionuclides (Community Water Systems Only):			
Gross Alpha	<input type="checkbox"/>	Quarterly	3 rd 2022 & 1 st , 2 nd 2023
Radium 226/228	<input type="checkbox"/>	Quarterly	3 rd 2022 & 1 st , 2 nd 2023
Uranium	<input type="checkbox"/>	Quarterly	3 rd 2022 & 1 st , 2 nd 2023
SOCs	<input type="checkbox"/>	Annually	2022, 2023
VOCs (sw)	<input checked="" type="checkbox"/>		
VOCs (gw)	<input type="checkbox"/>	Annually	2022, 2023
Distribution System Sampling:			
Other Sampling:			
TOC	<input checked="" type="checkbox"/>		
Turbidity	<input checked="" type="checkbox"/>		
Source Water Coliform	<input type="checkbox"/>	Annually	
Other (specify)	<input checked="" type="checkbox"/>		

Yes No

● Is all required monitoring current?

Are samples collected at the correct locations in the system?

One quarter rads taken 4th qtr 2020. 4 consecutive qtrs. needed. If first two qtrs. ND can go to every 9 yrs

Comments: New Wells

IOC – 3 rounds @ 3 yrs then can go to 9 yrs
VOC/SOC – 3 annual rounds then can go to 3 yrs

Management & Operations

O&M Manual and Emergency Response Plan

Yes No

● Does system have an operation and maintenance manual?

● Does system have an emergency response plan?

Do any system components have auxiliary power?

If yes, describe: Diesel Genrators at High School, Eastside and and City Wells

Operator Certification

Yes No N/A

● Is the DRC identified and certified at the appropriate level?

If the DRC is a contract operator, how do they work with the system?

● Does system have written protocols for under-certified operators?

Plan Review/Master Plan

Yes No N/A

● Have all major modifications been approved by DWS?

● Does the system have a current (<20 yr. old) master plan? (Not required if < 300 connections)

What year was the plan completed?

Compliance Status

Yes No N/A

● Is water system in compliance (all orders resolved and not a priority non-complier)?

● Does the system issue public notice as required?

● Are consumer confidence reports sent to users each year?

Comments:

APPENDIX D
Oregon Water Resources Department and
City Well Information

NOTICE TO WATER WELL CONTRACTOR

The original and first copy of this report are to be filed with the

STATE ENGINEER, SALEM, OREGON 97310
within 30 days from the date of well completion.

DESC
3023

WATER WELL REPORT

STATE OF OREGON

(Please type or print)

(Do not write above this line)

State Well No. 153/10E-9
State Permit No. G-9979

(1) OWNER:

Name City of Sisters
Address Sisters City Hall
Sisters, Oregon 97759

(2) TYPE OF WORK (check):

New Well Deepening Reconditioning Abandon
If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:

Rotary Driven
Cable Jetted
Dug Bored

(4) PROPOSED USE (check):

Domestic Industrial Municipal
Irrigation Test Well Other

CASING INSTALLED:

Threaded Welded
14" Diam. from + 2 ft. to 100 ft. Gage 250
12" Diam. from 25 ft. to 111 ft. Gage 250
10" Diam. from 0 ft. to 195.6 ft. Gage 250

PERFORATIONS:

Perforated? Yes No.
Type of perforator used ACY and Machine
Size of perforations 1/4 in. by 6" and 1/4" by 2"
1200 perforations from 50 ft. to 100 ft.
1560 perforations from 95.6 ft. to 195.6 ft.

(7) SCREENS:

Well screen installed? Yes No
Manufacturer's Name _____
Type _____ Model No. _____
Diam. _____ Slot size _____ Set from _____ ft. to _____ ft.
Diam. _____ Slot size _____ Set from _____ ft. to _____ ft.

(8) WELL TESTS:

Drawdown is amount water level is lowered below static level Davidson
Was a pump test made? Yes No If yes, by whom? Drilling
Yield: 549 gal./min. with 4 ft. drawdown after 1 1/2 hrs.
902 " 7'4" " 4 "
" 1315 " 5'3" " 1 "
~~XXXXXX~~ PUMP TEST 24 hrs.
gal./min. with _____ ft. drawdown after _____ hrs.
Artesian flow _____ g.p.m.
Temperature of water 46 Depth artesian flow encountered _____ ft.

(9) CONSTRUCTION:

Well seal—Material used Cement and Bentonite
Well sealed from land surface to 40 ft.
Diameter of well bore to bottom of seal 18 in.
Diameter of well bore below seal 16 in.
Number of sacks of cement used in well seal 58 sacks
Number of sacks of bentonite used in well seal 150 lbs. sacks
Brand name of bentonite Western
Number of pounds of bentonite per 100 gallons of water 5 1/2 gals. water per 100 lbs. Cement lbs./100 gals.
Was a drive shoe used? Yes No Plugs _____ Size: location _____ ft.
Did any strata contain unusable water? Yes No
Type of water? Surface depth of strata 3 feet
Method of sealing strata off casing and grout
Was well gravel packed? Yes No Size of gravel: _____
Gravel placed from _____ ft. to _____ ft.

(10) LOCATION OF WELL:

County Wasco Driller's well number _____
NW 1/4 SW 1/4 Section 9 T. 15 S R. 10 E W.M.
Bearing and distance from section or subdivision corner _____

(11) WATER LEVEL: Completed well.

Depth at which water was first found 105 ft.
Static level 85 ft. below land surface. Date 10/2/75
Artesian pressure _____ lbs. per square inch. Date _____

(12) WELL LOG:

Diameter of well below casing 10"
Depth drilled 211 ft. Depth of completed well 211 ft.
Formation: Describe color, texture, grain size and structure of materials; and show thickness and nature of each stratum and aquifer penetrated, with at least one entry for each change of formation. Report each change in position of Static Water Level and indicate principal water-bearing strata.

MATERIAL	From	To	SWL
Overburden	0	2	
Cong. Gray	2	21	
Clay and Cong. Brown	21	29	
Lava - Mild	29	111	
Sandstone & Cong. Brown	111	175	
Cong. Gray - Waterbearing	175	195	
Basalt	195	211	

RECEIVED

JAN 05 1976

WATER RESOURCES DEPT.
SALEM, OREGON

Work started 4/3/ 1975 Completed 10/2 1975
Date well drilling machine moved off of well 10/3/ 1975

Drilling Machine Operator's Certification:

This well was constructed under my direct supervision. Materials used and information reported above are true to my best knowledge and belief.

[Signed] William D. Aiken Date 10/15 1975.
(Drilling Machine Operator)

Drilling Machine Operator's License No. 803

Water Well Contractor's Certification:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Name DAVIDSON DRILLING INC. (Type or print)
(Person, firm or corporation)

Address 626 N.W. Marshall Way Redmond, Ore. 97751

[Signed] David Davidson (Water Well Contractor)

Contractor's License No. 548 Date 10/15/ 1975

STATE OF OREGON
WATER WELL REPORT
(as required by ORS 537.705)

Desc 1034 RECEIVED

SEP 16 1991

(START CARD) # 27957

15S/10E/85

(1) OWNER: Well Number: _____
Name Hap Taylor Construction WATER RESOURCES DEPT
Address 2641 NE Ravenwood Dr. SALEM OREGON
City Bend State OR Zip 97701

(2) TYPE OF WORK:
 New Well Deepen Recondition Abandon

(3) DRILL METHOD
 Rotary Air Rotary Mud Cable
 Other _____

(4) PROPOSED USE:
 Domestic Community Industrial Irrigation
 Thermal Injection Other _____

(5) BORE HOLE CONSTRUCTION:
Special Construction approval Yes No Depth of Completed Well 302 ft.
Explosives used Yes No Type _____ Amount _____

HOLE SEAL Amount
Diameter From To Material From To sacks or pounds
22" 0 39 Cement 0 39 93 sacks
17" 39 190
14" 190 244
13" 244 302
How was seal placed: Method A B C D E
Backfill placed from _____ ft. to _____ ft. Material _____
Gravel placed from _____ ft. to _____ ft. Size of gravel _____

(6) CASING/LINER:
Diameter From To Gauge Steel Plastic Welded Threaded
Casing: 18" +1 39 .375
Liner: 14" +1 244 .250
10" 238 302 .250

(7) PERFORATIONS/SCREENS:
 Perforations Method _____
 Screens Type _____ Material _____

From To Slot size Number Diameter Tele/pipe size Casing Liner
242 302 1/8x3 2400 10"

(8) WELL TESTS: Minimum testing time is 1 hour
 Pump Bailor Air Flowing Artesian
Yield gal/min Drawdown Drill stem at Time
1200 .3ft 220 8 hr/hr

Temperature of water 51 Depth Artesian Flow Found _____
Was a water analysis done? Yes By whom _____
Did any strata contain water not suitable for intended use? Too little
 Salty Muddy Odor Colored Other _____
Depth of strata: _____

(9) LOCATION OF WELL by legal description:
County Deschutes Latitude _____ Longitude _____
Township 15 S Nor S. Range 10 E E or W, WM.
Section 8 W W
Tax Lot _____ Lot _____ Block _____ Subdivision _____
Street Address of Well (or nearest address) 15200 McKenzie Hwy.
Sisters, OR

(10) STATIC WATER LEVEL:
101 ft. below land surface. Date 7/31/91
Artesian pressure _____ lb. per square inch. Date _____

(11) WATER BEARING ZONES:
Depth at which water was first found 105'
From To Estimated Flow Rate SWL
251 273 101
283 288 101
288 295 1200+ 101
295 301 101

(12) WELL LOG: Ground elevation _____
Material From To SWL
Top soil 0 1
Cobbles with sand & dirt 1 23
Volcanic gravels 23 34
Basalt black porous 34 50
Basalt grey hard 50 63
Cinders red 63 75
Volcanic gravels grey & red 75 98
Basalt grey medium fractured 98 103
Pumice white 103 105
Basalt grey fractured with round gravels 105 145 101
Conglomerate brown 145 155 101
Rock grey hard 155 160 101
Rock soft grey & brown 160 175 101
Gravel broken 175 193 101
Rock broken grey & brown 193 203 101
Conglomerate tight brown 203 235 101
Rock broken with gravel 235 241 101
Basalt grey hard & porous 241 251 101
Basalt brown porous 251 273 101
Basalt grey hard 273 283 101
Basalt porous grey & lavender 283 288 101
Cinders red 288 295

Date started 7-19-91 Completed 8-12-91

(unbonded) Water Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.
Signed _____ WWC Number 1358
Date 8-21-91

(bonded) Water Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.
Signed _____ WWC Number 723
Date 8-21-91

DESC 1034

RECEIVED

SEP 16 1991

STATE OF OREGON WATER WELL REPORT (as required by ORS 537.765)

(START CARD) # 27957 (cont'd)

(1) OWNER: Name Hap Taylor Construction (cont'd) SALEM, OREGON Address City State Zip

(2) TYPE OF WORK: [] New Well [] Deepen [] Recondition [] Abandon

(3) DRILL METHOD: [] Rotary Air [] Rotary Mud [] Cable [] Other

(4) PROPOSED USE: [] Domestic [] Community [] Industrial [] Irrigation [] Thermal [] Injection [] Other

(5) BORE HOLE CONSTRUCTION: Special Construction approval Yes No Depth of Completed Well ft. Explosives used [] [] Type Amount

Table with columns: HOLE Diameter, SEAL Material, Amount sacks or pounds

How was seal placed: Method [] A [] B [] C [] D [] E [] Other Backfill placed from ft. to ft. Material Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER: Table with columns: Diameter, From, To, Gauge, Steel, Plastic, Welded, Threaded

Final location of shoe(s)

(7) PERFORATIONS/SCREENS: [] Perforations Method [] Screens Type Material

Table with columns: From, To, Slot size, Number, Diameter, Tele/pipe size, Casing, Liner

(8) WELL TESTS: Minimum testing time is 1 hour [] Pump [] Bailer [] Air [] Flowing Artesian Yield gal/min Drawdown Drill stem at Time

Temperature of water Depth Artesian Flow Found Was a water analysis done? Did any strata contain water not suitable for intended use? Depth of strata:

(9) LOCATION OF WELL by legal description: County Latitude Longitude Township N or S, Range E or W, WM. Section Tax Lot Lot Block Subdivision Street Address of Well (or nearest address)

(10) STATIC WATER LEVEL: ft. below land surface. Date Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES: Table with columns: From, To, Estimated Flow Rate, SWL

(12) WELL LOG: Table with columns: Material, From, To, SWL

Date started Completed

(unbonded) Water Well Constructor Certification: I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Signed Date WWC Number

(bonded) Water Well Constructor Certification: I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. Signed Date WWC Number

STATE OF OREGON
WATER WELL REPORT
(as required by ORS 537.785)

DESC
1034

RECEIVED

JUN - 9 1992

15S/10E/5
 (START CARD) # 27957

(1) OWNER:

Name **Hap Taylor Construction**
 Address **2641 NE Ravenwood Dr.**
 City **Bend** State **Oregon** Zip **97701**

LOCATION OF WELL by legal description:

County **Deschutes** Latitude _____ Longitude _____
 Township **15 S** Nor S. Range **10 E** E or W. WM. _____
 Section **5** 1/4 _____ 3/4 _____
 Tax Lot _____ Lot _____ Block _____ Subdivision _____
 Street Address of Well (or nearest address) **Sisters School**
New construction

(2) TYPE OF WORK:

New Well Deepen Recondition Abandon

(3) DRILL METHOD

Rotary Air Rotary Mud Cable
 Other _____

(4) PROPOSED USE:

Domestic Community Industrial Irrigation
 Thermal Injection Other _____

(5) BORE HOLE CONSTRUCTION:

Special Construction approval Yes No Depth of Completed Well **302** ft.
 Explosives used Yes No Type _____ Amount _____

Diameter	HOLE		Material	SEAL		Amount sacks or pounds
	From	To		From	To	
17"	0	39	Cement	0	39	93
14"	39	190				
13"	190	244				
	244	302				

How was seal placed: Method A B C D E
 Other _____

Backfill placed from _____ ft. to _____ ft. Material _____
 Gravel placed from _____ ft. to _____ ft. Size of gravel _____

(6) CASING/LINER:

Casing	Diameter	From	To	Gauge	Steel		Plastic		Welded	Threaded
					✓	□	□	□		
	18"	+1	39	.375	✓	□	□	□	✓	□
					□	□	□	□	□	□
					□	□	□	□	□	□
Liner:	14"	+1 1/2	244	.250	✓	□	□	□	✓	□
	10"	238	302	.250	✓	□	□	□	✓	□

Final location of sheets: _____

(7) PERFORATIONS/SCREENS:

Perforations Method **FAST**
 Screens Type _____ Material _____

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
242	302	1/8x3	2400	10"		□	✓
						□	□
						□	□
						□	□
						□	□

(8) WELL TESTS: Minimum testing time is 1 hour

Pump Bailor Air Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
1200	.3ft	220	8 hrs

Temperature of water **51 degrees** Artesian Flow Found _____

Was a water analysis done? Yes By whom _____

Did any strata contain water not suitable for intended use? Too little

Salty Muddy Odor Colored Other _____

Depth of strata: _____

(10) STATIC WATER LEVEL:

101 ft. below land surface. Date **7-31**
 Artesian pressure _____ lb. per square inch. Date _____

(11) WATER BEARING ZONES:

Depth at which water was first found **105'**

From	To	Estimated Flow Rate	SWL
251	273	1200+	101
283	288	1200+	101
288	295	1200+	101
295	301	1200+	101

(12) WELL LOG:

Material	From	To	SWL
Top soil	0	1	
Cobbles with sand and dirt	1	23	
Volcanic gravels	23	34	
Basalt black porous	34	50	
Basalt grey hard	50	63	
Cinders Red	63	75	
Volcanic gravels grey & red	75	92	
Basalt grey med fract	98	103	
Pumice white	103	105	
Basalt grey fractured	105		
with round gravels		145	101
Conglomerate brown	145	155	101
Rock grey hard	155	160	101
Rock soft grey & brown	160	175	101
gravel brocken	175	193	101
rock broken grey & brown	193	203	101
conglomerate tight brown	203	235	101
Rock broken with gravel	235	241	101
Basalt grey hard & porous	241	251	101
Basalt brown porous	251	273	
Basalt grey hard	273	283	
Basalt porous grey & lavender	283	288	
Cinders red	288	295	

Date started **continued next page**

(unbonded) Water Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.

WWC Number **1358**
 Signed _____ Date **8-16-91**

(bonded) Water Well Constructor Certification:

I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

WWC Number **123**
 Signed _____ Date **8-16-91**

STATE OF OREGON

WATER SUPPLY WELL REPORT

(as required by ORS 537.765 & OAR 690-205-0210)

WELL LABEL # L 84019

AMENDED 3-6-07

AMENDED REPORT CARD # 1000329 3-20-07

(1) LAND OWNER Owner Well I.D. Sisters Well #3

First Name Last Name
Company CITY OF SISTERS
Address 520 EAST CASCADE AVE
City SISTERS State OR Zip 97759

(2) TYPE OF WORK [X] New Well [] Deepening [] Conversion [] Alteration (repair/recondition) [] Abandonment

(3) DRILL METHOD [X] Rotary Air [] Rotary Mud [] Cable [] Auger [] Cable Mud [] Reverse Rotary [] Other

(4) PROPOSED USE [] Domestic [] Irrigation [X] Community [] Industrial/ Commercial [] Livestock [] Dewatering [] Thermal [] Injection [] Other

(5) BORE HOLE CONSTRUCTION Special Standard [X] Attach copy) Depth of Completed Well 288.00 ft.

Table with columns: Dia, From, To, Material, From, To, Amt, sacks/lbs. Rows include Cement, Bentonite Chips, Cement.

How was seal placed: Method [] A [] B [X] C [] D [] E

Backfill placed from ft. to ft. Material

Filter pack from ft. to ft. Material Size

Explosives used: [] Yes Type Amount

(6) CASING/LINER

Table with columns: Casing, Liner, Dia, From, To, Gauge, Stl, Plstc, Wld, Thrd. Includes graphical representation of casing/liner.

Shoe [] Inside [] Outside [] Other Location of shoe(s)

Temp casing [] Yes Dia From To

(7) PERFORATIONS/SCREENS

Perforations Method Screens Type Cont. Wire Wrap Material 304 SS

Table with columns: Perf/Screen, Casing/Liner, Dia, From, To, Scrn/slot width, Slot length, # of slots, Tel/pipe size.

(8) WELL TESTS: Minimum testing time is 1 hour

Table with columns: Pump/Bailer/Air/Flowing Artesian, Yield gal/min, Drawdown, Drill stem/Pump depth, Duration (hr).

Temperature 54 °F Lab analysis [] Yes By

Water quality concerns? [] Yes (describe below)

Table with columns: From, To, Description. Includes 'RECEIVED' and 'MAR 28 2007' stamp.

(9) LOCATION OF WELL (legal description)

County Deschutes Twp 15 S N/S Range 10.00 E E/W WM
Sec 4 SE 1/4 of the NW 1/4 Tax Lot 103
Tax Map Number Lot
Lat ° 0 ' " or DMS or DD
Long ° 0 ' " or DMS or DD
[] Street address of well [X] Nearest address

NE LOT ABOUT 350 FT WEST OF CAMP POLK RD AT INTERSECTION WITH BARCLAY

(10) STATIC WATER LEVEL

Table with columns: Date, SWL(psi), + SWL(ft). Rows for Existing Well / Predeepening and Completed Well (02-02-2007, 73.3).

Flowing Artesian? [] Dry Hole? []

WATER BEARING ZONES Depth water was first found

Table with columns: SWL Date, From, To, Est Flow, SWL(psi), + SWL(ft).

(11) WELL LOG

Table with columns: Material, From, To, Ground Elevation. Lists soil and rock layers like Top Soil, Gravels, Basalt, etc.

Date Started 11-27-2006 Completed 02-02-2007

(unbonded) Water Well Constructor Certification

I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards.

License Number 1702 Date 03-06-2007

Electronically Filed

Signed RUSTY R OTTO (E-filed)

(bonded) Water Well Constructor Certification

I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above.

License Number 1523 Date 03-06-2007

Electronically Filed

Signed ROBERT STADELI (E-filed)

Contact Info (optional)

(5) BORE HOLE CONSTRUCTION

BORE HOLE			SEAL			sacks/	
Dia	From	To	Material	From	To	Amt	lbs

FILTER PACK

From	To	Material	Size

(10) STATIC WATER LEVEL

Water Bearing Zones

SWL Date	From	To	Est Flow	SWL(psi)	+ SWL(ft)

(6) CASING/LINER

Casing Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(11) WELL LOG

Material	From	To

(7) PERFORATIONS/SCREENS

Perf/Screen	Casing/Liner Dia	Screen Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/pipe size

(8) WELL TESTS: Minimum testing time is 1 hour

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
3,000	6	175	2

Water Quality Concerns

From	To	Description	Amount	Units

Comments/Remarks

RECEIVED

MAR 28 2007

Map of well



Oregon

Theodore R. Kulongoski, Governor

Water Resources Department
North Mall Office Building
725 Summer Street NE, Suite A
Salem, OR 97301-1266
503-986-0900
FAX 503-986-0904

January 17, 2007

GEO TECH EXPLORATIONS
ROBERT STADELI #1523
19700 SW TETON
TUALATIN OR 97062

RECEIVED
JAN 19 2007

FINAL ORDER

Dear Robert:

The Special Standard request you submitted for owner: City of Sisters, Start Card number 1000329 is hereby approved for the following: You may use 3/4-inch unhydrated bentonite chips in this well from a depth of 155 ft bgs to 170 ft bgs due to a lost circulation zone. The sealing material from 155 ft bgs to land surface shall be cement grout. The placement of the bentonite shall conform to the Departments rules and the manufacturers specifications and result in a seal that is free of voids or bridges. Care shall be taken to minimize the introduction of bentonite dust (See OAR 690-210-0330). All other standards must be adhered to. Your Special Standard request form is enclosed.

The Well Construction Standards serve to protect ground water resources. By approving and issuing this special construction standard the Oregon Water Resources Department is not representing that a well constructed in accordance with this condition will maintain structural integrity or that it meets engineering standards. The well constructor/or landowner is responsible for ensuring that a well is constructed in a manner that protects ground water resources as required under Oregon Administrative Rules 690-200 through 690-240.

If you have any questions concerning this letter, I may be contacted at (503) 986-0851, or by e-mail at Kristopher.R.Byrd@wr.d.state.or.us.

Sincerely,

Kristopher Byrd
Well Construction Program Coordinator
Enforcement Section

cc: Larry Carey, SC Region Well Inspector
File.

This is a final order in other than contested case. This order is subject to judicial review under ORS 183.484. Any petition for judicial review must be filed within the 60 day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080 you may either petition for judicial review or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

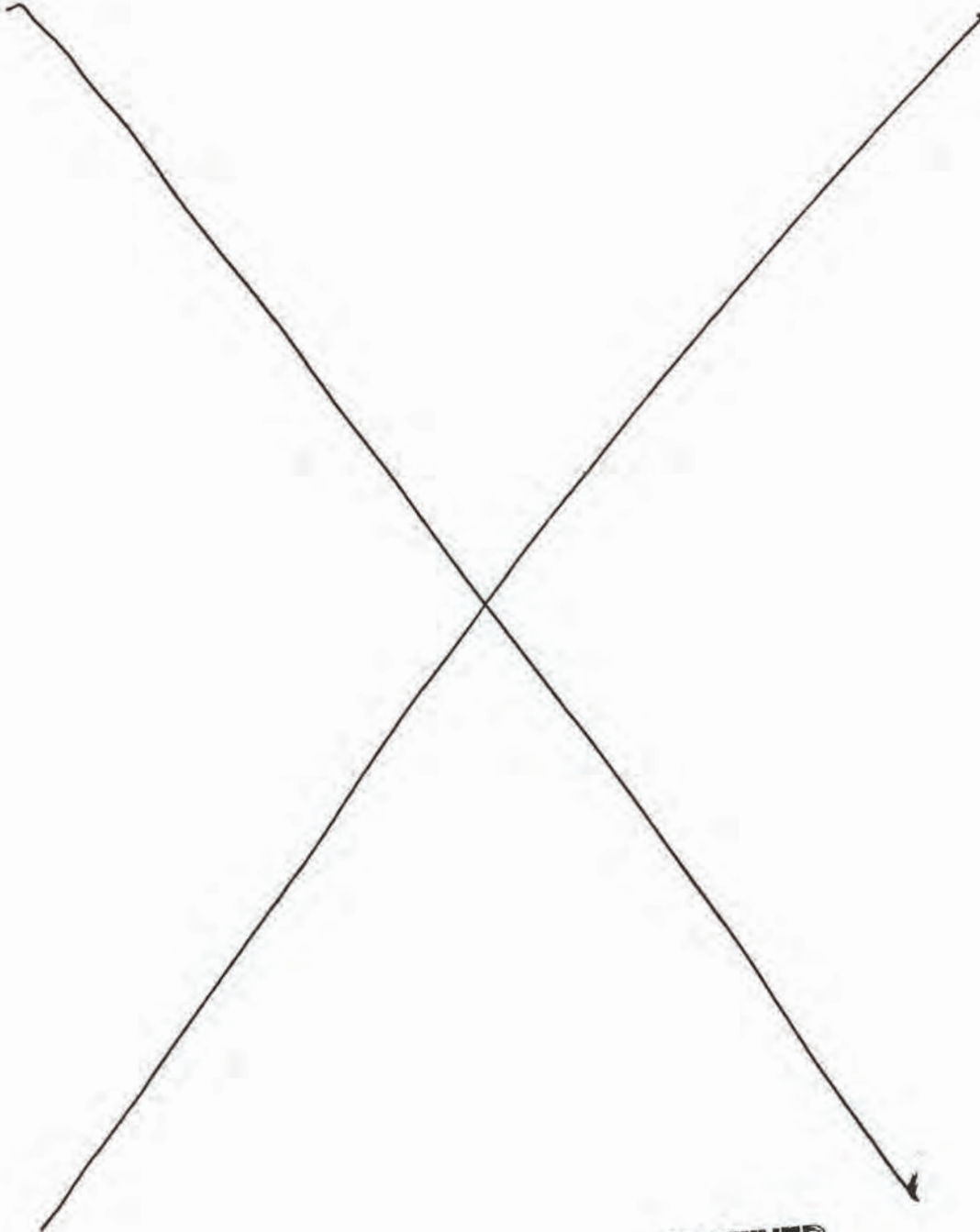
RECEIVED

MAR 28 2007

WATER RESOURCES DEPT
SALEM, OREGON

Map of well

only 3 pages



RECEIVED
MAR 28 2007
WATER RESOURCES DEPT
SALEM, OREGON

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765 & OAR 690-205-0210)

DESC 62447

1/20/2021

WELL I.D. LABEL# L 138648
START CARD # 1049398
ORIGINAL LOG #

(1) LAND OWNER
Owner Well I.D.
First Name Last Name
Company CITY OF SISTERS
Address PO BOX 39 525 E. CASCADE AVENUE
City SISTERS State OR Zip 97759

(2) TYPE OF WORK
New Well Deepening Conversion
Alteration (complete 2a & 10) Abandonment(complete 5a)

(2a) PRE-ALTERATION
Dia + From To Gauge Stl Plstc Wld Thrd
Casing:
Material From To Amt sacks/lbs
Seal:

(3) DRILL METHOD
Rotary Air Rotary Mud Cable Auger Cable Mud
Reverse Rotary Other

(4) PROPOSED USE
Domestic Irrigation Community
Industrial/ Commercial Livestock Dewatering
Thermal Injection Other MUNICIPAL

(5) BORE HOLE CONSTRUCTION
Special Standard (Attach copy)
Depth of Completed Well 293.00 ft.

Table with columns: Dia, From, To, Material, From, To, Amt, sacks/lbs. Rows include Bentonite Chips and Cement with 5% Bento.

How was seal placed: Method A B C D E
Other POURED DRY

Backfill placed from ft. to ft. Material
Filter pack from ft. to ft. Material Size

Explosives used: Yes Type Amount

(5a) ABANDONMENT USING UNHYDRATED BENTONITE
Proposed Amount Actual Amount

(6) CASING/LINER
Casing Liner Dia + From To Gauge Stl Plstc Wld Thrd
Shoe Inside Outside Other Location of shoe(s)
Temp casing Yes Dia 20 From 0 To 200

(7) PERFORATIONS/SCREENS
Perforations Method
Screens Type CONTINUOUS WIRE Material 304 SS
Perf/ Casing/ Screen Scrn/slot Slot # of Tel/
Screen Liner Dia From To width length slots pipe size

(8) WELL TESTS: Minimum testing time is 1 hour

Pump Bailer Air Flowing Artesian
Yield gal/min Drawdown Drill stem/Pump depth Duration (hr)
1970 13 160 24

Temperature 54 °F Lab analysis Yes By
Water quality concerns? Yes (describe below) TDS amount 112 ppm
From To Description Amount Units

(9) LOCATION OF WELL (legal description)

County DESCHUTES Twp 15.00 S N/S Range 10.00 E E/W WM
Sec 9 SW 1/4 of the NE 1/4 Tax Lot 401

Tax Map Number Lot
Lat " or DMS or DD
Long " or DMS or DD

Street address of well Nearest address
504 S LOCUST ST CREEKSIDE CAMPGROUND WELL#4

(10) STATIC WATER LEVEL

Table with columns: Date, SWL(psi), SWL(ft). Rows for Existing Well / Pre-Alteration and Completed Well.

WATER BEARING ZONES Depth water was first found 102.00

Table with columns: SWL Date, From, To, Est Flow, SWL(psi), SWL(ft). Rows for various dates.

(11) WELL LOG

Table with columns: Material, From, To. Lists various geological layers like SANDY PUMICE AND GRAVEL, GRAY AND BROWN LAVA, etc.

Date Started 10/12/2020 Completed 1/19/2021

(unbonded) Water Well Constructor Certification

I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.
License Number 1852 Date 1/19/2021

Signed JEB ABBAS (E-filed)

(bonded) Water Well Constructor Certification

I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.
License Number 1720 Date 1/20/2021

Signed JACK ABBAS (E-filed)

Contact Info (optional) JACK ABBAS

APPENDIX E
**Municipal Water Right Permits, Certificates,
and Transfers**

STATE OF OREGON
COUNTY OF DESCHUTES
CERTIFICATE OF WATER RIGHT

THIS CERTIFICATE ISSUED TO

CITY OF SISTERS
P.O. BOX 39
SISTERS, OREGON 97759

confirms the right to use the waters of A WELL in the DESCHUTES RIVER BASIN for the purpose of MUNICIPAL USE.

The right has been perfected under Permit G-9979. The date of priority is FEBRUARY 24, 1983. The right is limited to not more than 1.78 CUBIC FEET PER SECOND or its equivalent in case of rotation, measured at the well.

The well is located as follows:

NW 1/4 SW 1/4, SECTION 9, T 15 S, R 10 E, W.M.; 481.87 FEET SOUTH AND 706.96 FEET EAST FROM THE W 1/4 CORNER OF SECTION 9.

The right shall conform to such reasonable rotation system as may be ordered by the proper state officer.

A description of the place of use under the right, and to which such right is appurtenant, is as follows:

S 1/2 SE 1/4
SW 1/4
SECTION 4

E 1/2 SW 1/4
SE 1/4
SECTION 5

E 1/2 NE 1/4
NE 1/4 NW 1/4
NW 1/4 NE 1/4
SECTION 8

N 1/2
SECTION 9
TOWNSHIP 15 SOUTH, RANGE 10 EAST, W.M.

The right to the use of the water for the above purpose is restricted to beneficial use on the lands or place of use described.

WITNESS the signature of the Water Resources Director, affixed JULY 19, 1991.

SUPERSEDED BY
CERT. NO. **88184**

/s/ WILLIAM H. YOUNG
William H. Young

Recorded in State Record of Water Right Certificates numbered 66520.

G-10545.DM

T-11284 Cancelled V87 p. 405

STATE OF OREGON
 COUNTY OF DESCHUTES
 CERTIFICATE OF WATER RIGHT

THIS CERTIFICATE ISSUED TO

CITY OF SISTERS
 P.O. BOX 39
 SISTERS, OR 97759

confirms the right to use the waters of TWO WELLS, in the DESCHUTES RIVER BASIN for MUNICIPAL USE.

This right was perfected under Permit G-9979. The date of priority is FEBRUARY 24, 1983. The amount of water to which this right is entitled is limited to an amount actually used beneficially, and shall not exceed 1.78 CUBIC FEET PER SECOND or its equivalent in case of rotation, measured at the wells.

The well is located as follows:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
15 S	10 E	WM	4	SE NW	ADDITIONAL WELL (WELL #3) 1890 FEET SOUTH AND 2325 FEET EAST FROM NW CORNER, SECTION 4
15 S	10 E	WM	9	NW SW	ORIGINAL WELL (WELL #1) 482 FEET SOUTH AND 707 FEET EAST FROM W1/4 CORNER, SECTION 9

The right shall conform to such reasonable rotation system as may be ordered by the proper state officer.

A description of the place of use is as follows:

Twp	Rng	Mer	Sec	Q-Q	GLot
15 S	10 E	WM	4	NE NW	3
15 S	10 E	WM	4	SW NW	
15 S	10 E	WM	4	SE NW	
15 S	10 E	WM	4	SW 1/4	
15 S	10 E	WM	4	SW SE	
15 S	10 E	WM	4	SE SE	
15 S	10 E	WM	5	SW 1/4	
15 S	10 E	WM	5	SE 1/4	
15 S	10 E	WM	6	SE 1/4	
15 S	10 E	WM	8	NE NE	
15 S	10 E	WM	8	NW NE	
15 S	10 E	WM	8	SE NE	
15 S	10 E	WM	8	NE NW	

NOTICE OF RIGHT TO PETITION FOR RECONSIDERATION OR JUDICIAL REVIEW

This is an order in other than a contested case. This order is subject to judicial review under ORS 183.482. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.482. Pursuant to ORS 183.482, ORS 536.075 and OAR 137-003-0675, you may petition for judicial review and petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

Twp	Rng	Mer	Sec	Q-Q	GLot
15 S	10 E	WM	9	NE 1/4	
15 S	10 E	WM	9	NW 1/4	
15 S	10 E	WM	9	SE 1/4	

Water Use Measurement Conditions:

- A. The water user shall maintain the meter or other suitable measuring device in good working order.
- B. The water user shall allow the watermaster access to the meter or measuring device; provided however, where the meter or measuring device is located within a private structure, the watermaster shall request access upon reasonable notice.

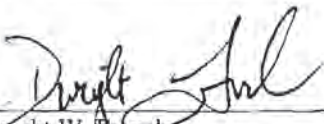
The quantity of water diverted at the additional point of appropriation (well), together with the quantity of diverted at the old point of appropriation, shall not exceed the quantity of water available from the original point of appropriation.

Water shall be acquired from the same aquifer (water source) as the original point of appropriation.

The right to the use of the water for the above purpose is restricted to beneficial use on the lands or place of use described; however, water may be applied to lands which are not specifically described above, provided the holder of this right complies with ORS 540.510(3).

This certificate is issued to confirm a change in ADDITIONAL POINT OF APPROPRIATION AND PLACE OF USE approved by an order of the Water Resources Director entered APRIL 20, 2012, at Special Order Volume 87, Page 405, approving Transfer Application 11284, and supersedes Certificate 66520, State record of Water Right Certificates.

Issued APR 23 2013


 Dwight W. Branch
 Administrator, Water Right Services, for
 Phillip C. Ward, Director



STATE OF OREGON

County of **DESCHUTES**

PERMIT TO APPROPRIATE THE PUBLIC WATERS

This is to certify that I have examined APPLICATION **G-10545** and do hereby grant the same SUBJECT TO EXISTING RIGHTS and the following limitations and conditions:

This permit is issued to **City of Sisters** by **John A. Rankin, Planning Director/Engineer** of **PO Box 39, Sisters, Oregon 97759, phone 549-6022**, for use of the waters of **1 well**.

for the PURPOSE of **municipal use**

that the PRIORITY OF THE RIGHT dates from **February 24, 1983**

and is limited to the amount of water which can be applied to beneficial use and shall not exceed **2.93 cubic feet per second**

measured at the point of diversion from the **well**, or its equivalent in case of rotation with other water users.

The well is to be LOCATED: **481.87 feet South and 706.96 feet East from the W 1/4 Corner of Section 9, being within the NW 1/4 SW 1/4 of Section 9, Township 15 South, Range 10 East, WM, in the County of Deschutes.**

A description of the PLACE OF USE under the permit, and to which such right is appurtenant, is as follows:

Township 15 South, Range 10 East, WM	Section 4	S 1/2	SE 1/4
		SW 1/4	
	Section 5	E 1/2	SW 1/4
		SE 1/4	
	Section 8	E 1/2	NE 1/4
		NE 1/4	NW 1/4
		NW 1/4	NE 1/4
	Section 9	N 1/2	

The well shall be constructed in accordance with the General Standards for the Construction and Maintenance of Water Wells in Oregon. The works constructed shall include an air line and pressure gauge or an access port for measuring line, adequate to determine water level elevation in the well at all times. The permittee shall install and maintain a weir, meter, or other suitable measuring device, and shall keep a complete record of the amount of ground water withdrawn.

Actual construction work shall begin on or before **March 18, 1984**, and shall thereafter be prosecuted with reasonable diligence and be completed on or before **October 1, 19 84**.

Complete application of the water to the proposed use shall be made on or before **October 1, 19 85**.

Witness my hand this **18th** day of **March**, 1983.

/s/ **JAMES E. SEXSON**

WATER RESOURCES DIRECTOR

This permit is for the beneficial use of water. By law, the land use associated with this water use must be in compliance with statewide land-use goals and any local acknowledged land-use plan. It is possible that the land use you propose may not be allowed if it is not in keeping with the goals and the acknowledged plan. Your city or county planning agency can advise you about the land-use plan in your area.

APPLICATION **G-10545**

"CERTIFICATE NO. 66520"

PERMIT

G 9979

**BEFORE THE WATER RESOURCES DEPARTMENT
OF THE
STATE OF OREGON**

In the Matter of Transfer Application)	FINAL ORDER APPROVING AN
T-11284, Deschutes County)	ADDITIONAL POINT OF
)	APPROPRIATION AND CHANGE IN
)	PLACE OF USE

Authority

ORS 537.705 and 540.505 to 540.580 establish the process in which a water right holder may submit a request to transfer the point of appropriation, place of use, or character of use authorized under an existing water right. OAR Chapter 690, Division 380 implements the statutes and provides the Department's procedures and criteria for evaluating transfer applications.

Applicant

CITY OF SISTERS
PO BOX 39
SISTERS, OR 97759

Agent

GSI WATER SOLUTIONS INC.
1600 WESTERN BLVD. SUITE 240
CORVALLIS, OR 97333

Findings of Fact

Background

1. On August 23, 2011, City of Sisters filed an application for an additional point of appropriation and to change the place of use under Certificate 66520. The Department assigned the application number T-11284.
2. The right to be transferred is as follows:

Certificate: 66520 in the name of City of Sisters (perfected under Permit G-9979)
Use: Municipal use
Priority Date: February 24, 1983
Rate: 1.78 cubic feet per second
Source: A well within the Deschutes River Basin

Authorized Point of Appropriation:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
15 S	10 E	WM	9	NW SW	481.87 FEET SOUTH AND 706.96 FEET EAST FROM THE W1/4 CORNER OF SECTION 9

This final order is subject to judicial review by the Court of Appeals under ORS 183.482. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.482(1). Pursuant to ORS 536.075 and OAR 137-003-0675, you may petition for judicial review or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

Authorized Place of Use:

MUNICIPAL USE				
Twp	Rng	Mer	Sec	Q-Q
15 S	10 E	WM	4	NE SW
15 S	10 E	WM	4	NW SW
15 S	10 E	WM	4	SW SW
15 S	10 E	WM	4	SE SW
15 S	10 E	WM	4	SW SE
15 S	10 E	WM	4	SE SE
15 S	10 E	WM	5	NE SW
15 S	10 E	WM	5	SE SW
15 S	10 E	WM	5	NE SE
15 S	10 E	WM	5	NW SE
15 S	10 E	WM	5	SW SE
15 S	10 E	WM	5	SE SE
15 S	10 E	WM	8	NE NE
15 S	10 E	WM	8	NW NE
15 S	10 E	WM	8	SE NE
15 S	10 E	WM	8	NE NW
15 S	10 E	WM	9	NE NE
15 S	10 E	WM	9	NW NE
15 S	10 E	WM	9	SW NE
15 S	10 E	WM	9	SE NE
15 S	10 E	WM	9	NE NW
15 S	10 E	WM	9	NW NW
15 S	10 E	WM	9	SW NW
15 S	10 E	WM	9	SE NW

3. Transfer Application T-11284 proposes an additional point of appropriation approximately 1.25 miles from the existing point of appropriation to:

WELL	Twp	Rng	Mer	Sec	Q-Q	Measured Distances
DESC 57902	15 S	10 E	WM	4	SE NW	1890 FEET SOUTH AND 2325 FEET EAST FROM THE NW CORNER OF SECTION 4

4. Transfer Application T-11284 also proposes to change the place of use of the right to:

MUNICIPAL USE					
Twp	Rng	Mer	Sec	Q-Q	GOV LOT
15 S	10 E	WM	4	NE NW	3
15 S	10 E	WM	4	SW NW	
15 S	10 E	WM	4	SE NW	
15 S	10 E	WM	4	NE SW	
15 S	10 E	WM	4	NW SW	
15 S	10 E	WM	4	SW SW	
15 S	10 E	WM	4	SE SW	
15 S	10 E	WM	4	SW SE	
15 S	10 E	WM	4	SE SE	
15 S	10 E	WM	5	NE SW	
15 S	10 E	WM	5	NW SW	
15 S	10 E	WM	5	SW SW	
15 S	10 E	WM	5	SE SW	

MUNICIPAL USE					
Twp	Rng	Mer	Sec	Q-Q	GOV LOT
15 S	10 E	WM	5	NE SE	
15 S	10 E	WM	5	NW SE	
15 S	10 E	WM	5	SW SE	
15 S	10 E	WM	5	SE SE	
15 S	10 E	WM	6	NE SE	
15 S	10 E	WM	6	NW SE	
15 S	10 E	WM	6	SW SE	
15 S	10 E	WM	6	SE SE	
15 S	10 E	WM	8	NE NE	
15 S	10 E	WM	8	NW NE	
15 S	10 E	WM	8	SE NE	
15 S	10 E	WM	8	NE NW	
15 S	10 E	WM	9	NE NE	
15 S	10 E	WM	9	NW NE	
15 S	10 E	WM	9	SW NE	
15 S	10 E	WM	9	SE NE	
15 S	10 E	WM	9	NE NW	
15 S	10 E	WM	9	NW NW	
15 S	10 E	WM	9	SW NW	
15 S	10 E	WM	9	SE NW	
15 S	10 E	WM	9	NE SE	
15 S	10 E	WM	9	NW SE	
15 S	10 E	WM	9	SW SE	
15 S	10 E	WM	9	SE SE	

5. Notice of the application for transfer was published on August 30, 2011, pursuant to OAR 690-380-4000. No comments were filed in response to the notice.
6. On February 15, 2012, the Department sent a copy of the draft Preliminary Determination proposing to approve Transfer Application T-11284 to the applicant. The draft Preliminary Determination cover letter set forth a deadline of March 16, 2012, for the applicant to respond. The applicant requested that the Department proceed with issuance of a Preliminary Determination and provided the necessary information to demonstrate that the applicant is authorized to pursue the transfer.
7. On March 2, 2012, the Department issued a Preliminary Determination proposing to approve Transfer Application T-11284 and sent a copy to the applicant. Additionally, notice of the Preliminary Determination for the transfer application was published on the Department's weekly notice on March 6, 2012, and in the Sisters Nugget newspaper on March 7, 14 and 21, 2012, pursuant to ORS 540.520 and OAR 690-380-4020. No protests were filed in response to the notice.

Transfer Review Criteria (OAR 690-380-4010)

8. Water has been used according to the terms and conditions of the right. The right is not subject to forfeiture under ORS 540.610 because it is a right held by a municipality.

9. A pump, pipelines, and a municipal system sufficient to use the full amount of water allowed under the existing right are present.
10. The proposed change would not result in enlargement of the right.
11. The proposed change would not result in injury to other water rights.

Conclusions of Law

The additional point of appropriation and change in place of use proposed in Transfer Application T-11284 are consistent with the requirements of ORS 537.705 and 540.505 to 540.580 and OAR 690-380-5000.

Now, therefore, it is ORDERED:

1. The additional point of appropriation and change in place of use proposed in application T-11284 are approved.
2. The right to the use of the water is restricted to beneficial use at the place of use described; however, because the right is for municipal use, water may be applied to lands which are not specifically described, provided the holder of the right complies with ORS 540.510(3). The right to the use of water is subject to all other conditions and limitations contained in Certificate 66520 and any related decree.
3. Water right certificate 66520 is cancelled.
4. The quantity of water diverted at the additional point of appropriation, together with that diverted at the original point of appropriation, shall not exceed the quantity of water lawfully available at the original point of appropriation.
5. Water use measurement conditions:
 - a. Before water use may begin under this order, the water user shall install a totalizing flow meter, or, with prior approval of the Director, another suitable measuring device, at each point of appropriation.
 - b. The water user shall maintain the meters or measuring devices in good working order.
 - c. The water user shall allow the Watermaster access to the meters or measuring devices; provided however, where the meters or measuring devices are located within a private structure, the Watermaster shall request access upon reasonable notice.
6. Water shall be acquired from the same aquifer (water source) as the original point of appropriation.
7. Full beneficial use of the water shall be made, consistent with the terms of this order, on or before **October 1, 2017**. A Claim of Beneficial Use prepared by a Certified Water Right Examiner shall be submitted by the applicant to the Department within one year after the deadline for completion of the changes and full beneficial use of the water.

8. After satisfactory proof of beneficial use is received, a new certificate confirming the right transferred will be issued

Dated at Salem, Oregon this 20 day of April, 2012.


Dwight French, Water Right Services Administrator, for
PHILLIP C. WARD, DIRECTOR

Mailing Date APR 23 2012

Application for Permanent Water Right Transfer



Oregon Water Resources Department
725 Summer Street NE, Suite A
Salem, Oregon 97301-1266
(503) 986-0900
www.oregon.gov/OWRD

Part 1 of 5 – Minimum Requirements Checklist

This transfer application will be returned if Parts 1 through 5 and all required attachments are not completed and included.

For questions, please call (503) 986-0900, and ask for Transfer Section.

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Check all items included with this application. (N/A = Not Applicable)

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- Part 1 – Completed Minimum Requirements Checklist.
- Part 2 – Completed Transfer Application Map Checklist.
- Part 3 – Application Fee, payable by check to the Oregon Water Resources Department, and completed Fee Worksheet, page 3. Try the new online fee calculator at: http://apps.wrd.state.or.us/apps/misc/wrd_fee_calculator.
- Part 4 – Completed Applicant Information and Signature.
- Part 5 – Information about Water Rights to be Transferred: **How many water rights are to be transferred? 1 List them here: 93889 (Attachment A)**
Please include a separate Part 5 for each water right. (See instructions on page 6)
NOTE: A separate transfer application is required for each water right unless the criteria in OAR 690-380-3220 are met.

Attachments:

- Completed Transfer Application Map. **Attachment B**
- Completed Evidence of Use Affidavit and supporting documentation. **Attachment C**
- N/A Affidavit(s) of Consent from Landowner(s) (if the applicant does not own the land the water right is on.)
- N/A Supplemental Form D – For water rights served by or issued in the name of an irrigation district. Complete when the transfer applicant is not the irrigation district.
- N/A Oregon Water Resources Department’s Land Use Information Form with approval and signature (or signed land use form receipt stub) from each local land use authority in which water is to be diverted, conveyed, and/or used. Not required if water is to be diverted, conveyed, and/or used only on federal lands or if all of the following apply: a) a change in place of use only, b) no structural changes, c) the use of water is for irrigation only, and d) the use is located within an irrigation district or an exclusive farm use zone. **Attachment D**
- N/A Water Well Report/Well Log for changes in point(s) of appropriation (well(s)) or additional point(s) of appropriation. **Attachment E**
- N/A Geologist Report for a change from a surface water point of diversion to a ground water point of appropriation (well), if the proposed well is more than 500’ from the surface water source and more than 1000’ upstream or downstream from the point of diversion. See OAR 690-380-2130 for requirements and applicability.

(For Staff Use Only)

WE ARE RETURNING YOUR APPLICATION FOR THE FOLLOWING REASON(S):

<input type="checkbox"/> Application fee not enclosed/insufficient	<input type="checkbox"/> Map not included or incomplete
<input type="checkbox"/> Land Use Form not enclosed or incomplete	<input type="checkbox"/> Evidence of Use Form not enclosed or incomplete
<input type="checkbox"/> Additional signature(s) required	<input type="checkbox"/> Part is incomplete
Other/Explanation _____	- 13840 -
Staff: _____ 503- _____	Date: ____/____/____

Part 2 of 5 – Transfer Application Map

Your transfer application will be returned if any of the map requirements listed below are not met.

Please be sure that the transfer application map you submit includes all the required items and matches the existing water right map. Check all boxes that apply.

- N/A Certified Water Right Examiner (CWRE) Stamp and Original Signature. For a list of CWREs, see http://apps.wrd.state.or.us/apps/wr/cwre_license_view/. CWRE stamp and signature are not required for substitutions.
- N/A If **more than three** water rights are involved, separate maps are needed for each water right.
- Permanent quality printed with dark ink on good quality paper.
- The size of the map can be 8½ x 11 inches, 8½ x 14 inches, 11 x 17 inches, or up to 30 x 30 inches. For 30 x 30 inch maps, one extra copy is required.
- A north arrow, a legend, and scale.
- The scale of the map must be: 1 inch = 400 feet, 1 inch = 1,320 feet, the scale of the Final Proof/Claim of Beneficial Use Map (the map used when the permit was certificated), the scale of the county assessor map if the scale is not smaller than 1 inch = 1,320 feet, or a scale that has been pre-approved by the Department.
- Township, Range, Section, ¼ ¼, DLC, Government Lot, and other recognized public land survey lines.
- Tax lot boundaries (property lines) are required. Tax lot numbers are recommended.
- Major physical features including rivers and creeks showing direction of flow, lakes and reservoirs, roads, and railroads.
- Major water delivery system features from the point(s) of diversion/appropriation such as main pipelines, canals, and ditches.
- Existing place of use that includes separate hachuring for each water right, priority date, and use including number of acres in each quarter-quarter section, government lot, or in each quarter-quarter section as projected within government lots, donation land claims, or other recognized public land survey subdivisions. If less than the entirety of the water right is being changed, a separate hachuring is needed for lands left unchanged.
- N/A Proposed place of use that includes separate hachuring for each water right, priority date, and use including number of acres in each quarter-quarter section, government lot, or in each quarter-quarter section as projected within government lots, donation land claims, or other recognized public land survey subdivisions.
- Existing point(s) of diversion or well(s) with distance and bearing or coordinates from a recognized survey corner. This information can be found in your water right certificate or permit.
- N/A If you are proposing a change in point(s) of diversion or well(s), show the proposed location and label it clearly with distance and bearing or coordinates. If GPS coordinates are used, latitude-longitude coordinates may be expressed as either degrees-minutes-seconds with at least one digit after the decimal (example – 42°32'15.5") or degrees-decimal with five or more digits after the decimal (example – 42.53764°).

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Part 4 of 5 – Applicant Information and Signature

Applicant Information

APPLICANT/BUSINESS NAME City of Sisters, Attn: Paul Bertagna			PHONE NO. 541-549-6022	ADDITIONAL CONTACT NO.
ADDRESS PO Box 39				FAX NO.
CITY Sisters	STATE OR	ZIP 97759	E-MAIL pbertagna@ci.sisters.or.us	
BY PROVIDING AN E-MAIL ADDRESS, CONSENT IS GIVEN TO RECEIVE ALL CORRESPONDENCE FROM THE DEPARTMENT ELECTRONICALLY. COPIES OF THE FINAL ORDER DOCUMENTS WILL ALSO BE MAILED.				

Agent Information – The agent is authorized to represent the applicant in all matters relating to this application.

AGENT/BUSINESS NAME GSI Water Solutions, Inc., Attn: Trevor Grandy			PHONE NO. 971-200-8545	ADDITIONAL CONTACT NO.
ADDRESS 147 SW Shevlin Hixon Dr., Suite 201				FAX NO.
CITY Bend	STATE OR	ZIP 97702	E-MAIL tgrandy@gsiws.com	
BY PROVIDING AN E-MAIL ADDRESS, CONSENT IS GIVEN TO RECEIVE ALL CORRESPONDENCE FROM THE DEPARTMENT ELECTRONICALLY. COPIES OF THE FINAL ORDER DOCUMENTS WILL ALSO BE MAILED.				

Explain in your own words what you propose to accomplish with this transfer application, and why:
 The applicant is proposing to add two points of appropriation (Well 3 and Well 4) to water right Certificate 93889. The applicant is also proposing to change the place of use of Certificate 93889 to be the "City of Sisters service area."

If you need additional space, continue on a separate piece of paper and attach to the application as "Attachment 1".

Check One Box

- By signing this application, I understand that, upon receipt of the draft preliminary determination and prior to Department approval of the transfer, I will be required to provide landownership information and evidence that I am authorized to pursue the transfer as identified in OAR 690-380-4010(5); **OR**
- I affirm the applicant is a municipality as defined in ORS 540.510(3)(b) and that the right is in the name of the municipality or a predecessor; **OR**
- I affirm the applicant is an entity with the authority to condemn property and is acquiring by condemnation the property to which the water right proposed for transfer is appurtenant and have supporting documentation.

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By my signature below, I confirm that I understand:

- Prior to Department approval of the transfer application, I may be required to submit payment to the Department for publication of a notice in a newspaper with general circulation in the area where the water right is located, once per week for two consecutive weeks. If more than one qualifying newspaper is available, I suggest publishing the notice in the following newspaper: The Nugget.
- Amendments to the application may only be made in response to the Department's Draft Preliminary Determination (DPD). The applicant will have a period of at least 30 days to amend the application to address any issues identified by the Department in the DPD, or to withdraw the application. Note that amendments may be subject to additional fees, pursuant to ORS 536.050.
- Failure to complete an approved change in place of use and/or change in character of use, will result in loss of the water right (OAR 690-380-6010).
- Refunds may only be granted upon request and, as set forth in ORS 536.050(4)(a), if the Director determines that a refund of all or part of a fee is appropriate in the interests of fairness to the public or necessary to correct an error of the Department.

I (we) affirm that the information contained in this application is true and accurate.



Cory Misley
Applicant signature

Cory Misley, City Manager
Print Name (and Title if applicable)

9/21/2021
Date

Is the applicant the sole owner of the land on which the water right, or portion thereof, proposed for transfer is located? Yes No*

N/A: The applicant is a municipality

**If NO, include signatures of all deeded landowners (and mailing and/or e-mail addresses if different than the applicant's) or attach affidavits of consent (and mailing and/or e-mail addresses) from all landowners or individuals/entities to which the water right(s) were conveyed.*

Check the following boxes that apply:

- The applicant is responsible for completion of change(s). Notices and correspondence should continue to be sent to the applicant.
- The receiving landowner will be responsible for completing the proposed change(s) after the final order is issued. Copies of notices and correspondence should be sent to this landowner.
- Both the receiving landowner and applicant will be responsible for completion of change(s). Copies of notices and correspondence should be sent to this landowner and the applicant.

At this time, are the lands in this transfer application in the process of being sold? Yes No

If YES, and you know who the new landowner will be, please complete the receiving landowner information table below. If you do not know who the new landowner will be, then a request for assignment will have to be filed for at a later date.

If a property sells, the certificated water right(s) located on the land belong to the new owner, unless a sale agreement or other document states otherwise. For more information see: https://www.oregon.gov/owrd/WRDFormsPDF/Transfer_Property_Transactions.pdf

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RECEIVING LANDOWNER NAME N/A		PHONE NO.	ADDITIONAL CONTACT NO.
ADDRESS		FAX NO.	
CITY	STATE	ZIP	E-MAIL
Describe any special ownership circumstances: The applicant is a municipality			
The confirming Certificate shall be issued in the name of: <input type="checkbox"/> Applicant <input type="checkbox"/> Receiving Landowner			


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Check here if any of the water rights proposed for transfer are or will be located within or served by an irrigation or other water district. (Tip: Complete and attach Supplemental Form D.)

IRRIGATION DISTRICT NAME N/A	ADDRESS	
CITY	STATE	ZIP

Check here if water for any of the rights supplied under a water service agreement or other contract for stored water with a federal agency or other entity.

ENTITY NAME N/A	ADDRESS	
CITY	STATE	ZIP

 To meet State Land Use Consistency Requirements, you must list all county, city, municipal corporation, or tribal governments within whose jurisdiction water will be diverted, conveyed or used.

ENTITY NAME City of Sisters	ADDRESS 520 East Cascade; PO Box 39	
CITY Sisters	STATE OR	ZIP 97759

ENTITY NAME	ADDRESS	
CITY	STATE	ZIP

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Part 5 of 5 – Water Right Information

Please use a separate Part 5 for each water right being changed. See instructions on page 6, to copy and paste additional Part 5s, or to add additional rows to tables within the form.

CERTIFICATE # 93889

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Description of Water Delivery System

System capacity: 1.56 cubic feet per second (cfs) OR
 _____ gallons per minute (gpm)

Describe the current water delivery system or the system that was in place at some time within the last five years. Include information on the pumps, canals, pipelines, and sprinklers used to divert, convey, and apply the water at the authorized place of use. **The City of Sisters' current point of appropriation, Well 2, is equipped with a submersible pump. Water is pumped from the well into the City's municipal water distribution system.**

Table 1. Location of Authorized and Proposed Point(s) of Diversion (POD) or Appropriation (POA)
 (Note: If the POD/POA name is not specified on the certificate, assign it a name or number here.)

POD/POA Name or Number	Is this POD/POA Authorized on the Certificate or is it Proposed?	If POA, OWRD Well Log ID# (or Well ID Tag# L-__)	Twp		Rng		Sec	¼ ¼		Tax Lot, DLC or Gov't Lot	Measured Distances (from a recognized survey corner)
Well 2	<input checked="" type="checkbox"/> Authorized <input type="checkbox"/> Proposed	DESC 1034	15	S	10	E	5	SW	SW	900	1,280 feet North and 1,175 feet East from SW corner of Section 5
Well 3	<input type="checkbox"/> Authorized <input checked="" type="checkbox"/> Proposed	DESC 57902	15	S	10	E	4	SE	NW	103	1,890 feet South and 2,325 feet East from NW corner of Section 4
Well 4	<input type="checkbox"/> Authorized <input checked="" type="checkbox"/> Proposed	DESC 62447	15	S	10	E	9	SW	NE	401	1,505 feet South and 1,715 feet West from NE corner of Section 9

Check all type(s) of change(s) proposed below (change "CODES" are provided in parentheses):

- | | |
|--|--|
| <input checked="" type="checkbox"/> Place of Use (POU) | <input type="checkbox"/> Supplemental Use to Primary Use (S to P) |
| <input type="checkbox"/> Character of Use (USE) | <input type="checkbox"/> Point of Appropriation/Well (POA) |
| <input type="checkbox"/> Point of Diversion (POD) | <input checked="" type="checkbox"/> Additional Point of Appropriation (APOA) |
| <input type="checkbox"/> Additional Point of Diversion (APOD) | <input type="checkbox"/> Substitution (SUB) |
| <input type="checkbox"/> Surface Water POD to Ground Water POA (SW/GW) | <input type="checkbox"/> Government Action POD (GOV) |

Will all of the proposed changes affect the entire water right?

- Yes Complete only the Proposed ("to" or "on" lands) section of Table 2 on the next page. Use the "CODES" listed above to describe the proposed changes.
- No Complete all of Table 2 to describe the portion of the water right to be changed.

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For Place of Use or Character of Use Changes

Are there other water right certificates, water use permits or ground water registrations associated with the "from" or the "to" lands? Yes No

If YES, list the certificate, water use permit, or ground water registration numbers: N/A – The authorized use is municipal use, so the water rights are not 'layered'.



Pursuant to ORS 540.510, any "layered" water use such as an irrigation right that is supplemental to a primary right proposed for transfer must be included in the transfer or be cancelled. Any change to a ground water registration must be filed separately in a ground water registration modification application.

For Substitution (ground water supplemental irrigation will be substituted for surface water primary irrigation)

Ground water supplemental Permit or Certificate # _____;
Surface water primary Certificate # _____.

For a change from Supplemental Irrigation Use to Primary Irrigation Use

Identify the primary certificate to be cancelled. Certificate # _____

For a change in point(s) of appropriation (well(s)) or additional point(s) of appropriation:

Well log(s) are attached for each authorized and proposed well(s) that are clearly labeled and associated with the corresponding well(s) in Table 1 above and on the accompanying application map.

See Attachment E

Tip: You may search for well logs on the Department's web page at:
http://apps.wrd.state.or.us/apps/gw/well_log/Default.aspx

AND/OR

Describe the construction of the authorized and proposed well(s) in Table 3 for any wells that do not have a well log. For *proposed wells not yet constructed or built*, provide "a best estimate" for each requested information element in the table. The Department recommends you consult a licensed well driller, geologist, or certified water right examiner to assist with assembling the information necessary to complete Table 3.

Table 3. Construction of Point(s) of Appropriation

Any well(s) in this listing must be clearly tied to corresponding well(s) described in Table 1 and shown on the accompanying application map. Failure to provide the information will delay the processing of your transfer application until it is received. The information is necessary for the department to assess whether the proposed well(s) will access the same source aquifer as the authorized point(s) of appropriation (POA). The Department is prohibited by law from approving POA changes that do not access the same source aquifer.

Proposed or Authorized POA Name or Number	Is well already built? (Yes or No)	If an existing well: OWRD Well ID Tag No. L_____	Total well depth	Casing Diameter	Casing Intervals (feet)	Seal depth(s) (intervals)	Perforated or screened intervals (in feet)	Static water level of completed well (in feet)	Source aquifer (sand, gravel, basalt, etc)	Well-specific rate (cfs or gpm). If less than full rate of water right

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Attachment A

Certificate 93889

Application for a Permanent Water Right Transfer - City of Sisters

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STATE OF OREGON
COUNTY OF DESCHUTES
CERTIFICATE OF WATER RIGHT

THIS CERTIFICATE ISSUED TO

CITY OF SISTERS
PO BOX 39
SISTERS OR 97759

confirms the right to the use of water perfected under the terms of Permit G-11418. The amount of water used to which this right is entitled is limited to the amount used beneficially, and shall not exceed the amount specified, or its equivalent in the case of rotation, measured at the point of diversion from the source. The specific limits and conditions of the use are listed below.

APPLICATION FILE NUMBER: G-12591
SOURCE OF WATER: WELL 2 IN WHYCHUS BASIN
PURPOSE OR USE: MUNICIPAL USES
MAXIMUM RATE: 1.56 CUBIC FEET PER SECOND
DATE OF PRIORITY: JUNE 25, 1991

The well is located as follows:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
15 S	10 E	WM	5	SW SW	WELL 2 - 1280 FEET NORTH AND 1175 FEET EAST FROM SW CORNER, SECTION 5

A description of the place of use is as follows:

Twp	Rng	Mer	Sec	Q-Q
15 S	10 E	WM	4	SW NE
15 S	10 E	WM	4	SE NW
15 S	10 E	WM	4	NE SW
15 S	10 E	WM	4	NW SW
15 S	10 E	WM	4	SW SW
15 S	10 E	WM	4	SE SW
15 S	10 E	WM	4	NE SE
15 S	10 E	WM	4	NW SE
15 S	10 E	WM	4	SW SE
15 S	10 E	WM	4	SE SE
15 S	10 E	WM	5	NE SW
15 S	10 E	WM	5	SE SW



NOTICE OF RIGHT TO PETITION FOR RECONSIDERATION OR JUDICIAL REVIEW

This is an order in other than a contested case. This order is subject to judicial review under ORS 183.484 and ORS 536.075. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.484(2). Pursuant to ORS 183.484, ORS 536.075 and OAR 137-004-0080, you may petition for judicial review and petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied. In addition, under ORS 537.260 any person with an application, permit or water right certificate subsequent in priority may jointly or severally contest the issuance of the certificate within three months after issuance of the certificate.

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Twp	Rng	Mer	Sec	Q-Q
15 S	10 E	WM	5	NE SE
15 S	10 E	WM	5	NW SE
15 S	10 E	WM	5	SW SE
15 S	10 E	WM	5	SE SE
15 S	10 E	WM	8	SE NE
15 S	10 E	WM	8	NE NW
15 S	10 E	WM	8	NW NW
15 S	10 E	WM	9	NW NE
15 S	10 E	WM	9	SW NE
15 S	10 E	WM	9	SE NE
15 S	10 E	WM	9	NE NW
15 S	10 E	WM	9	NW NW
15 S	10 E	WM	9	SW NW
15 S	10 E	WM	9	SE NW
15 S	10 E	WM	9	NW SW

The City shall monitor and report the impact of water use under this right on water levels within the aquifer that provides water to the well under this right in accordance with the plan on file with the Department. If any well listed on this right displays a total static water-level decline of 25 or more feet over any period of years, as compared to the reference level, then the City shall discontinue use of, or reduce the rate or volume of withdrawal from, the well. Such action shall be taken until the water level recovers to above the 25-foot decline level or until the Department determines, based on the City or the Department's data and analysis, that no action is necessary because the aquifer in question can sustain the observed declines without adversely impacting the resource or senior water rights. The City shall in no instance allow excessive decline to occur within the aquifer as a result of use under this right.

If substantial interference with a senior water right occurs due to withdrawal of water from any well listed on this right, then use of water from the well shall be discontinued or reduced and/or the schedule of withdrawal shall be regulated until or unless the Department approves or implements an alternative administrative action to mitigate the interference. The Department encourages junior and senior appropriators to jointly develop plans to mitigate interferences.

The well shall be maintained in accordance with the General Standards for the Construction and Maintenance of Water Wells in Oregon. The works shall be equipped with a usable access port, and may also include an air line and pressure gauge adequate to determine the water level elevation in the well at all times.

When required by the Department, the water user shall install and maintain a weir, meter, or other suitable measuring device, and shall keep a complete record of the amount of ground water withdrawn.

The Director may require water level or pump test results every ten years.

Failure to comply with any of the provisions of this right may result in action including, but not limited to, restrictions on the use, civil penalties, or cancellation of the right.

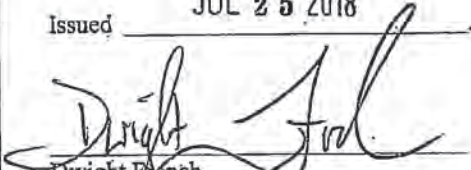
This right is for the beneficial use of water without waste. The water user is advised that new regulations may require the use of best practical technologies or conservation practices to achieve this end.

By law, the land use associated with this water use must be in compliance with statewide land-use goals and any local acknowledged land-use plan.

The use of water shall be limited when it interferes with any prior surface or ground water rights.

The right to the use of the water for the above purpose is restricted to beneficial use on the lands or place of use described; however, water may be applied to lands which are not specifically described above, provided the holder of this right complies with ORS 540.510.

Issued JUL 25 2018


Dwight French
Water Right Services Division Administrator, for
Thomas M. Byler, Director
Oregon Water Resources Department



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Attachment B

Application Map

Application for a Permanent Water Right Transfer - City of Sisters

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Attachment C

Evidence of Use Affidavit

Application for a Permanent Water Right Transfer - City of Sisters

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Application for Water Right Transfer

Evidence of Use Affidavit



Oregon Water Resources Department
 725 Summer Street NE, Suite A
 Salem, Oregon 97301-1266
 (503) 986-0900
 www.wrd.state.or.us

Please print legibly or type. Be as specific as possible. Attach additional pages if you need more spacing. Supporting documentation must be attached.

State of Oregon)
) ss
 County of DESCHUTES

I, CORY MISLEY, in my capacity as CITY MANAGER,
 mailing address PO Box 39 Sisters, OR 97759
 telephone number (541)549-6022, being first duly sworn depose and say:

1. My knowledge of the exercise or status of the water right is based on (check one):

- Personal observation Professional expertise

2. I attest that:

Water was used during the previous five years on the entire place of use for Certificate # _____; OR

My knowledge is specific to the use of water at the following locations within the last five years:

Certificate #	Township	Range	Mer	Sec	¼ ¼	Gov't Lot or DLC	Acres (if applicable)

OR

- Confirming Certificate # _____ has been issued within the past five years; OR
- Part or all of the water right was leased instream at some time within the last five years. The instream lease number is: _____ (Note: If the entire right proposed for transfer was not leased, additional evidence of use is needed for the portion not leased instream.); OR
- The water right is not subject to forfeiture and documentation that a presumption of forfeiture for non-use would be rebutted under ORS 540.610(2) is attached.
- Water has been used at the actual current point of diversion or appropriation for more than 10 years for Certificate # _____ (For Historic POD/POA Transfers)

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(continues on reverse side)

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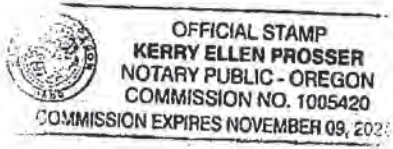
3. The water right was used for: (e.g., crops, pasture, etc.): MUNICIPAL WATER SUPPLY

4. I understand that if I do not attach one or more of the documents shown in the table below to support the above statements, my application will be considered incomplete.

[Signature]
Signature of Affiant

9/21/2021
Date

Signed and sworn to (or affirmed) before me this 21 day of September, 2021.



[Signature]
Notary Public for Oregon
My Commission Expires: 11/09/23

Supporting Documents	Examples
<input type="checkbox"/> Copy of a water right certificate that has been issued within the last five years. (not a remaining right certificate)	Copy of confirming water right certificate that shows issue date
<input type="checkbox"/> Copies of receipts from sales of irrigated crops or for expenditures related to use of water	<ul style="list-style-type: none"> • Power usage records for pumps associated with irrigation use • Fertilizer or seed bills related to irrigated crops • Farmers Co-op sales receipt
<input type="checkbox"/> Records such as FSA crop reports, irrigation district records, NRCS farm management plan, or records of other water suppliers	<ul style="list-style-type: none"> • District assessment records for water delivered • Crop reports submitted under a federal loan agreement • Beneficial use reports from district • IRS Farm Usage Deduction Report • Agricultural Stabilization Plan • CREP Report
<input type="checkbox"/> Aerial photos containing sufficient detail to establish location and date of photograph	<p>Multiple photos can be submitted to resolve different areas of a water right. If the photograph does not print with a "date stamp" or without the source being identified, the date of the photograph and source should be added.</p> <p>Sources for aerial photos: OSU – www.oregonexplorer.info/imagery OWRD – www.wrd.state.or.us Google Earth – earth.google.com TerraServer – www.terraserver.com</p>
<input type="checkbox"/> Approved Lease establishing beneficial use within the last 5 years	Copy of instream lease or lease number
<input checked="" type="checkbox"/> The water right is not subject to forfeiture and documentation that a presumption of forfeiture for non-use would be rebutted under ORS 540.610(2).	This is a municipal water right and a presumption of forfeiture would be rebutted under ORS 540.610(2)(a) and (b) . See water right Certificate 93889 in transfer application, Attachment A.

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Attachment E

Well Logs: DESC 1034, DESC 57092, & DESC 62447

Application for a Permanent Water Right Transfer - City of Sisters

RECEIVED

13840

OCT 06 2021

OWRD

DESC 1034 RECEIVED

15S/10E/85

**STATE OF OREGON
WATER WELL REPORT**
(as required by ORS 637.765)

SEP 16 1991

(START CARD) # 27957

(1) OWNER: Well Number _____
Name Hap Taylor Construction **WATER RESOURCES DEPT**
Address 2641 NE Ravenwood Dr. **SALEM OREGON**
City Bend State OR Zip 97701

(9) LOCATION OF WELL by legal description:
County Deschutes Latitude _____ Longitude _____
Township 15 S Nor S. Range 10 E E or W. W.M.
Section 8 _____
Tax Lot _____ Lot _____ Block _____ Subdivision _____
Street Address of Well (or nearest address) 15200 McKenzie Hwy
Sisters, OR

(2) TYPE OF WORK:
 New Well Deepen Recondition Abandon

(3) DRILL METHOD
 Rotary Air Rotary Mud Cable
 Other _____

(4) PROPOSED USE:
 Domestic Community Industrial Irrigation
 Thermal Injection Other _____

(5) BORE HOLE CONSTRUCTION:
Special construction approval Yes No Depth of Completed Well 302 ft.
Explosives used Yes No Type _____ Amount _____

ROLE		SEAL		Amount	
Diameter	From To	Material	From To	sacks or pounds	
22"	0 39	Cement	0 39	93 sacks	
17"	39 190				
14"	190 244				
13"	244 302				

How was seal placed? Method A B C D E
 Other _____
Backfill placed from _____ ft. to _____ ft. Material _____
Gravel placed from _____ ft. to _____ ft. Size of gravel _____

(6) CASING/LINER:

Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing 18"	+1	39	375	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Liner 14"	+13	244	250	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	10"	238	302	250	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Final location of sheets: _____

(7) PERFORATIONS/SCREENS:

Perforations Method _____
 Screens Type _____ Material _____

From	To	Slot size	Number	Diameter	Tel./pipe size	Casing	Liner
242	302	1/8x3	2400	10"		<input type="checkbox"/>	<input checked="" type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>

(8) WELL TESTS: Minimum testing time is 1 hour

Pump Bailer Air Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
1200	.3ft	220	8 hr/hr

Temperature of water 51 Depth Artesian Flow Found _____
Was a water analysis done? Yes By whom _____
Did any strata contain water not suitable for intended use? Too little
 Saky Muddy Odor Colored Other _____
Depth of strata: _____

(10) STATIC WATER LEVEL:
101 ft. below land surface. Date 7/31/91
Artesian pressure _____ lb. per square inch. Date _____

(11) WATER BEARING ZONES:
Depth at which water was first found 105'

From	To	Estimated Flow Rate	SWL
251	273		101
283	288		101
288	295	1200+	101
295	301		101

(12) WELL LOG: Ground elevation _____

Material	From	To	SWL
Top soil	0	1	
Cobbles with sand & dirt	1	23	
Volcanic gravels	23	34	
Basalt black porous	34	50	
Basalt grey hard	50	63	
Cinders red	63	75	
Volcanic gravels grey & red	75	98	
Basalt grey medium fractured	98	103	
Pumice white	103	105	
Basalt grey fractured with round gravels	105	145	101
Conglomerate brown	145	155	101
Rock grey hard	155	160	101
Rock soft grey & brown	160	175	101
Gravel broken	175	193	101
Rock broken grey & brown	193	203	101
Conglomerate light brown	203	235	101
Rock broken with gravel	235	241	101
Basalt grey hard & porous	241	251	101
Basalt brown porous	251	273	101
Basalt grey hard	273	283	101
Basalt porous grey & lavender	283	288	101
Cinders red	288	295	101

Date started 7-19-91 Completed 8-12-91

(unbonded) Water Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.
Signed [Signature] WWC Number 1358
Date 8-21-91

(bonded) Water Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.
Signed [Signature] WWC Number 723
Date 8-21-91

ORIGINAL & FIRST COPY: WATER RESOURCES DEPARTMENT SECOND COPY: CONSTRUCTOR THIRD COPY: CUSTOMER 8806128

OCT 06 2021

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DESC 1034

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SEP 16 1991

STATE OF OREGON WATER WELL REPORT (as required by ORS 537.765)

(START CARD) # 27957 (cont'd)

(1) OWNER:

Name Han Taylor Construction (cont'd) WATER RESOURCES DEPARTMENT GALEM, OREGON
Address
City State Zip

(2) TYPE OF WORK:

New Well Deepen Reconition Abandon

(3) DRILL METHOD

Rotary Air Rotary Mud Cable Other

(4) PROPOSED USE:

Domestic Community Industrial Irrigation
Thermal Injection Other

(5) BORE HOLE CONSTRUCTION:

Special Construction approval Yes No Depth of Completed Well ft.
Explosives used Yes No Type Amount

Table with columns for HOLE Diameter, SEAL Material, and Amount sacks or pounds.

How was seal placed: Method A B C D E

Backfill placed from ft. to ft. Material
Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER:

Table with columns for Diameter, Gauge, Steel, Plastic, Welded, Threaded for Casing and Liner.

Final location of shoe(s)

(7) PERFORATIONS/SCREENS:

Table with columns for From, To, Slot size, Number, Diameter, Tele/pipe size, Casing, Liner.

(8) WELL TESTS: Minimum testing time is 1 hour

Table with columns for Pump, Bailer, Air, Flowing, Artesian, Yield gal/min, Drawdown, Drill stem at, Time.

Temperature of water Depth Artesian Flow Found
Was a water analysis done? Yes By whom
Did any strata contain water not suitable for intended use? Too little
Salty Muddy Odor Colored Other
Depth of strata

(9) LOCATION OF WELL by legal description:

County Latitude Longitude
Township N or S, Range E or W, WM.
Section M W
Tax Lot Lot Block Subdivision
Street Address of Well (or nearest address)

(10) STATIC WATER LEVEL:

ft. below land surface. Date
Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:

Table with columns for From, To, Estimated Flow Rate, SWL.

(12) WELL LOG:

Table with columns for Material, From, To, SWL. Includes handwritten 'RECEIVED' and 'OCT 06 2021'.

Date started Completed

(unbonded) Water Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.

Signed [Signature] WWC Number: Date

(bonded) Water Well Constructor Certification:

I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above, all work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

Signed [Signature] WWC Number: Date

DESC 57902

DESC 57902

STATE OF OREGON

WATER SUPPLY WELL REPORT

(as required by ORS 537.765 & OAR 690-205-0210)

03-06-2007

WELL LABEL # 84019

AMENDED 3-20-07

AMENDED REPORT CARD # 1000329

(1) LAND OWNER

Owner Well I.D. Sisters-Well #3

First Name: Last Name: Company: CITY OF SISTERS Address: 520 EAST CASCADE AVE City: SISTERS State: OR Zip: 97759

(2) TYPE OF WORK

New Well Deepening Conversion Alteration (repair/recondition) Abandonment

(3) DRILL METHOD

Rotary Air Rotary Mud Cable Auger Cable Mud Reverse Rotary Other

(4) PROPOSED USE

Domestic Irrigation Community Industrial/ Commercial Livestock Dewatering Thermal Injection Other

(5) BORE HOLE CONSTRUCTION

Special Standard Attach copy Depth of Completed Well 288.00 ft

Table with columns: Dis, From, To, Material, SEAL, Amt, lbs. Rows include Cement, Bentonite Chips, and Cement.

How was seal placed: Method A B C D E

Backfill placed from ft. to ft. Material

Filter pack from ft. to ft. Material Size

Explosives used: Yes Type Amount

(6) CASING/LINER

Table with columns: Casing, Liner, Dia, From, To, Gauge, Sd, Plstc, Wld, Thrd. Includes rows for 16" and 14" diameters.

Shoe Inside Outside Other Location of shoe(s)

Temp casing Yes Dia From To

(7) PERFORATIONS/SCREENS

Table with columns: Perf/Screen, Casing/Liner Dia, From, To, Sem/slot width, Slot length, # of slots, Tele/pipe size. Includes a 'RECEIVED' stamp.

(8) WELL TESTS: Minimum testing time is 1 hour

Table with columns: Pump/Bailer/Air/Flowing Artesian, Yield gal/min, Drawdown, Drill stem/Pump depth, Duration (hr). Includes a 'RECEIVED' stamp.

Temperature 54 °F Lab analysis Yes By

Water quality concerns? Yes (describe below) Description

Table with columns: From, To, Description. Includes a 'RECEIVED' stamp and date 'MAR 28 2007'.

(9) LOCATION OF WELL (legal description)

County Deschutes Twp 10-00 S N/S Range 10.00 E E/W WM Sec 4 SE 1/4 of the NW 1/4 Tax Lot 103 Tax Map Number Lot Lat Long DMS or DD

NE LOT ABOUT 350 FT WEST OF CAMP POLK RD AT INTERSECTION WITH BARCLAY

(10) STATIC WATER LEVEL

Table with columns: Existing Well / Predeepening, Completed Well, Date, SWL (psi), SWL (ft). Includes a 'RECEIVED' stamp.

Flowing Artesian? Dry Hole?

WATER BEARING ZONES: Depth water was first found

Table with columns: SWL Date, From, To, Est Flow, SWL (psi), SWL (ft)

(11) WELL LOG

Table with columns: Material, From, To, Ground Elevation. Lists various soil and rock layers. Includes 'RECEIVED' and 'OCT 06 2021' stamps.

Date Started 11-27-2006 Completed 02-02-2007

(unbonded) Water Well Constructor Certification I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards.

License Number 1702 Date 03-06-2007

Electronically Filed Signed RUSTY ROTTO (E-filed)

(bonded) Water Well Constructor Certification I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above.

License Number 1523 Date 03-06-2007 Electronically Filed Signed ROBERT STADELI (E-filed)

Contact Info (optional)

WATER RESOURCES DEPARTMENT

THIS REPORT MUST BE SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK

13840

AMENDED
DESC 57902

AMENDED DESC 57902

3-6-07

03-06-2007

WELL I.D. # L 84019

Page 3 of 3

START CARD # 1000329

WATER SUPPLY WELL REPORT -
continuation page

Map of well



Oregon

Theodore R. Kulongoski, Governor

January 17, 2007

GEO TECH EXPLORATIONS
ROBERT STADELI #1523
19700 SW TETON
TUALATIN OR 97062

Water Resources Department
North Mall Office Building
725 Summer Street NE, Suite A
Salem, OR 97301-1266
503-986-0900
FAX 503-986-0904

JAN 19 2007

FINAL ORDER

Dear Robert:

The Special Standard request you submitted for owner: City of Sisters, Start Card number 1000329 is hereby approved for the following: You may use 3/4-inch unhydrated bentonite chips in this well from a depth of 155 ft bgs to 170 ft bgs due to a lost circulation zone. The sealing material from 155 ft bgs to land surface shall be cement grout. The placement of the bentonite shall conform to the Departments rules and the manufacturers specifications and result in a seal that is free of voids or bridges. Care shall be taken to minimize the introduction of bentonite dust (See OAR 690-210-0330). All other standards must be adhered to. Your Special Standard request form is enclosed.

The Well Construction Standards serve to protect ground water resources. By approving and issuing this special construction standard the Oregon Water Resources Department is not representing that a well constructed in accordance with this condition will maintain structural integrity or that it meets engineering standards. The well constructor/or landowner is responsible for ensuring that a well is constructed in a manner that protects ground water resources as required under Oregon Administrative Rules 690-200 through 690-240.

If you have any questions concerning this letter, I may be contacted at: (503) 986-0851, or by e-mail at Kristopher.R.Byrd@wrd.state.or.us.

Sincerely,

Kristopher Byrd
Well Construction Program Coordinator
Enforcement Section

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cc: Larry Carey, SC Region Well Inspector
File.

This is a final order in other than contested case. This order is subject to judicial review under ORS 183.484. Any petition for judicial review must be filed within the 60 day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080 you may either petition for judicial review or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

RECEIVED

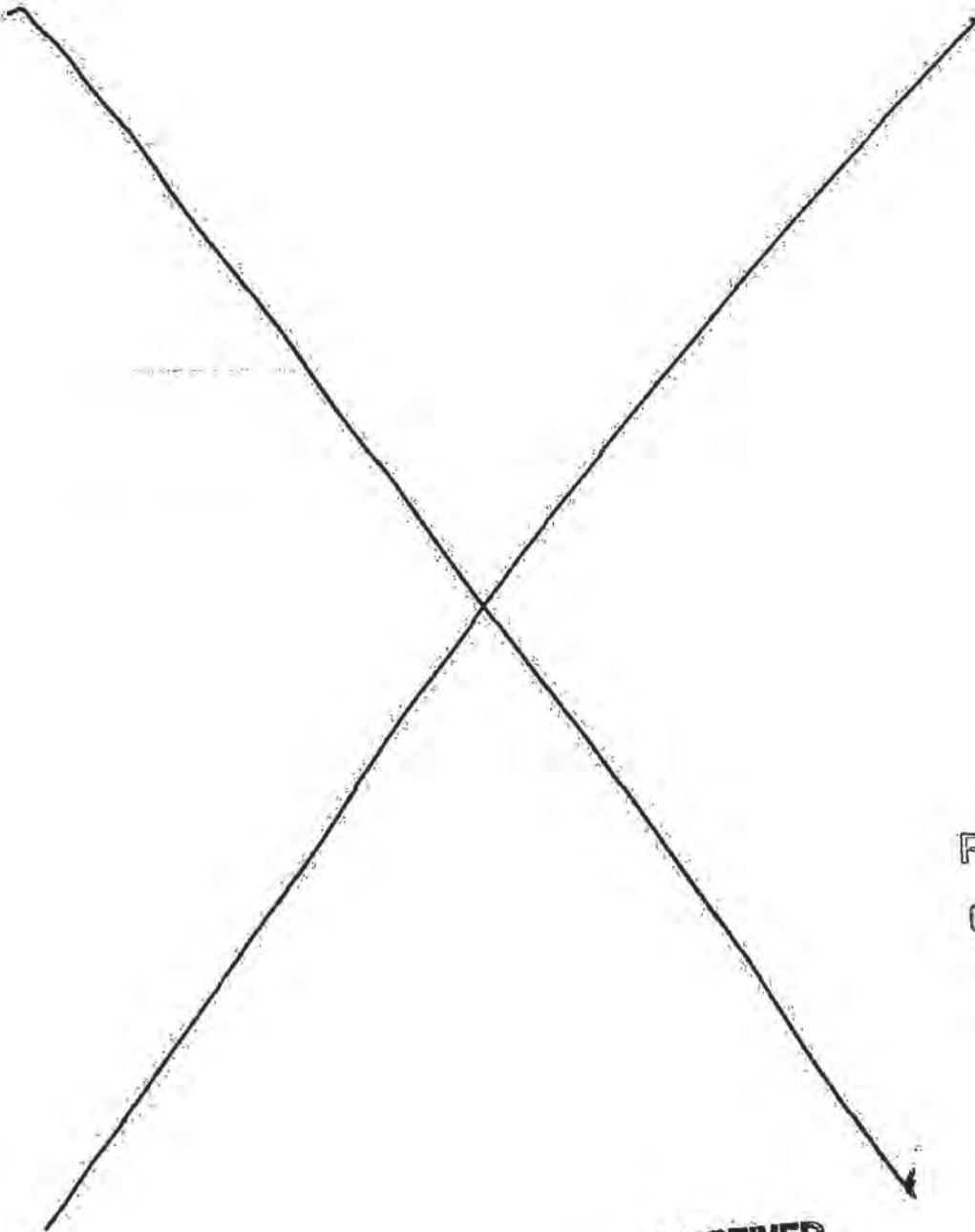
MAR 28 2007

WATER RESOURCES DEPT.
SALEM, OREGON

13840

Map of well

only 3 pages



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OCT 06 2021
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RECEIVED
MAR 28 2007
WATER RESOURCES DEPT
SALEM, OREGON

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765 & OAR 690-205-0210)

DESC 62447

WELL I.D. LABEL# L 138648
START CARD # 1049398
ORIGINAL LOG #

1/20/2021

(1) LAND OWNER Owner Well I.D. _____
First Name _____ Last Name _____
Company CITY OF SISTERS
Address PO BOX 39 525 E. CASCADE AVENUE
City SISTERS State OR Zip 97759

(2) TYPE OF WORK New Well Deepening Conversion
 Alteration (complete 2a & 10) Abandonment (complete 5a)

(2a) PRE-ALTERATION
Dia + From To Gauge Stl Plstc Wld Thrd
Casing: _____
Material From To Amt sacks/lbs
Seal: _____

(3) DRILL METHOD
 Rotary Air Rotary Mud Cable Auger Cable Mud
 Reverse Rotary Other

(4) PROPOSED USE Domestic Irrigation Community
 Industrial/ Commercial Livestock Dewatering
 Thermal Injection Other MUNICIPAL

(5) BORE HOLE CONSTRUCTION Special Standard (Attach copy)
Depth of Completed Well 293.00 ft.

BORE HOLE SEAL
Dia From To Material From To Amt lbs
22 0 200 Bentonite Chips 0 115 381 S
15 200 293 Calculated 211.65
Cement with 5% Bento 115 137 53 S
Calculated 14.5

How was seal placed: Method A B C D E
 Other POURED DRY
Backfill placed from _____ ft. to _____ ft. Material _____
Filter pack from _____ ft. to _____ ft. Material _____ Size _____
Explosives used: Yes Type _____ Amount _____

(5a) ABANDONMENT USING UNHYDRATED BENTONITE
Proposed Amount _____ Actual Amount _____

(6) CASING/LINER
Casing Liner Dia + From To Gauge Stl Plstc Wld Thrd
16 4 200 .375
12 290 293 .375
Shoe Inside Outside Other Location of shoe(s) _____
Temp casing Yes Dia 20 From + 0 To 200

(7) PERFORATIONS/SCREENS
Perforations Method _____
Screens Type CONTINUOUS WIRE Material 304 SS
Perf/ Casing/ Screen Screen Liner Dia From To Scrn/slot width Slot # of Tele/ length slots pipe size
Screen Liner 12 190 290 .125

(8) WELL TESTS: Minimum testing time is 1 hour
 Pump Bailer Air Flowing Artesian
Yield gal/min Drawdown Drill stem/Pump depth Duration (hr)
1970 13 160 24

Temperature 54 °F Lab analysis Yes By _____
Water quality concerns? Yes (describe below) TDS amount 112 ppm
From To Description Amount Units

(9) LOCATION OF WELL (legal description)
County DESCHUTES Twp 15.00 S N/S Range 10.00 E E/W WM
Sec 9 SW 1/4 of the NE 1/4 Tax Lot 401
Tax Map Number _____ Lot _____
Lat _____ " or _____ DMS or DD
Long _____ " or _____ DMS or DD
 Street address of well Nearest address
504 S LOCUST ST CREEKSIDE CAMPGROUND WELL#4

(10) STATIC WATER LEVEL
Date SWL(psi) + SWL(ft)
Existing Well / Pre-Alteration _____
Completed Well 1/19/2021 _____ 76.8
Flowing Artesian? Dry Hole?

WATER BEARING ZONES Depth water was first found 102.00
SWL Date From To Est Flow SWL(psi) + SWL(ft)
10/14/2020 102 165 100 57
10/19/2020 165 177 50 82
1/11/2021 201 280 1970 76.5

(11) WELL LOG Ground Elevation _____
Material From To
SANDY PUMICE AND GRAVEL 0 3
GRAY AND BROWN LAVA 3 45
RED CINDERS 45 50
GRAVELS W/BROWN SAND 50 65
SANDSTONE CONGLOMERATE 65 72
GRAY MILD LAVA 72 93
DARK BROWN SANDSTONE 93 102
GRAVELS AND SAND W/BASALT CHIPS 102 127
CEMENTED GRAVELS 127 141
FRACTURED BASALT W/CINDER 141 148
GRAY BASALT 148 165
BROKEN BASALT W/CLAY SEAMS 165 177
HARD GRAY BASALT 177 201
BROWN AND GRAY BROKEN LAVA 201 206
FRACTURED BROWN BASALT 206 233
GRAY WEATHERED BASALT 233 245
BROWN BROKEN BASALT 245 259
GRAY BASALT SOME FRACTURED 259 276
BROKEN BASALT 276 280

Date Started 10/12/2020 Completed 1/19/2021

(unbonded) Water Well Constructor Certification
I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.
License Number 1852 Date 1/19/2021
Signed JEB ABBAS (E-filed)

(bonded) Water Well Constructor Certification
I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.
License Number 1720 Date 1/20/2021
Signed JACK ABBAS (E-filed)
Contact Info (optional) JACK ABBAS 13840



September 30, 2021

Kelly Starnes
Oregon Water Resources Department
725 Summer Street NE, Suite A
Salem, OR 97301

Re: Application for Permanent Water Right Transfer for Certificate 93889
City of Sisters

Dear Mr. Starnes:

GSI Water Solutions, Inc. (GSI) is submitting the enclosed permanent water right transfer application on behalf of the City of Sisters (City). Also enclosed is the \$3,680 application fee.

The City is proposing to add two points of appropriation (Well 3 and Well 4) to water right Certificate 93889 and change the place of use to the "City of Sisters service area."

Please contact me at 971-200-8545 if you have any questions regarding this application.

Sincerely,

A handwritten signature in black ink, appearing to read "Trevor Grandy", is written over a light blue horizontal line.

Trevor Grandy
Water Resources Consultant

CC: Paul Bertagna, City of Sisters

Enclosures: Permanent Water Right Transfer Application
Check in the amount of \$3,680

RECEIVED

OCT 06 2021

13840

OWRD

STATE OF OREGON
 COUNTY OF DESCHUTES
 CERTIFICATE OF WATER RIGHT

THIS CERTIFICATE ISSUED TO

CITY OF SISTERS
 PO BOX 39
 SISTERS OR 97759

confirms the right to the use of water perfected under the terms of Permit G-11418. The amount of water used to which this right is entitled is limited to the amount used beneficially, and shall not exceed the amount specified, or its equivalent in the case of rotation, measured at the point of diversion from the source. The specific limits and conditions of the use are listed below.

APPLICATION FILE NUMBER: G-12591
 SOURCE OF WATER: WELL 2 IN WHYCHUS BASIN
 PURPOSE OR USE: MUNICIPAL USES
 MAXIMUM RATE: 1.56 CUBIC FEET PER SECOND
 DATE OF PRIORITY: JUNE 25, 1991

The well is located as follows:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
15 S	10 E	WM	5	SW SW	WELL 2 - 1280 FEET NORTH AND 1175 FEET EAST FROM SW CORNER, SECTION 5

A description of the place of use is as follows:

Twp	Rng	Mer	Sec	Q-Q
15 S	10 E	WM	4	SW NE
15 S	10 E	WM	4	SE NW
15 S	10 E	WM	4	NE SW
15 S	10 E	WM	4	NW SW
15 S	10 E	WM	4	SW SW
15 S	10 E	WM	4	SE SW
15 S	10 E	WM	4	NE SE
15 S	10 E	WM	4	NW SE
15 S	10 E	WM	4	SW SE
15 S	10 E	WM	4	SE SE
15 S	10 E	WM	5	NE SW
15 S	10 E	WM	5	SE SW



NOTICE OF RIGHT TO PETITION FOR RECONSIDERATION OR JUDICIAL REVIEW

This is an order in other than a contested case. This order is subject to judicial review under ORS 183.484 and ORS 536.075. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.484(2). Pursuant to ORS 183.484, ORS 536.075 and OAR 137-004-0080, you may petition for judicial review and petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied. In addition, under ORS 537.260 any person with an application, permit or water right certificate subsequent in priority may jointly or severally contest the issuance of the certificate within three months after issuance of the certificate.

Twp	Rng	Mer	Sec	Q-Q
15 S	10 E	WM	5	NE SE
15 S	10 E	WM	5	NW SE
15 S	10 E	WM	5	SW SE
15 S	10 E	WM	5	SE SE
15 S	10 E	WM	8	SE NE
15 S	10 E	WM	8	NE NW
15 S	10 E	WM	8	NW NW
15 S	10 E	WM	9	NW NE
15 S	10 E	WM	9	SW NE
15 S	10 E	WM	9	SE NE
15 S	10 E	WM	9	NE NW
15 S	10 E	WM	9	NW NW
15 S	10 E	WM	9	SW NW
15 S	10 E	WM	9	SE NW
15 S	10 E	WM	9	NW SW

The City shall monitor and report the impact of water use under this right on water levels within the aquifer that provides water to the well under this right in accordance with the plan on file with the Department. If any well listed on this right displays a total static water-level decline of 25 or more feet over any period of years, as compared to the reference level, then the City shall discontinue use of, or reduce the rate or volume of withdrawal from, the well. Such action shall be taken until the water level recovers to above the 25-foot decline level or until the Department determines, based on the City or the Department's data and analysis, that no action is necessary because the aquifer in question can sustain the observed declines without adversely impacting the resource or senior water rights. The City shall in no instance allow excessive decline to occur within the aquifer as a result of use under this right.

If substantial interference with a senior water right occurs due to withdrawal of water from any well listed on this right, then use of water from the well shall be discontinued or reduced and/or the schedule of withdrawal shall be regulated until or unless the Department approves or implements an alternative administrative action to mitigate the interference. The Department encourages junior and senior appropriators to jointly develop plans to mitigate interferences.

The well shall be maintained in accordance with the General Standards for the Construction and Maintenance of Water Wells in Oregon. The works shall be equipped with a usable access port, and may also include an air line and pressure gauge adequate to determine the water level elevation in the well at all times.

When required by the Department, the water user shall install and maintain a weir, meter, or other suitable measuring device, and shall keep a complete record of the amount of ground water withdrawn.

The Director may require water level or pump test results every ten years.

Failure to comply with any of the provisions of this right may result in action including, but not limited to, restrictions on the use, civil penalties, or cancellation of the right.

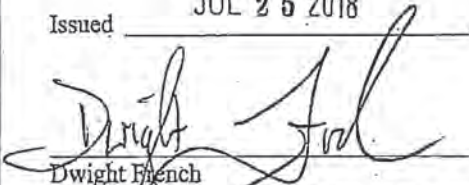
This right is for the beneficial use of water without waste. The water user is advised that new regulations may require the use of best practical technologies or conservation practices to achieve this end.

By law, the land use associated with this water use must be in compliance with statewide land-use goals and any local acknowledged land-use plan.

The use of water shall be limited when it interferes with any prior surface or ground water rights.

The right to the use of the water for the above purpose is restricted to beneficial use on the lands or place of use described; however, water may be applied to lands which are not specifically described above, provided the holder of this right complies with ORS 540.510.

Issued JUL 25 2018



Dwight French
Water Right Services Division Administrator, for
Thomas M. Byler, Director
Oregon Water Resources Department



13840

STATE OF OREGON
 COUNTY OF DESCHUTES
 CERTIFICATE OF WATER RIGHT

THIS CERTIFICATE ISSUED TO

CITY OF SISTERS
 PO BOX 39
 SISTERS OR 97759

confirms the right to use the waters of WELL 2 in the SQUAW CREEK Basin for MUNICIPAL USE.

This right was perfected under Permit G-11418. The date of priority is JUNE 25, 1991. The amount of water to which this right is entitled is limited to an amount actually used beneficially, and shall not exceed 1.78 CUBIC FEET PER SECOND or its equivalent in case of rotation, measured at the well.

The well is located as follows:

Twp	Rng	Mer	Sec	Q-Q	GLot	DLC	Measured Distances
15 S	10 E	WM	5	SW SW			1280 FEET NORTH & 1175 FEET EAST FROM SW CORNER, SECTION 5

A description of the place of use to which this right is appurtenant is as follows:

MUNICIPAL USE						
Twp	Rng	Mer	Sec	Q-Q	GLot	DLC
15 S	10 E	WM	4	SW NE		
15 S	10 E	WM	4	SE NW		
15 S	10 E	WM	4	NE SW		
15 S	10 E	WM	4	NW SW		
15 S	10 E	WM	4	SW SW		
15 S	10 E	WM	4	SE SW		
15 S	10 E	WM	4	NE SE		
15 S	10 E	WM	4	NW SE		
15 S	10 E	WM	4	SW SE		
15 S	10 E	WM	4	SE SE		
15 S	10 E	WM	5	NE SW		
15 S	10 E	WM	5	SE SW		
15 S	10 E	WM	5	NE SE		

NOTICE OF RIGHT TO PETITION FOR RECONSIDERATION OR JUDICIAL REVIEW

This is an order in other than a contested case. This order is subject to judicial review under ORS 183.484. Any petition for judicial review must be filed within the 60 day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080, you may either petition for judicial review or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied. In addition, under ORS 537.260 any person with an application, permit or water right certificate subsequent in priority may jointly or severally contest the issuance of the certificate at any time before it has issued, and after the time has expired for the completion of the appropriation under the permit, or within three months after issuance of the certificate.

MUNICIPAL USE						
Twp	Rng	Mer	Sec	Q-Q	GLot	DLC
15 S	10 E	WM	5	NW SE		
15 S	10 E	WM	5	SW SE		
15 S	10 E	WM	5	SE SE		
15 S	10 E	WM	8	SE NE		
15 S	10 E	WM	8	NE NW		
15 S	10 E	WM	8	NW NW		
15 S	10 E	WM	9	NW NE		
15 S	10 E	WM	9	SW NE		
15 S	10 E	WM	9	SE NE		
15 S	10 E	WM	9	NE NW		
15 S	10 E	WM	9	NW NW		
15 S	10 E	WM	9	SW NW		
15 S	10 E	WM	9	SE NW		
15 S	10 E	WM	9	NW SW		

The City shall monitor and report the impact of water use under this right on water levels within the aquifer that provides water to the well under this right in accordance with the plan on file with the Department. If a well listed on this permit displays a total static water-level decline of 25 or more feet over any period of years, as compared to the reference level, then the City shall discontinue use of, or reduce the rate or volume of withdrawal from, the well. Such action shall be taken until the water level recovers to above the 25 foot decline level or until the Department determines, based on the City or the Department's data and analysis, that no action is necessary because the aquifer in question can sustain the observed declines without adversely impacting the resource or senior water rights. The City shall in no instance allow excessive decline to occur within the aquifer as a result of use under this right.

If substantial interference with a senior water right occurs due to withdrawal of water from any well listed on this right, then use of water from the well shall be discontinued or reduced and/or the schedule of withdrawal shall be regulated until or unless the Department approves or implements an alternative administrative action to mitigate the interference. The Department encourages junior and senior appropriators to jointly develop plans to mitigate interference.

The well shall be maintained in accordance with the General Standards for the Construction and Maintenance of Water Wells in Oregon. The works shall be equipped with a usable access port, and may also include an air line and pressure gauge adequate to determine the water level elevation in the well at all times. When required by the Department, the water user shall install and maintain a weir, meter, or other suitable measuring device and shall keep a complete record of the amount of ground water withdrawn.

The Director may require water level or pump tests every ten years.

Failure to comply with any of the provisions of this right may result in action including, but not limited to, restrictions on the use, civil penalties, or cancellation of the right.


This right is for the beneficial use of water without waste. The water user is advised that new regulations may require the use of best practical technologies or conservation practices to achieve this end.

By law, the land use associated with this water use must be in compliance with statewide land-use goals and any local acknowledged land-use plan.

Water may be applied to lands which are not specifically described above, provided the holder of this right complies with ORS 540.510(3).

The use of water shall be limited when it interferes with any prior surface or ground water rights.

Issued DEC 11 2008


Phillip C. Ward, Director
Water Resources Department

STATE OF OREGON
 COUNTY OF DESCHUTES
 CERTIFICATE OF WATER RIGHT

THIS CERTIFICATE ISSUED TO

CITY OF SISTERS
 PO BOX 39
 SISTERS OR 97759

confirms the right to use the waters of WELL #3 in the WHYCHUS BASIN for MUNICIPAL USES.

This right was perfected under Permit G-11418. The date of priority is JUNE 25, 1991. The amount of water to which this right is entitled is limited to an amount actually used beneficially, and shall not exceed 1.78 CUBIC FEET PER SECOND, or its equivalent in case of rotation, measured at the point of appropriation.

The point of appropriation is located as follows:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
15 S	10 E	WM	4	SE NW	1,890 FEET SOUTH AND 2,325 FEET EAST FROM THE NW CORNER OF SECTION 4

A description of the place of use is as follows:

Municipal Uses				
Twp	Rng	Mer	Sec	Q-Q
15 S	10 E	WM	4	NE NW
15 S	10 E	WM	4	SW NW
15 S	10 E	WM	4	SE NW
15 S	10 E	WM	4	NE SW
15 S	10 E	WM	4	NW SW
15 S	10 E	WM	4	SW SW
15 S	10 E	WM	4	SE SW
15 S	10 E	WM	4	NE SE
15 S	10 E	WM	4	NW SE
15 S	10 E	WM	4	SW SE
15 S	10 E	WM	4	SE SE
15 S	10 E	WM	5	SW NE
15 S	10 E	WM	5	SE NE
15 S	10 E	WM	5	SW NW
15 S	10 E	WM	5	SE NW
15 S	10 E	WM	5	NE SW
15 S	10 E	WM	5	NW SW
15 S	10 E	WM	5	SW SW
15 S	10 E	WM	5	SE SW



NOTICE OF RIGHT TO RECONSIDERATION OR JUDICIAL REVIEW

This is an order in other than a contested case. This order is subject to judicial review under ORS 183.482. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.482. Pursuant to ORS 183.482, ORS 536.075, and OAR 137-004-0080, you may petition for judicial review and petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

Municipal Uses				
Twp	Rng	Mer	Sec	Q-Q
15 S	10 E	WM	5	NE SE
15 S	10 E	WM	5	NW SE
15 S	10 E	WM	5	SW SE
15 S	10 E	WM	5	SE SE
15 S	10 E	WM	6	NE SE
15 S	10 E	WM	6	NW SE
15 S	10 E	WM	6	SW SE
15 S	10 E	WM	6	SE SE
15 S	10 E	WM	8	NE NE
15 S	10 E	WM	8	NW NE
15 S	10 E	WM	8	SE NE
15 S	10 E	WM	8	NE NW
15 S	10 E	WM	9	NE NE
15 S	10 E	WM	9	NW NE
15 S	10 E	WM	9	SW NE
15 S	10 E	WM	9	SE NE
15 S	10 E	WM	9	NE NW
15 S	10 E	WM	9	NW NW
15 S	10 E	WM	9	SW NW
15 S	10 E	WM	9	SE NW
15 S	10 E	WM	9	NE SE
15 S	10 E	WM	9	NW SE
15 S	10 E	WM	9	SW SE
15 S	10 E	WM	9	SE SE

The City shall monitor and report the impact of water use under this right on water levels within the aquifer that provides water to the well under this right in accordance with the plan on file with the Department. If any well listed on this right displays a total static water-level decline of 25 or more feet over any period of years, as compared to the reference level, then the City shall discontinue use of, or reduce the rate or volume of withdrawal from, the well. Such action shall be taken until the water level recovers to above the 25-foot decline level or until the Department determines, based on the City or the Department's data and analysis, that no action is necessary because the aquifer in question can sustain the observed declines without adversely impacting the resource or senior water rights. The City shall in no instance allow excessive decline to occur within the aquifer as a result of use under this right.

If substantial interference with a senior water right occurs due to withdrawal of water from any well listed on this right, then use of water from the well shall be discontinued or reduced and/or the schedule of withdrawal shall be regulated until or unless the Department approves or implements an alternative administrative action to mitigate the interference. The Department encourages junior and senior appropriators to jointly develop plans to mitigate interferences.

The well shall be maintained in accordance with the General Standards for the Construction and Maintenance of Water Wells in Oregon. The works shall be equipped with a usable access port, and may also include an air line and pressure gauge adequate to determine the water level elevation in the well at all times.

The water user shall maintain an in-line flow meter or other suitable device for measuring and recording the quantity of water appropriated.

The Director may require water level or pump tests every ten years.

Failure to comply with any of the provisions of this right may result in action including, but not limited to, restrictions on the use, civil penalties, or cancellation of the right.

This right is for the beneficial use of water without waste. The water user is advised that new regulations may require the use of best practical technologies or conservation practices to achieve this end.

By law, the land use associated with this water use must be in compliance with statewide land-use goals and any local acknowledged land-use plan.

Water may be applied to lands which are not specifically described above, provided the holder of this right complies with ORS 540.510(3).

The use of water shall be limited when it interferes with any prior surface or ground water rights.

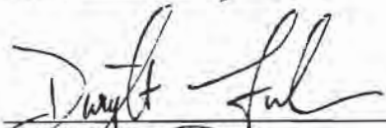
Water shall be acquired from the same aquifer (water source) as the original point of appropriation.

The quantity of water diverted at the new point of appropriation shall not exceed the quantity of water lawfully available at the original point of appropriation, described as follows:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
15 S	10 E	WM	5	SW SW	1,280 FEET SOUTH AND 1,175 FEET EAST FROM THE SW CORNER OF SECTION 5

This certificate is issued to confirm changes in point of appropriation and place of use approved by an order of the Water Resources Director entered June 1, 2009, at Special Order Volume 77, Page 955, approving Transfer Application 10766, supersedes Certificate 85243, State record of Water Right Certificates.

Issued OCT 7 2011


Dwight W. French
Water Right Services Administrator, for
Phillip C. Ward, Director



STATE OF OREGON
 COUNTY OF DESCHUTES
 CERTIFICATE OF WATER RIGHT

THIS CERTIFICATE ISSUED TO

CITY OF SISTERS
 PO BOX 39
 SISTERS OR 97759

confirms the right to the use of water perfected under the terms of Permit G-11418. The amount of water used to which this right is entitled is limited to the amount used beneficially, and shall not exceed the amount specified, or its equivalent in the case of rotation, measured at the point of diversion from the source. The specific limits and conditions of the use are listed below.

APPLICATION FILE NUMBER: G-12591
 SOURCE OF WATER: WELL 2 IN WHYCHUS BASIN
 PURPOSE OR USE: MUNICIPAL USES
 MAXIMUM RATE: 1.56 CUBIC FEET PER SECOND
 DATE OF PRIORITY: JUNE 25, 1991

The well is located as follows:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
15 S	10 E	WM	5	SW SW	WELL 2 - 1280 FEET NORTH AND 1175 FEET EAST FROM SW CORNER, SECTION 5

A description of the place of use is as follows:

Twp	Rng	Mer	Sec	Q-Q
15 S	10 E	WM	4	SW NE
15 S	10 E	WM	4	SE NW
15 S	10 E	WM	4	NE SW
15 S	10 E	WM	4	NW SW
15 S	10 E	WM	4	SW SW
15 S	10 E	WM	4	SE SW
15 S	10 E	WM	4	NE SE
15 S	10 E	WM	4	NW SE
15 S	10 E	WM	4	SW SE
15 S	10 E	WM	4	SE SE
15 S	10 E	WM	5	NE SW
15 S	10 E	WM	5	SE SW



NOTICE OF RIGHT TO PETITION FOR RECONSIDERATION OR JUDICIAL REVIEW

This is an order in other than a contested case. This order is subject to judicial review under ORS 183.484 and ORS 536.075. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.484(2). Pursuant to ORS 183.484, ORS 536.075 and OAR 137-004-0080, you may petition for judicial review and petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied. In addition, under ORS 537.260 any person with an application, permit or water right certificate subsequent in priority may jointly or severally contest the issuance of the certificate within three months after issuance of the certificate.

Twp	Rng	Mer	Sec	Q-Q
15 S	10 E	WM	5	NE SE
15 S	10 E	WM	5	NW SE
15 S	10 E	WM	5	SW SE
15 S	10 E	WM	5	SE SE
15 S	10 E	WM	8	SE NE
15 S	10 E	WM	8	NE NW
15 S	10 E	WM	8	NW NW
15 S	10 E	WM	9	NW NE
15 S	10 E	WM	9	SW NE
15 S	10 E	WM	9	SE NE
15 S	10 E	WM	9	NE NW
15 S	10 E	WM	9	NW NW
15 S	10 E	WM	9	SW NW
15 S	10 E	WM	9	SE NW
15 S	10 E	WM	9	NW SW

The City shall monitor and report the impact of water use under this right on water levels within the aquifer that provides water to the well under this right in accordance with the plan on file with the Department. If any well listed on this right displays a total static water-level decline of 25 or more feet over any period of years, as compared to the reference level, then the City shall discontinue use of, or reduce the rate or volume of withdrawal from, the well. Such action shall be taken until the water level recovers to above the 25-foot decline level or until the Department determines, based on the City or the Department's data and analysis, that no action is necessary because the aquifer in question can sustain the observed declines without adversely impacting the resource or senior water rights. The City shall in no instance allow excessive decline to occur within the aquifer as a result of use under this right.

If substantial interference with a senior water right occurs due to withdrawal of water from any well listed on this right, then use of water from the well shall be discontinued or reduced and/or the schedule of withdrawal shall be regulated until or unless the Department approves or implements an alternative administrative action to mitigate the interference. The Department encourages junior and senior appropriators to jointly develop plans to mitigate interferences.

The well shall be maintained in accordance with the General Standards for the Construction and Maintenance of Water Wells in Oregon. The works shall be equipped with a usable access port, and may also include an air line and pressure gauge adequate to determine the water level elevation in the well at all times.

When required by the Department, the water user shall install and maintain a weir, meter, or other suitable measuring device, and shall keep a complete record of the amount of ground water withdrawn.

The Director may require water level or pump test results every ten years.

Failure to comply with any of the provisions of this right may result in action including, but not limited to, restrictions on the use, civil penalties, or cancellation of the right.

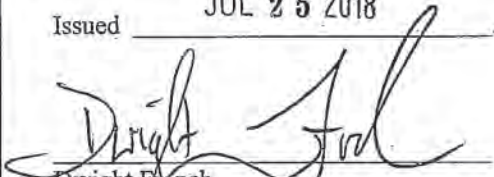
This right is for the beneficial use of water without waste. The water user is advised that new regulations may require the use of best practical technologies or conservation practices to achieve this end.

By law, the land use associated with this water use must be in compliance with statewide land-use goals and any local acknowledged land-use plan.

The use of water shall be limited when it interferes with any prior surface or ground water rights.

The right to the use of the water for the above purpose is restricted to beneficial use on the lands or place of use described; however, water may be applied to lands which are not specifically described above, provided the holder of this right complies with ORS 540.510.

Issued JUL 25 2018



Dwight French
Water Right Services Division Administrator, for
Thomas M. Byler, Director
Oregon Water Resources Department



STATE OF OREGON
COUNTY OF DESCHUTES
PERMIT TO APPROPRIATE THE PUBLIC WATERS

THIS PERMIT IS HEREBY ISSUED TO

CITY OF SISTERS
P.O. BOX 39
SISTERS, OREGON 97759

503-549-6022

to use the waters of A WELL in the SQUAW CREEK BASIN for MUNICIPAL USE.

This permit is issued approving Application G-12591. The date of priority is JUNE 25, 1991. The use is limited to not more than 3.34 CUBIC FEET PER SECOND, or its equivalent in case of rotation, measured at the well.

The well is located as follows:

SW 1/4 SW 1/4, SECTION 5, T 15 S, R 10 E, W.M.; 40 FEET SOUTH AND 145 FEET WEST FROM NE CORNER, SW 1/4 SW 1/4, SECTION 5.

The use shall conform to such reasonable rotation system as may be ordered by the proper state officer.

A description of the proposed place of use under this permit is as follows:

SW 1/4 NE 1/4
SE 1/4 NW 1/4
S 1/2
SECTION 4
E 1/2 SW 1/4
SE 1/4
SECTION 5
N 1/2 NW 1/4
SE 1/4 NE 1/4
SECTION 8
W 1/2 NE 1/4
SE 1/4 NE 1/4
NW 1/4
NW 1/4 SW 1/4
SECTION 9

TOWNSHIP 15 SOUTH, RANGE 10 EAST, W.M.

The City shall develop a plan to monitor and report the impact of water use under this permit on water levels within the aquifer that provides water to the permitted well. The plan shall be submitted to the Department within one year of the date the permit is issued and shall be subject to the approval of the Department. At a minimum, the plan shall include a program to periodically measure static water levels within the permitted well or an adequate substitute such as water levels in nearby wells. The plan shall also stipulate a reference water level against which any water-level declines will be compared. If a well listed on this permit displays a total static water-level decline of 25 or more feet over any period of years, as compared to the reference level, then the City shall discontinue use of, or reduce the rate or volume of withdrawal from, the well. Such action shall be taken until the water level recovers to above the 25-foot decline level or until the Department determines, based on the City or the Department's data and analysis, that no action is necessary because the aquifer in question can sustain the observed declines without adversely impacting the resource or senior water rights. The City shall in no instance allow excessive decline to occur within the aquifer as a result of use under this permit.

If substantial interference with a senior water right occurs due to withdrawal of water from any well listed on this permit, then use of water from the well shall be discontinued or reduced and/or the schedule of withdrawal shall be regulated until or unless the Department approves or implements an alternative administrative action to mitigate the interference. The Department encourages junior and senior appropriators to jointly develop plans to mitigate interferences.

Within one year from the date the Water Resources Commission adopts rules describing the schedules, standards and procedures for water conservation management plans by water suppliers, the city shall submit a plan which is consistent with said rules.

Within one year of permit issuance, the city shall prepare a plan/timetable for the Water Resources Commission which shall indicate the steps which the City intends to pursue to obtain a long-term water supply.

The well shall be constructed in accordance with the General Standards for the Construction and Maintenance of Water Wells in Oregon. The works shall be equipped with a usable access port, and may also include an air line and pressure gauge adequate to determine water level elevation in the well at all times. When required by the department, the permittee shall install and maintain a weir, meter, or other suitable measuring device, and shall keep a complete record of the amount of ground water withdrawn.

Prior to receiving a certificate of water right, the permit holder shall submit the results of a pump test meeting the department's standards, to the Water Resources Department. The Director may require water level or pump test results every ten years thereafter.

Actual construction work shall begin on or before February 3, 1993, and shall be completed on or before October 1, 1994. Complete application of the water shall be made on or before October 1, 1995.

B+C ext to 10-1-99

Failure to comply with any of the provisions of this permit may result in action including, but not limited to, restrictions on the use, civil penalties, or cancellation of the permit.

This permit is for beneficial use of water without waste. The water user is advised that new regulations may require use of best practical technologies or conservation practices to achieve this end.

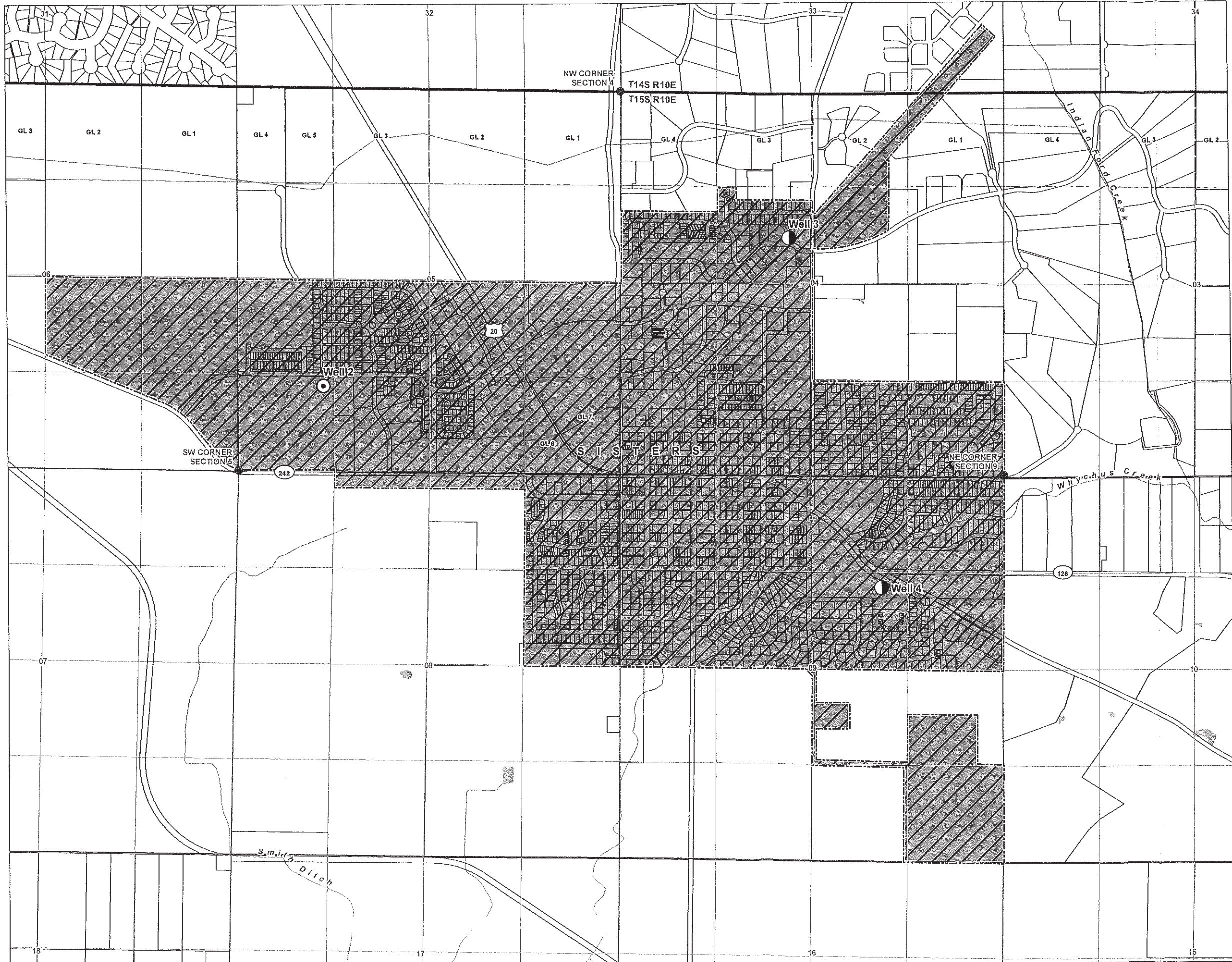
By law, the land use associated with this water use must be in compliance with statewide land-use goals and any local acknowledged land-use plan.

The use of water shall be limited when it interferes with any prior surface or ground water rights.

Issued this date, FEBRUARY 3, 1992.

/s/ WILLIAM H. YOUNG

Water Resources Department
William H. Young
Director



Transfer Map
Proposed POU and
Authorized and Proposed POAs
Certificate 93889
City of Sisters
 Deschutes County, Oregon
 Township 14 & 15 South, Range 10 East

LEGEND

- Authorized Point of Appropriation (POA)
- Proposed Additional Point of Appropriation (APOA)
- Proposed Place of Use (POU)
- Tax Lot
- Government Lot (GL)
- City Boundary
- Watercourse
- Waterbody

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 OCT 06 2021
 OWRD

CERTIFIED WATER RIGHTS EXAMINER STAMP

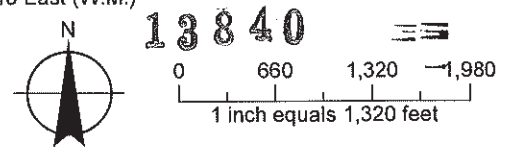
Certified Water Rights Examiner
 #78208WRE
Bruce Brody-Heine
 Bruce Brody-Heine
 June 29, 2007
 STATE OF OREGON
 EXPIRES: 12-31-21

LOCATION DESCRIPTION

Well 2
 Located 1,280 feet North and 1,175 feet East from the SW corner of Section 5, Township 15 South, Range 10 East (W.M.), being within Tax Lot 1510050000900

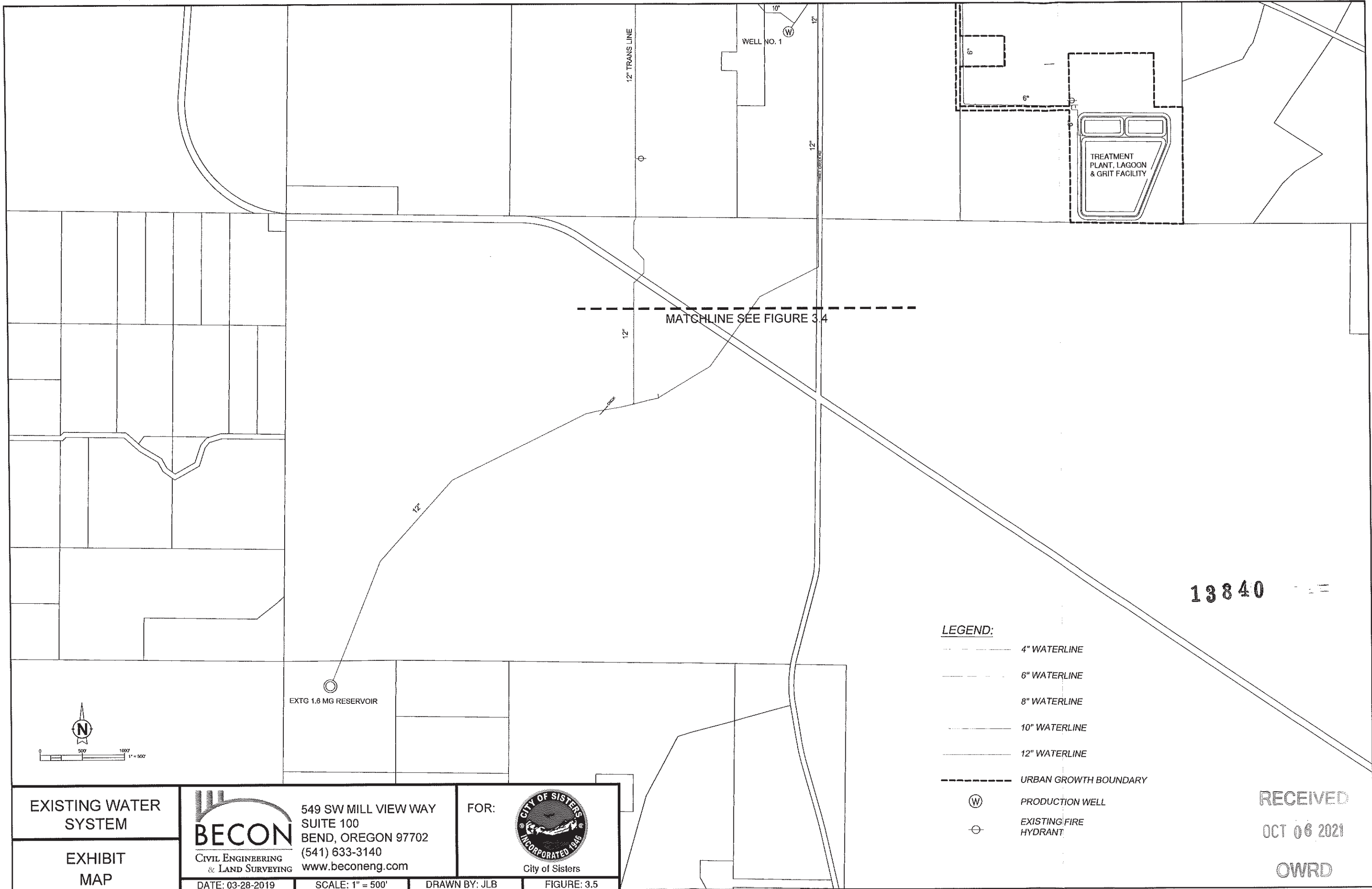
Well 3
 Located 1,890 feet South and 2,325 feet East from the NW corner of Section 4, Township 15 South, Range 10 East (W.M.)

Well 4
 Located 1,505 feet South and 1,715 feet West from the NE corner of Section 9, Township 15 South, Range 10 East (W.M.)



DISCLAIMER
 This map was prepared for the purpose of identifying the location of a water right only and it is not intended to provide legal dimensions or location of property ownership lines.
 Date: September 8, 2021
 Data Sources: BLM, ESRI, OWRD, USGS





- LEGEND:**
- 4" WATERLINE
 - 6" WATERLINE
 - 8" WATERLINE
 - 10" WATERLINE
 - 12" WATERLINE
 - URBAN GROWTH BOUNDARY
 - ⊙ PRODUCTION WELL
 - ⊕ EXISTING FIRE HYDRANT

13840

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EXISTING WATER SYSTEM

EXHIBIT MAP



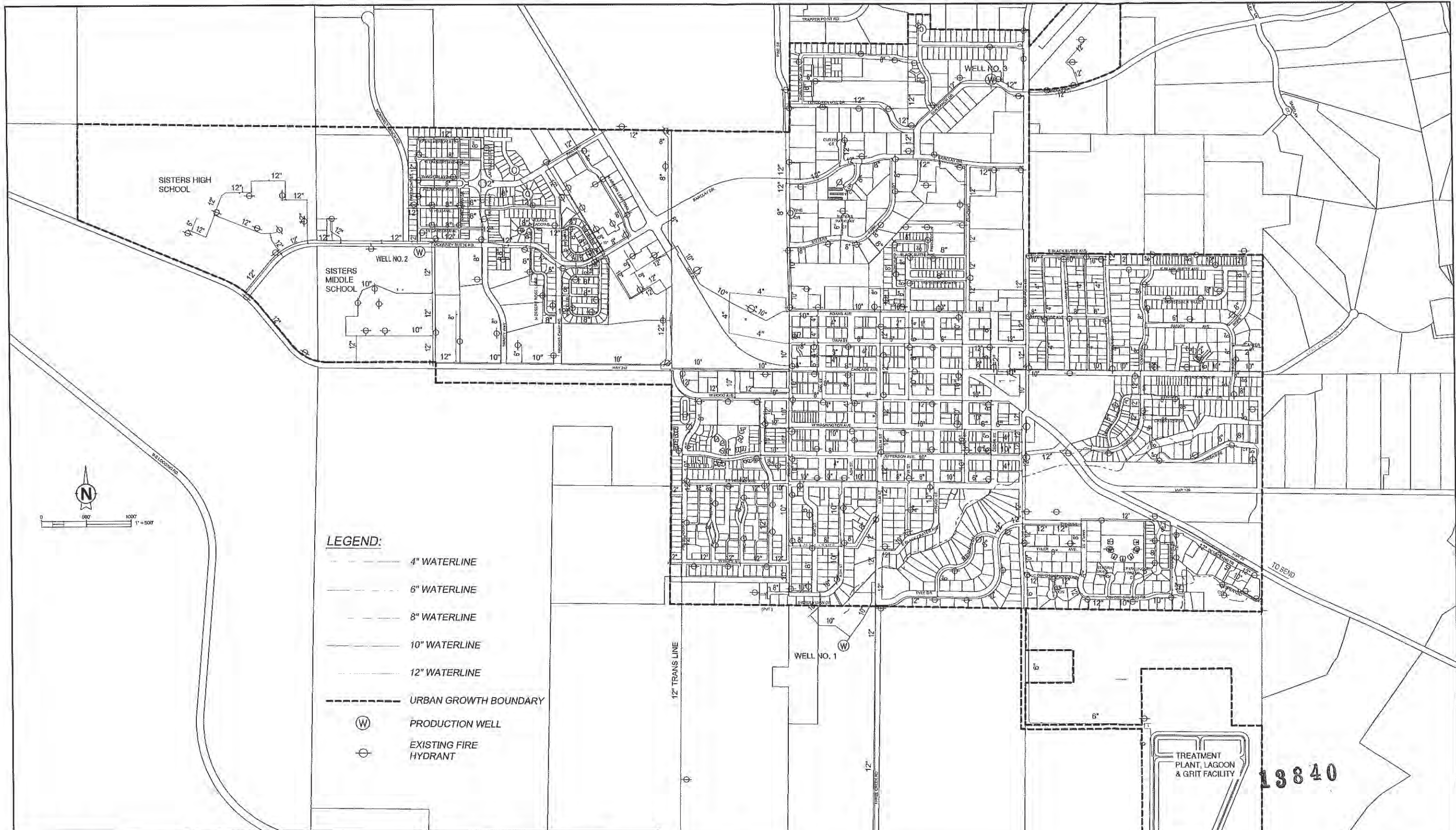
549 SW MILL VIEW WAY
 SUITE 100
 BEND, OREGON 97702
 (541) 633-3140
 www.beconeng.com

FOR:



City of Sisters

DATE: 03-28-2019 SCALE: 1" = 500' DRAWN BY: JLB FIGURE: 3.5



- LEGEND:**
- 4" WATERLINE
 - 6" WATERLINE
 - 8" WATERLINE
 - 10" WATERLINE
 - 12" WATERLINE
 - 12" TRANS LINE
 - URBAN GROWTH BOUNDARY
 - (W) PRODUCTION WELL
 - (H) EXISTING FIRE HYDRANT

EXISTING WATER SYSTEM
EXHIBIT MAP

BECON
CIVIL ENGINEERING & LAND SURVEYING
549 SW MILL VIEW WAY
SUITE 100
BEND, OREGON 97702
(541) 633-3140
www.beconeng.com

FOR:
CITY OF SISTERS
INCORPORATED 1946
City of Sisters

DATE: 03-28-2019 SCALE: 1" = 500' DRAWN BY: JLB FIGURE: 3.4

13840

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OCT 06 2021
OWRD



Transfer Map
Authorized POU and
Authorized POAs
Certificate 93889
City of Sisters
 Deschutes County, Oregon
 Township 15 South, Range 10 East (W.M.)

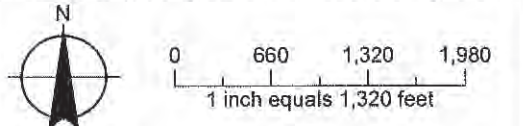
- LEGEND**
- Authorized Point of Appropriation
 - Existing Place of Use (POU)
 - Tax Lot
 - Government Lot (GL)
 - City Boundary
 - Watercourse
 - Waterbody

RECEIVED
 OCT 06 2021
 OWRD

CERTIFIED WATER RIGHTS EXAMINER STAMP

Certified Water Rights Examiner
 #78208WRE
Bruce Brody-Héine
 Bruce Brody-Héine
 June 29, 2007
STATE OF OREGON
 EXPIRES: 12-31-21

LOCATION DESCRIPTION
Well 2
 Located 1,280 feet North and 1,175 feet East from the SW corner of Section 5, Township 15 South, Range 10 East (W.M.), being within Tax Lot 1510050000900



DISCLAIMER
 This map was prepared for the purpose of identifying the location of a water right only and it is not intended to provide legal dimensions or location of property ownership lines.
 Date: September 8, 2021
 Data Sources: BLM, ESRI, OWRD, USGS



Authorized Point of Appropriation:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
15 S	10 E	WM	5	SW SW	1,280 FEET NORTH AND 1,175 FEET EAST FROM THE SW CORNER OF SECTION 5

Authorized Place of Use:

MUNICIPAL USES				
Twp	Rng	Mer	Sec	Q-Q
15 S	10 E	WM	4	SW NE
15 S	10 E	WM	4	SE NW
15 S	10 E	WM	4	NE SW
15 S	10 E	WM	4	NW SW
15 S	10 E	WM	4	SW SW
15 S	10 E	WM	4	SE SW
15 S	10 E	WM	4	NE SE
15 S	10 E	WM	4	NW SE
15 S	10 E	WM	4	SW SE
15 S	10 E	WM	4	SE SE
15 S	10 E	WM	5	NE SW
15 S	10 E	WM	5	SE SW
15 S	10 E	WM	5	NE SE
15 S	10 E	WM	5	NW SE
15 S	10 E	WM	5	SW SE
15 S	10 E	WM	5	SE SE
15 S	10 E	WM	8	SE NE
15 S	10 E	WM	8	NE NW
15 S	10 E	WM	8	NW NW
15 S	10 E	WM	9	NW NE
15 S	10 E	WM	9	SW NE
15 S	10 E	WM	9	SE NE
15 S	10 E	WM	9	NE NW
15 S	10 E	WM	9	NW NW
15 S	10 E	WM	9	SW NW
15 S	10 E	WM	9	SE NW
15 S	10 E	WM	9	NW SW

3. Transfer Application T-10766 proposes to move the authorized point of appropriation approximately 1.25 miles northeast from the existing point of appropriation to:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
15S	10E	WM	4	SE NW	1,890 FEET SOUTH AND 2,325 FEET EAST FROM THE NW CORNER OF SECTION 4

4. Transfer Application T-10766 also proposes to change the place of use of the right to:

MUNICIPAL USES				
Twp	Rng	Mer	Sec	Q-Q
15 S	10 E	WM	4	NE NW
15 S	10 E	WM	4	SW NW
15 S	10 E	WM	4	SE NW
15 S	10 E	WM	4	NE SW
15 S	10 E	WM	4	NW SW
15 S	10 E	WM	4	SW SW
15 S	10 E	WM	4	SE SW
15 S	10 E	WM	4	NE SE
15 S	10 E	WM	4	NW SE
15 S	10 E	WM	4	SW SE
15 S	10 E	WM	4	SE SE
15 S	10 E	WM	5	SW NE
15 S	10 E	WM	5	SE NE
15 S	10 E	WM	5	SW NW
15 S	10 E	WM	5	SE NW
15 S	10 E	WM	5	NE SW
15 S	10 E	WM	5	NW SW
15 S	10 E	WM	5	SW SW
15 S	10 E	WM	5	SE SW
15 S	10 E	WM	5	NE SE
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15 S	10 E	WM	8	NE NE
15 S	10 E	WM	8	NW NE
15 S	10 E	WM	8	SE NE
15 S	10 E	WM	8	NE NW
15 S	10 E	WM	9	NE NE
15 S	10 E	WM	9	NW NE
15 S	10 E	WM	9	SW NE
15 S	10 E	WM	9	SE NE
15 S	10 E	WM	9	NE NW
15 S	10 E	WM	9	NW NW
15 S	10 E	WM	9	SW NW
15 S	10 E	WM	9	SE NW
15 S	10 E	WM	9	NE SE
15 S	10 E	WM	9	NW SE
15 S	10 E	WM	9	SW SE
15 S	10 E	WM	9	SE SE

5. Notice of the application for transfer was published on January 13, 2009, pursuant to OAR 690-380-4000. No comments were filed in response to the notice.

6. On March 6, 2009, the Department mailed a copy of the draft Preliminary Determination proposing to approve Transfer Application T-10766 to the applicant. The cover letter for the draft Preliminary Determination set forth a deadline of April 9, 2009, for the applicant to respond. The applicant responded by the deadline, identified some minor clerical errors in the draft (that have been corrected in this document) and requested that the Department proceed with issuance of a Preliminary Determination.
7. On March 25, 2009, the Department issued a Preliminary Determination proposing to approve Transfer Application T-10766 and mailed a copy to the applicant. Additionally, notice of the Preliminary Determination for the transfer application was published on the Department's weekly notice on April 7, 2009, and in The Nugget newspaper on April 15, 22 and 29, 2009, pursuant to ORS 540.520 and OAR 690-380-4020. No protests were filed in response to the notice.

Transfer Review Criteria (OAR 690-380-4010)

8. Water has been used within the last five years according to the terms and conditions of the right. There is no information in the record that would demonstrate that the right is subject to forfeiture under ORS 540.610.
9. A pump and pipeline system sufficient to use the full amount of water allowed under the existing right was present within the five-year period prior to submittal of Transfer Application T-10766.
10. The proposed change would not result in enlargement of the right.
11. The proposed change would not result in injury to other water rights.

Conclusions of Law

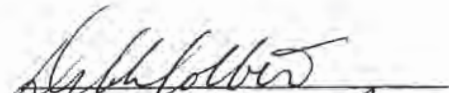
The change in point of appropriation and change in place of use proposed in Transfer Application T-10766 are consistent with the requirements of ORS 537.705 and 540.505 to 540.580 and OAR 690-380-5000.

Now, therefore, it is ORDERED:

1. The change in point of appropriation and change in place of use proposed in application T-10766 are approved.
2. The right to the use of the water is restricted to beneficial use at the place of use described, and is subject to all other conditions and limitations contained in Certificate 85243 and any related decree.
3. Water right certificate 85243 is cancelled.
4. Any portions of the former place of use of the transferred right that are not included in the proposed place of use shall no longer receive water under the right.

5. Water shall be acquired from the same aquifer (water source) as the original point of appropriation.
6. The quantity of water diverted at the new point of appropriation shall not exceed the quantity of water lawfully available at the original point of appropriation.
7. Prior to diverting water, the water user shall install an in-line flow meter or other suitable device for measuring and recording the quantity of water diverted. The type and plans of the measuring device must be approved by the Department prior to beginning construction and shall be installed under the general supervision of the Department. The water user shall maintain and operate the measuring device as required by the Department.
8. The approved changes shall be completed and full beneficial use of the water shall be made on or before **October 1, 2014**. A Claim of Beneficial Use prepared by a Certified Water Rights Examiner shall be submitted by the applicant to the Department within one year after the deadline for completion of the changes and full beneficial use of the water.
9. When satisfactory proof of the completed changes is received, a new certificate confirming the right transferred will be issued.

Dated at Salem, Oregon this 15th day of June 2009.


Phillip C. Ward, Director *PCW*

Mailing date: JUN 12 2009

Oregon Water Resources Department

Water Rights Section

Water Rights Application

Number G-17058

Superseding Final Order

Appeal Rights

Under the provisions of ORS 537.170 and ORS 537.622, the applicant may request a contested case hearing by submitting the information required for a protest under ORS 537.153(6) or ORS 537.621(7) to the Department within 14 days after the date of mailing of this order as shown below. If a contested case hearing is requested, the Department must schedule one. In the contested case hearing, however, only those issues based on the modifications to the Proposed Final Order may be addressed.

ORS 536.075 allows for additional appeal rights for other than contested case. This is a Final Order in other than contested case. This order is subject to judicial review under ORS 183.484. Any petition for judicial review must be filed within the 60 day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080 you may either petition for judicial review or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

This statement of judicial review rights does not create a right to judicial review of this order, if judicial review is otherwise precluded by law. Where no changes have been made to a Proposed Final Order on a water right application and no protests have been filed during the protest period, the Final Order is not subject to judicial review.

Findings of Fact

On May 27, 2008, City of Sisters submitted an application to the Department for a water use permit.

The Department issued a Proposed Final Order on April 6, 2010, concluding that with the mitigation proposed by the applicant, water is available for the proposed use, and that the proposed use would ensure the preservation of the public welfare, safety and health. The protest period closed May 21, 2010, and no protest was filed.

As required by OAR 690-505-0615, the applicant must submit proposed mitigation that meets the requirements of OAR 690-505-0610(2)-(5). Pursuant to OAR 690-505-0620, a permit shall not be issued until the applicant provides documentary evidence that mitigation water, in an amount satisfying the mitigation obligation, is legally protected instream.

The applicant submitted a mitigation proposal to provide 241.8 acre-feet of mitigation water within the Whychus Creek Zone of Impact. The applicant is proposing to obtain mitigation by purchasing mitigation credits, completing a mitigation project, and/or through an offset. One mitigation credit is equivalent to one acre-foot of mitigation water.

The proposed use would not impair or be detrimental to the public interest, but the Department's continuing evaluation reveals that the Proposed Final Order requires modification to the following conditions:

Within five years of permit issuance, the permittee shall submit a Water Management and Conservation Plan, addressing use under this permit, consistent with OAR 690-086. The Director may approve an extension of this time line to complete the required Water Management and Conservation Plan. The time line for submittal of a plan under this permit does not alter the time lines for submittal of a plan under any other order of the Department. No water may be diverted if a Water Management and Conservation Plan is not submitted within five years of permit issuance, unless an extension of this time has been approved.

The permittee shall provide mitigation prior to each stage of development under the permit, as described in the incremental development mitigation plan on file with the Department, and in accordance with the standards of the Deschutes Ground Water Mitigation Rules, OAR Chapter 690, Division 505.

The permittee shall not increase the rate or amount of water diverted, as described in the incremental development mitigation plan, prior to increasing the corresponding mitigation.

The permittee shall seek and receive Departmental approval prior to changing the incremental mitigation development plan and related mitigation obligation for each stage of permit development.

The permittee shall report to the Department the progress of implementing the incremental mitigation development plan and related mitigation no later than April 1 of each year. This annual notification is not necessary if the permittee has completed development and submitted a Claim of Beneficial Use to the Department.

On June 17, 2010, the Water Resources Department issued a Final Order approving Application G-17058 contingent upon the required mitigation being provided and the payment of permit recording fees.

Subsequently, the Department discovered the June 17, 2010 Final Order erroneously indicated all 241.8 permanent mitigation credits must be obtained prior to permit issuance, rather than only the first increment of mitigation consistent with an approved incremental development mitigation plan.

Conclusions of Law

The Department therefore concludes that water is available in the amount necessary for the proposed use; the proposed use will not result in injury to existing water rights; and the proposed

use would ensure the preservation of the public welfare, safety and health as described in ORS 537.525.

Order

The June 17, 2010 Final Order issued for Application G-17058 is superseded by this instrument and is of no further force or effect.

Application G-17058 is approved with the above modifications to the Proposed Final Order.

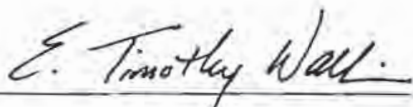
A permit consistent with the attached draft permit shall be issued upon:

- a) the applicant providing satisfactory mitigation, by purchasing mitigation credits, completing a mitigation project, and/or through an offset, meeting the requirements of OAR 690-505-0610(2)-(5), according to an approved incremental development plan; and
- b) the submission of permit recording fees in the amount of \$600.

This Superseding Final Order is issued approving Application G-17058 contingent upon the required mitigation being provided, and permit recording fees paid before a permit may be issued. This Final Order shall expire 5 years after issuance unless the required mitigation is provided. OAR 690-505-0620(2).

DATED

JULY 8 , 2010



for Phillip C. Ward, Director

Water Resources Department

This document was prepared by Jeana Eastman. If you have any questions about any of the statements contained in this document I am most likely the best person to answer your questions. You can reach me at 503-986-0859.

If you have previously filed a protest and want to know its status, please contact Patricia McCarty at 503-986-0820.

If you have other questions about the Department or any of its programs please contact our Customer Service Group at 503-986-0801.

Address all other correspondence to: Water Rights Section, Oregon Water Resources Department, 725 Summer St NE Ste A, Salem OR 97301-1266, Fax: 503-986-0901.

STATE OF OREGON

COUNTY OF DESCHUTES

DRAFT PERMIT TO APPROPRIATE PUBLIC WATERS

THIS DRAFT PERMIT IS HEREBY ISSUED TO:

CITY OF SISTERS
 PO BOX 39 150 N FIR ST
 SISTERS OR 97759

The specific limits and conditions of the use are listed below.

APPLICATION FILE NUMBER: G-17058

SOURCE OF WATER: FOUR WELLS IN WHYCHUS CREEK BASIN

RATE: 2.0 CUBIC FEET PER SECOND, FURTHER LIMITED TO 604.6 ACRE FEET PER YEAR

DATE OF PRIORITY: MAY 27, 2008

USE: MUNICIPAL USE

PERIOD: YEAR ROUND

Authorized Points of Appropriation:

	Twp	Rng	Mer	Sec	Q-Q	Measured Distances
WELL 1 (DESC 3023)	15 S	10 E	WM	9	NW SW	2950 FEET SOUTH AND 650 FEET EAST FROM NW CORNER, SECTION 9
WELL 2 (DESC 1034)	15 S	10 E	WM	5	NW SW	1335 FEET NORTH AND 1210 FEET EAST FROM SW CORNER, SECTION 5
WELL 3 (DESC 57902)	15 S	10 E	WM	4	SE NW	1890 FEET SOUTH AND 2325 FEET EAST FROM NW CORNER, SECTION 4
WELL 4	15 S	10 E	WM	8	SW SW	230 FEET NORTH AND 1125 FEET EAST FROM SW CORNER, SECTION 8

Authorized Place of Use: WITHIN THE CITY OF SISTERS SERVICE BOUNDARY, INCLUDING:

Twp	Rng	Mer	Sec	Q-Q
15 S	10 E	WM	4	NE NW
15 S	10 E	WM	4	SW NW
15 S	10 E	WM	4	SE NW
15 S	10 E	WM	4	NE SW
15 S	10 E	WM	4	NW SW
15 S	10 E	WM	4	SW SW
15 S	10 E	WM	4	SE SW
15 S	10 E	WM	4	NE SE
15 S	10 E	WM	4	NW SE
15 S	10 E	WM	4	SW SE
15 S	10 E	WM	4	SE SE
15 S	10 E	WM	5	SW NE
15 S	10 E	WM	5	SE NE
15 S	10 E	WM	5	SW NW
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Twp	Rng	Mer	Sec	Q-Q
15 S	10 E	WM	5	SW SW
15 S	10 E	WM	5	SE SW
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15 S	10 E	WM	5	NW SE
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15 S	10 E	WM	9	NE SE
15 S	10 E	WM	9	NW SE
15 S	10 E	WM	9	SW SE
15 S	10 E	WM	9	SE SE

Measurement, Recording and Reporting Conditions:

- A. Before water use may begin under this permit, the permittee shall install a totalizing flow meter at each point of appropriation. The permittee shall maintain the meters in good working order.
- B. The permittee shall keep a complete record of the amount of water used each month, and shall submit a report which includes the recorded water use measurements to the Department annually or more frequently as may be required by the Director. Further, the Director may require the permittee to report general water-use information, including the place and nature of use of water under the permit.
- C. The permittee shall allow the watermaster access to the meters; provided however, where any meter is located within a private structure, the watermaster shall request access upon reasonable notice.
- D. The Director may provide an opportunity for the permittee to submit alternative measuring and reporting procedures for review and approval.

The Department requires the water user to obtain, from a qualified individual (see below), and report annual static water levels for each well on the permit. The static water level shall be measured in the month of March. Reports shall be submitted to the Department within 30 days of measurement.

The permittee shall report an initial March static water-level measurement once well construction is complete and annual measurements thereafter. Annual measurements are required whether or not the well is used. The first annual measurement will establish a reference level against which future measurements will be compared. However, the Director may establish the reference level based on an analysis of other

water-level data. The Director may require the user to obtain and report additional water levels each year if more data are needed to evaluate the aquifer system.

All measurements shall be made by a certified water rights examiner, registered professional geologist, registered professional engineer, licensed well constructor or pump installer licensed by the Construction Contractors Board. Measurements shall be submitted on forms provided by, or specified by, the Department. Measurements shall be made with equipment that is accurate to at least the standards specified in OAR 690-217-0045. The Department requires the individual performing the measurement to:

- A. Associate each measurement with an owner's well name or number and a Department well log ID; and
- B. Report water levels to at least the nearest tenth of a foot as depth-to-water below ground surface; and
- C. Specify the method of measurement; and
- D. Certify the accuracy of all measurements and calculations reported to the Department.

The water user shall discontinue use of, or reduce the rate or volume of withdrawal from, the well(s) if any of the following events occur:

- A. Annual water-level measurements reveal an average water-level decline of three or more feet per year for five consecutive years; or
- B. Annual water-level measurements reveal a water-level decline of 15 or more feet in fewer than five consecutive years; or
- C. Annual water-level measurements reveal a water-level decline of 25 or more feet; or
- D. Hydraulic interference leads to a decline of 25 or more feet in any neighboring well with senior priority.

The period of restricted use shall continue until the water level rises above the decline level which triggered the action or the Department determines, based on the permittee's and/or the Department's data and analysis, that no action is necessary because the aquifer in question can sustain the observed declines without adversely impacting the resource or causing substantial interference with senior water rights. The water user shall not allow excessive decline, as defined in Commission rules, to occur within the aquifer as a result of use under this permit. If more than one well is involved, the water user may submit an alternative measurement and reporting plan for review and approval by the Department.

Within five years of permit issuance, the permittee shall submit a Water Management and Conservation Plan, addressing use under this permit, consistent with OAR 690-086. The Director may approve an extension of this time line to complete the required Water Management and Conservation Plan. The time line for submittal of a plan under this permit does not alter the time lines for submittal of a plan under any other order of the Department. No water may be diverted if a Water Management and Conservation Plan is not submitted within five years of permit issuance, unless an extension of this time has been approved.

Ground Water Mitigation Conditions:

1. Mitigation Obligation: 241.8 acre-feet of mitigation water in the Whychus Creek Zone of Impact, located anywhere in the Whychus Creek Basin above river mile 16.
2. Mitigation Source: mitigation credits, a mitigation project, and/or offset.
3. Mitigation water must be legally protected instream in the Whychus Creek Zone of Impact for the life of the permit and subsequent certificate(s). Regulation of the use and/or cancellation of the permit, or subsequent certificate(s) will occur if the required mitigation is not maintained.

4. The permittee shall provide mitigation prior to each stage of development under the permit, as described in the incremental development mitigation plan on file with the Department, and in accordance with the standards of the Deschutes Ground Water Mitigation Rules, OAR Chapter 690, Division 505.
5. The permittee shall not increase the rate or amount of water diverted, as described in the incremental development mitigation plan, prior to increasing the corresponding mitigation.
6. The permittee shall seek and receive Departmental approval prior to changing the incremental mitigation development plan and related mitigation obligation for each stage of permit development.
7. The permittee shall report to the Department the progress of implementing the incremental mitigation development plan and related mitigation no later than April 1 of each year. This annual notification is not necessary if the permittee has completed development and submitted a Claim of Beneficial Use to the Department.
8. The permittee shall provide additional mitigation if the Department determines that average annual consumptive use of the subject appropriation has increased beyond the originally mitigated amount.
9. If mitigation is from a secondary right for stored water from a storage project not owned or operated by the permittee, the use of water under this right is subject to the maintenance and terms and conditions of a valid contract or satisfactory replacement, with the owner/operator of the storage project, a copy of which must be on file in the records of the Water Resources Department.
10. Failure to comply with these mitigation conditions shall result in the Department regulating the ground water permit, or subsequent certificate(s), proposing to deny any permit extension application for the ground water permit, and proposing to cancel the ground water permit, or subsequent certificate(s).

Scenic Waterway Condition:

Use of water under authority of this permit may be regulated if analysis of data available after the permit is issued discloses that the appropriation will measurably reduce the surface water flows necessary to maintain the free-flowing character of a scenic waterway in quantities necessary for recreation, fish and wildlife in effect as of the priority date of the right, or as those quantities may be reduced subsequently. However, the use of ground water allowed under the terms of this permit will not be subject to regulation for Scenic Waterway flows, provided the required mitigation is maintained.

STANDARD CONDITIONS

1. Failure to comply with any of the provisions of this permit may result in action including, but not limited to, restrictions on the use, civil penalties, or cancellation of the permit.
2. If the number, location, source, or construction of any well deviates from that proposed in the permit application or required by permit conditions, this permit may be subject to cancellation, unless the Department authorizes the change in writing.
3. If substantial interference with a senior water right occurs due to withdrawal of water from any well listed on this permit, then use of water from the well(s) shall be discontinued or reduced and/or the schedule of withdrawal shall be regulated until or unless the Department approves or implements an alternative administrative action to mitigate the interference. The Department encourages junior and senior appropriators to jointly develop plans to mitigate interferences.
4. The wells shall be constructed in accordance with the General Standards for the Construction and Maintenance of Water Wells in Oregon. The works shall be equipped with a usable access port, and may also include an air line and pressure gauge adequate to determine water level elevation in the well at all times.

5. Where two or more water users agree among themselves as to the manner of rotation in the use of water and such agreement is placed in writing and filed by such water users with the watermaster, and such rotation system does not infringe upon such prior rights of any water user not a party to such rotation plan, the watermaster shall distribute the water according to such agreement.
6. Prior to receiving a certificate of water right, the permit holder shall submit the results of a pump test meeting the department's standards, to the Water Resources Department. The Director may require water level or pump test results every ten years thereafter.
7. This permit is for the beneficial use of water without waste. The water user is advised that new regulations may require the use of best-practice technologies or conservation practices to achieve this end.
8. By law, the land use associated with this water use must be in compliance with statewide land-use goals and any local acknowledged comprehensive land-use plan.
9. Completion of construction and complete application of the water to the use shall be made within 20 years of the date of permit issuance. If the water is not completely applied before this date, and the permittee wishes to continue development under the permit, the permittee must submit an application for extension of time, which may be approved based upon the merit of the application.
10. Within one year after complete application of water to the proposed use, the permittee shall submit a claim of beneficial use, which includes a map and report, prepared by a Certified Water Rights Examiner.

Issued

DRAFT – NOT A PERMIT

for Phillip C. Ward, Director
Water Resources Department

STATE OF OREGON

COUNTY OF DESCHUTES

PERMIT TO APPROPRIATE PUBLIC WATERS

THIS PERMIT IS HEREBY ISSUED TO:

CITY OF SISTERS
 PO BOX 39 150 N FIR ST
 SISTERS OR 97759

The specific limits and conditions of the use are listed below.

APPLICATION FILE NUMBER: G-17058

SOURCE OF WATER: FOUR WELLS IN WHYCHUS CREEK BASIN

RATE: 2.0 CUBIC FEET PER SECOND, FURTHER LIMITED TO 604.6 ACRE FEET PER YEAR

DATE OF PRIORITY: MAY 27, 2008

USE: MUNICIPAL USE

PERIOD: YEAR ROUND

Authorized Points of Appropriation:

	Twp	Rng	Mer	Sec	Q-Q	Measured Distances
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15 S	10 E	WM	4	NW SE
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Measurement, Recording and Reporting Conditions:

- A. Before water use may begin under this permit, the permittee shall install a totalizing flow meter at each point of appropriation. The permittee shall maintain the meters in good working order.
- B. The permittee shall keep a complete record of the amount of water used each month, and shall submit a report which includes the recorded water use measurements to the Department annually or more frequently as may be required by the Director. Further, the Director may require the permittee to report general water-use information, including the place and nature of use of water under the permit.
- C. The permittee shall allow the watermaster access to the meters; provided however, where any meter is located within a private structure, the watermaster shall request access upon reasonable notice.

- D. The Director may provide an opportunity for the permittee to submit alternative measuring and reporting procedures for review and approval.

The Department requires the water user to obtain, from a qualified individual (see below), and report annual static water levels for each well on the permit. The static water level shall be measured in the month of March. Reports shall be submitted to the Department within 30 days of measurement.

The permittee shall report an initial March static water-level measurement once well construction is complete and annual measurements thereafter. Annual measurements are required whether or not the well is used. The first annual measurement will establish a reference level against which future measurements will be compared. However, the Director may establish the reference level based on an analysis of other water-level data. The Director may require the user to obtain and report additional water levels each year if more data are needed to evaluate the aquifer system.

All measurements shall be made by a certified water rights examiner, registered professional geologist, registered professional engineer, licensed well constructor or pump installer licensed by the Construction Contractors Board. Measurements shall be submitted on forms provided by, or specified by, the Department. Measurements shall be made with equipment that is accurate to at least the standards specified in OAR 690-217-0045. The Department requires the individual performing the measurement to:

- A. Associate each measurement with an owner's well name or number and a Department well log ID; and
- B. Report water levels to at least the nearest tenth of a foot as depth-to-water below ground surface; and
- C. Specify the method of measurement; and
- D. Certify the accuracy of all measurements and calculations reported to the Department.

The water user shall discontinue use of, or reduce the rate or volume of withdrawal from, the well(s) if any of the following events occur:

- A. Annual water-level measurements reveal an average water-level decline of three or more feet per year for five consecutive years; or
- B. Annual water-level measurements reveal a water-level decline of 15 or more feet in fewer than five consecutive years; or
- C. Annual water-level measurements reveal a water-level decline of 25 or more feet; or
- D. Hydraulic interference leads to a decline of 25 or more feet in any neighboring well with senior priority.

The period of restricted use shall continue until the water level rises above the decline level which triggered the action or the Department determines, based on the permittee's and/or the Department's data and analysis, that no action is necessary because the aquifer in question can sustain the observed declines without adversely impacting the resource or causing substantial interference with senior water rights. The water user shall not allow excessive decline, as defined in Commission rules, to occur within the aquifer as a result of use under this permit. If more than one well is involved, the water user may submit an alternative measurement and reporting plan for review and approval by the Department.

Within five years of permit issuance, the permittee shall submit a Water Management and Conservation Plan, addressing use under this permit, consistent with OAR 690-086. The Director may approve an

extension of this time line to complete the required Water Management and Conservation Plan. The time line for submittal of a plan under this permit does not alter the time lines for submittal of a plan under any other order of the Department. No water may be diverted if a Water Management and Conservation Plan is not submitted within five years of permit issuance, unless an extension of this time has been approved.

Ground Water Mitigation Conditions:

1. Mitigation Obligation: 241.8 acre-feet of mitigation water in the Whychus Creek Zone of Impact, located anywhere in the Whychus Creek Basin above river mile 16.
2. Mitigation Source: Mitigation Credits from a chartered mitigation bank, or suitable replacement mitigation that meets the requirements of OAR 690-505-0610, in accordance with the incremental development plan on file with the Department, within the Whychus Creek Zone of Impact.
3. Mitigation water must be legally protected instream in the Whychus Creek Zone of Impact for the life of the permit and subsequent certificate(s). Regulation of the use and/or cancellation of the permit, or subsequent certificate(s) will occur if the required mitigation is not maintained.
4. The permittee shall provide mitigation prior to each stage of development under the permit, as described in the incremental development mitigation plan on file with the Department, and in accordance with the standards of the Deschutes Ground Water Mitigation Rules, OAR Chapter 690, Division 505.
5. The permittee shall not increase the rate or amount of water diverted, as described in the incremental development mitigation plan, prior to increasing the corresponding mitigation.
6. The permittee shall seek and receive Departmental approval prior to changing the incremental mitigation development plan and related mitigation obligation for each stage of permit development.
7. The permittee shall report to the Department the progress of implementing the incremental mitigation development plan and related mitigation no later than April 1 of each year. This annual notification is not necessary if the permittee has completed development and submitted a Claim of Beneficial Use to the Department.
8. The permittee shall provide additional mitigation if the Department determines that average annual consumptive use of the subject appropriation has increased beyond the originally mitigated amount.
9. If mitigation is from a secondary right for stored water from a storage project not owned or operated by the permittee, the use of water under this right is subject to the maintenance and terms and conditions of a valid contract or satisfactory replacement, with the owner/operator of the storage project, a copy of which must be on file in the records of the Water Resources Department.
10. Failure to comply with these mitigation conditions shall result in the Department regulating the ground water permit, or subsequent certificate(s), proposing to deny any permit extension application for the ground water permit, and proposing to cancel the ground water permit, or subsequent certificate(s).

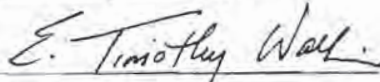
Scenic Waterway Condition:

Use of water under authority of this permit may be regulated if analysis of data available after the permit is issued discloses that the appropriation will measurably reduce the surface water flows necessary to maintain the free-flowing character of a scenic waterway in quantities necessary for recreation, fish and wildlife in effect as of the priority date of the right, or as those quantities may be reduced subsequently. However, the use of ground water allowed under the terms of this permit will not be subject to regulation for Scenic Waterway flows, provided the required mitigation is maintained.

STANDARD CONDITIONS

1. Failure to comply with any of the provisions of this permit may result in action including, but not limited to, restrictions on the use, civil penalties, or cancellation of the permit.
2. If the number, location, source, or construction of any well deviates from that proposed in the permit application or required by permit conditions, this permit may be subject to cancellation, unless the Department authorizes the change in writing.
3. If substantial interference with a senior water right occurs due to withdrawal of water from any well listed on this permit, then use of water from the well(s) shall be discontinued or reduced and/or the schedule of withdrawal shall be regulated until or unless the Department approves or implements an alternative administrative action to mitigate the interference. The Department encourages junior and senior appropriators to jointly develop plans to mitigate interferences.
4. The wells shall be constructed in accordance with the General Standards for the Construction and Maintenance of Water Wells in Oregon. The works shall be equipped with a usable access port, and may also include an air line and pressure gauge adequate to determine water level elevation in the well at all times.
5. Where two or more water users agree among themselves as to the manner of rotation in the use of water and such agreement is placed in writing and filed by such water users with the watermaster, and such rotation system does not infringe upon such prior rights of any water user not a party to such rotation plan, the watermaster shall distribute the water according to such agreement.
6. Prior to receiving a certificate of water right, the permit holder shall submit the results of a pump test meeting the department's standards, to the Water Resources Department. The Director may require water level or pump test results every ten years thereafter.
7. This permit is for the beneficial use of water without waste. The water user is advised that new regulations may require the use of best-practice technologies or conservation practices to achieve this end.
8. By law, the land use associated with this water use must be in compliance with statewide land-use goals and any local acknowledged comprehensive land-use plan.
9. Completion of construction and complete application of the water to the use shall be made within 20 years of the date of permit issuance. If the water is not completely applied before this date, and the permittee wishes to continue development under the permit, the permittee must submit an application for extension of time, which may be approved based upon the merit of the application.
10. Within one year after complete application of water to the proposed use, the permittee shall submit a claim of beneficial use, which includes a map and report, prepared by a Certified Water Rights Examiner.

Issued September 9, 2010



for Phillip C. Ward, Director
Water Resources Department



Groundwater Permit Application Map

City of Sisters Deschutes County, Oregon

Township 15 South, Range 10 East (W.M.)

LEGEND

- Proposed Points of Appropriation (POA)**
- Existing Wells (constructed)
 - Future Well (to be constructed)
 - ▨ Proposed Place of Use (POU)
 - - - Urban Growth Boundary
 - Tax Lots
 - Waterbodies
 - ~ Watercourses

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MAY 27 2008
WATER RESOURCES DEPT
SALEM, OREGON

POA LOCATION DESCRIPTIONS

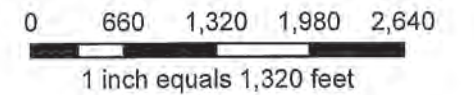
- Existing Well #1**
Located 2,950 feet South and 650 feet East from the NW corner of Section 9, Township 15 South, Range 10 East (W.M.)
- Existing Well #2**
Located 1,335 feet North and 1,210 feet East from the SW corner of Section 5, Township 15 South, Range 10 East (W.M.)
- Existing Well #3**
Located 1,890 feet South and 2,325 feet East from the NW corner of Section 4, Township 15 South, Range 10 East (W.M.)
- Future Well #4**
Located 230 feet North and 1,125 feet East from the SW corner of Section 8, Township 15 South, Range 10 East (W.M.)

DISCLAIMER

This map was prepared for the purpose of identifying the location of a water right only and it is not intended to provide legal dimensions or location of property ownership lines.



Scale
1:15,840



MAP NOTES:

Projection: Oregon State Plane South Zone
Datum: North American Datum of 1983
Date: May 23, 2008
Data Sources: Deschutes County GIS, Oregon Geospatial Data Clearinghouse



App No G-17058

STATE OF OREGON

COUNTY OF DESCHUTES

PERMIT TO APPROPRIATE THE PUBLIC WATERS

THIS PERMIT IS HEREBY ISSUED TO

CITY OF SISTERS
520 E CASCADE AVENUE
PO BOX 39
SISTERS, OR 97759

This superseding permit is issued to clarify a condition pertaining to the original well construction standards under Permit G-13316, and superseded by Permit G-18261 issued August 6, 2019. This permit correctly describes an amendment for a change in place of use and a change in point of appropriation under Permit Amendment Application T-12767 and approved by Special Order Vol. 113, Page 812-814, entered August 6, 2019 and Corrected by Special Order Vol. 113, Page 880, and to describe an extension of time for complete application of water approved June 8, 2012, and an assignment to a new permittee approved September 26, 2017. This permit supersedes Permit G-18261, originally G-13316.

The specific limits and conditions of the use are listed below.

APPLICATION FILE NUMBER: G-14486

SOURCE OF WATER: 2 WELLS IN SQUAW CREEK BASIN

PURPOSE OR USE: QUASI-MUNICIPAL

MAXIMUM RATE: 2.15 CUBIC FEET PER SECOND

PERIOD OF USE: YEAR ROUND

DATE OF PRIORITY: MARCH 27, 1997

WELL LOCATIONS:

TwP	Rng	Mer	Sec	Q-Q	Measured Distances
15 S	10 E	WM	8	SW SW	WELL 4 - 230 FEET NORTH AND 1125 FEET EAST FROM THE SW CORNER OF SECTION 8
15 S	10 E	WM	9	SW NE	EASTSIDE WELL - 1505 FEET SOUTH AND 1715 FEET WEST FROM THE NE CORNER OF SECTION 9

THE PLACE OF USE IS LOCATED AS FOLLOWS:

QUASI-MUNICIPAL
WITHIN THE SERVICE BOUNDARIES OF THE CITY OF SISTERS

Permit Amendment T-12767 Conditions

Measurement, recording and reporting conditions:

The combined quantity of water diverted at the new points of appropriation, together with that diverted at the old point of appropriation, shall not exceed the quantity of water lawfully available at the original point of appropriation.

Water use measurement conditions:

- a. Before water use may begin under this order, the water user shall install a totalizing flow meter, or, with prior approval of the Director, another suitable measuring device at each point of appropriation (new and existing)
- b. The water user shall maintain the meters or measuring devices in good working order.
- c. The water user shall allow the Watermaster access to the meters or measuring devices; provided however, where the meters or measuring devices are located within a private structure, the Watermaster shall request access upon reasonable notice.

Water shall be acquired from the same aquifer as the original point of appropriation.

Existing Permit Conditions

- A. Before water use may begin under this permit, the permittee shall install a meter or other suitable measuring device as approved by the Director. The permittee shall maintain the meter or measuring device in good working order, shall keep a complete record of the amount of water used each month and shall submit a report which includes the recorded water use measurements to the Department annually or more frequently as may be required by the Director. Further, the Director may require the permittee to report general water use information, including the place and nature of use of water under the permit.
- B. The permittee shall allow the watermaster access to the meter or measuring device; provided however, where the meter or measuring device is located within a private structure, the watermaster shall request access upon reasonable notice.

The water user shall develop a plan to monitor and report the impact of water use under this permit on water levels within the aquifer that provides water to the permitted well(s). The plan shall be submitted to the Department within one year of the date the permit is issued and shall be subject to the approval of the Department. At a minimum, the plan shall include a program to periodically measure static water levels within the permitted well(s) or an adequate substitute such as water levels in nearby wells. The plan shall also stipulate a reference water level against which any water-level declines will be compared. If a well listed on this permit (or replacement well) displays a total static water-level decline of 25 or more feet over any period of years, as compared to the reference level, then the water user shall discontinue use of, or reduce the rate or volume of withdrawal from, the well(s). Such action shall be taken until the water level recovers to above the 25-foot decline level or until the Department determines, based on the water user's and/or the Department's data and analysis, that no action is necessary because the aquifer in question can sustain the observed declines without adversely impacting the resource or senior water rights. The water user shall in no instance allow excessive decline, as defined in Commission rules, to occur within the aquifer as a result of use under this permit.

If substantial interference with a senior water right occurs due to withdrawal of water from any well listed on this permit, then use of water from the well(s) shall be discontinued or reduced and/or the schedule of withdrawal shall be regulated until or unless the Department approves or implements an alternative administrative action to mitigate the interference. The Department encourages junior and senior appropriators to jointly develop plans to mitigate interferences.

Use of water under authority of this permit may be regulated if analysis of data available after permit issuance discloses that the appropriation will measurably reduce the surface water flows necessary to maintain the free-flowing character of a scenic waterway in quantities necessary for recreation, fish and wildlife in effect as of the priority date of the right or as those quantities may be subsequently reduced.

The water user shall be responsible for updating the City of Sisters Water Management and Conservation Plan within one year of annexation into the City of Sisters. If annexation does not occur within one year of permit issuance, the water user shall submit a water management and conservation plan consistent with OAR Chapter 690, Division 86 within 2 years of permit issuance.

Original Well Conditions under Permit G-13316

The original well authorized under original Permit G-13316 identified as A Well in Squaw Creek Basin located at, SW ¼ NE ¼, Section 8, T15S, R10E, W.M; 390 FEET NORTH AND 1509 FEET WEST FROM THE EAST ¼ CORNER OF SECTION 8, is conditioned as follows:

According to the well report, the well may not conform with the current construction standards. However, it appears that the well was constructed in accordance with the standards in effect at that time. If at any time, however, the well or its use:

- a. acts as a conduit for groundwater contamination;
- b. allows loss of artesian pressure;
- c. allows waste of groundwater;
- d. interferes with senior groundwater users; or
- e. interferes with nearby surface water sources,

the Department may require that the well be repaired in accordance with the current well construction standards.

STANDARD CONDITIONS

The wells shall be constructed in accordance with the General Standards for the Construction and Maintenance of Water Wells in Oregon. The works shall be equipped with a usable access port, and may also include an air line and pressure gauge adequate to determine water level elevation in the well at all times.

The use shall conform to such reasonable rotation system as may be ordered by the proper state officer..

Prior to receiving a certificate of water right, the permit holder shall submit the results of a pump test meeting the department's standards, to the Water Resources Department. The Director may require water level or pump test results every ten years thereafter.

Failure to comply with any of the provisions of this permit may result in action including, but not limited to, restrictions on the use, civil penalties, or cancellation of the permit. This permit is for the beneficial use of water without waste. The water user is advised that new regulations may require the use of best practical technologies or conservation practices to achieve this end.

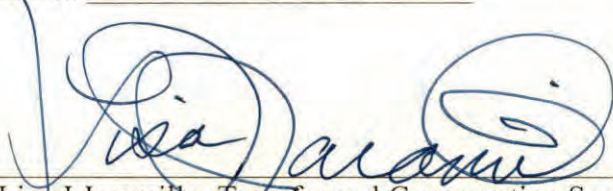
By law, the land use associated with this water use must be in compliance with statewide land-use goals and any local acknowledged land-use plan.

The use of water shall be limited when it interferes with any prior surface or ground water rights.

The Director finds that the proposed use(s) of water described by this permit, as conditioned, will not impair or be detrimental to the public interest.

Actual construction of the well was to begin within one year from permit issuance (February 18, 1998). The complete application of the water to the use was to be made on or before October 30, 2002. By Extension of Time Final Order dated June 8, 2012, the completion of the application of water was extended to on or before October 1, 2023.

Issued AUG 16 2019



Lisa J Jaramillo, Transfer and Conservation Section Manager, for
Thomas M. Byler, Director
Oregon Water Resources Department

**BEFORE THE WATER RESOURCES DEPARTMENT
OF THE
STATE OF OREGON**

In the Matter of Permit Amendment)	FINAL ORDER
T-12767, Deschutes County)	APPROVING A CHANGE IN POINT
)	OF APPROPRIATION AND A
)	CHANGE IN PLACE OF USE

Authority

Oregon Revised Statute (ORS) 537.211 establishes the process in which a water right permit holder may submit a request to change the point of appropriation and/or place of use authorized under an existing water right permit.

Applicant

CITY OF SISTERS
PAUL BERTAGNA
520 E. CASCADE AVE
PO BOX 39
SISTERS, OR 97759

Findings of Fact

1. On November 1, 2017, filed an application to change the point of appropriation and to change the place of use under Permit G-13316. The Department assigned the application number T-12767.
2. On June 8, 2012, the Department approved an extension of time for complete application of water to October 1, 2023.
3. On September 26, 2017, the Department approved an assignment of the permit to City of Sisters.
4. Notice of the application for the permit amendment was published in the Department's weekly notice on November 7, 2017, and in the Bend Bulletin newspaper on July 19 and 26, 2019, pursuant to ORS 540.520(5). No comments were filed in response to the notices.

This is a final order in other than contested case. This order is subject to judicial review under ORS 183.484. Any petition for judicial review must be filed within the 60 day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080 and OAR 690-01-0005 you may either petition for judicial review or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

5. Permit Amendment Application T-12767 proposes to move the authorized point of appropriation with approximate distances from the existing point of appropriation as follows:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances	Distance from existing Well
15 S	10 E	WM	8	SW SW	WELL 4 – 230 FEET NORTH AND 1125 FEET EAST FROM THE SW CORNER OF SECTION 8	0.74 mile
15 S	10 E	WM	9	SW NE	EASTSIDE WELL - 1505 FEET SOUTH AND 1715 FEET WEST FROM THE NE CORNER OF SECTION 9	1.0 mile

6. Permit Amendment Application T-12767 also proposes to change the place of use of the permit to:

QUASI-MUNICIPAL
WITHIN THE SERVICE BOUNDARIES OF THE CITY OF SISTERS

Permit Amendment Review Criteria

7. The changes would not result in injury to other water rights.
8. The proposed place of use is owned and/or controlled by the permit holder.
9. The changes do not enlarge the permit.
10. The changes do not alter any other terms of the permit.
11. The proposed place of use is contiguous to the authorized place of use.

Conclusions of Law

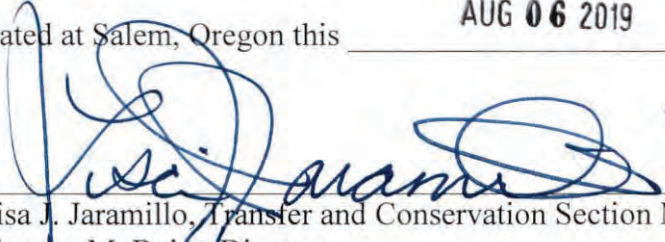
The change in point of appropriation and change in place of use proposed by Permit Amendment Application T-12767 are consistent with the requirements of ORS 537.211.

Now, therefore, it is ORDERED:

1. The change in point of appropriation and change in place of use proposed by Permit Amendment Application T-12767 are approved.
2. Permit G-18261, in the name of City of Sisters, is issued to replace Permit G-13316, and incorporates the amendments approved by this order, the extension of time, the assignment, and the Water Management and Conservation Plan. Permit G-13316, in the name of CITY OF SISTERS, is no longer of any force or effect.
3. The combined quantity of water diverted at the new points of appropriation, together with that diverted at the old point of appropriation, shall not exceed the quantity of water lawfully available at the original point of appropriation.

4. Water use measurement conditions:
 - a. Before water use may begin under this order, the water user shall install a totalizing flow meter, or, with prior approval of the Director, another suitable measuring device at each point of appropriation (new and existing)
 - b. The water user shall maintain the meters or measuring devices in good working order.
 - c. The water user shall allow the Watermaster access to the meters or measuring devices; provided however, where the meters or measuring devices are located within a private structure, the Watermaster shall request access upon reasonable notice.
5. Water shall be acquired from the same aquifer as the original point of appropriation.
6. The former place of use shall no longer be irrigated as part of this permit.
7. All other terms and conditions of Permit G-18261 remain the same.

Dated at Salem, Oregon this **AUG 06** 2019



Lisa J. Jaramillo, Transfer and Conservation Section Manager, for
Thomas M. Byler, Director
Oregon Water Resources Department

Mailing Date: **AUG 07** 2019

**BEFORE THE WATER RESOURCES DEPARTMENT
OF THE
STATE OF OREGON**

In the Matter of Special Order Volume)
113, Pages 812-814, approving Permit) CORRECTING ORDER
Amendment T-12767, Deschutes County)

Authority

Oregon Revised Statute (ORS) 537.211 establishes the process in which a water right permit holder may submit a request to change the point of appropriation and/or place of use authorized under an existing water right permit.

Applicant

CITY OF SISTERS
PAUL BERTAGNA
520 E. CASCADE AVE
PO BOX 39
SISTERS, OR 97759

Findings of Fact

1. On August 6, 2019, the Department issued an order approving Permit Amendment Application T-12767. The order was recorded at Special Order Volume 113, Pages 812-814.
2. The order contained an error in the conditions to be applied to superseding permit G-18261, originally Permit G-13316, specifically condition number 6 which states "the former place of use shall no longer be irrigated as part of this permit." This condition does not apply to Quasi-Municipal use.

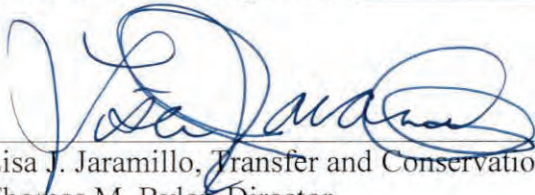
Now, therefore, it is ORDERED:

1. The change in point of appropriation and change in place of use proposed by Permit Amendment Application T-12767 are approved.
2. Permit G-18261, in the name of CITY OF SISTERS, is issued to replace Permit T-12767 and incorporates the amendments approved by this order, the extension of time, the assignment, and the Water Management and Conservation Plan. Permit T-12767, in the name of CITY OF SISTERS, is no longer of any force or effect.
3. The combined quantity of water diverted at the new points of appropriation, together with that diverted at the old point of appropriation, shall not exceed the quantity of water lawfully available at the original point of appropriation.

This is a final order in other than contested case. This order is subject to judicial review under ORS 183.484. Any petition for judicial review must be filed within the 60 day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080 and OAR 690-01-0005 you may either petition for judicial review or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

4. The order approving Permit Amendment Application T-12767 as recorded at Special Order Volume 113, Pages 812-814 is corrected to remove the erroneous condition to be applied to superseding permit G-18261, originally Permit G-13316.
5. Permit G-18270, in the name of CITY OF SISTERS is issued to replace Permit G-18261, originally Permit G-13316, and incorporates the amendments approved by this order, the extension of time, the assignment, and the Water Management and Conservation Plan. Permit G-18261, originally Permit G-13316, is no longer of any force or effect.
6. All other terms and conditions of Permit G-18261, originally G-13316 remain the same.
7. All other provisions of Special Order Volume 113, Pages 812-814 remain in effect.

Dated at Salem, Oregon this AUG 16 2019



Lisa J. Jaramillo, Transfer and Conservation Section Manager, for
Thomas M. Byler, Director
Oregon Water Resources Department

Mailing Date: AUG 19 2019

STATE OF OREGON

WATER DIVISION No.

COUNTY OF

DESCHUTES

CERTIFICATE OF WATER RIGHT

(For rights perfected under original, enlargement or secondary permits)

This is to Certify, That THE SISTERS DOMESTIC WATER USERS ASSOCIATION

of Sisters, State of Oregon, has made proof to the satisfaction of the STATE WATER BOARD of Oregon, of a right to the use of the

waters of Branton Ditch out of Squaw Creek, a tributary of Deschutes River

, for the purpose of municipal supply for the Town of Sisters, Oregon

under Permit No. 3384 of the State Engineer, and that said right to the use of said waters has been perfected in accordance with the laws of Oregon and duly confirmed by order of the STATE WATER BOARD of Oregon, made and entered

of record in the Record of Proceedings of said Board, at Salem, in Volume 1,

at page 389, on the 13th day of April, 1921; that the priority of

the right hereby confirmed dates from May 18, 1917; that the amount of water to which such right is entitled and hereby confirmed, for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not

exceed 1.50 cubic feet per second.

A description of the lands under such right, and to which the water hereby confirmed is appurtenant, or, if for other purposes, the place where such water is put to beneficial use, is as follows: The Town of Sisters, in Deschutes County, Oregon.

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described.

Rights to the use of water for power purposes are limited to a period of forty years from the date of priority of the right, as herein set forth, subject to a preference right of renewal under the laws existing at the date of the expiration of the right for power purposes, as hereby confirmed and limited.

Witness the seal and signature of the STATE

WATER BOARD affixed this 13th day

of April, 1921.

STATE WATER BOARD

(SEAL OF STATE WATER BOARD)

By PERCY A. CUPPER, State Engineer, President

Attest: R. W. POTTER, Secretary

STATE OF OREGON
COUNTY OF DESCHUTES
CERTIFICATE OF WATER RIGHT

This Is to Certify, That THE SISTERS WATER USERS ASSOCIATION

of Sisters , State of Oregon , has made proof to the satisfaction of the STATE ENGINEER of Oregon, of a right to the use of the waters of Springs a tributary of Squaw Creek for the purpose of Municipal supply under Permit No. 8906 of the State Engineer, and that said right to the use of said waters has been perfected in accordance with the laws of Oregon; that the priority of the right hereby confirmed dates from February 11, 1929;

that the amount of water to which such right is entitled and hereby confirmed, for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed 0.2 cubic foot per second

The point of diversion is located in the ~~SE~~^{SE} ~~1~~¹ of Section 6 , Township 15 S , Range 10 E, W. M. The use hereunder for irrigation shall conform to such reasonable rotation system as may be ordered by the proper state officer.

The amount of water used for irrigation, together with the amount secured under any other right existing for the same lands, shall be limited to one-eightieth of one cubic foot per second per acre, or its equivalent in case of rotation.

A description of the lands irrigated under the right hereby confirmed, and to which such right is appurtenant (if for irrigation, or any other purpose), is as follows:

PLACE OF USE:

Section 4,
Township 15 South, Range 10 East, W. M.,
being within the town of Sisters.

The right to the use of the water for any purpose is restricted to the lands or place of use herein described.

After the expiration of fifty years from the date of this certificate or on the expiration of any federal power license issued in connection with this right, and after not less than two years notice in writing to the holder hereof, the State of Oregon, or any municipality thereof, shall have the right to take over the dams, plants and other structures and all appurtenances thereto which have been constructed for the purpose of devoting to beneficial use the water rights specified herein, upon condition that before taking possession the State or municipality shall pay not to exceed the fair value of the property so taken, plus such reasonable damages, if any, to valuable, serviceable and dependable property of the holder of this certificate, not taken over, as may be caused by the severance therefrom of the property taken in accordance with the provisions of section 47-508, Oregon Code 1930.

WITNESS the signature of the State Engineer,

affixed this 1st day

of June , 193 3

CHAS. E. STRICKLIN

State Engineer

Recorded in State Record of Water Right Certificates, Volume 9 , page 10028 .

STATE OF OREGON
 COUNTY OF DESCHUTES
CERTIFICATE OF WATER RIGHT

This Is to Certify, That SISTERS DOMESTIC WATER DISTRICT

of Sisters, State of Oregon, has made proof to the satisfaction of the STATE ENGINEER of Oregon, of a right to the use of the waters of Pole Creek Swamp Springs, a tributary of Squaw Creek for the purpose of Domestic and Municipal Supply under Permit No. 12597 of the State Engineer, and that said right to the use of said waters has been perfected in accordance with the laws of Oregon; that the priority of the right hereby confirmed dates from April 7, 1937;

that the amount of water to which such right is entitled and hereby confirmed, for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed 1.25 cubic feet per second,

or its equivalent in case of rotation, measured at the point of diversion from the stream. The point of diversion is located in the SW $\frac{1}{4}$ SE $\frac{1}{4}$, Section 35, Township 15 South, Range 9 East, W. M.

The amount of water used for irrigation, together with the amount secured under any other right existing for the same lands, shall be limited to of one cubic foot per second per acre.

and shall conform to such reasonable rotation system as may be ordered by the proper state officer.

A description of the place of use under the right hereby confirmed, and to which such right is appurtenant, is as follows:

SW $\frac{1}{4}$ of Section 4
 NW $\frac{1}{4}$ of Section 9
 Township 15 South, Range 10 East, W. M.

The right to the use of the water for the purposes aforesaid is restricted to the lands or place of use herein described.

WITNESS the signature of the State Engineer, affixed

this 1st day of May, 1937

CHAS. E. STRICKLIN

State Engineer

Recorded in State Record of Water Right Certificates, Volume 12, page 13501

STATE OF OREGON
 COUNTY OF **DESCHUTES**
CERTIFICATE OF WATER RIGHT

This Is to Certify, That SISTERS DOMESTIC WATER DISTRICT

of **Sisters**, State of **Oregon**, has made proof to the satisfaction of the **STATE ENGINEER** of Oregon, of a right to the use of the waters of **9** springs a tributary of **Squaw Creek** for the purpose of **Municipal** under Permit No. **12869** of the State Engineer, and that said right to the use of said waters has been perfected in accordance with the laws of Oregon; that the priority of the right hereby confirmed dates from **November 1, 1937**;

that the amount of water to which such right is entitled and hereby confirmed, for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed **1.25** cubic feet per second,

or its equivalent in case of rotation, measured at the point of diversion from the stream. The point of diversion is located in the **SW $\frac{1}{4}$ SW $\frac{1}{4}$** , Section 3 and **NW $\frac{1}{4}$ NW $\frac{1}{4}$** , Section 10, Township 16 South, Range 9 East, W. M.

The amount of water used for irrigation, together with the amount secured under any other right existing for the same lands, shall be limited to **of one cubic foot per second per acre**,

and shall conform to such reasonable rotation system as may be ordered by the proper state officer.

A description of the place of use under the right hereby confirmed, and to which such right is appurtenant, is as follows:

SW $\frac{1}{4}$ SW $\frac{1}{4}$
SE $\frac{1}{4}$ SW $\frac{1}{4}$
NW $\frac{1}{4}$ SW $\frac{1}{4}$
 Section 4
NE $\frac{1}{4}$ NE $\frac{1}{4}$
 Section 8
NW $\frac{1}{4}$ NW $\frac{1}{4}$
NE $\frac{1}{4}$ NW $\frac{1}{4}$
 Section 9
 Township 15 South, Range 10 East, W. M.

The right to the use of the water for the purposes aforesaid is restricted to the lands or place of use herein described.

WITNESS the signature of the State Engineer, affixed

this **1st** day of **May**, 193 **/41**

CHAS. E. STRICKLIN

State Engineer

STATE OF OREGON
COUNTY OF DESCHUTES
CERTIFICATE OF WATER RIGHT

THIS CERTIFICATE ISSUED TO

CITY OF SISTERS
SISTERS, OREGON 97759

confirms the right to use the waters of POLE CREEK AND SISTERS' RESERVOIR CONSTRUCTED UNDER PERMIT R-5054, a tributary of SQUAW CREEK, for the purpose of MUNICIPAL USE.

This right was perfected under Permit 32854. The date of priority is NOVEMBER 17, 1967. This right is limited to 1.45 CUBIC FEET PER SECOND, or its equivalent in case of rotation, measured at the point of diversion from the source.

The points of diversion are located as follows:

SE 1/4 NE 1/4, NE 1/4 NE 1/4, SECTION 19, T 15 S, R 10 E, W.M.; CREEK DIVERSION- 1810 FEET SOUTH AND 1100 FEET WEST, RESERVOIR OUTLET- 880 FEET SOUTH AND 750 FEET WEST, BOTH FROM THE NE CORNER OF SECTION 19.

This right shall conform to any reasonable rotation system ordered by the proper state officer.

A description of the place of use under this right, and to which this right is appurtenant, is as follows:

SW 1/4 NE 1/4
SE 1/4 NW 1/4
S 1/2
SECTION 4

E 1/2 SW 1/4
SE 1/4
SECTION 5

N 1/2 NE 1/4
SE 1/4 NE 1/4
SECTION 8

W 1/2 NE 1/4
SE 1/4 NE 1/4
NW 1/4
NW 1/4 SW 1/4
SECTION 9

TOWNSHIP 15 SOUTH, RANGE 10 EAST, W.M.

The right to the use of the water for the above purpose is restricted to beneficial use on the lands or place of use described. The right is subject to minimum flows established by the Water Resources Commission with an effective date prior to this right.

WITNESS the signature of the Water Resources Director, affixed JANUARY 3, 1991.

/s/ WILLIAM H. YOUNG

William H. Young

Recorded in State Record of Water Right Certificates numbered 65091.

44263.DLM

**BEFORE THE WATER RESOURCES DEPARTMENT
OF THE
STATE OF OREGON**

In the Matter of Instream Lease Application) DETERMINATION and
IL-1243, Certificates 65091, 65090, 13509,) FINAL ORDER ON PROPOSED
13501, 10028, and 3227, Deschutes County) INSTREAM LEASE

Authority

ORS 537.348 establishes the process in which a water right holder may submit a request to lease an existing water right for instream purposes. OAR Chapter 690, Division 077 implements the statutes and provides the Department's procedures and criteria for evaluating instream lease applications.

Lesser

City of Sisters
PO Box 39
Sisters, OR 97759

Lessee

Deschutes River Conservancy (DRC)
P.O. Box 1560
Bend, Oregon 97709
gen@deschutesriver.org

Findings of Fact

1. On April 13, 2017, the City of Sisters and the DRC filed an application to renew instream lease IL-1243, involving all of Certificates 65091, 65090, 13509, 13501, 10028, and 3227 for instream use.

2. The first right to be leased is as follows:

Certificate: 65091 in the name of City of Sisters

Use: Municipal Use

Priority Date: November 17, 1967

Quantity: 1.45 Cubic Foot per Second (CFS)

Source: Pole Creek and Sisters Reservoir constructed under permit R-5054, tributary to Whychus Creek (formerly Squaw Creek)

Authorized Point of Diversion (POD):

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
15 S	10 E	WM	19	SE NE	CREEK DIVERSION: 1810 FEET SOUTH AND 1100 FEET WEST FROM THE NE CORNER OF SECTION 19
15 S	10 E	WM	19	NE NE	RESERVOIR OUTLET: 880 FEET SOUTH AND 750 FEET WEST FROM THE NE CORNER OF SECTION 19

Authorized Place of Use:

Twp	Rng	Mer	Sec	Q-Q
15 S	10 E	WM	4	SW NE
15 S	10 E	WM	4	SE NW
15 S	10 E	WM	4	S ½

This is a final order in other than contested case. This order is subject to judicial review under ORS 183.484. Any petition for judicial review must be filed within the 60 day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080 you may either petition for judicial review or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

Twp	Rng	Mer	Sec	Q-Q
15 S	10 E	WM	5	E ½ SW ¼
15 S	10 E	WM	5	SE ¼
15 S	10 E	WM	8	N ½ NE ¼
15 S	10 E	WM	8	SE NE
15 S	10 E	WM	9	W ½ NE ¼
15 S	10 E	WM	9	SE NE
15 S	10 E	WM	9	NW ¼
15 S	10 E	WM	9	NW SW

3. The second right to be leased is as follows:

Certificate: 65090 in the name of City of Sisters
Use: Storage of water for Municipal Use
Priority Date: August 10, 1967
Quantity: 6.3 Acre-Feet (AF)
Source: Pole Creek, tributary to Whychus Creek (formerly Squaw Creek)
Authorized Place of Use (Reservoir Location):

Twp	Rng	Mer	Sec	Q-Q
15 S	10 E	WM	19	NE NE

4. Certificates 65091 and 65090 all describe points of diversion and a reservoir that are located on Pole Creek Ditch. Pole Creek has historically been diverted from its natural channel and into Pole Creek Ditch. Recent restoration efforts have resulted in the installation of a headgate and modification of the stream channel to allow water in Pole Creek to flow past the ditch and continue downstream in the natural stream channel. Pole Creek Ditch is the actual diversion point for water out of Pole Creek and into the ditch. The Department has determined that, for purposes of instream leasing and restoration of streamflows, the ditch location on the creek may be used as the start point for the instream use created as a result of the lease of Certificates 65091 and 65090 to instream use. The head of Pole Creek Ditch is located as follows:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
15 S	10 E	WM	19	SE NE	CREEK DIVERSION: 1810 FEET SOUTH AND 1100 FEET WEST FROM THE NE CORNER OF SECTION 19

5. The third right to be leased is as follows:

Certificate: 13509 in the name of Sisters Domestic Water District
Use: Municipal Use
Priority Date: November 1, 1937
Quantity: 1.25 Cubic Foot per Second (CFS)
Source: Nine Springs, tributaries to Whychus Creek (formerly Squaw Creek)
Authorized Points of Diversion (POD):

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
16 S	9 E	WM	3	SW SW	Not described in Certificate
16 S	9 E	WM	10	NW NW	Not described in Certificate

Authorized Place of Use:

Twp	Rng	Mer	Sec	Q-Q
15 S	10 E	WM	4	SW SW
15 S	10 E	WM	4	SE SW
15 S	10 E	WM	4	NW SW
15 S	10 E	WM	8	NE NE
15 S	10 E	WM	9	NW NW
15 S	10 E	WM	9	NE NW

6. Water was originally diverted from the Springs under Certificate 13509 into a pick-up ditch along the ridge between Pole Creek and Whychus Creek. The pick-up ditch diverted water from the springs over the ridge and into a small channel tributary to Pole Creek. The pick-up ditch still carries water from several of the springs over the ridge and into a tributary to Pole Creek. The Watermaster has identified that at least one of the springs flow into Whychus Creek. Other springs either only flow a few feet or flow into the pick-up ditch. The Watermaster has estimated that there may be as much as 1.5 CFS flowing down the pick-up ditch and over the ridge into the unnamed tributary to Pole Creek. The amount of water flowing down the pick-up ditch appears to be more than the amount authorized (1.25 CFS) under Certificate 13509.

The Lessor and Lessee have requested that water from the springs be protected into Pole Creek. Certificate 13509 identifies that the springs are tributary to Whychus Creek (formerly Squaw Creek). However, the Department has determined that because there are sufficient flows in the pick-up ditch that, for purposes of the lease, the springs may be considered tributary to the unnamed tributary to Pole Creek.

7. The fourth right to be leased is as follows:

Certificate: 13501 in the name of Sisters Domestic Water District

Use: Domestic and Municipal Supply

Priority Date: April 7, 1937

Quantity: 1.25 Cubic Foot per Second (CFS)

Source: Pole Creek Swamp Springs, tributary to Whychus Creek (formerly Squaw Creek)

Authorized Points of Diversion (POD):

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
15 S	9 E	WM	35	SW SE	Not described in Certificate

Authorized Place of Use:

Twp	Rng	Mer	Sec	Q-Q
15 S	10 E	WM	4	SW
15 S	10 E	WM	9	NW

8. Water was originally diverted from the Pole Creek Swamp Springs under Certificate 13501 into a pick-up ditch which delivered water into Pole Creek Ditch. The pick-up ditch has been abandoned and over the years has been disrupted by hikers. Presently the springs no longer flow down the pick-up ditch. Instead, they flow under natural conditions into the natural channel of Pole Creek, tributary to Whychus Creek.

9. The fifth right to be leased has been clarified from the lease application and is as follows:

Certificate: 10028 in the name of Sisters Water User Association
Use: Municipal Use
Priority Date: February 11, 1929
Quantity: 0.2 Cubic Foot per Second (CFS)
Source: Springs, tributary to Whychus Creek (formerly Squaw Creek)
Authorized Points of Diversion (POD):

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
15 S	10 E	WM	8	SE SE	Not described in Certificate

Authorized Place of Use (within the town of Sisters):

Twp	Rng	Mer	Sec
15 S	10 E	WM	4

10. The Department has additional information indicating that the source of water for Certificate 10028 may not actually be springs but rather an overflow channel, which flows into Whychus Creek, for Pole Creek Ditch. According to the Watermaster, the point of diversion for Certificate 10028 is located within this overflow ditch. When water is diverted into Pole Creek Ditch by City of Sisters and Patterson Ranch any water that is not used flows into this overflow ditch and then into Whychus Creek. Water is only present at this location when there are unused flows from Pole Creek Ditch.

11. The seventh right to be leased is as follows:

Certificate: 3227 in the name of Sisters Domestic Water User Association
Use: Municipal Use
Priority Date: May 18, 1917
Quantity: 1.5 Cubic Foot per Second (CFS)
Source: Branton Ditch out of Whychus Creek (formerly Squaw Creek), tributary to the Deschutes River
Authorized Point of Diversion (POD): Branton Ditch
Authorized Place of Use: The Town of Sisters

12. Certificate 3227 does not describe the location of the Branton Ditch POD. However, the map associated with the water right shows the location of the POD as being within:

Twp	Rng	Mer	Sec	Q-Q
15 S	10 E	WM	9	SE NE

**The Watermaster has identified that this ditch and POD may no longer exist.*

13. The lease application includes the information required under OAR 690-077-0076(3). The Department provided notice of the lease application pursuant to OAR 690-077-0077(1). No comments were received.

14. The lease application requests to protect 1.45 CFS instream year round under Certificate 65091 and 6.3 AF (0.11 CFS) instream from April 1 through April 29 under Certificate 65090. The water stored in a reservoir under Certificate 65090 may be appropriated under Certificate 65091 as part of the maximum of 1.45 CFS authorized under that right. To prevent injury and enlargement, the Department has determined that up to 1.45 CFS may be protected instream with a portion of that being the 6.3 AF of stored water. 6.3 AF of stored water is equivalent to 0.009 CFS year round.

15. The lease application requests to protect water instream under Certificates 65091 and 65090 from Pole Creek into Whychus Creek. An instream reach is generally from the point of diversion to the mouth of the source stream (Pole Creek) but may be protected further if measurable in the receiving stream (Whychus Creek) (OAR 690-077-0015 (8)). The quantity that may be leased instream from Pole Creek is measurable into Whychus Creek and may be protected instream in Whychus Creek.

The lease application requests to protect water instream under Certificate 13509 from the Springs into Pole Creek and into Whychus Creek. Certificate 13509 identifies that these springs are tributary to Whychus Creek. However, as identified in Finding of Fact #5, flows from several of the springs are carried through a pick-up ditch and over the ridge into the Pole Creek sub basin. An instream reach is generally from the point of diversion to the mouth of the source stream (the springs and into the pick-up ditch) but may be protected further if measurable in the receiving stream (unnamed tributary to Pole Creek) (OAR 690-077-0015 (8)). The quantity that may be leased instream from the springs (1.25 CFS), which flow into the pick-up ditch, is measurable into the unnamed tributary to Pole Creek. The quantity to be leased is also measurable into Pole Creek and then into Whychus Creek and may be protected instream in down to the mouth of Whychus Creek.

The applicant requested to protect water instream under Certificate 13501 from the Pole Creek Swamp Springs into Pole Creek and then into Whychus Creek. The Pole Creek Swamp Springs, as described in Finding of Fact #8, are no longer physically diverted into Pole Creek Ditch but flow under natural conditions into Pole Creek Swamp, which is tributary to the natural channel of Pole Creek. An instream reach is generally from the point of diversion to the mouth of the source stream (Pole Creek Swamp Springs) but may be protected further if measurable in the receiving stream (Pole Creek) (OAR 690-077-0015 (8)). The quantity that may be leased instream from Pole Creek Swamp Springs is measurable into Pole Creek and may be protected instream in Pole Creek. The quantity proposed to be protected instream is also measurable into Whychus Creek.

The lease application requests to protect water instream under Certificate 10028 from the Springs into Pole Creek and then into Whychus Creek. However, the Springs (or overflow channel) do not flow under natural conditions into Pole Creek but rather flow (when water is present as described in Finding of Fact #10) into Whychus Creek. Water may not be protected instream in Pole Creek. For Whychus Creek, an instream reach is generally from the point of diversion to the mouth of the source stream (the Springs) but may be protected further if measurable in the receiving stream (Whychus Creek) (OAR 690-077-0015 (8)). The quantity that may be leased instream from the Springs (or overflow channel) is not measurable into Whychus Creek and may not be protected instream in Whychus Creek.

16. The instream use been modified from the lease application to prevent injury and enlargement and is as follows:

Springs, tributary to Whychus Creek (flow into a pick-up ditch, which then flows into an unnamed tributary to Pole Creek)

Certificate	Priority Date	Instream Rate (CFS)	Instream Volume (AF)	Period Protected Instream
Instream Reach: From the Springs to the mouth of the pick-up ditch in the NW SW of Sec 3, T16S, R9E, W.M.				
13509	11/1/1937	1.25	904.96	January 1 – December 31

Unnamed tributary to Pole Creek

Certificate	Priority Date	Instream Rate (CFS)	Instream Volume (AF)	Period Protected Instream
Instream Reach: From the confluence of the pick-up ditch with the unnamed tributary to Pole Creek to the mouth of the unnamed tributary to Pole Creek				
13509	11/1/1937	1.25	904.96	January 1 – December 31

Pole Creek Swamp Springs, tributary to Pole Creek

Certificate	Priority Date	Instream Rate (CFS)	Instream Volume (AF)	Period Protected Instream
Instream Reach: From Pole Creek Swamp Springs (as described in Finding of Fact #7) to mouth of spring channel (confluence with Pole Creek)				
13501	4/7/1937	1.25	904.96	January 1 – December 31

Pole Creek, tributary to Whychus Creek

Certificate	Priority Date	Instream Rate (CFS)	Instream Volume (AF)	Period Protected Instream
Instream Reach: From the confluence of the unnamed tributary to Pole Creek and Pole Creek to Pole Creek Ditch POD (as described in Finding of Fact #4)				
13509	11/1/1937	1.25	904.96	January 1 – December 31
65091 & 65090	11/17/1967	1.441	1043.24	
	8/10/1967	0.009	6.3	
Totals		2.7	1954.5	
Instream Reach: In Pole Creek, from confluence with Pole Creek Swamp to mouth of Pole Creek				
13501	4/7/1937	1.25	904.96	January 1 – December 31
13509	11/1/1937	1.25	904.96	
65091 & 65090	11/17/1967	1.441	1043.24	
	8/10/1967	0.009	6.3	
Totals		3.95	2859.46	

Springs, tributary to Whychus Creek

Certificate	Priority Date	Instream Rate (CFS)	Instream Volume (AF)	Period Protected Instream
Instream Reach: From POD (as described in Finding of Fact #9 to mouth of overflow channel (confluence with Whychus Creek)				
10028	2/11/1929	0.2	144.79	January 1 – December 31

Whychus Creek, tributary to the Deschutes River

Certificate	Priority Date	Instream Rate (CFS)	Instream Volume (AF)	Period Protected Instream
Instream Reach: From confluence of Pole Creek and Whychus Cr to POD for Cert 3227 (as described in Finding of Fact #12)				
13501	4/7/1937	1.25	904.96	January 1 – December 31
13509	11/1/1937	1.25	904.96	
65091 & 65090	11/17/1967	1.441	1043.24	
	8/10/1967	0.009	6.3	
Totals		3.95	2859.46	
Instream Reach: From POD for Cert 3227 to mouth of Whychus Creek				
13501	4/7/1937	1.25	904.96	January 1 – December 31
13509	11/1/1937	1.25	904.96	
65091 & 65090	11/17/1967	1.441	1043.24	
	8/10/1967	0.009	6.3	
3227	5/18/1917	1.5	1085.95	
Totals		5.45	3945.41	

17. If approved, this instream lease is not reasonably expected to affect land use significantly as prescribed by ORS 197.180, OAR Chapter 660, Divisions 30 and 31, and OAR Chapter 690, Division 5.
18. Based upon review of the application, comments received, information provided by the Department's Watermaster, and other available information, the Department finds that the lease will not result in injury or enlargement. This finding is made through an abbreviated review recognizing that the lease may be modified or revoked under OAR 690-077-0077 if the Department later finds that the lease is causing injury to any existing water right or enlargement of the original right.
19. If a right which has been leased is later proposed to be leased again or transferred to an instream use under ORS 537.348 and OAR 690-077-0070 or OAR 690-077-0075 a new injury review shall be required. Transfers will be subject to a full and complete review to determine consistency with the requirements of OAR Chapter 690, Division 380 and Division 077. Approval of this lease does not establish a precedent for approval of future leases or transfers.
20. The Lessor has requested that the lease terminate on December 31, 2021. The lease will commence the date the final order is signed and on January 1 of each succeeding calendar year the lease is in place.
21. The Lessor has requested the option of terminating the lease early with written notice to the Department.

CONCLUSIONS OF LAW

The Department concludes that the lease will not result in injury or enlargement, OAR 690-077-0077. The lease conforms to the applicable provisions of OAR 690-077-0015.

Therefore, it is ORDERED:

1. That the Lease as described herein is APPROVED.
2. The former place of use will no longer receive water as part of these rights, any supplemental rights, or any other layered water rights for irrigation use, including ground water registrations during the term of the lease.
3. The lease will terminate on December 31, 2021. For multiyear leases, the Lessor shall have the option of terminating the lease with written notice to the Department provided to both the Salem office and Watermaster office. Written notice of termination of a lease must be provided by all Lessors and the Lessee. The written notice to Salem office must include original signatures. The notice to the Watermaster office may be made by fax or e-mail. The lease may be terminated at any time during a calendar year. However, if the termination request is received less than 30-days prior to the period of allowed instream use (January 1 through December 31) or after the period of allowed use has begun for the water right(s) being leased, water may not be used under the right(s) leased until the following calendar year, unless the Director determines that enlargement would not occur.

Dated at Salem, Oregon this 26 day of May, 2017.



Dwight French, Water Right Services Administrator, for
THOMAS M. BYLER, DIRECTOR

This document was prepared by Joan Smith if you have any questions, please call 503-986-0892.

Mailing date: MAY 31 2017

STATE OF OREGON
 COUNTY OF DESCHUTES
 CERTIFICATE OF WATER RIGHT

THIS CERTIFICATE ISSUED TO

LLOYD F. BROGAN
 BOX 72
 SISTERS OR 97759

confirms the right to use the waters of a WELL in the WHYCHUS CREEK (formerly known as Squaw Creek) Basin for SUPPLEMENTAL IRRIGATION of 19.7 ACRES.

This right was perfected under Permit G-3095. The date of priority is MAY 13, 1966. The amount of water to which this right is entitled is limited to an amount actually used beneficially, and shall not exceed 0.246 CUBIC FOOT PER SECOND or its equivalent in case of rotation, measured at the well.

The well is located as follows:

Twp	Rng	Mer	Sec	Q-Q	Survey Coordinates
15 S	10 E	WM	10	SW SE	1290 FEET NORTH AND 20 FEET EAST FROM THE S 1/4 CORNER, SECTION 10

The amount of water used for irrigation, together with the amount secured under any other right existing for the same lands, is limited to a diversion of ONE-EIGHTIETH of one cubic foot per second, or its equivalent for each acre irrigated, and shall be further limited to a diversion of not to exceed 3 acre-feet per acre for each acre irrigated during the irrigation season of each year. The use shall conform to such reasonable rotation system as may be ordered by the proper state officer. The right to the use of the water for the above purpose is restricted to beneficial use on the lands or place of use described and is subject to the existing minimum flow policies established by the Water Policy Review Board.

A description of the place of use to which this right is appurtenant is as follows:

Twp	Rng	Mer	Sec	Q-Q	Tax Lot	Acres
15 S	10 E	WM	10	SW SE	704	19.7

This certificate describes that portion of the water right confirmed by Certificate 45033, State record of Water Right Certificates, NOT modified by the provisions of an order of the Water Resources Director entered October 12, 2005, approving Transfer Applications 8900 and 8902.

NOTICE OF RIGHT TO PETITION FOR RECONSIDERATION OR JUDICIAL REVIEW

This is an order in other than a contested case. This order is subject to judicial review under ORS 183.484. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080, you may either petition for judicial review or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied. In addition, under ORS 537.260 any person with an application, permit or water right certificate subsequent in priority may jointly or severally contest the issuance of the certificate at any time before it has issued, and after the time has expired for the completion of the appropriation under the permit, or within three months after issuance of the certificate.

THIS CERTIFICATE IS ISSUED TO CORRECTLY IDENTIFY THE AMOUNT OF WATER TO WHICH THIS RIGHT IS ENTITLED AND SUPERSEDES CERTIFICATE 82873.

The issuance of this superseding certificate does not confirm the status of the water right in regard to the provisions of ORS 540.610 pertaining to forfeiture or abandonment.

The use of water shall be limited when it interferes with any prior surface or ground water rights.

Issued DEC 26 2008


Phillip C. Ward, Director
Water Resources Department

STATE OF OREGON

COUNTY OF DESCHUTES

CERTIFICATE OF WATER RIGHT

THIS CERTIFICATE ISSUED TO

CITY OF SISTERS
150 N FIR ST
SISTERS, OR 97759

WILLITTS LLC
16488 WILT RD
SISTERS, OR 97759

confirms the right to use the waters of THREE WELLS in the WHYCHUS CREEK (formerly known as Squaw Creek) BASIN for SUPPLEMENTAL IRRIGATION of 12.5 ACRES.

This right was perfected under Permit G-3095. The date of priority is MAY 13, 1966. The amount of water to which this right is entitled is limited to an amount actually used beneficially, and shall not exceed 0.157 CUBIC FOOT PER SECOND (IF AVAILABLE AT THE ORIGINAL POINT OF APPROPRIATION BEING WITHIN THE SW ¼ SW ¼, SECTION 10, TOWNSHIP 15 SOUTH, RANGE 10 EAST, W.M.; 1290 FEET NORTH AND 20 FEET EAST FROM THE S ¼ CORNER OF SECTION 10) or its equivalent in case of rotation, measured at the well.

The wells are located as follows:

Well	Twp	Rng	Mer	Sec	Q-Q	Measured Distances
Well 4	15 S	10 E	WM	9	SE NE	100 FEET NORTH AND 85 FEET WEST FROM THE WEST 1/4 CORNER, SECTION 10
Well 3	15 S	10 E	WM	10	SW NW	280 FEET NORTH AND 120 FEET EAST FROM THE WEST 1/4 CORNER, SECTION 10
Well 1	15 S	10 E	WM	10	SW SE	1290 FEET NORTH AND 20 FEET EAST FROM THE SOUTH 1/4 CORNER, SECTION 10

The amount of water used for irrigation, together with the amount secured under any other right existing for the same lands, is limited to a diversion of ONE-EIGHTIETH of one cubic foot per second, or its equivalent for each acre irrigated, and shall be further limited to a diversion of not to exceed 3 acre-feet per acre for each acre irrigated during the irrigation season of each year. The right to the use of the water for the above purpose is restricted to beneficial use on the lands or place of use described.

A description of the place of use to which this right is appurtenant is as follows:

SUPPLEMENTAL IRRIGATION - CITY OF SISTERS							
Source	Twp	Rng	Mer	Sec	Q-Q	Tax Lot	Acres
Well 1	15 S	10 E	WM	10	SW SE	704	7.3
Well 1	15 S	10 E	WM	10	SE SE	704	0.2

SUPPLEMENTAL IRRIGATION - WILLITTS, LLC							
Source	Twp	Rng	Mer	Sec	Q-Q	Tax Lot	Acres
Wells 3 & 4	15 S	10 E	WM	10	SW NW	800	1.3
Wells 3 & 4	15 S	10 E	WM	10	NW SW	800	3.7

The quantity of water diverted from the additional and new points of appropriation, together with that diverted at the old points of diversion, shall not exceed the quantity of water lawfully available at the original points of appropriation.

When required by the Department, the water user shall install and maintain an in-line flow meter or other suitable device(s) for measuring and recording the quantity of water diverted. The types and plans of the measuring device must be approved by the Department prior to beginning construction and shall be installed under the general supervision of the Department.

This certificate describes that portion of the water right confirmed by Certificate 85430, State Record of Water Right Certificates, NOT modified by the provisions of an order of the Water Resources Director entered DEC 09 2011, approving Transfer Application T-11201.

The issuance of this superseding certificate does not confirm the status of the water right in regard to the provisions of ORS 540.610 pertaining to forfeiture or abandonment.

The use of water shall be limited when it interferes with any prior surface or ground water rights.

WITNESS the signature of the Water Resources Director, affixed DEC 09 2011.



Dwight French, Water Right Services Administrator, for
PHILLIP C. WARD, DIRECTOR

STATE OF OREGON
COUNTY OF DESCHUTES
CERTIFICATE OF WATER RIGHT

THIS CERTIFICATE ISSUED TO

SHARON AMESTOY
AMESTOY RANCH LLC
2955 NE 38TH AVE
PORTLAND, OR 97212

CITY OF SISTERS
150 N FIR ST.
SISTERS, OR 97759

STEVEN AND CINDY GREER
67315 BASS LANE
BEND, OR 97701

LAZY Z RANCH
c/o JAY POULOS
4389 CROISAN RIDGE WAY
SALEM, OR 97302

MURRAY GRAY LLC
c/o MURRAY HERMAN
1628 NW EVERETT ST.
PORTLAND, OR 97209-2109

SKI POND RANCH LLC
c/o DAVID HERMAN
1628 NW EVERETT ST.
PORTLAND, OR 97209-2109

confirms the right to use the waters of FOUR WELLS in the WHYCHUS CREEK (formerly known as Squaw Creek) BASIN for IRRIGATION OF 8.2 ACRES AND SUPPLEMENTAL IRRIGATION OF 95.6 ACRES.

This right was perfected under Permit G-4841. The date of priority is AUGUST 25, 1970. The amount of water to which this right is entitled is limited to an amount actually used beneficially, and shall not exceed 1.034 CUBIC FEET PER SECOND (cfs); being

Water User	Primary Rate (cfs)	Supplemental Rate (cfs)
Amestoy Ranch	0	0.206
City of Sisters	0	0.108
Steven & Cindy Greer	0.013	0
Lazy Z Ranch	0	0.101
Murray Gray, LLC	0.09	0
Ski Pond Ranch, LLC	0	0.516

(IF AVAILABLE AT THE ORIGINAL POINT OF APPROPRIATION, BEING WITHIN THE NW¼ NW¼, SEC. 14, T15S, R10E, WM, 290 FEET SOUTH AND 140 FEET EAST FROM THE NW CORNER OF SECTION 14) or its equivalent in case of rotation, measured at the wells.

The wells are located as follows:

Twp	Rng	Mer	Sec	Q-Q	Tax Lot	Measured Distances
15 S	10 E	WM	10	NW SE	700	WELL 5 - 830 FEET SOUTH AND 350 FEET EAST FROM THE C¼ CORNER OF SECTION 10
15 S	10 E	WM	10	SW SE	704	WELL 1 - 1290 FEET NORTH AND 20 FEET EAST FROM THE SOUTH 1/4 CORNER OF SECTION 10
15 S	10 E	WM	14	NW NW	1900	WELL 2 - 290 FEET SOUTH AND 140 FEET EAST FROM THE NW CORNER OF SECTION 14
15 S	10 E	WM	25	NW SE	907	GREER WELL - 1460 FEET NORTH AND 1750 FEET WEST FROM THE SE CORNER OF SECTION 25

The amount of water used for irrigation, together with the amount secured under any other right existing for the same lands, is limited to a diversion of ONE-EIGHTIETH of one cubic foot per second, or its equivalent for each acre irrigated, and shall be further limited to a diversion of not to exceed 3.0 acre-feet per acre for each acre irrigated during the irrigation season of each year.

A description of the place of use to which this right is appurtenant is as follows:

IRRIGATION – MURRAY GRAY							
Source	Twp	Rng	Mer	Sec	Q-Q	Tax Lot	Acres
Well 2	15 S	10 E	WM	14	NW NW	1900	7.2

IRRIGATION – STEVEN AND CINDY GREER							
Source	Twp	Rng	Mer	Sec	Q-Q	Tax Lot	Acres
Greer Well	15 S	10 E	WM	25	NW SE	907	1.0

SUPPLEMENTAL IRRIGATION – AMESTOY RANCH							
Source	Twp	Rng	Mer	Sec	Q-Q	Tax Lot	Acres
Well 2	15 S	10 E	WM	10	SW NE	702	0.9
Well 2	15 S	10 E	WM	10	SE NE	702	6.8
Well 2	15 S	10 E	WM	10	NE SE	702	6.8
Well 2	15 S	10 E	WM	10	NW SE	702	2.0

SUPPLEMENTAL IRRIGATION – CITY OF SISTERS							
Source	Twp	Rng	Mer	Sec	Q-Q	Tax Lot	Acres
Well 2	15 S	10 E	WM	10	NE SW	704	0.9
Well 2	15 S	10 E	WM	10	SE SW	704	11.6
Well 1	15 S	10 E	WM	10	NW SE	704	2.4
Well 2	15 S	10 E	WM	10	SE SE	704	4.0
Well 2	15 S	10 E	WM	15	NE NE	704	10.8

SUPPLEMENTAL IRRIGATION – LAZY Z RANCH							
Source	Twp	Rng	Mer	Sec	Q-Q	Tax Lot	Acres
Well 5	15 S	10 E	WM	10	NE SW	700	8.1

SUPPLEMENTAL IRRIGATION – SKI POND RANCH							
Source	Twp	Rng	Mer	Sec	Q-Q	Tax Lot	Acres
Well 2	15 S	10 E	WM	14	NE NE	1700	1.9
Well 2	15 S	10 E	WM	14	NW NE	1700	6.3
Well 2	15 S	10 E	WM	14	SW NE	1700	24.7
Well 2	15 S	10 E	WM	14	SE NE	1700	8.4

The use shall conform to such reasonable rotation system as may be ordered by the proper state officer.

The quantity of water diverted from the additional and new points of appropriation, together with that diverted at the old points of diversion, shall not exceed the quantity of water lawfully available at the original points of appropriation.

When required by the Department, the water user shall install and maintain an in-line flow meter or other suitable device(s) for measuring and recording the quantity of water diverted. The types and plans of the measuring device must be approved by the Department prior to beginning construction and shall be installed under the general supervision of the Department.

This certificate describes that portion of the water right confirmed by Certificate 87345, State Record of Water Right Certificates, NOT modified by the provisions of an order of the Water Resources Director entered July 18th, 2016, approving Transfer Application T-12188.

The issuance of this superseding certificate does not confirm the status of the water right in regard to the provisions of ORS 540.610 pertaining to forfeiture or abandonment.

The right to the use of the water for the above purpose is restricted to beneficial use on the lands or place of use described.

WITNESS the signature of the Water Resources Director, affixed July 18th, 2016.



Dwight French, Water Right Services Administrator, for
Thomas M. Byler, Director
Oregon Water Resources Department

**BEFORE THE WATER RESOURCES DEPARTMENT
OF THE
STATE OF OREGON**

In the Matter of Transfer Application) **FINAL ORDER**
T-12188, Deschutes County) **APPROVING A CHANGE IN PLACE**
) **OF USE**

Authority

Oregon Revised Statute (ORS) 537.705 and 540.505 to 540.580 establish the process in which a water right holder may submit a request to transfer the point of appropriation, place of use, or character of use authorized under an existing water right. Oregon Administrative Rule (OAR) Chapter 690, Division 380 implements the statutes and provides the Department’s procedures and criteria for evaluating transfer applications.

Applicant

CITY OF SISTERS
PO BOX 39
SISTERS, OR 97759

Receiving Landowner

SKI POND RANCH, LLC
C/O DAVID HERMAN
1775 W. STATE ST.
BOISE, ID 83702

Findings of Fact

1. On October 26, 2015, CITY OF SISTERS filed an application to change the place of use under Certificate 87345. The Department assigned the application number T-12188.
2. Ski Pond Ranch, LLC (David Herman) is the receiving landowner who will be responsible for completion of the changes.
3. Notice of the application for transfer was published on November 3, 2015, pursuant to OAR 690-380-4000. No comments were filed in response to the notice.
4. On January 21, 2016, the Department sent a copy of the Draft Preliminary Determination proposing to approve Transfer Application T-12188 to the applicant. The Draft Preliminary Determination cover letter set forth a deadline of February 22, 2016, for the applicant to respond. The applicant requested that the Department proceed with issuance of a Preliminary Determination and provided the necessary information to demonstrate that the applicant is authorized to pursue the transfer.

This final order is subject to judicial review by the Court of Appeals under ORS 183.482. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.482(1). Pursuant to ORS 536.075 and OAR 137-003-0675, you may petition for judicial review or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

5. On June 7, 2016, the Department issued a Preliminary Determination proposing to approve Transfer Application T-12188 and sent a copy to the applicant. Additionally, notice of the Preliminary Determination for the transfer application was published in the Department's weekly notice on July 14, 2016 pursuant to ORS 540.520 and OAR 690-380-4020. No protests were filed in response to the notice.

6. The portion of the right to be transferred is as follows:

Certificate: 87345 in the names of SHARON AMESTOY (AMESTOY RANCH LLC), CITY OF SISTERS, STEVEN AND CINDY GREER, LAXY Z RANCH (c/o JAY POULOS), MURRAY GRAY LLC (c/o MURRAY HERMAN), AND SKI POND RANCH LLC (c/o DAVID HERMAN) (perfected under Permit G-4841)

Use: IRRIGATION OF 3.1 ACRES

Priority Date: AUGUST 25, 1970

Rate: 0.039 CUBIC FOOT PER SECOND

Limit/Duty: The amount of water used for irrigation, together with the amount secured under any other right existing for the same lands, is limited to a diversion of ONE-EIGHTIETH of one cubic foot per second, or its equivalent for each acre irrigated, and shall be further limited to a diversion of not to exceed 3.0 acre-feet per acre for each acre irrigated during the irrigation season of each year.

Source: A WELL within the WHYCHUS CREEK BASIN

Authorized Point of Appropriation:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
15 S	10 E	WM	14	NW NW	Well 2 - 290 FEET SOUTH AND 140 FEET EAST FROM THE NW CORNER OF SECTION 14

Authorized Place of Use:

IRRIGATION					
Twp	Rng	Mer	Sec	Q-Q	Acres
15 S	10 E	WM	15	NE NE	3.1

7. A scrivener's error was found on Certificate 87345. Certificate 87345 describes the location of the City of Sisters irrigation as:

IRRIGATION - CITY OF SISTERS							
Source	Twp	Rng	Mer	Sec	Q-Q	Tax Lot	Acres
Well 2	15 S	10 E	WM	15	NE NE	200	5.0
Well 2	15 S	10 E	WM	15	SE NE	200	11.1

Special Order Volume 85 page 721 voluntarily canceled a portion of the irrigated acres. The City of Sisters canceled 1.9 acres in the NE NE and 11.1 acres in the SE NE of Section 15. Certificate 87345 should be described as:

IRRIGATION - CITY OF SISTERS							
Source	Twp	Rng	Mer	Sec	Q-Q	Tax Lot	Acres
Well 2	15 S	10 E	WM	15	NE NE	200	3.1

8. Transfer Application T-12188 proposes to change the place of use of the right to:

IRRIGATION					
Twp	Rng	Mer	Sec	Q-Q	Acres
15 S	10 E	WM	14	SW NE	3.1

Transfer Review Criteria (OAR 690-380-4010)

9. Water has been used within the last five years according to the terms and conditions of the right. There is no information in the record that would demonstrate that the right is subject to forfeiture under ORS 540.610.
10. A pump, pipeline, and sprinkler system sufficient to use the full amount of water allowed under the existing right were present within the five-year period prior to submittal of Transfer Application T-12188.
11. The proposed change would not result in enlargement of the right.
12. The proposed change would not result in injury to other water rights.
13. All other application requirements are met.

Conclusions of Law

The change in place of use proposed in Transfer Application T-12188 is consistent with the requirements of ORS 537.705 and 540.505 to 540.580 and OAR 690-380-5000.

Now, therefore, it is ORDERED:

1. The change in place of use proposed in Transfer Application T-12188 is approved.
2. The right to the use of the water is restricted to beneficial use at the place of use described, and is subject to all other conditions and limitations contained in Certificate 87345 and any related decree.
3. Water right Certificate 87345 is cancelled. A new certificate will be issued describing that portion of the right not affected by this transfer.
4. Water use measurement conditions:
 - a. Before water use may begin under this order, the water user shall install a totalizing flow meter, or, with prior approval of the Director, another suitable measuring device at each point of appropriation (new and existing).
 - b. The water user shall maintain the meters or measuring devices in good working order.
 - c. The water user shall allow the Watermaster access to the meters or measuring devices; provided however, where the meters or measuring devices are located within a private structure, the Watermaster shall request access upon reasonable notice.

5. The former place of use of the transferred right shall no longer receive water under the right.
6. Full beneficial use of the water shall be made, consistent with the terms of this order, on or before **October 1, 2017**. A Claim of Beneficial Use prepared by a Certified Water Right Examiner shall be submitted by the applicant to the Department within one year after the deadline for completion of the change and full beneficial use of the water.
7. After satisfactory proof of beneficial use is received, a new certificate confirming the right transferred will be issued.

Dated at Salem, Oregon this 18 day of July, 2016.



Dwight French, Water Right Services Administrator, for
Thomas M. Byler, Director
Oregon Water Resources Department

Mailing date: JUL 21 2016

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WATER RESOURCES DEPT
SALEM, OREGON

Oregon Water Resources Department

Municipal Reclaimed Water Registration Form

A water use permit may not be required if the water being used is reclaimed water as defined in ORS 537.131 and the reclaimed water use is both authorized by the Oregon Department of Environmental Quality (DEQ) and registered with Oregon Water Resources Department (WRD)(ORS 537.132). Currently there is no fee for registering.

Complete and send this Registration Form to the DEQ permit writer managing the wastewater treatment facility discharge permit. DEQ will review and sign this Registration Form prior to sending it on to WRD in Salem. A response letter will be sent by WRD to all parties within 60 days of receipt.

Instructions are available to guide you. If you need assistance, please call 503-986-0900 and ask for the "Water Reuse Coordinator" or contact the local watermaster in your county. Insert "N/A" if the requested information does not apply to your situation.

1. Name of "Registrant". Who will use the reclaimed water?

Name of Reclaimed Water User: City of Sisters

County where reclaimed water use will occur: Deschutes

Mail Address: P.O. Box 39 Sisters Oregon 97759
Street/P.O. Box City State Zip

Daytime Telephone: (541) 549-6022 E-mail: pbertagna@ci.sisters.or.us

2. Does the reclaimed water user own the land where the use will occur?

YES NO If no, provide the landowner's name and contact information.

Landowner Name: City of Sisters

Mail Address: P.O. Box 39 Sisters Oregon 97759
Street/P.O. Box City State Zip

Daytime Telephone: (541) 549-6022 E-mail: pbertagna@ci.sisters.or.us

3. Are there existing water rights on the same land where the use will occur?

YES (provide information below) NO

Application No. See attached map Permit No. See attached map

Certificate No. _____ Decree vol. & pg. 95-141

Will the reclaimed water be used instead of existing water rights OR used to supplement the continued use of the existing water rights? Instead of

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DEPARTMENT OF WATER RESOURCES
SYSTEMS DIVISION

4. Has DEQ issued a Municipal Wastewater Treatment Facility Discharge Permit authorizing the use of reclaimed water? (If yes, provide permit number)

YES NPDES Permit No. _____ or WPCF Permit No. 101779

Permit Effective Date: January 22, 2016 Permit Expiration Date: December 31, 2025

DEQ Region: (Check one) Northwest Region Eastern Region Western Region

NO Permit application was submitted to DEQ, but not yet issued.

NO Permit application has not been submitted to DEQ.

5. Who is treating and supplying the reclaimed water to the user?

Name of Supplier: City of Sisters Telephone No. (541) 549-6022

Treatment Facility Name: Sisters WWTP Telephone No. (541) 549-6022

Mail Address: P.O. Box 39 Sisters OR 97759
Street/P.O. Box City State Zip

6. Which water provider supplies potable municipal water to the city/community that produces the sewage entering the treatment facility?

Municipal Water Provider: City of Sisters Telephone No. (541) 549-6022

Source(s) of Municipal Water: Groundwater
(stream name, groundwater, and/or reservoir name)

7. Will the use of reclaimed water occur inside or outside the water service boundaries of the potable municipal water provider identified above in Question 6?

INSIDE OUTSIDE

8. What is the length in years of the agreement/contract between the reclaimed water user and the reclaimed water supplier? N/A

Describe any conditions in the agreement that limit use of the reclaimed water.

No agreement is necessary because the reclaimed water user and the reclaimed water supplier are the same.

9. Please describe the transmission system that delivers reclaimed water from the wastewater treatment facility to the place of reclaimed water use.

Reclaimed water is pumped from the treatment facility to the place of reclaimed water use using two 100 HP, 1,000 gpm pumps, through an 18" HDPE pipe, 10,000 feet in length.

(Include type of construction of diversion works/pump capacity, length and dimensions of supply ditches/pipelines)

10. What is the Intended Use(s) of Reclaimed Water?

Irrigation

(Irrigation, aquifer recharge, wetlands, industrial, cooling, aquifer storage & recovery, etc.)

Irrigation Total Acres: 159.7 What type of crop? Combination of forest application and hay
(hay, pasture, golf course, wood fiber, etc.)

What is the irrigation application system? Overhead Irrigation - Multiple Sprinklers
(flood, center pivot, wheel line, drip, micro-sprinklers)

How much Reclaimed Water will be used? 257 gpm seasonal average, 1,000 gpm peak flow
(cubic feet per second, OR gallons per minute)

Date use began or will begin: June 2017 Period of use (month/day): from April to October

11. What are the water user's motivations to use reclaimed water?

- My existing water rights are "junior" and not always reliable.
- Another water source is available, but reclaimed water is less expensive.
- Reclaimed water is the only source available and enables the use listed in Question 10.
- Reclaimed water allows a WRD transfer of existing water rights to a different location.
- Reclaimed water use reduces demand on the local municipal water supply.
- To assist the treatment facility in meeting DEQ regulatory permit requirements.
- To recharge the aquifer or store water in the aquifer for future recovery.
- Other (describe): _____

12. Describe the historic reclaimed water disposal method.

A) Into which stream was the reclaimed water discharged? Not Applicable

B) Has the reclaimed water been discharged into the stream for 5 or more years?

YES NO

C) Where did the treated wastewater historically enter the stream?

(Township, Range and Section, or distance from landmark, or river miles, or Lat/Long)

D) Does the amount (rate in gpm or cfs) of reclaimed water proposed for use under this registration represent more than 50% of the total average annual flow of the stream?

YES NO UNKNOWN

Source of information used to answer this? _____

13. Is the required map attached showing the reclaimed water transmission system and place of use? YES NO (If No, please prepare and attach map).

The Registration Form is not complete without an adequate map.
See map requirement explanation on page 4.

14. MAP REQUIREMENTS:

This registration must be accompanied by a map, or maps, to show the location of the wastewater treatment facility, location of reclaimed water transmission system (pipelines, canals, etc.) and the place of reclaimed water use. Features of the map(s) should include the following:

- A north arrow.
- Drawn to scale at not less than 4" = 1 mile, with the scale identified.
- Township, Range, Section, Quarter-Quarters, and tax lot number(s).
- Place of use shown by Quarter-Quarter section with shading or diagonal lines.
- Acres, if land application, per Quarter-Quarter section (approximate if not certain).
- Location of main canals or pipelines to and within the reclaimed water use area.
- Streams and roads identified if they cross through the map.
- Other obvious features that would help someone in the field locate the place of use.
- A legend.

**A map showing the wastewater treatment facility, transmission system, and place of use at a scale of 4" = 1 mile is fine only if a second map is provided showing the place of use at not less than 4" = 1 mile.*

15. ADDITIONAL COMMENTS: Provide additional information here or attach additional pages.

16. Signatures of Registrant and Reclaimed Water Supplier:

I/We certify that the information provided in this Registration Form is an accurate representation of the proposed reclaimed water use to the best of my knowledge:

Registrant Printed Name: Paul Bertagna Title: Public Works Director

Registrant Signature: Paul Bertagna City Manager Date: 11/10/16

Supplier Printed Name: Paul Bertagna Title: Public Works Director

Supplier Signature: Paul Bertagna City Manager Date: 11/10/16

NOTE: Once completed and signed, keep a copy and send this form to the DEQ permit writer responsible for the wastewater treatment facility permit. DEQ will sign and forward the form to WRD in Salem. A response letter will be sent by WRD to all parties within 60 days.

This section is to be completed by DEQ

17. Signature of DEQ Water Quality Manager:

Date registration form received at DEQ: November 10, 2016

Pursuant to ORS 537.132 DEQ has:

- a) Authorized the use of reclaimed water (referred to by DEQ regulations as "recycled water") as evidenced by the NPDES or WPCF permit issued and described below.

Permit Number: 101779 DEQ File Number: 81850

Printed DEQ Permit Writer's Name: Lawrence Brown RBHS - Environmental Health Specialist

Mail Address: 475 NE Bellevue Drive - Suite 110; Bend OR 97701

Telephone: (541) 633-2025 E-mail: brown.larry@deq.state.or.us

- b) Consulted with State Department of Fish and Wildlife and determined this use of reclaimed water shall not have a significant negative impact on fish or wildlife.

ODFW contact name: Danette Faucera

ODFW contact phone number: (503) 947-6092

- c) Determined the use of reclaimed water is intended to improve the water quality of the receiving stream.

The reclaimed water is (e.g. too warm for salmonids): Not applicable

I certify the provisions of ORS 537.132(1)(a)(b) and (c) for this application are satisfied.


DEQ Water Quality Manager Signature

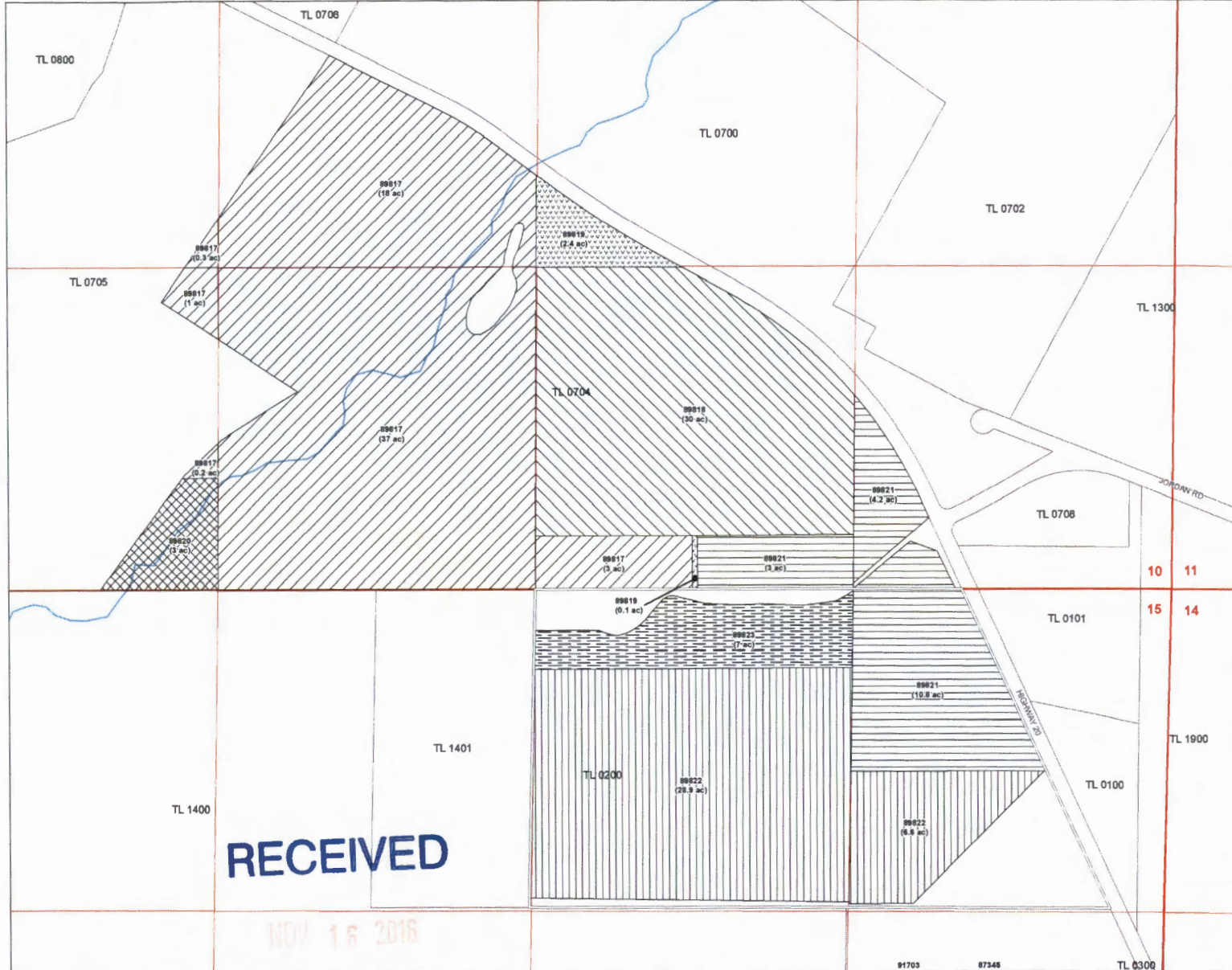
Date NOV 15, 2016

Don Butcher
DEQ Water Quality Manager's printed name

Once signed by DEQ, this completed form is to be sent to:

Oregon Water Resources Department
C/O Water Reuse Coordinator
725 Summer St. NE, Suite A
Salem, OR 97301-1266

Township 15 South, Range 10 East (W.M.)



Lazy Z Surface Water Rights
City of Sisters

LEGEND

- Area of Interest
- 88817 (CW 71, T-11318)
- 88818 (CW 71, T-11318)
- 88819 (CW 71, T-11318)
- 88820 (CW 71, T-11318)
- 88821 (CW 71, T-11318)
- 88822 (CW 71, T-11318)
- 88823 (CW 71, T-11318)
- All Other Features**
- City of Sisters UGB
- Tax Lots
- Uncle John Ditch



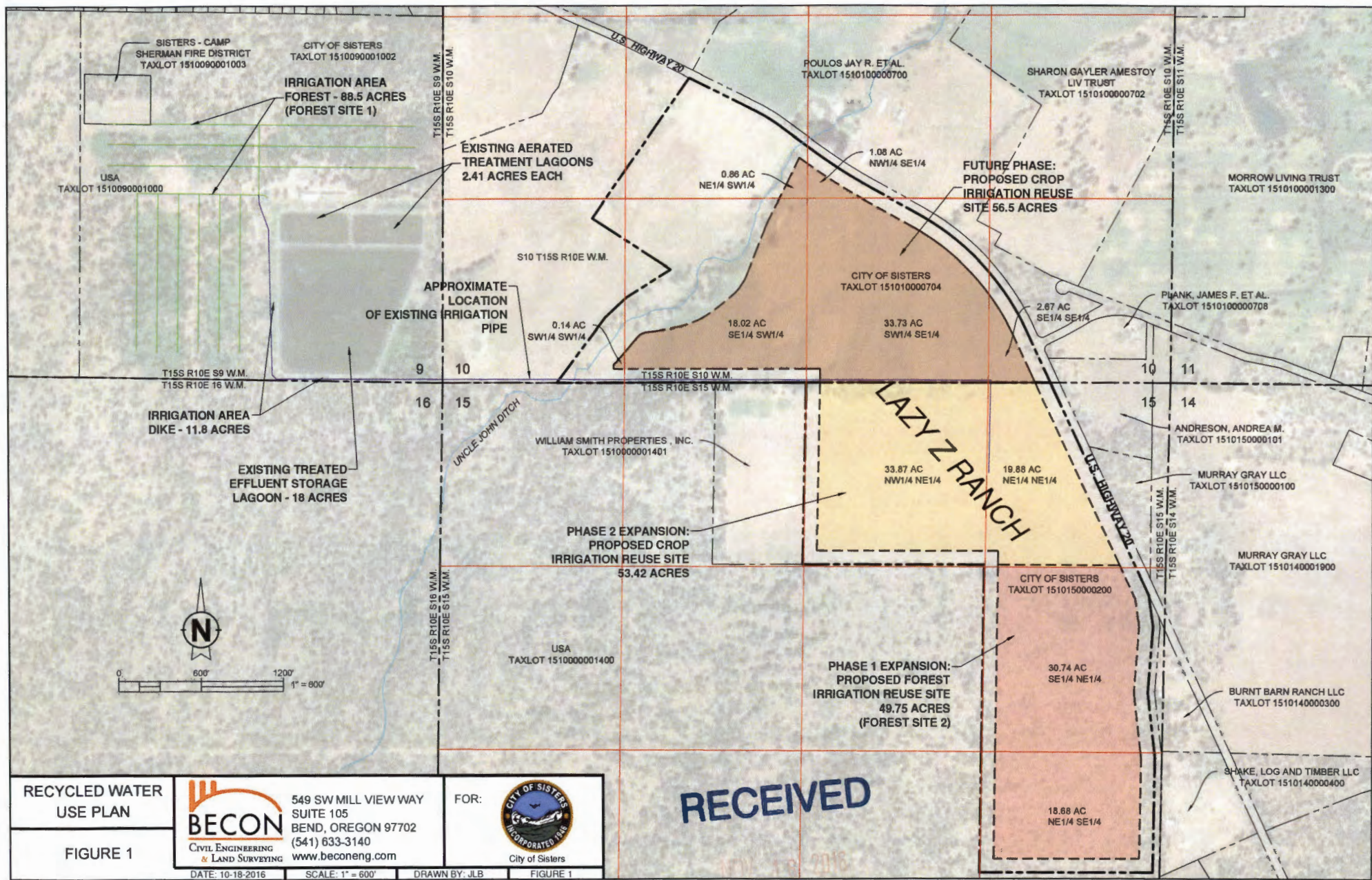
MAP NOTES:
Date: January 24, 2013
Data Sources: Deschutes Co GIS, Deschutes River Conservancy



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WATER RESOURCES DEPT
SALEM, OREGON



Section 15: NENE,
NWNE

Reclaimed Water Registration Checklist

RM (assigned by Kerri) - 211 County Deschutes Registrant (User of Water) City of Sisters
 Place of Use: Township 15S Range 10E Section 10, 15 QQ's SECTION 10 = SESE, SWSE, SE, SW, SWSW, NWSE, NESW, NW, NN
 Amount 0.57CFS Use Irrigation Acres (if for IR) 159.7 WM Dist. # 11
 Supplier City of Sisters DEQ Muni WW Permit # (Source) 101779
 Point of Diversion: Township 15S Range 10E Section 9 QQ SESE, SWSE
 Contract Length in Years N/A
 Agent (if any) N/A

Property ownership: Does the Registrant own all the land for the proposed project? (Y) / N
 If No:

The affected landowner's name and mailing address must be listed

The **map** must meet the following minimum requirements.

- Township, Range, Section
- Streams and road identified if they cross through the map
- Place of use, 1/4-1/4's and tax lot clearly identified
- Even map scale not less than 4" = 1 mile (1" = 1320 ft.)
- Location of *each* diversion point (WW Treatment Plant)
- North Directional Symbol
- Number of acres per 1/4-1/4 if for irrigation, nursery, or agriculture
- Legend

**A map showing the wastewater treatment facility, transmission system, and place of use at a scale of 4" = >1 mile is fine only if a second map is provided showing the place of use at not less than 4" = 1 mile.*

Signature of *all* Registrants and Reclaimed Water Supplier

DEQ section (17) is completely filled out and signed.

Existing Water Rights - 89817, 89819, 89820, 89818, 89821, 89822,

***Do not send registration back to applicant if it is not complete, ALL registrations go to Kerri Cope.**

Reviewed by: KJC Date: 11/28/16

*Remember there is no fee for Reclaimed Water Registrations

Oregon Department of Environmental Quality
RECYCLED WATER USE PLAN SUMMARY



Directions: Check (✓) appropriate boxes for tables and provide brief narrative where necessary. Submit with Recycled Water Use Plan to DEQ.

APPLICANT INFORMATION

Facility Name: City of Sisters Waste Water Treatment Plant
Address: 912 S. Locust Street, Sisters OR 97759
Contact Name/Phone Number: Paul Bertagna/541-323-5212

TYPE OF WASTEWATER TREATMENT PLANT

<input type="checkbox"/> Activated Sludge	<input type="checkbox"/> Re-circulating Gravel/Sand Filter
<input type="checkbox"/> Mechanically Aerated Lagoon	<input type="checkbox"/> Rotating Biological Filter
<input checked="" type="checkbox"/> Aerated Lagoon	<input type="checkbox"/> Other (Specify):

Average Dry Weather Flow, million gallons per day (MGD): _____

TREATMENT CLASS IN ACCORDANCE WITH OAR 340-055-0012

<input type="checkbox"/> Class A	<input type="checkbox"/> Class C
<input type="checkbox"/> Class B	<input checked="" type="checkbox"/> Class D
<input type="checkbox"/> Non-Disinfected water	

TREATMENT EFFICIENCY CAPABILITY DURING REUSE

<input type="checkbox"/> Tertiary Treatment	<input type="checkbox"/> 85% or more BOD/TSS removal
<input type="checkbox"/> 95% or more BOD/TSS removal	<input type="checkbox"/> Rotating Biological Filter
<input type="checkbox"/> 90% or more BOD/TSS removal	<input checked="" type="checkbox"/> Other (Specify): 80% TSS removal efficiency

DISINFECTION METHOD

<input checked="" type="checkbox"/> Chlorine injection just prior to irrigation
<input type="checkbox"/> Chlorine injection with storage of recycled water
<input type="checkbox"/> Chlorine injection after storage just prior to irrigation
<input type="checkbox"/> UV exposure just prior to irrigation
<input type="checkbox"/> UV exposure with storage of recycled water
<input type="checkbox"/> UV exposure after storage just prior to irrigation
<input type="checkbox"/> Other (specify):

STORAGE IMPOUNDMENT

	Y	N
Is there a storage facility proposed for this project?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
If yes, at the WWTP	<input type="checkbox"/>	<input checked="" type="checkbox"/>
If yes, located at a location other than the WWTP	<input type="checkbox"/>	<input checked="" type="checkbox"/>
If yes to either of the above, specify the location and length of time the storage facility will be used:		

Recycled Water Use Plan Summary

ARE THERE ALARMS FOR VARIOUS UNIT PROCESSES?

		Y	N
Are alarms independent of the normal power supply of the plant?		<input type="checkbox"/>	<input checked="" type="checkbox"/>
Failure of a disinfection treatment process?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Failure of a clarification process?	N/A	<input type="checkbox"/>	<input type="checkbox"/>
Failure of a coagulation process?	N/A	<input type="checkbox"/>	<input type="checkbox"/>
Failure of a filtration process?	N/A	<input type="checkbox"/>	<input type="checkbox"/>
Are the alarms on separate circuit breakers from the reuse pumps?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Is the Recycled Water back-up generator tested regularly?		<input type="checkbox"/>	<input type="checkbox"/>

IN THE EVENT OF POWER LOSS:

		Y	N
Can the plant continue to discharge?		<input type="checkbox"/>	<input checked="" type="checkbox"/>
Can there be any irrigation of non-disinfected water?		<input type="checkbox"/>	<input checked="" type="checkbox"/>
If no to either of the above, specify control measures that will be in place to stop the irrigation as soon as possible.			
The irrigation pumps cannot operate without power so the entire system will not run and the auto-dialer will call out to our on-call personnel that there has been a power outage.			

RECYCLED WATER WILL BE BENEFICIALLY USED FOR THE FOLLOWING (CHECK ALL THAT APPLY):

✓	Beneficial Purpose	Class				
		A	B	C	D	ND
Irrigation						
<input checked="" type="checkbox"/>	Fodder, fiber, seed crops not intended for human ingestion, commercial timber	Y	Y	Y	Y	Y
<input type="checkbox"/>	Firewood, ornamental nursery stock, Christmas trees	Y	Y	Y	Y	N
<input type="checkbox"/>	Sod	Y	Y	Y	Y	N
<input type="checkbox"/>	Pasture for animals	Y	Y	Y	Y	N
<input type="checkbox"/>	Processed food crops	Y	Y	Y	N	N
<input type="checkbox"/>	Orchards or vineyards if an irrigation method is used to apply recycled water directly to the soil	Y	Y	Y	N	N
<input type="checkbox"/>	Golf courses, cemeteries, highway medians, industrial or business campuses	Y	Y	Y	N	N
<input type="checkbox"/>	Any agricultural or horticultural use	Y	N	N	N	N
<input type="checkbox"/>	Parks, playgrounds, school yards, residential landscapes, other landscapes accessible to the public	Y	N	N	N	N
Industrial, Commercial, or Construction						
<input type="checkbox"/>	Industrial cooling	Y	Y	Y	N	N
<input type="checkbox"/>	Rock crushing, aggregate washing, mixing concrete	Y	Y	Y	N	N
<input type="checkbox"/>	Dust control	Y	Y	Y	N	N
<input type="checkbox"/>	Nonstructural fire fighting using aircraft	Y	Y	Y	N	N
<input type="checkbox"/>	Street sweeping or sanitary sewer flushing	Y	Y	Y	N	N
<input type="checkbox"/>	Stand alone fire suppression systems in commercial and residential buildings	Y	Y	N	N	N
<input type="checkbox"/>	Non-residential toilet or urinal flushing, floor drain trap priming	Y	Y	N	N	N
<input type="checkbox"/>	Commercial car washing	Y	N	N	N	N
<input type="checkbox"/>	Fountains when the water is not intended for human consumption	Y	N	N	N	N

Recycled Water Use Plan Summary

✓	Beneficial Purpose	Class				
		A	B	C	D	ND
<input type="checkbox"/>	Impoundments or Artificial Groundwater Recharge					
<input type="checkbox"/>	Water supply for landscape impoundments including, but not limited to, golf course water ponds and non-residential landscape ponds	Y	Y	Y	N	N
<input type="checkbox"/>	Restricted recreational impoundments	Y	Y	N	N	N
<input type="checkbox"/>	Nonrestricted recreational impoundments including, but not limited to, recreational lakes, water features accessible to the public, and public fishing ponds	Y	N	N	N	N
<input type="checkbox"/>	Artificial groundwater recharge	Y	N	N	N	N
<input type="checkbox"/>	Other (describe):					

PAGES 4 & 5 REQUIRED FOR IRRIGATION ONLY

THE IRRIGATION AREA WILL BE USED FOR THE FOLLOWING (CHECK ALL THAT APPLY):

<input checked="" type="checkbox"/>	Crops (specify types): Orchard Grass
<input type="checkbox"/>	Pasture
<input checked="" type="checkbox"/>	Forest
<input type="checkbox"/>	Public access areas (specify types):
<input type="checkbox"/>	Natural areas (specify species or mix):
<input type="checkbox"/>	Other (specify):

APPLICATION RATE

	Y	N
Will irrigation be controlled not to exceed the water consumption rate of the crop being grown?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Will irrigation be controlled not to exceed the nutrient requirements of the crop being grown?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

What is the proposed application rate of the recycled water? Varies, see RWUP Section 7.0

Acreage of irrigation site Varies, see RWUP Section 7.0

The months that irrigation will be permitted April to October

If irrigation occurs with Class C recycled water at nighttime, will the public access be restricted to allow for sunlight contact on irrigated water? Yes No N/A

If so, specify length of time _____

TRANSMISSION & DISTRIBUTION LINES/PIPES

	Y	N
At the end of the irrigation day, will the transport lines/pipes be drained back to the wastewater treatment facility?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Is there a gate/ball shut off valve at the irrigation pump?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Is there an in line pressure relief valve to by-pass reuse water back into the source basin if there is a line transmission plug?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
At the cessation of the irrigation season, will the transport lines/pipes be flushed and cleaned?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Is there a gate/ball shut off valve at the irrigation field, or at each irrigation zone?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

ZONED LAND USE OF IRRIGATION SITE (CHECK ALL THAT APPLY)

<input checked="" type="checkbox"/>	Exclusive Farm Use (EFU)	<input type="checkbox"/>	Industrial
<input type="checkbox"/>	Forestry	<input type="checkbox"/>	State/Federal lands
<input type="checkbox"/>	Rural Residential	<input type="checkbox"/>	Other (Specify):

ZONED LAND USE OF AREA AROUND IRRIGATION SITE (CHECK ALL THAT APPLY)

<input checked="" type="checkbox"/>	Exclusive Farm Use (EFU)	<input type="checkbox"/>	Industrial
<input type="checkbox"/>	Forestry	<input type="checkbox"/>	State/Federal lands
<input type="checkbox"/>	Rural Residential	<input type="checkbox"/>	Other (Specify):

Prevailing wind direction during irrigation season (specify): North

Will irrigation be restricted when winds exceed 10 MPH?: Yes

THE NEAREST DEVELOPED PROPERTY FROM IRRIGATION SITE (ft):

North boundary: 1455' to TL 151010000708
South boundary: 155' to TL 151014000800 (SOUTHEAST)
East boundary: 120' to TL 151014000400 AND TL 151040000300
West boundary: 1385' to TL 1510000001401 (NORTHWEST)
What is the nearest developed property downwind of irrigation site (specify type and distance): TL 151010000708, Single Family Residence, zoned EFUSC.
Are there any playgrounds, schools, or public parks within 1/2 mile of irrigation site? (specify): No.

Recycled Water Use Plan Summary

DOMESTIC WELLS

	Y	N
Are there any domestic wells or other domestic water sources located within the irrigation site?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Are there any domestic wells or other domestic water sources located within 150', 100, or 50' of the irrigation site?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<i>If yes to either of the above, identify the number of wells or sources and identify their location on the attached site plan.</i>		

POTENTIAL RUN-OFF POINTS ARE LOCATED AT THE (CHECK ALL THAT APPLY):

<input type="checkbox"/>	North boundary (specify):	ALL RUNOFF WILL BE CONTROLLED ON SITE
<input type="checkbox"/>	South boundary (specify):	
<input type="checkbox"/>	East boundary (specify):	
<input type="checkbox"/>	West boundary (specify):	

PUBLIC ACCESS WILL BE CONTROLLED BY THE FOLLOWING (CHECK ALL THAT APPLY):

<input checked="" type="checkbox"/>	No trespassing or warning signs (specify spacing): 200'
<input checked="" type="checkbox"/>	Fencing (specify type): Barb Wire
<input type="checkbox"/>	Other (specify):

BARRIERS ON BOUNDARIES THAT MAY MITIGATE AEROSOL DRIFT (CHECK ALL THAT APPLY)

<input checked="" type="checkbox"/>	Natural vegetation (specify height and width): Ponderosa Pine and Juniper, up to 2' diameter, and 50' height.
<input type="checkbox"/>	Natural topography (specify):
<input type="checkbox"/>	Tree or fence row (specify height):
<input checked="" type="checkbox"/>	Other (specify): native shrubs and grasses
<input type="checkbox"/>	None:

IRRIGATION METHOD (CHECK ALL THAT APPLY)

<input checked="" type="checkbox"/>	Set sprinkler heads with spray height of 20' and spray diameter of 140'
<input type="checkbox"/>	Wheel irrigation line with spray height of _____ and spray diameter of _____
<input type="checkbox"/>	Big gun irrigation with spray height of _____ and spray diameter of _____
<input type="checkbox"/>	Other (specify):

IRRIGATION EQUIPMENT SPECIFICATIONS (insert more rows as needed)

Sprinkler head types (brand and model)	Irrigation zones/cells	PSI operating ranges
RAINBIRD, RAIN GUN SR3003/F3002	4 - 6 Zones	40 TO 100 PSI

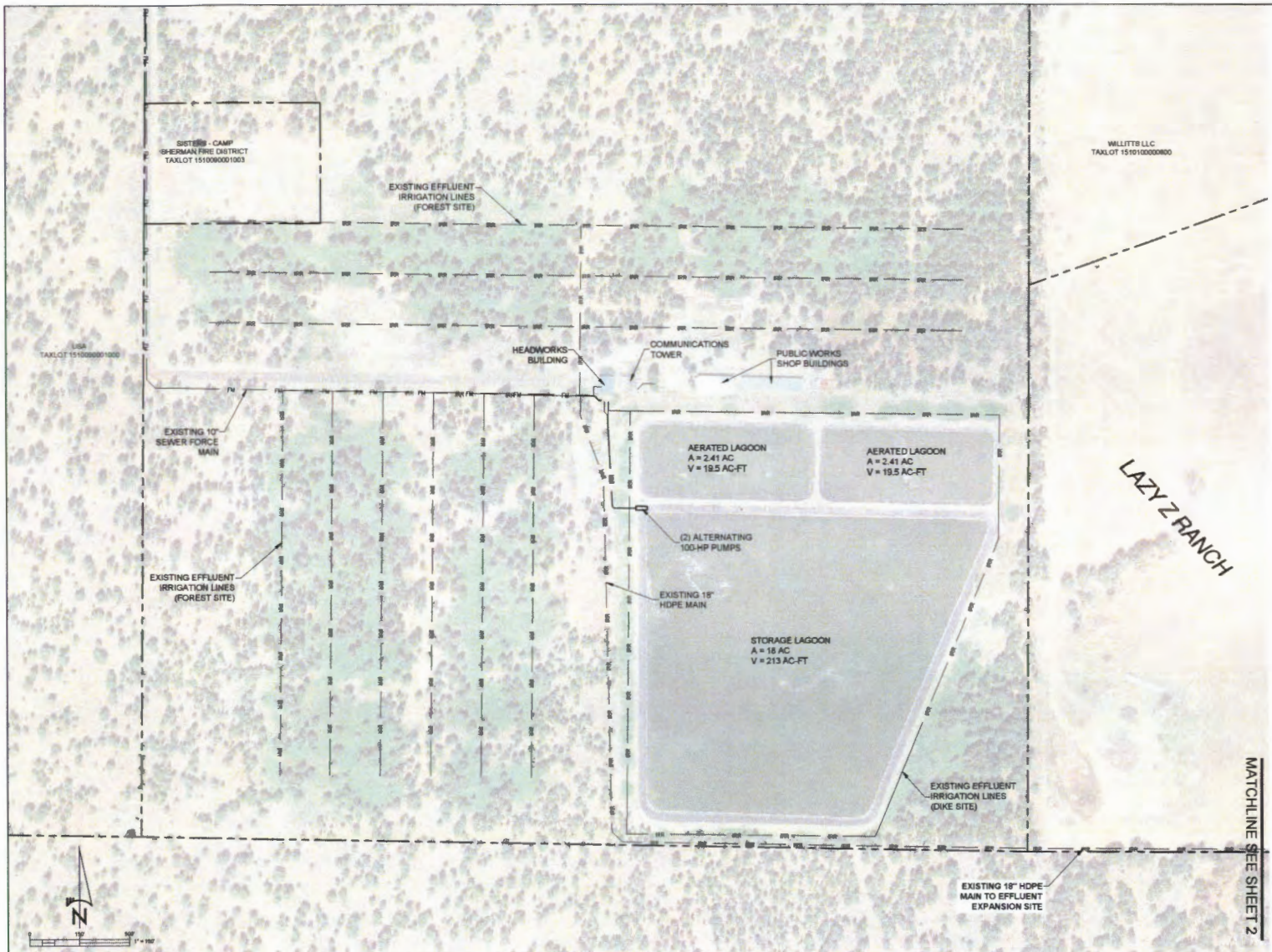
Recycled Water Use Plan Summary

REQUIRED ATTACHEMENTS:

1. Overhead scale diagram/plan view of the wastewater treatment plant that identifies the treatment and disinfection components of the plant.
2. Overhead scale diagram/plan view of the transport line from wastewater treatment plant to the reuse area.
3. Overhead scale diagram/plan of the irrigation site showing surrounding properties and irrigation system layout.
4. A full copy of the Recycled Water Use Plan.

HEALTH DIVISION REVIEW COMMENTS:

Print Form



SITE NOTES:

GENERAL:
 OWNER/APPLICANT: CITY OF SISTERS
 PROPERTY: WASTE WATER TREATMENT PLANT
 PROPERTY ADDRESS: 1000 SOUTH LOCUST ST., SISTERS, OR, 97759
 PROPERTY SIZE: 108.60 ACRES
 ZONING: F1, PF, UAR10
 TAXLOT NUMBER: 1510060001002

NOTE: SEE FIGURE 2: PROCESS SCHEMATIC IN THE RECYCLED WATER USE PLAN FOR TREATMENT AND DISINFECTION COMPONENTS OF THE PLANT.

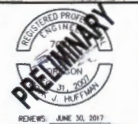
LEGEND:

----- PROPERTY LINE
 - - - - - SETBACK LINE
 --- EXISTING IRRIGATION LINE
 FM --- EXISTING SEWER FORCE MAIN

PRELIMINARY - NOT FOR CONSTRUCTION

NO	DATE	BY	APPR	REVISIONS

VERIFY SCALES
 BAR IS ONE INCH ON ORIGINAL DRAWING
 IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY



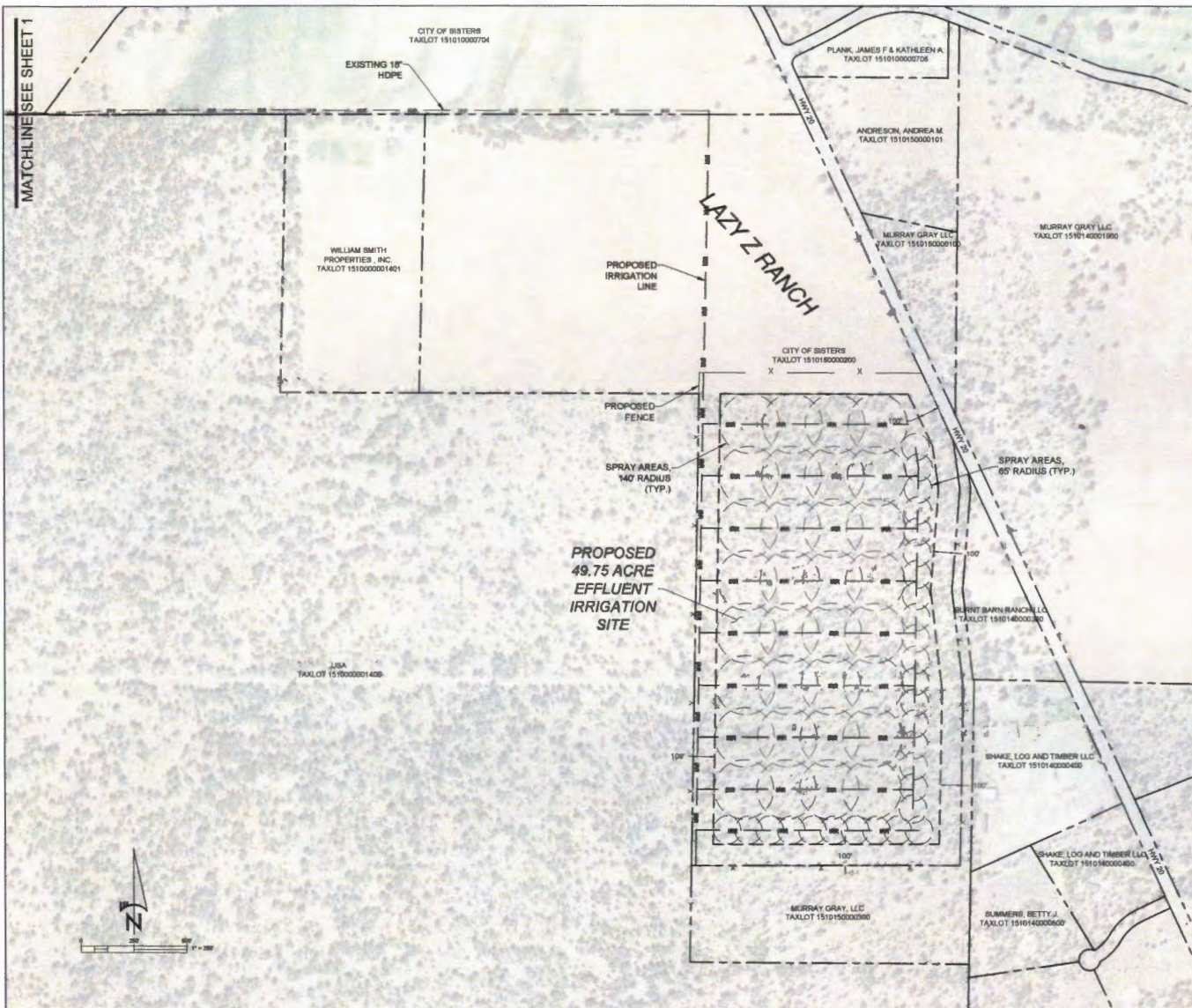
BECON
 549 8th MILL VIEW WAY, SUITE 105
 BEND, OREGON 97702
 (541) 833-3140
 www.beconeng.com

DESIGNED BY: E.J.H. DRAWN BY: J.L.B. CHECKED BY: SCALE: 1" = 150'
 DATE: 09-22-2016 PROJECT NO: 13702.118

CITY OF SISTERS
 RECYCLED WATER USE PHASE 1 EXPANSION

WASTE WATER TREATMENT PLANT

DRAWING NO: P1
 SHEET NO: 1 of 2



SITE NOTES

GENERAL
 OWNER/APPLICANT: CITY OF SISTERS
 PROPERTY: LAZY Z RANCH
 PROPERTY ADDRESS: 86355 HWY 20, SISTERS, OR, 97756
 PROPERTY SIZE: 125.69 ACRES
 ZONING: EFUSC
 TAXLOT NUMBER: 1510150000200

PHASE 1 EFFLUENT IRRIGATION EXPANSION:
 PROJECT AREA: 49.75 ACRES
 IRRIGATION PIPE: = 12,660 - LF
 PROPERTY LINE SETBACK: 100 - FT

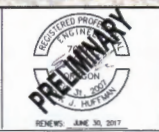
LEGEND:

- PROPERTY LINE
- - - - - SETBACK LINE
- PROPOSED EFFLUENT IRRIGATION LINE
- x - - - - PROPOSED FENCE
- EXISTING IRRIGATION LINE
- SPRAY AREA

PRELIMINARY - NOT FOR CONSTRUCTION

NO	DATE	BY	APPR	REVISIONS

VERIFY SCALES
 BAR IS ONE INCH ON
 ORIGINAL DRAWING
 IF NOT ONE INCH ON
 THIS SHEET, ADJUST
 SCALES ACCORDINGLY



BECON
 549 8th MILL VIEW WAY, SUITE 106
 BEND, OREGON 97702
 (541) 633-3140
 www.beconing.com

DESIGNED BY: E.H. DRAWN BY: J.L.B. CHECKED BY: E.H. SCALE: 1" = 250'
 DATE: 08-22-2018 PROJECT NO: 13702.119

CITY OF SISTERS RECYCLED WATER USE PHASE 1 EXPANSION SITE PLAN	DRAWING NO: P2
	SHEET NO: 2 of 2

2016 Recycled Water Use Plan



City of Sisters, Oregon

October 2016

PREPARED BY:

BECON CIVIL ENGINEERING AND LAND SURVEYING

549 SW MILL VIEW WAY, 105

BEND, OREGON 97702

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**Recycled Water Use Plan
For
City of Sisters
WPCF Permit No. 101779
File No. 81850**

Facility: City of Sisters Wastewater Treatment Plant
912 S. Locust Street
Sisters, Oregon 97759

Physical Address:
1000 South Locust Street
Sisters, Oregon 97759

Mailing Address:
520 East Cascade, PO Box 39
Sisters, Oregon 97759

Contact: Paul Bertagna
Phone: 541.323.5212
Email: pbertagna@ci.sisters.or.us

October 2016

1.0 INTRODUCTION

1.1 OVERVIEW

The City of Sisters wastewater system operates under a Water Pollution Control Facilities Permit, Number 101779, which was last issued on January 22, 2016. An initial Wastewater Recycled Water use Plan was completed in April of 2002 by HGE Inc. for the irrigation of 100.3-Acres of land in the South ½ of Section 9. For future increase in flows the City is expanding their irrigation reuse sites to include the Lazy Z Ranch property. The property is City owned and includes both: T15, R10, S10; TL 704 (100.26 acres) and T15, R10, S15; TL 200 (125.68 acres) for a total of 225.64 acres. However, only TL 200 has received land use approval, to date, from Deschutes County - signed and dated August 6, 2008. The permit conditions require submission of an updated Recycled Water Use Plan (RWUP) prior to effluent discharge to the new site.

The City of Sisters 2016 Wastewater Capital Facilities plan identify the need to expand their effluent irrigation facilities to obtain capacity for future flows. A wastewater reuse and conservation planning study, by Newton Consultants, Inc. (2013) was used to determine the feasibility for effluent irrigation in the Lazy Z property. Shown in Figure 1 are the City's existing wastewater system facilities and proposed irrigation expansion sites. Phase 1 (planned for 2017), Phase 2 (planned for 2031), and future phases (after 2035) are incorporated into this Recycled Water Use Plan update.

Recycled water usage of treated effluent will allow the City of Sisters to meet water quality standards of the State of Oregon, and to maintain compliance with conditions of the Water Pollution Control Facilities Permit. ***This RWUP supersedes any previous plans.***

1.2 CONTACTS

The City of Sisters is the end user and recycled water generator for the waste water treatment plant (WWTP), located at the following address:

1000 S Locust St.
Sisters, Oregon 97759

Paul Bertagna is the Public Works Director and WWTP operator, his contact information is listed below:

Director of Public Works
Paul Bertagna
(541) 323-5212
pbertagna@ci.sisters.or.us

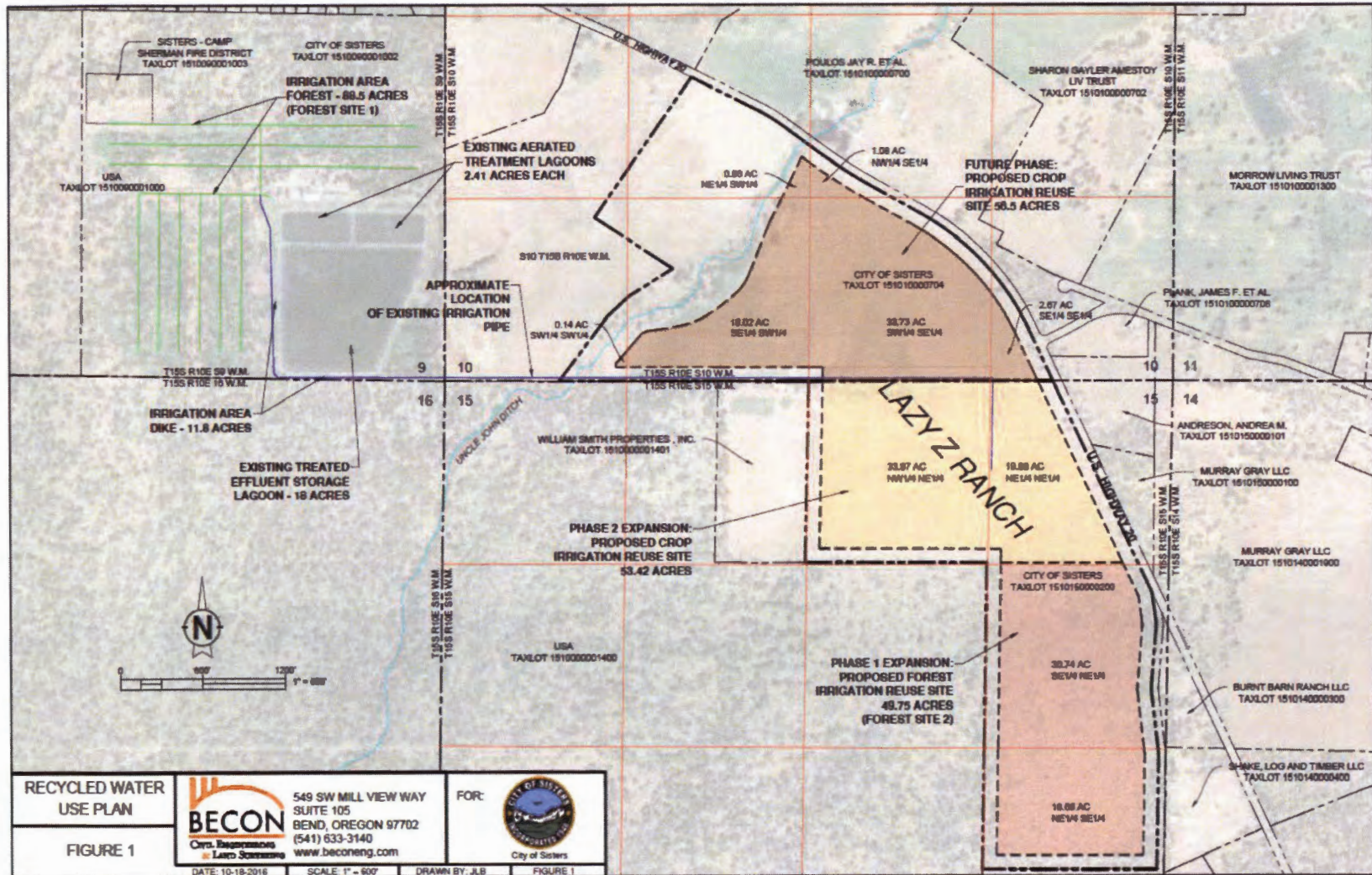


Figure 1: Recycled Water Use Plan Exhibit Map

2.0 BENEFICIAL PURPOSES

Beneficial purposes lie at the core of the recycled water use program and can influence wastewater treatment, monitoring, as well as public health and environmental concerns.

Beneficial Purpose	Class of Water	Quantity (mgd)	Frequency
<ul style="list-style-type: none">• Irrigation of orchard grass• Compliance with WPCF permit, and to provide capacity for future wastewater flows.	D	0.522 mgd	April – October

3.0 WASTEWATER TREATMENT

3.1 EXISTING WASTEWATER SYSTEM

The City wastewater system has been operating since 2002. Gravity collection system piping varies from 6" to 24" diameter PVC wastewater mains, with four (4) wastewater pump stations. A 12" diameter pressure main of 9350 lineal feet carries wastewater flows from Pump Station # 1 in the City, directly to the Wastewater Treatment Plant. The wastewater treatment plant is a 3-cell aerated lagoon system with winter holding. Two aerated treatment cells are 2.41 acres, providing for a capacity of 19.5 Ac. Ft. An 18-acre aerated winter holding lagoon is provided for storage, containing 213 Ac. Ft. of storage.

Total inflow for the 2015 year was 70.8 million gallons, with a summer average of 233,570 gpd (gallons per day) and winter average of 153,770 gpd. Shown in Figure 2 is the process schematic for the City of Sisters WWTP.

3.2 EXISTING EFFLUENT IRRIGATION SYSTEM

The existing recycled water use irrigation site is a 108.60-Acre site on the South ½ of Section 9, T15S, 10E, W.M. Land reuse of the stored water is provided on 88.5 acres of natural forest and 11.8 acres of dike and lawn areas (100.3-Acres Total). Application is applied at agronomic rates. The existing (year 2002) recycled water use plan limits irrigation to 13.2 and 47.4 million gallons of dike and forest irrigation respectively. The treatment plant produces Class D quality for both the treated and recycled water. A full copy of the approved WPCF permit is in Appendix C of this document.

The irrigation site surrounds the wastewater treatment and holding ponds. Three separate irrigation systems are provided. Each of the two forest irrigation sites is served by a 10-inch diameter PVC irrigation header from the effluent pumps located in the control building. The dike irrigation system is fed through a looped 4-inch diameter irrigation system. A marking ribbon is buried with the pipe to indicate non-potable water. Two alternating 100 HP pumps are provided to deliver treated recycled water to the forest irrigation system, and a single 15 HP pump is provided to deliver water to the dike irrigation system. An existing pipeline exists on the Lazy Z Ranch property (see Figure I), which may be used for irrigation purposes.

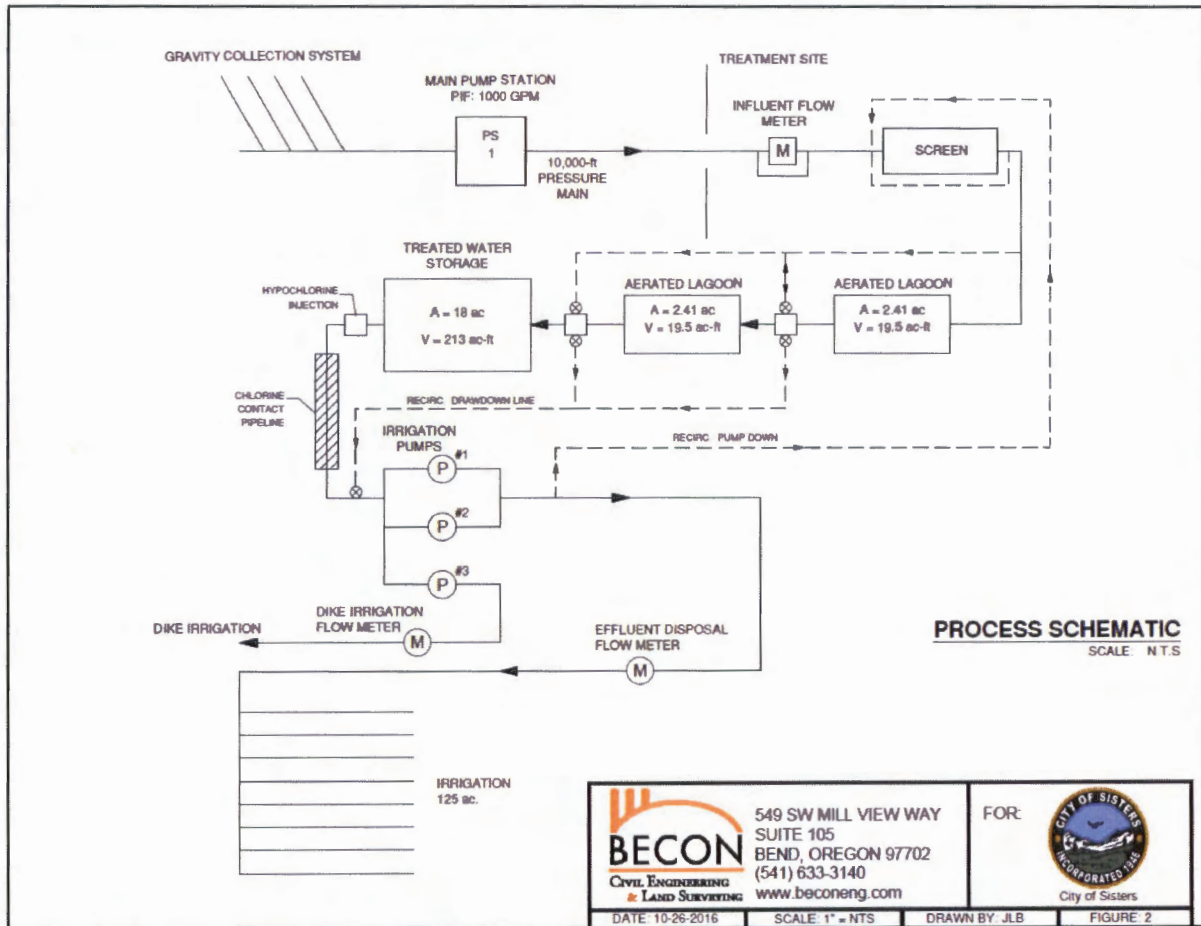


Figure 2: Water Treatment Plant Schematic

3.3 INFLUENT FLOW MEASUREMENT AND SAMPLING

Influent flow measurement is provided in the pump room of the control building for the wastewater treatment plant. The meter is an 8" ASA electromagnetic flow meter which has been calibrated annually since installation. Influent sampling is provided by an ISCO 3710FR refrigerated sampler located in the pump room of the control building at the treatment plant. This is a 24-hour composite sampler which provides composite data for influent BODs and TSS.

3.4 DISINFECTION FACILITIES

Disinfection of effluent at the Sisters plant is provided by chlorination, specifically through sodium hypo-chlorite. Equipment includes a Lightnin chemical mixer, a 500-gallon polyethylene sodium hypo-chlorite tank, a Wallace & Tiernan chemical feed pump, a Grundfos Fost back-up chemical feed pump, a Gas Mastrrr 3-hp flash mixer, a vacuum regulator, rate controller, ejector water supply system, and a chlorine contact pipeline. The chlorine contact pipeline is 1,140 feet of 36" PVC piping buried in the dike along the west side of lagoon # 1 and the holding pond. A Gas Mastrrr Series 32 chlorine induction feeder-flash mixer is provided in the transfer structure from the holding pond to the chlorine contact pipeline. This unit provides a positive flash mix of sodium hypo-chlorite solution which flows through the chlorine contact pipeline toward the land reuse system. A sampling tap is provided on the effluent

(reuse) piping to allow for sampling of effluent pumped from the reuse pumps to either of the two reuse systems provided. Disinfection facilities are controlled through the SCADA system with the PLC provided.

3.5 EFFLUENT REUSE SYSTEM

The effluent reuse facilities are intended to discharge treated and disinfected effluent for land reuse through irrigation of both forest land and lagoon dikes and lawns on the treatment plant site. The effluent reuse system that is in place includes a holding pond for storage, a chlorine contact line for effluent disinfection, three irrigation pumps, a re-circulation system, and a sprinkler system to provide reuse on treatment plant lagoon dikes and lawn areas, and on 88.5 acres of forest land. Additional area for reuse is set aside for buffer to adjacent properties on the North, East and South boundaries of the treatment plant site, in compliance with Oregon DEQ regulations.

Prior to land reuse, the effluent is disinfected in 1,140 feet of 36" chlorine contact line, which provides for a minimum detention time of 60 minutes at peak discharge flows of 1,000 gpm. Sodium hypochlorite from the 500 gallon HDPE storage tank is mixed with effluent from Lagoon No. 3, in the chlorine contact facility. Effluent is discharged to forest land and pond dikes and lawn areas from April 1 to October 31 and stored in the holding pond during the remaining months. The storage lagoon must be lowered sufficiently by the end of the irrigation season to ensure maximum practicable storage capacity during the no irrigation months.

The land reuse system diverts the majority of the effluent to 88.5 acres of forest land, and the remaining to the treatment plant lagoon dikes and lawn areas (11.8 acres). The effluent is pumped to these locations using three pumps. Two 100 HP, 1000 gpm capacity pumps transport effluent to the forest land, while one 15 HP, 125 gpm capacity pushes the water to the dike. The effluent is carried to the forest land in a 10" main line which branches out into 8" lines across the irrigation area. There are flow meters stationed after the pumping facility that are measuring the quantity of effluent traveling to both the forest land and dike.

Both effluent reuse systems provided for discharge from the Sisters WWTP are controlled through the SCADA system, with the Programmable Logic Controller provided. Both the SCADA system and the PLC have been in use since the plant became operational, and equipment of this type and age becomes outdated, is not supported and difficult to repair due to availability of parts. Both the SCADA system and the PLC will need to be replaced in the near future.

3.6 EFFLUENT FLOW MEASUREMENT AND SAMPLING

Effluent flow measurements are provided in the pump room of the control building for the WWTP. Two meters are provided, with one on the dike and lawn reuse system, and one on the forest reuse system. Each meter is an ASA model IF6 electromagnetic flow meter, which have been calibrated annually since installation. Grab samples are taken out of the transfer structure before the effluent enters the chlorine contact line. These samples are then tested for concentration of E.coli. Flow measurements are recorded in the SCADA system provided. Flowmeter performance has been excellent, all the units were rebuilt in 2007 due to the pump building inadvertently flooding. All flow meters are flow tested and calibrated annually to ensure accuracy within specifications.

4.0 RECYCLED WATER MONITORING AND SAMPLING

OAR 340-055 defines the regulations for land application of recycled water.

- i. Prior to land application of the recycled water, it must receive at least Class D treatment as defined in OAR 340-055. Class D recycled water must not exceed a 30-day log mean day log mean of 126 E. coli organisms per 100 milliliters and 406 E. coli organisms per 100 milliliters in any single sample. Class C recycled water must not exceed a 7 day median of 23 organisms/100 milliliters and no two consecutive samples must exceed 240 organisms/100 milliliters.
- ii. Irrigation must conform to a Recycled Water Use Plan approved by DEQ and meet the required setbacks as defined in OAR 340-055.
- iii. The City of Sisters must restrict public access to the reuse site(s) for the protection of public health.
- iv. Treated effluent may only be irrigated on land between April 1 through October 31 for dissipation by evapotranspiration and controlled seepage by following sound irrigation practices unless otherwise approved in writing by DEQ.
- v. Recycled water equipment must be operated so as to prevent:
 - a) Prolonged ponding of treated recycled water on the ground surface;
 - b) Surface runoff or subsurface drainage through drainage tile;
 - c) The creation of odors, fly and mosquito breeding or other nuisance conditions;
 - d) The overloading of land with nutrients, organics, or other pollutant parameters; and
 - e) Impairment of existing or potential beneficial uses of groundwater.
 - f) Until otherwise approved in writing by the Department via a revised reclaimed water use plan, treated effluent must only be reused on Class D beneficial uses.

4.1 EFFLUENT MONITORING

Monthly discharge monitoring reports (DMR) are sent to the DEQ before the 15th day of the following month providing monitoring and sampling information for the WWTP including the reuse facility as required by the WPCF permit and summarized in Table 1. The recycled water applied to the irrigation field is measured daily when the system is in use. During the irrigation operation in 2015 there was a total of 5.46 and 72.57 million gallons applied to the dike and forest respectively.

Table 1: Recycled Monitoring Program

Item or Parameter	Minimum Frequency	Type of Sample
Total Inflow to WWTP	Daily	Measurement
Total reuse flows (recycled water)	Daily	Measurement
Flow Meter Verification	Annually	Verification
E. Coli	Weekly	Grab
Nitrogen Nitrate (NH ₃ -N)	Annually	Grab
Inspect Lagoon	Daily	Visual
Inspect Lagoon Liner	Daily	Visual

4.2 WATER QUALITY

Operations have experienced no problems in meeting permit conditions for E. coli. Effluent nutrient data for August 2015 indicated the following: Nitrate Nitrogen (NO₃-N): 0.03 mg/l. Nutrient levels are reasonable and do not raise concerns regarding system performance or effluent loadings.

5.0 SYSTEM MAINTENANCE AND CONTINGENCY PROCEDURES

The WWTP recycled water facilities will be maintained, per OAR 340-055-0025(1)(f), as well as a description of contingency procedures, per OAR 340-055-0025 (1)(d). The City of Sisters has submitted system maintenance and contingency procedures to Oregon DEQ as part of the submittal documents for the WPCF permit in 2002. The City maintains copies of the system maintenance and contingency procedures and are available upon request.

6.0 PUBLIC HEALTH AND ENVIRONMENTAL CONTROLS

6.1 ACCESS AND EXPOSURE CONTROLS

The irrigation sites are on City owned property with the required setbacks for Class D recycled water. Public access is prevented from entry into the existing and proposed area by barb wire fences around the irrigation site, a 6 foot chain link site with barb wire around the treatment plant site, and locked gates for both. Signs are posted around the perimeter of the irrigation field to indicate the water is not safe for drinking and that effluent is being applied as irrigation. Access and exposure are addressed as follows:

- Staff are the only people authorized to enter the site.
- The general public does not have access to the site.
- There are no grazing animals allowed on the site.
- The irrigation water is not used for sod, nurse stock or Christmas trees.
- The irrigation water is not used for commercial or industrial uses.
- The irrigation site is posted.
- All supervisors and staff working near the site are educated regarding access restrictions for this land application site.
- Irrigation over spray shall be monitored during windy days to ensure the buffer zones are not violated. When wind velocities exceed 10 mph, irrigation should stop or be reduced to prevent over spray on neighboring properties if this situation was to occur.
- When winds are high staff will assure that the buffer zones are not violated or the irrigation system will be turned off.
- The lagoon is fenced and gated.

6.2 SETBACKS

The required setbacks for Class D recycled water are as follows (per ORS 340-055-0012):

- 100 feet from the property line
- 100 feet from a water supply
- 70 feet from food preparation sites or drinking fountains.

6.3 NOTIFICATION

OAR 340-055 requires notification of recycled water use. There are two audiences for notification: personnel and the public. The notification methods used for each audience are as follows:

- Personnel:
 - Employees who will be working near the site are educated about the recycled water reuse program.
 - The irrigation site is posted with signs.
- The general public is notified through the WPCF permitting process through the Oregon Department of Environmental Quality.

6.4 SITE MANAGEMENT PRACTICES

Site management practices include the following:

- When using recycled water for irrigation, the perimeter of the site is posted with signs indicating that recycled water is not safe for drinking.
- When the ground is frozen, no irrigation is done.
- If the wind is high, no irrigation is done.
- Irrigation is done only when maintenance staff are on duty.
- Irrigation of fodder, fiber, seed crops not intended for human ingestion, sod, commercial timber, firewood, ornamental nursery stock, or Christmas trees is prohibited for three days before harvesting.

7.0 LAND APPLICATION PLAN

OAR 340-055-0025(2)(a) establishes additional requirements for recycled water use plans when conventional irrigation is used. In general, this includes a site characterization, description of the irrigation system, soils and crops, application rates, site management practices and public access control. Some of these items have already been described, such as the system description (Section 3), and site management and public access control (Section 6). The reader may refer to earlier sections of this plan for these items.

7.1 PROPOSED EFFLUENT IRRIGATION EXPANSION

The proposed recycled water use irrigation site, also known as the Lazy Z Ranch property, is approximately 225.6-Acres and located directly east from the existing Wastewater Treatment Plant. The site is divided into 2 lots, T15, R10, S10; TL (Taxlot) 704 (100.26 acres) and T15, R10, S15; TL 200 (125.68 acres) for a total of 225.64 acres (See Figure 1). The city anticipates using the 49.75-Acres forested area (Phase 1) and a 53.42-Acre crop land area (Phase 2) for effluent irrigation.

The Lazy Z Ranch property provides multiple possibilities for effluent reuse expansion. Both forest irrigation and crop irrigation sites are available. Both Phase 1 and Phase 2 have been incorporated into this Recycle Water Use Plan update.

A flow balance is provided in Table A and Table B (see Appendix B), considering available holding capacity and effluent reuse through the constructed irrigation systems described previously. The flow balance was developed assuming a lifetime for the effluent system of 10 and 20 years, to the year 2025 and 2035 respectively. Assuming that growth projections are accurate, and that estimated agronomic usage of the recycled water are accurate, the existing facilities cannot provide adequate area for disposal of flows.

In the 2025 water balance (Table A) the existing effluent irrigation system will continue to operate at threshold levels (see Table 1). The Phase 1 expansion site (Forest Site 2) will operate at irrigation rates necessary to lower the holding pond storage to the initial depth (6'). As shown in the 2035 water balance (Table B), the forest sites and the dike will operate at the irrigation application limit. The crop site will operate at irrigation rates required to lower the holding pond storage to the initial depth (6.0'). Irrigation discharge may be modified if necessary as long as the application rates in Table 2 are not exceeded on any give season, peak month, and peak day.

7.1.1 Phase 1 – Forest Irrigation Effluent Expansion – TL 200

A 49.75-Acre forested area is available for effluent irrigation at the southeast corner of the Lazy Z Ranch property. The Phase 1 effluent expansion will be fully implemented during 2017. Phase 1 is included in the 2025 and 2035 water balance computations for this Recycled Water Use Plan update (Table A and B).

7.1.2 Phase 2 – Future Crop Irrigation Effluent Expansion – TL 200

A 53.42-Acre crop land area is available for effluent irrigation in the southeast portion of the Lazy Z Ranch property. It is anticipated that this area would have a permitted application rate of 25.5 inches per

year and could be connected to the existing pipeline which terminates in the center of the site. A wastewater reuse study by Newton Consultants Inc., completed in June 2013, identified multiple crop irrigation applications, grass crop is assumed. The City anticipates to implement Phase 2 by 2031. Phase 2 was incorporated into the water balance computations for 2035 conditions. Phase 2 will conform to DEQ requirements for Class D recycled water.

7.1.3 Future Phase – Future Crop Irrigation Effluent Expansion – TL 704

An additional 56.5-Acres of land is available for crop irrigation. The wastewater reuse study by Newton Consultants Inc., identified multiple crop irrigation applications, all to take place after 2035. The Future Phase was included in the water balance computations for 2035 conditions. The future phase will conform to DEQ requirements for Class D recycled water.

7.2 SITE CHARACTERIZATION

A USGS topo map, NRCS soil maps, and soil series descriptions for the proposed area described are included in Appendix A. The proposed irrigation expansion site (TL 200 described above) is located at 68355 HWY 20, Sisters, Oregon 97759. The site has the following characteristics:

- Land Use Zone: Exclusive Farm Use (to be rezoned to Public Facilities prior to any irrigation expansion activity).
- Size: 125.68 Acres

Rain fall and evaporation data was obtained from the Western Regional Climate Center (WRCC 2016).

- Annual Average Rainfall: 13.5 inches
- Annual Evaporation: 51.68 inches
- Average Annual Temperatures: average annual max – 84.4°F, average annual Min – 20.9°F
- Topography: Slope is roughly 0 – 2.5%
- Elevation: 3180-FT to 3230-FT
- Setbacks from property Line: 100-FT
- Not located in a flood plain.
- Depth to Groundwater: Based on City well logs, depth varies from 63 – 113 feet.
- Winter ground can be frozen.
- Winds can be moderate. Prevailing wind direction is north per the National Oceanic and Atmospheric Administration (NOAA 2016).

The 2002 Wastewater Reclaimed Water Use Plan calculated an application rate of 28.79-in/acre per season in the Dike and 14.3-inches/acre per season in the forest (an efficiency coefficient of 70% was applied to compensate for evaporation losses during the application). The City now uses an efficiency coefficient of 75% for all future planning purposes. Application rate limits (using a 75% efficiency coefficient) per the Soil and Water Reuse Reports, prepared by Wert & Associates, Inc. (1998 and 2007) are shown in Table 2 below:

Table 2: Irrigation Application Rate Limits

Application	Dike	Forest	Crop
Seasonal Amount	34”	19.1”	34”

Peak Month (July)	8.3"	7.3"	8.3"
Peak Daily	0.4"	0.2"	0.4"

7.3 PHASE 1: FOREST EFFLUENT IRRIGATION EXPANSION

The City will expand their irrigation to the 49.75 – Acre site at the southeast corner of the Lazy Z Ranch Property. Using data from existing Lagoons, the wastewater will contain:

NO ₃ -	0.5 mg/l
NH ₄	0.5 mg/l
TKN	9.0 mg/l
Total Nitrogen:	10 mg/l

- Water Application:
 - There are no Oregon State University extension bulletins for water consumption of the existing stand of ponderosa pine, lodgepole pine, pine-sage, and bitter brush. Literature review was made by Wert and Associates, Inc. (1998) to determine application rates.
 - Total Irrigated area is 49.75 – Acres with Setbacks.
 - See water balance computations in Appendix B for application rates per month.
 - The peak daily irrigation rate shall be 0.2", or 290,096 gpd.
 - The total irrigation volume is 19.10 inches over a 7-month period (April – October). The amount applied through irrigation is within the applications rate limits (see Table 2).
- Nitrogen Loading:
 - Based on literature and Wert and Associates, Inc. (1998) concluded that applying 1.3 Acre-Feet of wastewater to the existing forest will add 35 lbs of available nitrogen per acre. Based on this result, 2132 lbs of organic nitrogen loading will be applied to the site per year.
 - Total volume applied is 25,802,683 gallons or 97,637,780 liters.
 Nitrogen loading in mg: 967,060,000 mg
 Total concentration = 9.9 mg/l (less than 10 mg/L)
- Cropping Program:
 - The site will be mowed 2 to 3 times per irrigation season. Mowing's will be disposed of or moved to a non-irrigation site. Herbicides will be applied annually to control weeds.

7.4 PHASE 2: CROP EFFLUENT IRRIGATION EXPANSION

The 53.42-Acre site will be planted with hay/alfalfa/grass. No other crops are proposed. Using data from existing Lagoons, the wastewater will contain:

NO ₃	0.5 mg/l
NH ₄	0.5 mg/l
TKN	9.0 mg/l
Total Nitrogen:	10 mg/l

- Water Application:
 - Consumptive use rates by month for pasture grasses grown in the Bend/Sisters are were taken from Oregon State University Extension Bulletin 8530.
 - Total irrigated area is 53.42 – Acres (with setbacks).
 - The crop will require about 3” of water per month (see water balance computation in Appendix B).
 - The peak daily irrigation rate shall be 0.4 inches or 580,193 gpd (see Table 2).
 - The total irrigation volume is 19.50 inches over a 7-month period (April – October). The amount applied through irrigation is within the applications rate limits (see Table 2).

- Nitrogen Loading:
 - Per the 2007 Soil and Water Reuse Report by Wert and Associates, Inc., the average organic concentration of 10 mg/l or 27 lbs of nitrogen per 1 Acre-Foot of wastewater. Oregon State University recommends orchard grass for the site. For orchard grass, 3 Acre-Feet/Acre of wastewater will be applied which will contain 81 pounds of organic nitrogen per acre.
 - The calculated irrigation discharge is 19.5 inches per year, or 86.8 Acre-Feet, which is equivalent to 2344 lbs of organic nitrogen loading per year.
 - Total volume applied is 11,695,352 gallons or 44,271,723 liters.
 Nitrogen loading in mg: 1,063,200,000 mg
 Total concentration = 5.6 mg/l (less than 10 mg/L)
 - The orchard grass will need an additional 119 lb/acre of nitrogen fertilizer.

- Cropping Program:
 - The crop will absorb nutrients, be harvested and be removed from the site for beneficial use.

7.5 IRRIGATION MANAGEMENT AND SCHEDULING

7.5.1 Irrigation Site: Startup

During each startup of either irrigation system, the chief operator should make certain that disinfection facilities are fully operational, and should verify that water quality testing is provided to assure compliance with the WPCF permit conditions. This will require activation of the chlorination system provided, and testing to assure that permit conditions are being met prior to discharge of the treated effluent for reuse purposes.

7.5.2 Irrigation Site: Field Observations

During April through October, field observations should be made daily, or when effluent reuse is being utilized, of the site for evidence of runoff. All irrigation water must percolate into the ground for usage by the disposal site. The irrigation rate must be maintained at agronomic rates. Aerosol drift from the application site should be observed and reported if excessive distances are observed. A wind monitoring system is provided from the weather station, and should function to limit irrigation during periods when excessive wind conditions are experienced on site.

7.5.3 Recording: Verification of Permit Conditions prior to Disposal

The City should maintain records of water quality testing at any time that effluent reuse is anticipated for either of the irrigation sites provided. Compliance will be required for both E.coli, and for total coliform, and actual testing data should be reported on the Daily Monitoring Report, for submittal to the Oregon Department of Environmental Quality on a monthly basis.

7.5.4 Recording: Flow Meter Records, Pump Time and Rainfall

The City should maintain influent and effluent flow meter records for all flow meters provided, with information provided through physical measurements verified against records maintained in the SCADA system provided. Similar records should be maintained for daily pump times and rainfall monitored during the irrigation period. Operational records and rainfall shall be recorded in order to review final management of reclaimed water usage and potential operational requirements. Since irrigation needs will be limited to specific application periods, the irrigation equipment can be operated through the SCADA system to apply effluent reuse when irrigation can best be applied for beneficial usage, with storage being maintained in the interim.

7.5.5 Operational Conditions

City staff should maintain records for operational conditions on the effluent reuse sites. Records shall include: 1) amount of effluent applied to each irrigation site, 2) ability to control storage and irrigation needs, and 3) agricultural concerns or benefits with water available for effluent reuse.

7.5.6 Summary of Record-Keeping

Reporting of water quality testing as addressed by the WPCF permit, (E. coli and coliform), irrigation site field observations, and operational conditions will be important for long term operation of the reclaimed water use site. Effluent flow meter readings and rainfall will need to be recorded daily.

- A summary of the reporting needs is as follows:
- Daily influent flows, in gpd, into the Wastewater Treatment Facility
- Daily water quality E.coli numbers to show compliance with permit conditions
- Daily water quality coliform numbers to show compliance with permit conditions
- Daily effluent flow meter records for the effluent irrigation and disposal systems
- Daily pump records, in hours, for each of the irrigation pumps being utilized
- Daily rainfall volumes, in 1/100th inches
- Irrigation rates and volumes on a daily basis
- Field observations of potential locations for runoff, and photos of any runoff occurrences

7.6 SITE MONITORING PLAN

Soil sampling will be used to monitor the nutrient balance with regards to the soil fertility of the sites. Soil sampling will take place at all forest and crop effluent irrigation sites. The sampling procedure shall be per section 7.6.1, or per the latest Oregon State University (OSU) Extension Service soil sampling guide.

7.6.1 General Soil Sampling Procedures

On forest sites sampling shall be done along one irrigation line for uniformity and consistency. On crop sites sampling shall be done in a simple random pattern. At least 30 samples shall be taken from each effluent irrigation site. Sampling shall be conducted every two years in the forest sites and annually in the crop sites. Sampling will take place at the end of each irrigation season (November). The soil sampling process is listed below:

1. Proper information and materials shall be obtained (Education Extension from OSU).
2. Proper sampling tools/equipment shall be used (e.g. soil auger, shovel, bucket etc.). Equipment must be clean, specifically free of fertilizer. Galvanized buckets or rusted tools/equipment shall not be used. Tools shall be used properly.
3. Unusual areas shall be avoided. This includes but is not limited to abandoned farmsteads, feed lots, manure piles, fences eroded knolls, low areas, and salty or wet spots shall be avoided or sampled separately.
4. Sites shall be divided into areas for sampling. (i.e. Forest Site 1, Forest Site 2, Crop Site 1 etc.).
5. Samples shall be taken to a 3-ft depth at 1-ft increments (1st sample at 1-ft depth, 2nd sample at 2-ft depth etc.).
6. Composite samples shall be analyzed for each site. The composite sample is a mixture of all the samples within the site. The composite sample shall be well mixed.
7. Moist soil samples shall be kept cool at all times (during and after sampling). Samples can be frozen or refrigerated for extended periods of time without adverse effects. If samples cannot be refrigerated or frozen after collection, they shall be air dried or taken directly to the testing laboratory.
8. All data shall be collected, stored, and documented.

7.6.2 Soil Sample Analysis

The City shall sample for nitrate (NO₃-), nitrite (NO₂-), ammonia (NH₄), Total Kjeldahl Nitrogen (TKN), and phosphorus (P). Samples shall be sent to laboratories that are certified by the North American Proficiency Testing (NAPT) program. The NH₄ will be lost to vitalization when it is irrigated. Most of the nitrogen will be in the form of algae cells. When the algae is spread on the soil it will be mineralized into forms available to plants. (Wert, 2007).

REFERENCES

*References available upon request.

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NOAA. "National Weather Service." *National Oceanic and Atmospheric Administration (NOAA)*. <http://www.noaa.gov>. (Accessed August 2016). Web.

Newton, D.J. "Wastewater Reuse and Conservation Project Planning Study." *Newton Consultants Inc.* (June 2013). Print.

Nored, R.D. "Wastewater Reclaimed Water Use Plan." *HGE, Inc.* (April 2002).

Wert, S. "Soil and Water Reuse Report for Sister Wastewater Project." *Wert & Associates, Inc.* (February 1998).Print.

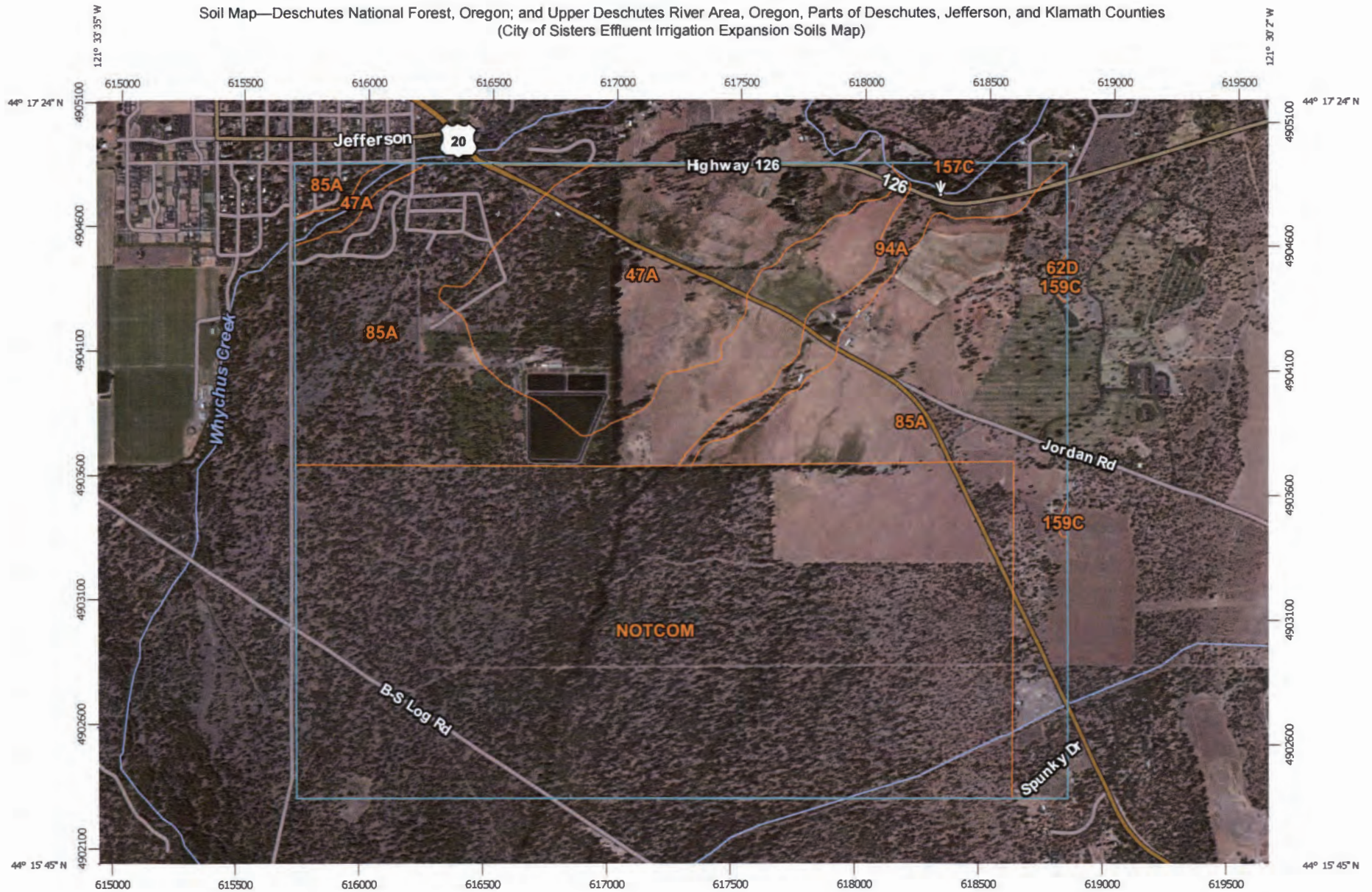
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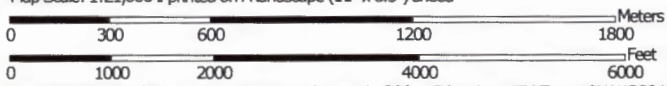
APPENDIX A

- USGS Topo Maps
- NRCS soil maps, and soil series descriptions

Soil Map—Deschutes National Forest, Oregon; and Upper Deschutes River Area, Oregon, Parts of Deschutes, Jefferson, and Klamath Counties
(City of Sisters Effluent Irrigation Expansion Soils Map)




Map Scale: 1:21,600 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge ticks: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)




















Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features


-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot


 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Deschutes National Forest, Oregon
Survey Area Data: Version 2, Dec 5, 2013

Soil Survey Area: Upper Deschutes River Area, Oregon, Parts of Deschutes, Jefferson, and Klamath Counties
Survey Area Data: Version 11, Sep 18, 2015

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 20, 2010—Sep 4, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Deschutes National Forest, Oregon (OR605)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
NOTCOM	No Digital Data Available	960.8	48.8%
Subtotals for Soil Survey Area		960.8	48.8%
Totals for Area of Interest		1,967.4	100.0%

Upper Deschutes River Area, Oregon, Parts of Deschutes, Jefferson, and Klamath Counties (OR620)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
47A	Ermabell loamy fine sand, 0 to 3 percent slopes	283.0	14.4%
62D	Henkle-Lava flows-Fryrear complex, 15 to 50 percent slopes	0.7	0.0%
85A	Lundgren sandy loam, 0 to 3 percent slopes	658.1	33.5%
94A	Omahaling fine sandy loam, 0 to 5 percent slopes	61.9	3.1%
157C	Wanoga-Fremkle-Rock outcrop complex, 0 to 15 percent slopes	0.7	0.0%
159C	Wilt sandy loam, 0 to 15 percent slopes	2.2	0.1%
Subtotals for Soil Survey Area		1,006.6	51.2%
Totals for Area of Interest		1,967.4	100.0%

APPENDIX B

- Water balance computations for 2025 and 2035 conditions.

City of Sisters Recycled Water Use Plan

Table II

Water Balance for Aerated Treatment, Holding, and Irrigation (2035 Conditions) - Balance Including Evaporation on Treatment and Holding Ponds

Holding Pond Constants:		Annual Irrigation:	Forest Irrigation Site 1	88.5 ac
*Assume 6' Water on 10/01 for Start			Forest Irrigation Site 2	49.75 ac
			Dike Irrigation	11.8 ac
Treatment Pond Constants:			Crop	53.42 ac
Water Surface Area	4.82 ac	Irrigation Required:	Dike	25.5 in/acre
			Forest Site 1	14.3 in/acre
			Forest Site 2	14.3 in/acre
			Crop	14.6 in/acre

Mo.	Holding Pond Initial Volume (Ac-ft)	Initial Depth flow (ft) ¹	Influent Flow (gpd)	Monthly Influent Flow (Ac-ft)	Rainfall (in)	Evaporation from Ponds (in)	Net (in)	Net Ponds Evap. (Ac-ft)	Irrigation Discharge Forest Site 1 (Ac-ft)	Irrigation Discharge Forest Site 2 (Ac-ft)	Irrigation Discharge Dikes (Ac-ft)	Irrigation Discharge Crop (Ac-ft)	Final Volume (Ac-ft)	Final Depth (ft)	Irrigation Discharge Forest Site 1 (in/acre)	Irrigation Discharge Forest Site 2 (in/acre)	Irrigation Discharge Dikes (in/acre)	Irrigation Discharge Crop (in/acre) ²
Oct.	30.07	6.00	348825.48	33.19	0.95	3.29	-2.34	-3.92	9.96	5.60	2.46	11.13	30.20	6.01	1.35	1.35	2.50	2.50
Nov.	30.20	6.01	350443.91	32.27	2.10	1.80	0.30	0.50	0.00	0.00	0.00	0.00	62.97	8.12	0.00	0.00	0.00	0.00
Dec.	62.97	8.12	355343.87	33.81	2.27	0.00	2.27	3.89	0.00	0.00	0.00	0.00	100.67	10.47	0.00	0.00	0.00	0.00
Jan.	100.67	10.47	345048.46	32.83	2.24	0.00	2.24	3.94	0.00	0.00	0.00	0.00	137.44	12.70	0.00	0.00	0.00	0.00
Feb.	137.44	12.70	335344.85	28.82	1.45	0.00	1.45	2.61	0.00	0.00	0.00	0.00	168.87	14.54	0.00	0.00	0.00	0.00
Mar.	168.87	14.54	353089.85	33.59	1.12	0.00	1.12	2.06	0.00	0.00	0.00	0.00	204.53	16.58	0.00	0.00	0.00	0.00
Apr.	204.53	16.58	344085.93	31.68	0.79	5.26	-4.47	-8.40	18.44	10.36	4.43	14.47	180.11	15.19	2.50	2.50	4.50	3.25
May	180.11	15.19	356379.50	33.91	0.78	7.25	-6.47	-11.98	22.13	12.44	4.43	13.36	149.69	13.42	3.00	3.00	5.00	3.00
June	149.69	13.42	408924.67	37.65	0.61	8.70	-8.09	-14.70	29.50	16.58	4.92	11.13	110.51	11.08	4.00	4.00	6.00	2.50
July	110.51	11.08	417177.24	39.69	0.38	10.17	-9.79	-17.34	36.88	20.73	5.90	12.24	57.11	7.75	5.00	5.00	8.00	2.75
Aug.	57.11	7.75	396525.50	37.73	0.41	9.06	-8.65	-14.76	18.44	10.36	7.87	12.24	31.16	6.07	2.50	2.50	6.00	2.75
Sept.	31.16	6.07	382863.27	35.25	0.40	6.15	-5.75	-9.63	5.53	3.11	5.90	12.24	30.00	6.00	0.75	0.75	2.00	2.75
Total				410.41	13.50	51.68	38.18	-67.73	140.9	79.2	35.9	86.8			75% Efficiency 19.10	19.10	34.00	19.50
															14.33	14.33	25.50	14.63

Notes: 1. Depth at deep end. 4.0 foot depth corresponds to 0.0 foot depth at shallow end of pond. The end of season depth is approximately 6 feet in order to keep the surface aerators in operation and to avoid the need for removing the unutilized aerators prior to the pond freezing over.
 2. Application rates in water balance are lower than allowable rates. See Section 6.1 for allowable application rates in each area.

APPENDIX C

Water Pollution Control Facilities (WPCF) Permit No. 101779, Expires December 31, 2025.

Expiration Date: December 31, 2025
Permit Number: 101779
File Number: 81850
Page 1 of 13 Pages

WATER POLLUTION CONTROL FACILITIES PERMIT

Department of Environmental Quality
475 NE Bellevue Dr. Suite 110, Bend, OR 97701
Telephone: 541-388-6146
(541) 388-6146
Issued pursuant to ORS 468B.050

ISSUED TO:

City of Sisters
P.O. Box 39
Sisters, OR 97759

SOURCES COVERED BY THIS PERMIT:

<u>Type of Waste</u>	<u>Outfall Number</u>	<u>Method of Disposal</u>
Domestic Sewage	001	Recycled Water Reuse

SYSTEM TYPE AND LOCATION:

Domestic Sewage Lagoons
912 S. Locust Street
T15S, R10 EWM, S09; TL 1002
Longitude -121.538480;
Latitude 44.280506
Sisters, Oregon

RIVER BASIN INFORMATION:

Basin: Deschutes
Sub-Basin: Upper Deschutes
LLID: 1213357444600-20.47-N
County: Deschutes
Nearest surface stream which would receive waste if it were to discharge: Whychus Creek formally called Squaw Creek

Treatment System Class: I
Collection System Class: II

Issued in response to Application No. 968002 received December 17, 2010.

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


Don Butcher, Water Quality Permit Manager
Eastern Region

January 22, 2016
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:

	Page
Schedule A - Waste Disposal Limitations	2
Schedule B - Minimum Monitoring and Reporting Requirements	3-4
Schedule C - Compliance Conditions and Schedules	5
Schedule D - Special Conditions	6-8
Schedule E - Not Applicable.....	--
Schedule F - General Conditions	9-13

All direct a discharge to surface waters is prohibited.

SCHEDULE A

Waste Disposal Limitations

1. The permittee is authorized to construct, operate, and maintain wastewater collection, treatment and disposal systems to serve the City of Sisters in accordance with the conditions set forth in this permit.
2. The wastewater collections, treatment and land application system must not be hydraulically or organically loaded in excess of their respective, DEQ approved design capacities. At full build-out, however, the annual average daily influent flow must not exceed 0.38 MGD.
3. All wastewater treatment and disposal systems must be operated in compliance with the following conditions:
 - a. No discharge to state waters is permitted. All wastewater must be stored and treated for disposal by land application following sound irrigation practices.
 - b. Recycled Wastewater
 - i. Prior to land application of the recycled water, it must receive at least Class D treatment as defined in OAR 340-055. Class D recycled water must not exceed a 30-day log mean of 126 E. coli organisms per 100 milliliters and 406 E. coli organisms per 100 milliliters in any single sample. Class C recycled water must not exceed a 7 day median of 23 organisms/100 milliliters and no two consecutive samples must exceed 240 organisms/100 milliliters.
 - ii. Irrigation must conform to a Recycled Water Use Plan approved by DEQ and meet the required setbacks as defined in OAR 340-055.
 - iii. The City of Sisters must restrict public access to the reuse site(s) for the protection of public health.
 - iv. Treated effluent may only be irrigated on land between April 1 through October 31 for dissipation by evapotranspiration and controlled seepage by following sound irrigation practices unless otherwise approved in writing by DEQ.
 - v. Recycled water equipment must be operated so as to prevent:
 - (A) Prolonged ponding of treated recycled water on the ground surface;
 - (B) Surface runoff or subsurface drainage through drainage tile;
 - (C) The creation of odors, fly and mosquito breeding or other nuisance conditions;
 - (D) The overloading of land with nutrients, organics, or other pollutant parameters; and
 - (E) Impairment of existing or potential beneficial uses of groundwater.
 - (F) Until otherwise approved in writing by the Department via a revised reclaimed water use plan, treated effluent must only be reused on Class D beneficial uses.
4. The storage lagoon must be lowered sufficiently by the end of the irrigation season to ensure maximum practicable storage capacity during the non-irrigation months.
5. The permittee must, 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.
6. No activities must be conducted that could cause an adverse impact on existing or potential beneficial uses of groundwater. All wastewater and process related residuals must be managed and disposed in a manner that will prevent a violation of the Groundwater Quality Protection Rules (OAR 340-040).

SCHEDULE B1. System Monitoring Requirements

The permittee must monitor the operation and efficiency of all treatment and disposal facilities. Sampling and measurements taken as required herein must be representative of the nature of the wastewater, and must be taken under normal operating conditions. Unless otherwise agreed to in writing by the Department of Environmental Quality, data collected, and submitted must include but not necessarily be limited to the following parameters and minimum frequencies:

a. **Influent Monitoring and Reporting Requirements****Table B 1: Influent Monitoring**

Item or Parameter	Time Period	Minimum Frequency	Sample Type/Required Action	Report
Total Flow (MGD)	Year-round	Daily	Measurement	Daily totals Monthly maximum Monthly minimum Monthly average Monthly total
Flow Meter Verification	Year-round	Annually	Verification	Completed or not completed (Pass, Fail)
BOD ₅ and TSS (mg/L)	Year-round	Weekly	Composite	Monthly averages Weekly values
pH (S.U.)	Year-round	3/week	Grab	Monthly maximum Monthly minimum Monthly average

b. **Recycled Water Monitoring Requirements:****Table B2: Recycled Water Monitoring**

Item or Parameter	Minimum Frequency	Sample Type/Required Action
Total Flow (MGD) or Quantity Irrigated (in/ac)	Daily	Measurement
Flow Meter Calibration	Annually	Verification
Chlorine, Total Residual (mg/L)	Daily	Grab
pH	3/Week	Grab
E. coli Bacteria	1/Week	Grab*
Total Coliform	1/Week	Grab*
Total P and Total N	Annually	Grab
Annual Irrigation		

*The permittee is only required to sample for either E. coli or total coliform, but not both for an individual use. If the permittee is irrigating on crops requiring only Class D quality effluent, E. coli must be monitored. If the permittee irrigates/reuses effluent for Class C uses, total coliform must be monitored.

2. Reporting Procedures

- a. Monitoring results must be reported on DEQ approved forms. Reports must be submitted to DEQ's Eastern Region – Bend office by the 15th day of the following month.
- b. State monitoring reports must 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 during the reporting period. Monitoring reports must also identify each system classification as found on page one of this permit.
- c. Monitoring reports must also include a record of the quantity and method of use of all sludge removed from the treatment facility and a record of all applicable equipment breakdowns and bypassing.
- d. The laboratory used by the permittee to analyze samples must 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 must be included in the report, but not used in calculations required by this permit. When possible, the permittee must re-sample in a timely manner for parameters failing the QA/QC requirements, analyze the samples, and report the results.
- e. By no later than January 15 of each year, the permittee must submit to DEQ an annual report describing the effectiveness of the recycle water system to comply with the approved recycle water use plan, the rules of Division 55, and the limitations and conditions of this permit applicable to reuse of recycled water. The review is to provide a summary of land application conducted at each site which is adequate to demonstrate that reuse water was applied agronomically and/or hydraulic loading rates, and that required site management practices were followed.

SCHEDULE C

Compliance Conditions and Schedules

- a. Within 180 days the permittee must update their recycled water use plan for DEQ approval. A recycled water use plan must describe how the wastewater treatment system owner will comply with OAR 340-055 (refer to OAR 340-055-0025).
- b. The permittee is expected to meet the compliance date that have been established in this schedule. Either prior to or no later than 14 days following any lapsed compliance date, the permittee shall submit to the Department a notice of compliance or noncompliance with the established schedule. The Director or his authorized representative may revise a schedule of compliance if he determines good and valid cause resulting from events over which the permittee has little or no control.

SCHEDULE D

Special Conditions

1. Prior to constructing or modifying any wastewater control facilities, detailed plans and specifications shall be approved in writing by DEQ. After approval of the plans, all construction shall be in strict conformance with the plans unless otherwise approved in writing by DEQ.
2. Within 6 months of such time as the sewage lagoons require removal of accumulated biosolids, the permittee shall submit a biosolids management plan that complies with the Department's biosolids management regulations as established in OAR 340-50.
3. This permit may be modified to incorporate any applicable standard for sewage sludge use or disposal promulgated under section 405(d) of the Clean Water Act, if the standard for sewage sludge use or disposal is more stringent than any requirements for sludge use or disposal in the permit, or controls a pollutant or practice not limited in this permit.
4. The permittee must, during all times of disposal, provide personnel to ensure the continuous performance of the disposal system within the limitations of this permit. In the event that any condition of this permit or DEQ rules are violated, the permittee must immediately take action to correct the violation and to notify DEQ **within 24 hours** at: DEQ's Eastern Region Water Quality Program Office (541) 388-6146.

Response: In response to a notification, DEQ may conduct an investigation to evaluate the nature and extent of the problem, and may require additional corrective actions, as necessary. Compliance with this requirement does not relieve the permittee from responsibility to maintain continuous compliance with the conditions of this permit or the resulting liability for failure to comply.

5. All materials and equipment, including but not limited to tanks, pumps, controls, valves, etc. must be installed, operated, and maintained in accordance with manufacturer's minimum specifications.
6. The permittee must immediately notify the DEQ Bend office (phone 388-6146) of any occurrence of surfacing sewage so corrective action can be coordinated between the permittee and DEQ. When the DEQ offices are not open, the permittee must report the incident to the Oregon Emergency Response System (phone 1-800-452-0311).
7. Emergency Response and Public Notification Plan
 - a. The permittee must develop, and maintain and implement an Emergency Response and Public Notification Plan (the Plan) per Schedule F, Section B, and Conditions 5 & 6. The permit holder must develop the plan within six months of permit issuance and update the Plan annually to ensure that telephone and email contact information for applicable public agencies are current and accurate. An updated copy of the plan must be kept on file at the wastewater treatment facility for Department review. The latest plan revision date must be listed on the Plan cover along with the reviewer's initials or signature.

8. Recycled Water Use Plan

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

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

- a. All recycled water must be managed in accordance with the approved Recycled Water Use Plan. No substantial changes must be made in the approved plan without written approval by DEQ.
- b. The permittee must notify DEQ 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 DEQ offices are not open, the permittee must report the incident of noncompliance to the Oregon Emergency Response System (Telephone Number 1-800-452-0311).
- c. No recycled water must be made available to a person proposing to recycle unless that person certifies in writing that they have read and understand the provisions in Division 55. This written certification must be kept on file by the sewage treatment system owner and be made available to DEQ for inspection.
- e. Treated effluent must not be irrigated on ground that is frozen, snow-covered, or saturated with water. The volume of irrigated effluent and its total nitrogen loading must not exceed that established in a DEQ-approved recycled water use plan.
- f. Unless otherwise approved in writing by DEQ, a vegetative cover must be maintained on the land irrigation area at all times. Vegetation is to be periodically cut and removed to ensure maximum evapotranspiration and nutrient capture.

10. Operator Certification

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

a. Definitions

- i. "Supervise" means to have full and active responsibility for the daily onsite technical operation of a wastewater treatment system or wastewater collection system.
- ii. "Supervisor" or "designated operator", means the operator delegated authority by the permittee for establishing and executing the specific practice and procedures for operating the wastewater treatment system or wastewater collection system in accordance with the policies of the owner of the system and any permit requirements.
- iii. "Shift Supervisor" means the operator delegated authority by the permittee for executing the specific practice and procedures for operating the wastewater treatment

system or wastewater collection system when the system is operated on more than one daily shift.

- iv. "System" includes both the collection system and the treatment systems.
 - b. The permittee must have its system supervised by one or more operators who hold a valid certificate for the type of wastewater treatment or wastewater collection system, and at a grade equal to or greater than the wastewater system's classification as specified on page 1 of this permit.
 - c. The permittee's wastewater system may not be without the designated supervisor for more than 30 days. During this period, there must be another person available to supervisor who is certified at no more than one grade lower than the classification of the wastewater system. The permittee must delegate authority to this operator to supervise the operation of the system.
 - d. If the wastewater system has more than one daily shift, the permittee must have another properly certified operator available to supervisor operation of the system. Each shift supervisor, if any, must be certified at no more than one grade lower than the system classification.
 - e. The permittee is not required to have a supervisor on site at all times; however, the supervisor must be available to the permittee and operator at all times.
 - f. The permittee must notify DEQ in writing of the name of the system supervisor. The permittee may replace or re-designate the system supervisor with another properly certified operator at any time and must notify DEQ in writing within 30 days of replacement or re-designation of operator in charge. As of this writing, the notice of replacement or re-designation must be sent to Water Quality Division, Operator Certification Program, 2020 SW 4th Avenue, Suite 400, Portland, OR 97201. This address may be updated in writing by DEQ during the term of this permit.
 - g. When compliance with paragraph (c) of Item 8 in this section is not possible or practicable because the system supervisor is not available or the position is vacated unexpectedly, and another certified operator is not qualified to assume supervisory responsibility, the Director may grant a time extension for compliance with the requirements in response to a written request from the system owner. The Director will not grant an extension longer than 120 days unless the system owner documents the existence of extraordinary circumstances.
11. DEQ may reopen the Schedules in this permit, if necessary, to include new or revised conditions.
 12. If warranted, at any time, DEQ may evaluate the need for or require a full assessment of the facility's impact on groundwater quality.

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 CONTROLS1. 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. **Representative Sampling**

Sampling and measurements taken as required herein must be representative of the volume and nature of the monitored discharge when discharging or land applying. Monitoring points must not be changed without notification to and the approval of DEQ.

5. **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. *BOD₅* means five-day biochemical oxygen demand.
2. *TSS* means total suspended solids.
3. *FC* means fecal coliform bacteria.
4. *NH₃-N* means Ammonia Nitrogen.
5. *NO₃-N* means Nitrate Nitrogen.
6. *NO₂-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 flow or time intervals over a 24-hour period.
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.

STATE OF OREGON
COUNTY OF DESCHUTES
CERTIFICATE OF WATER RIGHT

THIS CERTIFICATE ISSUED TO

CITY OF SISTERS
SISTERS, OREGON 97759

confirms the right to store the waters of POLE CREEK, a tributary of SQUAW CREEK, in SISTERS' RESERVOIR, appropriated under Permit 32854, for the purpose of MUNICIPAL USE.

The right to store these waters has been perfected under Reservoir Permit R-5054. The date of priority is AUGUST 10, 1967. The amount of water entitled to be stored each year under such right is not more than 6.3 ACRE FEET.

The reservoir is located as follows:

NE 1/4 NE 1/4
SECTION 19
TOWNSHIP 15 SOUTH, RANGE 10 EAST, W.M.

The dam is to be operated and maintained in accordance to the approved plans and specifications.

The right to store and use the water for the above purpose is restricted to beneficial use at the place of use described.

WITNESS the signature of the Water Resources Director, affixed
JANUARY 3, 1991.

/s/ WILLIAM H. YOUNG

William H. Young

Recorded in State Record of Water Right Certificates numbered 65090.

R-43919 DLM

STATE OF OREGON
 COUNTY OF DESCHUTES
 CERTIFICATE OF WATER RIGHT

THIS CERTIFICATE ISSUED TO

CITY OF SISTERS
 PO BOX 39
 SISTERS, OR 97759

confirms the right to use the waters of WHYCHUS CREEK, a tributary to DESCHUTES RIVER for IRRIGATION of 113 ACRES.

This right was confirmed by decree of the Circuit Court of the State of Oregon for Crook County. The decree is of record at Salem, in the Order Record of the Water Resources Director in Volume 1 at Page 120. The date of priority is 1880.

The amount of water to which this right is entitled is limited to an amount actually used beneficially, and shall not exceed 2.028 CUBIC FOOT PER SECOND, (if available at the original point of diversion) or its equivalent in case of rotation, if available at the original point of diversion.

The original point of diversion is located as follows:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
15 S	10 E	WM	21	SW SW	140 FEET NORTH AND 1190 FEET EAST FROM THE SW CORNER OF SECTION 21

The new Point of Diversion is located:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
15 S	10 E	WM	21	SW SW	998 FEET NORTH AND 1211 FEET EAST FROM THE SW CORNER OF SECTION 21

The use shall conform to such reasonable rotation system as may be ordered by the proper state officer.

This is a final order in other than a contested case. This order is subject to judicial review under ORS 183.484. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080, you may petition for judicial review or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

A description of the place of use to which this right is appurtenant is as follows:

IRRIGATION						
Twp	Rng	Mer	Sec	Q-Q	Tax Lot	Acres
15 S	10 E	WM	10	NE SW	704	18.0
15 S	10 E	WM	10	NW SW	704	0.3
15 S	10 E	WM	10	SW SW	704	4.2
15 S	10 E	WM	10	SE SW	704	37.0
15 S	10 E	WM	10	NW SE	704	2.4
15 S	10 E	WM	10	SW SE	704	36.1
15 S	10 E	WM	10	SE SE	704	4.2
15 S	10 E	WM	15	NE NE	200	10.8
						113.0

The water user shall install and maintain an in-line flow meter or other suitable device for measuring and recording the quantity of water diverted.

This certificate confirms a change in point of diversion approved by the provisions of an Order of the Water Resources Director entered February 26, 2015, approving Transfer Application T-11318, and supersedes Certificates 89817, 89818, 89819, 89820, and 89821.

The issuance of this superseding certificate does not confirm the status of the water right in regard to the provisions of ORS 540.610 pertaining to forfeiture or abandonment.

The right to the use of the water for the above purpose is restricted to beneficial use on the lands or place of use described and is subject to all other conditions and limitations contained in said decree.

WITNESS the signature of the Water Resources Director, affixed March 14, 2018



 Dwight French,
 Water Right Services Administrator, for
 Thomas M. Byler, Director
 Oregon Water Resources Department

STATE OF OREGON
COUNTY OF DESCHUTES
CERTIFICATE OF WATER RIGHT

THIS CERTIFICATE ISSUED TO

CITY OF SISTERS
PO BOX 39
SISTERS, OR 97759

confirms the right to use the waters of WHYCHUS CREEK, a tributary to the DESCHUTES RIVER for IRRIGATION of 35.5 ACRES.

This right was confirmed by decree of the Circuit Court of the State of Oregon for Crook County. The decree is of record at Salem, in the Order Record of the Water Resources Director in Volume 1 at Page 120. The date of priority is 1881.

The amount of water to which this right is entitled is limited to an amount actually used beneficially, and shall not exceed 0.554 CUBIC FOOT PER SECOND, (if available at the original point of diversion) or its equivalent in case of rotation, measured at the point of diversion.

The original point of diversion is located as follows:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
15 S	10 E	WM	21	SW, SW	UNCLE JOHN DITCH: 140 FEET NORTH AND 1190 FEET EAST FROM THE SW CORNER, SECTION 21

The new Point of Diversion is located:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
15 S	10 E	WM	21	SW, SW	998 FEET NORTH AND 1211 FEET EAST FROM THE SW CORNER OF SECTION 21

The use shall conform to such reasonable rotation system as may be ordered by the proper state officer.

A description of the place of use to which this right is appurtenant is as follows:

This is a final order in other than a contested case. This order is subject to judicial review under ORS 183.484. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080, you may petition for judicial review or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

IRRIGATION AND DOMESTIC						
Twp	Rng	Mer	Sec	Q-Q	Tax Lot	Acres
15 S	10 E	WM	15	NE NE	200	6.6
15 S	10 E	WM	15	NW NE	200	28.9

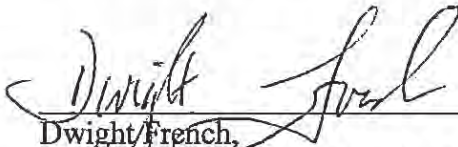
The water user shall install and maintain an in-line flow meter or other suitable device for measuring and recording the quantity of water diverted.

This certificate confirms a change in point of diversion approved by the provisions of an Order of the Water Resources Director entered February 26, 2015, approving Transfer Application T-11318, and supersedes Certificate 89822.

The issuance of this superseding certificate does not confirm the status of the water right in regard to the provisions of ORS 540.610 pertaining to forfeiture or abandonment.

The right to the use of the water for the above purpose is restricted to beneficial use on the lands or place of use described and is subject to all other conditions and limitations contained in said decree.

WITNESS the signature of the Water Resources Director, affixed March 14, 2018.



 Dwight French,
 Water Right Services Administrator, for
 Thomas M. Byler, Director
 Oregon Water Resources Department

STATE OF OREGON
 COUNTY OF DESCHUTES
 CERTIFICATE OF WATER RIGHT

THIS CERTIFICATE ISSUED TO

CITY OF SISTERS
 PO BOX 39
 SISTERS, OR 97759

confirms the right to use the waters of WHYCHUS CREEK, a tributary to the DESCHUTES RIVER for IRRIGATION of 7.0 ACRES.

This right was confirmed by decree of the Circuit Court of the State of Oregon for Crook County. The decree is of record at Salem, in the Order Record of the Water Resources Director in Volume 1 at Page 120. The date of priority is 1886.

The amount of water to which this right is entitled is limited to an amount actually used beneficially, and shall not exceed 0.109 CUBIC FOOT PER SECOND, (if available at the original point of diversion) or its equivalent in case of rotation, measured at the point of diversion.

The original point of diversion is located:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
15 S	10 E	WM	21	SW-SW	UNCLE JOHN DITCH: 140 FEET NORTH AND 1190 FEET EAST FROM THE SW CORNER OF SECTION 21

The new Point of Diversion is located:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
15 S	10 E	WM	21	SW-SW	998 FEET NORTH AND 1211 FEET EAST FROM THE SW CORNER OF SECTION 21

The use shall conform to such reasonable rotation system as may be ordered by the proper state officer.

A description of the place of use to which this right is appurtenant is as follows:

This is a final order in other than a contested case. This order is subject to judicial review under ORS 183.484. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080, you may petition for judicial review or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

IRRIGATION - CITY OF SISTERS						
Twp	Rng	Mer	Sec	Q-Q	Tax Lot	Acres
15 S	10 E	WM	15	NW NE	200	7.0

The water user shall install and maintain an in-line flow meter or other suitable device for measuring and recording the quantity of water diverted.

This certificate confirms a change in point of diversion approved by the provisions of an Order of the Water Resources Director entered February 26, 2015, approving Transfer Application T-11318, and together with Certificate 93682 supersedes Certificate 89823.

The issuance of this superseding certificate does not confirm the status of the water right in regard to the provisions of ORS 540.610 pertaining to forfeiture or abandonment.

The right to the use of the water for the above purpose is restricted to beneficial use on the lands or place of use described and is subject to all other conditions and limitations contained in said decree.

WITNESS the signature of the Water Resources Director, affixed March 14, 2018.



 Dwight French,
 Water Right Services Administrator, for
 Thomas M. Byler, Director
 Oregon Water Resources Department

Findings of Fact

Background

1. On November 17, 2011, Three Sisters Irrigation District, and co-applicants listed above, filed an application to change the points of diversion under Certificates 86824, 83355, 85389, 85391, 86828, 86826, 85392, 85386, 85393, 85387 and 85388. The application also contained a request for a fee waiver under OAR 690-380-3400 (3) and a request for a map waiver under OAR 690-380-3410 (1)(c), and supplied the appropriate documentation from the Oregon Department of Fish & Wildlife. The Department approved the requests. The Department assigned the transfer application number T-11318.
2. Transfer application was filed in conjunction with Conserved Water Application CW-71.
3. On February 24, 2015, the Department issued an Order approving CW-71. As a result of the CW-71 Order, reduced rate certificates were issued which supersede the following certificates involved in this transfer.

Original Certificate	Original Rate	Superseding Certificate	Reduced Rate
86824	1.230	89817	0.959
83355	0.620	89818	0.484
85389	0.080	89819	0.062
85391	0.100	89820	0.078
86828	0.570	89821	0.445
86826	0.710	89822	0.554
85392	0.600	89823	0.468
85386	0.800	89824	0.624
85393	0.492	89825	0.384
85393	0.682	89844*	0.682

*- remaining right, not reduced in rate

4. Certificates 85387 and 85388 were superseded by Certificates 87243 and 87242 and inchoate portions under Transfer T-10907. The inchoate portions of Certificates 85387 and 85388 were confirmed under a Determination of Satisfactory Proof, recorded in Special Order Volume 91, Pages 428-430. As a result of the CW-71 Order, reduced rate certificates were issued which supersede 87243 and 87242 and the confirmed inchoate portions of the certificates under T-10907.

Original Certificate	Original Rate	Superseding Certificate	Reduced Rate
85387/87243	0.966	89826	0.753
85387/T-10907	0.474	89827	0.370
85388/87242	0.180	89828	0.140
85388/T-10907	0.190	89829	0.148

5. The first right to be transferred is as follows:

Certificate: 89817 in the name of CITY OF SISTERS and LAZY Z MEADOWS, LLC (confirmed by Decree of the Circuit Court of the State of Oregon for Deschutes County)

Use: IRRIGATION of 59.5 ACRES
Priority Date: 1880
Rate: 0.959 CUBIC FOOT PER SECOND
Source: WHYCHUS CREEK (formerly known as Squaw Creek), tributary to the
 DESCHUTES RIVER

Authorized Point of Diversion:

Twp	Rng	Mer	Sec	Q - Q	Measured Distances
15 S	10 E	WM	21	SW SW	600 FEET NORTH AND 1100 FEET EAST FROM THE SW CORNER OF SECTION 21

Authorized Place of Use:

IRRIGATION						
Twp	Rng	Mer	Sec	Q - Q	Tax Lot	Acres
15 S	10 E	WM	10	NE SW	704	18.0
15 S	10 E	WM	10	NW SW	704	0.3
15 S	10 E	WM	10	SW SW	704	1.2
15 S	10 E	WM	10	SE SW	704	37.0
15 S	10 E	WM	10	SW SE	704	3.0

6. The second right to be transferred is as follows:

Certificate: 89818 in the name of G.W. McFARLANE (confirmed by Decree of the Circuit Court of the State of Oregon for Deschutes County)

Use: IRRIGATION of 30.0 ACRES

Priority Date: 1880

Rate: 0.484 CUBIC FOOT PER SECOND

Limit/Duty: The amount of water used for irrigation, together with the amount secured under any other right existing for the same lands, is limited to a diversion of ONE-FIFTIETH of one cubic foot per second, or its equivalent for each acre irrigated during the irrigation season of each year.

Source: WHYCHUS CREEK (formerly known as Squaw Creek), tributary to the DESCHUTES RIVER

Authorized Place of Use:

IRRIGATION						
Twp	Rng	Mer	Sec	Q - Q	Tax Lot	Acres
15 S	10 E	WM	10	SW SE	704	30.0

7. Certificate 83355 does not describe the location of the point of diversion, however information is available from the transfer application, indicating that the point of diversion is located as follows:

Authorized Point of Diversion:

Twp	Rng	Mer	Sec	Q - Q	Measured Distances
15 S	10 E	WM	21	SW SW	UNCLE JOHN DITCH - 140 FEET NORTH AND 1190 FEET EAST FROM THE SW CORNER OF SECTION 21

8. The third right to be transferred is as follows:

Certificate: 89819 in the name of CITY OF SISTERS (confirmed by Decree of the Circuit Court of the State of Oregon for Deschutes County)

Use: IRRIGATION of 2.5 ACRES
Priority Date: 1880
Rate: 0.062 CUBIC FOOT PER SECOND
Source: WHYCHUS CREEK (formerly known as Squaw Creek), tributary to the
 DESCHUTES RIVER

Authorized Point of Diversion:

Twp	Rng	Mer	Sec	Q - Q	Measured Distances
15 S	10 E	WM	21	SW SW	UNCLE JOHN DITCH - 140 FEET NORTH AND 1190 FEET EAST FROM THE SW CORNER OF SECTION 21

Authorized Place of Use:

IRRIGATION						
Twp	Rng	Mer	Sec	Q - Q	Tax Lot	Acres
15 S	10 E	WM	10	NW SE	704	2.4
15 S	10 E	WM	10	SW SE	704	0.1

9. The fourth right to be transferred is as follows:

Certificate: 89820 in the name of CITY OF SISTERS (confirmed by Decree of the Circuit Court of the State of Oregon for Deschutes County)

Use: IRRIGATION of 3.0 ACRES

Priority Date: 1880

Rate: 0.078 CUBIC FOOT PER SECOND

Source: WHYCHUS CREEK (formerly known as Squaw Creek), tributary to the
 DESCHUTES RIVER

Authorized Point of Diversion:

Twp	Rng	Mer	Sec	Q - Q	Measured Distances
15 S	10 E	WM	21	SW SW	UNCLE JOHN DITCH - 140 FEET NORTH AND 1190 FEET EAST FROM THE SW CORNER OF SECTION 21

Authorized Place of Use:

IRRIGATION						
Twp	Rng	Mer	Sec	Q - Q	Tax Lot	Acres
15 S	10 E	WM	10	SW SW	704	3.0

10. The fifth right to be transferred is as follows:

Certificate: 89821 in the name of CITY OF SISTERS and LAZY Z MEADOWS, LLC (confirmed by Decree of the Circuit Court of the State of Oregon for Deschutes County)

Use: IRRIGATION of 18.0 ACRES

Priority Date: 1880

Rate: 0.445 CUBIC FOOT PER SECOND

Source: WHYCHUS CREEK (formerly known as Squaw Creek), tributary to the
 DESCHUTES RIVER

Authorized Point of Diversion:

Twp	Rng	Mer	Sec	Q - Q	Measured Distances
15 S	10 E	WM	21	SW SW	UNCLE JOHN DITCH - 140 FEET NORTH AND 1190 FEET EAST FROM THE SW CORNER OF SECTION 21

Authorized Place of Use:

IRRIGATION						
Twp	Rng	Mer	Sec	Q - Q	Tax Lot	Acres
15 S	10 E	WM	10	SW SE	704	3.0
15 S	10 E	WM	10	SE SE	704	4.2
15 S	10 E	WM	15	NE NE	200	10.8

11. The sixth right to be transferred is as follows:

Certificate: 89822 in the name of CITY OF SISTERS and LAZY Z MEADOWS, LLC
(confirmed by Decree of the Circuit Court of the State of Oregon for
Deschutes County)

Use: IRRIGATION of 35.5 ACRES

Priority Date: 1881

Rate: 0.554 CUBIC FOOT PER SECOND

Source: WHYCHUS CREEK (formerly known as Squaw Creek), tributary to the
DESCHUTES RIVER

Authorized Point of Diversion:

Twp	Rng	Mer	Sec	Q - Q	Measured Distances
15 S	10 E	WM	21	SW SW	UNCLE JOHN DITCH - 140 FEET NORTH AND 1190 FEET EAST FROM THE SW CORNER OF SECTION 21

Authorized Place of Use:

IRRIGATION						
Twp	Rng	Mer	Sec	Q - Q	Tax Lot	Acres
15 S	10 E	WM	15	NE NE	200	6.6
15 S	10 E	WM	15	NW NE	200	28.9

12. The seventh right to be transferred is as follows:

Certificate: 89823 in the name of CITY OF SISTERS and HAWK'S HAVEN
RESERVE, LLC, BRUCE & MARLEEN ROGNLIEN (confirmed by
Decree of the Circuit Court of the State of Oregon for Deschutes County)

Use: IRRIGATION of 30.0 ACRES

Priority Date: 1886

Rate: 0.468 CUBIC FOOT PER SECOND

Source: WHYCHUS CREEK (formerly known as Squaw Creek), tributary to the
DESCHUTES RIVER

Authorized Point of Diversion:

Twp	Rng	Mer	Sec	Q - Q	Measured Distances
15 S	10 E	WM	21	SW SW	UNCLE JOHN DITCH - 140 FEET NORTH AND 1190 FEET EAST FROM THE SW CORNER OF SECTION 21

Authorized Place of Use:

IRRIGATION - HAWK'S HAVEN RESERVE, LLC						
Twp	Rng	Mer	Sec	Q - Q	Tax Lot	Acres
15 S	10 E	WM	10	SW NW	706	9.9
15 S	10 E	WM	10	SE NW	706	12.6
15 S	10 E	WM	10	NE SW	706	0.3
15 S	10 E	WM	10	NW SW	706	0.2

IRRIGATION - CITY OF SISTERS						
Twp	Rng	Mer	Sec	Q - Q	Tax Lot	Acres
15 S	10 E	WM	15	NW NE	200	7.0

13. The eighth right to be transferred is as follows:

Certificate: 89824 in the name of HAWK'S HAVEN RESERVE, LLC, BRUCE and MARLEEN ROGNLIEN (confirmed by Decree of the Circuit Court of the State of Oregon for Deschutes County)

Use: IRRIGATION of 40.0 ACRES

Priority Date: 1895

Rate: 0.624 CUBIC FOOT PER SECOND

Source: WHYCHUS CREEK (formerly known as Squaw Creek), tributary to the DESCHUTES RIVER

Authorized Point of Diversion:

Twp	Rng	Mer	Sec	Q - Q	Measured Distances
15 S	10 E	WM	21	SW SW	UNCLE JOHN DITCH - 140 FEET NORTH AND 1190 FEET EAST FROM THE SW CORNER OF SECTION 21

Authorized Place of Use:

IRRIGATION - HAWK'S HAVEN RESERVE						
Twp	Rng	Mer	Sec	Q - Q	Tax Lot	Acres
15 S	10 E	WM	10	SW NE	706	3.6
15 S	10 E	WM	10	SW NW	706	18.8
15 S	10 E	WM	10	SE NW	706	16.1
15 S	10 E	WM	10	NE SW	706	1.5

14. The ninth right to be transferred is as follows:

Certificate: 89825 in the name of SHARON AMESTOY, AMESTOY RANCH, LLC; LAZY Z RANCH c/o JAY POULOS (confirmed by Decree of the Circuit Court of the State of Oregon for Deschutes County)

Use: IRRIGATION of 24.6 ACRES

Priority Date: 1900

Rate: 0.384 CUBIC FOOT PER SECOND (if available at the original point of diversion being within the NW $\frac{1}{4}$ SW $\frac{1}{4}$, Section 9, Township 15 South, Range 10 East, W.M.; 910 Feet South and 160 Feet East from the W $\frac{1}{4}$ Corner of Section 9) or its equivalent in case of rotation, measured at the point of diversion

Source: WHYCHUS CREEK (formerly known as Squaw Creek), tributary to the DESCHUTES RIVER

Authorized Point of Diversion:

Twp	Rng	Mer	Sec	Q - Q	Measured Distances
15 S	10 E	WM	21	SW SW	UNCLE JOHN DITCH - 140 FEET NORTH AND 1190 FEET EAST FROM THE SW CORNER OF SECTION 21

Authorized Place of Use:

IRRIGATION - AMESTOY RANCH						
Twp	Rng	Mer	Sec	Q - Q	Tax Lot	Acres
15 S	10 E	WM	10	SW NE	702	0.9
15 S	10 E	WM	10	SE NE	702	6.8
15 S	10 E	WM	10	NE SE	702	6.8
15 S	10 E	WM	10	NW SE	702	2.0

IRRIGATION - LAZY Z RANCH						
Twp	Rng	Mer	Sec	Q - Q	Tax Lot	Acres
15 S	10 E	WM	10	NE SW	700	8.1

15. The tenth right to be transferred is as follows:

Certificate: 89844 in the name of SKI POND RANCH, LLC, c/o DAVID HERMAN (confirmed by Decree of the Circuit Court of the State of Oregon for Deschutes County)

Use: IRRIGATION of 34.1 ACRES

Priority Date: 1900

Rate: 0.682 CUBIC FOOT PER SECOND (if available at the original point of diversion being within the NW $\frac{1}{4}$ SW $\frac{1}{4}$, Section 9, Township 15 South, Range 10 East, W.M.; 910 Feet South and 160 Feet East from the W $\frac{1}{4}$ Corner of Section 9) or its equivalent in case of rotation, measured at the point of diversion

Source: WHYCHUS CREEK (formerly known as Squaw Creek), tributary to the DESCHUTES RIVER

Authorized Point of Diversion:

Twp	Rng	Mer	Sec	Q - Q	Measured Distances
15 S	10 E	WM	21	SW SW	UNCLE JOHN DITCH - 140 FEET NORTH AND 1190 FEET EAST FROM THE SW CORNER OF SECTION 21

Authorized Place of Use:

IRRIGATION - SKI POND RANCH, LLC						
Twp	Rng	Mer	Sec	Q - Q	Tax Lot	Acres
15 S	10 E	WM	14	NE NE	1700	1.1
15 S	10 E	WM	14	NW NE	1700	6.3
15 S	10 E	WM	14	SW NE	1700	24.7
15 S	10 E	WM	14	SE NE	1700	2.0

16. The eleventh right to be transferred is as follows:

Certificate: 89826 in the name of SHARON AMESTOY, AMESTOY RANCH, WILLITTS, LLC, R & B RANCH, LLC, c/o RICK MORROW (confirmed by Decree of the Circuit Court of the State of Oregon for Deschutes County)

Use: IRRIGATION of 48.3 ACRES

Priority Date: 1908

Rate: 0.753 CUBIC FOOT PER SECOND

Source: WHYCHUS CREEK (formerly known as Squaw Creek), tributary to the DESCHUTES RIVER

Authorized Point of Diversion:

Twp	Rng	Mer	Sec	Q - Q	Measured Distances
15 S	10 E	WM	21	SW SW	UNCLE JOHN DITCH - 140 FEET NORTH AND 1190 FEET EAST FROM THE SW CORNER OF SECTION 21

Authorized Place of Use:

IRRIGATION - WILLITTS, LLC						
Twp	Rng	Mer	Sec	Q - Q	Tax Lot	Acres
15 S	10 E	WM	10	SW NW	800	1.3
15 S	10 E	WM	10	NW SW	800	3.7

IRRIGATION - AMESTOY RANCH						
Twp	Rng	Mer	Sec	Q - Q	Tax Lot	Acres
15 S	10 E	WM	10	NE SE	702	17.8
15 S	10 E	WM	10	SW SE	702	0.3
15 S	10 E	WM	10	SE SE	702	8.9

IRRIGATION - R & B RANCH, LLC						
Twp	Rng	Mer	Sec	Q - Q	Tax Lot	Acres
15 S	10 E	WM	11	NW SW	1300	10.0
15 S	10 E	WM	11	SW SW	1300	6.3

17. The twelfth right to be transferred is as follows:

Certificate: 89827 in the name of R & B RANCH, LLC, c/o RICK MORROW
(confirmed by Decree of the Circuit Court of the State of Oregon for
Deschutes County)

Use: IRRIGATION of 23.7 ACRES

Priority Date: 1908

Rate: 0.37 CUBIC FOOT PER SECOND

Source: WHYCHUS CREEK (formerly known as Squaw Creek), tributary to the
DESCHUTES RIVER

Authorized Point of Diversion:

Twp	Rng	Mer	Sec	Q - Q	Measured Distances
15 S	10 E	WM	21	SW SW	UNCLE JOHN DITCH - 140 FEET NORTH AND 1190 FEET EAST FROM THE SW CORNER OF SECTION 21

Authorized Place of Use:

IRRIGATION - R & B RANCH, LLC						
Twp	Rng	Mer	Sec	Q - Q	Acres	
15 S	10 E	WM	11	SW NE	5.6	
15 S	10 E	WM	11	SE NE	5.5	
15 S	10 E	WM	11	NE SE	12.4	
15 S	10 E	WM	11	SE SE	0.2	

18. The thirteenth right to be transferred is as follows:

Certificate: 89828 the name of SHARON AMESTOY, AMESTOY RANCH, LLC
(perfected under Permit E-176)

Use: IRRIGATION of 14.5 ACRES

Priority Date: October 7, 1912

Rate: 0.14 CUBIC FOOT PER SECOND
Source: WHYCHUS CREEK (formerly known as Squaw Creek), tributary to the DESCHUTES RIVER

Authorized Point of Diversion:

Twp	Rng	Mer	Sec	Q - Q	Measured Distances
15 S	10 E	WM	21	SW SW	UNCLE JOHN DITCH - 140 FEET NORTH AND 1190 FEET EAST FROM THE SW CORNER OF SECTION 21

Authorized Place of Use:

IRRIGATION - AMESTOY RANCH						
Twp	Rng	Mer	Sec	Q - Q	Tax Lot	Acres
15 S	10 E	WM	10	SE NE	702	11.9
15 S	10 E	WM	10	NE SE	702	2.6

19. The fourteenth right to be transferred is as follows:
Certificate: 89829 the name of R & B RANCH, LLC, c/o RICK MORROW (perfected under Permit E-176)
Use: IRRIGATION of 14.9 ACRES
Priority Date: October 7, 1912
Rate: 0.148 CUBIC FOOT PER SECOND
Source: WHYCHUS CREEK (formerly known as Squaw Creek), tributary to the DESCHUTES RIVER

Authorized Point of Diversion:

Twp	Rng	Mer	Sec	Q - Q	Measured Distances
15 S	10 E	WM	21	SW SW	UNCLE JOHN DITCH - 140 FEET NORTH AND 1190 FEET EAST FROM THE SW CORNER OF SECTION 21

Authorized Place of Use:

IRRIGATION - R & B RANCH, LLC						
Twp	Rng	Mer	Sec	Q - Q	Tax Lot	Acres
15 S	10 E	WM	11	SW NE	1300	10.8
15 S	10 E	WM	11	SE NE	1300	4.1

20. Transfer Application T-11318 proposes to change the point of diversion for the above described rights downstream approximately 1400 feet to the Three Sisters Irrigation District main diversion:

Proposed Point of Diversion:

Twp	Rng	Mer	Sec	Q - Q	Measured Distances
15 S	10 E	WM	21	SW SW	998 FEET NORTH AND 1211 FEET EAST FROM THE SW CORNER OF SECTION 21

21. Notice of the application for transfer was published on November 22, 2011, pursuant to OAR 690-380-4000. No comments were filed in response to the notice.
22. The Oregon Department of Fish and Wildlife has determined that a fish screen is necessary at the new point of diversion and that the diversion is currently equipped with an appropriate fish screen.

23. On November 27, 2012, the Department sent a copy of the draft Preliminary Determination proposing to approve Transfer Application T-11318 to the applicants. The draft Preliminary Determination cover letter set forth a deadline of December 28, 2012, for the applicants to respond. The applicants requested clarification on Condition #7 of the final page of the draft Preliminary Determination. OWRD confirmed that the CWRE will review the new POD for capacity and the District may request a waiver to provide self-certification maps from the District for the places of use. The applicants requested that the Department proceed with issuance of a Preliminary Determination and provided the necessary information to demonstrate that the applicants are authorized to pursue the transfer.
24. On January 10, 2013, the Department issued a Preliminary Determination proposing to approve Transfer Application T-11318 and sent a copy to the applicants. Additionally, notice of the Preliminary Determination for the transfer application was published on the Department's weekly notice on January 15, 2013, and in *The Bulletin* newspaper on January 17, 24, and 31, 2013, pursuant to ORS 540.520 and OAR 690-380-4020. No protests were filed in response to the notices.

Transfer Review Criteria [OAR 690-380-4010(2)]

25. Water has been used within the five-year period prior to submittal of the transfer application according to the terms and conditions of the rights. There is no information in the records that would demonstrate that the rights are subject to forfeiture under ORS 540.610.
26. A diversion structure and ditch sufficient to use the full amount of water allowed under the existing rights were present within the five-year period prior to submittal of Transfer Application T-11318.
27. The proposed changes would not result in enlargement of the rights.
28. The proposed changes would not result in injury to other water rights.

Conclusions of Law

The changes in points of diversion proposed in Transfer Application T-11318 appear be consistent with the requirements of ORS 540.505 to 540.580 and OAR 690-380-5000. If protests are not filed pursuant to OAR 690-380-4030, the transfer application will be approved.

Now, therefore, it is ORDERED:

1. The changes in points of diversion proposed in application T-11318 are approved.
2. The right to the use of the water is restricted to beneficial use at the place of use described, and is subject to all other conditions and limitations contained in Certificates 89817, 89818, 89819, 89820, 89821, 89822, 89823, 89824, 89825, 89826, 89827, 89828, 89829, 89844, and any related decree.

3. Water right Certificates 89817, 89818, 89819, 89820, 89821, 89822, 89823, 89824, 89825, 89826, 89827, 89828, 89829, and 89844 are cancelled.
4. The quantity of water diverted at the new point of diversion shall not exceed the quantity of water lawfully available at the original points of diversion.
5. The water users shall maintain and operate the existing measuring device and shall make such improvements as may be required by the Department.
6. The water users shall maintain and operate a fish screen at the point of diversion consistent with the Oregon Department of Fish and Wildlife's operational and maintenance standards.
7. Full beneficial use of the water shall be made, consistent with the terms of this order, on or before **October 1, 2016**. A Claim of Beneficial Use prepared by a Certified Water Right Examiner shall be submitted by the applicant to the Department within one year after the deadline for completion of the changes and full beneficial use of the water. (See clarification in Finding of Fact #23 above.)
8. After satisfactory proof of beneficial use is received, new certificates confirming the rights transferred will be issued.

Dated at Salem, Oregon this 26th day of February, 2015.


Dwight French, Water Right Services Administrator, for
THOMAS M. BYLER, DIRECTOR

Mailing date: FEB 27 2015

**BEFORE THE WATER RESOURCES DEPARTMENT
OF THE STATE OF OREGON**

In the Matter of Application for Extension)
of Time for Transfer Application T-11318,)
Deschutes County)

FINAL ORDER APPROVING AN
EXTENSION OF TIME

Applicant

PAUL BERTAGNA, DIRECTOR
PUBLIC WORKS DEPARTMENT
CITY OF SISTERS
PO BOX 39
SISTERS, OR 97759

Agent

GENEVIEVE HURBERT
DESCHUTES RIVER CONSERVANCY, AGENT
700 NW HILL ST STE 1
BEND, OR 97703

Authority

OAR 690-380-6020 establishes an application process and criteria for the review of extensions of time for the completion of changes authorized under water right transfer applications.

Findings of Fact

1. On June 5, 2017, the Department received an application for extension of time for Transfer Application T-11318.
2. The Department issued an order approving Transfer Application T-11318 on February 26, 2015. The order was recorded in Special Order Volume 95, Pages 141-151. The order set a transfer completion date of October 1, 2016.
3. To fully complete the change, the applicant needs to make beneficial use from the new point of diversion authorized in T-11318 on an approximately 20 acre portion held by the City of Sisters.
4. The applicant has requested that the time for completion of beneficial use be extended to October 1, 2017.

Conclusions of Law

Pursuant to OAR 690-380-6020, the Director of the Water Resources Department concludes the applicant has shown reasonable diligence to complete the transfer within the time period established by the order approving Transfer Application T-11318.

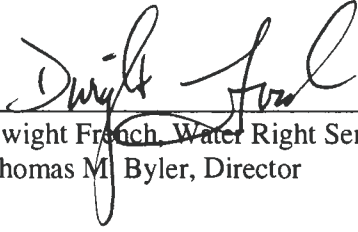
NOTICE OF RIGHT TO PETITION FOR RECONSIDERATION OR JUDICIAL REVIEW

This is an order in other than a contested case. This order is subject to judicial review under ORS 183.484. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080, you may petition for judicial review or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

Now, therefore, it is ORDERED:

The time for completion of the changes authorized by Transfer Application T-11318 shall be extended to October 1, 2017.

Dated at Salem, Oregon this 12 day of June, 2017.



Dwight French, Water Right Services Administrator, for
Thomas M. Byler, Director

JUN 14 2017

Mailing date: _____

APPENDIX F
Inspection Memo - 1.6 MG Prestressed
Concrete Water Storage Tank

INSPECTION MEMO

1.6MG Prestressed Concrete Water Storage Tank

*Water Reservoir
Sisters, OR*



Prepared for:

**City of Sisters, OR
Anderson Perry & Associates**

Prepared by:



**Concrete
Tank Services**

Inspection | Rehab | Retrofit

INSPECTION MEMO

1.6 MG PRESTRESSED CONCRETE WATER STORAGE TANK

Sisters, OR – Water Storage Tank

On Monday, May 16th, 2022, an interior and exterior inspection was conducted at the water storage reservoir, located near Peterson Burn Rd, in Sisters, Oregon. The interior and exterior inspection was performed on the existing concrete water storage tank. Prior to mobilizing for the inspection, the City of Sisters set up confined space for the interior inspection. The inspection was performed by Daniel Gancher, Western Regional Manager, Nick Belmont, Pacific Northwest Regional Manager, and Adam Blaser, Central Regional Manager.

Description of Services Provided

Prior to the May 16th mobilization, DN Tanks met with Anderson Perry and the City of Sisters at the existing reservoir location, and an exterior walk was performed around the existing reservoir. We walked onto the roof to look at the condition of roof joints, hatches, and concrete surface condition of the roof. We then did an exterior walk around the reservoir sidewalls, and a hammer was used to sound the shotcrete/gunite. This is a common inspection practice, to identify signs of delamination. Delamination is identified by this method by hearing a hollow sound with the hammer on the shotcrete/gunite material. There were several hollow spots identified during this sounding, at varying elevations and locations on the reservoir. This prompted the City of Sisters to request DN Tanks to perform a more thorough interior and exterior inspection. The exterior inspection services included chipping and cutting into the shotcrete/gunite wall in the hollow spots that were identified, to examine the condition of the prestressing reinforcement. With presence of exterior cracks and delaminated shotcrete/gunite, there could be the potential for corroded prestressing reinforcement. An interior inspection was also performed during the same mobilization, which was accomplished by floating in the reservoir with a disinfected raft. The water elevation was temporarily lowered, to allow more visible concrete surfaces during this inspection.

Existing Prestressed Concrete Tank Information

DN Tanks has been provided original bidding documents from Anderson Perry and the City of Sisters. Per the construction documents, and the conditions discovered during the inspection, the reservoir appears to be a prestressed concrete tank, with a reinforced concrete corewall. The bid documents are dated 1993, so it can be assumed the reservoir was constructed sometime between 1993-1995. The roof consists of

precast pie-shaped “T” slabs. As noted in the photographs shown below, the exterior shotcrete is approximately 3” thick. The existing prestressing strand was measured to be approximately ½” in diameter, and the construction window showed two strands grouped closely together. There were slight bulges in the wall, which may indicate the location of the prestressing strand locations. If this is accurate, the prestressing strands are spaced approximately 2’-0” on-center.

Exterior Wall Findings

The exterior shotcrete/gunite materials was chipped in multiple locations. In several of the locations, no prestressing reinforcement was identified, and the shotcrete/gunite material was chipped back to the reinforced concrete corewall. A location on the North side of the wall, approximately 4’ from finished grade, prestressing reinforcement was discovered. As mentioned previously, this discovered at a hollow spot. The shotcrete/gunite material was bonded very well around the prestressing reinforcement, and the reinforcement showed no signs of corrosion. The prestressing reinforcement was in excellent condition. At this location, as show on the following pictures, there were two galvanized prestressing strands that was fully encased in shotcrete. There was small visible cracking in the shotcrete/gunite, with visible efflorescence. This could possibly be able removed from a pressure washing. Based on the condition of the shotcrete/gunite at the multiple locations that were chipped, and the condition of the prestressing strand that was exposed, no repairs are recommended on the exterior walls.

Interior Findings

The visible interior walls were in excellent condition. There were no visible signs of cracking nor spalling concrete. No further action nor repair is recommended.

The interior column was in good location, with no visible deficiencies identified.

The interior floor was difficult to see, due to the fact the reservoir was in service. There was a previous repair that was visible, with a white substance that looks to have been placed to fill in a crack. It is likely that this was an epoxy material. The coating is showing signs of failure, with visible loss of material in middle of the repair material. It would be recommended to remove and replace this coating with an elastomeric coating. There were no other sings of distress in the floor that were visible from the raft.

The underside of the roof showed signs of possible water intrusion at the existing construction joints on the pie-shaped precast panels. The pictures below show efflorescence at several locations at the existing construction joints, which would indicate moisture is getting through the existing construction joints. In one location, the filler material used in the construction joint has come loose, and was hanging from the interior roof. There are several locations that look have small spalls, with potentially exposed rebar. From the elevation of the raft, it was difficult to identify. There were a few locations that daylight was visible from the underside of the roof. The existing concrete spalls are recommended to be repaired. The construction joints and daylight locations are recommended to be repaired.

Exterior Roof Condition

The exterior roof is in fair condition. The exterior construction joints are showing signs of failure with visible cracks in between the construction joints. There appears to be an existing coating that was placed on the exterior concrete surface, that is showing signs of wear and tear. A coating would be recommended on the exterior roof surface, and a construction joint replacement would be recommended to prevent water intrusion.

Overall, the prestressed concrete reservoir is in very good condition. The repairs noted in this inspection memo could help preserve the condition of the reservoir, to help extend the surface life and avoid potential water quality concerns with water intrusion. The City of Sisters noted that they are not aware of the existing concrete reservoir having any active leaks. It would be recommended to perform a leak test to confirm existing conditions.

Photographs



Figure 1: Exterior View of Reservoir



Figure 2: Exterior View of Reservoir Wall



Figure 3: Exterior inspection window with no prestressing



Figure 4: Exterior inspection window with no prestressing



Figure 5: Exposed prestressing strand

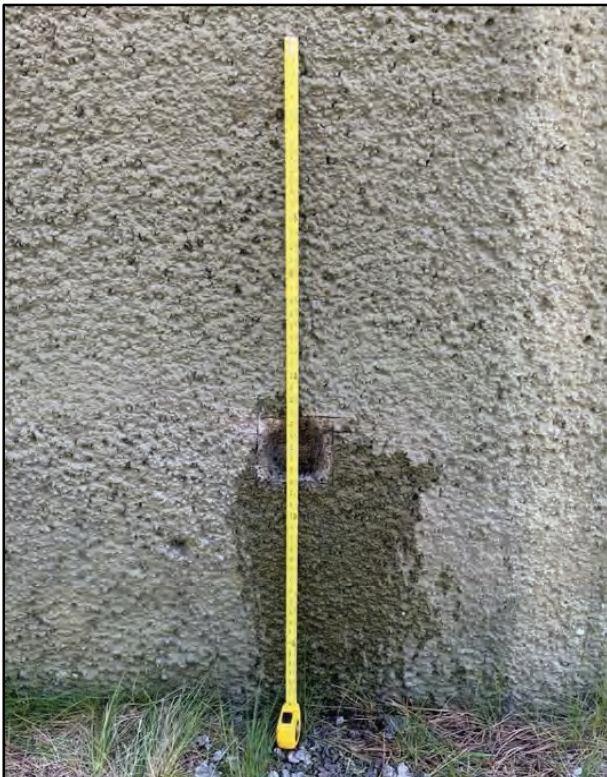


Figure 6: Exposed prestressing strand – 3'-6" from finished grade



Figure 7: Interior view – Float inspection



Figure 8: Interior view – note construction joints with existing spalls



Figure 9: Interior View of Column

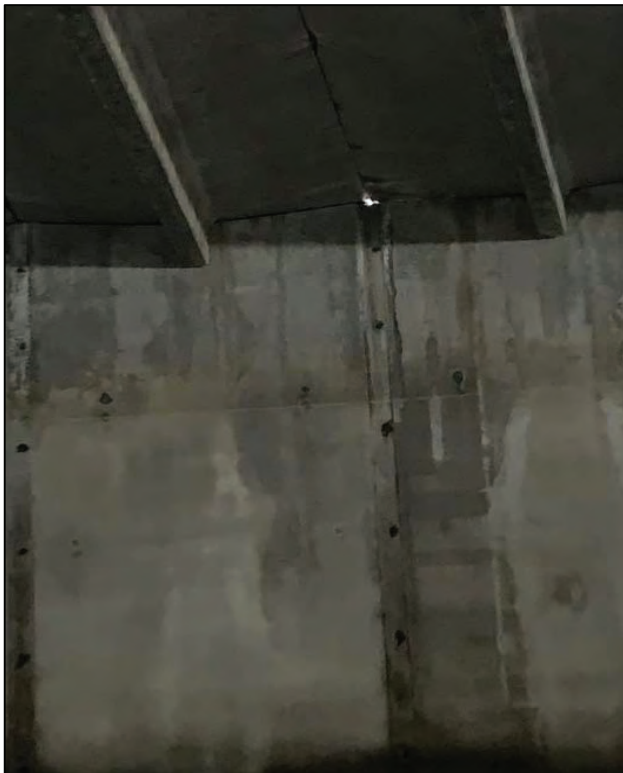


Figure 10: Interior view – Note potential daylight – found in several locations



Figure 11: Exterior Roof – Note construction joints and existing coating



Figure 11: Exterior Roof – Note construction joints and existing coating

APPENDIX G
Public Protection Classification Summary
Report - Sisters Camp
Sherman FD - Oregon



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March 27, 2017

Mr. Chuck Newport, Board Chairman
Sisters Camp Sherman FD
PO Box 1509
Sisters, Oregon, 97759

RCVD 3-28-17
ACCT# _____
CAPT. INITIALS _____
CHIEF INITIALS RJ 3-28-17

RE: Sisters Camp Sherman Fd, Deschutes, Jefferson Counties, Oregon
Public Protection Classification: 03/10
Effective Date: July 01, 2017

Dear Mr. Chuck Newport,

We wish to thank you and Chief Roger Johnson for your cooperation during our recent Public Protection Classification (PPC) survey. ISO has completed its analysis of the structural fire suppression delivery system provided in your community. The resulting classification is indicated above.

If you would like to know more about your community's PPC classification, or if you would like to learn about the potential effect of proposed changes to your fire suppression delivery system, please call us at the phone number listed below.

ISO's Public Protection Classification Program (PPC) plays an important role in the underwriting process at insurance companies. In fact, most U.S. insurers – including the largest ones – use PPC information as part of their decision-making when deciding what business to write, coverage's to offer or prices to charge for personal or commercial property insurance.

Each insurance company independently determines the premiums it charges its policyholders. The way an Insurer uses ISO's information on public fire protection may depend on several things – the company's fire-loss experience, ratemaking methodology, underwriting guidelines, and its marketing strategy.

Through ongoing research and loss experience analysis, we identified additional differentiation in fire loss experience within our PPC program, which resulted in the revised classifications. We based the differing fire loss experience on the fire suppression capabilities of each community. The new classifications will improve the predictive value for insurers while benefiting both commercial and residential property owners. We've published the new classifications as "X" and "Y" – formerly the "9" and "8B" portion of the split classification, respectively. For example:

- A community currently graded as a split 6/9 classification will now be a split 6/6X classification; with the "6X" denoting what was formerly classified as "9."
- Similarly, a community currently graded as a split 6/8B classification will now be a split 6/6Y classification, the "6Y" denoting what was formerly classified as "8B."

- Communities graded with single "9" or "8B" classifications will remain intact.
- Properties over 5 road miles from a recognized fire station would receive a class 10.

PPC is important to communities and fire departments as well. Communities whose PPC improves may get lower insurance prices. PPC also provides fire departments with a valuable benchmark, and is used by many departments as a valuable tool when planning, budgeting and justifying fire protection improvements.

ISO appreciates the high level of cooperation extended by local officials during the entire PPC survey process. The community protection baseline information gathered by ISO is an essential foundation upon which determination of the relative level of fire protection is made using the Fire Suppression Rating Schedule.

The classification is a direct result of the information gathered, and is dependent on the resource levels devoted to fire protection in existence at the time of survey. Material changes in those resources that occur after the survey is completed may affect the classification. Although ISO maintains a pro-active process to keep baseline information as current as possible, in the event of changes please call us at 1-800-444-4554, option 2 to expedite the update activity.

ISO is the leading supplier of data and analytics for the property/casualty insurance industry. Most insurers use PPC classifications for underwriting and calculating premiums for residential, commercial and industrial properties. The PPC program is not intended to analyze all aspects of a comprehensive structural fire suppression delivery system program. It is not for purposes of determining compliance with any state or local law, nor is it for making loss prevention or life safety recommendations.

If you have any questions about your classification, please let us know.

Sincerely,

Alex Shubert

Alex Shubert
Manager -National Processing Center

cc: Mr. Tony Salamone, Water Superintendent, Caldera Water Company
Mr. Dale Cooper, Water Resources Director, Cascade Meadow Ranch Water Company
Mr. Lynn Lounsbury, Water Resources Director, Indian Meadow Water Company
Mr. Ed Young, Water Superintendent, Metollus Meadows
Mr. Sean Croson, Water Resources Director, Rlm at Aspen Lakes Water Company
Mr. Paul Bertagna, Director of Public Works, Sisters Water Company
Mr. Tom Meese, Water Resources Director, Sno Cap Vista Water Company
Mr. Ron Remund, Water Resources Director, Squaw Creek Canyon Water Company
Mr. Butch Rogers, Water Resources Director, The Rldge at Indian Ford
Mr. Lynn Lounsbury, Water Resources Director, Tollgate Water Company
Chief Roger Johnson, Chief, SISTERS CAMP SHERMAN FIRE DEPARTMENT
Mr. Steve Relnke, Director, Deschutes County 911 Center

**Public Protection Classification
(PPC™)
Summary Report**

Sisters Camp Sherman FD

OREGON

Prepared by

**Insurance Services Office, Inc.
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Mt. Laurel, New Jersey 08054-5404
1-800-444-4554**

Report Created March 2017

Effective July 1, 2017

Background Information

Introduction

ISO collects and evaluates information from communities in the United States on their structure fire suppression capabilities. The data is analyzed using our Fire Suppression Rating Schedule (FSRS) and then a Public Protection Classification (PPC™) grade is assigned to the community. The surveys are conducted whenever it appears that there is a possibility of a PPC change. As such, the PPC program provides important, up-to-date information about fire protection services throughout the country.

The FSRS recognizes fire protection features only as they relate to suppression of first alarm structure fires. In many communities, fire suppression may be only a small part of the fire department's overall responsibility. ISO recognizes the dynamic and comprehensive duties of a community's fire service, and understands the complex decisions a community must make in planning and delivering emergency services. However, in developing a community's PPC grade, only features related to reducing property losses from structural fires are evaluated. Multiple alarms, simultaneous incidents and life safety are not considered in this evaluation. The PPC program evaluates the fire protection for small to average size buildings. Specific properties with a Needed Fire Flow in excess of 3,500 gpm are evaluated separately and assigned an individual PPC grade.

A community's investment in fire mitigation is a proven and reliable predictor of future fire losses. Statistical data on insurance losses bears out the relationship between excellent fire protection – as measured by the PPC program – and low fire losses. So, insurance companies use PPC information for marketing, underwriting, and to help establish fair premiums for homeowners and commercial fire insurance. In general, the price of fire insurance in a community with a good PPC grade is substantially lower than in a community with a poor PPC grade, assuming all other factors are equal.

ISO is an independent company that serves insurance companies, communities, fire departments, insurance regulators, and others by providing information about risk. ISO's expert staff collects information about municipal fire suppression efforts in communities throughout the United States. In each of those communities, ISO analyzes the relevant data and assigns a PPC grade – a number from 1 to 10. Class 1 represents an exemplary fire suppression program, and Class 10 indicates that the area's fire suppression program does not meet ISO's minimum criteria.

ISO's PPC program evaluates communities according to a uniform set of criteria, incorporating nationally recognized standards developed by the National Fire Protection Association and the American Water Works Association. A community's PPC grade depends on:

- **Needed Fire Flows**, which are representative building locations used to determine the theoretical amount of water necessary for fire suppression purposes.
- **Emergency Communications**, including emergency reporting, telecommunicators, and dispatching systems.
- **Fire Department**, including equipment, staffing, training, geographic distribution of fire companies, operational considerations, and community risk reduction.
- **Water Supply**, including inspection and flow testing of hydrants, alternative water supply operations, and a careful evaluation of the amount of available water compared with the amount needed to suppress fires up to 3,500 gpm.

Data Collection and Analysis

ISO has evaluated and classified over 46,000 fire protection areas across the United States using its FSRS. A combination of meetings between trained ISO field representatives and the dispatch center coordinator, community fire official, and water superintendent is used in conjunction with a comprehensive questionnaire to collect the data necessary to determine the PPC grade. In order for a community to obtain a grade better than a Class 9, three elements of fire suppression features are reviewed. These three elements are Emergency Communications, Fire Department, and Water Supply.

A review of the **Emergency Communications** accounts for 10% of the total classification. This section is weighted at **10 points**, as follows:

- **Emergency Reporting** 3 points
- **Telecommunicators** 4 points
- **Dispatch Circuits** 3 points

A review of the **Fire Department** accounts for 50% of the total classification. ISO focuses on a fire department's first alarm response and initial attack to minimize potential loss. The fire department section is weighted at **50 points**, as follows:

- **Engine Companies** 6 points
- **Reserve Pumpers** 0.5 points
- **Pump Capacity** 3 points
- **Ladder/Service Companies** 4 points
- **Reserve Ladder/Service Trucks** 0.5 points
- **Deployment Analysis** 10 points
- **Company Personnel** 15 points
- **Training** 9 points
- **Operational considerations** 2 points
- **Community Risk Reduction** 5.5 points (in addition to the 50 points above)

A review of the **Water Supply** system accounts for 40% of the total classification. ISO reviews the water supply a community uses to determine the adequacy for fire suppression purposes. The water supply system is weighted at **40 points**, as follows:

- **Credit for Supply System** 30 points
- **Hydrant Size, Type & Installation** 3 points
- **Inspection & Flow Testing of Hydrants** 7 points

There is one additional factor considered in calculating the final score – **Divergence**.

Even the best fire department will be less than fully effective if it has an inadequate water supply. Similarly, even a superior water supply will be less than fully effective if the fire department lacks the equipment or personnel to use the water. The FSRS score is subject to modification by a divergence factor, which recognizes disparity between the effectiveness of the fire department and the water supply.

The Divergence factor mathematically reduces the score based upon the relative difference between the fire department and water supply scores. The factor is introduced in the final equation.

PPC Grade

The PPC grade assigned to the community will depend on the community's score on a 100-point scale:

PPC	Points
1	90.00 or more
2	80.00 to 89.99
3	70.00 to 79.99
4	60.00 to 69.99
5	50.00 to 59.99
6	40.00 to 49.99
7	30.00 to 39.99
8	20.00 to 29.99
9	10.00 to 19.99
10	0.00 to 9.99

The classification numbers are interpreted as follows:

- Class 1 through (and including) Class 8 represents a fire suppression system that includes an FSRS creditable dispatch center, fire department, and water supply.
- Class 8B is a special classification that recognizes a superior level of fire protection in otherwise Class 9 areas. It is designed to represent a fire protection delivery system that is superior except for a lack of a water supply system capable of the minimum FSRS fire flow criteria of 250 gpm for 2 hours.
- Class 9 is a fire suppression system that includes a creditable dispatch center, fire department but no FSRS creditable water supply.
- Class 10 does not meet minimum FSRS criteria for recognition, including areas that are beyond five road miles of a recognized fire station.

New PPC program changes effective July 1, 2014

We have revised the PPC program to capture the effects of enhanced fire protection capabilities that reduce fire loss and fire severity in Split Class 9 and Split Class 8B areas (as outlined below). This new structure benefits the fire service, community, and property owner.

New classifications

Through ongoing research and loss experience analysis, we identified additional differentiation in fire loss experience within our PPC program, which resulted in the revised classifications. We based the differing fire loss experience on the fire suppression capabilities of each community. The new PPC classes will improve the predictive value for insurers while benefiting both commercial and residential property owners. Here are the new classifications and what they mean.

Split classifications

When we develop a split classification for a community — for example 5/9 — the first number is the class that applies to properties within 5 road miles of the responding fire station and 1,000 feet of a creditable water supply, such as a fire hydrant, suction point, or dry hydrant. The second number is the class that applies to properties within 5 road miles of a fire station but beyond 1,000 feet of a creditable water supply. We have revised the classification to reflect more precisely the risk of loss in a community, replacing Class 9 and 8B in the second part of a split classification with revised designations.

What's changed with the new classifications?

We've published the new classifications as "X" and "Y" — formerly the "9" and "8B" portion of the split classification, respectively. For example:

- A community currently displayed as a split 6/9 classification will now be a split 6/6X classification; with the "6X" denoting what was formerly classified as "9".
- Similarly, a community currently graded as a split 6/8B classification will now be a split 6/6Y classification, the "6Y" denoting what was formerly classified as "8B".
- Communities graded with single "9" or "8B" classifications will remain intact.

Prior Classification	New Classification
1/9	1/1X
2/9	2/2X
3/9	3/3X
4/9	4/4X
5/9	5/5X
6/9	6/6X
7/9	7/7X
8/9	8/8X
9	9

Prior Classification	New Classification
1/8B	1/1Y
2/8B	2/2Y
3/8B	3/3Y
4/8B	4/4Y
5/8B	5/5Y
6/8B	6/6Y
7/8B	7/7Y
8/8B	8/8Y
8B	8B

What's changed?

As you can see, we're still maintaining split classes, but it's how we represent them to insurers that's changed. The new designations reflect a reduction in fire severity and loss and have the potential to reduce property insurance premiums.

Benefits of the revised split class designations

- To the fire service, the revised designations identify enhanced fire suppression capabilities used throughout the fire protection area
- To the community, the new classes reward a community's fire suppression efforts by showing a more reflective designation
- To the individual property owner, the revisions offer the potential for decreased property insurance premiums

New water class

Our data also shows that risks located more than 5 but less than 7 road miles from a responding fire station with a creditable water source within 1,000 feet had better loss experience than those farther than 5 road miles from a responding fire station with no creditable water source. We've introduced a new classification —10W— to recognize the reduced loss potential of such properties.

What's changed with Class 10W?

Class 10W is property-specific. Not all properties in the 5-to-7-mile area around the responding fire station will qualify. The difference between Class 10 and 10W is that the 10W-graded risk or property is within 1,000 feet of a creditable water supply. Creditable water supplies include fire protection systems using hauled water in any of the split classification areas.

What's the benefit of Class 10W?

10W gives credit to risks within 5 to 7 road miles of the responding fire station and within 1,000 feet of a creditable water supply. That's reflective of the potential for reduced property insurance premiums.

What does the fire chief have to do?

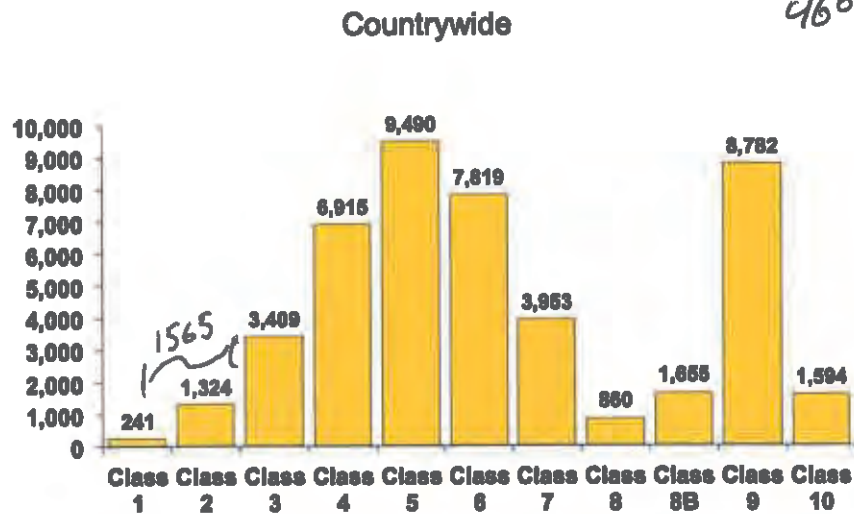
Fire chiefs don't have to do anything at all. The revised classifications went in place automatically effective July 1, 2014 (July 1, 2015 for Texas).

What if I have additional questions?

Feel free to contact ISO at 800.444.4554 or email us at PPC-Cust-Serv@iso.com.

Distribution of PPC Grades

The 2017 published countrywide distribution of communities by the PPC grade is as follows:



Assistance

The PPC program offers help to communities, fire departments, and other public officials as they plan for, budget, and justify improvements. ISO is also available to assist in the understanding of the details of this evaluation.

The PPC program representatives can be reached by telephone at (800) 444-4554. The technical specialists at this telephone number have access to the details of this evaluation and can effectively speak with you about your questions regarding the PPC program. What's more, we can be reached via the internet at www.isomitigation.com/talk/.

We also have a website dedicated to our Community Hazard Mitigation Classification programs at www.isomitigation.com. Here, fire chiefs, building code officials, community leaders and other interested citizens can access a wealth of data describing the criteria used in evaluating how cities and towns are protecting residents from fire and other natural hazards. This website will allow you to learn more about the PPC program. The website provides important background information, insights about the PPC grading processes and technical documents. ISO is also pleased to offer Fire Chiefs Online — a special, secured website with information and features that can help improve your PPC grade, including a list of the Needed Fire Flows for all the commercial occupancies ISO has on file for your community. Visitors to the site can download information, see statistical results and also contact ISO for assistance.

In addition, on-line access to the FSRS and its commentaries is available to registered customers for a fee. However, fire chiefs and community chief administrative officials are given access privileges to this information without charge.

To become a registered fire chief or community chief administrative official, register at www.isomitigation.com.

PPC Review

ISO concluded its review of the fire suppression features being provided for Sisters Camp Sherman FD. The resulting community classification is **Class 03/10**.

If the classification is a single class, the classification applies to properties with a Needed Fire Flow of 3,500 gpm or less in the community. If the classification is a split class (e.g., 6/XX):

- The first class (e.g., "6" in a 6/XX) applies to properties within 5 road miles of a recognized fire station and within 1,000 feet of a fire hydrant or alternate water supply.
- The second class (XX or XY) applies to properties beyond 1,000 feet of a fire hydrant but within 5 road miles of a recognized fire station.
- **Alternative Water Supply:** The first class (e.g., "6" in a 6/10) applies to properties within 5 road miles of a recognized fire station with no hydrant distance requirement.
- **Class 10** applies to properties over 5 road miles of a recognized fire station.
- **Class 10W** applies to properties within 5 to 7 road miles of a recognized fire station with a recognized water supply within 1,000 feet.
- Specific properties with a Needed Fire Flow in excess of 3,500 gpm are evaluated separately and assigned an individual classification.

FSRS Feature	Earned Credit	Credit Available
Emergency Communications		
414. Credit for Emergency Reporting	3.00	3
422. Credit for Telecommunicators	3.20	4
432. Credit for Dispatch Circuits	1.80	3
440. Credit for Emergency Communications	8.00	10
Fire Department		
513. Credit for Engine Companies	5.67	6
523. Credit for Reserve Pumpers	0.36	0.50
532. Credit for Pump Capacity	3.00	3
549. Credit for Ladder Service	1.64	4
553. Credit for Reserve Ladder and Service Trucks	0.00	0.50
561. Credit for Deployment Analysis	3.40	10
571. Credit for Company Personnel	10.26	15
581. Credit for Training	6.19	9
730. Credit for Operational Considerations	2.00	2
590. Credit for Fire Department	32.52	50
Water Supply		
616. Credit for Supply System	25.17	30
621. Credit for Hydrants	2.25	3
631. Credit for Inspection and Flow Testing	3.88	7
640. Credit for Water Supply	31.30	40
Divergence	-2.64	-
1050. Community Risk Reduction	4.93	5.50
Total Credit	74.11	105.50

Emergency Communications

Ten percent of a community's overall score is based on how well the communications center receives and dispatches fire alarms. Our field representative evaluated:

- Communications facilities provided for the general public to report structure fires
- Enhanced 9-1-1 Telephone Service including wireless
- Computer-aided dispatch (CAD) facilities
- Alarm receipt and processing at the communication center
- Training and certification of telecommunicators
- Facilities used to dispatch fire department companies to reported structure fires

	Earned Credit	Credit Available
414. Credit Emergency Reporting	3.00	3
422. Credit for Telecommunicators	3.20	4
432. Credit for Dispatch Circuits	1.80	3
Item 440. Credit for Emergency Communications:	8.00	10

Item 414 - Credit for Emergency Reporting (3 points)

The first item reviewed is Item 414 "Credit for Emergency Reporting (CER)". This item reviews the emergency communication center facilities provided for the public to report fires including 911 systems (Basic or Enhanced), Wireless Phase I and Phase II, Voice over Internet Protocol, Computer Aided Dispatch and Geographic Information Systems for automatic vehicle location. ISO uses National Fire Protection Association (NFPA) 1221, *Standard for the Installation, Maintenance and Use of Emergency Services Communications Systems* as the reference for this section.

Item 410. Emergency Reporting (CER)	Earned Credit	Credit Available
<p>A./B. Basic 9-1-1, Enhanced 9-1-1 or No 9-1-1</p> <p>For maximum credit, there should be an Enhanced 9-1-1 system, Basic 9-1-1 and No 9-1-1 will receive partial credit.</p>	20.00	20
<p>1. E9-1-1 Wireless</p> <p>Wireless Phase I using Static ALI (automatic location identification) Functionality (10 points); Wireless Phase II using Dynamic ALI Functionality (15 points); Both available will be 25 points</p>	25.00	25
<p>2. E9-1-1 Voice over Internet Protocol (VoIP)</p> <p>Static VoIP using Static ALI Functionality (10 points); Nomadic VoIP using Dynamic ALI Functionality (15 points); Both available will be 25 points</p>	25.00	25
<p>3. Computer Aided Dispatch</p> <p>Basic CAD (5 points); CAD with Management Information System (5 points); CAD with Interoperability (5 points)</p>	15.00	15
<p>4. Geographic Information System (GIS/AVL)</p> <p>The PSAP uses a fully integrated CAD/GIS management system with automatic vehicle location (AVL) integrated with a CAD system providing dispatch assignments.</p> <p>The individual fire departments being dispatched <u>do not</u> need GIS/AVL capability to obtain this credit.</p>	15.00	15
<p>Review of Emergency Reporting total:</p>	100.00	100

Item 422- Credit for Telecommunicators (4 points)

The second item reviewed is Item 422 "Credit for Telecommunicators (TC)". This item reviews the number of Telecommunicators on duty at the center to handle fire calls and other emergencies. All emergency calls including those calls that do not require fire department action are reviewed to determine the proper staffing to answer emergency calls and dispatch the appropriate emergency response. NFPA 1221, *Standard for the Installation, Maintenance and Use of Emergency Services Communications Systems*, recommends that ninety-five percent of emergency calls shall be answered within 15 seconds and ninety-nine percent of emergency calls shall be answered within 40 seconds. In addition, NFPA recommends that ninety percent of emergency alarm processing shall be completed within 60 seconds and ninety-nine percent of alarm processing shall be completed within 90 seconds of answering the call.

To receive full credit for operators on duty, ISO must review documentation to show that the communication center meets NFPA 1221 call answering and dispatch time performance measurement standards. This documentation may be in the form of performance statistics or other performance measurements compiled by the 9-1-1 software or other software programs that are currently in use such as Computer Aided Dispatch (CAD) or Management Information System (MIS).

Item 420. Telecommunicators (CTC)	Earned Credit	Credit Available
<p>A1. Alarm Receipt (AR)</p> <p>Receipt of alarms shall meet the requirements in accordance with the criteria of NFPA 1221</p>	20.00	20
<p>A2. Alarm Processing (AP)</p> <p>Processing of alarms shall meet the requirements in accordance with the criteria of NFPA 1221</p>	20.00	20
<p>B. Emergency Dispatch Protocols (EDP)</p> <p>Telecommunicators have emergency dispatch protocols (EDP) containing questions and a decision-support process to facilitate correct call categorization and prioritization.</p>	0.00	20
<p>C. Telecommunicator Training and Certification (TTC)</p> <p>Telecommunicators meet the qualification requirements referenced in NFPA 1061, <i>Standard for Professional Qualifications for Public Safety Telecommunicator</i>, and/or the Association of Public-Safety Communications Officials - International (APCO) <i>Project 33</i>. Telecommunicators are certified in the knowledge, skills, and abilities corresponding to their job functions.</p>	20.00	20
<p>D. Telecommunicator Continuing Education and Quality Assurance (TQA)</p> <p>Telecommunicators participate in continuing education and/or in-service training and quality-assurance programs as appropriate for their positions</p>	20.00	20
Review of Telecommunicators total:	80.00	100

Item 432 - Credit for Dispatch Circuits (3 points)

The third item reviewed is Item 432 "Credit for Dispatch Circuits (CDC)". This item reviews the dispatch circuit facilities used to transmit alarms to fire department members. A "Dispatch Circuit" is defined in NFPA 1221 as "A circuit over which an alarm is transmitted from the communications center to an emergency response facility (ERF) or emergency response units (ERUs) to notify ERUs to respond to an emergency". All fire departments (except single fire station departments with full-time firefighter personnel receiving alarms directly at the fire station) need adequate means of notifying all firefighter personnel of the location of reported structure fires. The dispatch circuit facilities should be in accordance with the general criteria of NFPA 1221. "Alarms" are defined in this Standard as "A signal or message from a person or device indicating the existence of an emergency or other situation that requires action by an emergency response agency".

There are two different levels of dispatch circuit facilities provided for in the Standard – a primary dispatch circuit and a secondary dispatch circuit. In jurisdictions that receive 730 alarms or more per year (average of two alarms per 24-hour period), two separate and dedicated dispatch circuits, a primary and a secondary, are needed. In jurisdictions receiving fewer than 730 alarms per year, a second dedicated dispatch circuit is not needed. Dispatch circuit facilities installed but not used or tested (in accordance with the NFPA Standard) receive no credit.

The score for Credit for Dispatch Circuits (CDC) is influenced by monitoring for integrity of the primary dispatch circuit. There are up to 0.90 points available for this Item. Monitoring for integrity involves installing automatic systems that will detect faults and failures and send visual and audible indications to appropriate communications center (or dispatch center) personnel. ISO uses NFPA 1221 to guide the evaluation of this item. ISO's evaluation also includes a review of the communication system's emergency power supplies.

Item 432 "Credit for Dispatch Circuits (CDC)" = 1.80 points

Fire Department

Fifty percent of a community's overall score is based upon the fire department's structure fire suppression system. ISO's field representative evaluated:

- Engine and ladder/service vehicles including reserve apparatus
- Equipment carried
- Response to reported structure fires
- Deployment analysis of companies
- Available and/or responding firefighters
- Training

	Earned Credit	Credit Available
513. Credit for Engine Companies	5.67	6
523. Credit for Reserve Pumpers	0.36	0.5
532. Credit for Pumper Capacity	3.00	3
549. Credit for Ladder Service	1.64	4
553. Credit for Reserve Ladder and Service Trucks	0.00	0.5
561. Credit for Deployment Analysis	3.40	10
571. Credit for Company Personnel	10.26	15
581. Credit for Training	6.19	9
730. Credit for Operational Considerations	2.00	2
Item 590. Credit for Fire Department:	32.62	50

Basic Fire Flow

The Basic Fire Flow for the community is determined by the review of the Needed Fire Flows for selected buildings in the community. The fifth largest Needed Fire Flow is determined to be the Basic Fire Flow. The Basic Fire Flow has been determined to be 3500 gpm.

Item 513 - Credit for Engine Companies (6 points)

The first item reviewed is Item 513 "Credit for Engine Companies (CEC)". This item reviews the number of engine companies, their pump capacity, hose testing, pump testing and the equipment carried on the in-service pumpers. To be recognized, pumper apparatus must meet the general criteria of NFPA 1901, *Standard for Automotive Fire Apparatus* which include a minimum 250 gpm pump, an emergency warning system, a 300 gallon water tank, and hose. At least 1 apparatus must have a permanently mounted pump rated at 750 gpm or more at 150 psi.

The review of the number of needed pumpers considers the response distance to built-upon areas; the Basic Fire Flow; and the method of operation. Multiple alarms, simultaneous incidents, and life safety are not considered.

The greatest value of A, B, or C below is needed in the fire district to suppress fires in structures with a Needed Fire Flow of 3,500 gpm or less: **3 engine companies**

- a) **3 engine companies** to provide fire suppression services to areas to meet NFPA 1710 criteria or within 1½ miles.
- b) **3 engine companies** to support a Basic Fire Flow of 3500 gpm.
- c) **3 engine companies** based upon the fire department's method of operation to provide a minimum two engine response to all first alarm structure fires.

The FSRS recognizes that there are **3 engine companies** in service.

The FSRS also reviews Automatic Aid. Automatic Aid is considered in the review as assistance dispatched automatically by contractual agreement between two communities or fire districts. That differs from mutual aid or assistance arranged case by case. ISO will recognize an Automatic Aid plan under the following conditions:

- It must be prearranged for first alarm response according to a definite plan. It is preferable to have a written agreement, but ISO may recognize demonstrated performance.
- The aid must be dispatched to all reported structure fires on the initial alarm.
- The aid must be provided 24 hours a day, 365 days a year.

FSRS Item 512.D "Automatic Aid Engine Companies" responding on first alarm and meeting the needs of the city for basic fire flow and/or distribution of companies are factored based upon the value of the Automatic Aid plan (up to 1.00 can be used as the factor). The Automatic Aid factor is determined by a review of the Automatic Aid provider's communication facilities, how they receive alarms from the graded area, inter-department training between fire departments, and the fire ground communications capability between departments.

For each engine company, the credited Pump Capacity (PC), the Hose Carried (HC), the Equipment Carried (EC) all contribute to the calculation for the percent of credit the FSRS provides to that engine company.

Item 513 "Credit for Engine Companies (CEC)" = 5.67 points

Item 523 - Credit for Reserve Pumpers (0.50 points)

The item is Item 523 "Credit for Reserve Pumpers (CRP)". This item reviews the number and adequacy of the pumpers and their equipment. The number of needed reserve pumpers is 1 for each 8 needed engine companies determined in Item 513, or any fraction thereof.

Item 523 "Credit for Reserve Pumpers (CRP)" = 0.36 points

Item 532 - Credit for Pumper Capacity (3 points)

The next item reviewed is Item 532 "Credit for Pumper Capacity (CPC)". The total pump capacity available should be sufficient for the Basic Fire Flow of 3500 gpm. The maximum needed pump capacity credited is the Basic Fire Flow of the community.

Item 532 "Credit for Pumper Capacity (CPC)" = 3.00 points

Item 549 - Credit for Ladder Service (4 points)

The next item reviewed is Item 549 "Credit for Ladder Service (CLS)". This item reviews the number of response areas within the city with 5 buildings that are 3 or more stories or 35 feet or more in height, or with 5 buildings that have a Needed Fire Flow greater than 3,500 gpm, or any combination of these criteria. The height of all buildings in the city, including those protected by automatic sprinklers, is considered when determining the number of needed ladder companies. Response areas not needing a ladder company should have a service company. Ladders, tools and equipment normally carried on ladder trucks are needed not only for ladder operations but also for forcible entry, ventilation, salvage, overhaul, lighting and utility control.

The number of ladder or service companies, the height of the aerial ladder, aerial ladder testing and the equipment carried on the in-service ladder trucks and service trucks is compared with the number of needed ladder trucks and service trucks and an FSRs equipment list. Ladder trucks must meet the general criteria of NFPA 1901, *Standard for Automotive Fire Apparatus* to be recognized.

The number of needed ladder-service trucks is dependent upon the number of buildings 3 stories or 35 feet or more in height, buildings with a Needed Fire Flow greater than 3,500 gpm, and the method of operation.

The FSRs recognizes that there are **0 ladder companies** in service. These companies are needed to provide fire suppression services to areas to meet NFPA 1710 criteria or within 2½ miles and the number of buildings with a Needed Fire Flow over 3,500 gpm or 3 stories or more in height, or the method of operation.

The FSRs recognizes that there are **3 service companies** in service.

Item 549 "Credit for Ladder Service (CLS)" = 1.64 points

Item 553 – Credit for Reserve Ladder and Service Trucks (0.50 points)

The next item reviewed is Item 553 "Credit for Reserve Ladder and Service Trucks (CRLS)". This item considers the adequacy of ladder and service apparatus when one (or more in larger communities) of these apparatus are out of service. The number of needed reserve ladder and service trucks is 1 for each 8 needed ladder and service companies that were determined to be needed in Item 540, or any fraction thereof.

Item 553 "Credit for Reserve Ladder and Service Trucks (CRLS)" = 0.00 points

Item 561 – Deployment Analysis (10 points)

Next, Item 561 "Deployment Analysis (DA)" is reviewed. This Item examines the number and adequacy of existing engine and ladder-service companies to cover built-upon areas of the city.

To determine the Credit for Distribution, first the Existing Engine Company (EC) points and the Existing Engine Companies (EE) determined in Item 513 are considered along with Ladder Company Equipment (LCE) points, Service Company Equipment (SCE) points, Engine-Ladder Company Equipment (ELCE) points, and Engine-Service Company Equipment (ESCE) points determined in Item 549.

Secondly, as an alternative to determining the number of needed engine and ladder/service companies through the road-mile analysis, a fire protection area may use the results of a systematic performance evaluation. This type of evaluation analyzes computer-aided dispatch (CAD) history to demonstrate that, with its current deployment of companies, the fire department meets the time constraints for initial arriving engine and initial full alarm assignment in accordance with the general criteria of in NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*.

A determination is made of the percentage of built upon area within 1½ miles of a first-due engine company and within 2½ miles of a first-due ladder-service company.

Item 561 "Credit Deployment Analysis (DA)" = 3.40 points

Item 571 – Credit for Company Personnel (15 points)

Item 571 "Credit for Company Personnel (CCP)" reviews the average number of existing firefighters and company officers available to respond to reported first alarm structure fires in the city.

The on-duty strength is determined by the yearly average of total firefighters and company officers on-duty considering vacations, sick leave, holidays, "Kelley" days and other absences. When a fire department operates under a minimum staffing policy, this may be used in lieu of determining the yearly average of on-duty company personnel.

Firefighters on apparatus not credited under Items 513 and 549 that regularly respond to reported first alarms to aid engine, ladder, and service companies are included in this item as increasing the total company strength.

Firefighters staffing ambulances or other units serving the general public are credited if they participate in fire-fighting operations, the number depending upon the extent to which they are available and are used for response to first alarms of fire.

On-Call members are credited on the basis of the average number staffing apparatus on first alarms. Off-shift career firefighters and company officers responding on first alarms are considered on the same basis as on-call personnel. For personnel not normally at the fire station, the number of responding firefighters and company officers is divided by 3 to reflect the time needed to assemble at the fire scene and the reduced ability to act as a team due to the various arrival times at the fire location when compared to the personnel on-duty at the fire station during the receipt of an alarm.

The number of Public Safety Officers who are positioned in emergency vehicles within the jurisdiction boundaries may be credited based on availability to respond to first alarm structure fires. In recognition of this increased response capability the number of responding Public Safety Officers is divided by 2.

The average number of firefighters and company officers responding with those companies credited as Automatic Aid under Items 513 and 549 are considered for either on-duty or on-call company personnel as is appropriate. The actual number is calculated as the average number of company personnel responding multiplied by the value of AA Plan determined in Item 512.D.

The maximum creditable response of on-duty and on-call firefighters is 12, including company officers, for each existing engine and ladder company and 6 for each existing service company.

Chief Officers are not creditable except when more than one chief officer responds to alarms; then extra chief officers may be credited as firefighters if they perform company duties.

The FSRS recognizes 5.57 on-duty personnel and an average of 9.00 on-call personnel responding on first alarm structure fires.

Item 571 "Credit for Company Personnel (CCP)" = 10.26 points

Item 581 – Credit for Training (9 points)

Training	Earned Credit	Credit Available
<p>A. Facilities, and Use For maximum credit, each firefighter should receive 18 hours per year in structure fire related subjects as outlined in NFPA 1001.</p>	18.00	35
<p>B. Company Training For maximum credit, each firefighter should receive 16 hours per month in structure fire related subjects as outlined in NFPA 1001.</p>	25.00	25
<p>C. Classes for Officers For maximum credit, each officer should be certified in accordance with the general criteria of NFPA 1021. Additionally, each officer should receive 12 hours of continuing education on or off site.</p>	8.00	12
<p>D. New Driver and Operator Training For maximum credit, each new driver and operator should receive 60 hours of driver/operator training per year in accordance with NFPA 1002 and NFPA 1451.</p>	4.17	5
<p>E. Existing Driver and Operator Training For maximum credit, each existing driver and operator should receive 12 hours of driver/operator training per year in accordance with NFPA 1002 and NFPA 1451.</p>	3.33	5
<p>F. Training on Hazardous Materials For maximum credit, each firefighter should receive 6 hours of training for incidents involving hazardous materials in accordance with NFPA 472.</p>	0.67	1
<p>G. Recruit Training For maximum credit, each firefighter should receive 240 hours of structure fire related training in accordance with NFPA 1001 within the first year of employment or tenure.</p>	5.00	5
<p>H. Pre-Fire Planning Inspections For maximum credit, pre-fire planning inspections of each commercial, industrial, institutional, and other similar type building (all buildings except 1-4 family dwellings) should be made annually by company members. Records of inspections should include up-to date notes and sketches.</p>	4.56	12

Item 580 “Credit for Training (CT)” = 6.19 points

Item 730 – Operational Considerations (2 points)

Item 730 "Credit for Operational Considerations (COC)" evaluates fire department standard operating procedures and incident management systems for emergency operations involving structure fires.

Operational Considerations	Earned Credit	Credit Available
Standard Operating Procedures The department should have established SOPs for fire department general emergency operations	50	50
Incident Management Systems The department should use an established incident management system (IMS)	50	50
Operational Considerations total:	100	100

Item 730 "Credit for Operational Considerations (COC)" = 2.00 points

Water Supply

Forty percent of a community's overall score is based on the adequacy of the water supply system. The ISO field representative evaluated:

- the capability of the water distribution system to meet the Needed Fire Flows at selected locations up to 3,500 gpm.
- size, type and installation of fire hydrants.
- inspection and flow testing of fire hydrants.

	Earned Credit	Credit Available
616. Credit for Supply System	25.17	30
621. Credit for Hydrants	2.25	3
631. Credit for Inspection and Flow Testing	3.88	7
Item 640. Credit for Water Supply:	31.30	40

Item 616 – Credit for Supply System (30 points)

The first item reviewed is Item 616 “Credit for Supply System (CSS)”. This item reviews the rate of flow that can be credited at each of the Needed Fire Flow test locations considering the supply works capacity, the main capacity and the hydrant distribution. The lowest flow rate of these items is credited for each representative location. A water system capable of delivering 250 gpm or more for a period of two hours plus consumption at the maximum daily rate at the fire location is considered minimum in the ISO review.

Where there are 2 or more systems or services distributing water at the same location, credit is given on the basis of the joint protection provided by all systems and services available.

The supply works capacity is calculated for each representative Needed Fire Flow test location, considering a variety of water supply sources. These include public water supplies, emergency supplies (usually accessed from neighboring water systems), suction supplies (usually evidenced by dry hydrant installations near a river, lake or other body of water), and supplies developed by a fire department using large diameter hose or vehicles to shuttle water from a source of supply to a fire site. The result is expressed in gallons per minute (gpm).

The normal ability of the distribution system to deliver Needed Fire Flows at the selected building locations is reviewed. The results of a flow test at a representative test location will indicate the ability of the water mains (or fire department in the case of fire department supplies) to carry water to that location.

The hydrant distribution is reviewed within 1,000 feet of representative test locations measured as hose can be laid by apparatus.

For maximum credit, the Needed Fire Flows should be available at each location in the district. Needed Fire Flows of 2,500 gpm or less should be available for 2 hours; and Needed Fire Flows of 3,000 and 3,500 gpm should be obtainable for 3 hours.

Item 616 “Credit for Supply System (CSS)” = 25.17 points

Item 621 – Credit for Hydrants (3 points)

The second item reviewed is Item 621 "Credit for Hydrants (CH)". This item reviews the number of fire hydrants of each type compared with the total number of hydrants.

There are a total of 502 hydrants in the graded area.

620. Hydrants, - Size, Type and Installation	Number of Hydrants
A. With a 6 -inch or larger branch and a pumper outlet with or without 2½ -inch outlets	333
B. With a 6 -inch or larger branch and no pumper outlet but two or more 2½ -inch outlets, or with a small foot valve, or with a small barrel	3
C/D. With only a 2½ -inch outlet or with less than a 6 -inch branch	144
E/F. Flush Type, Cistern, or Suction Point	22

Item 621 "Credit for Hydrants (CH)" = 2.25 points

Item 630 – Credit for Inspection and Flow Testing (7 points)

The third item reviewed is Item 630 "Credit for Inspection and Flow Testing (CIT)". This item reviews the fire hydrant inspection frequency, and the completeness of the inspections. Inspection of hydrants should be in accordance with AWWA M-17, *Installation, Field Testing and Maintenance of Fire Hydrants*.

Frequency of Inspection (FI): Average interval between the 3 most recent inspections.

Frequency	Points
1 year	30
2 years	20
3 years	10
4 years	5
5 years or more	No Credit

Note: The points for inspection frequency are reduced by 10 points if the inspections are incomplete or do not include a flushing program. An additional reduction of 10 points are made if hydrants are not subjected to full system pressure during inspections. If the inspection of cisterns or suction points does not include actual drafting with a pumper, or back-flushing for dry hydrants, 20 points are deducted.

Total points for Inspections = 2.14 points

Frequency of Fire Flow Testing (FF): Average interval between the 3 most recent inspections.

Frequency	Points
5 years	40
6 years	30
7 years	20
8 years	10
9 years	5
10 years or more	No Credit

Total points for Fire Flow Testing = 1.74 points

Item 631 "Credit for Inspection and Fire Flow Testing (CIT)" = 3.88 points

Divergence = -2.64

The Divergence factor mathematically reduces the score based upon the relative difference between the fire department and water supply scores. The factor is introduced in the final equation.

Community Risk Reduction

	Earned Credit	Credit Available
1025. Credit for Fire Prevention and Code Enforcement (CPCE)	2.03	2.2
1033. Credit for Public Fire Safety Education (CFSE)	1.87	2.2
1044. Credit for Fire Investigation Programs (CIP)	1.03	1.1
Item 1050. Credit for Community Risk Reduction	4.93	5.50

Item 1025 – Credit for Fire Prevention Code Adoption and Enforcement (2.2 points)	Earned Credit	Credit Available
Fire Prevention Code Regulations (PCR) Evaluation of fire prevention code regulations in effect.	10.00	10
Fire Prevention Staffing (PS) Evaluation of staffing for fire prevention activities.	8.00	8
Fire Prevention Certification and Training (PCT) Evaluation of the certification and training of fire prevention code enforcement personnel.	4.36	6
Fire Prevention Programs (PCP) Evaluation of fire prevention programs.	14.50	16
Review of Fire Prevention Code and Enforcement (CPCE) subtotal:	36.86	40

Item 1033 – Credit for Public Fire Safety Education (2.2 points)	Earned Credit	Credit Available
Public Fire Safety Educators Qualifications and Training (FSQT) Evaluation of public fire safety education personnel training and qualification as specified by the authority having jurisdiction.	5.00	10
Public Fire Safety Education Programs (FSP) Evaluation of programs for public fire safety education.	29.00	30
Review of Public Safety Education Programs (CFSE) subtotal:	34.00	40

Item 1044 – Credit for Fire Investigation Programs (1.1 points)	Earned Credit	Credit Available
Fire Investigation Organization and Staffing (IOS) Evaluation of organization and staffing for fire investigations.	8.00	8
Fire Investigator Certification and Training (IQT) Evaluation of fire investigator certification and training.	4.80	6
Use of National Fire Incident Reporting System (IRS) Evaluation of the use of the National Fire Incident Reporting System (NFIRS) for the 3 years before the evaluation.	6.00	6
Review of Fire Investigation Programs (CIP) subtotal:	18.80	20

Summary of PPC Review
for
Sisters Camp Sherman FD

FSRS Item	Earned Credit	Credit Available
Emergency Communications		
414. Credit for Emergency Reporting	3.00	3
422. Credit for Telecommunicators	3.20	4
432. Credit for Dispatch Circuits	1.80	3
440. Credit for Emergency Communications	8.00	10
Fire Department		
513. Credit for Engine Companies	5.67	6
523. Credit for Reserve Pumpers	0.36	0.5
532. Credit for Pumper Capacity	3.00	3
549. Credit for Ladder Service	1.64	4
553. Credit for Reserve Ladder and Service Trucks	0.00	0.5
561. Credit for Deployment Analysis	3.40	10
571. Credit for Company Personnel	10.26	15
581. Credit for Training	6.19	9
730. Credit for Operational Considerations	2.00	2
590. Credit for Fire Department	32.52	50
Water Supply		
616. Credit for Supply System	25.17	30
621. Credit for Hydrants	2.25	3
631. Credit for Inspection and Flow Testing	3.88	7
640. Credit for Water Supply	31.30	40
Divergence	-2.64	-
1050. Community Risk Reduction	4.93	5.50
Total Credit	74.11	105.5

Final Community Classification = 03/10

INSURANCE SERVICES OFFICE, INC.
HYDRANT FLOW DATA SUMMARY

City Sisters Camp Sherman Fd

County Oregon (Deschutes, Jefferson)

State OREGON (36)

Witnessed by: Insurance Services Office

Date: Dec 13, 2016

TEST NO.	TYPE DIST.*	TEST LOCATION	SERVICE	FLOW - GPM $Q=(29.83(C(d^2)p^{0.5}))$			PRESSURE PSI		FLOW -AT 20 PSI		REMARKS***	MODEL TYPE	
				INDIVIDUAL HYDRANTS	TOTAL		STATIC	RESID.	NEEDED **	AVAIL.			
1		North Locust Lane & CASCADE AVE	Sisters Water Company, MAIN	1260	0	0	1260	80	66	5000	2800		
10		West Adams Street & OAK ST	Sisters Water Company, MAIN	710	0	0	710	75	66	2250	1900		
11		Saddle & TOLLGATE RD	Tollgate Water Company, MAIN	810	0	0	810	71	38	750	1000		
12		16085 FOX RIDGE CIRCLE	The Ridge at Indian Ford, Main	750	0	0	750	76	63	500	1700		
13		OLD WAGON WHEEL	Indian Meadow Water Company, MAIN	380	0	0	380	108	84	500	750		
14		MOUNTAIN VIEW	Squaw Creek Canyon Water Company, MAIN	300	0	0	300	90	45	750	400		
15		31500 SW Blue Lake Dr	Caldera Water Company, Main	990	0	0	990	77	73	500	4200		
16		69305 Hawksflight	Rim at Aspen Lakes Water Company, Main	800	0	0	800	70	48	500	1200	(B)-(371 gpm)	
17		15123 Windigo Trail	Cascade Meadow Ranch Water Company, Zone 2	610	0	0	610	52	32	500	800	(B)-(450 gpm)	
1A		East Cascade Avenue & LOCUST ST	Sisters Water Company, MAIN	1260	0	0	1260	80	66	1750	2800		
1B		Maple Street & CASCADE AVE	Sisters Water Company, MAIN	1260	0	0	1260	80	66	750	2800		
2		West McKenzie Highway & TRINITY WAY	Sisters Water Company, MAIN	1070	0	0	1070	68	65	3500	4800		
3		West Rte 20 & BARCLAY DR	Sisters Water Company, MAIN	1070	0	0	1070	80	65	4500	2300		
3.2			Sisters Water Company, MAIN	0	0	0	0	0	0	2000	0		
4		South Pine Street & HOOD AVE	Sisters Water Company, MAIN	1820	0	0	1820	79	50	3500	2700		
5		Desperado Trail & HWY 20	Sisters Water Company, MAIN	860	0	0	860	80	74	3000	3000		

THE ABOVE LISTED NEEDED FIRE FLOWS ARE FOR PROPERTY INSURANCE PREMIUM CALCULATIONS ONLY AND ARE NOT INTENDED TO PREDICT THE MAXIMUM AMOUNT OF WATER REQUIRED FOR A LARGE SCALE FIRE CONDITION.

THE AVAILABLE FLOWS ONLY INDICATE THE CONDITIONS THAT EXISTED AT THE TIME AND AT THE LOCATION WHERE TESTS WERE WITNESSED.

*Comm = Commercial; Res = Residential

**Needed is the rate of flow for a specific duration for a full credit condition. Needed Fire Flows greater than 3,500 gpm are not considered in determining the classification of the city when using the Fire Suppression Rating Schedule.

*** (A)-Limited by available hydrants to gpm shown. Available facilities limit flow to gpm shown plus consumption for the needed duration of (B)-2 hours, (C)-3 hours or (D)-4 hours.

INSURANCE SERVICES OFFICE, INC.
HYDRANT FLOW DATA SUMMARY

City Sisters Camp Sherman Fd

County Oregon(Deschutes, Jefferson),

State OREGON (36)

Witnessed by: Insurance Services Office

Date: Dec 13, 2016

TEST NO.	TYPE DIST.*	TEST LOCATION	SERVICE	FLOW - GPM			PRESSURE		FLOW -AT 20 PSI		REMARKS***	MODEL TYPE	
				INDIVIDUAL HYDRANTS	TOTAL		STATIC	RESID.	NEEDED **	AVAIL.			
6		South Elm Street & WASHINGTON AVE	Sisters Water Company, MAIN	1950	0	0	1950	74	55	3000	3400		
7		West Sisters Park Drive & PINE ST	Sisters Water Company, MAIN	2020	0	0	2020	79	50	3000	3000		
8		West Barclay Drive & PINE ST	Sisters Water Company, MAIN	2050	0	0	2050	84	55	2500	3100		
9		East Cascade Avenue & FIR ST	Sisters Water Company, MAIN	790	0	0	790	72	62	2500	1900		
HW 1		25737 Suttle Sherman Road	Fire Department Supply	0	0	0	700	0	0	1750	700		CTR
HW 2		13375 SW Forest Service Road	Fire Department Supply	0	0	0	950	0	0	1500	950		
HW 3		70936 Indian Ford Road	Fire Department Supply	0	0	0	800	0	0	500	800		CTR
HW 4		70162 Doggie Drive	Fire Department Supply	0	0	0	700	0	0	500	700		CTR
HW 5		14873 Remuda Road	Fire Department Supply	0	0	0	750	0	0	500	750		CTR

THE ABOVE LISTED NEEDED FIRE FLOWS ARE FOR PROPERTY INSURANCE PREMIUM CALCULATIONS ONLY AND ARE NOT INTENDED TO PREDICT THE MAXIMUM AMOUNT OF WATER REQUIRED FOR A LARGE SCALE FIRE CONDITION.

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*** (A)-Limited by available hydrants to gpm shown. Available facilities limit flow to gpm shown plus consumption for the needed duration of (B)-2 hours, (C)-3 hours or (D)-4 hours.

HYDRANT FLOW DATA SUMMARY

City Sisters Camp Sherman FdCounty Oregon (Deschutes, Jefferson)State OREGON (36)Witnessed by: Insurance Services OfficeDate: Dec 13, 2016

TEST NO.	TYPE DIST.*	TEST LOCATION	SERVICE	FLOW - GPM $Q = (29.83(C(d^2)p^{0.5}))$				PRESSURE PSI		FLOW -AT 20 PSI		REMARKS***	MODEL TYPE
				INDIVIDUAL HYDRANTS			TOTAL	STATIC	RESID.	NEEDED **	AVAIL.		
1		North Locust Lane & CASCADE AVE	Sisters Water Company, MAIN	1260	0	0	1260	80	66	5000	2800		
10		West Adams Street & OAK ST	Sisters Water Company, MAIN	710	0	0	710	75	66	2250	1900		
11		Saddle & TOLLGATE RD	Tollgate Water Company, MAIN	810	0	0	810	71	38	750	1000		
12		16085 FOX RIDGE CIRCLE	The Ridge at Indian Ford, Main	750	0	0	750	76	63	500	1700		
13		OLD WAGON WHEEL	Indian Meadow Water Company, MAIN	380	0	0	380	108	84	500	750		
14		MOUNTAIN VIEW	Squaw Creek Canyon Water Company, MAIN	300	0	0	300	90	45	750	400		
15		31500 SW Blue Lake Dr	Caldera Water Company, Main	990	0	0	990	77	73	500	4200		
16		69305 Hawksflight	Rim at Aspen Lakes Water Company, Main	800	0	0	800	70	48	500	1200	(B)-(371 gpm)	
17		15123 Windigo Trail	Cascade Meadow Ranch Water Company, Zone 2	610	0	0	610	52	32	500	800	(B)-(450 gpm)	
1A		East Cascade Avenue & LOCUST ST	Sisters Water Company, MAIN	1260	0	0	1260	80	66	1750	2800		
1B		Maple Street & CASCADE AVE	Sisters Water Company, MAIN	1260	0	0	1260	80	66	750	2800		
2		West McKenzie Highway & TRINITY WAY	Sisters Water Company, MAIN	1070	0	0	1070	68	65	3500	4800		
3		West Rte 20 & BARCLAY DR	Sisters Water Company, MAIN	1070	0	0	1070	80	65	4500	2300		
3.2			Sisters Water Company, MAIN	0	0	0	0	0	0	2000	0		
4		South Pine Street & HOOD AVE	Sisters Water Company, MAIN	1820	0	0	1820	79	50	3500	2700		
5		Desperado Trail & HWY 20	Sisters Water Company, MAIN	860	0	0	860	80	74	3000	3000		

THE ABOVE LISTED NEEDED FIRE FLOWS ARE FOR PROPERTY INSURANCE PREMIUM CALCULATIONS ONLY AND ARE NOT INTENDED TO PREDICT THE MAXIMUM AMOUNT OF WATER REQUIRED FOR A LARGE SCALE FIRE CONDITION.

THE AVAILABLE FLOWS ONLY INDICATE THE CONDITIONS THAT EXISTED AT THE TIME AND AT THE LOCATION WHERE TESTS WERE WITNESSED.

*Comm = Commercial; Res = Residential.

**Needed is the rate of flow for a specific duration for a full credit condition. Needed Fire Flows greater than 3,500 gpm are not considered in determining the classification of the city when using the Fire Suppression Rating Schedule.

*** (A)-Limited by available hydrants to gpm shown. Available facilities limit flow to gpm shown plus consumption for the needed duration of (B)-2 hours, (C)-3 hours or (D)-4 hours.

INSURANCE SERVICES OFFICE, INC.
HYDRANT FLOW DATA SUMMARY

City Sisters Camp Sherman Fd

County Oregon (Deschutes, Jefferson)

State OREGON (36)

Witnessed by: Insurance Services Office

Date: Dec 13, 2016

TEST NO.	TYPE DIST.*	TEST LOCATION	SERVICE	FLOW - GPM			PRESSURE		FLOW -AT 20 PSI		REMARKS***	MODEL TYPE	
				INDIVIDUAL HYDRANTS			TOTAL	STATIC	RESID.	NEEDED **			AVAIL.
6		South Elm Street & WASHINGTON AVE	Sisters Water Company, MAIN	1950	0	0	1950	74	55	3000	3400		
7		West Sisters Park Drive & PINE ST	Sisters Water Company, MAIN	2020	0	0	2020	79	50	3000	3000		
8		West Barclay Drive & PINE ST	Sisters Water Company, MAIN	2050	0	0	2050	84	55	2500	3100		
9		East Cascade Avenue & FIR ST	Sisters Water Company, MAIN	790	0	0	790	72	62	2500	1900		
HW 1		25737 Suttle Sherman Road	Fire Department Supply	0	0	0	700	0	0	1750	700		CTR
HW 2		13375 SW Forest Service Road	Fire Department Supply	0	0	0	950	0	0	1500	950		
HW 3		70936 Indian Ford Road	Fire Department Supply	0	0	0	800	0	0	500	800		CTR
HW 4		70162 Doggie Drive	Fire Department Supply	0	0	0	700	0	0	500	700		CTR
HW 5		14873 Remuda Road	Fire Department Supply	0	0	0	750	0	0	500	750		CTR

THE ABOVE LISTED NEEDED FIRE FLOWS ARE FOR PROPERTY INSURANCE PREMIUM CALCULATIONS ONLY AND ARE NOT INTENDED TO PREDICT THE MAXIMUM AMOUNT OF WATER REQUIRED FOR A LARGE SCALE FIRE CONDITION.

THE AVAILABLE FLOWS ONLY INDICATE THE CONDITIONS THAT EXISTED AT THE TIME AND AT THE LOCATION WHERE TESTS WERE WITNESSED.

*Comm = Commercial; Res = Residential.

**Needed is the rate of flow for a specific duration for a full credit condition. Needed Fire Flows greater than 3,600 gpm are not considered in determining the classification of the city when using the Fire Suppression Rating Schedule.

*** (A)-Limited by available hydrants to gpm shown. Available facilities limit flow to gpm shown plus consumption for the needed duration of (B)-2 hours, (C)-3 hours or (D)-4 hours.

APPENDIX H
2022 Camp Sherman Fire District Fire
Hydrant Capacity Flow Test Results

2022 SISTERS - CAMP SHERMAN FIRE DISTRICT FIRE HYDRANT CAPACITY FLOW TEST

<u>Hydrant ID</u>	<u>Test Date</u>	<u>Time</u>	<u>Tester</u>	<u>Static</u>	<u>Resid.</u>	<u>Pitot</u>	<u>Testing Device</u>	<u>Flow GPM</u>	<u>Flow @ 20psi Resid.</u>	<u>Location</u>
S208	1/11/22	9:28	JA	56	21	16	4.5" HOSE MONSTER	1324	1344	MCKINNEY BUTTE RD (N OF SMS)
		9:29		56	22	17		1365	1408	BTWN REED ST & MCKINNEY RANCH RD
		9:30		56	22	17		1365	1408	(WELLS OFF & RESERVOIR AT 20.1')
S106	1/11/22	9:46	JA	64	29	23	4.5" HOSE MONSTER	1588	1797	USFS HOUSING LOOP RD# 2058-030
		9:47		64	29	23		1588	1797	(WELLS OFF & RESERVOIR AT 20.1')
		9:48		64	29	23		1588	1797	
S248	1/11/22	10:03	JA	73	32	25	4.5" HOSE MONSTER	1656	1902	295 W LUNDGREN MILL DR
		10:04		73	32	25		1656	1902	(WELLS OFF & RESERVOIR AT 19.9')
		10:05		73	32	25		1656	1902	
S160	1/11/22	10:25	JA	92	37	30	4.5" HOSE MONSTER	1814	2098	N ROPE PL @ ALLEY/NORTH DEAD END
		10:26		92	38	30		1814	2119	(WELLS OFF & RESERVOIR AT 19.8')
		10:27		92	37	30		1814	2098	
S43	1/11/22	10:47	JA	59	26	22	4.5" HOSE MONSTER	1553	1700	E TYEE DR @ S ELM ST
		10:48		59	26	21		1517	1660	(WELLS OFF & RESERVOIR AT 19.6')
		10:49		59	26	22		1553	1700	

PERTINENT NOTES REGARDING THE ABOVE FLOW TEST DATA:

- 1) FLOW GPM DERIVED FROM THE HYDRO FLOW PRODUCTS HOSE MONSTER FLOW CHART FOR THE 4.5" ORIFICE.
- 2) THESE TESTS WERE CONDUCTED TO SOLELY REPRESENT THE HYDRANT FLOW CAPACITIES OF THE INDIVIDUAL HYDRANTS THAT WERE TESTED. THESE TESTS DO NOT REPRESENT MAIN CAPACITY TESTS, AS ALL PRESSURE AND FLOW READINGS WERE OBTAINED FROM THE SINGLE HYDRANTS THAT WERE TESTED.
- 3) DURING THESE TESTS, THE CITY'S RESERVOIR LEVEL WAS BETWEEN 19.6' TO 20.1', WITH ALL WELLS OFF, PER JOSH STOTTS WITH THE CITY OF SISTERS. SEE NOTES FOR RESERVOIR LEVEL FOR EACH TEST. CONTACT THE CITY FOR ADDITIONAL INFORMATION THAT MAY BE NECESSARY FOR FLOW MODELING, ETC. JOSH STOTTS MONITORED THE SYSTEM STATUS BY COMPUTER DURING THE TESTS.
- 4) AFTER OPENING THE HYDRANTS TO FULL FLOW, PITOT AND RESIDUAL PRESSURE READINGS WERE TAKEN AT ONE MINUTE INTERVALS FROM THE TEST HYDRANTS (LISTED ABOVE) TO ALLOW FOR SYSTEM PERFORMANCE & STABILIZATION. THE SYSTEM STATIC PRESSURES WERE TAKEN IMMEDIATELY FOLLOWING THE FLOW TESTS, BUT ARE ASSUMED AS THE STATIC PRESSURES FOR ALL READINGS DURING THE GIVEN TEST.
- 5) THE SISTERS-CAMP SHERMAN FIRE DISTRICT AND ITS AGENTS ASSUME NO LIABILITY FOR THE ACCURACY OF THE FLOW TESTING EQUIPMENT OR THE HYDRANT FLOW DATA PROVIDED HEREIN.

2022 SISTERS - CAMP SHERMAN FIRE DISTRICT FIRE HYDRANT CAPACITY FLOW TEST

<u>Hydrant ID</u>	<u>Test Date</u>	<u>Time</u>	<u>Tester</u>	<u>Static</u>	<u>Resid.</u>	<u>Pitot</u>	<u>Testing Device</u>	<u>Flow GPM</u>	<u>Flow @ 20psi Resid.</u>	<u>Location</u>
S208	1/10/22	13:55	JA	75	36	27	4.5" HOSE MONSTER	1720	2071	MCKINNEY BUTTE RD (N OF SMS)
		13:56		75	37	29		1783	2177	BTWN REED ST & MCKINNEY RANCH RD
		13:57		75	37	29		1783	2177	(WELL #4 ON & RESERVOIR AT ~22.6')
S106	1/10/22	14:14	JA	81	44	33	4.5" HOSE MONSTER	1902	2491	USFS HOUSING LOOP RD# 2058-030
		14:15		81	45	34		1931	2567	(WELL #4 ON & RESERVOIR AT ~22.6')
		14:15		81	45	34		1931	2567	
S248	1/10/22	14:31	JA	90	43	33	4.5" HOSE MONSTER	1902	2358	295 W LUNDGREN MILL DR
		14:32		90	47	36		1987	2585	(WELL #4 ON & RESERVOIR AT ~22.7')
		14:33		90	46	35		1959	2517	
		14:34		90	46	35		1959	2517	
S160	1/10/22	14:49	JA	104	52	39	4.5" HOSE MONSTER	2068	2679	N ROPE PL @ ALLEY/NORTH DEAD END
		14:50		104	55	42		2146	2871	(WELL #4 ON & RESERVOIR AT ~22.7')
		14:51		104	55	42		2146	2871	
S43	1/10/22	15:09	JA	76	38	28	4.5" HOSE MONSTER	1752	2160	E TYEE DR @ S ELM ST
		15:10		76	42	32		1873	2452	(WELL #4 ON & RESERVOIR AT ~22.8')
		15:11		76	42	32		1873	2452	

PERTINENT NOTES REGARDING THE ABOVE FLOW TEST DATA:

- 1) FLOW GPM DERIVED FROM THE HYDRO FLOW PRODUCTS HOSE MONSTER FLOW CHART FOR THE 4.5" ORIFICE.
- 2) THESE TESTS WERE CONDUCTED TO SOLELY REPRESENT THE HYDRANT FLOW CAPACITIES OF THE INDIVIDUAL HYDRANTS THAT WERE TESTED. THESE TESTS DO NOT REPRESENT MAIN CAPACITY TESTS, AS ALL PRESSURE AND FLOW READINGS WERE OBTAINED FROM THE SINGLE HYDRANTS THAT WERE TESTED.
- 3) DURING THESE TESTS, THE CITY'S RESERVOIR LEVEL WAS BETWEEN 22.6'-22.8', WITH WELL #4 OPERATING, PER JOSH STOTTS WITH THE CITY OF SISTERS. CONTACT THE CITY FOR ADDITIONAL INFORMATION THAT MAY BE NECESSARY FOR FLOW MODELING, ETC. SEE EACH TEST FOR +/- RESERVOIR LEVEL.
- 4) AFTER OPENING THE HYDRANTS TO FULL FLOW, PITOT AND RESIDUAL PRESSURE READINGS WERE TAKEN AT ONE MINUTE INTERVALS FROM THE TEST HYDRANTS (LISTED ABOVE) TO ALLOW FOR SYSTEM PERFORMANCE & STABILIZATION. THE SYSTEM STATIC PRESSURES WERE TAKEN IMMEDIATELY FOLLOWING THE FLOW TESTS, BUT ARE ASSUMED AS THE STATIC PRESSURES FOR ALL READINGS DURING THE GIVEN TEST.
- 5) THE SISTERS-CAMP SHERMAN FIRE DISTRICT AND ITS AGENTS ASSUME NO LIABILITY FOR THE ACCURACY OF THE FLOW TESTING EQUIPMENT OR THE HYDRANT FLOW DATA PROVIDED HEREIN.