City of
White Salmon, Washington
WATER SYSTEM PLAN
2024

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WATER SYSTEM PLAN

FOR THE

CITY OF WHITE SALMON, WASHINGTON

NOVEMBER 2024

DAVID THEODORE JEPSEN
42991
11/11/2024

This Water System Plan (WSP) was completed through a joint effort between the City of White Salmon and Anderson Perry & Associates, Inc. (AP). The City of White Salmon staff completed Chapters 5, 6, and 7 and associated Appendix items of the WSP. AP authored the remaining chapters of the WSP.

ANDERSON PERRY & ASSOCIATES, INC.

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

Job No. 250-12

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Chapter 1 - Introduction

This chapter provides general information on the City of White Salmon's water system, including ownership and management, history and background, applicable City codes, facility inventory, related plans, and service area characteristics and policies.

Ownership and Management

The City of White Salmon owns and operates a municipal water system (Washington State Department of Health [DOH] Identification No. 96350) that provides water service to residents inside and outside of the city limits.

The City is governed by an elected mayor and five elected City Council members. The general management and control of the City's water utilities is under the authority of the mayor, city administrator, and public works operations manager. The mayor is the administrative lead of the City government, while the city administrator oversees the Public Works Department, and the public works operations manager supervises the day-to-day operations of the City's water system.

History and Background

The City of White Salmon is located on a 550-foot bluff overlooking the Columbia River and adjacent to the White Salmon River. The City is located in Klickitat County adjacent to the City of Bingen and across the Columbia River from Hood River, Oregon. The City is served by State Route (SR) 14, a major east/west arterial along the Columbia River, and by SR 141 through White Salmon proper. For many years, logging, lumber production, and agriculture were the mainstays of the economy. These sectors continue to play important roles in the economy, as do recreation, tourism, and technology.

The City is located on the east side of the Cascade Range in a transition zone between the marine-influenced climate west of the Cascades and the dry, continental climate of the intermountain region. Combined, the area's location and relatively mild climate offer visitors and residents a variety of recreational activities. Hiking, fishing, camping, rafting, kayaking, and biking opportunities are abundant throughout the Columbia River Gorge, Gifford Pinchot National Forest, and Mt. Adams areas. The White Salmon area of the Columbia River Gorge is known particularly for windsurfing and kiteboarding.

The City's name originates from the nearby White Salmon River, which was named during the Lewis and Clark Expedition when the explorers observed the river teeming with salmon whose color had turned white after spawning. Settlers arrived in the White Salmon area in the mid-1880s and established the upland portion of the land where the City now resides. The City was platted in 1903 and subsequently incorporated in 1907.

Domestic water service has been provided to the White Salmon area since the early 1900s. The water system was privately owned until the 1930s, when the City purchased all water rights and system facilities and commenced operation and maintenance (O&M) of the system.

The water system's original water source was Jewett Springs, which is adjacent to Jewett Creek. Water rights for Buck Creek were obtained and it was used exclusively for more than 80 years, until 1999, when *Cryptosporidium* oocysts, *Giardia lamblia cysts*, fecal coliform, and fecal *streptococcus* were discovered in the unfiltered creek water. A boil water order was instituted and remained in place until 2000 when the first of two groundwater wells, Well No. 1, was placed into service. The Buck Creek water source was then taken out of service and considered an emergency backup source. The second groundwater well, Well No. 2, was completed in 2002.

By 2006, water levels and pumping volumes in the wells were dropping over time, and the City was withdrawing more water than allowed by its water rights. The City subsequently enacted a moratorium for new users and considered developing a new source. After reviewing possible sources, the City chose to install a slow sand filter plant on the Buck Creek source to provide long-term potable water needs for the area. With the operation of the Nathan Wellman Memorial slow sand filter plant (Buck Creek water treatment plant [WTP]) and the acquisition of a new water rights permit from the Washington State Department of Ecology (Ecology), the moratorium for new users was lifted in 2011. The known major events in the development of the City's water system are summarized on Table 1-1.

TABLE 1-1
WATER SYSTEM HISTORY

Year	Event
1900s	The original water system was built by the Jewett family and subsequently privately operated by the White Salmon Water Company. Jewett Springs was the system's original water source.
1903	The City was platted.
1907	The City was incorporated.
1917	The Washington State Department of Natural Resources (DNR) issued necessary pipeline easements for Buck Creek transmission main lines.
1923	A water right was obtained for Buck Creek by the White Salmon Water Company.
1937	The City purchased the water system and water rights and established a water department.
1939	The Spring Street Reservoir was constructed; wood stave pipelines were replaced with 10- and 12-inch steel pipelines.
1956/57	Fourteen-inch steel pipelines was installed to replace 10- and 12-inch steel pipelines and remaining wood stave pipelines.
1957	The City applied for additional water rights for Buck Creek to handle potential future growth.
1960 through 1980	Several major water system improvement projects were completed.
1973	Futrell-Redford-Saxton Consulting Engineers and Planners prepared "A Report on an Engineering Study and Preliminary Design of Water System Facilities for the City of White Salmon."
1979	R.A. Edwards & Associates, Inc., prepared "A Report on Water Source Analysis and Recommended for Improvements."
1981	The Los Altos Reservoir Station was constructed.
1982	Wellman & Associates prepared the "Water System Plan for the City of White Salmon."
1988	The City began selling water to the City of Bingen.
1991	The Los Altos Booster Pump Station (BPS) and the Strawberry Mountain Reservoir and BPS were constructed.
1996	• Wellman & Associates authored a "Multi-Jurisdictional Water Master Plan" for the Cities of White Salmon and Bingen and the Port of Klickitat. • Rainfall resulted in severe flooding, with large quantities of sediment entering the City's water system. A boil water order was implemented for several days until the system was disinfected.

Year	Event
1999	The presence of *Cryptosporidium* oocysts, *Giardia lamblia* cysts, fecal coliform, and fecal *streptococcus* was discovered in the water from Buck Creek being diverted by the City. A boil water order was issued as mandated in a bilateral compliance agreement with the DOH.
2000	Well No. 1 was placed into service. The boil water order was lifted in August, and the use of Buck Creek surface water was discontinued. The Grand Ronde BPS and Childs Reservoir were constructed.
2001	The Dock Grade Reservoir, a 10-inch main along Dock Grade Road, and a pressure reducing valve (PRV) station were constructed to provide fire flow to the City's River Front District.
2002	Well No. 2 was placed into service, and the Well No. 2 BPS was constructed. The "Buck Creek Watershed Comprehensive Management Plan" was issued.
2004	Bell Design Company completed the "City of White Salmon Water Master Plan."
2006	Due to withdrawals exceeding the City's existing water rights, a moratorium was placed on new water services.
2008	The City was awarded a grant from the Columbia River Basin Water Management Program for Buck Creek to the Grande Ronde Aquifer, Aquifer Storage and Recovery (ASR) Project.
2009/10	A new slow sand filter plant at the Buck Creek diversion, a new reservoir tank next to the Grand Ronde BPS, and a new reservoir tank at Strawberry Mountain were constructed.
2010	The new Buck Creek WTP was placed into service in July.
2011	• A new water rights permit was issued to the City allowing 2.2 cubic feet per second (cfs) and 780 acre-feet per year (ac-ft/yr) of water withdrawal under specified conditions. • The moratorium on new water services was lifted. • The Water Main Relocation Project, consisting of 13,319 linear feet (LF) of 16-inch ductile iron pipe and 1,150 LF of 8-inch polyvinyl chloride (PVC) pipe, was constructed. Due to the demolition of the Condit Dam, relocation of the Buck Creek transmission main was necessary. • The Loop Road Water Line Project, consisting of approximately 1,185 LF of 16-inch PVC pipe and 3,595 LF of 12-inch PVC pipe, was constructed. • Aspect Consulting, LLC, completed the "City of White Salmon ASR Feasibility Assessment Study." • A new observation/monitoring well was drilled next to Well No. 2.
2014	• The Snowden Road-Simmons Road Water Line Project was completed. • The City's Water System Plan received approval. • The City purchased 2.0 cfs and 1,445.4 ac-ft/yr of water rights on Black Sand Creek, a tributary of the White Salmon River, from the White Salmon Irrigation District (WSID). • The City obtained a permit with the WSID to establish a White Salmon Water Rights Bank for mitigation of out-of-stream uses and in-stream flow (total: 8.0 cfs and 5,781.6 ac-ft/yr).
2015	• The Tohomish Street Project was completed, which included water line replacement on Tohomish, Snohomish, and Estes Streets and Fire Hall Alley. The project was funded by U.S. Department of Agriculture (USDA) Rural Development (RD). • City applied for Ecology's Drought Funding to bring Jewett Springs into service.
2017	Aspect Consulting, LLC, completed the White Salmon River Source Reliability Study. The study determined that the White Salmon River could potentially serve as a suitable alternative water source for the City.
2018	Revised water rates were adopted based on a 2017 Water and Sewer Cost of Service Rate Study.
2019	Applied for and obtained a $3,193,000 loan from USDA RD for the Jewett Water Main Improvements Project.
2019/20	Applied for and obtained a $750,000 loan from the Washington State Public Works Board (PWB) Emergency Loan Program to design replacement of the existing 14-inch diameter transmission main.

Year	Event
2020	The City received grants from Ecology and the Yakama Nation, and committed staff time to evaluate the treatment needs of the White Salmon River, conduct a treatment pilot test, and advance design and permitting strategies.
2021	• The Jewett Water Main Improvements Project, which included installation of a new water main along Jewett Boulevard/SR 141, Skyline Drive, Rhine Village Drive, Pine Drive, and Wauna Avenue between Jewett and Tohomish Street, was completed. The project also included the installation of three PRV stations and a new water meter vault for the Bingen intertie on Jewett Boulevard. • The City applied for and was awarded grant and loan funding from USDA RD for the Transmission Main Replacement Phase I Project for the replacement of the 14-inch diameter transmission main adjacent to Buck Creek. • The Garfield Avenue Water Line Improvements and El Camino Real Water Line Improvements Projects were completed. • A pilot study for slow sand filtration system treatment was completed for the White Salmon River. Results were generally positive but inconclusive. Additional pilot testing was recommended.
2022	• The City applied for and was awarded an additional loan funding from PWB for the Transmission Main Replacement Phase I project. • The City applied for and was awarded loan funding from PWB for the North Main/Spring Street Water Improvements project. • Installation of a Starlink satellite system at the Buck Creek WTP for telemetry communications.
2023	• Construction commenced on the Transmission Main Replacement Phase I project. • The City applied for and was awarded loan funding from PWB for the Transmission Main Replacement Phase IIA project for the replacement of the 14-inch diameter transmission main from the manifold connection “Manifold” to the check valve station location off SR 141 on top of Bald Mountain Curves. • The design of the Supervisory Control and Data Acquisition (SCADA) Upgrade - 2023 project was completed with bid solicitation. Construction completion is anticipated in 2024.

Geography

The City of White Salmon is located in the Cascade Range on the north side of the Columbia River Gorge. The City is bound to the west by the White Salmon River, Cox Mountain to the north, Burdoin Mountain to the east, and the Columbia River to the south. The water distribution system covers an area rising from the Columbia River’s banks, at approximately 120 feet above mean sea level (AMSL), to an elevation of 1,050 feet AMSL at the top of Strawberry Mountain. The majority of the system lies within the Columbia Gorge Scenic Area. Wells No. 1 and 2 are located in the White Salmon River Valley (elevation of approximately 440 feet AMSL) near milepost 5.42 on SR 141, not far from the former east bank of Northwestern Lake. The Buck Creek intake is located at an elevation of 1,037 feet AMSL in a sharply incised, narrow canyon that rises to an elevation of approximately 3,700 feet AMSL.

Neighboring/Adjacent Water Systems

The City’s neighboring/adjacent water systems are listed on Table 1-2. A map showing the City’s relation to these water systems is presented on Figure 1-1.

TABLE 1-2
NEIGHBORING/ADJACENT WATER SYSTEMS

Water System	DOH No.
City of Bingen	06900
Mt. Adams Orchard	56397
Underwood Water System	90200
Fordyce Water Association	05182

Ordinances/Bylaws

Existing City ordinances pertaining to the water system are found under Title 13, Public Services, of the City's Municipal Code. Chapter sections pertaining to the water system are:

- 13.08 - Water Department
- 13.16 - Water and Sewer Rates and Charges
- 13.20 - Control of Backflow and Cross-Connections to the City Water System
- 13.24 - Water Conservation
- 13.28 - Developer Reimbursement

Inventory of Existing Facilities

The City's existing water system facilities are summarized on Table 1-3 and shown on Figure 1-2. Additional information and a discussion regarding each major water system facility are included in Chapter 3. A copy of the City's Water Facilities Inventory (WFI) report is provided in Appendix A.

TABLE 1-3
INVENTORY OF EXISTING FACILITIES

Existing Water System Facility	Value
Four Sources (Three Active, One Emergency)	
S01 - Buck Creek, Surface Water, Active	1,000 gpm
S02 - Jewett Springs, Groundwater/Spring, Emergency	100 gpm
S03 - Well No. 1, Groundwater, Active	600 gpm
S04 - Well No. 2, Groundwater, Active	200 gpm
Water Rights - 5.2 cfs Cumulative Flow; 1,468 ac-ft Cumulative Volume	
Certificate No. 3474, Buck Creek or Wellfield	2.0 cfs
Certificate No. 7109, Buck Creek or Wellfield	2.0 cfs, 688 ac-ft
Certificate No. 10252, Jewett Springs	1.0 cfs
Permit S4-35068P, Buck Creek	2.2 cfs, 780 ac-ft
Water Treatment	
Buck Creek - Slow Sand Filtration Followed by Chlorination	1,000 gpm
Wells No. 1 and 2 - Chlorination with Hypochlorite Solution	-
Storage Reservoirs - Total 2,021,600 gallons (rounded)	
Grand Ronde Reservoir	100,000 gallons
Spring Street Reservoir	500,000 gallons
Los Altos Reservoir	1,000,000 gallons

Existing Water System Facility	Value
Strawberry Mountain Reservoirs (West/East)	200,000 gallons
Childs Reservoir	203,684 gallons
Dock Grade Reservoir (6th Street)	218,000 gallons
Transmission and Distribution	
Number of Pressure Zones	15
Number of BPSs	4
Diameter of Pipelines	1 to 20 inches
Total Length of Pipelines	232,232 feet
WFI (copy provided in Appendix A)	
Active Number of Connections	1,908
Approved Number of Connections	2,831

ac-ft = acre-feet
gpm = gallons per minute

Related Plans and Documents

The following documents were consulted when preparing this Water System Plan (WSP).

Water System-related

- City of White Salmon Wellhead Protection Plan, Bell Design Company, May 2002
- The Buck Creek Watershed Comprehensive Management Plan, DNR and the City of White Salmon, August 2002
- Emergency Response Plan, June 2004
- City of White Salmon Water Master Plan, Bell Design Company, December 2004
- City of White Salmon, Washington Water Utility Financial Plan, Economic and Financial Analysis, April 2006
- Water Supply and Water Demand Conservation Management Plan, not dated
- City of Bingen Water System Plan, Gray & Osborne, Inc., December 2008
- City of White Salmon ASR Feasibility Assessment, Aspect Consulting, LLC, April 22, 2011
- City of White Salmon Water System Plan, Anderson Perry & Associates, Inc. (AP) Revised April 2014
- City of White Salmon Water and Sewer Cost of Service Rate Study, AP, October 2017
- White Salmon River Source Reliability Study, Aspect Consulting, LLC, October 20, 2017
- City of White Salmon ASR System Assistance Technical Memorandum, Gray & Osborne, Inc., November 1, 2019
- White Salmon River Water Supply Alternative Summary, Aspect Consulting, LLC, October 2022 Letter from Phil Rigdon, Yakama Nation Department of Natural Resources to Tom Tebb, Ecology's Office of Columbia River, May 17, 2019

Planning and Standards-related

- Klickitat County Zoning Ordinance No. 62678, Klickitat County, last amended May 31, 2011
- City of White Salmon Urbanization Study, FCS Group, November 11, 2020
- City of White Salmon 2040 Comprehensive Plan, WPA USA Inc., E2 Land Use Planning Services, and 3J Consulting, 2021
- City of White Salmon Department of Public Works, Development Review Packet, June 2022
- City of White Salmon Public Works, Construction Standard: Specifications and Standard Plans, March 15, 2023

Department of Health-related

- Washington State DOH Water System Planning Handbook, Publication No. 338-068, August 2020
- Washington State DOH Water System Design Manual, Publication No. 333-123, June 2020
- Washington State DOH Water Use Efficiency Rule Guidebook, Publication No. 331-375, 3rd edition, 2017

Environmental-related

- U.S. Geological Survey in cooperation with the Yakama Nation, Fish Population and Habitat Analysis in Buck Creek, Washington, Prior to Recolonization by Anadromous Salmonids after the Removal of Condit Dam, Open-File Report 2012-1270
- Washington State DNR, State Trust Lands Final Habitat Conservation Plan, September 1997
- The Buck Creek Watershed Comprehensive Management Plan, Washington State DNR and City of White Salmon, August 2002.
- Washington State DNR, Policy for Sustainable Forests, December 2006

Supervisory Control and Data Acquisition-related

- City of White Salmon SCADA Master Plan, Preliminary 90 Percent Review, RH2 Engineering, Inc., June 2019
- City of White Salmon SCADA Pre-Design Report, R&W Engineering, Inc., for AP, September 2022

Service Area Characteristics

A utility's service area is composed of existing, retail, future, and water rights place of use service areas (WRPOUSA). The City's water service areas include the City of White Salmon and portions of Klickitat and Skamania Counties. These service areas are discussed below and are shown on Figures 1-3 through 1-10.

Existing Service Area

The existing service area (ESA) is the area where a water system already provides direct service, remote service, or where service connections are currently available. The City's ESA Includes the city limits; portions of the urban growth area (UGA) to the north, south, and east of the city limits; and other areas.

Retail Service Area

The retail service area (RSA) is the area where the City has a duty to provide direct service under defined conditions. The RSA includes the ESA, the area already being served near the transmission line in Klickitat County, and the area already being served near Lakeview Road in Skamania County. Retail service includes service to Mt. Adams Orchard water system.

Future Service Area

The future service area (FSA) is the area where the City intends to provide direct water service in the future. The City's desired FSA includes the ESA and RSA and portions of land shown on Figures 1-3 through 1-10.

The UGA is the area outside the City but within the boundary of the urban exempt area (UEA). The UEA was established by 1986 legislation that designated the Columbia River Gorge National Scenic Area. The UGA, consisting of approximately 2,210 acres, serves as a buffer between the City and rural areas north and west in Klickitat County. The land in the UGA remains under County jurisdiction until property owners petition the City for annexation and the annexation process is complete.

The City has no plans to provide water to the Fordyce Water Association or the Underwood Water System as both are outside the FSA.

Water Rights Place of Use Service Area

The WRPOUSA is the area where the City is using or plans to use their water rights. The City's WRPOUSA includes all of the ESA, RSA, FSA, and the City of Bingen. The City of Bingen is a wholesale customer. Water sold to the City of Bingen is currently under the City of White Salmon's water rights as agreed upon by both parties in several interlocal agreements (see Chapter 10 and Appendix B). The WRPOUSA also includes the City of Bingen's FSA and WRPOUSA.

Zoning and Land Use

Zoning and land use designations for the water service area are summarized on Table 1-4. The City of White Salmon, Klickitat County, and Skamania County zoning maps are provided in Appendix A.

TABLE 1-4
ZONING AND LAND USE DESIGNATIONS

Zoning/Land Use	Minimum Size and Density	Description
City of White Salmon Zoning and Land Use		
Single-family Large Lot Residential District (RL)	20,000 square feet (SF)	One single-family detached dwelling unit per lot, including manufactured homes but not mobile homes.
Single-family Residential District (R1)	5,000 SF	Detached single-family units (SFU) including manufactured homes but not mobile homes.
Two Family Residential District (R2)	5,000 SF - SFU 6,000 SF - Two-family structure 3,000 SF per townhouse	One two-family attached dwelling structure (duplex) per lot. Townhouse buildings not having more than two townhouses.
Multi-Family Residential (R3)	2,500 SF - First two units 2,000 SF - Each additional unit	Designated for uses consistent with R1 and R2 zones as well as multi-unit dwellings such as a triplex, four-plex, multi-family apartments, and up to four townhouses. These dwellings must be rented on a month-to-month basis. Does not include motels.
Mobile/Manufactured Home Residential Park District	Minimum 2.5 acres	Designated for mobile/manufactured home parks intended for single-family residency. Structures in this zone include park office, laundry, toilets, and washroom.
General Commercial District (C)	No minimum	Designated for structures, premises, and facilities that would provide a major shopping and business center able to serve an urban and/or agricultural area of sufficient population to support the facilities. Principal use listed as uses permitted outright in the C District are intended to be retail and service-oriented uses focused on sales of goods and services to end users.
Public Use Overlay (PU)	No minimum	Areas for public and quasi-public uses, publicly owned or controlled parks and recreation facilities, and governmental buildings and facilities.
Riverfrontage District (RD)	Area required to meet provisions of Chapter 17.50 of the municipal code	Planned development for recreational, commercial, light industrial, and limited residential uses, particularly those uses that are water-dependent or where the proximity to the Columbia River is necessary for the development. Limited commercial uses and manufacturing allowed.
Klickitat County Zoning and Land Use within the City's Water Service Area		
Rural Residential (RR)	RR1 - 1 acre RR2 - 2 acres Minimum lot and yard depth provisions	Purpose to maintain openness and rural character of countryside, to protect the County's water and other natural resources, and to provide areas that are appropriate for typical rural development of all kinds. Principal purposes permitted outright include agriculture, SFU including mobile homes, agricultural produce stands, home occupation, and dwellings and other buildings customarily provided in conjunction with agriculture.

Zoning/Land Use	Minimum Size and Density	Description
Suburban Residential (SR)	20,000 SF One dwelling not exceeding 40 feet in height Minimum lot and yard depth provisions	For large lot residential developments at housing densities consistent with the physical characteristics of the areas in which these developments occur. Principal purposes permitted outright include SFU, including mobile homes; agriculture; and home occupation.
Public	Lots exceeding 40,000 SF require submittals for approval of long-range development plans before issuance of building permit	Areas for the creation, protection, and enhancement of public uses on publicly owned lands that serve the community or governmental functions. Principal uses include public schools and parks, public utilities, governmental offices, marinas, museums, and police and fire stations.
Resource Land District (RL)	Dependent on soil suitability and acreage	Land for present and future commercial farm and forest operations. Different permitted uses allowed include home occupations, SFU, mobile homes, and seasonal homes.
Skamania County Zoning and Land Use within the UGA Boundary		
Rural II (R2)	Two acres unless local health authority requires a larger lot size	Land use area intended to provide rural living without significant encroachment on lands used for agriculture and timber.

Service Area Policies

The City's service area policies include service area requirements and conditions of service, duty to serve, and local government consistency.

Service Area Requirements and Conditions of Service

The City's water service areas and conditions of service are summarized on Table 1-5.

TABLE 1-5
SUMMARY OF CITY WATER SERVICE POLICIES AND REQUIREMENTS

Service Policy/Requirement	Reference
Water Use and Metering	
• Potable water may be used for domestic, irrigation, or other purposes (other than domestic use). • The City may install water meters to measure water use by any patron of the water system where meters are not currently installed. • The City may fix the hours during the day and/or night when patrons may use water for irrigation and other purposes other than for domestic use. • Polluting the water supply and interfering with or damaging the water system is prohibited. • The City has the authority to prohibit any use of water by nonresident water system patrons for irrigation, power, or sprinkling. • Use of water from one property by any person for use on other property is prohibited.	Chapter 13.08.010-120, City Code

<table>
<tr><th>Service Policy/Requirement</th><th>Reference</th></tr>
<tr><td>Cost of Water Service</td><td></td></tr>
<tr><td>
Residential, 5/8-inch Service

Base Rate - Inside city limits = $49.13 per month; outside city limits = $72.30 per month
Unit Rate - 1 to 5,000 gallons = $1.31 per 1,000 gallons; 5,001 to 15,000 gallons = $3.31 per 1,000 gallons; 15,001 gallons and over = $8.36 per 1,000 gallons.

Commercial
<table>
<tr><th rowspan="2">Meter Size</th><th colspan="2">Base Rate</th><th rowspan="2">Unit Rate Tiers, gallons (Rate Same as Residential)</th></tr>
<tr><th>Inside</th><th>Outside</th></tr>
<tr><td>1-inch</td><td>$93.16</td><td>$134.43</td><td>10,000/25,000/>25,001</td></tr>
<tr><td>1.5-inch</td><td>$221.28</td><td>$314.00</td><td>12,000/40,000/>40,001</td></tr>
<tr><td>2-inch</td><td>$400.97</td><td>$565.75</td><td>40,000/100,000/>100,001</td></tr>
<tr><td>4-inch</td><td>$1,606.63</td><td>$2,266.96</td><td>85,000/280,000 />280,001</td></tr>
</table>
<p>Multiple Residential Facilities - Basic rate equal to total number of users.</p>
<p>Combination Residential/Commercial - The higher of either the Residential or the Commercial and Irrigation Water Base Rate based on location (inside or outside city limits) plus usage charges.</p>
<p>Rate Break Assistance Program - Provided for low-income senior citizens and disabled persons upon meeting specified criteria.</p>
<p>Water Rights Acquisition Fund (WRAF) Surcharge</p>
<table>
<tr><th>Meter Size</th><th>Monthly WRAF Surcharge</th></tr>
<tr><td>5/8-inch (Residential)</td><td>$6.25</td></tr>
<tr><td>1-inch and 1.5-inch</td><td>$7.50</td></tr>
<tr><td>2-inch</td><td>$8.00</td></tr>
<tr><td>4-inch</td><td>$30.00</td></tr>
</table>
<p>Private Fire Protection, 4-inch Service - Inside city limits = $18.95 per month, outside city limits = $27.90 per month.</p>
</td><td>Chapter 13.16.025, 13.16.095-101 City Code</td></tr>
</table>

<table>
<tr><th>Service Policy/Requirement</th><th>Reference</th></tr>
<tr><td colspan="2">Connection Fees</td></tr>
<tr><td>The charges for connecting to the City’s water system include impact and connection fees and installation costs.

Impact Fees - Based on water meter size.
<table>
<tr><th>Meter Size</th><th>Inside City</th><th>Outside City</th></tr>
<tr><td>3/4-inch</td><td>$5,287</td><td>$7,464</td></tr>
<tr><td>1-inch</td><td>$7,705</td><td>$9,883</td></tr>
<tr><td>1 1/2-inch</td><td>$14,615</td><td>$16,792</td></tr>
<tr><td>2-inch</td><td>$24,489</td><td>$26,466</td></tr>
<tr><td>3-inch</td><td>$51,927</td><td>$54,105</td></tr>
<tr><td>4-inch</td><td>$91,166</td><td>$93,888</td></tr>
<tr><td>6-inch</td><td>$202,265</td><td>$205,531</td></tr>
</table>

Connection Fees - The City will facilitate the water tap, if needed, and supply, install, and connect the water meter, valves, and service piping not to exceed 30 feet from the line connection to the meter. The connection fee for this work is based on actual cost, plus 17 percent.

Installation Costs - The applicant or owner is responsible for all excavation, bedding, backfill, and surface restoration as required to make the connection from the City’s facilities to the service location. Work may be performed by private contract or City staff. Minimum charge for work by City staff is $250 inside city limits and $350 outside city limits.</td><td>Chapter 13.16 through 020, City Code</td></tr>
<tr><td colspan="2">Wholesaling Water</td></tr>
<tr><td>Currently, the City wholesales water to the City of Bingen. Water rates for wholesaling water are established by an interlocal agreement (see Appendix A).</td><td>Chapter 13.16.090, City Code</td></tr>
<tr><td colspan="2">Water Wheeling</td></tr>
<tr><td>Water wheeling is the practice of transferring water between two entities whereby one entity uses its system infrastructure to treat and/or convey water owned by the receiving entity. The City does not currently have a water wheel. In general, water wheeling requests would be considered on their merits on a case-by-case basis.</td><td>–</td></tr>
<tr><td colspan="2">Annexation</td></tr>
<tr><td>One of the requirements for a new water connection outside the City is for the owner to agree, in writing, to the mayor and any future mayor being appointed as the property owner’s attorney-in-fact for purposes of filing a petition to initiate annexation of the owner’s real property to the City.</td><td>Chapter 13.16.015, City Code</td></tr>
<tr><td>Direct Connection, Mandatory Connection, and Satellite/Remote System</td><td></td></tr>
<tr><td>The City requires direct connection to its water system. The party requiring the connection is responsible for connecting to the existing system, installing the system to City standards, and ceding ownership of the constructed facilities to the service meter to the City. If needed, the City will facilitate the water system installation and be properly reimbursed.

Satellite/remote systems are currently part of the system. Requests for satellite/remote systems are considered on their merits on a case-by-case basis.</td><td>Chapter 13.08.110, Chapter 13.16.020, City Code</td></tr>
<tr><td colspan="2">Design and Performance Standards</td></tr>
<tr><td>The City’s adopted design and construction standards are required for water system construction.</td><td>Chapter 7 and Appendix H</td></tr>
</table>

Service Policy/Requirement	Reference
Formation of Local Improvement Districts (LID) Outside Legal Boundaries	
Historically, the City has not encouraged the formation of LIDs outside its legal boundaries. The City has encouraged formal annexation proceedings for development within the potential annexation area. Outside of the potential annexation area, direct connection to the water system along the 14-inch transmission main is allowed.	–
Latecomer Agreements	
The City is authorized to enter into contracts with real property owners for the construction of water system facilities within 10 miles of the city limits and provide for their reimbursement by subsequent real property owners who did not contribute to the original cost of the facilities and who tapped into the system as a "latecomer."	Chapter 13.28, City Code
Oversizing	
All system improvements needed to accommodate new water infrastructure are at the requesting party's cost. The City may choose to share costs with the requesting party if the City desires oversized facilities.	–
Cross-Connection Control (CCC) Program	
The City adopted and implemented a CCC Program and has a CCC specialist on staff. All new services are reviewed for compliance with the program. CCC requirements are set as a condition of service.	Chapter 13.20, City Code
Extensions of the Water System to New Services	
• The City will provide water service at urban standards to areas within the UGA, provided the development conforms to the City's annexation policy. • The new development is expected to pay for the extensions and comply with City design and construction standards. • All extensions to the current water system must be approved by the City Council. • All required easements, permits, and connection fees must be paid in full prior to the system's physical connection. • The developer/owner requesting the extension may elect to install through private contract or by using City staff at a predetermined cost. • The City is authorized to enter into latecomer agreements. • Upon satisfactory completion of the extension, the City is authorized to approve and accept constructed facilities. • The developer/owner will provide verified cost records, as-built construction drawings, and a one-year warranty at the completion of the project and before a latecomer's agreement is executed. • Outside city limits, the real property owner must agree in writing to the appointment of the mayor as the property owner's attorney-in-fact for purposes of filing a petition to initiate annexation of the property to the City.	Chapters 13.16.010-20; 13.28.010 through 090, City Code and Chapter 7
Water Pressure Considerations	
The City's water system has several water pressure zones. Within an existing pressure zone or in the establishment of a new pressure zone, target service pressures at all service meter locations is a minimum static pressure of 55 pounds per square inch (psi) at maximum daily demand flows and a maximum of 80 psi, unless otherwise approved by the City.	–

Currently, the City does not have a mandatory water service connection policy and allows drilling permit-exempt (exempt) potable water wells inside city limits. The City should consider adopting an ordinance requiring mandatory water service connection for all new services within city limits as the City has invested in and operates and maintains a water service that benefits all residents.

Exempt wells are private wells allowed by the State of Washington for specific, restricted uses exempt from the requirement of obtaining a permit for groundwater withdrawal. While exempt wells are an accepted method of ensuring water supplies and serving unique water needs in rural settings, there are concerns with the construction and operation of these wells, which are discussed further in Technical Memorandum No. 4 (see Appendix C). The City should consider pursuing an ordinance prohibiting the drilling of new exempt potable water wells within city limits. The City should also contemplate lobbying Klickitat and Skamania Counties to adopt County ordinances requiring that the water availability verification associated with new building permit applications includes a provision that all properties within the City's water RSA connect to the City's water system, unless an exemption is specifically granted by the City.

Duty to Serve

According to the municipal water law as codified in Revised Code of Washington (RCW) 43.20.260, a municipal supplier has a duty to serve new water services (including individual connections) with the identified RSA if the utility:

- Can provide water service in a timely and reasonable manner.
- Has sufficient water rights or uses water from a source that has a water right.
- Has sufficient capacity to serve the water in a safe and reliable manner as determined by the DOH.
- The service is consistent with the requirements of any comprehensive plans or development regulations adopted under Chapter 36.70A RCW, or any other applicable comprehensive plans, land use plans, or development regulations.

The City is cognizant of its duty to serve within its RSA. The following is a summary of the City's process and procedures utilized in responding to requests for new water services within the City's RSA. The time frames shown on Table 1-6 are general in nature; the City's process and procedures for approving or disapproving a service application can vary depending on the individual circumstances of each request. A copy of the City's applications for water/sewer service and service installation are provided in Appendix A.

TABLE 1-6
SUMMARY OF THE CITY'S PROCESS AND PROCEDURES FOR NEW WATER SERVICE REQUESTS

Request Element	Generalized Time Frame
Process for Service Requests	
1. Applicant submits a completed City water application for water service connection to clerk/treasurer's office along with any calculated fees and/or charges determined to be due at the time the application is submitted. The clerk/treasurer, or qualified designee, determines the magnitude of fees and charges to be paid by the applicant upon approval of the planning director.	Applicant dependent
1a. Applicants for properties outside city limits must also submit and complete the City's Agreement for Annexation and Appointment of Attorney-In-Fact as a condition for an approved water application.	1a. Applicant dependent

Request Element	Generalized Time Frame
2. The planning director, or his/her designee, reviews the submitted application.	
2a. The planning director or his/her designee will review the completed water application to determine if all information is properly submitted, as required, and will schedule a meeting between the applicant and the City's Development Review Team. The Development Review team may include, but is not limited to, the following: planning director (chair), city administrator, public works staff, city engineer, administrative staff, other department heads, and other jurisdictions (e.g., school district, Washington State Department of Transportation, Klickitat County, etc.).	2a. Three to seven days
2b. A meeting is scheduled for the applicant to meet with the Development Review Team to determine the following: a) Size of water service desired b) Location and size of water main line from which service is to be extended, or if a water main line extension is required c) Review of the policies, procedures, construction specifications, any provisions necessary for backflow prevention devices, or the need for installation of PRVs d) Responsibility for construction costs, and the review of the City's fees and charges e) The need for public easements and right-of-way (ROW). If a public easement is needed, the applicant will provide the City the easement/ROW for the new water service connection as required by the Development Review Team and/or City attorney	2b. Development Review Team meeting date dependent on applicant and City staff schedules, three to seven days. Development Review Team meetings are held on Thursdays.
2c. The Development Review Team or their designee, conducts field reconnaissance of the proposed property to be served, researches the water system map archive files to verify the existence of a suitable water main line in the immediate area from which a water service connection is to be tapped and supplied, and field designates the specific location for the new meter setting(s).	2c. Three to ten days
2d. The Development Review Team, or their designee, will review the system water pressure (psi), adequacy of the existing water main line to supply the new property site(s), and determine the adequacy of the City's water source capacity to meet the water demand requirements anticipated by the applicant at the proposed site. 2e. If the Development Review Team determines a water main line extension is required to serve a particular lot, short plat, or subdivision, the applicant will be required to submit six sets of engineered (by a State of Washington professional engineer) preliminary design plans to the City for review and approval. Two sets will be sent to the DOH, two sets will be reviewed by the Development Review Team, and two sets will be retained by the planning director for evaluation and filing. The Development Review Team may elect to have the city engineer or other consulting engineers review the proposed water system improvements. In the case where engineered plans are required; the city administrator withholds formal approval of the water service application and engineered plans until after receiving commentary and notice of approval or denial from the DOH.	2d. Three to 15 days 2e. Applicant is responsible for submittal of engineered plans. The DOH review can take up to 30 days. The City's formal decision after receiving DOH comments, seven to 14 days.

Request Element	Generalized Time Frame
3. With the satisfaction of all City requirements for compliance with water service policy and procedures, determination of adequate water source capacity and distribution system capacity, submittal and approval of engineered plans, DOH concurrence (if applicable), and after confirmation that all fees and charges have been paid by the applicant, the Development Review Team will make an recommendation to the city administrator on approval or disapproval of the water service application. If application is not tentatively approved, the city administrator or his/her designee will notify the applicant in writing of the decision and reasons for the decision.	One to three days for work order
4. After the water service application has been approved, a work order is compiled and forwarded to the public works staff for scheduling the new water service. The construction schedule is a matter of coordination between the applicant's contractor and the public works staff with the intent to meet the applicant's service need when possible.	Seven to 21 days
5. If the City installs new service, all City charges related to the water connection must be paid in full prior to installation of the connection. For all services not installed by the City, the Development Review Team designee must inspect the water service connection and piping prior to the connection being placed into service.	Not Applicable
Determination of Adequate Capacity	
The Development Review Team, in consultation with the city engineer and other consultants, will determine the adequacy of the City's water system to handle the new proposed service by evaluating the service location, type of demand (i.e., residential, commercial, industrial), the proposed demand with the City's current and future water demand capacity, and water right assessment. The City's system will have sufficient capacity and be capable of providing a new water service if the proposed service is not anticipated to exceed the City's water system capacity in areas including non-fire flow (peak day and annual average demand), fire flow (peak and duration), storage capacity, adequate pressure under peak and emergency conditions, treatment, and water rights. The DOH and Ecology regulate the number of approved connections the City may have or issue depending on water source capacity and water system capability. The Development Review Team may consult with the city engineer or other consulting engineers to confirm the City has sufficient water system capacity to handle the proposed new water service.	Three to 15 days
Non-technical Conditions Related to New Service Request	
1. The applicant agrees in writing to conform to, and be governed by, the rules and regulations of the water department and the provisions of Chapters 13.08 and 13.16 of the Municipal Code and to pay the costs of making the connection and of supplying the water meter.	Dependent on applicant
2. With submission of application, the applicant specifically agrees to install and always maintain, their plumbing system in compliance with current International Plumbing Code as it pertains to the prevention of water system contamination, prevention of pressure surges, and thermal expansion in their water piping. For thermal expansions, it shall be assumed that a check valve is installed by and on the applicant/owner's water system pipe. For areas of high water supply pressure (more than 80 psi), it shall be assumed PRVs are installed by and on the applicant/owner's water system pipe.	Dependent on applicant

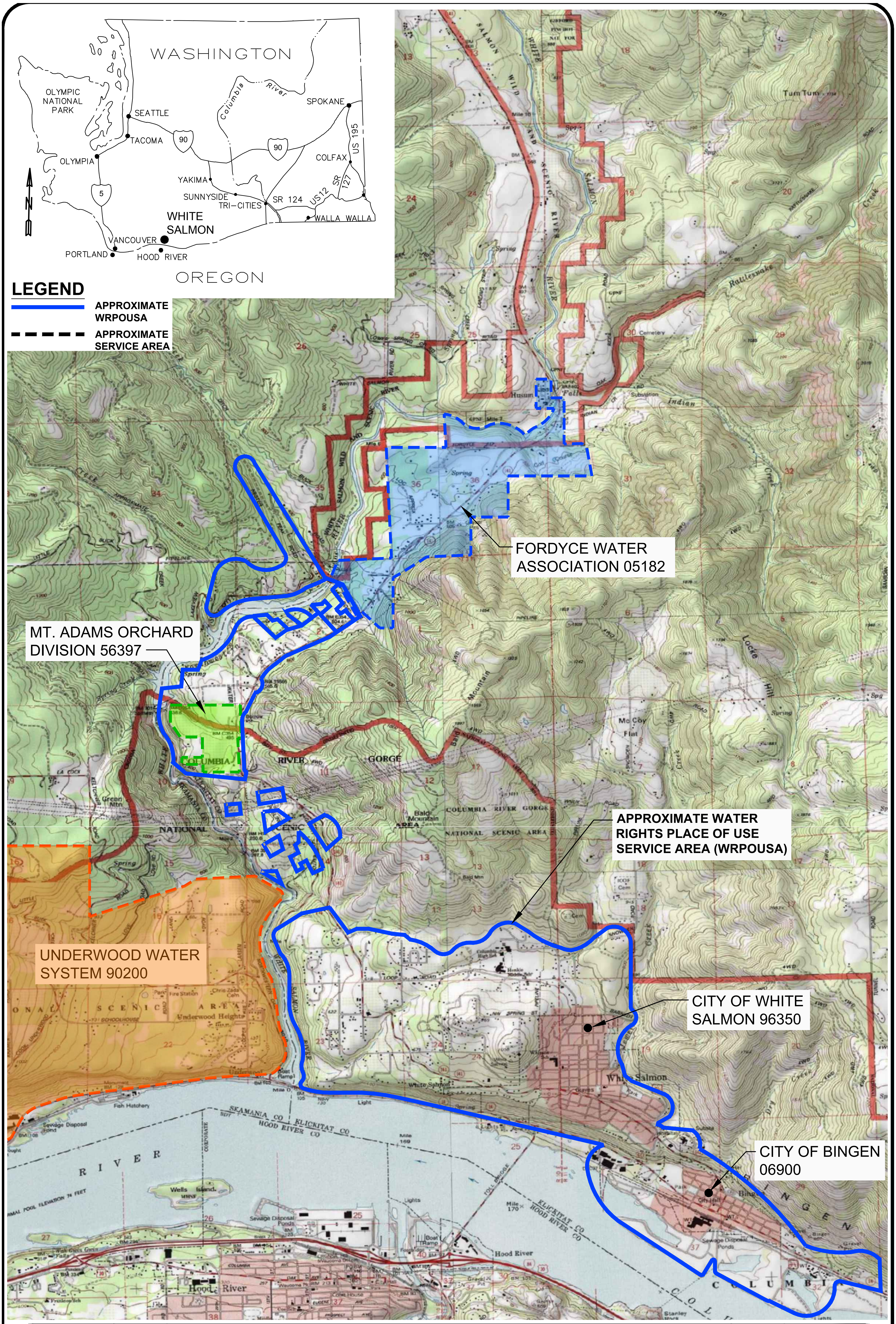
Request Element	Generalized Time Frame
3. The applicant shall secure and provide necessary easements and ROW for new water service as required by the city administrator and/or city attorney.	Dependent on applicant
4. The applicant shall secure a permit from the City for water piping installed between the new water meter and the house connection. A permit for water piping inside the house must be obtained from the Building Code Department (City or Klickitat or Skamania County).	Dependent on applicant
5. With submission of the water service application, the applicant agrees not to make a claim against the City or its agents or employees for damages and/or loss of production, sales, or service, in case of water pressure variations, or disruption of the water supply for water system repair, routine maintenance, power outages, and other conditions expected in the operation of a water system.	Three to ten days
Procedures for Requesting/Granting Time Extensions	
All fees and charges associated with a water application are due and payable within 30 days for the issuance of approval of the application by the city administrator or his/her designee. If a request for physical hookup is not made within six months of the application approval date, the approval is void and the application fee is forfeited to the City. One six-month extension may be granted due to circumstances judged by the city administrator to be beyond the applicant's control. Such extension must be applied for within six months from the date of approval by the applicant and may not continue beyond one year from the application approval date.	Three to ten days
Procedures for Handling Disputes and Appeals of Denied Water Service Request	
Disputes and appeals of denied water service requests by the City administrator, or his/her designee on the fees and charges determined to be due and payable by the City clerk/treasurer shall be submitted in writing for consideration first by the mayor or his/her designee. The mayor shall review the appeal and consult with the city administrator and the Development Review Team or consultants prior to issuing a written finding on the matter.	Up to 60 days of the appeal request
If the applicant disputes the findings of the mayor, the applicant may file with the city clerk/treasurer an appeal of the matter, in writing, to the City Council. The City Council will issue a decision affirming or modifying the decision of the mayor or his/her designee. The decision of the Council shall be final.	Up to 60 days of the appeal request

Local Government Consistency

In addition to the duty to serve requirement, the municipal water law also requires that a Water System Plan be consistent with local adopted plans, regulations, and policies. Local government consistency must be obtained before the plan is submitted to the DOH. For the City of White Salmon's WSP, Klickitat and Skamania Counties were contacted and requested to review the relevant water system planning information prepared and provide a signed consistency statement to the City for submission to the DOH. Signed copies of the consistency statements from the Counties and the City of White Salmon are provided in Appendix B.

Correspondence

A copy of relevant correspondence with the DOH and Ecology is presented in Appendix B.



anderson perry
& associates, inc.

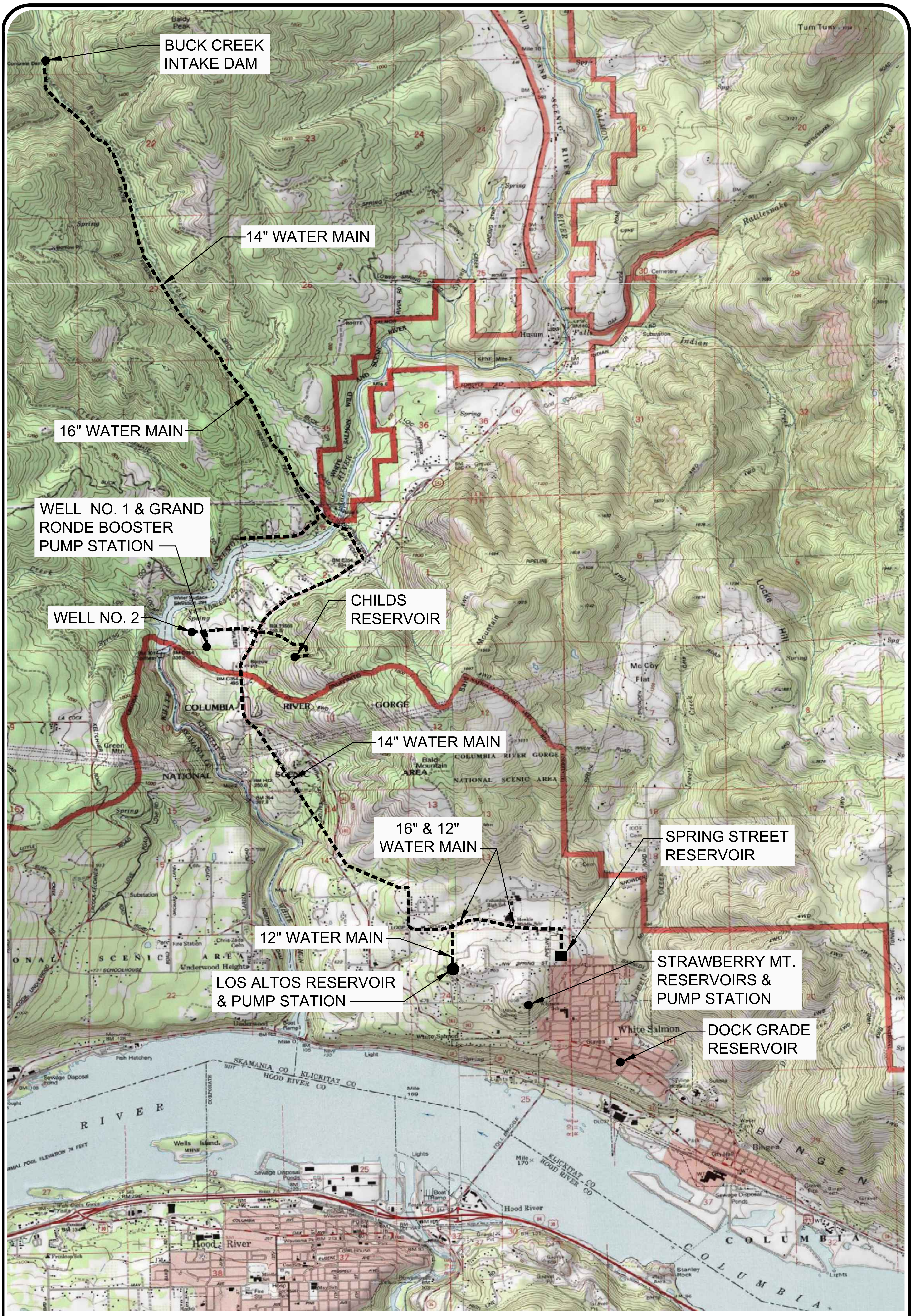
CITY OF WHITE SALMON, WASHINGTON

WATER SYSTEM PLAN

VICINITY MAP

FIGURE

1-1



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CITY OF WHITE SALMON, WASHINGTON

WATER SYSTEM PLAN

OVERALL WATER SYSTEM MAP

FIGURE

1-2

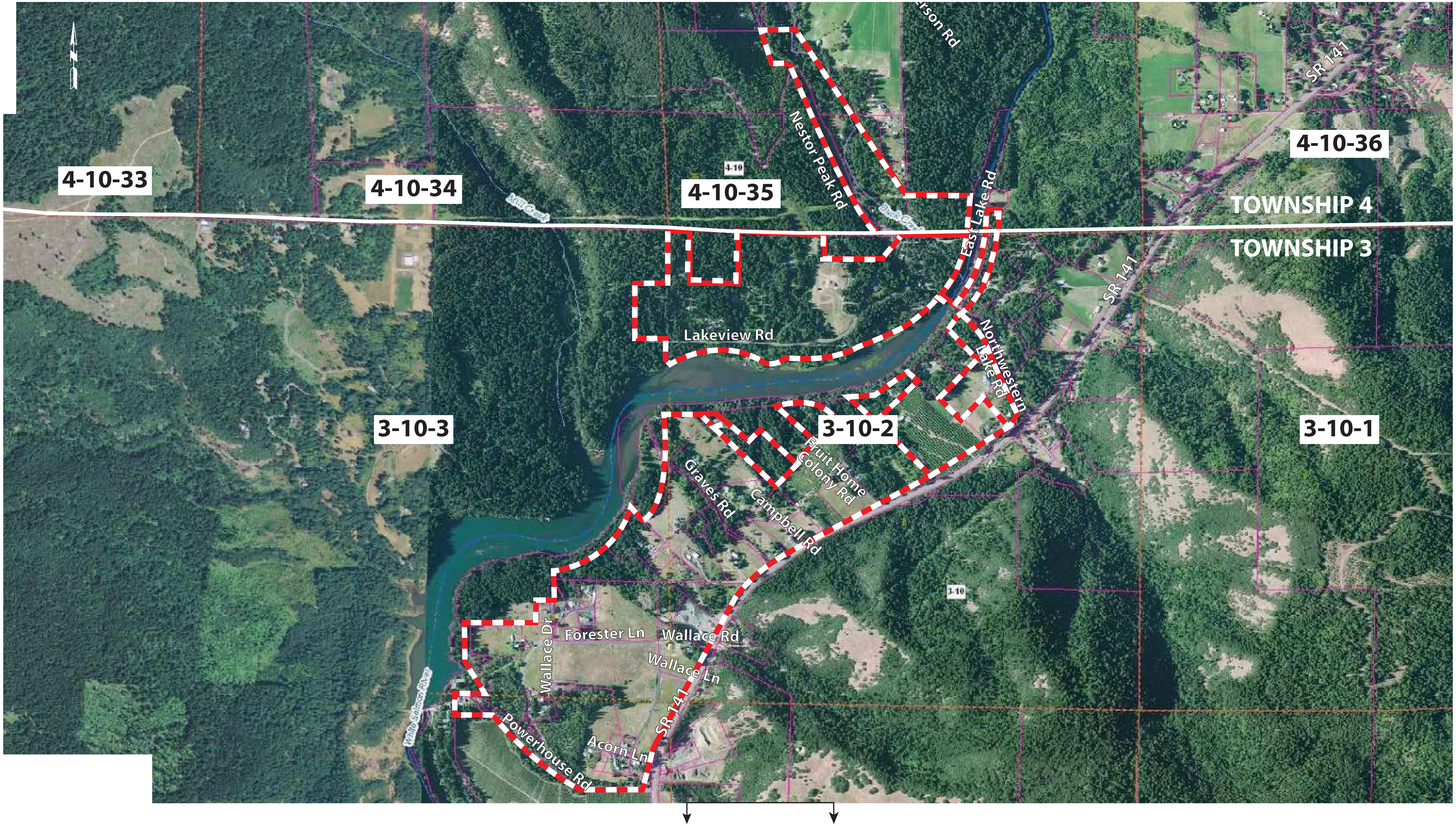

FIGURE 1-4

FIGURE 1-4

LEGEND

🟥 RETAIL SERVICE AREA
▨ EXISTING SERVICE AREA
■ CITY LIMITS
🟧 URBAN EXEMPT BOUNDARY
3-10-3 TOWNSHIP - RANGE - SECTION

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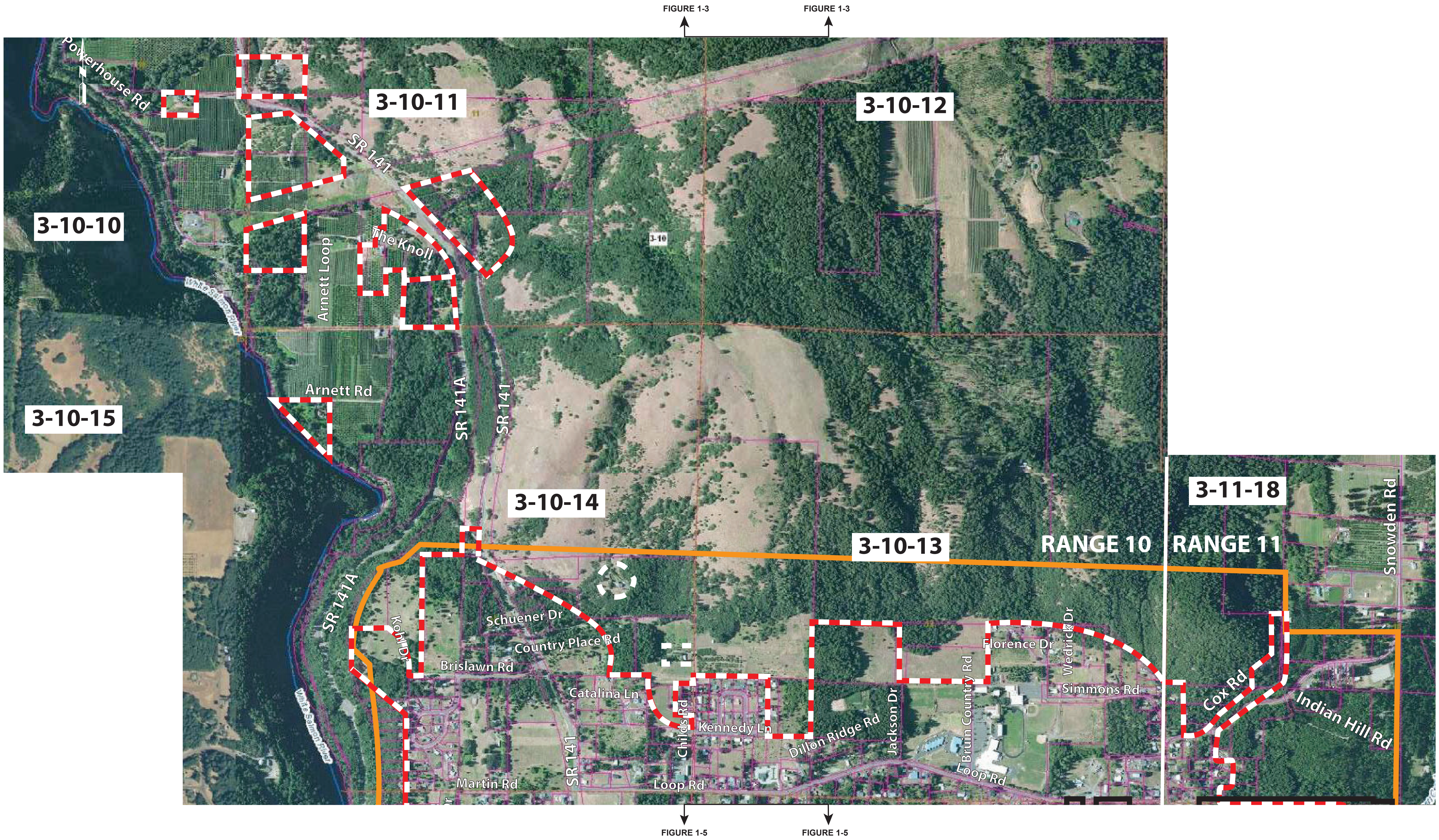
CITY OF WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN

EXISTING AND RETAIL SERVICE AREAS

FIGURE
1-3

S:\Docs\White Salmon\250-12 Water System Plan 2021\Water Service Area Map\Figure 1-3 Existing & Retail Service Areas.ai



LEGEND

▬ RETAIL SERVICE AREA
▬ EXISTING SERVICE AREA
▬ CITY LIMITS
▬ URBAN EXEMPT BOUNDARY
3-10-3 TOWNSHIP - RANGE - SECTION

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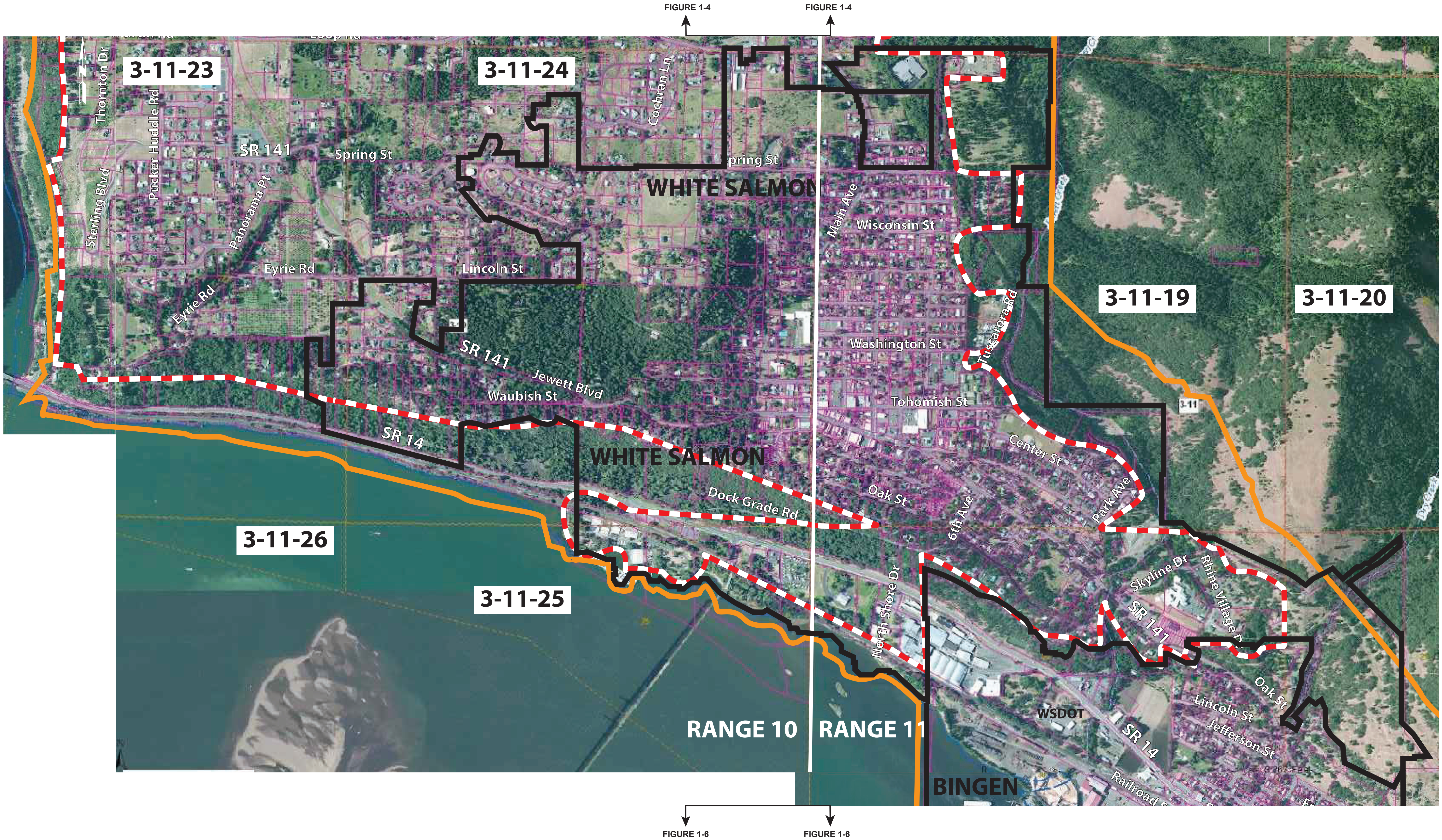
CITY OF WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN

EXISTING AND RETAIL SERVICE AREAS

FIGURE
1-4

S:\Docs\White Salmon\250-12 Water System Plan 2021\Water Service Area Map\Figure 1-4 Existing & Retail Service Areas.ai



LEGEND

🟥 RETAIL SERVICE AREA

▨ EXISTING SERVICE AREA

▬ CITY LIMITS

▬ URBAN EXEMPT BOUNDARY

3-10-3 TOWNSHIP - RANGE - SECTION

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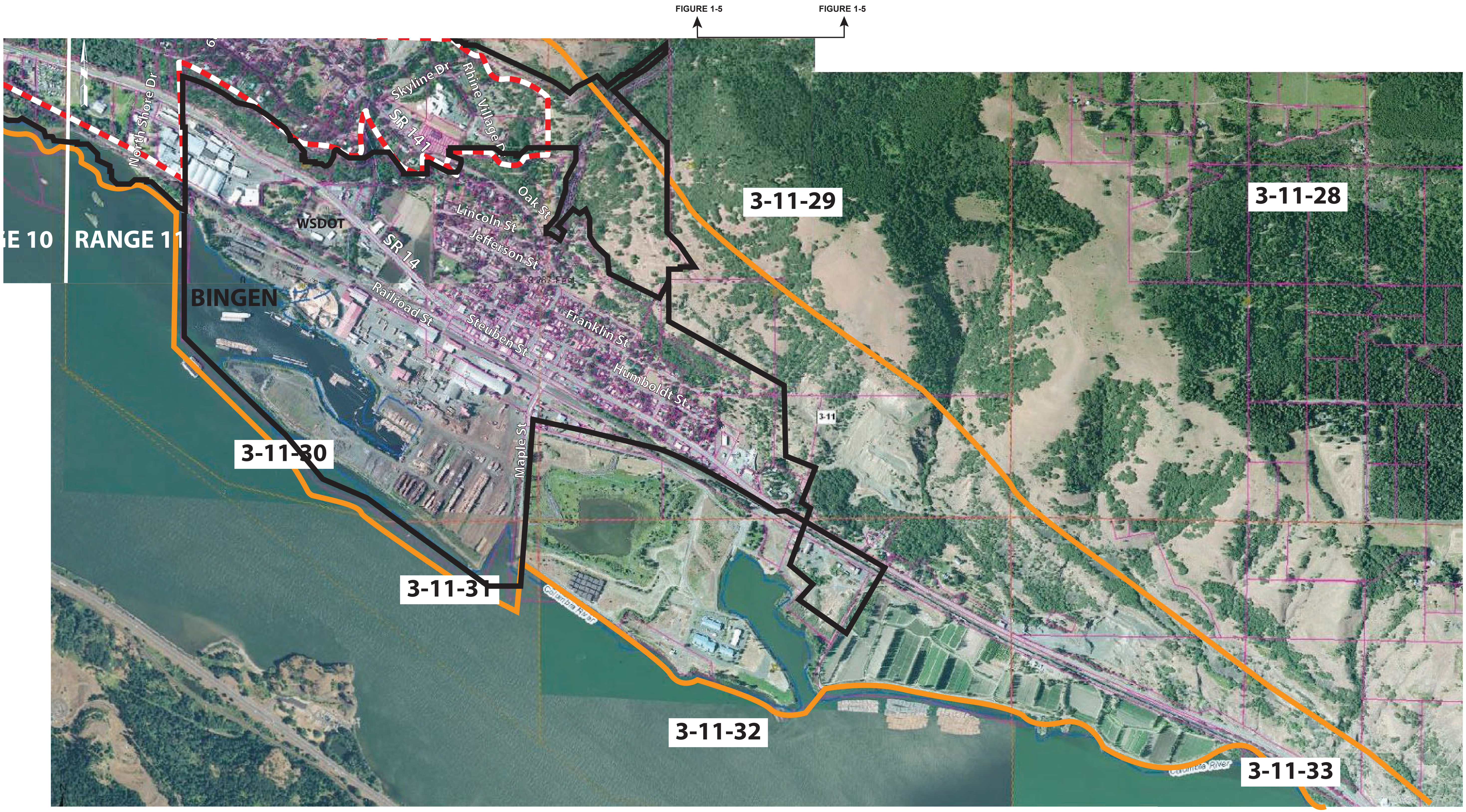
CITY OF WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN

EXISTING AND RETAIL SERVICE AREAS

FIGURE
1-5

S:\Docs\White Salmon\250-12 Water System Plan 2021\Water Service Area Map\Figure 1-5 Existing & Retail Service Areas.ai



LEGEND

🟥 RETAIL SERVICE AREA

▨ EXISTING SERVICE AREA

▬ CITY LIMITS

▬ URBAN EXEMPT BOUNDARY

3-10-3 TOWNSHIP - RANGE - SECTION

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CITY OF WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN

EXISTING AND RETAIL SERVICE AREAS

FIGURE
1-6

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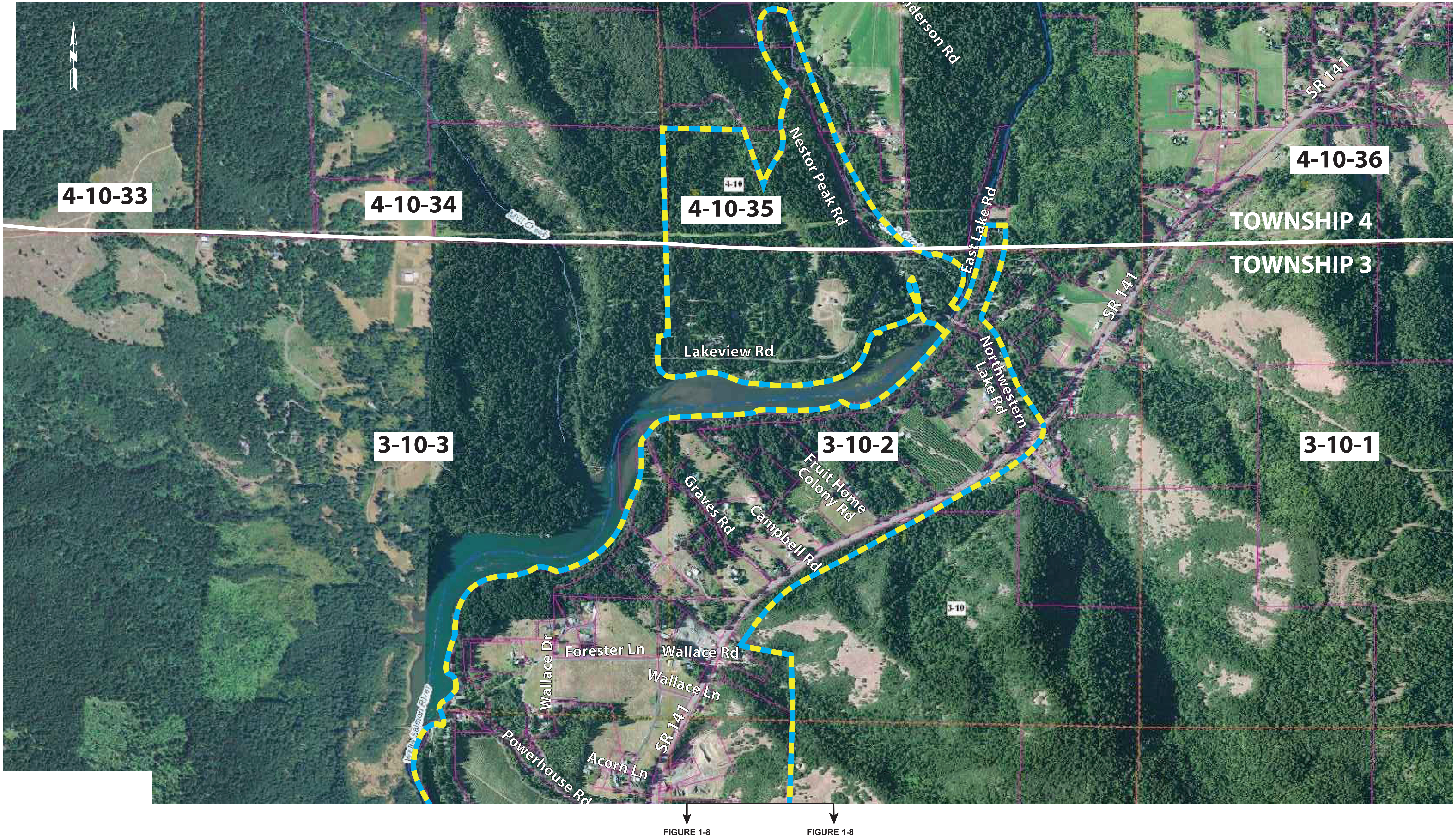

LEGEND

- WATER RIGHTS PLACE OF USE SERVICE AREA (WRPOUSA)
- FUTURE SERVICE AREA
- CITY LIMITS
- URBAN EXEMPT BOUNDARY
- 3-10-3 TOWNSHIP - RANGE - SECTION

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CITY OF WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN

FUTURE AND WRPOUSA

FIGURE
1-7

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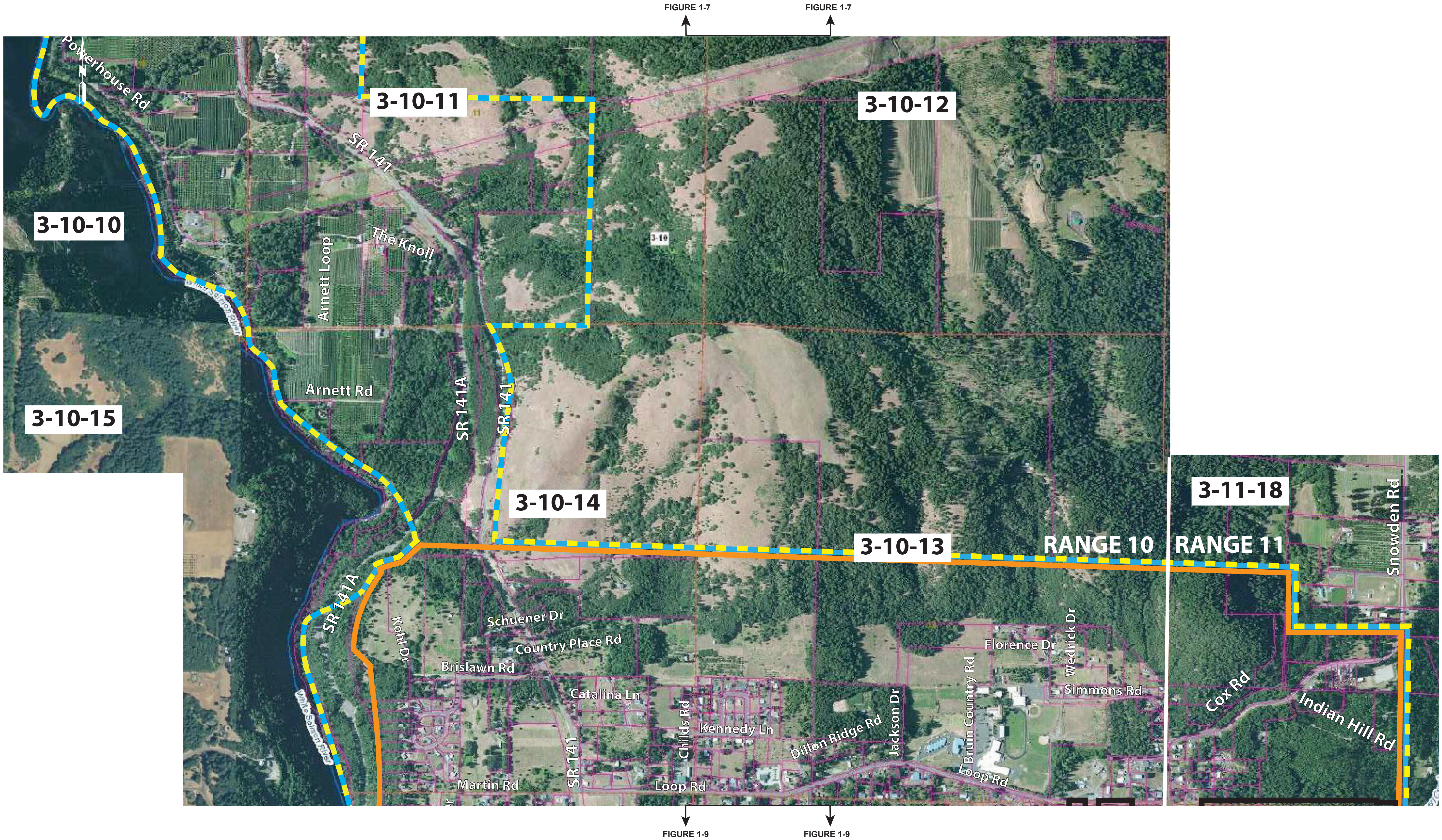

LEGEND

▬	WATER RIGHTS PLACE OF USE SERVICE AREA (WRPOUSA)
┅	FUTURE SERVICE AREA
▬	CITY LIMITS
▬	URBAN EXEMPT BOUNDARY
3-10-3	TOWNSHIP - RANGE - SECTION

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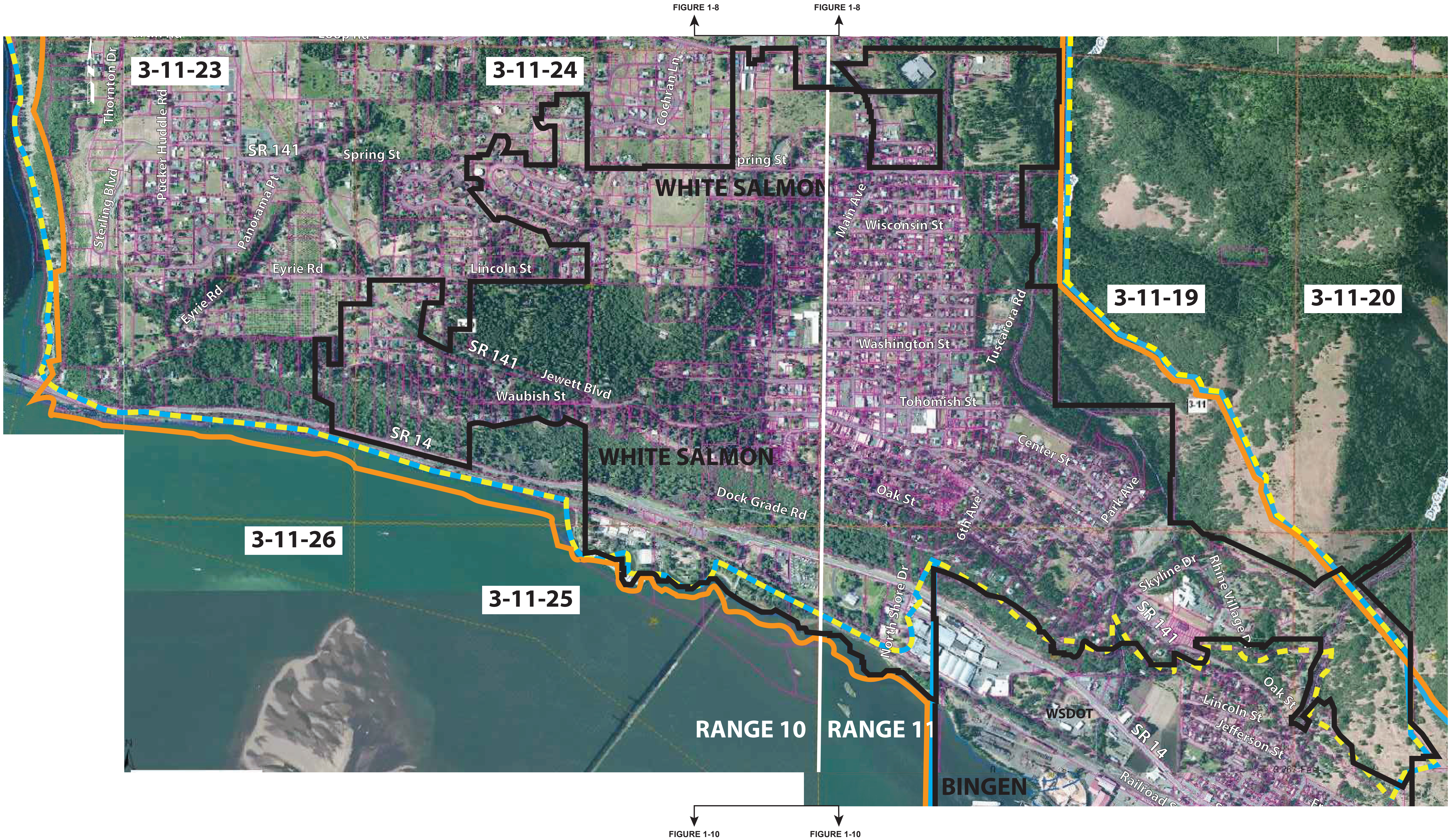
CITY OF WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN

FUTURE AND WRPOUSA

FIGURE

1-8

S:\Docs\White Salmon\250-12 Water System Plan 2021\Water Service Area Map\Figure 1-8 Existing & Retail Service Areas.ai



LEGEND

▬	WATER RIGHTS PLACE OF USE SERVICE AREA (WRPOUSA)
- - -	FUTURE SERVICE AREA
▬	CITY LIMITS
▬	URBAN EXEMPT BOUNDARY
3-10-3	TOWNSHIP - RANGE - SECTION

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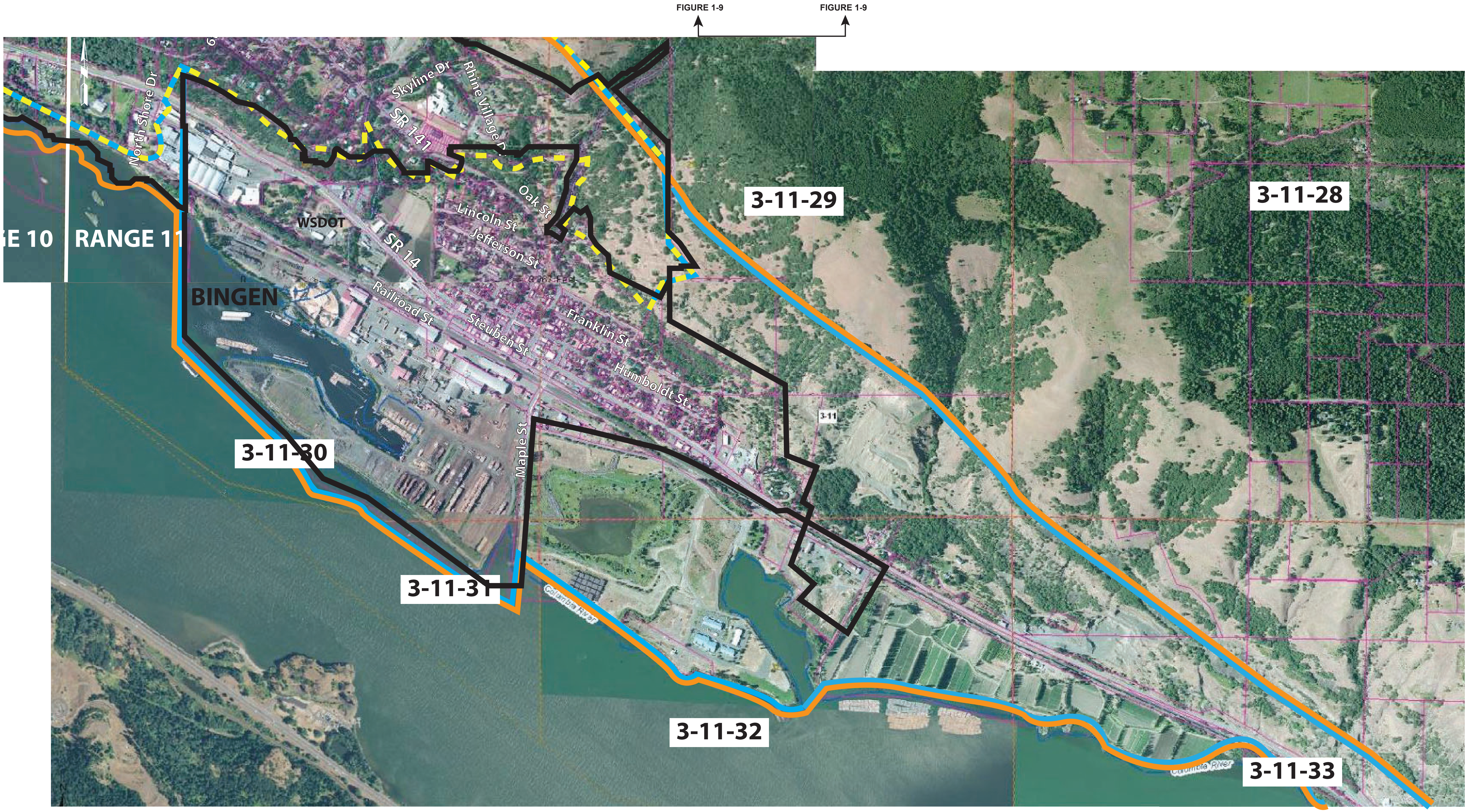
CITY OF WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN

FUTURE AND WRPOUSA

FIGURE
1-9

S:\Docs\White Salmon\250-12 Water System Plan 2021\Water Service Area Map\Figure 1-9 Existing & Retail Service Areas.ai



LEGEND

🟦	WATER RIGHTS PLACE OF USE SERVICE AREA (WRPOUSA)
- - - -	FUTURE SERVICE AREA
▬	CITY LIMITS
🟧	URBAN EXEMPT BOUNDARY
3-10-3	TOWNSHIP - RANGE - SECTION

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CITY OF WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN

FUTURE AND WRPOUSA

FIGURE

1-10

S:\Docs\White Salmon\250-12 Water System Plan 2021\Water Service Area Map\Figure 1-10 Existing & Retail Service Areas.ai

Chapter 2 - Basic Planning Data

This chapter presents basic planning data essential for assessing the City of White Salmon's water demands. This planning information is used to evaluate the existing system and determine future needs based on projected demographic trends for the next ten and 20 years. Information used in the water system analysis for the City of White Salmon includes historical water system demands and population projections. The historical water system demands were used with the population projections for the City to project its future water demand.

Current water system data are described in this section. These data include current population and service connections, supply water production, current service water use, equivalent residential units (ERU), and current water rates. Source water production and water use data were collected and compiled in accordance with Washington State Department of Health's (DOH) water system planning requirements (DOH 2020). Water data in this Water System Plan (WSP) are reported in gallons to be consistent with the City's current measurement devices.

The following water terms are referred to and used in this WSP:

- **Average Annual Demand (AAD)** - The total volume of water delivered to the system in a full year expressed in gallons.
- **Average Daily Demand (ADD)** - The total volume of water delivered to the system over a year divided by 365 days. The average use in a single day is expressed in gallons per day (gpd).
- **Distribution System Leakage (DSL)** - Water lost from the distribution system, including both apparent and real losses. Apparent losses include theft, meter inaccuracies, and data collection errors. Real losses are physical losses from the distribution system, including reservoir overflows, leaking valves and fittings, and water main breaks.
- **ERUs** - A system-specific unit of measure used to express the amount of water consumed by a typical full-time single-family residence for a water system.
- **Maximum Monthly Demand (MMD)** - The peak usage in gpd averaged over one month. The peak usage typically occurs during the summer.
- **Maximum Daily Demand (MDD)** - The largest volume of water delivered to the system in a single day expressed in gpd. The MDD is used to size facilities to provide capacity for periods of high demand. MDD usually occurs during the warmest part of the year when agriculture, irrigation, and recreational uses of potable water are at their greatest. MDD typically occurs during a holiday, such as the Fourth of July, a fire flow event, or during an event, such as a county fair.
- **Peak Hourly Demand (PHD)** - The maximum volume of water delivered to the system in a single hour expressed in gallons per minute (gpm). Distribution systems should be designed to adequately handle the PHD. During this peak usage, storage reservoirs supply the demand in excess of the peak demand. PHD is commonly experienced during early morning hours when many water users are bathing, cooking, and engaging in other activities that require widespread water use.

The demands described above, expressed in gpd, can be divided by the population served to determine a demand per person, or a per capita demand, which is expressed in gallons per capita day (gpcd). Per capita demands can be multiplied by future population projections to determine future water demands.

Current and Historical Population and Service Connections

The City of White Salmon provides potable water to customers inside and outside city limits and sells excess water to the City of Bingen. Population trends for the City's water system were evaluated in terms of the City of White Salmon's population, City of Bingen's population, and the number of water service connections outside the City, which will be used to estimate the number of people being served outside the City. Population data for the cities were based on two sources: the American Community Survey five-year estimate for 2019, and the April 1, 2020, 2021, 2022, and 2023 Population of Cities, Towns, and Counties Used for Allocation of Selected State Revenues, State of Washington (Washington State Office of Financial Management).

City of White Salmon

The City's historical population from 1920 to 2020 is summarized on Table 2-1. The population of the City of White Salmon in 2020 was 2,485.

TABLE 2-1
HISTORICAL POPULATION OF WHITE SALMON

Year	Population
1920	619
1930	798
1940	985
1950	1,353
1960	1,590
1970	1,585
1980	1,853
1990	1,861
2000	2,193
2010	2,224
2020	2,485

Over the last 100 years, the City's population increased from 619 to 2,485, which represents an annual growth of 1.4 percent. Over the past 20 years, the City grew from 2,193 (2000) to 2,485 (2020), for a total of 0.63 percent annual growth. A portion of the growth occurred due to a new development, while some is from annexation. The City's population for 2021 and 2022 is estimated to be 2,490. The estimated population for the City of White Salmon in 2023 is 2,500.

The population within Klickitat County experienced slower growth than the City's population growth, with 0.86 percent between 2010 (19,161 at the 2010 Census) and 2020 (22,735 at the 2020 Census).

In addition to serving the City's residents, the City of White Salmon provides water to the City of Bingen and other users outside city limits. For these reasons, the historic and current populations for the City of Bingen and the unincorporated area adjacent to the City were reviewed.

City of Bingen

The historical population of the City of Bingen is summarized on Table 2-2.

TABLE 2-2
HISTORICAL POPULATION OF BINGEN

Year	Population
1930	365
1940	600
1950	736
1960	636
1970	671
1980	679
1990	645
2000	672
2010	712
2020	778

In 2020, the population of Bingen was 778. The population for 2021, 2022, and 2023, is estimated to be 780.

Overall, the population in the City of Bingen increased from 365 to 778 during the last 90 years, which represents an annual growth of 0.84 percent. Over the last ten years, the City of Bingen's population grew from 712 to 778 (0.89 percent annual growth). This population growth is slightly less than the 1 percent annual growth assumed in the City of White Salmon's 2014 WSP.

While the City of White Salmon provides a significant amount of water to the City of Bingen, these water sales only occur if White Salmon has excess water. In 2021, water sales to Bingen represented approximately 18.1 percent of the City's total water sales.

Unincorporated Area Served by the City of White Salmon's Water System

The population of water service users in the unincorporated area around White Salmon is not specifically enumerated as part of the Census data. Consequently, the number of unincorporated water service users must be estimated.

The unincorporated population within the water service area was calculated from the product of the number of residential water services in the area and the estimated population per housing unit. An average population per housing unit of 2.5 persons was used for the unincorporated water service area. For estimating the population outside of the City, the average population per residential water service account will be considered the same as the average population per housing unit.

In 2023, the total number of full-time residential connections outside the City (excluding vacant and seasonal accounts) was 634. Assuming an average population of 2.5 persons per residential account, the total estimated population on the City's potable water system is approximately 1,585.

Total Population in White Salmon Service Area

Total population in the White Salmon water service area (not including Bingen) is calculated to be 4,085 based on the sum of the City's estimated population in 2023 (2,500) and the calculated population outside the city limits that are on the water system (1,585). In the 2014 WSP, a 1.5 percent annual growth rate was used for projecting growth in the City and the unincorporated service area. Based on the calculated 2012 water service population of 3,761 and current service population of 4,085, the actual annual growth rate was 0.86 percent for the 2012 through 2023 time period.

Water Supply Characteristics

The City relies on a combination of surface water from Buck Creek and groundwater from Wells No. 1 and 2 to supply its potable water. In addition, Jewett Springs could be used as an emergency or backup source if water treatment were provided. The infrastructure at Jewett Creek would need to be updated and/or replaced to remove, convey, or treat water from Jewett Springs.

Historically, the City relied on Buck Creek as its primary water source. Due to water quality issues associated with *cryptosporidium* oocysts, *giardia lamblia* cysts, fecal coliform, and fecal *streptococcus*, as well as limited surface water treatment capabilities, the City drilled and developed two groundwater sources in 1999: Wells No. 1 and 2. The new wells became the City's primary water sources, with Buck Creek serving as an untreated emergency source. However, the water levels and production capacity of the wells, especially Well No. 2, have exhibited a continuing decreasing trend since coming online. In response to the declining production, the City redeveloped the Buck Creek diversion by installing a slow sand filter plant to allow it to be a continuously treated water supply source.

The City is also implementing aquifer storage and recovery by diverting excess treated water from Buck Creek to Well No. 2 from November through March, then withdrawing it to satisfy higher demands during the remainder of the year.

Water quality from all of the City's sources is acceptable and within the State of Washington's drinking water standards.

Refer to Chapter 3, System Analysis, for additional and more detailed information on the City's water supply characteristics and reliability evaluation.

Water Rights Changes

To protect the City of Bingen's ability to continue using the City of White Salmon as a water supply source, Bingen submitted a water rights change application and obtained a permit (G4-33106) for a non-additive water right related to White Salmon's Wells No. 1 and 2. The City of Bingen and the Port of Klickitat contributed to and own a portion of these well facilities. Prior to this permit, all water withdrawals from these well facilities were attributed to White Salmon's water rights and consumptive use.

Interties

The City of White Salmon has three metered interties with the City of Bingen: SR 14, Jewett Boulevard/SR 141, and the Hospital intertie. These interties are strictly for the purchase of wholesale water by the City of Bingen from the City of White Salmon. Due to the topographic elevation difference between the two Cities, the transfer of water from Bingen to White Salmon is not currently possible. A more detailed description of the Bingen interties is provided in Chapter 3.

Use of Reclaimed Water, Reuse, and Other Non-Potable Sources

Currently, the City does not use reclaimed water, reuse, and other non-potable sources for domestic or non-domestic uses.

Water supply reliability evaluation is described in Chapter 3, System Analysis.

Water Production and Distribution

In this section, the amount of water diverted or produced from the City of White Salmon's water sources and then distributed to the distribution system is examined.

Water Production

As previously mentioned, the City relies on a combination of surface water from Buck Creek and groundwater from Wells No. 1 and 2 to supply its potable water needs. Total water production from the City's water sources for the 2014 through 2021 is summarized on Table 2-3.

TABLE 2-3
SOURCE WATER PRODUCTION (2014 THROUGH 2021)

	Buck Creek			Well No. 1			Well No. 2		
Year	Gallons per Year	Ac-ft/ yr	Percent	Gallons per Year	Ac-ft/ yr	Percent	Gallons per Year	Ac-ft/ yr	Percent
2014	166,710,815	511.7	52.9	137,336,200	421.5	43.5	11,364,000	34.9	3.6
2015	256,239,452	786.4	71.3	79,209,360	243.1	22.1	23,741,600	72.9	6.6
2016	212,835,696	653.2	63.7	93,429,539	286.7	28.0	27,709,134	85.0	8.3
2017	204,948,802	629.0	60.1	103,145,487	316.6	30.2	33,073,666	101.5	9.7
2018	189,732,412	582.3	57.8	104,861,525	321.8	31.9	33,663,000	103.3	10.3
2019	188,267,355	577.8	57.1	114,747,578	352.2	34.8	26,763,000	82.1	8.5
2020	200,758,493	616.1	56.3	125,644,969	385.6	35.2	30,208,100	92.7	8.5
2021	165,353,404	507.5	48.3	132,720,701	407.3	38.8	44,179,114	135.6	12.9

Ac-ft/yr = acre-feet per year

Buck Creek is the City's primary water source, providing approximately 48 to 71 percent of the City's potable water needs. The remaining water production originates from Wells No. 1 and 2, with the primary well source being Well No. 1. Since 2015, Buck Creek has experienced a downward trend in production (71.3 percent to 48.3 percent); however, Wells No. 1 and 2 have experienced an increase in production (28.7 percent to 51.7 percent).

Water Loss from Buck Creek Transmission Main

The City diverts water from Buck Creek and treats it at the Buck Creek WTP. After treatment, the treated water flows into a concrete reservoir that serves as a surge tank. The flow from the reservoir surge tank is measured before being conveyed by a 14-inch diameter steel transmission main to the City's distribution system.

The City collects water meter readings of the water treated at the WTP and from the Buck Creek Monitoring Station, which is located on the transmission main approximately 14,000 linear feet (2.66 miles) downstream of the WTP. Based on the difference in meter readings collected from these two flowmeters, the transmission main is believed to have substantial leaks. In 2020, the water loss through this section of the water system was estimated to be approximately 36,400 gpd (24 gpm), which represents approximately 4 percent of the WTP water production. For this reason, the City utilizes the flow readings from the Buck Creek Monitoring Station as the basis for the amount of water entering the distribution system and the DSL calculations. For the purposes of this WSP, the term "water distributed" refers to water from Buck Creek (as measured at the Buck Creek Monitoring Station) and from Wells No. 1 and 2.

While the water loss from the transmission main is significant, the City has not been able to observe any visible areas of water leakage along the transmission main alignment. Currently, the City is working on a design to replace this portion of the existing 14-inch steel transmission main.

Water Distributed

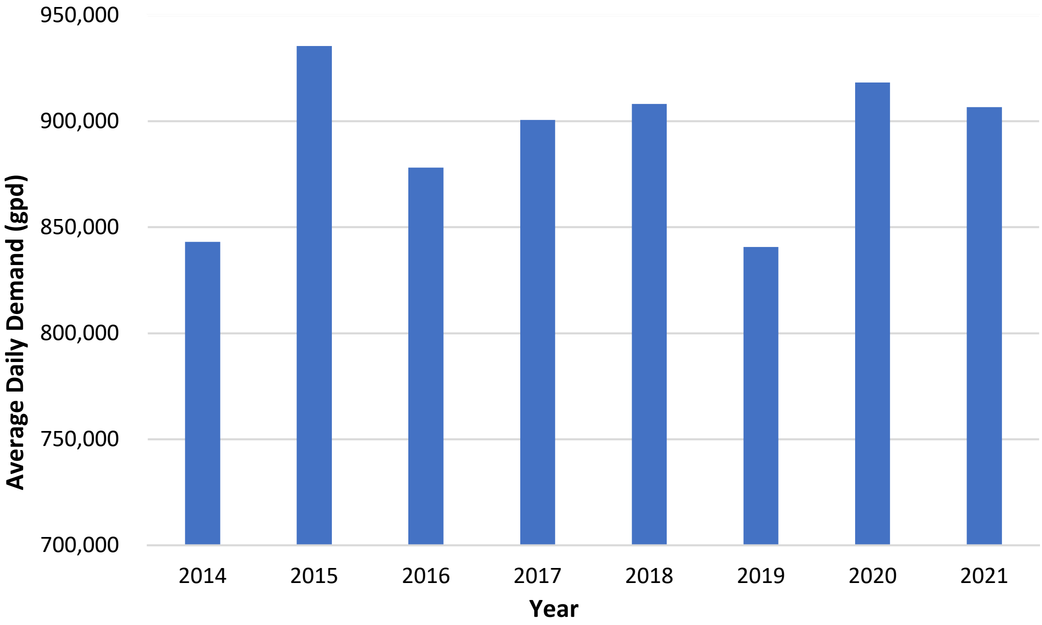
A summary of source water distributed data from 2014 through 2021 is presented on Table 2-4. A more detailed summary of the 2014 to 2021 data is provided in Appendix D.

TABLE 2-4
SUMMARY OF SOURCE WATER DISTRIBUTED (2014 THROUGH 2021)

Year	AAD (gallons per year)	AAD (ac-ft/yr)	ADD (gpd)	MMD (gpd)	MDD (gpd)
2014	307,712,900	944.4	843,050	1,324,850	1,983,200
2015	341,426,680	1,047.9	935,420	1,428,240	1,528,500
2016	320,478,460	983.6	878,020	1,338,545	1,473,500
2017	328,714,382	1,008.9	900,590	1,367,930	1,530,330
2018	331,461,275	1,017.3	908,110	1,441,870	1,590,700
2019	306,861,342	941.8	840,720	1,294,155	2,329,000
2020	335,130,331	1,028.5	918,165	1,452,310	2,225,270
2021	330,887,655	1,015.8	905,590	1,403,810	1,699,850
2014 through 2021 Average	324,540,767	996.0	889,153	1,378,270	1,808,643

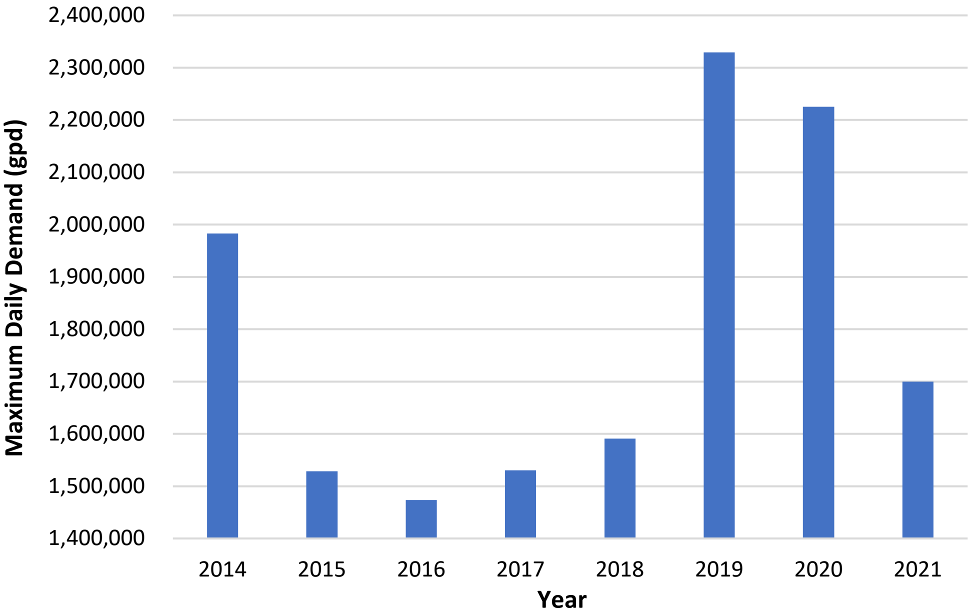
In general, the amount of water distributed from the 2014 through 2021 period varied with the year but, in general, was greater in terms of annual and average daily amounts. The ADD distributed from 2014 through 2021 is shown on Chart 2-1.

CHART 2-1
AVERAGE DAILY DEMAND (2014 THROUGH 2021)



The MMD and MDD production from 2014 through 2021 also fluctuated with the year. In particular, the MDD in 2019 and 2020 are significantly higher, ranging from approximately 2.22 to 2.33 million gallons per day. The MDD from 2014 through 2021 is shown on Chart 2-2.

CHART 2-2
MAXIMUM DAILY DEMAND (2014 THROUGH 2021)



Peaking factors are commonly used to develop relationships between the ADD and the other planning criteria. These factors are used primarily for calculating future water demand. A summary of the calculated flow peaking factors is presented on Table 2-5.

TABLE 2-5
SUMMARY OF PEAKING FACTORS FOR SOURCE WATER PRODUCTION

Year	MDD/ADD	MDD/MMD
2014	2.35	1.50
2015	1.63	1.07
2016	1.68	1.10
2017	1.70	1.12
2018	1.75	1.10
2019	2.77	1.80
2020	2.42	1.53
2021	1.88	1.21
Average 2014 through 2021	**2.06**	**1.31**

For the 2014 through the 2021 period, the MDD/ADD peaking factors varied significantly, ranging from 1.63 to 2.77. The MDD/MMD peaking factors ranged from 1.07 to 1.80, with an average of 1.31.

One other water distribution parameter, PHD, is typically calculated and used in water system analysis. For this calculation, the number of ERUs within a water system is calculated and used in an equation developed by the DOH in its Water System Design Manual (June 2020) to estimate the PHD. The calculation of the number of ERUs and system PHD is discussed later in this chapter.

Water Distribution Summary

The current estimated total source water distributed and total water distributed minus Bingen water sales is summarized on Table 2-6. Two water distribution values were computed as future water distribution will be based on separate evaluations of future water demand within the City of White Salmon and unincorporated areas served by the City.

TABLE 2-6
SUMMARY OF CURRENT WATER DISTRIBUTION

Demand Parameters	Total (gpd)	Peaking Factor	Per Capita Demand[1] (gpcd)
Total Production			
ADD	918,165	1.00	-
MMD	1,452,300	1.58	-
MDD	2,329,000	2.53	-
Total Production Minus Bingen Water Sales			
ADD	814,269	1.00	192
MMD	1,270,117	1.56	299
MDD	2,066,140	2.53	486

[1] *Based on a water service population of 4,247.*

The current total water distributed was primarily based on the 2020 water production data, with the MDD based on the 2019 data, as these data represent the high water demand for the time period reviewed. The estimated total water distributed minus the Bingen water sales was computed to determine the water production per capita for the City of White Salmon and the unincorporated areas served by the City. The amount of water sold to Bingen was based on annual water sales for 2020, including an annual demand of 37,922,000 gallons or an ADD of 103,896 gpd, maximum month sales of 182,183 gpd (average over two months), and using the above MDD/ADD peaking factor. These water demand criteria will serve as the basis for the future projected water demand discussed later in this chapter.

Water Usage

Four years of annual service water use data (2017 through 2021) were compiled, analyzed, and compared with data from 2002 and the average for 2009 to 2011. The service water use data are summarized on Table 2-7.

TABLE 2-7
SUMMARY OF EXISTING ANNUAL SERVICE WATER USE

	Water Use (gallons)			
Year	**Inside City**	**Outside City[1]**	**Bingen**	**Total**
2002	124,303,000	91,826,000	15,543,000	231,672,000
2009 through 2011 Average	83,382,330	57,640,000	41,167,670	182,190,000
2017	107,106,000	66,037,000	29,625,000	203,269,000
2018	112,499,000	67,358,000	25,329,000	205,186,000
2019	100,301,000	64,561,000	23,899,000	188,761,000
2020	104,030,000	67,871,000	37,922,000	209,823,000
2021	112,212,000	74,155,000	43,599,000	229,966,000
2017 through 2021 Average	107,229,600	67,996,400	32,074,800	207,401,000

[1]*Outside City water use does not include Bingen.*

Annual water use (without Bingen) has varied approximately 10 percent inside and outside the City. Comparing water use in 2002 and 2021, water use inside and outside the City has been reduced by approximately 10 percent and 19 percent, respectively. The annual water use from 2017 through 2021 is approximately 35 percent higher inside the City and 29 percent higher outside the City than the 2009 through 2011 water usage. The increase in water usage from 2009 through 2011 to 2017 through 2021 is attributed to growth in water service connections and users, and to the years of water conservation by the City users that was needed until the Buck Creek WTP was put into service in 2010. The largest amount of water consumed in the City was in 2021, with an approximately 9.6 percent increase over 2020 annual water use.

The water sold to Bingen ranged from approximately 12 to 19 percent of the total water used. In the last two years (2020 and 2021), the amount of water sold to Bingen has increased by approximately 55 percent over the amount sold in 2017 through 2019.

Seasonal Water Use

Due to the City reading water meters every other month, seasonal water use in the City was based on water production instead of water usage or sales. A spreadsheet summarizing historical monthly water production is included in Appendix D. The following conclusions were made based on the water production data.

- Peak water production usually occurs in either the month of July or August each year.
- The lowest water demand typically occurs in the months of February through April.

The largest water use in the White Salmon water service area appears to typically coincide with the driest and warmest months of the year (July through September). Depending on the year, significant water demand can also occur in the months of June and October. The lowest water demand is generally in early spring or winter months.

Distribution System Leakage

All unauthorized water consumption is considered DSL. Authorized consumption is defined as the volume of water authorized for use by the water system. All unauthorized uses and any water, whether authorized or unauthorized, that cannot be tracked is considered DSL. Therefore, it is important to document all authorized water use. Some examples of water use that can be considered authorized use, if they are tracked and metered or estimated, include the following:

- Maintenance flushing of the water system
- Firefighting (flow from hydrants)
- Water used for hydrant flow testing
- Cleaning of water tanks or reservoirs
- Water sold or given to contractors or government agencies

DSL should be calculated in terms of both percentage and total volume. At a minimum, calculation of the DSL requires collection of the amount of water purchased, diverted, or pumped from the source; the amount of water purchased from another supplier; and the amount of consumed authorized water. Water systems excluding transmission lines use the production meter located prior to the distribution system. Unless an alternative methodology is submitted and approved by the DOH, the DSL will be calculated as follows:

$$\text{Percent DSL} = [(TP - AC) / TP] \times 100$$
$$\text{Volume DSL} = TP - AC$$

Where:
DSL = Percent of distribution system leakage
TP = Total water produced and purchased
AC = Authorized consumption

As part of the water use efficiency (WUE) rules, a DSL standard was enacted. WUE requirements establish a 10 percent or less DSL standard based on a three-year rolling average. A water system meeting this requirement is considered in compliance. If a water system is not meeting this standard, a Water Loss Control Action Plan (WLCAP) must be developed and implemented. Refer to Chapter 4 for additional details and discussion, as well as WUE rules.

The calculated percent DSL value for the City of White Salmon for 2021 based on the annual production and consumption values shown above is 30.0 percent. The calculated rolling DSL average for the past three years is approximately 30 percent, excluding the Buck Creek water main DSL. Since the DSL is more than the State of Washington's standard, the City will need to prepare and implement a WLCAP (see Chapter 4).

Equivalent Residential Units

An ERU is used to equate non-residential use to a specific number of family residences. The number of ERUs in a water system is also used to project future water demand and calculate the average cost for water services to a typical residence. The average cost per residential connection is not only used to inform the users but is also used by regulatory and funding agencies for comparing costs with other communities. Since a water system typically consists of multi-family, commercial, governmental, industrial, and agricultural users, the most common method of calculating the average residential user cost is to evaluate each non-residential source based on water consumption relative to the typical residential account or ERU.

Residential usage is determined by subtracting commercial, irrigation, industrial, and other non-residential contributions from the total water usage. The water usage per ERU is calculated by dividing the single-family residential water usage by the total number of single-family dwelling units within the City. The total number of ERUs is determined by dividing the total water usage by the average water usage per ERU.

For the City's ERU calculation, the different sources or sectors within the City were compiled and tracked using the City's current user classes, then summarized into categories (residential, commercial/ irrigation, new construction, seasonal, vacant and empty lots, miscellaneous, and Bingen sales.) The categories were also further divided into inside and outside the City.

Year 2021 was observed to have the highest annual water use and was selected as the base year for ERU calculations. For 2021, the estimated average annual residential water consumption was calculated to be 78,660 gallons per ERU per year or 215.5 gpd per ERU. The average annual water consumption per ERU was lower in the City (70,725 gallons per ERU) than outside the City (93,675 gallons).

The estimated number of ERUs for the different user categories served by the City in 2021 is summarized on Table 2-8 (based on 78,664 gallons per ERU per year or 215.5 gpd per ERU).

TABLE 2-8
ESTIMATED NUMBER OF EQUIVALENT RESIDENTIAL UNITS BASED ON AVERAGE DEMAND (YEAR 2021)

Source	No. of Units[1]	Water Usage (gallons per year)	ERUs	Percent of Usage
Residential				
Inside City	1,192	84,304,000	1,192	25.5
Outside City	630	59,015,000	630	17.8
Subtotal	**1,822**	**143,319,000**	**1,822**	**43.3**
Commercial/Irrigation				
Inside City	124	24,672,000	313.6	7.5
Outside City	38	11,497,000	146.1	3.5
Subtotal	**162**	**36,169,000**	**459.7**	**10.9**
New Construction				
Inside City	20	1,151,000	14.6	0.3
Outside City	16	860,000	10.9	0.3
Subtotal	**36**	**2,774,000**	**25.5**	**0.6**
Seasonal/Vacant/Empty Lots and Miscellaneous				
Inside City	62	2,085,000	26.5	0.6
Outside City	52	2,783,000	35.3	0.8
Subtotal	**114**	**3,879,000**	**61.8**	**1.2**
Bingen Sales				
(Outside City)	3	43,599,000	554.2	13.2
Total Inside City	**1,398**	**112,212,000**	**1,427**	**33.9**
Total Outside City	**739**	**117,754,000**	**1,496**	**35.6**
Authorized Unmetered Consumption		**1,726,874**	**22**	**0.5**
DSL	**-**	**99,184,781**	**1,261**	**30.0**
TOTAL	**2,137**	**330,877,655**	**4,206**	**100.0**

[1] *Number of units does not equal the physical number of connections but the number of "connections" as defined by the DOH for its Water Facilities Inventory report.*

Residential usage included approximately 43 percent of all water consumed in the City's water service area (not including residential use in Bingen or DSL). The remaining portion, approximately 57 percent, is utilized by non-residential (commercial, irrigation, construction, etc.) customers and the City of Bingen. Outside water sales, including water sold to Bingen, represent approximately 13 percent of the water sold by the City. The calculated DSL value is approximately one-third of the water distributed. The total number of ERUs currently being served by the City is 4,206.

A comparison of ERUs calculated in 2011 and 2021 is shown on Table 2-9.

TABLE 2-9
COMPARISON OF EQUIVALENT RESIDENTIAL UNITS FOR 2011 AND 2021

Source	2011	2021
Residential		
Inside City	987	1,072
Outside City	615	750
Subtotal	**1,602**	**1,822**
Commercial/Irrigation		
Inside City	227.7	313.6
Outside City	135.4	146.1
Subtotal	**363.1**	**459.7**
New Construction		
Inside City	0.4	14.6
Outside City	2.0	10.9
Subtotal	**2.4**	**25.5**
Seasonal/Vacant/Empty Lots and Miscellaneous		
Inside City	1.5	26.5
Outside City	13.1	35.3
Subtotal	**14.6**	**61.8**
Bingen Sales		
(Outside City)	897.6	554.2
Total Inside City	**1,217**	**1,427**
Total Outside City	**1,663**	**1,496**
DSL	**1,379**	**1,261**
TOTAL	**4,257**	**4,206**

Compared to 2011, the number of ERUs in 2021 was significantly higher in the commercial/irrigation, new construction, and seasonal/vacant/empty lots and miscellaneous water use categories but was offset by reduction in the number of ERU water sales to Bingen. The total number of ERUs in 2021 is less than in 2011, primarily due to a decrease in the DSL and increase in the water consumption per ERU in 2021.

The residential MDD per ERU was calculated based on the adopted MDD of 2,329,000 gpd and the total calculated number of ERUs in 2021 (i.e., 4,206) as shown on Table 2-8. These values were used to be consistent with the current water demand and reflect current water production and DSL in the system. The calculated residential MDD per ERU per day equals 553.7 or 554 gallons per ERU per day.

Peak Hourly Demand

The PHD is often used in water system analysis to ensure the storage and distribution system will continue to function during short peak demand situations. Lacking documented information, Equation 3-1 of DOH's Water System Design Manual is utilized to determine PHD flows.

Equation 3-1: Determination of PHD

$PHD = [(ERU_{MDD} /1,440) X ((C X N) + F)] + 18$

Where:

PHD = Peak Hourly Demand, gpm
C = Coefficient Associated with Ranges of ERUs
N = Number of ERUs
ERU_{MDD} = Maximum Daily Demand per ERU (gpd)

The total number of ERUs used for the PHD determination is 4,206, which is the combination of the number of ERUs currently on the system (2,945) and the number of ERUs representative of DSL (1,261). Using an MDD of 2,329,000 gpd, the calculated ERU MDD is 554 gpd (rounded). With an ERU value of 4,206, the coefficients “C” and “F” for Equation 3-1 are 1.6 and 225, respectively. A summary of the Equation 3-1 calculations is given below.

$$\begin{aligned} PHD &= [(ERU\ MDD / 1,440) X (C X ERU + F)] + 18 \\ &= [(554/1,440) X ((1.6 X 4,206) + 225) + 18 \\ &= [(0.385) X (6,995)] + 18 \\ &= 2,694 \text{ gpm} \end{aligned}$$

For this WSP, the total PHD for system evaluation is based on the water production value of 2,694 gpm.

Without the demand from the City of Bingen, the projected PHD is based on 3,652 ERUs and is calculated to be 2,400 gpm per Equation 3-1.

Future Population Projections and Land Use

Future water demands are projected using past records of water produced and water sold, along with projected land use, population estimates, service connection growth, and anticipated additional water demand (i.e., non-residential needs). The goal of projecting future water demand is not to build larger facilities to accommodate excessive water consumption, but rather to evaluate the capability of existing components and to size new facilities for reasonable demand rates. Large amounts of leakage and excessive water consumption should not be projected into future estimates. Rather, efforts should be made to reduce leakage and lost water to a reasonable level and utilize lower, more acceptable demand rates for planning efforts. Water demand projections should be based on acceptable water loss quantities, reasonable conservation measures, and the community’s expected water use characteristics.

There is a degree of uncertainty associated with future water demand projections for any community. Uncertainties in projections exist because of the estimates used to define the community’s current water use and the built-in assumptions made with respect to anticipated growth in a community. The impact of water conservation measures on a community’s future water consumption is also difficult to predict.

The following discussion will address projected land use and population within the City along with projected water usage in the City’s water system service area. This information will be utilized to forecast the future water demand within the City for the next ten and 20 years.

Projected Land Use

Existing and future land use/zoning designations within White Salmon pursuant to the Comprehensive Plan are shown in Appendix A.

The City is anticipated to add approximately 1,019 new housing units over the next 20 to 30 years to accommodate anticipated population growth. This forecasted housing will require approximately 182 acres of land; however, only 117 acres of land is currently available within the city limits. An additional 76 acres of land in the urban exempt area would need to be annexed into the City to accommodate the projected growth. Over the next 20 to 30 years, White Salmon will also need to develop between nine and 18 acres of land for commercial purposes and between nine and 22 acres of land for industrial uses.

Projected Population

Population projections used in this WSP were based primarily on information provided in the City's 2040 Comprehensive Plan (July 2021 draft) and the City's Urbanization Study (FCS Group 2020). In these documents, projected population growth was based on a high population growth scenario for Klickitat County of 0.96 percent annual growth over the next 20 to 30 years. The western portion of Klickitat County is expected to account for 59 percent of the County's total new housing demand. Approximately 80 percent of the future housing demand in the western Klickitat County is anticipated to be supported by year-round residents; the remaining 20 percent would be derived from seasonal residents and visitors. The net effect of these projections is that an additional 1,019 housing units is anticipated to be needed in the City over the next 20 to 30 years.

Because of the dramatic rise in home prices coupled with a corresponding decrease in available housing, the City is working on a Housing Action Plan to meet the City's current and future housing needs. The Housing Action Plan will include reviewing and changing the existing development code, reviewing and modifying zoning designations, developing partnerships with private and non-profit entities to spur development, and surveying the City residents.

Based on an average household size of 2.2 persons per household (FCS Group 2020), the total additional population growth over the next 20 to 30 years for the City based on an additional 1,019 housing units would be 2,242. With the current City population at 2,490, the anticipated population growth equates to an annual growth of approximately 2 to 3 percent per year, depending on whether a 20- or 30-year time period is used.

In the 2014 WSP, a 1.5 percent annual growth rate was used for projecting growth in the City and unincorporated water service area. As discussed earlier, the number of service connections has increased by 1.2 percent and the estimated population by 1.36 percent between 2011 and 2020. For this WSP, a 2 percent annual growth rate will be used for projecting growth in the City's water service area based on information provided in the City's 2040 Comprehensive Plan and the Urbanization Study (FCS Group 2020). The proposed annual growth is less than the projected housing needs for the next 20 to 30 years but is above the growth observed in the last nine years.

The current and future potable water service area population of the City's water system is summarized on Table 2-10 for both the 10-year (2034) and the 20-year (2044) projections.

TABLE 2-10
CURRENT AND FUTURE POTABLE
WATER SERVICE AREA POPULATION (EXCLUDING BINGEN)

Year	Population
2024	4,085
2034	4,980
2044	6,070

Projected population growth for the City of Bingen was assumed to be 0.5 percent annually, which is nearly the amount of growth the City of Bingen experienced from 2010 to 2020. The projected population for the City of Bingen is provided on Table 2-11.

TABLE 2-11
CURRENT AND FUTURE
POPULATION FOR CITY OF BINGEN

Year	Population
2024	780
2034	820
2044	862

Future Water Demand

Projected Non-Residential Water Needs

Future non-residential water usage will increase with the addition of significant non-residential users and generally increase with a growing population to support the needs and desires of the general population.

Water Demand Forecasting

Water demand forecasts were prepared in accordance with the guidelines contained in the Water System Planning Guidebook Requirements. All system forecasts included projections of water demand for ten and 20 years into the future for ADD, MMD, MDD, and PHD. Water demand forecasts were compiled for the White Salmon city limits and unincorporated areas, as well as for the City of Bingen.

White Salmon City Limits and Unincorporated Area

Future water demand for this service area was calculated using the current water production without the Bingen water sales (Table 2-7) and the projected population growth given on Table 2-10. The projected water demand is summarized on Table 2-12.

TABLE 2-12
PROJECTED WATER DEMAND FOR WHITE SALMON CITY LIMITS AND UNINCORPORATED AREA

Parameter	Year		
	2024	**2034**	**2044**
Service Population, capita	4,085	4,980	6,070
ADD, gpd	814,270	997,550	1,215,900
ADD, ac-ft/yr	912	1,117	1,362
MMD, gpd	1,270,100	1,556,000	1,896,600
MDD, gpd	2,066,100	2,531,300	3,085,300
PHD, gpm[1]	2,400	2,940	3,584

[1] *PHD values based on total water production value of 2,400 gpm*

City of Bingen

Since the City of Bingen is a significant consumer for potable water produced by the City of White Salmon, Bingen's future water needs were estimated as a part of this WSP. Since the City of Bingen has source water limitations, it was assumed for this WSP that water for future growth would be supplied by the City of White Salmon.

Flow projections were based on Bingen's 2020 purchased water quantity from the City of White Salmon (approximately 37.2 million gallons) assuming all water needed for new population growth within Bingen will be obtained from the City of White Salmon. The amount of water needed for new population growth in Bingen was based on 2020 production and purchase records. The projected water sales demand for Bingen is summarized on Table 2-13.

TABLE 2-13
PROJECTED WATER SALES TO THE CITY OF BINGEN

Parameter	Year		
	2024	**2034**	**2044**
Service Population	785	820	862
Water Demand			
ADD, gpd	103,900	111,000	116,860
ADD, ac-ft/yr	116.4	121.6	127.8
MMD, gpd	182,180	194,590	204,910
MDD, gpd	262,860	280,800	295,660
PHD, gpm	294	314	331

The water demand forecasts along with the number of anticipated ERUs for the White Salmon service area is summarized on Table 2-14. The ERUs shown for 2024 will not match the calculated total number of ERUs in the system since the water demand was based on 2019 and 2020 water demand data.

TABLE 2-14
PROJECTED WATER DEMAND FOR THE WHITE SALMON WATER SYSTEM

	Year		
Parameter	**2024**	**2034**	**2044**
ADD, gpd	918,165	1,106,100	1,330,000
ADD, ac-ft/yr	1,028.5	1,239.1	1,489.9
MMD, gpd	1,452,300	1,750,600	2,101,500
MDD, gpd	2,329,000	2,812,000	3,381,000
PHD, gpm	2,694	3,254	3,914
ERUs	4,206	5,132	6,171

Chapter 3 - System Analysis

The City of White Salmon's water system was evaluated based on criteria established by the City, the State, and the drinking water industry. The evaluation was performed to determine whether the existing system facilities are capable of supplying sufficient quality and quantities to satisfy the existing and projected water demands outlined in Chapter 2.

System Design Standards

The City's system design standards are summarized on Table 3-1.

TABLE 3-1
CITY OF WHITE SALMON'S SYSTEM DESIGN STANDARDS

Parameter	City Standard
Water Quality Parameters	As a minimum, water quality is monitored to meet the requirements of WAC 246-290-300; the City's Water Quality Monitoring Report for Year 2022 is given in Appendix H.
ADD, MDD, and PHD	WAC 246-290-221/DOH Water System Design Manual (2020); ADD and MDD based on actual recorded system data.
Storage Requirements	WAC 246-290-235/Chapter 7, DOH Water System Design Manual (2020)
Fire Flow Rate and Duration	IFC 2009 Commercial, hospital, and school areas - 2,000 gpm for two hours. All other areas - 1,000 gpm for two hours. Special situations - 500 gpm for two hours by City and local fire department. See Figure 3-1 for target fire flow areas.
Minimum System Pressure	WAC 246-290-230/Chapter 6 DOH Water System Design Manual (2020) - Maintain minimum pressure of 30 psi in the system under PHD conditions and depleted ES and 20 psi under MDD and fire flow conditions where design volume of fire suppression and ES are depleted.
Minimum Pipe Size	Minimum 8-inch diameter for distribution and fire flow, unless justified by hydraulic analysis. Pipes connecting fire hydrants to be DI and at least 6 inches in diameter. The maximum length of 6-inch diameter pipe between the main and fire hydrant shall not exceed 50 feet and shall be installed with restrained joints.
Telemetry Systems	Telemetry systems are to be designed to meet the City's requirements for system operating parameters and data collection and to be compatible with the City's existing system.
Backup Power Requirements	WAC 246-290-420/WAC 246-293-660/Chapters 8 and 10, DOH Water System Design Manual (2020) - On-site backup power equipment or gravity SB storage shall be provided, unless the power grid meets the minimum reliability criteria. On-site backup power facilities shall be provided for closed system BPSs.
Valve and Hydrant Spacing	Sufficient valving should be installed on a water main to ensure a minimum number of customers are without water service when the water main is turned off for maintenance, repair, replacement, or additions. Valves are to be installed on each leg of all tees and crosses, at intervals of 500 feet or less in commercial or multi-family areas, and 800 feet or less in single-family areas or as otherwise approved by the City. Valves are to be installed on each side of the hydrant tee at fire hydrants designated by the City. Valves to be installed on the water main at each end of the mains located in easements. Hydrant spacing in single-family residential areas is not to exceed 500 feet. Hydrant spacing in commercial, industrial, and multi-family residential areas is not to exceed

Parameter	City Standard
	300 feet. For all other occupancy-type buildings, maintain a maximum distance of 150 feet between hydrants and the buildable portion of any lot measured along an access roadway or driveway. For commercial buildings, the minimum number of hydrants required is determined by dividing the required fire flow in gpm by 1,200. The hydrant must be located no closer than 50 feet to any building being served and no farther than 300 feet from any portion thereof. In addition, a hydrant must be located within 150 feet of a sprinkler standpipe or FDC. The City shall determine if hydrants located across streets from a construction site can be included for fire protection. Fire line services shall have a State-approved double check detector backflow prevention assembly, at a minimum, installed in a utility vault at the ROW/property line with a 6-inch PVC gravity drain to storm drainage system or daylight.
Other System Policies	Whenever possible, loop water mains to minimize occurrence of dead-end lines. Provide fire hydrant or blow-off assembly at dead-end mains for flushing purposes. Sample stations shall be installed where indicated by the City.

ADD = average daily demand
BPSs = booster pump stations
DI = ductile iron
DOH = Washington State Department of Health
ES = equalizing storage
FDC = Fire Department Connection
gpm = gallons per minute
IFC = International Fire Code
MDD = maximum daily demand
PHD = peak hour demand
psi = pounds per square inch
PVC = polyvinyl chloride
ROW = right-of-way
SB = standby
WAC = Washington Administrative Code

Water Quality Analysis

The City of White Salmon complies with the provisions of the Safe Drinking Water Act (SDWA) and WAC 246-290. The City's water quality monitoring program is discussed further in Chapter 6. With a few exceptions, the City has historically complied with the water quality provisions of SDWA and WAC 246-290.

Water from Wells No. 1 and 2 does not require treatment. However, the source water is dosed with a sodium hypochlorite solution for disinfection purposes. Surface water from Buck Creek is treated via slow sand filtration and then chlorinated for disinfection. Pursuant to the SDWA and WAC 246-290-662, the slow sand filtration of the Buck Creek source requires the City to maintain a residual disinfectant concentration within the distribution system.

Since 1989, samples from the City of White Salmon's water system have been collected. The analytical results of the prior years sampling are available on the DOH's website. The data was reviewed and evaluated primarily with respect to the following:

- Constituents observed to have concentrations above the State's reporting limits
- Concentrations above the drinking water maximum contaminant limits (MCL)
- Trends of nitrate concentrations over time

Only four water quality exceedances for the City's water system have been recorded on the DOH's website. The last water quality exceedance occurred in August 2008 and was for the presence of total coliform in the distribution system.

Buck Creek (Source 01)

Originating high in the watershed, the water quality for Buck Creek is excellent. The water is "soft," with a hardness in the 15 to 30 milligrams per liter (mg/L), calcium carbonate ($CaCO_3$) range. Nitrate has been detected on occasion but only at concentrations just above detection limits. Likewise, fluoride has also been detected just above detection limits.

Buck Creek has had total and fecal coliform at elevated levels, thus, the water from this source is filtered and disinfected. Since the slow sand filter plant was installed, the range of total and fecal coliform detected in the raw water has ranged from less than 2 to 170 colony forming units (cfu) per 100 milliliters (mL), and less than 1 to 11 cfu per 100 mL, respectively. The slow sand filter plant has provided excellent treatment with no exceedances in drinking water quality standards.

Jewett Springs (Source 02)

Very limited data are available on the water quality of Jewett Springs. From samples taken in the early 1990s, water from Jewett Springs could be characterized as "soft," with a hardness below 55 mg/L, low nitrate concentrations (1 to 2 mg/L), and at times with significant amounts of iron (greater than 0.3 mg/L). Jewett Springs exceeded the inorganic water quality MCL for iron (0.3 mg/L) with 0.31 mg/L. Since water samples have not been taken and analyzed since the early 1990s, characterization of the current water quality in the creek is difficult. One concern with the Jewett Springs water quality is the nitrate level and whether it has stabilized or risen with time.

Wells No. 1 and 2 (Sources 03 and 04)

The water quality in Wells No. 1 and 2 is excellent and no MCLs have been exceeded. Well No. 1 water is considered "moderately hard," with a hardness between 55 and 120 mg/L. Trace nitrate (less than 1 mg/L) amounts have been detected in the past few years. Fluoride has not been detected in any of the Well No. 1 samples. The water in Well No. 1 contains more ions, as evidenced by higher total dissolved solids, conductivity, and hardness Water from Well No. 2 is considered "soft," with a hardness below 55 mg/L. Nitrate and fluoride levels in the water from Well No. 2 have been just above detection limits in the past few years.

Corrosion

No major corrosion issues have occurred in recent years. Portions of the existing 14-inch diameter steel transmission main conveying Buck Creek water from the WTP to the Wells No. 1 and 2 areas does have cathodic protection. Due to leaks, several portions of the transmission main have been repaired or replaced.

Copper and lead concentrations in samples taken from the City's distribution system have been in compliance with drinking water standards.

Disinfection Byproducts

To protect drinking water from disease-causing organisms and/or pathogens, water suppliers often add a disinfectant, such as chlorine, to drinking water. However, disinfectants themselves can react with naturally-occurring materials in the water to form byproducts, which may pose health risks. Different disinfectants produce different types and/or amounts of disinfection byproducts. Disinfection byproducts for which regulations have been established have been identified in drinking water, including trihalomethanes (THMs), haloacetic acids five (HAA5), bromate, and chlorite. The disinfection byproducts of most interest for the City are THMs and HAA5.

THMs and HAA5 are groups of chemicals that form along with other disinfection byproducts when chlorine or other disinfectants used to control microbial contaminants in drinking water react with naturally occurring organic and inorganic matter. The THMs are chloroform, bromodichloromethane, dibromochloromethane, and bromoform. The U.S. Environmental Protection Agency (EPA) has published the Stage 1 Disinfectants/Disinfection Byproducts Rule to regulate total THMs at a maximum allowable annual average level of 80 parts per billion (ppb). The regulated HAA5 are: monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid. The EPA has published the Stage 1 Disinfectants/Disinfection Byproducts Rule to regulate HAA5 at a maximum allowable annual average of 60 ppb.

Based on sampling and analysis, disinfection byproducts do not appear to be a water quality issue for the City's water system.

Evaluation of Water Quality Related Complaint Records

All water quality complaints are reviewed and investigated by the Public Works staff. The investigation of water quality complaints is documented in the Public Works' logbook, which is kept at the Public Works' shop. City staff have indicated the majority, if not all, of the water quality complaints were related to chlorine taste and rust color of the water.

Asset Inventory and Analysis

This section establishes a date-based inventory of all City-owned water system assets and satisfies the requirements of WAC 246-290-100(4)(e)(iii). The physical condition, life expectancy, and system criticality of existing facilities is also evaluated and discussed in this section. The overall asset inventory, condition, and criticality of the City's water system are outlined in Technical Memorandum No. 7 in Appendix C.

A general description and condition of the City's major water system components is provided below.

Sources

The City relies on a combination of surface water from Buck Creek and groundwater from Wells No. 1 and 2 to supply its potable water needs. In addition, Jewett Springs could be used as an emergency or backup source if water treatment was provided. Currently, the infrastructure in place to remove, convey, or treat water from Jewett Springs is not in service. The characteristics of the City's water sources are summarized on Table 3-2.

TABLE 3-2
WHITE SALMON SOURCE WATER CHARACTERISTICS

Parameter	Buck Creek	Well No. 1	Well No. 2	Jewett Springs
Status	Primary	Primary	Primary	Emergency
Date Installed	-	1998	2001	-
Treatment (Other than Disinfection)	Slow Sand Filtration	-	-	-
Disinfection	Chlorination	Chlorination	Chlorination	Chlorination
Intake/Wellhead Elevation, feet	1,042	440.2	437.8	-
Well Depth, feet	-	755	1,242	-
Rated Capacity, gpm	1,000	1,000	1,400	100
Current Capacity	1,000	600	200	Not in Service
Design Head (Wells Only), feet	-	370	850	-
Static Water Level, feet[1]	-	210 to 240	250 to 260	-
Well Diameter, inches	-	10	14.75	-
Pump Type	-	Submersible	Turbine	-
Motor Size, horsepower (Hp)	-	75	400	-

[1] *Based on Observation Wells No. 1 and 2.*

Buck Creek

The Buck Creek surface water diversion is located approximately 6 to 7 miles northwest of the City of White Salmon and approximately 4 miles northwest of Wells No. 1 and 2. As briefly described in Chapter 2, the City historically relied on Buck Creek as its primary water source. Due to water quality issues, the City drilled and developed two groundwater sources in 1999: Wells No. 1 and 2. The new wells became the City's primary water sources with Buck Creek serving as an untreated emergency source. However, the water levels and production capacity of the wells, especially Well No. 2, began exhibiting a decrease coming online. In response to declining production, the City redeveloped the Buck Creek diversion for use as a continuously treated water supply source and a potential seasonal source for aquifer storage and recovery (ASR) use by installing slow sand filtration and chlorination facilities. The design capacity of the slow sand filter plant is 2.2 cfs or 1,000 gpm.

Stream flow data are limited for Buck Creek (November 2001 through April 2004, June to October 2009, and July to October 2010). From 2001 to 2004, the minimum monthly average flows range from 18.0 to 20.0 cfs between July and November and 30.0 to 70.0 cfs from December through May. The minimum measured daily flows were approximately 6.0 cfs for 12 days in November 2001; otherwise, the stream flows remained above approximately 18.0 cfs. The minimum stream flow of 6.0 cfs observed in November 2001 is considered representative of drought year flow late in the season. From June to October in 2009/2010, stream flows ranged from approximately 6.3 to 16.5 cfs (Reach 4, United States Geological Survey [USGS] Open File Report 2012-1270).

Minimum stream flows in Buck Creek are a concern as a condition of water right Permit No. S4-35068P is when the stream flow in Buck Creek is below 2.0 cfs at a location immediately below the White Salmon Irrigation District (WSID) Point of Diversion, the City's diversions will be reduced to sustain 2.0 cfs in the creek. However, the City's diversion shall not be curtailed below 2.0 cfs. See below for additional discussion of the City's water rights.

Buck Creek water is a very high-quality source. Historical water quality problems with the Buck Creek source water were the result of high turbidity and the presence of pathogens (giardia and cryptosporidium) in the raw water source. Treatment with slow sand filtration and chlorination at the City's Buck Creek WTP addresses these water quality issues. The Buck Creek WTP was constructed in 2009/10. Slow sand filtration systems have a long history and have been used without disinfection since at least the 1850s in London, England. The process consists of introducing the raw water over a well-graded sand media filter and letting the water level elevation (or head) push the water through the media. Both physical and biological activity on the media reduces solids and removes viruses, G*iardia lamblia* cysts, and *Cryptosporidium* oocysts from the water.

The water treatment system consists of a mechanical screen, sedimentation basin, two slow sand filtration basins, disinfection, and storage. The intake for the water treatment system is located just upstream of the Buck Creek diversion. For pretreatment, the City utilizes a mechanical screen to remove debris from the creek and a sedimentation basin to reduce the solids introduced to the slow sand system. The sedimentation basin has a surface area of approximately 1,440 square feet (SF). After traveling through the mechanical screen and sedimentation basin, the source water flows to two basins each with 5,063 SF of surface area. Based on a design flow of 0.1 gpm per square foot, each basin is designed to handle flows up to 500 gpm. Flow to each basin is set manually with inlet butterfly valves. The media cross-section includes 3-inch diameter PVC laterals with 1-foot of washed gravel and 3 feet of tripled washed sand. The original top elevation of the sand media is 1,036.5 feet. The slow sand filter basins are in concrete basins housed in a wood-framed, metal-sided building for cover.

Filtrate from the basins is injected with 12 percent hypochlorite solution for disinfection. The filtered water then travels to and through Reservoir No. 1, which provides contact time for chlorine disinfection and controls the downstream water level to ensure the slow sand filters are continuously submerged. The outfall pipe elevation in the reservoir tank is set to fix the amount of water that remains in the tank to 79 percent of the working volume of the tank. This set volume is used for chlorine disinfection time along with the volume of water in the existing transmission main downstream to the Buck Creek Monitoring Station. This reservoir is listed as a "reservoir" tank for the water system since it is primarily used for treatment and does not provide storage capacity for the system.

The following parameters are measured and recorded at the Buck Creek WTP:

- Water level behind the diversion dam
- Temperature of the raw water
- pH and turbidity at the inlet
- Turbidity of the effluent from each slow sand filtration basin
- Turbidity of water being sent to the City's system

This information is either collected by the City's supervisory control and data acquisition (SCADA) system or manually during daily site visits. The turbidity level from the slow sand filters is typically below 1.0 nephelometric turbidity units.

The primary maintenance consideration for a slow sand filtration system is maintaining a clean filter. Cleaning becomes necessary when headloss reaches approximately 4 feet. The sand surface is typically scraped twice per year depending on the raw water quality, sand size, and filtration rates. Cleaning involves manually scraping the top 1 to 2 inches of the filter media and disposing of the media. Cleaning necessitates removing the filters from service, after which a ripening period is required to bring the filters back into operation.

Since the Buck Creek WTP was placed into service in 2010, several operational and maintenance issues have been identified and are discussed below. Completed and proposed improvements for these issues are also identified below. Some of the issues were originally identified in the ASR System Assistance Technical Memorandum, Gray & Osborne, Inc., November 1, 2019 (see Appendix E).

Corrosion Caused by Chlorine Vapor

Portions of the piping in the WTP control room have experienced corrosion that is attributed to the hypochlorite solution being stored inside the control room. In 2021, to limit further corrosion, the City constructed a separate chlorine storage building just to the south of the existing WTP control room. The 55-gallon drums of hypochlorite solution and delivery pumps are now stored in the new building and new piping was installed in the existing control room. The new chlorine storage building is a wood-framed and sided building with a concrete slab. Propane heat and insulation provide protection against freezing.

Low Available Clearance for Scraping

Approximately 6 feet of clearance is available between the bottom of the wooden roof trusses and the sand level of the filters. Scraping is completed by members of the City's staff using rakes, shovels, and wheelbarrows. Because of the low clearance, the staff must avoid the bottom chord of the trusses during scraping activities. To improve the working clearance, the existing slow sand filter roof could be moved upwards 12 inches and secured to mitigate the head clearance issues for City staff during the scraping activities. Another option is to remove the existing roof trusses and replace them with "scissor" trusses that would allow more clearance for much of the truss span.

Roof Restoration and Improvements

The plywood sheathing on the roof structure is believed to be deteriorating in several places. This deterioration appears to be due to passive ventilation in the building and the use of ordinary building type plywood. The plywood sheathing for the Buck Creek WTP should be replaced with marine-grade sheathing, along with a vapor barrier and new roofing.

The new roof should include new hatches to allow conveyance of new sand substrate for the filters. With the existing roof, no practical means exists for replacing the sand, except by disturbing and replacing portions of the existing roof structure (i.e., removing shingles and cutting an opening in the sheathing).

Some of the gutters along the roof have been damaged from snow sliding off the roof. Snow guards or diverters would be needed if the gutters are going to be replaced.

Manual Adjustment of Buck Creek Water Treatment Plant Flow Rate

Flow rate through the WTP is adjusted manually based on the estimated lowest daily demand in the water system. This mode of operation is used to avoid potentially overflowing the Childs Reservoir and other reservoirs in the system. Water from Wells No. 1 and 2 is used to supplement peak demands. The WTP could be operated at a higher flow rate if automated control of the WTP flow was possible.

Manual adjustments of the WTP flow requires City staff to travel to and from the WTP (approximately 30 minutes one way). To reduce these trips and improve WTP oversight and control, telemetry to the WTP is needed to establish a communication link to the City’s SCADA system. Due to the surrounding terrain (i.e., canyon) and the site’s remoteness, telemetry options at the WTP site are limited.

To maintain control and establish the best telemetry quality, the City has recently installed a Starlink satellite system at the Buck Creek WTP (September 2022) and is considering installation of conduit and fiber optic cable from the Buck Creek WTP to the Buck Creek Monitoring Station or installation of a Starlink satellite system at the Buck Creek Monitoring Station. The purpose of the proposed conduit and fiber optic cable is to transfer information from the Buck Creek Monitoring Station to the Buck Creek WTP, then convey the data to the City’s SCADA system. The ultimate goal of these improvements is to provide communication to and from the Buck Creek WTP and the Buck Creek Monitoring Station by the most cost-effective and reliable means.

The current means of communication at the Buck Creek Monitoring Station is digital subscriber line that does not have the reliability or capacity to handle the Buck Creek WTP communication. An alternate option is for information to be conveyed by fiber optic lines installed on Klickitat Public Utility District (PUD) power poles to the Childs Monitoring Station, Well No.2, and the Grand Ronde BPS. Telemetry information from these stations would then be conveyed to the City’s SCADA system. The decision to proceed on the proposed fiber optic conduit system is dependent in part on the performance of the Starlink satellite system.

Reduced Capacity During High Turbidity Events

Due to high turbidity events in Buck Creek during the winter that cannot be effectively treated by the WTP, the WTP must be taken offline at times. To reduce solids loading to the slow sand filters and allow increased water production over a wider range of raw water turbidity conditions, installation of a gravel upflow roughing filter upstream of the slow sand filters has been suggested (Gray & Osborne, Inc., 2019). This type of pretreatment technology has been used successfully with slow sand filters at other locations in the State.

The existing sedimentation basin, with 1,500 SF of area, could be converted into a roughing filter. At a typical surface loading rate of 1 gallons per minute per square foot, the existing settling basin would be large enough to treat up to 1,500 gpm. The existing wood baffles and wood-framed roof would need to be removed to install distribution lateral piping and collectors and gravel media. The roof would then need to be replaced. The existing settling basin is equipped with bypass piping that could be used in the event raw water needs to be discharged directly into the slow sand filters.

To verify the effectiveness of a gravel upflow roughing filter, a pilot test consisting of a small-scale roughing filter and slow sand filter unit is needed. The pilot equipment should be operated for at least 6 months through the winter and spring seasons. The estimated cost for a pilot test is $30,000.

Gravel upflow roughing filters are typically cleaned through routine backflushing with water every one to two months. The flushed water would need to be discharged to a settling tank/basin to settle out accumulated solids prior to being discharged into Buck Creek. This discharge would be covered by the WTP’s National Pollutant Discharge Elimination System Permit. Space at the WTP is limited. One potential location of the settling tank/basin is between the WTP entrance and the Buck Creek Reservoir (see Figure 5 from the ASR technical assistance memorandum (Gray & Osborne, Inc., 2019) in Appendix C.

Potential issues with the proposed gravel upflow roughing filter include construction of a new settling tank/basin and installation of a 8-inch diameter drainpipe from the proposed roughing filter to the settling tank. An alternate alignment for the 8-inch diameter drain line may be needed as the proposed alignment conflicts with a 12-inch diameter transmission main, a 6-inch diameter pipe for the on-site turbine, and several electrical conduits.

Time to Refill the Slow Sand Filters

Refilling of a sand filter bay and removal of floating debris out of the overflow pipes can take approximately two days. Each slow sand filter bay has a volume of approximately 285,000 gallons (Gray & Osborne, Inc., 2019); however, only 38,000 gallons of water is available from Reservoir No. 1 to refill a filter bay. Once the 38,000 gallons is used from Reservoir No. 1, the remaining water needed for refilling comes from the other filter bay. To provide more backfill water to complete the process more quickly, additional finished water storage would be needed. However, insufficient space exists on site to construct additional reservoir storage at the required elevations to refill the slow sand filter bays.

One potential operational change is to not drain all the water from the filters before scraping. If the water level is maintained at approximately 2 to 3 feet below the top of the sand, City staff would still have a stable platform to walk on while reducing the amount of water that would be required to refill the filter bay. However, when City staff tried to implement this change, the scraping work was found to be more difficult.

Well No. 1

Between Wells No. 1 and 2, Well No. 1 has had the larger amount of water production. Based on groundwater level drawdown data, Well No. 1 is in a semi-confined aquifer that contains a no-flow boundary and a leakage or recharge boundary. The recharge boundary was interpreted to reflect hydraulic continuity with what was Northwestern Lake (now the White Salmon River) through highly fractured Grande Ronde Basalt in the vicinity of Well No. 1 (Aspect Consulting, LLC, 2011). Well No. 1 originally had a capacity of 1,000 gpm. In 2008, the 125 Hp line shaft turbine pump failed and was replaced with a 75 Hp submersible pump. Water production from this well has decreased over the years with a current capacity of approximately 600 gpm.

Well No. 2

Well No. 2 is a free-flowing (artesian) well with a shut-in pressure of 98 pounds per square inch (psi) at the time of drilling. Based on groundwater level drawdown data from Well No. 2 and several observation wells in the area, Well No. 2 is completed in a confined aquifer. Since starting water production, Well No. 2 has shown a continued decrease in pumping water level and the shut-in pressure has decreased to approximately 60 to 70 psi (Aspect Consulting, LLC, 2011). Well No. 2 originally had a capacity in excess of 1,400 gpm. Production from Well No. 2 with artesian pressure dropped to approximately 100 gpm in 2010 and 55 gpm in 2011.

Attempts to pump from Well No. 2 resulted in a rapid drawdown of the water level with the pump having to be shut off to avoid running the pump dry. A variable frequency drive (VFD) was installed on the pump controls in an effort to modulate the well flow and increase the time of pumping. However, the VFD controls only increased the available pumping times from approximately 30 to 60 minutes. In the summer of 2008, the 400 Hp line shaft turbine pump in Well No. 2 was disabled due to its inability to pump from this well consistently and continuously. The City now strictly uses this well under free-flowing conditions.

Aquifer Storage and Recovery (ASR)

To address water supply shortages and meet future peak seasonal demand using its wells, the City installed the means for ASR at Well No. 2. While both Wells No. 1 and 2 are candidates for ASR, Well No. 2 was selected as the preferred ASR target zone (Aspect Consulting, LLC, 2011). With the ASR operation, the City diverts and treats surface water on a seasonal basis (anticipated between November and April) from the existing Buck Creek diversion and injects and stores the water in the Grande Ronde Basalt aquifer using Well No. 2. Stored water in this aquifer is recovered to meet peak summer water demands.

The City submitted Applications No. S4-33092, G4-33093, and R4-33094 to the Washington State Department of Ecology (Ecology) for the seasonal diversion of surface water, underground storage, and subsequent recovery for municipal and instream flow uses. The submitted applications requested seasonal instantaneous diversion (Qi) of 2.2 cfs, 600 acre-feet per year (ac-ft/yr) of surface water from Buck Creek, storage of diverted water in the Grande Ronde Basalt via Well No. 2, and maximum withdrawal of 1,000 gpm up to 600 ac-ft/yr. The recharge period is defined as the period between November 1 and April 30 of each year. The storage period is defined as the period from when the recharge ceases for the year until production first resumes after April 30 at Well No. 2. The recovery period is defined as any production from Well No.2 occurring after the end of the storage period.

Between 2014 and 2015, the City performed pilot testing of the ASR operations under a preliminary permit issued by Ecology on May 23, 2014. Data and results of the pilot testing was presented to Ecology in an Aquifer Storage and Recovery Reservoir Permit Report: Application No. R4-33094, dated July 2017. Since completion of the pilot testing, the City and Ecology have been working to complete the City's ASR project. Total water diverted to Well No. 2 under the ASR program is shown on Table 3-3.

TABLE 3-3
ANNUAL AQUIFER STORAGE AND RECOVERY DIVERSION TO WELL NO. 2
(2014 THROUGH 2021)

	ASR Diversion	
Year	**MG**	**ac-ft/year**
2014	10.62	32.59
2015	0.30	0.92
2016	-	-
2017	-	-
2018	-	-
2019	10.49	32.19
2020	8.19	25.13
2021	-	-

MG = million gallons

To date, the City has only been able to divert a small fraction (maximum of 5.4 percent) of the permit limit of 600 ac-ft/yr into the Grande Ronde Basalt via Well No. 2. Even with the small percentage of recharge, the ASR operation has resulted in the production of Well No. 2 increasing from 55 to 200 gpm.

Several factors have contributed to the City only being able to obtain a small percentage of the desired ASR recharge, including the following.

Existing Water Transmission Main

The existing water main for the ASR consists of 8-inch, 10-inch, and 20-inch diameter pipe between Wells No. 1 and 2 and the existing Buck Creek transmission main. These pipelines are used to convey water from Well No. 1 and the Grand Ronde BPS to Childs Reservoir and from Buck Creek to Well No. 2 for ASR. During ASR diversion to Well No. 2, the City is unable to utilize Well No. 1 for source water because the existing water main is used for both purposes. For the City to pump water from Well No. 1 and convey it to the City, the ASR must be off.

City staff have observed limitations on the amount of water that can be forced into Well No. 2 by gravity. The restricted flow is attributed to sections of small diameter water mains (i.e., 8-inch and 10-inch diameter pipe) and an 8-inch Cla-Val control valve installed in a valve vault near Well No. 1. This valve appears to be a reduced-port, solenoid-controlled pressure sustaining/pressure reducing valve and is likely reducing the driving head available for forcing water into Well No. 2. The pressure set point on the valve will likely need to be adjusted to allow more water to flow into Well No. 2. Since the potential available static pressure at Well No. 2 is approximately 260 psi, it is likely more beneficial to maintain the functionality of the valve and just modify its target pressure set point. The valve should be adjusted to determine how much water can be forced by gravity into Well No. 2 (Gray & Osborne, Inc., 2019).

To allow simultaneous operation of Well No. 1 and the ASR to Well No. 2, and to provide more ASR capacity, the installation of a 12-inch diameter main that conveys water from the existing 16-inch diameter Buck Creek transmission main upstream of the Childs Reservoir directly to Well No. 2 has been proposed.

Manual Operation and Monitoring

ASR diversion to Well No. 2 requires the City staff to manually operate a number of valves and to closely monitor the water level in Childs Reservoir to prevent the tank from overflowing. Under current operating conditions, the City's staffing, and ongoing work, constant monitoring by City staff over the entire recharge period is not sustainable.

Several improvements are recommended to improve the ASR operation and monitoring including the installation of the proposed 12-inch diameter main at Well No. 2 (discussed above) and the installation of a remote electronic control valve to open and close off the ASR from the 12-inch diameter water main at Well No. 2. For a remote-control valve to be operable, the City's SCADA system will need to be updated and include the remote-control valve operation.

For the City to continue and improve its current ASR operation, the following improvements and actions should be considered: 1) identify and correct issues with the inlet control valve to the Childs Reservoir and connect the valve operation to the City's SCADA system for control and operation, 2) fix the check feature of the outlet control valve from Childs Reservoir or install a new check valve, and 3) modify the existing SCADA program to shut down the pumps at the Grand Ronde BPS when there is a loss of communication with the Childs Reservoir Monitoring Station.

Long-term, the SCADA communications between the Childs Monitoring Station, Well No. 2, the Grand Ronde BPS, and the rest of the City's SCADA system needs to be upgraded for better quality and reliability. The City has contracted for a SCADA pre-design report, which is anticipated to be issued shortly.

Additional Head Needed to Increase Recharge

Well No. 2 is under artesian pressure, which is beneficial during the ASR recovery stage but provides additional resistance during the ASR recharge stage. Currently, the City is utilizing the existing head pressure created from the transmission main for ASR. Based on preliminary calculations, a direct in-line booster pump ranging from 100 to 125 Hp will likely be needed to increase the head pressure up to the recharge target rate of 1,000 gpm (Gray & Osborne, Inc., 2019). For design and control purposes, the in-line booster pump should be slightly oversized with a 150 Hp pump, then the flow adjusted with a VFD to meet the recharge operating conditions.

Water Levels in Observation Wells No. 1 and 2

Purveyors with groundwater sources are required to have a monitoring program for well levels. The purpose of such monitoring is to provide the purveyor with the ability to determine if, and the extent of, any trends that show decreased capability of the aquifer, or a specific well, to provide water for utility services on an ongoing basis.

The City records the static water levels on two monitoring wells (Observation Wells No. 1 and 2) associated with the City's Wells No. 1 and 2. The City previously monitored the Ottoman Well, which was representative of local shallow wells used for the potable water supply in the area, but discontinued monitoring when the Condit Dam was removed in October 2011. Since the dam removal, static water levels in the Ottoman Well have decreased substantially as the well appears to be hydraulically connected to the White Salmon River.

Since 2008, the static water levels at Observation Wells No. 1 and 2 have been recorded, for the most part, on a weekly basis. A summary of the well observation data from 2002 through the majority of October 2020 is provided on Figure E-1 in Appendix E. A polynomial trend line was also included in this figure to show the overall water level trends for Observation Wells No. 1 and 2.

Overall, the static water levels in both Observation Wells No. 1 and 2 steadily increased over time with Well No. 2 increasing more than Well No. 1. While Wells No. 1 and 2 have different aquifer characteristics, the water level in Observation Wells No. 1 and 2 have similar trends and appear correlated. ASR with Well No. 2 is attributed to the higher water levels in Observation Well No. 2. The overall increase in the static water levels in these observation wells is attributed to the City's diversion of Buck Creek water for potable use and reduced reliance on Wells No. 1 and 2 for domestic supply. The current operation of the Buck Creek and well sources has improved the sustainability of the City's water sources.

Jewett Springs

This spring was the original water source for the City's water system and is now used as an emergency water source. At a minimum, extensive piping improvements and water quality testing would be needed to restore this source to continuous service.

White Salmon River (Potential New Source)

Since 2017, the City has been studying the possibility of implementing a new surface water diversion on the White Salmon River with shared benefits for both instream aquatic resources and an additional water source for the City. Such a project could result in approximately 3.2 cfs of instream flow benefit for aquatic resources. Approximately 2.2 cfs of late summer and fall water rights on Buck Creek would be exchanged for an equivalent amount of water rights on the White Salmon River and 1.0 cfs of Jewett Springs water rights would be similarly exchanged. With this additional diversion, the City would keep the treatment system on Buck Creek, using it outside of spawning season, and would continue using the wells as a redundancy measure. The new diversion would require the City to perform significant upgrades to its water system or construct new facilities, including a new screened intake, pumping infrastructure, new surface water treatment facility, disinfection infrastructure, and transmission main improvements.

The City has performed pilot testing a slow sand filter treatment system to evaluate treatment requirements and constraints for a new potable supply sourced from the White Salmon River. The results of the pilot plant study were inconclusive, and additional testing is recommended. Ripening of the filter required approximately two months to obtain nearly a 2-log bacteriological removal and was likely slowed by cold water temperatures. A high turbidity event in June 2021 necessitated a cleaning scrape of the filter, which impacted filtration efficiency but it has since improved. The filter was achieving greater than 95 percent removal; however, the filter has not achieved the 2-log removal generally expected from slow sand filters. Additional pilot testing has been proposed.

Storage

The City's reservoirs operate together with various booster pumps to provide the water storage needs of the system. Currently, the City of White Salmon has seven reservoirs in its distribution system: Grand Ronde, Childs, Los Altos, Spring Street, Strawberry Mountain (West/East), and Dock Grade. The tank at the Buck Creek WTP was not included since the tank is primarily used for chlorine contact time. The locations of these reservoirs are shown on Figure 1-2 in Chapter 1, and Figures 3-2 and 3-3. The characteristics of each reservoir are summarized on Table 3-4.

TABLE 3-4
POTABLE WATER RESERVOIRS

Name	Year Constructed	Material	Base Overflow Elevation (feet)	Volume (gallons)
Grand Ronde	2009	Concrete	424 to 449	99,200
Childs	2000	Glass-Fused-to-Steel	925 to 945	203,000
Los Altos	1981	Steel	879.85 to 901.85	1,000,000
Spring Street	1939	Concrete	875.85 to 889.85	500,000
Strawberry Mountain (West/East)	1991/2009	Concrete	1,059 to 1,084	99,200
Dock Grade	2001	Glass-Fused-to-Steel	500 to 514.5	218,000

Water from the source wells is conveyed to the Grand Ronde Reservoir, located next to Well No. 1, then is pumped to Childs Reservoir via the Grand Ronde BPS. Buck Creek source water is conveyed to the City's distribution system through a combination of 14-inch steel and 16-inch ductile iron (DI) water mains. City staff strive to utilize Buck Creek water for base flow demand and well water to over peak demands.

From Buck Creek and Childs Reservoir, potable water flows through a 14-inch diameter transmission main for approximately 3.1 miles to the Los Altos Reservoir and 3.7 miles to the Spring Street Reservoir. Water levels in the Los Altos Reservoir are maintained with a two-way altitude valve. The Los Altos Reservoir is slightly higher than the Spring Street Reservoir and can backfeed the Spring Street Reservoir through the two-way valve. Consequently, the Los Altos Reservoir provides most of the ES in the system. A check valve located on the 14-inch diameter water main near Brislawn Road and the Bald Mountain Curves prevents the Los Altos Reservoir from providing flow to the north part of the service area, which is currently being served by the Childs Reservoir.

Reservoir water levels in the Spring Street Reservoir are controlled by an electronic valve. The purpose of the valve is to prevent the reservoir from overflowing and limits the amount of water flowing into the reservoir. The electronic valve is either controlled by the programmable logic controller (PLC) unit at the reservoir or is manually adjusted by the SCADA system.

The Strawberry Mountain Reservoirs are filled with water from the Los Altos BPS, which is located adjacent the Los Altos Reservoir. The Dock Grade Reservoir is located near the lower end of the City's distribution system and provides storage for water being conveyed to the City of Bingen and for fire flow to the Riverfront District along State Route (SR) 14. The reservoir water level in the Dock Grade Reservoir is controlled with a pressure sustaining altitude valve.

Additional descriptions of each reservoir are presented below.

Grand Ronde Reservoir

This poured-in-place concrete reservoir was constructed to act as a surge tank for water between Wells No. 1 and 2 and the Grand Ronde BPS. The reservoir is filled by Wells No. 1 and 2. The water level is controlled by the SCADA system and the operation of the pumps at the Grand Ronde BPS. Normal pump start and stop elevations are 445 feet and 448 feet, respectively. The low and high water alarms are 440 feet and 448.5 feet, respectively. The operating level in the reservoir is adjustable via the SCADA system.

Childs Reservoir

Water is conveyed from the source wells through the Grand Ronde BPS to Childs Reservoir. Water from the reservoir flows through a 20-inch diameter water main down to SR 141, then is conveyed through the City's 14-inch diameter transmission main to the Los Altos and Spring Street Reservoirs.

The water level in Childs Reservoir is monitored by a pressure transducer in the tank that is connected to the SCADA system. Tank level is used to initiate operation of Well No. 1 and/or Well No. 2, and the Grand Ronde BPS. Approximately 3 feet or 38,225 gallons is used for operational storage (OS), which is one of the primary purposes of the reservoir. Childs Reservoir also provides reservoir storage (including fire flow storage) for the northern rural area of the City's service area. This area is isolated from the Los Altos and Spring Street Reservoirs by an inline check valve on the 14-inch diameter transmission main located near Brislawn Road and Bald Mountain Curves.

A flow control valve and adjacent flowmeter located at the Childs Monitoring Station open and allow water to discharge from the reservoir when either Los Altos or Spring Street Reservoirs call for water. The base of the Childs Reservoir was situated at the hydraulic grade line (HGL) of 925 feet based on the inlet elevation of the Buck Creek diversion (approximately 1,041 feet) and the available flow through the 14-inch diameter steel transmission main. Currently, water overflows the outlet pipe at the Buck Creek WTP into the transmission main, an upper portion of the existing transmission main flows under open channel conditions. The elevation at which the transmission main flow becomes pressurized varies and depends on demands and the height of the water in Childs Reservoir.

Thus, the HGL for the transmission main flow will, at times, be above or below the Childs Reservoir, which can result in overflow at low flows or stagnation at high flows. As noted in the discussion above on the ASR to Well No. 2, the overflow at Childs Reservoir can be mitigated by adjusting the backflow feature of the existing flow control valve or by installing a new, separate backflow valve on the outlet line. Stagnation in Childs Reservoir can be avoided by adjusting the Buck Creek flow relative to the City's water needs.

In the early fall 2021, a considerable amount of debris had accumulated on the debris fence located on the uphill side of the reservoir. While one of the posts of the debris fence appeared to have shifted, the fence restrained the debris from the tank walls. A few rocks managed to get over the fence but no signs of damage to the tank walls was observed. The City contracted out the removal of excessive debris from behind the debris fence.

Los Altos Reservoir

Los Altos is the largest reservoir in the City's system with 1.0 MG of storage. The Los Altos Reservoir serves the Los Altos pressure zone, which covers the area west of the reservoir and the areas north and south of the Strawberry Mountain pressure zone. Through water main connections located on Lincoln Street and Waubish Street/SR 141, the Los Altos Reservoir also provides water to the Spring Street pressure zone at the intersection of N.W. Lincoln Street and N.W. Garfield Street. The 4-inch valve at Waubish Street and SR 141 remains open year-round. Besides feeding the Los Altos pressure zone, the reservoir can also backfeed the Spring Street Reservoir through its two-way altitude valve and feed the Strawberry Mountain pressure zone via the Los Altos BPS.

The Los Altos Reservoir is constructed of welded steel with a protective coating. The protective coating on the tank was last replaced approximately 25 years ago. Since the life of protective coatings is approximately 20 years, the tank should be inspected and assessed immediately and new coatings applied possibly in the next five years. For tank coating restoration, the Los Altos Reservoir can be taken off-line and bypassed.

The reservoir has a flowmeter only on the inlet pipe. An altitude valve on the inlet pipe controls water conveyed to the reservoir. The outlet pipe does not have a flowmeter or a check valve installed. To prevent overflows from the 14- and 16-inch transmission main backfeeding the reservoir through the pressure zone distribution, a control valve was installed downstream of the Childs Reservoir at the Childs Monitoring Station.

In 2011, the inlet main conveying water to Los Altos Reservoir was upgraded from 8-inch diameter to 12-inch diameter to increase flow to the tank. The initial outlet reservoir pipe is 12-inch diameter steel that tees into an 8-inch diameter steel pipe, which conveys water to the 8- and 10-inch diameter mains on N.W. Lincoln Street. Ideally, the water main from the Los Altos Reservoir to N.W. Lincoln Street would be 12-inches in diameter to increase hydraulic capacity and reduce headloss from this main during high demand flows.

Spring Street Reservoir

The Spring Street Reservoir is a belowground, rectangular concrete tank that was constructed around 1939. Like Los Altos Reservoir, this reservoir is also fed directly by Buck Creek and Childs

Reservoir. As the overflow elevation is approximately 2 feet below the Los Altos Reservoir overflow elevation, the Spring Street Reservoir can be fed by the Los Altos Reservoir through the existing 12-inch diameter main between the two reservoirs or backfed through the Spring Street pressure zone. An electronic control valve, with input from the reservoir level monitor, is used to maintain the water level in the reservoir and prevent overflows. The Spring Street Reservoir provides storage for most of the water service area within the city limits including downtown, Skyline Hospital, Whitson Elementary School, and the Bingen intertie on SR 141.

The Spring Street Reservoir is the oldest reservoir in the City's water system and has in the past been considered a probable source of leakage. During a July 2020 inspection of the City's reservoirs, DOH staff observed significant deficiencies in the physical safety, security, and reliability of the Spring Street Reservoir, including failing roof and roof support structures throughout the tank. Given the age and failing condition of the Spring Street Reservoir, it should be replaced rather than repaired.

Strawberry Mountain Reservoirs

The Strawberry Mountain Reservoirs (West and East) provide storage for the Strawberry Mountain pressure zone and the North Main/Simmons Road pressure zone. The Strawberry Mountain pressure zone covers the northwest portion within the city limits and a portion of the urban growth area centered along N.W. Spring Street from west of Patton Lane to El Camino Real and N.W. Country View Road. This pressure zone also includes Rio Vista, Strawberry Mountain Road (including the area served by the Strawberry Mountain BPS), Sundown Lane, and Cochran Lane. This area is exclusively residential services.

The North Main/Simmons Road pressure zone serves Simmons Road, portions of Snowden Road, and Cox Road providing water to area residences, the White Salmon Elementary School, the Henkle Middle School, and Columbia High School. A portion of this pressure zone is in one of the City's 2,000 gpm fire flow areas.

The Strawberry Mountain Reservoirs consist of two poured-in-place concrete tanks, each with a capacity of 99,200 gallons. Having two reservoirs at this location allows for one reservoir to be taken out of service without severely impacting water service in the pressure zone. One of reservoir needs to be in service for the operation of the Los Altos BPS, which feeds them water.

The Strawberry Mountain Reservoirs have a single inlet/outlet pipe that can lead to stagnation issues. However, water quality issues due to stagnation have not been reported most likely due to the size of the reservoirs and high demands. Water for the Strawberry Mountain BPS originates from the 6-inch drain line off the West Reservoir and a separate 6-inch main directly off the East Reservoir.

The addition of the Simmons Road pressure zone to the Strawberry Mountain Reservoirs system was recommended in the 2014 Water System Plan (WSP) to increase the demand and storage requirements at these reservoirs. With nesting, an additional 55,000 to 65,000 gallons of storage was anticipated to be needed on or adjacent to the existing reservoirs. Since the 2014 WSP, the City has acquired additional acreage at the Strawberry Mountain site, which should allow additional on-site storage to be constructed.

Dock Grade Reservoir (6th Street)

The Dock Grade Reservoir is a 218,000-gallon bolted glass-fused-to-steel reservoir. The Dock Grade Reservoir provides storage for the Riverfront District and flow-through to the SR 14 intertie with the City of Bingen. Being in the lower part of the Spring Street pressure zone, the Dock Grade Reservoir is fed primarily by the Spring Street Reservoir and the distribution system within its pressure zone. The reservoir has an electronic flowmeter that monitors the flow leaving the reservoir.

The City has two pressure reducing valves (PRVs) located in a vault upstream of the Dock Grade Reservoir. These PRVs are connected to a level transmitter for the reservoir and are used to control the water level in the Dock Grade Reservoir. The operating level of the reservoir is between 925 to 945 feet mean sea level. The primary control of the water level in the tank is through a solenoid-operated, 6-inch diameter PRV. A 6-inch diameter bypass PRV is used in the event of an emergency or for maintenance of the solenoid-operated PRV.

In 2020, the solenoid-operated PRV experienced problems controlling the water level in the Dock Grade Reservoir. Upon inspection, it appears that there are rocks or pipe debris in the valve that was preventing the valve from operating properly. The debris may have been caused by the water main construction on Jewett Boulevard. The City installed a H-style strainer upstream of the valves to protect the valves from debris and converted the bypass PRV into a hydraulically operated altitude valve. The existing solenoid-operated valve was converted to a bypass valve.

Booster Pump Stations

The City has three BPSs that either convey water to different pressure zones or supply water to a specific pressure zone. The three BPSs are Grand Ronde, Los Altos, and Strawberry Mountain (see Figure 1-2 in Chapter 1 and Figures 3-2 and 3-3 for BPS locations). The Main Street BPS was eliminated and replaced with the Cochran PRV station. Information on these pump stations is summarized on Table 3-5.

TABLE 3-5
BOOSTER PUMP STATIONS

Parameter/Station	Grand Ronde	Los Altos	Strawberry Mountain
Installation Year	2000	1981	2018
Base Elevation, feet	430	879	1,059
No. of Pumps	5	2	2/2
Design Flow, gpm	400 to 1,400	175	49 to 67/250
Design Head, feet	501 to 517	193	145 to 175/140
Nominal RPM	1,800	3,600	3,600
Motor Hp	100 to 250	15	2/15
Motor Voltage	460	240	240
Motor Phase	3	3	3
Emergency Power	Yes	No	No
Above/Below Grade	Above	Below	Above

RPM = revolutions per minute

Each BPS is discussed below.

Grand Ronde Booster Pump Station

The Grand Ronde BPS is used to convey water from Wells No. 1 and 2 to fill the Childs Reservoir through a 20-inch diameter DI transmission main. The station itself has five pumps that were originally designed for specific tasks; only three pumps are currently in service.

- Two 200 Hp pumps: Pumps 1A and 1B (design flow = 1,000 gpm, design head = 501 feet) were originally designed to act as redundant pumps serving Well No. 1. These pumps are currently out of service.
- Two 250 Hp pumps: Pumps 2A and 2B (design flow = 1,400 gpm, design head = 504 feet) were originally designed to act as redundant pumps serving Well No. 2. These pumps are in service and are now designated as Pumps A and B.
- One 100 Hp pump: Artesian pump (design flow = 400 gpm, design head = 517 feet) was originally designed to boost the artesian flow from Well No. 2. This pump is currently in service and is designated as Pump C.

Pumps A and B typically alternate in operation and respond to a drop in the water level of 2.25 feet in Childs Reservoir. If the level in Childs Reservoir drops below 3.1 feet, then Pump C is called to run to assist in filling the tank.

The Grand Ronde BPS is considered a very reliable system with on-site standby power, redundant pumps for conveyance, and a low probability that both source wells will be out of service at the same time. The only time both sources would be out of service is when water from Buck Creek is diverted to Well No. 2 for ASR. Under these circumstances, the City is unable to utilize Well No. 1 as a water source while ASR for Well No. 2 is in operation. To correct this, a new 12-inch diameter transmission main is proposed to provide water from the existing 16-inch diameter transmission main directly to Well No. 2. The proposed connection point for the new 12-inch main is upstream of the existing 16-inch diameter transmission main tie-in point with the 20-inch diameter outlet main from Childs Reservoir.

Los Altos Booster Pump Station

The purpose of the Los Altos BPS is to convey water from the Los Altos Reservoir to the Strawberry Mountain Reservoirs. The Los Altos BPS contains two 15 Hp pumps located in a belowground package steel vault. The operation of the pumps is initiated and terminated by the water level in the Strawberry Mountain Reservoirs. The pumps can either alternate in operation or work in tandem.

With a design flow of the pumps is 175 gpm, the Los Altos BPS, whether in single or tandem pump operation, cannot meet the fire flow requirements of the Strawberry Mountain pressure zones. Flow capacity for the BPS is limited in part to the existing pumps and piping (2-inch diameter suction and 1.25-inch diameter discharge), which are both undersized. In the 2004 WSP, recommendations for this BPS included replacing the existing station with an aboveground station, upgrading the individual pump capacity to 750 gpm, and adding flowmeters with telemetry. The Los Altos BPS does not have emergency backup power facilities, a dedicated standby generator and electrical components, or the ability to connect a standby generator.

In the May 2010 Sanitary Survey of the City's water facilities, the DOH considered the location of the Los Altos BPS as "high risk for failure" due to flooding and a safety concern for entry as a confined space. The DOH also noted the existing vault is an old sewer lift station with outdated controls, no drain, and that it was covered with rust along the bottom edge.

To improve the capabilities of the Los Altos BPS, the following improvements are recommended are made:

- Construct a new aboveground duplex BPS with 350 gpm capacity pumps at a minimum (minimum combined capacity in parallel of approximately 500 gpm).
- Install a permanent standby emergency generator and associated electrical components (i.e., automatic transfer switch [ATS]).
- Upsize portions of the water main between the BPS and Strawberry Mountain Reservoirs to a 10-inch diameter or larger pipe to provide additional flow capacity without excessive headloss. Specifically, from the Los Altos BPS along the northern portion of El Camino Real to the 10-inch diameter main located at the intersection of N.W. Country View Road and N.W. Springs Street (approximately 1,900 linear feet [LF]).
- Install a flowmeter off the pump station discharge and add telemetry controls and monitoring.
- Demolish and abandon the existing BPS.

Strawberry Mountain Booster Pump Station

The Strawberry Mountain BPS serves the homes surrounding the Strawberry Mountain Reservoirs located at an elevation where the water level in the reservoirs cannot provide adequate water pressure. The booster pumps take water from the drain line of the West Strawberry Mountain Reservoir and boost the water pressure to approximately 60 psi using a Grundfos Hydro Multi-B/E 2 CME5-4 duplex pump system. This pump system operates with a VFD, which allows the pumps to ramp up and down to meet water demands. A 45-gallon hydropneumatic tank provides water storage and reduces the number of pump starts. When the pressure drops below the setpoint, two high-flow pumps (Grundfos Paco) operate to meet high water demands (i.e., fire flow event). New pumps and piping were installed in the Strawberry Mountain BPS in 2018.

Annual usage in 2020/21 for the area served by the Strawberry Mountain BPS was 2,110,000 gallons or 5,780 gallons per day (approximately four times the consumption recorded in 2011).

The source of water to the Strawberry Mountain BPS originates from a 6-inch drain line associated with the West Reservoir. This configuration provides acceptable operating conditions for the booster pumps but limits the ability to remove the West Reservoir from service.

The Strawberry Mountain BPS does not have emergency standby power. In the event of a power outage, the City has no way of maintaining booster pump operation or the water pressure in the Upper Strawberry Mountain pressure zone. The Strawberry Mountain BPS does not have a flowmeter downstream of the pumps; installation of a flowmeter would allow the City to track water production versus consumption within the Strawberry Mountain pressure zone. The new high demand pumps provide approximately 500 gpm flow, which is less than 1,000 gpm provided in other parts of the City.

Recommendations for the Strawberry Mountain BPS include the following:

- Construct a new pump station with increased high flow demand pumps (minimum of 1,000 gpm).
- Install a permanent standby emergency generator and associated electrical components (i.e., ATS).
- Reconnect the inlet line to the booster pumps to a location that allows the West Reservoir to be taken offline.
- Install a flowmeter on the discharge side of the booster pumps.

Supervisory Control and Data Acquisition

The City utilizes a SCADA system for controlling and monitoring its water and wastewater systems. The City's existing SCADA system was originally installed in 2002 with numerous upgrades occurring over the last 20 years. The SCADA system has been experiencing system communication issues as of late and the City is pursuing improvements. Evaluations of the existing SCADA system include a draft SCADA Master Plan prepared by RH2 Engineering, Inc., in June 2019, and a SCADA Pre-Design Report prepared by R&W Engineering under subcontract with Anderson Perry and Associates, Inc., in September 2022. The following is an overview of the City's SCADA system. Additional detailed information can be found in the reports referenced above.

From a facility layout and telemetry standpoint, three distinct zones or segments exist in the City's SCADA system. The water system segments are described below.

Segment 1

The central facilities of the City's water system includes the Los Altos Reservoir, Los Altos BPS, Spring Street Reservoir, Strawberry Mountain Reservoirs, Dock Grade Reservoir, SR 14 intertie, and the City shop. The area includes most of the potable water reservoirs and customers in the City's system. Currently, Los Altos BPS does not have SCADA telemetry. Most of the information collected from Segment 1 includes reservoir levels, reservoir level alarms, and flow. Communication within Segment 1 is provided by plain old telephone service (POTS).

Segment 2

Segment 2 includes the Grand Ronde BPS, Grand Ronde Reservoir, Wells No. 1 and 2, Childs Reservoir, and the Childs Monitoring Station. The Grand Ronde Reservoir is currently monitored. Data collected from Segment 2 includes reservoir levels, reservoir level alarms, booster pump operation, flow, and chlorine residual concentration. The Grand Ronde BPS, Well No. 2, and the

Childs Monitoring Station communicate via unlicensed 900 megahertz (MHz) private radios. SCADA communication with the Grand Ronde BPS is by digital subscriber line service.

Segment 3

Segment 3 consists of the Buck Creek Monitoring Station and the Buck Creek WTP. The Buck Creek WTP did not have telemetry until September 2022. The Buck Creek Monitoring Station is monitored for flow and water quality data (i.e., chlorine residual) to confirm the WTP is operating properly, and the appropriate amount of chlorine is being provided. The Buck Creek Monitoring Station is served by digital subscriber line service.

Until September 2022, the Buck Creek WTP did not have telemetry connections due to its remoteness and existing topography. In September 2022, the City installed a Starlink satellite system and is currently able to monitor the Buck Creek WTP remotely. The City is evaluating the Starlink satellite for function and reliability. If it is found to meet the City’s needs, the Starlink system may be employed at the Buck Creek Monitoring Station and at the Segment 2 stations.

The City has experienced communication difficulties with the POTS, DSL, and 900 MHz radio systems and is seeking to upgrade communications through the use of a possible combination of cellular telephones, fiber optic, licensed radio, and Starlink satellite systems.

In addition to the communication issues, the City’s SCADA system is outdated and needs to be upgraded. The City’s two SCADA computer stations are obsolete and are no longer supported. In most of the facilities, the PLC is no longer supported by the manufacturer and parts are not available. The SCADA system alarm notification is provided through a hardware-based alarm auto dialer that only notifies City staff that a problem exists at a facility but does not provide any details as to the problem.

The SCADA computer terminals should be replaced with up-to-date computers and human machine interface (HMI) vendor-compatible Windows operating software. The SCADA HMI program should be replaced with a newly developed and state of the art application. The master SCADA terminal design should include redundancy allowing continuous system control and data acquisition from two separate locations (City shop and Grand Ronde BPS) on the City’s system. Replacement of the obsolete PLCs is recommended. Replacement is a simple swap of components and the transfer of the existing program with minimal modifications for most facilities. A web-based alarm annunciation system is needed to provide City staff with more accurate information of alarms in the system. Updated cybersecurity measures will be part of the new SCADA upgrade improvements.

The SCADA system and telemetry improvements are anticipated to begin in January 2024 and will likely be completed in December 2024 depending on project funding, scheduling of facility outages, and availability of specified equipment and materials.

Transmission and Distribution System Piping

An overview of the City’s water transmission and distribution system is presented on Figures 3-2 and 3-3. The City of White Salmon’s transmission and water distribution system is a combination of pipe materials and sizes. The distribution system consists of 1- to 20-inch diameter pipe. The pipe inventory does not include residential service lines that mostly consisting of 1-inch or less diameter pipe. A summary of the distribution system pipe sizes and materials inventory is shown on Table 3-6. The inventory was compiled based on the City's electronic Water System Map, the hydraulic model of the City's water system, existing Record Drawings, and staff input.

TABLE 3-6
TRANSMISSION AND DISTRIBUTION SYSTEM PIPE SIZES AND MATERIALS SUMMARY

Pipe Diameter (inches)	Materials of Construction/Length (LF)					
	AC	DI	Steel	PVC	Total	Percent of Total
1	-	-	2,793	-	2,793	1.2
1.5	-	-	-	138	138	0.1
2	-	-	12,676	1,227	13,903	6.1
3	-	-	6,742	-	6,742	2.9
4	14,689	67	3,213	5,369	23,338	10.2
6	8,069	1,279	-	56,590	65,938	28.9
8	-	3,583	15,399	13,110	32,092	14.1
10	-	8,565	2,353	10,691	21,609	9.5
12	-	5,231	-	5,378	10,609	4.6
14	-	-	31,247	-	31,247	13.7
16	-	13,281	-	1,118	14,399	6.3
20	-	5,552	-	-	5,552	2.4
TOTAL	**22,758**	**37,558**	**74,423**	**93,621**	**228,360**	**-**
PERCENT OF TOTAL	**10.0**	**16.4**	**32.6**	**41.0**	**-**	**100.0**

AC = asbestos cement

The most prevalent pipe within the distribution system (28.9 percent) is 6-inch diameter pipe followed by 8-inch diameter pipe (14.1 percent). The City's system does contain a relatively large amount of pipe that is less than or equal to 3 inches in diameter (10.3 percent).

In addition to the various diameters, the water transmission and distribution system is also composed of a variety of materials. The materials used depended primarily on the accepted and available materials at the time of construction. In the 1940s and 1950s, steel piping was commonly used. Later, AC piping was utilized for water main construction in the 1950s, '60s, and '70s. Currently, DI, PVC, high density polyethylene, or polyethylene (PE) pipe materials are being used by a number of communities in the process of constructing new water lines.

Nearly 74 percent of the City's piping consists of a combination of PVC and steel pipe, with PVC being the predominant pipe type. Significant amounts of AC and DI pipe are also in service. Service line piping in the City is consists of copper, PE, cross-linked polyethylene (PEX), and galvanized steel. The U.S. Environmental Protection Agency is requiring all potable water systems to compile a lead service line (LSL) inventory as part of the new Lead and Copper Rule Revisions (LCRR). An inventory of the LSLs has begun to ensure the City is in compliance with the new LCRR. The inventory must be developed by October 16, 2024.

Currently, DI pipe is being used to replace water mains located in Washington State Department of Transportation ROW, PVC pipe (C900, 250 psi) is being used to replace water mains, and PEX, copper tube size is being used for service lines.

The existing condition of the distribution system depends greatly on the materials used to construct the system, the age of the installed pipe, and the level of workmanship at the time of construction. In general, City staff considers steel pipe equal to or less than 3 inches in diameter and AC pipe to be the most susceptible to corrosion and leakage.

The transmission main from the Buck Creek WTP to the Spring Street and Los Altos Reservoirs consists of a combination of 12-, 14-, and 16-inch diameter pipe constructed of steel, PVC and DI. The distance from the Buck Creek WTP to the Los Altos Reservoir is approximately 8 miles. This transmission main is considered the “life blood” of the City’s water system as it conveys water from the City’s sources to the service area. Depending on the location, a pipe failure on this main could result in one or more sources being isolated from the system and unable to convey water to the City and its customers.

The most critical part of the transmission main is the portion near the Childs Reservoir connection point (adjacent to the Childs Reservoir Monitoring Station) to the top of the Bald Mountain Curves adjacent to SR 141. This portion of the transmission main conveys water from all of the sources. Upstream of the Childs Reservoir connection point, the transmission main carries water exclusively from the Buck Creek water source.

The existing 14-inch diameter steel pipe makes up the majority of the existing transmission main and was installed around 1957 to replace a wood stave transmission pipe. The steel pipe is cathodically protected by induced current and anode beds. Portions of the transmission main have been replaced over the years due to leak repairs, realignment of the pipe route, and pipe upgrades to the system. The most recent improvements include the following:

- **2011 Water Main Relocation Project** - This project included the installation of approximately 13,300 LF of 16-inch DI pipe and 1,150 LF of 8-inch DI pipe needed to reroute the transmission main over the White Salmon River because of the Condit Dam removal.
- **2011 Loop Road Water Line Project** - Approximately 1,200 LF of 16-inch PVC and 3,580 LF of 12-inch PVC pipe was installed to increase the hydraulic capacity of the transmission main along Loop Road.
- **2012 Los Altos Reservoir Main Upgrade** - Originally bid as part of the 2011 Loop Road Water Line project, approximately 1,450 LF of 12-inch PVC pipe was installed in 2012 using a combination of contractors and City staff. The purpose of the main upgrade was to increase the water flow rate to the Los Altos Reservoir.

The remaining portions of the 14-inch diameter steel transmission main are critical system components that have been in service more than 60 years, at the end of their service life, are undersized for peak demand, or are known for leakage.

Approximately 12,500 LF of existing 14-inch water main that conveys water from the Buck Creek WTP remains in service above the 16-inch diameter main constructed as part of the 2011 Water Main Relocation Project. The existing water main is located on a trail on the south side of

Buck Creek, which makes accessibility for operation and maintenance limited due to the trail, existing trail width, and limited clearance from trees and undergrowth. The City collects water meter readings of the water treated at the Buck Creek WTP and downstream on the transmission main at the Buck Creek Monitoring Station. Based on the meter readings collected from the two flowmeters in 2020, the water loss through this section of the water system is approximately 36,400 gpd. This loss represents approximately 4 percent of the Buck Creek WTP water production or approximately 184 equivalent residential units (ERUs) of water usage in the City's water system. While this water loss is significant, the City has not observed any visible areas of water leakage along the transmission main.

The remainder of the existing 14-inch diameter main (approximately 14,500 LF connects the City's wells and water main originating from Buck Creek with the City's distribution system at the intersection of N.W. Loop Road and N.W. Childs Road. The existing transmission main lies adjacent to SR 141 and on private property through easements. Within the private property easements, access to the existing transmission main is limited. The transmission main is a significant part of the City's water system; therefore, improved access is needed to ensure it can be properly inspected (e.g., discover leaks) and maintained.

The longer the water main remains in service the greater the likelihood that it will fail and require maintenance thus, resulting in water disruption to customers and significant expense to the City. Some sections of the pipe experience pressures approaching or exceeding 250 psi as the pipe travels across the White Salmon River valley. At these pressures, even a small leak can result in the loss of a large amount of water and damage to the surrounding soils.

Previously, the City made repairs to the transmission main that proved costly due to the specialized nature of the existing steel pipe. A recent repair to the transmission main cost approximately $76,000 for the manufacture of two custom-made couplers. To avoid additional maintenance expenses on the existing system and decrease the risk of being unable to provide water and firefighting services to City customers, the City is working on the design and would like to construct the new transmission main improvements when construction funding is available.

Recognizing the vital importance and critical condition of the existing 14-inch diameter transmission main, the City applied for and was awarded a pre-construction loan from the Washington State Public Works Board (PWB) for the replacement of the transmission main. The design was separated into two phases: Phase I for the installation of approximately 12,500 LF of 16-inch diameter main on Buck Creek Road from the Buck Creek WTP to the existing 16-inch diameter line, and Phase II for the installation of approximately 14,300 LF of 20-inch diameter pipe along SR 141 to the intersection of N.W. Loop Road and N.W. Childs Road.

Significant progress has been made on the Phase I improvements including the City obtaining a Washington State Department of Natural Resources (DNR) easement for the installation of the new transmission main on Buck Creek Road, completing the design and receiving DOH approval of the proposed improvements, and securing grant and loan monies from Rural Development for construction. Bids for construction were received in June 2022. However, the bids received were higher than available funding; the City sought and secured a PWB loan to finance the additional funding needed for construction. As part of the DNR easement, the City and the DNR will work jointly in demolishing and abandoning portions of the existing 14-inch diameter water transmission main. The demolition and abandonment work will be performed once the new Phase I transmission main improvements are completed.

Design for Phase II is expected to be completed in May 2023. The Phase II improvements are more extensive due to the greater length and larger diameter transmission pipe and the need for distribution system piping to connect existing customers to the proposed new transmission main alignment. An additional 6,600 LF of 4-, 6-, 8-, and 12-inch diameter pipe along with approximately 21,400 LF of 1- and 2-inch diameter pipe are anticipated for the new distribution system. Construction funding for Phase II has not been identified yet.

Water Pressure

Due to topographic elevation differences in the City's water service area, system pressure can vary significantly depending on location. As shown on Figures 3-4 and 3-5, approximately 15 pressure zones are isolated by PRV stations, check valves, or BPSs.

Ideally, the static water pressure within a municipal system is within the range of 55 to 85 psi. The majority of the City's system has static water pressures that exceed 85 psi, while several areas have more than 140 psi with a few areas exceeding 250 psi. These high water pressures in the system increase leakage from pipe joints and fittings and reduce the life expectancy of the piping system. High pressure can also cause damage to the customers fixtures and plumbing if not properly mitigated. The City does not provide pressure reducing capability on the street side of the meter and, thus, customers must install PRVs on the house side of the meter to reduce the water pressure to acceptable limits.

In some areas (e.g., 14-inch diameter transmission main from the water sources), the existing pressure cannot be reduced without adversely affecting water flow. However, other areas in the City's system could be controlled with the creation of new pressure zones using PRVs and isolation valves. Since the 2014 WSP, the City has installed five PRV stations (Eyrie for the Eyrie pressure zone; Loop Road for the North Main/Simmons Road pressure zone; and Jewett, Oak, and Vine for the Hospital pressure zone). Except for Eyrie, all of these PRV stations are operational. Due to a potential downstream interconnection with the Los Altos pressure zone, City staff have not made the Eyrie PRV operational. Given the high pressures downstream of the Eyrie PRV (including S.W. Eyrie Road, S.W. Cherry Blossom Lane, and Sterling Boulevard), the source of the potential downstream interconnection needs to be determined and shut off, and this station made operational. Other high pressure areas of concern include the following.

- Area A - Portions of S.E. 1st Avenue, S.E. Oak Street (north of 5th Avenue), S.E. Wyers Street, S.E. 4th Avenue, and S.E. 5th Avenue.
- Area B - portions of N.E. Park Avenue, N.E. Tohomish Street, N.E. Center Street, N.E. Grandview Blvd, and N.E. Vine Street.
- Area C - portions of West Winds Road.
- Area D - Area southeast of Skyline Hospital, near the Hospital intertie with the City of Bingen.

In the City's 2004 and 2014 WSPs, implementation of a series of cascading pressure zones was recommended. Given the City's existing topography and extensive distribution system, the recommended target high pressure is 115 psi. Allowances of pressures that exceed the target range (55 to 115 psi) could be made in special circumstances. The number of required PRV stations in the system could also be reduced by installing additional isolation valves. For redundancy, a minimum of two PRV stations would be needed between each pressure zone whenever possible.

The primary limitations to implementing an extensive series of cascading pressure zones are the cost and suitable locations for the PRV stations. Based on contract prices for the Jewett Water Main Improvements project, the cost in 2019 for an installed PRV station ranged from approximately $65,000 to $91,000. In the 2014 WSP, a 16 new PRV stations were recommended. Assuming an additional ten new PRVs are still needed, the estimated cost (in 2021 dollars) would be approximately $650,000 to $910,000.

Another limitation is finding and securing suitable locations for the PRV stations. For the Jewett Water Main Improvements project, considerable effort was expended in identifying and designing the new PRV stations. The City requested the new PRV stations to be in the public ROW and located outside existing roadways as the City requested the use of hatches instead of manholes for access to the vaults. Findings sites in the public ROW with suitable space for a vault outside typical traffic use means that the installed PRVs are not necessarily located at the same hydraulic grade line.

For creation of the cascading pressure zone system, both PRV stations and isolation valves may be needed to control the flow and isolate individual pressure zones. Isolating certain water mains may create dead-end mains that do not have much turnover or consumption of the water in the main depending on the amount of water used in the main and location of the last service in relation to the isolation valve. Water turnover in these isolated mains can be improved by periodically opening the isolated valves manually or using a battery-operated solenoid system, e.g., Cla-Val 136-AU, that allows water to flow through the isolated valve on a timed, periodic basis. The decision of how to handle the isolated dead-end mains should be reviewed on a case-by-case basis.

The PRV stations themselves would consist of a main line PRV valve and a bypass PRV valve. The main line PRV valve would be sized to handle the maximum flow anticipated, typically fire flow. The bypass PRV valve would be utilized at low flow rates and when the main valve needs servicing or replacement. These stations can either be constructed on site or constructed as a packaged system off site, then installed. For consistency and familiarity in layout and materials, the City prefers to utilize PRV stations with Cla-Val equipment.

Implementation of cascading pressure zones is a valid approach to reduce the high water pressures within the City's system. Given the cost and difficulty in locating PRV stations, it would be best to implement the installation of multiple PRV stations in conjunction with a major water main improvements project. Areas exist were installations of isolated PRV stations are warranted. Proposed new PRV station locations are discussed in more detail under the System Deficiencies and Proposed Improvements section.

Interties

The City of White Salmon has three metered interties with the City of Bingen. The locations of these interties are shown on Figure 3-2. A description of these interties follows and is summarized on Table 3-7.

State Route 14

This intertie is located on SR 14 between Dock Grade Road and the Bingen city limits and consists of an 8-inch diameter magnetic flowmeter and 8-inch diameter pressure sustaining valve. For the past few years, the majority of the water being conveyed to the City of Bingen has flowed through this intertie. In 2021, 42.54 MG of water was conveyed to the City of Bingen.

Hospital Intertie

In the mid-2000s, the majority of the water conveyed to the City of Bingen flowed through this intertie connection (0.7 to 52 MG). Water was not conveyed through this intertie in 2021. This intertie consists of a 4-inch diameter pressure sustaining valve and flowmeter.

Jewett Boulevard/State Route 141

This intertie consists of a 3-inch diameter flowmeter, PRV (on Bingen side of the meter), and isolation valves that were installed in a new vault in 2020 as part of the Jewett Water Main Improvements project. Water from this intertie is used by 13 customers in the upper part of Bingen's water service area located on North Oak Street (street addresses: 425, 433, and 435), Lois Lane (103, 105, 111, 113, 115, and 117), and Bridgeview Court (101, 103, 108, and 110). In 2021, approximately 1.07 MG of water was conveyed through this intertie.

TABLE 3-7
INTERTIE METER INFORMATION

Location	Manufacturer/Model	2021 Flow	Installed	Last Calibrated
SR 14	8-inch McCrometer MX Ultra Mag	42.2 MG	Unknown	Unknown
Hospital	4-inch Sensus	0.00 MG	Unknown	Unknown
SR 141, Jewett Boulevard	3-inch Master Meter/Octave (Ultrasonic)	1.07 MG	2020	2020

Water Supply Reliability Evaluation

The purpose of this analysis is to summarize efforts being undertaken to ensure an adequate quantity of water can be provided at all times.

Source Reliability

Source reliability relates to the dependability of drinking water sources to provide an adequate or desired quantity of water over a given period of time. The City has two wells (Wells No. 1 and 2) and a surface water diversion (Buck Creek) for source water. Water quality from all the sources is good.

Buck Creek has a reliable stream flow. Based on existing flow data, the lowest flows observed in Buck Creek were in November 2001 at 6.0 cfs. During minimum stream flow conditions, 2.0 cfs (897 gpm) may be diverted per the City's water rights.

The flows from Wells No. 1 and 2 has dropped significantly since first being placed into service, Well No. 1 dropped from 1,000 to 600 gpm and Well No. 2 dropped from 1,400 to 200 gpm. With the reintroduction of source water from Buck Creek, the static water levels in the wells have stabilized and increased. With further implementation of ASR at Well No. 2, higher flows and increased reliability from Well No. 2 is anticipated.

Facility Reliability

Facility reliability relates to the dependability of the water system facilities such as pumps, storage tanks, and water mains to deliver the desired quantities of water over a given period of time.

Source/Treatment

Buck Creek operates using gravity and utilizes a water turbine to generate needed on-site electricity. Water treatment includes a roughing filter and two slow sand finishing filters, which provide redundancy. The Buck Creek WTP is considered very reliable.

Wells No. 1 and 2 and the Grand Ronde BPS have emergency backup power for continued operation of these facilities. The only time these facilities are not able to produce water is when water from Buck Creek is diverted for ASR at Well No. 2. The transmission piping for the wells does not allow simultaneous pumping of Well No. 1 and ASR to Well No. 2. The proposed installation of a new 12-inch diameter main from the 16-inch diameter transmission main to Well No. 2 would allow Well No. 1 water to be conveyed to Childs Reservoir and the City's distribution system.

Reservoirs

The City has a number of reservoirs that serve or can serve multiple pressure zones. The most critical reservoirs in the City are the Los Altos, Spring Street, and Strawberry Mountain Reservoirs. If the Los Altos Reservoir is down, it can be bypassed and served by Childs Reservoir. With Spring Street Reservoir out of service, the combination of the Los Altos, Childs, and Strawberry Mountain Reservoirs can serve the Spring Street and North Main/Simmons Road pressure zones. The two reservoirs at Strawberry Mountain are for redundancy, which allows one reservoir to be out of service while maintaining pressure within the pressure zone.

Distribution System

For the most part, the City's distribution system is well-looped and provides water at suitable flows and pressures. A few areas with marginal pressure are located at an elevation too close to the water operating level in the reservoirs. These areas are identified and improvements are discussed herein.

The Strawberry Mountain and Los Altos BPSs do not have emergency backup power for operation during an extended power outage. Installation of emergency backup power at these facilities is recommended.

Water from the City's sources is conveyed to the water service area by a combination of 14- and 16-inch diameter transmission main pipe. To date, the transmission main has provided reliable service. Portions of the transmission main are more than 60 years old and have experienced previous leaks. The most critical part of this transmission main is from the Childs Reservoir connection to the City's main service area. The transmission main conveys water from all of the City's sources. Upstream of the Childs Reservoir is the transmission main from the Buck Creek WTP. A significant portion of the existing 14-inch steel transmission main (13,300 LF) was replaced with 16-inch DI pipe in the 2011 Water Main Relocation Project.

The design for replacement of the remaining portions of the transmission main was completed for the Phase I project (on Buck Creek Road, starting at the WTP) and is continuing for Phase II (from the Childs Reservoir connection to the City).

Capacity Analysis

A capacity analysis is used to assess the legal and physical capacity of a water system based on the system's available water rights, sources, treatment, storage, and distribution components, and to satisfy the requirements of WAC 246-290-100(4)(e)(iii). A capacity analysis will determine if a water system can adequately serve existing customers and keep pace with future demands and consumer expectations (level of service).

Source Capacity Evaluation

In this section, the ability of the City's existing sources to meet current and projected demands is evaluated. For this evaluation, the maximum source production from Well No. 1 was assumed to be limited to 20 hours per day. For source water from Buck Creek and Well No. 2 (under artesian conditions), 24-hour production was assumed. The evaluation included current source capacity and enhanced source capacity with increased ASR flow. The source capacity evaluation is summarized on Table 3-8.

TABLE 3-8
SOURCE CAPACITY EVALUATION

Parameter/Year	2024	2034	2044
No. of ERUs	4,206	5,132	6,171
Water Demand			
Annual Source Production, ac-ft/yr	1,028.5	1,239.1	1,489.9
ADD, gpd	918,165	1,106,100	1,330,000
MDD, gpm	1,617	1,953	2,348
MDD, gpd	2,329,000	2,812,000	3,381,000
PHD, gpm	2,694	3,254	3,914

Source Capacity with Buck Creek and Wells No. 1 and 2 Production - Current Production			
All Sources, gpm	1,800	1,800	1,800
Well No. 1 (20 hrs), Buck Creek and Well No. 2 (24 hrs), gpd	2,448,000	2,448,000	2,448,000
Capacity Surplus over MDD, gpd	119,000	(364,000)	(933,000)
Source Capacity with Buck Creek and Wells No. 1 and No. 2 Production with Increased ASR Flow			
All Sources, gpm[1]	2,025	2,025	2,025
Well No. 1 (20 hrs), Buck Creek and Well No. 2 (24 hrs), gpd	2,772,000	2,772,000	2,772,000
Capacity Surplus over MDD, gpd	443,000	(40,000)	(609,000)

[1] *Capacity with Buck Creek, Wells No. 1 and 2 with increased ASR flow: 2,025 gpm (Buck Creek - 1,000 gpm, Well No. 1 - 600 gpm, and Well No. 2 - 425 gpm [ASR Scenario 2]); assumes all sources in production.*

hrs = hours

The City's water sources are currently meeting water demands. However, the projected MDD is anticipated to exceed the City's source capacity by 2031, even with the projected increase in the capacity of Well No. 2 from 200 gpm to 425 gpm. To address the potential future capacity issues, the City will need to pursue additional source capacity and/or reduce peak demand (i.e., MDD). Additional source capacity options include further development of ASR at Well No. 2; diversion and treatment of water from Buck Creek, the White Salmon River, or the Columbia River; and drilling of a new groundwater well.

Currently, the City is using ASR but could enhance its program with improvements, including the installation of a new 12-inch diameter main and control valve from the existing 16-inch diameter main to Well No. 2, and potentially a booster pump system to "push" more ASR water into the Well No. 2 aquifer. The new 12-inch diameter main is currently being designed as part of the Transmission Main Replacement Phase II project (due to its proximity to the Phase II improvements). If ASR conveyance to Well No. 2 aquifer is still limited with the installation of the 12-inch diameter main, then the booster pump system for ASR at Well No. 2 should be pursued.

The City is also diverting and treating water for potable service at Buck Creek. Development of additional treatment capacity at Buck Creek will likely be limited by the available space for new facilities and the current 2.2 cfs (approximately 998 gpm) water right diversion from August 1 to October 31 requirement (see the Water Rights Evaluation section).

Currently, the only other source capacity being considered is the diversion and treatment of water from the White Salmon River. The White Salmon River source option is still in the conceptual/pre-design stage with pilot testing for slow sand filtration treatment. An in-depth evaluation of surface water diversion locations, pipeline conveyance options, and treatment facility locations is discussed in the White Salmon River Source Reliability Study (Aspect Consulting, LLC, 2017). The creation of a new surface water diversion on the White Salmon River would benefit the City and instream aquatic resources. The diversion of water from the White Salmon River could benefit aquatic resources and anadromous fish species in Buck Creek and Jewett Springs by exchanging 2.2 cfs of late summer and fall water rights for Buck Creek and 1.0 cfs for Jewett Springs with an equivalent amount of water rights on the White Salmon River (Aspect Consulting, LLC, 2017). Buck Creek would be the City's primary drinking water source in the winter, spring, and early summer; it would also replenish Well No. 2 with ASR water. The City would then rely on the White Salmon River source to supply drinking water during the summer and fall. The result would be 3.2 cfs of instream flow benefit during the low flow periods for Buck Creek and Jewett Springs, and the City being able to better utilize its existing water rights.

The new diversion would require significant upgrades to the City system, including a new screened intake from the White Salmon River; pumping infrastructure; a new surface water treatment facility (slow sand filter); disinfection, including contact tank; transmission main improvements; and operational changes. The new White Salmon River water treatment plant (WTP) would have a capacity of 3.2 cfs. The project cost for a shared diversion with the WSID (recommended alternative) and the new WTP is estimated to be $11.5 million (2017 dollars) (Aspect Consulting, LLC, 2017, 2022).

A pilot study for slow sand filtration system treatment was completed for the White Salmon River in November 2021. Results from the study were generally positive but inconclusive due to the limitations of pilot test infrastructure in the remote area of the White Salmon River corridor. Additional pilot testing of the slow sand filtration treatment process is recommended, along with further evaluation of permitting constraints and land access issues associated with the recent sale of the land used in the pilot study by SDS Lumber, LLC (Aspect Consulting, LLC, 2022).

Development of the Columbia River as a potable water source would require acquisition of water rights for diversion, property for diverting and treating water, a water treatment facility, and pumping facilities to convey water to the City of White Salmon.

Drilling of a new well as a potable water source is an option; however, the City has seen production loss from both of the existing wells after completion and subsequent operation. An evaluation of regional groundwater wells was also performed and discussed in the White Salmon River Source Reliability Study (Aspect Consulting, LLC, 2017).

The City could also address source capacity by reducing its peak or MDD demand by being more efficient in its water usage, such as curbing its DSL and customer demands. Water use efficiency measures to curb DSL and customer demands are discussed in Chapter 4.

Water Rights Evaluation

This section identifies and discusses the City's existing water rights and compares these water rights to the existing and projected water demands. A copy of the City's water rights is included in Appendix F.

- **Certificate No. 3474** - Certificate No. 3474 authorizes the withdrawal of 2.0 cfs or 897.6 gpm. The annual quantity was not specified on the certificate but was expressly limited to the amount actually and beneficially used. This water right was assigned from the WSID on June 14, 1945, and has a priority date of May 18, 1923. This right is for the diversion of water from Buck Creek (S01), Well No. 1 (S03), and Well No. 2 (S04), and is to be used for the Cities of White Salmon and Bingen.
- **Certificate No. 7109** - Certificate No. 7109 has a priority date of February 13, 1957, for 2.0 cfs (897.6 gpm) and 688 ac-ft/yr. This right is for the diversion of water from Buck Creek (S01), Well No. 1 (S03), and Well No. 2 (S04); and is to be used for the Cities of White Salmon and Bingen.

- **Certificate No. 10252** - Certificate No. 10252 has a priority date of February 27, 1963, for the diversion of 1.0 cfs and 688 ac-ft/yr from an unnamed spring tributary to Jewett Creek (Jewett Springs, S02). This right is considered "supplemental." For this water right, Ecology has interpreted the instantaneous quantity as additive to existing rights and the annual quantity as non-additive to existing rights.
- **Permit No. S4-35068P (Superseded)** - Permit S4-35068P has a priority date of May 30, 2007, and authorizes the removal of 2.2 cfs (non-additive) from Buck Creek (S01) and up to 780 ac-ft/yr (additive). Permit S4-35068 added the following water system limitations to the diversion of water from the City's water sources:
    - Permit S4-35068P and the existing water rights limit the total diversion from Buck Creek to 4.0 cfs from November 1 through July 31 and 2.2 cfs from August 1 through October 31.
    - Permit S4-35068P and the existing water rights limit the total diversion from all sources to 5.2 cfs and total annual appropriation of 1,468 acre-feet (ac-ft).
    - Certificates No. 3474 and 7109 are limited to a total of 4.0 cfs and 688 ac-ft/yr from Well No. 1 (S03) and Well No. 2 (S04).
    - Certificate No. 10252 is limited to 1.0 cfs and 688 ac-ft/yr from Jewett Springs (S02).
    - When the stream flow in Buck Creek is below 2.0 cfs immediately below the WSID Point of Diversion, the City's diversion from Buck Creek is reduced to sustain 2.0 cfs in the creek, except that the City's diversions shall not be curtailed below 2.0 cfs.
    - Consumptive use portion for the total annual diversion shall be mitigated. The consumptive use quantity will be equal to the total annual diversion minus the quantity of return flow via Bingen/White Salmon wastewater treatment plant (WWTP) minus water system leaks. Consumptive use is not to be exceeded based on mitigation provided for the 780 ac-ft for Permit No. S4-35068P.
    - Mitigation of consumptive use under Permit No. S4-35068P is provided by the City's interest in the White Salmon Water Bank (see Certificate No. 2154). The City shall retain sufficient consumptive use in trust to offset impacts associated with Permit No. S4-35098P and not commit its holdings in the White Salmon Water Bank to other uses or mitigation unless equivalent mitigation has been approved by Ecology and the DOH. Before the White Salmon Water Bank the City leased water rights from Klickitat PUD for mitigation of Permit No. S4-35068 (2010 to 2015).
- **Certificate No. 2154** - The City of White Salmon and the WSID applied for and established the White Salmon Water Bank by placing Certificate No. 2154 into Washington State Trust Water Right Program. The City and the WSID negotiated a Purchase and Sale Agreement (PSA) for 2.0 cfs of Certificate No. 2154 to be used by the City and 6.0 cfs to be used by the WSID. The water right priority date for Certificate No. 2154 is January 21, 1920.

  Of the City's 2.0 cfs portion, 1.2 cfs will be used as mitigation for the City's existing Permit No. S4-35068, which the City previously mitigated with water rights leased from Klickitat

PUD. The City pursued the PSA with the WSID for this certificate to own rather than lease its mitigated water rights. The 0.8 cfs balance will be used for other mitigation uses by the City to be defined later but could include longer-term growth than that provided in the Permit No. S4-35068 authorization. Superseding Permit No. S4-35068P was issued with revised Provisions 9 and 10, and deletion of Provision 11 of the original Permit No. S4-35068.

- **Applications No. G4-32539, G4-32540, and G4-32541** - These applications were filed on the same day (priority date April 28, 1997) for up to three wells to divert 1,500 gpm and 1,600 ac-ft/yr. The locations of the well sites for each application were different; see Appendix F for specific well locations.
- **Application No. S4-35387** - Application No. S4-35387 pertains to the diversion of 200 gpm and 300 ac-ft/yr of water to and from Buck Creek (S01) for the generation of hydropower to operate the City's water treatment facilities at the Buck Creek diversion. The priority date for Application No. S4-35387 is July 26, 2010.
- **Preliminary Permits No. S4-33092, G4-33093, and R4-33094** - Preliminary permit No. S4-33092 is for the seasonal diversion of surface water from the City's existing Buck Creek diversion. Under Preliminary Permit No. R4-33094, diverted water would be stored in the Grande Ronde Basalt using the City's existing Well No. 2. Stored water would then be recovered from Well No. 2 for municipal and in-stream flow uses under Preliminary Permit G4-33093. These permits are still preliminary in nature as the Yakama Nation has expressed support for these permits with the added provision of requiring any new diversions not reduce the flow in Buck Creek below 8 cfs (Rigdon 2019). The City is in the process of considering this condition to the permits and also, renewing these preliminary permits with the Department of Ecology's Office of Columbia River.

City of Bingen Permit No. G4-33106 - The City of Bingen was issued Permit No. G4-33106 for non-additive withdrawal of 200 gpm and up to a non-additive quantity of 223 ac-ft/yr from the existing wellfield developed by the City of White Salmon, the City of Bingen, and the Port of Klickitat as a regional water supply. The regional wellfield consists of Wells No. 1 and 2. The City of Bingen owns a 20 percent investment interest in the regional wellfield and also serves the Port of Klickitat's 5 percent investment interest from the wellfield. While this permit authorizes the City of Bingen to withdraw water from the City of White Salmon's wells, it does not change the amount of water that the City of White Salmon can withdraw from its wells or other sources.

The City's existing and pending water rights are summarized on Table 3-9.

TABLE 3-9
EXISTING AND PENDING WATER RIGHTS

		Instantaneous Flow (Qi) cfs or gpm		Annual Volume (Qa) ac-ft		
Certificate or Permit No.	**Source**	**Primary**	**Non-Additive**	**Primary**	**Non-Additive**	**Comments**
Active Certificates and Permits						
3474	S01, S03, S04	2.0		688		4.0 cfs and 688 ac-ft from Wells No. 1 and 2
7109	S01, S03, S04	2.0				

Certificate or Permit No.	Source	Instantaneous Flow (Qi) cfs or gpm		Annual Volume (Qa) ac-ft		Comments
		Primary	Non-Additive	Primary	Non-Additive	
10252	S02	1.0			688	
S4-35068P	S01/S02-S04	1.2	1.0	780		Consumptive use limited to 780 ac-ft/yr
S4-33092[1]	S01		2.2 cfs			ASR for S04
G4-33093[1]	S04		1,000 gpm			ASR for S04
R4-33094[1]	S04		2.2 cfs		600	ASR storage in S04
	TOTAL	**5.2**[2,3]	**1.0**	**1,468**[3]	**600**	
White Salmon Water Bank						
CS2-SWC2154 (KLIC-13-01)	Black Sand Creek and White Salmon River	**2.0**		**1,445.4**		Black Sand Creek and White Salmon River/mitigation of out of stream uses and instream flow
Pending Water Rights						
Application No.	**Submitted**					
G4-32539	4/28/97	1,500 gpm		1,600		Up the three wells
G4-32540	4/28/97	1,500 gpm		1,600		Up the three wells
G4-32541	4/28/97	1,500 gpm		1,600		Up the three wells
S4-35387	7/26/10	200 gpm		300		S01, Hydropower

[1] *Preliminary permit.*

[2] *Permit S4-35068 and the existing water rights limit the total diversion from Buck Creek to 4.0 cfs from November 1 through July 31 and 2.2 cfs from August 1 through October 31; superseding permit.*

[3] *Permit S4-35068 and the existing water rights limit the total diversion from all sources to 5.2 cfs and total annual appropriation of 1,468 ac-ft, superseding permit.*

Water Rights Adequacy

The City's existing and projected water consumption described in Chapter 2 was compared with available existing water rights as part of the required water rights self-assessment. For the comparison, the instantaneous flow from the City's sources was based on the current capacity of the sources: 1,000 gpm from Buck Creek (S01), 600 gpm from Well No. 1 (S03), and 200 gpm from Well No. 2 (S04). For future water demand, the source capacity was assumed to be the same except for an increase in Well No. 2 capacity from 200 gpm to 425 gpm from ASR.

The evaluation is summarized in the Water Rights Self-Assessment Form provided in Appendix F. The following conclusions were made based on the evaluation.

- The City's existing water rights are sufficient to satisfy current and projected 10-year water demands.

- The City's existing water rights are sufficient to satisfy the projected 20-year water demand but the City will need to develop the proposed White Salmon River source and establish and transfer water rights for this source. Total instantaneous capacity for the White Salmon River source would be approximately 4.0 cfs.

Consumptive Water Use Monitoring

Per Provision 9 of the City's water right permit for Buck Creek (S4-35068P, see Appendix F), an accounting of the total annual diversion minus the quantity of return flow via the Bingen/ White Salmon WWTP minus water system leaks is required to be documented in water and sewer planning documents. In addition to the return flow via the Bingen/White Salmon WWTP and water system leaks, the amount of water for ASR to Well No. 2 per Permits No. S4-33092, G4-33093, and R4-33094; and the amount of water appropriated by and sold to the City of Bingen per Permit No. G4-33106 are also included in the City's consumptive use calculation for 2020, which had a higher water production than 2019 or 2021.

The annual diversion, return flow, ASR flow, water sales to Bingen, and consumptive use quantity for 2020 are provided on Table 3-10. Year 2020 was selected for review due to higher water production in 2020 versus 2021.

TABLE 3-10
CITY OF WHITE SALMON CONSUMPTIVE WATER USE IN 2020

Parameter	Quantity (MG)
Diversions	
Total 2020 Annual Diversion from Buck Creek	200.758
Total 2020 Diversion from Wells No. 1 and 2	155.853
Total Diversion	**356.611**
Water Stored, Returned, or Leaked	
Total ASR to Well No. 2	8.194
Quantity of Return Flow to the Columbia River: Bingen/White Salmon WWTP	127.870
Water Leaks - Buck Creek Transmission Main	13.287
Water Leaks - Distribution System	104.769
Total Water Stored, Returned, or Leaked	**254.120**
Water Sales to Bingen	**37.922**
Consumptive Use Quantity by the City of White Salmon	**64.569**
ac-ft = 198.168	

The City of White Salmon is in compliance with Provision 9 of Permit S4-35068P (Superseded) since the consumptive use quantity for 2020 of 198.168 ac-ft is significantly below the maximum 780 ac-ft/yr diversion specified in the permit. The City of White Salmon sold 37.922 MG of potable water to the City of Bingen. With the inclusion of the water sold to the City of Bingen, the total consumptive use by the Cities was 102.49 MG or 314.6 ac-ft/yr, which is still below the maximum 780 ac-ft/yr diversion amount for consumptive use. The amount of return flow to the Columbia River for the water sold to Bingen, via the Bingen/White Salmon WWTP, should be calculated and included in future reviews of White Salmon's water rights to better reflect the consumptive use of both White Salmon and Bingen.

Storage Capacity Analysis

The ability of the storage reservoirs to meet current and projected water storage needs is evaluated by calculating and reviewing five separate components of reservoir storage: operational, equalizing, standby, fire flow, and dead storage (if any). A brief description of each of the storage component follows.

- **Operational Storage (OS)** - The volume of water corresponding to the band of storage between the supply pump on and off levels within the tank.
- **Equalizing Storage (ES)** - The water required when the source capacity cannot meet the PHD of the system. ES is either calculated as follows or in no case is less than zero:

  ES (gallons) = PHD (gpm) - sum of normal source capacity (gpm) X 150 minutes

  = PHD - 1,800 gpm X 150 minutes

  Additional ES may be required to meet the projected MDD flows in 2031 without conservation, DSL reduction, and ASR at Well No. 2. In such cases, the amount of ES needed is calculated from the difference between supply and demand over multiple days.
- **Standby (SB) Storage** - The amount of storage should sources fail or when unusual conditions impose higher demands than anticipated. The minimum amount of SB storage is 200 gallons per ERU. SB storage for multiple sources is calculated as follows:

  SB (gallons) = (two days X ADD) - (1,440 minutes X [sum of all sources - largest capacity source]) or 200 gallons/ERU
- **Fire Suppression Storage (FSS)** - The volume representing the product of the needed fire flow (gpm) and flow duration (hours).

  A flow of 2,000 gpm and a 2-hour duration were considered practical fire flow requirements for commercial areas, hospitals, and schools. These high fire flow demand areas are shown on Figure 3-1. For the rest of the service area, 1,000 gpm fire flow and a 2-hour duration is considered sufficient. While a 1,000 gpm fire flow is the target fire flow in the remainder of the City's service area, 500 gpm fire flow for 2 hours may be acceptable in some of the rural areas in limited circumstances. Based on these fire flow requirements, the FFS is calculated as follows.

  FSS (gallons) = 2,000 gpm x 2 hours x 60 minutes/hour = 240,000 gallons

  = 1,000 gpm X 2 hours X 60 minutes/hour = 120,000 gallons

  Currently, the 2,000 gpm fire flow areas are in four pressure zones: Dock Grade, Los Altos, Strawberry Mountain, and Spring Street. Portions of the 2,000 gpm fire flow area north of Loop Road is served by the Los Altos Reservoir while the remainder is served by the Strawberry Mountain Reservoirs. The Spring Street pressure zone is served by Spring Street and Los Altos Reservoirs. The Dock Grade Reservoir is fed by the Spring Street pressure zone.
- **Dead Storage (DS)** - The volume of stored water not available to all consumers at the minimum design pressure in accordance with Chapters 5 and 6 of WAC 246-290-230. DS is the amount of water needed to provide adequate pressure to all of the City's water users. The dead volume is excluded from volume provided to meet the OS, ES, and/or FSS volumes. Local community standards apply as to whether or not some DS volume may be used to provide SB storage volume to meet minimal community expectations during unusual operating conditions.

With the exception of the Grand Ronde Reservoir, the storage capacity requirements were determined for all of the City's reservoirs. Calculations were not performed for the Grand Ronde Reservoir since it is used exclusively as a surge tank for the Grand Ronde BPS. The storage capacity requirements were analyzed for the system as a whole. Based on the initial analysis, the excess reservoir capacity was projected based on the 2021 flow demand values provided in Chapter 2. However, subsequent reservoir capacity analysis of each pressure zone demonstrated that some zones have reservoir capacity surpluses while others have deficits. The reservoir capacity analysis for the pressure zones is discussed below.

For the evaluation, estimates of ADD, PHD, and ERU were made for each service area using 2021 consumption data for each pressure zone based on the customer meter addresses. The ADD for each pressure zone was based on the consumption data for each zone. The SB storage calculations for the Dock Grade Reservoir only included City users within the system; SB storage for the City of Bingen was not included in the reservoir calculations as the City sells excessive water to Bingen.

Several reservoir options and scenarios were examined for 2024, 2034, and 2044. Reservoir calculations were performed for these time periods for the following scenarios:

- With and without SB storage and FSS nesting
- Changing the Brislawn pressure zone supply from the Childs Reservoir to the Los Altos Reservoir, which is planned as part of the Transmission Main Replacement Phase II project.
- Supply the domestic usage for North Main/Simmons Road pressure zone via a pump station from the Spring Street Reservoir and supply fire flow for this pressure zone from both the Strawberry Mountain and Spring Street Reservoirs.

A discussion on the evaluation of each of these scenarios follows.

- **With and Without SB Storage and FSS Nesting** - The nesting of the SB storage and FSS has a significant effect on the storage requirements primarily on the Los Altos, Spring Street, and Strawberry Mountain Reservoirs. Currently, the City does not have sufficient capacity in its existing reservoirs for separate SB storage and FSS. With nesting of the FSS and SB storage, the reservoir capacity issues are narrowed to Strawberry Mountain, Dock Grade, and Spring Street Reservoirs. The reservoir capacity deficit at Spring Street is dependent on the amount of water being provided by the Los Altos Reservoir to the Spring Street pressure zone. The City's Fire Chief approves the nesting of the SB storage and the FSS and has provided a letter with his approval (see Appendix B). The remaining discussion on reservoir capacity will be based on nesting of the SB storage and FSS components.
- **Supply of the Spring Street Pressure Zone** - Currently, both the Spring Street and Los Altos Reservoirs supply water to the Spring Street pressure zone. Different balances of supply water from the Spring Street and Los Altos Reservoirs were reviewed to determine the optimum split of water to supply the Spring Street pressure zone for 2024, 2034, and 2044. The optimum balance for the Spring Street/Los Altos Reservoirs was 50/50 in 2024.

  In 2034, a slight excess in capacity (approximately 25,000 gallons) at the reservoirs is projected. By 2044, there does not appear to be sufficient capacity for both the Spring

Street and Los Altos Reservoirs to simultaneously supply the Spring Street pressure zone, and the Los Altos Reservoir to supply the Los Altos pressure zone. Additional reservoir capacity (approximately 240,000 gallons) would be needed to supply both Spring Street and Los Altos pressure zones in the future.

- **Changing Brislawn Pressure Zone Supply** - The proposed change to the Brislawn pressure zone supply from the Childs Reservoir to the Los Altos Reservoir would move approximately 3 MG of annual demand between the two reservoirs. The change would benefit the future storage capacity of Childs Reservoir and would not negatively impact the capacity of Los Altos Reservoir until sometime after 2034. As mentioned earlier, the Los Altos Reservoir and Spring Street Reservoirs will not have sufficient capacity to adequately serve their respective pressure zones. The addition of the Brislawn pressure zone adds to the additional capacity needs for the Los Altos Reservoir. In 2034, the combined capacity of Spring Street and Los Altos Reservoirs is deficient by approximately 140,000 gallons. By 2044, an additional 440,000 gallons of reservoir capacity would be needed from the Spring Street and Los Altos Reservoirs.

  Current and projected reservoir storage requirements with nesting of the SB storage and FSS are summarized on Table 3-11 for current DSL and current pressure zones (Scenario 1) and for current DSL and the Brislawn zone fed by the Los Altos BPS and North Main/Simmons Road zone fed by the Spring Street Reservoir (Scenario 2). The calculated reservoir storage requirements for Scenario 2 in 2024 represent the theoretical effect of the proposed pressure zone changes.

TABLE 3-11
RESERVOIR STORAGE REQUIREMENTS WITH NESTING OF STANDBY STORAGE AND FIRE SUPPRESSION STORAGE

Reservoir	Volume (gallons)			
	Existing Capacity	2024	2034	2044
Scenario 1 - Current DSL, Current Pressure Zones				
Childs	203,680	167,290	167,290	188,010
Los Altos/Spring Street	1,500,000	1,176,900	1,474,830	1,738,910
Strawberry Mountain (West/East)	198,400	305,510	387,500	460,700
Dock Grade	218,000	271,160	272,840	275,580
Total	**2,120,080**	**1,920,860**	**2,302,460**	**2,663,200**
Scenario 2 - Current DSL, Brislawn Fed by Los Altos, North Main/Simmons Road Fed by Spring Street				
Childs	203,680	167,290	167,290	167,290
Los Altos/Spring Street	1,500,000	1,264,190	1,639,230	1,936,450
Strawberry Mountain (West/East)	198,400	172,390	208,000	258,780
Dock Grade	218,000	271,160	272,840	275,580
Total	**2,120,080**	**1,875,030**	**2,287,360**	**2,638,100**

Based on these calculations, three potential storage issues were identified: additional storage capacity needed at the Strawberry Mountain Reservoirs if the current pressure zones are maintained, insufficient storage at the Dock Grade Reservoir, and additional storage with the combined Los Altos/Spring Street Reservoirs needed around year 2034. Also, the Spring Street Reservoir needs to be replaced.

Recommended Storage Capacity Improvements

Recommended storage capacity improvements include the following.

Additional Capacity at the Strawberry Mountain Reservoirs

In the 2014 WSP, the demolition and abandonment of the Main Street BPS along with the supply transfer of the North Main/Simmons Road pressure zone from the Spring Street Reservoir to the Strawberry Mountain Reservoirs was anticipated. The projected additional reservoir capacity needed at Strawberry Mountain was approximately 65,000 gallons. Based on current demands and existing pressure zones, the additional reservoir capacity needed at Strawberry Mountain is approximately 121,000 gallons (assuming nesting of SB storage and FSS), which is significantly higher than anticipated in 2014. By 2034 and 2044, the additional storage capacity needed at the Strawberry Mountain Reservoirs is approximately 190,000 gallons and 262,000 gallons, respectively.

Space at the existing site of the Strawberry Mountain Reservoirs is limited. The amount of clearance provided between reservoir structures and existing roadways will dictate the reservoir size and capacity that can be constructed. To determine available space for a new reservoir, a minimum of 15 feet from existing reservoir tanks and modified roadways was assumed. To obtain the needed future reservoir capacity and keep one or more of the existing Strawberry Mountain Reservoirs in service (approximate water level of 25 feet), then the following site improvements would be required.

- Realign the existing road to the southern end of the property.
- Move existing utilities (water mains and overhead electrical/cable).
- Decommission existing Strawberry Mountain Reservoir BPS and building and construct a new BPS on-site.
- Decommission existing West Strawberry Mountain Reservoir.

If the West Strawberry Mountain Reservoir remained in service, then construction of a nominal 300,000-gallon reservoir is recommended. With a water surface level of 25 feet, the tank would likely need a diameter of approximately 45 feet. With the decommission of the West Strawberry Mountain Reservoir, the new reservoir would need a nominal capacity of 400,000 gallons and a diameter of approximately 53 feet. With a 53-foot diameter tank, the separation between the West Strawberry Mountain Reservoir and new reservoir tank would be approximately 12 feet.

Given the proposed reservoir tank size and limited space for additional construction on site, a glass-fused-to-steel reservoir is recommended at the Strawberry Mountain site. The foundation for a glass-fused-to-steel reservoir can be overdesigned to allow the addition of more wall sheets that extend the height and, thus, the capacity of the reservoir in the future, if needed.

Alternatively, instead of the immediate construction of a new reservoir, the domestic supply for the North Main/Simmons Road pressure zone could be provided by a BPS fed by the Spring Street Reservoir. This pressure zone adjustment would delay the need for additional reservoir capacity at the Strawberry Mountain Reservoirs from 2024 until approximately 2034. With this alternative (Scenario 2), total additional reservoir capacity in 2034 and 2044 at the Strawberry Mountain Reservoirs would be approximately 10,000 and 60,000 gallons, respectively. While the booster pump alternative mitigates reservoir capacity at Strawberry Mountain location, the need for additional reservoir capacity at the Los Altos and Spring Street Reservoirs is accelerated.

A comparison of the construction of a new reservoir at the Strawberry Mountain site and the construction of a new BPS for the North Main/Simmons Road pressure zone was evaluated and discussed in Technical Memorandum No. 5 (see Appendix B). After reviewing the information, the City choose to proceed with the construction of a new BPS to expediate and mitigate the current reservoir capacity deficiency at the Strawberry Mountain reservoirs.

With the addition of a BPS, additional reservoir capacity for the Strawberry Mountain Reservoirs is not needed until approximately 2034. The need for the additional reservoir capacity could be mitigated by upgrading the pump capacity at the current Los Altos BPS. If the pump capacity was increased above the projected PHD, then ES capacity at the reservoirs would not be needed and would likely delay the need for a new reservoir at Strawberry Mountain until approximately 2044. Given the age and condition of the existing Los Altos Pump Station, construction of a new pump station is recommended. Recommended nominal capacity of the new reservoir at Strawberry Mountain is 300,000 gallons.

Insufficient Capacity at Dock Grade Reservoir

The capacity of the Dock Grade Reservoir is approximately 50,000 gallons less than the calculated required volume for 2044. However, this tank is being fed by both the Los Altos and Spring Street Reservoirs. The combined capacity of these reservoirs currently provides the additional storage needed for the Dock Grade pressure zone. No additional storage is recommended for the Dock Grade Reservoir at this time.

Additional Capacity at Los Altos/Spring Street Reservoirs and Replacement of the Spring Street Reservoir

The Los Altos and Spring Street Reservoirs provide 1.5 MG of storage. With the projected demands and current pressure zones, additional reservoir capacity of approximately 240,000 gallons in 2044 will be needed. Changes to the current pressure zones outlined in Scenario 2 would result in additional reservoir capacities for the Los Altos/ Spring Street Reservoir systems in 2034 and 2044 of approximately 140,000 gallons and 440,000 gallons, respectively.

Due to existing system hydraulics and lack of space around the existing reservoirs, additional capacity at either site is not possible. Therefore, construction of new reservoir is needed. As previously discussed, the Spring Street Reservoir is the oldest reservoir in the City and needs to be replaced. To provide for the projected needed capacity, the new reservoir should have a nominal capacity of 1 million gallons at a minimum.

Potential locations for the new reservoir include the Strawberry Mountain Reservoir site, the area east of Childs Road, the area west of N.W. Bruin Country Road and the area just north of the existing Spring Street Reservoir. A brief analysis of the advantages and disadvantages of each site is discussed below.

Strawberry Mountain Reservoir Site

The Strawberry Mountain Reservoir site was proposed as a potential location as it is City-owned property and has existing infrastructure (i.e., water mains). The main disadvantages include a higher elevation, which would require water to be pumped to the site, then the water pressure reduced to serve Spring Street and Los Altos pressure zones, and limited space for reservoir construction at the site. With a new reservoir at the Strawberry Mountain site, all water would need to be pumped from the Los Altos BPS and the Los Altos Reservoir. A new larger capacity pump station with a standby generator for the Los Altos Booster Pump Station would be required to serve the new reservoir. The design scenario would make the Los Altos Reservoir the primary storage facility for the City’s central region.

If the new reservoir is constructed at a higher elevation than the existing Los Altos and Spring Street Reservoirs, water pressure would need to be reduced to provide a suitable pressure to the respective pressure zones. The locations most likely in need of pressure reducing stations would be N.W. Spring Street and N. Main Avenue for the Spring Street pressure zone and near the Los Altos Reservoir off of Rio Vista Drive for the Los Altos pressure zone.

The improvements described above pertain to a larger capacity reservoir. A 59-foot diameter reservoir may be able to be constructed on site if the existing BPS, West Strawberry Mountain Reservoir, and shop building were demolished. To obtain sufficient reservoir capacity at this site, the new larger reservoir would need to be taller. Consequently, the existing East Strawberry Mountain Reservoir would be designated for reservoir service for the Strawberry Mountain neighborhood pressure zone. The nominal capacity of the reservoir would need to be a minimum of 1.261 MG with the loss in capacity of both the East and West Strawberry Mountain Reservoirs. To obtain 1.26 MG of storage capacity with a 59-foot diameter glass-fused-to steel reservoir, the reservoir tank would need to be approximately 70 feet tall. The existing BPS would need to be relocated to the northwest portion of the property where the shop building resides.

East of Childs Road Site

This site is located east of N.W. Childs Road on the eastern edge of Parcel No. 03101300000300. The site was proposed as it would allow a new reservoir to be constructed with the same operating water levels as the existing Los Altos Reservoir. The site would provide two locations for water from the transmission main to be stored in and allow gravity flow back into the system. The land would need to be purchased and an easement acquired for an access road from N.W. Childs Road to the site. The site would also require the installation of approximately 1,300 LF of 12-inch diameter main from the proposed 12-inch diameter water main to be installed as part of the Transmission Main Replacement Phase II project in N.W. Childs Road and at the reservoir site.

In addition, a new 12-inch diameter water main would need to be installed from N.W. Loop Road to N.W. Spring Street to connect the Upper Los Altos pressure zone with the Spring Street pressure zone. The location for the new water main would potentially be along or in the same alignment as the existing 14-inch diameter steel water main from Loop Road to the existing Spring Street Reservoir, then along the existing 10-inch main from the reservoir to N.W. Spring Street. Total distance for the new water main would be approximately 1,400 LF.

Water service in proximity to the proposed reservoir site would require the installation and operation of a BPS. Water for the BPS would most likely originate from the transmission main serving the reservoir site.

Due the narrow existing roadway along N.W. Childs Road, access to the site is a concern. Construction of a new reservoir at the site would create a considerable amount of traffic, which would be short-term in nature but would still adversely affect nearby residents.

N.W. Bruin Country Road Site

This site is located northwest of N.W. Bruin Country Road on the western edge of Parcel No. 03101309120100 and in the southern portion of Parcel No. 03101300001900. As with the East of Childs Road site, this site was proposed in an attempt to match the reservoir hydraulics at the Los Altos Reservoir. Land for the construction of the reservoir would need to be purchased along with any land needed for an access road. Approximately 1,100 to 1,800 LF of 12-inch diameter transmission main would need to be installed between the new reservoir and Loop Road and it would either need to follow Jackson Drive or N.W. Bruin Country Road, then proceed onto private property. Similar to the East of Childs Road site, approximately 1,400 LF of 12-inch diameter pipe would be needed to connect N.W. Loop Road to N.W. Spring Street.

Water service in proximity to this site would require the installation of a water main and a connection to the existing 8-inch diameter water main on N.W. Bruin Country Road, which would be part of the Strawberry Mountain pressure zone.

North of Spring Street Reservoir

This site is in the northwest portion of Parcel No. 031002375000400, just north of the City’s existing Spring Street Reservoir. This site was proposed because of its proximity to the Spring Street Reservoir and the existing 14-inch diameter transmission main, and to match the hydraulics of Los Altos Reservoir. Land would need to be purchased and an easement acquired for an access road from either N.W. Loop Road or N.W. Spring Street to the site. As with the East of Childs Road and N.W. Bruin Country Road sites, approximately 1,400 LF of 12-inch diameter pipe would need to be installed to replace the existing 10- and 14-inch diameter water mains between N.W. Loop Road and N.W. Spring Street.

Water service in and adjacent to this reservoir site would require the installation of a water main and a connection to either North Main Avenue or N.W. Spring Street, both of which are connected to the Strawberry Mountain pressure zone.

Summary of Potential Reservoir Sites

Of the sites reviewed, two sites are recommended for further investigation: the N.W. Bruin Country Road and the North of Spring Street Reservoir sites. The Strawberry Mountain Reservoir site has limitations requiring the new reservoir be relatively tall compared to other reservoirs in the City. The East of Childs Road site appears to be a suitable site but access on existing N.W. Childs Road for construction and other traffic are a concern.

Tanks for storage of potable water are usually constructed out of either concrete or steel. Each type of tank material has its advantages and disadvantages.

A number of different designs and methods for constructing a concrete tank exist. Some tanks use reinforced concrete while others use a prestressed, post-tensioned design. Tanks can also be constructed with poured-in-place concrete or precast concrete can be utilized. The advantages of a concrete tank include the ability to withstand seismic forces, the ability to fully or partially backfill against the tank walls, and low maintenance. The disadvantages of a concrete tank are the increased load this type of tank applies to the underlying soil and the cost.

Steel tanks are constructed with structural steel that is either welded or bolted together. Typically, the steel is manufactured off site, then delivered and assembled on site. To protect against corrosion, a coating is applied to both the exterior and interior of the tank. The interior of a steel tank is typically coated with an epoxy- or enamel-type finish that has a typical life expectancy of approximately 20 years with proper care and maintenance. One type of tank that has been popular in recent years is glass-fused-to-steel bolted tanks. With this type of tank, a 10 to 14 mil glass coating is applied to the steel to provide a protective coating. The life expectancy of this type of tank is estimated to be over more than 40 years. The main advantage of a steel tank is lower construction and installation costs when compared to a concrete tank. The primary disadvantage of a steel tank is the associated maintenance. Cathodic protection and periodic refurbishing of the steel tank surfaces is required to maintain the tank. While the glass-fused-to-steel bolted tanks do not need periodic refurbishing of the tank walls, these types of tanks generally cost more than epoxy-coated bolted tanks.

The most cost-effective tanks with capacities of 1.0 MG are prestressed, post-tensioned concrete tanks; welded steel tanks; and glass-fused-to-steel tanks. The prestressed, post-tensioned concrete tank is likely to have the highest capital cost but could be shown to be competitive with a life-cycle analysis comparison to other tanks.

Hydraulic Capacity Analysis of the Distribution System

The City's water distribution system was evaluated for its hydraulic capacity using a computer model that was compiled and based on the known system layout and anticipated operating conditions. The hydraulic model for this WSP was based on previously developed hydraulic models and incorporated into Innovyze Info Water Pro 4.0, Update No. 3, which is a state-of-the art software tool that has a platform built on ArcGIS Pro and is primarily used in the analysis and modeling of water distribution systems. The program employs mathematical algorithms based on hydraulic principles to predict system pressures and flow rates within a water system. Fire flows are important since the magnitude of these flows typically dictates the necessary hydraulic capacity of the water system.

The distribution system was defined using the City's existing water system map and previous water model. The information included pipe diameters, materials, and locations. The elevations of the reservoirs and each junction were defined using topographic data within the original model and the elevation of the outlying areas based on a USGS map and Google Earth Pro program of the area. City staff provided other system information such as valve conditions, hydrant locations, and reservoir details. The compiled model contained 455 nodes or junctions and 182 hydrants.

In modeling the distribution system, the following assumptions were made. Nominal pipe diameters were used to model the distribution system. Hazen-Williams roughness coefficients were used to account for the headloss through the pipe generated by friction with the wall and the reduction in diameter based on the material type and buildup. This method has been shown to generally give conservative values. Individual minor losses from valves and fittings are included with the roughness factors in the pipes.

Two flow scenarios were evaluated using the hydraulic computer model: PHD and Fire Flow under MDD conditions. These flow scenarios are discussed below in further detail with additional documentation included in Appendix E. Since the existing hydraulic model was previously calibrated, further reconciliation and calibration of the model for this WSP were not performed. Other than adding recently installed pipelines into the model, the only other significant change in the model was that the valve at intersection of N.W. Lincoln Street and N.W. Garfield Street, which provides water from the Los Altos Reservoir to the Spring Street Pressure zone, was shown as fully open. In the previous model, the valve was shown as only partially open to mirror the City's operation at the time of the previous modeling effort.

Scenario No. 1 - Peak Hourly Demand

The first scenario evaluated the system's response under the PHD condition. The demands for major water users were placed in appropriate locations and the rest of the demand was distributed evenly throughout the system. Under this condition, the model was run with the ES in the reservoirs depleted. In accordance with Chapter 5, WAC 246 290-230, the pressure throughout the distribution system must be at least 30 psi under PHD.

The PHD condition in the City's water system was satisfied in all pressure zones, except the Los Altos and Spring Street pressure zones. The junctions directly adjacent to the reservoirs were not considered deficiencies since there are no services at these junctions.

- **Los Altos Pressure Zone** - Several junctions (274, 281, 380, and 968) on Palos Verdes, Rio Vista, and N.W. Street had pressures below 30 psi during the PHD. Low pressure at these locations is due to the small relative difference in the elevations of the water level in the Los Altos Reservoir compared to the elevation of the specific junctions.
- **Spring Street Pressure Zone** - Several junctions (497, 499, and 511)) on Hillside Lane and N.W. Cherry Street had a pressure below 30 psi during PHD. This low pressure is due to the relative elevation at this location compared to the elevation at the Spring Street Reservoir.

Scenario No. 2 - Fire Flow Under Maximum Daily Demand Conditions

The second scenario evaluated the system's response under fire flow conditions at each hydrant during MDD conditions. The flow scenario provides very conservative model conditions (MDD flow, depleted SB storage/FSS reservoir capacity) to ensure fire flow can be maintained while protecting the system from low pressures. In reality, the system will provide more fire flow than what is shown from the model, especially when the reservoirs have a substantial amount of water. However, limitations in the system (e.g., insufficiently sized pipe) can result in draining water from upper parts of the system that can create low pressure conditions and potential backflow events. The Scenario No. 2 model results were used to determine the flow limitations in the distribution system.

For Scenario No. 2, a specific fire flow demand (1,000 gpm or 2,000 gpm, depending on location) was placed at each hydrant, one at a time, and the MDD was distributed throughout the system. If any location in the pressure zone was below 20 psi, the demand was reduced and the simulation repeated. This procedure continued until all of the locations were supplied with a minimum of 20 psi. Based on the calculated fire flow requirement for that particular hydrant, the hydrant either passed or failed the flow test.

Every pressure zone had hydrants unable to meet the Scenario No. 2 conditions. The majority of these hydrants were on 6-inch diameter or smaller lines that were not sufficiently looped (i.e., dead-end main or too small diameter looped mains) to provide the required fire flow. A discussion of the deficient hydrants by pressure zone is provided below.

Childs Pressure Zone

Insufficient fire flow was observed in the Wallace Subdivision (Forester Lane, Wallace Drive, and Wallace Road). The distribution system in this area is 6-inch diameter and is not capable of providing 1,000 gpm at Scenario No. 2 conditions.

Brislawn Pressure Zone

Sunset Circle (Nodes 920, 923-926) has insufficient fire flow. The lack of fire flow appears to be due to an existing 6-inch PRV and mains, and flow from only one direction since the valve on S.W. Martin Road is closed to isolate the Brislawn pressure zone from the Los Altos pressure zone.

With the proposed Transmission Main Replacement Phase II improvements, water to the Brislawn area would be provided by the new transmission main on SR 141 with a new 8-inch diameter line along Brislawn Road. A new PRV station would reduce pressure provided to this area and, with proper adjustment, allow the valve at Martin Road to be open. However, until the 2-inch diameter water main on Martin Road is upgraded, the connection would contribute little to fire flows in the area.

Los Altos Pressure Zone

Hydrants without sufficient fire flow in this pressure zone include Rio Vista (H980), Westview Lane (H954), N.W. Loop Road at SR 141 (H927), N.W. Kennedy Lane (H986), Maxwell (H965), Jewett (SR 141) at Waubish (H964), and N.W. Lincoln Street (H967, H968). Except for the noted hydrants on N.W. Lincoln Street, the above hydrants with insufficient flow were on 6-inch diameter or smaller lines and in most cases were insufficiently looped (i.e., dead-end mains). Insufficient fire flow on N.W. Lincoln Street is projected for hydrants off an elevated section of the 10-inch diameter main. In reviewing hydrant flow limitations downstream (i.e.: Spring Street and Hospital pressure zones), the limiting hydrant or node (H968) at the intersection of N.W. Lincoln Street and El Camino Real appears to be due to a combination of higher elevation and friction losses from the existing 8-inch diameter pipe on Palos Verdes and a portion of Rio Vista to the Los Altos Reservoir.

Eyrie/Los Altos Pressure Zone

Since the Eyrie PRV is not currently in service, this area is currently in the Los Altos pressure zone. Hydrants without sufficient fire flow include Eyrie Road (H948-950), Panaroma Point (H939-40, H944), S.W. Pucker Huddle Road (H942), S.W. Stratton Road (H943), S.W. Peck Road (H902), and Apgar Court (H902). The limitation to fire flow in these areas is due to undersized pipe (6-inches or less) without proper system looping.

Strawberry Mountain Reservoir Pressure Zone

While the Strawberry Mountain Reservoir BPS was upgraded with pumps with a greater flow capacity, these pumps were not able to convey over 1,000 gpm within the pressure zone. All three hydrants in this pressure zone did not reach 100 gpm at 20 psi conditions at MDD conditions.

Strawberry Mountain Pressure Zone

Hydrants without sufficient fire flow were observed on Rio Vista (H973, H980), Alta Vista (H973), El Camino Real (H972), Kiowa Lane (H1134), Schoolview Place (H1011) and N.W. Loop Road (H1003). With exception of the hydrant on N.W. Loop Road, the fire flow at the noted hydrants was not obtained due to 6-inch diameter mains located on dead-end mains. The hydrant at N.W. Loop Road is on an 8-inch main but could only obtain around 1,300 gpm in the 2,000 gpm required fire flow area. Flow capacity at this hydrant (H1003) is limited by flow coming from only one direction.

North Main/Simmons Road Pressure Zone

Hydrants (H994, H1004) without sufficient fire flow (approximately 1,300 gpm versus the required 2,000 gpm) are off N.W. Bruin Country Road next to Heinke Middle School and Columbia High School. Fire flow capacity is limited at this location due to flow coming from only one direction.

Spring Street Pressure Zone

Numerous hydrants in this pressure zone were identified with insufficient fire flow. Areas with insufficient fire flow of less than 1,000 gpm include N.W. Cherry Street (H1031), N.E. Cherry Street (H1032, H1034), N. Main Avenue (1037), N.E. Estes Avenue (H1041), N.E. Wauna Avenue (H1042, H1047), N.E. Skagit Avenue (H1044), Riverwatch Drive (H1026-27), S.E. Oak Street (H1060), N.E. Vine Street (H1077, H1080), N.E. O'Keefe Avenue (H1055), N.E. Center Street (H1073, H1076), and N.E. Orchard Avenue (H1076). The flow at these hydrants is adversely affected primarily by undersized piping (6-inch diameter and less).

Hydrants with fire flow less than 2,000 gpm in the downtown area include E. Jewett Boulevard (H1025, H1061-1063, H1066, H1069, H1283-84), North Main Avenue (H1019-20, H1028), N.W. Garfield Avenue (H1024), N.E. Lincoln Street (H1021-22), N.E. Estes Avenue (H1049), N.E. Pioneer Place (H1057), and N.E. Tohomish Street (H1050-51). The model fire flows in the downtown area are being restricted by the node at the intersection of N.W. Lincoln Street and El Camino Real (H968). The fire flow in this area can be increased by resolving the restriction. A proposed solution for the restriction is discussed in the Hospital pressure zone section. The solution resolves all of the deficient fire flows in the downtown area, except on N.E. Tohomish Street (H1050, served by 4- and 6-inch diameter mains) and N.E. Pioneer Place (H1057, served by 6-inch diameter mains).

Hospital Pressure Zone

One hydrant (H1093) was modeled to show less than 1,000 gpm and all the hydrants near the hospital (H1084 to H1088, H1230, H1537) were shown as not being able to meet 2,000 gpm (approximately 1,300 gpm). The model results were different than previous modeling results for the design of the Jewett Water Main Improvements project, which showed that over 2,000 gpm was attainable with the new 8-inch diameter and 12-inch diameter pipe installed as part of the project. The discrepancy in the model results is attributed to the previous model having the flow contribution from the Los Altos pressure zone restricted by a partially closed valve at the intersection of N.W. Lincoln Street and N.W. Garfield Avenue. Since this flow restriction is no longer present (valve is open), the model suggests a substantial amount of the fire flow is coming from the Los Altos Reservoir and pressure zone.

As previously discussed, the model fire flow is being restricted in this area by hydrant at the intersection of N.W. Lincoln Street and El Camino Real (H968). From additional modeling of the system, the installation of a new 12-inch diameter main from the Los Altos Reservoir to Rio Vista, then to N.W. Lincoln Street would eliminate the flow limitation on N.W. Lincoln

Street and bring fire flows in the Hospital pressure zone up to and above required values for all hydrants, except H1088 and H1230, which are both served by 6-inch diameter mains.

Flow Capacity into the City

City staff reports a flow of 2,000 gpm could originate from Childs Reservoir before the installation of the new Buck Creek 16-inch transmission main. During high water demands in the summer 2012, only 1,500 gpm could be conveyed to the City. Since the specific system conditions (i.e., reservoir levels and water demand) for these two flow rates are unknown, duplicating these two scenarios is difficult.

Using computer hydraulic modeling of the City's water system, the maximum peak flows with MDD flow conditions (conservative value of 2.55 million gallons per day [MGD]) were calculated for different pipe diameters in the 2014 WSP. These calculations assumed the Spring Street Reservoir flow was limited to 500 gpm and the Los Altos Reservoir water elevation was down 2 feet. The calculated transmission main flows under these "normal" conditions are summarized on Table 3-12.

TABLE 3-12
PREDICTED PEAK TRANSMISSION MAIN FLOWS

Pipe Diameter	Total Main Flow (gpm)
14-inch Existing	1,551/1,735
16-inch	2,400
20-inch	3,300

The calculated peak flow with the existing 14-inch pipe of 1,551 gpm is close to the value reported by City staff. Additional modeling of the transmission main capacity was performed at peak hour demand conditions with the Los Altos Reservoir water and Spring Street water level elevations at 888.0 feet (approximate 11 feet and 1-foot below normal high water levels in Los Altos and Spring Street Reservoirs, respectively). Under these conditions, the existing transmission main can convey approximately 1,735 gpm, which is considered a measure of the existing transmission main capacity during peak flow conditions.

The reason for the higher 2,000 gpm with the Childs Reservoir is unknown. With new, larger diameter pipe the flow capacity of the transmission main is predicted to be substantially higher, ranging from 2,400 to 3,300 gpm. The MDD flow for 2044 without DSL reduction or water conservation is 3.38 MGD, or approximately 2,348 gpm. The minimum size for a future transmission main would be 16 inches in diameter. However, additional capacity could be obtained with either an 18- or 20-inch diameter pipe.

For this WSP, the installation of a 20-inch diameter pipe is recommended for replacement of the existing 14-inch main from the existing 20-inch diameter line near the Childs Reservoir connection to the intersection of N.W. Childs and Loop Roads.

While the Buck Creek WTP is limited to 1,000 gpm in capacity, the peak or instantaneous flow in the transmission main downstream of Reservoir No. 1 could be greater. Based on computer hydraulic modeling of the system, a peak flow of approximately 2,100 gpm could occur in the Buck Creek transmission main without causing a vacuum. Under these peak flow conditions, the water inside Reservoir No. 1 would drop to just above an elevation of 1,037 feet and remain there. The water level within the outlet pipe and transmission main would also drop, allowing air into the main. The peak flow would then continue until the water level and hydraulic grade line in the Buck Creek transmission main matched the hydraulic grade line at the Childs Reservoir. Once the hydraulic grade lines between the two systems matched, then the flow from Buck Creek would be the same as the WTP production (up to 1,000 gpm) and any flow in excess of the WTP production would come from Childs Reservoir. However, flow from Childs Reservoir currently occurs only when peak demand is high and lasts long enough to exceed the Buck Creek transmission main peak flow and WTP flow.

Physical Capacity Analysis

The physical components of a water system, when properly designed, operated, and constructed, provide the infrastructure for the water system's physical capacity to serve its customers under peak demand conditions. The analysis of a system's physical capacity is based on the water system's ability to meet peak demand. One means of evaluating the physical capacity of a water system is through hydraulic modeling of the system at PHD and MDD plus fire flow conditions. An evaluation was completed and the results of the hydraulic modeling were discussed earlier. The other avenue to evaluate a water system's physical capacity is analyzing the ability of system components to meet the MDD. Chapter 6 of DOH's Water System Design Manual (2020) establishes the basis for the physical capacity analysis of a system.

The basic unit of a water system's physical capacity is the ERU (WAC 246-290-222). The number of ERUs a water system can accommodate is based on physical and legal constraints. Two flow-based ERU values are needed for the physical capacity analysis: ADD per ERU (ADD/ERU) and MDD per ERU (MDD/ERU). The ADD/ERU value was calculated and is discussed in Chapter 2. The ADD/ERU value is 215.5 gpd per ERU. The MDD/ERU was calculated using the MDD source water demand and the number of ERUs calculated in Chapter 2; the MDD/ERU value is 554 gpd per ERU.

Since the City is in the process of pilot testing its ASR system on Well No. 2, the physical capacity analysis also included the projected ASR retrieval flow rate of 425 gpm. Since the City of White Salmon provides excess water to the City of Bingen for potable water use, SB storage for Bingen was not included in the physical capacity calculations. The bases and calculations for the physical capacity analysis are summarized in Appendix E. The physical capacity of the City's overall water system is summarized on Table 3-13.

TABLE 3-13
OVERALL SYSTEM PHYSICAL CAPACITY

	Current/Enhanced ASR at Well No. 2	
Component	**ERUs**	**Value**
Existing ERUs	4,206	-
Water Rights, Qa	6,067	5.2 cfs, 2,334 gpm
Water Rights, Qi	6,081	1,468 ac-ft

Component	Current/Enhanced ASR at Well No. 2	
	ERUs	**Value**
Source Capacity - Buck Creek, Well No. 1, and Well No. 2/ASR	4,419/5,004	2.45/2.77 MGD
Transmission Main[1]	4,510	1,735 gpm
ES	4,511/4,877	170,000 gallons
SB Storage	4,259	1,703.8 MG

[1] Proposed new and existing 16-inch and new 20-inch diameter main would increase transmission main capacity to 3,300 gpm and provide a physical capacity of 8,578 ERUs.

The City's current water system has sufficient physical capacity for the present water demands. The transmission main capacity is barely sufficient for current water demands. The City has initiated the design of a new 16- and 20-inch diameter pipeline to replace the existing 14-inch diameter transmission main, known as the Transmission Main Replacement Phase I and Phase II projects.

The other water system components to note are the source capacity and reservoir storage. Currently, the City has sufficient source capacity to handle the MDD demand. However, with growth and increased water demand, source capacity will likely be a concern in the future. Reducing the current or limiting growth of future MDD demand could partially correct the source capacity deficiency. As shown on Table 3-16, enhanced ASR production could increase the City's source capacity capability to above the current demand. For the long-term, the City should continue its evaluation of water diversion and treatment from the White Salmon River and other potential new water sources, and its efforts for better water use efficiency (especially reducing MDD demand).

ES and SB storage are the next limiting physical capacity components. As discussed earlier, construction of a nominal 1.0 MG reservoir to replace the existing Spring Street Reservoir and construction of a nominal 300,000-gallon reservoir at the Strawberry Mountain Reservoir parcel were recommended.

Childs Collective Pressure Zone

The Childs Collective pressure zone includes the Brislawn, Buck Creek/Childs, Forester Lane, and Lakeview Lane pressure zones, which are served by the Childs Reservoir and the City's water sources. The physical capacity of this pressure zone is provided on Table 3-14 with the current capacity and future capacity with the transfer of the Brislawn pressure zone.

TABLE 3-14
CHILDS COLLECTIVE PRESSURE ZONE SYSTEM PHYSICAL CAPACITY

Component	Current/Transfer of Brislawn	
	ERUs	**Value**
Existing ERUs	236/177	-
Source Capacity	4,419	2.45 MGD
ES	N/A	-
SB Storage	401	160,938 gallons

This pressure zone has sufficient physical capacity. The transfer of the Brislawn pressure zone to the Los Altos pressure zone does not affect the SB storage; the transfer appears to simply reduce the number of ERUs in the system.

Strawberry Mountain Collective Pressure Zone

This collective pressure zone includes Strawberry Mountain, the Strawberry Mountain Reservoir, North Main/Simmons Road, and Michigan Road pressure zones. The physical capacity of the City's Strawberry Mountain Collective pressure zone was also reviewed, as the pressure zone is supplied solely by the Los Altos BPS and evaluated with the transfer of the North Main/ Simmons Road pressure zone to the Los Altos/Spring Street pressure zone. The physical capacity of the Strawberry Mountain Collective pressure zone is summarized on Table 3-15.

TABLE 3-15
STRAWBERRY MOUNTAIN COLLECTIVE PRESSURE ZONE SYSTEM PHYSICAL CAPACITY

	Current/Transfer of North Main/Simmons Road	
Component	**ERUs**	**gpd/gallons**
Existing ERUs	599/338	-
Source Capacity, Los Altos BPS	542/542	300,000 gpd
ES	532/364	34,950 gallons/16,000 gallons
SB Storage	318/362	127,250 gallons/144,700 gallons

The current pump capacity of the Los Altos BPS and the reservoir capacity of the Strawberry Mountain Reservoirs are insufficient to meet present demands. To provide sufficient capacity for the Strawberry Mountain pressure zone, the construction of a new BPS to serve the North Main/Simmons Road pressure zone is recommended using the Spring Street Reservoir as the water source for this zone. By transferring the North Main/Simmons Road pressure zone, surplus physical capacity is restored to the Strawberry Mountain pressure zone. While the transfer of the North Main/Simmons Road pressure zone remedies the present physical capacity deficient, additional reservoir storage capacity at Strawberry Mountain would be needed by 2031. An additional 64 ERUs (402 total) could be achieved if the Los Altos BPS capacity were increased above the PHD for the reduced Strawberry Mountain pressure zone.

Los Altos/Spring Street Collective Pressure Zone

This collective pressure zone includes the Los Altos, Eyrie, Spring Street, Dock Grade, Riverfront, and Hospital pressure zones. The physical capacity for this pressure zone (current and with the addition of Brislawn and North Main/Simmons Road pressure zones is provided on Table 3-16.

TABLE 3-16
LOS ALTOS/SPRING ST COLLECTIVE PRESSURE ZONE SYSTEM PHYSICAL CAPACITY

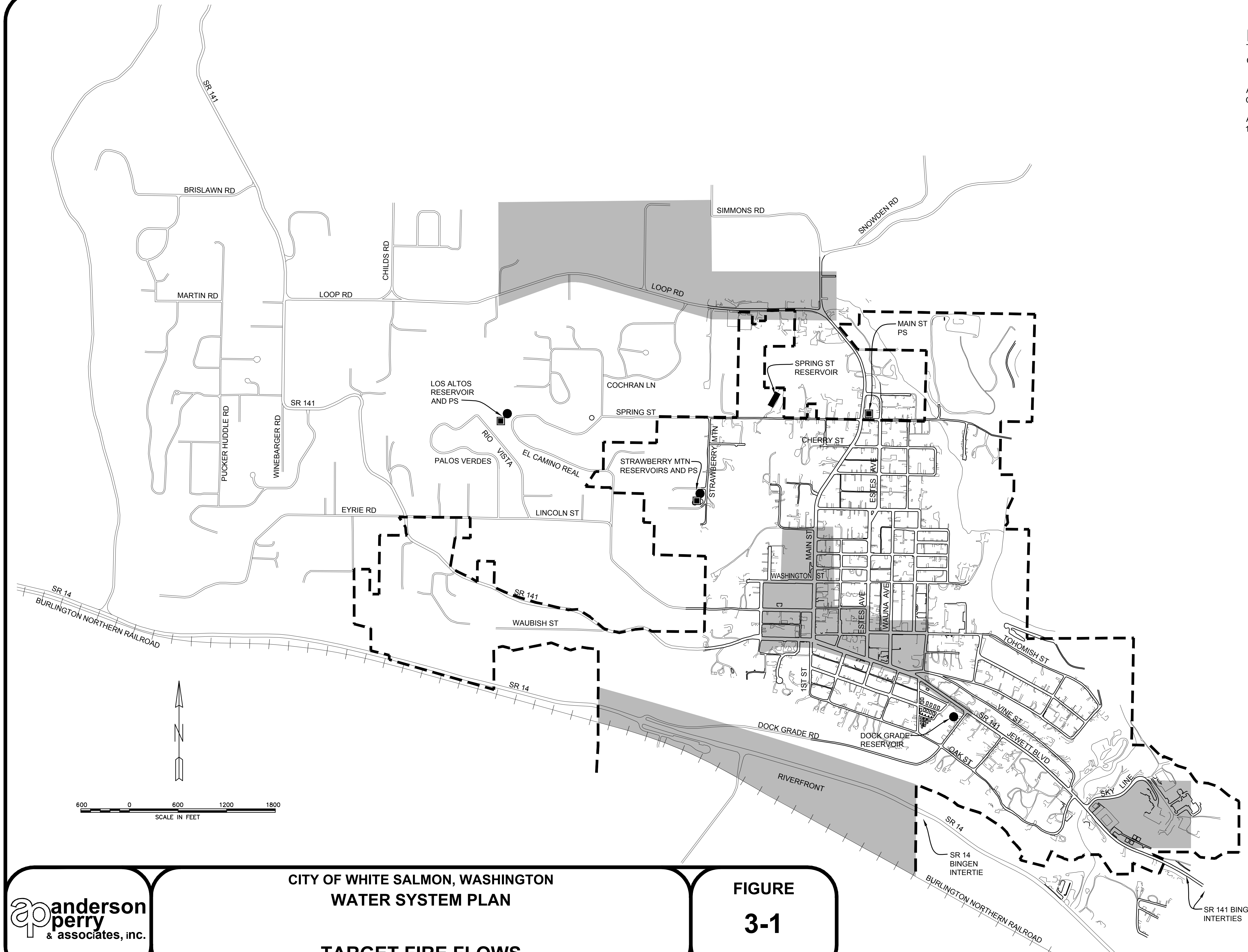
Component	Current/Addition of Brislawn and North Main/Simmons Road	
	ERUs	MG
Existing ERUs	2,607/2,666	-
ES	N/A	-
SB Storage	3,880/3,866	1.55/1.52

System Deficiencies and Proposed Improvements

System deficiencies were previously identified by the computer hydraulic modeling and from the overall review of the City's system. The proposed improvement projects to resolve or eliminate these deficiencies are summarized in this section.

The identified water system improvements were categorized by the type of improvement: sources, reservoirs, pump stations, transmission mains, distribution system mains, fire hydrants, PRV stations, and telemetry and SCADA systems.

The system deficiencies and proposed improvement projects are shown on Figures 3-6 and 3-7 and are summarized by improvement type on Figure 3-8. These improvements are discussed along with other program improvements in Chapter 8.



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CITY OF WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN

TARGET FIRE FLOWS

FIGURE
3-1

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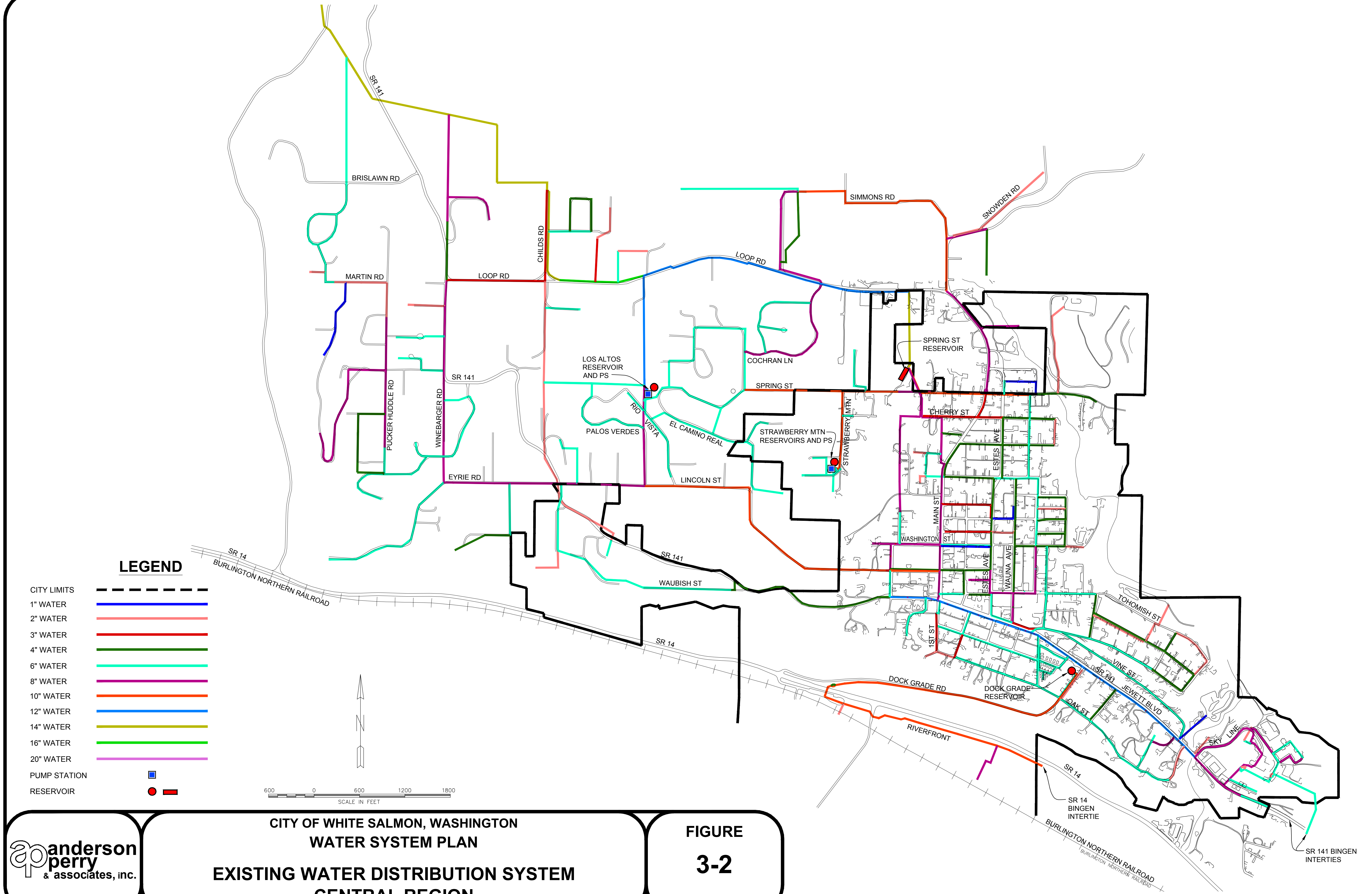

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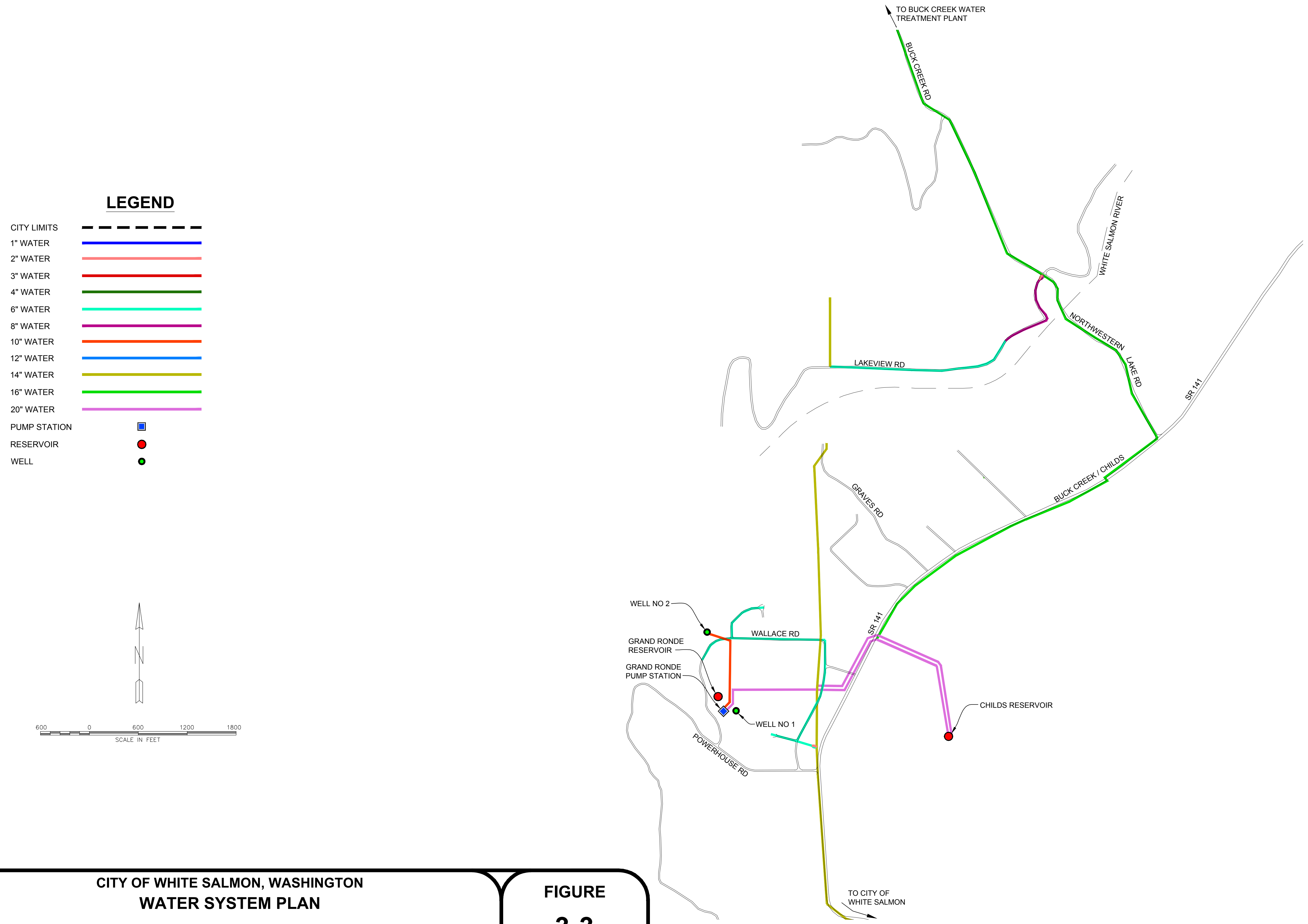
CITY OF WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN

EXISTING WATER DISTRIBUTION SYSTEM CENTRAL REGION

FIGURE
3-2



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CITY OF WHITE SALMON, WASHINGTON

WATER SYSTEM PLAN

EXISTING WATER DISTRIBUTION SYSTEM NORTHERN REGION

FIGURE

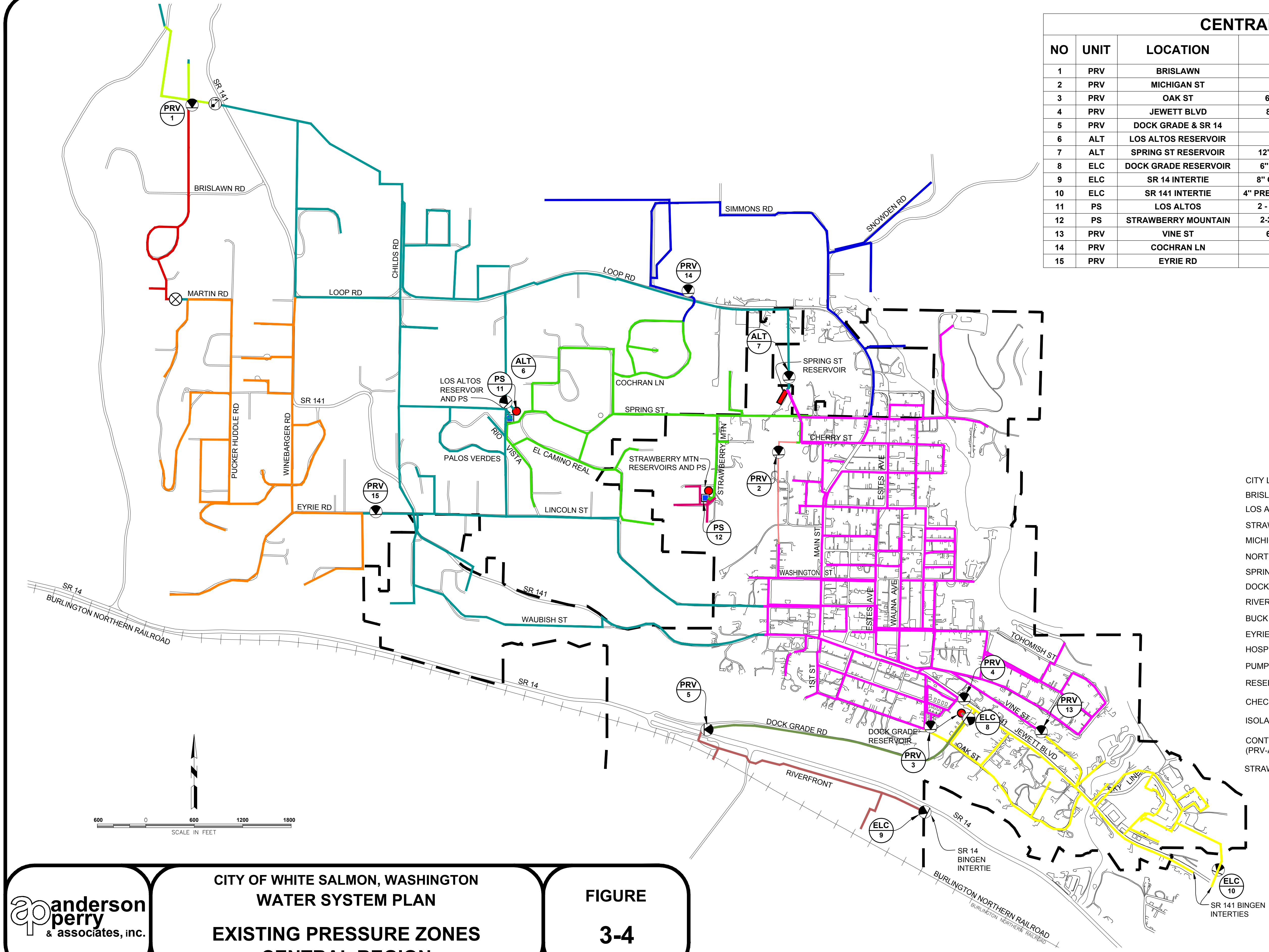
3-3

R:\Clients\White Salmon\250-12 Water System 2021\020 Planning-Studies\Figures\Fig 3-3 Existing Water Dist System-North.dwg, 11/8/2022 8:34:54 AM

R:\Clients\White Salmon\250-12 Water System 2021\020 Planning-Studies\Figures\Fig 3-4 Existing Pressure Zones 2021.dwg, 11/11/2022 7:21:57 AM

CENTRAL REGION

NO	UNIT	LOCATION	MAINLINE	BYPASS
1	PRV	BRISLAWN	4" CLA 90G-01AB	NONE
2	PRV	MICHIGAN ST	6" CLA 90G-01BY	NONE
3	PRV	OAK ST	6" CLA 92G-01 BVCSVKC	2" CLA 90G-01BCSVYKC
4	PRV	JEWETT BLVD	8" CLA 92G-01BVCSVKC	2" CLA 90G-01BCSVYKC
5	PRV	DOCK GRADE & SR 14	10" VLA 690G-01YBCS	4" CLA 690-01YBCS
6	ALT	LOS ALTOS RESERVOIR	8" CLA 210-27BY	NONE
7	ALT	SPRING ST RESERVOIR	12" CLA 131G-36YB/50G-01B	NONE
8	ELC	DOCK GRADE RESERVOIR	6" CLA 92G-01B/58EG-01BS	NONE
9	ELC	SR 14 INTERTIE	8" CLA 131G-05ABCS W/X117	NONE
10	ELC	SR 141 INTERTIE	4" PRESSURE SUSTAINING VALVES	NONE
11	PS	LOS ALTOS	2 - DUPLEX 15 HP, CORNELL	N/A
12	PS	STRAWBERRY MOUNTAIN	2-2 HP/2-15 HP, GRUNDFOS	N/A
13	PRV	VINE ST	6" CLA 92G-01BVCSVKC	2" CLA 90G-01BCSVYKC
14	PRV	COCHRAN LN	6" CLA 92-01BVCSVKC	2" CLA 90G-01BCSVYKC
15	PRV	EYRIE RD	6" CLA 90G-01AB	NONE



LEGEND

CITY LIMITS	— — —
BRISLAWN RD	━━
LOS ALTOS	━━
STRAWBERRY MTN	━━
MICHIGAN RD	━━
NORTH MAIN/SIMMONS RD	━━
SPRING ST	━━
DOCK GRANDE	━━
RIVERFRONT	━━
BUCK CREEK/CHILDS	━━
EYRIE (FUTURE)	━━
HOSPITAL	━━
PUMP STATION	■
RESERVOIR	● ▬
CHECK VALVE	⊘
ISOLATION VALVE	⊗
CONTROL VALVE (PRV-ALT-ELC)	◐
STRAWBERRY RESERVOIR	- - - - - -

ABBREVIATIONS

ALT - ALTITUDE CONTROL VALVE
PS - PUMP STATION
ELC - ELECTRONIC CONTROL VALVE
PRV - PRESSURE REDUCING VALVE

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CITY OF WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN

EXISTING PRESSURE ZONES CENTRAL REGION

FIGURE
3-4

NORTHERN REGION

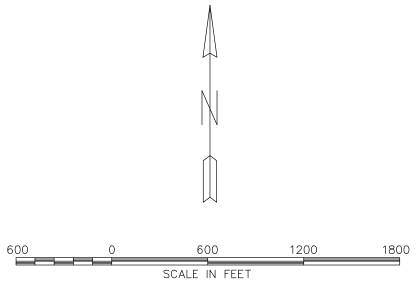
NO	UNIT	LOCATION	MAINLINE	BYPASS
14	PRV	LAKEVIEW	6" CLA 690-01BCSYKC	1.5" CLA 90G-01BCSYKC
15	PRV	FORESTER LANE	4" CLA 90G-01AB	1.5" WATTS
16	ELC	SR141 & CHILDS RES.	12" CLA 131G-02YBCS W/X117	NONE
17	Well	WELL NO. 2	400 HP, TURBINE	N/A
18	Well	WELL NO. 1	100 HP, SUBMERSIBLE	N/A
19	PS	A & B, GRAND RONDE	250 HP TURBINE	N/A
20	PS	C, GRAND RONDE	100 HP TURBINE	N/A
21	ASR	WELL NO. 2 ASR	10" 136 DG-01BSY 8" 631G-CT-BCSY	-
22	ASR	WELL NO. 2 ASR RELIEF	4" 58G-BCSY 01BS	NONE
23	PRV	FIRE HYDRANT	4" 94G-01BVYKC	3/4" 55F

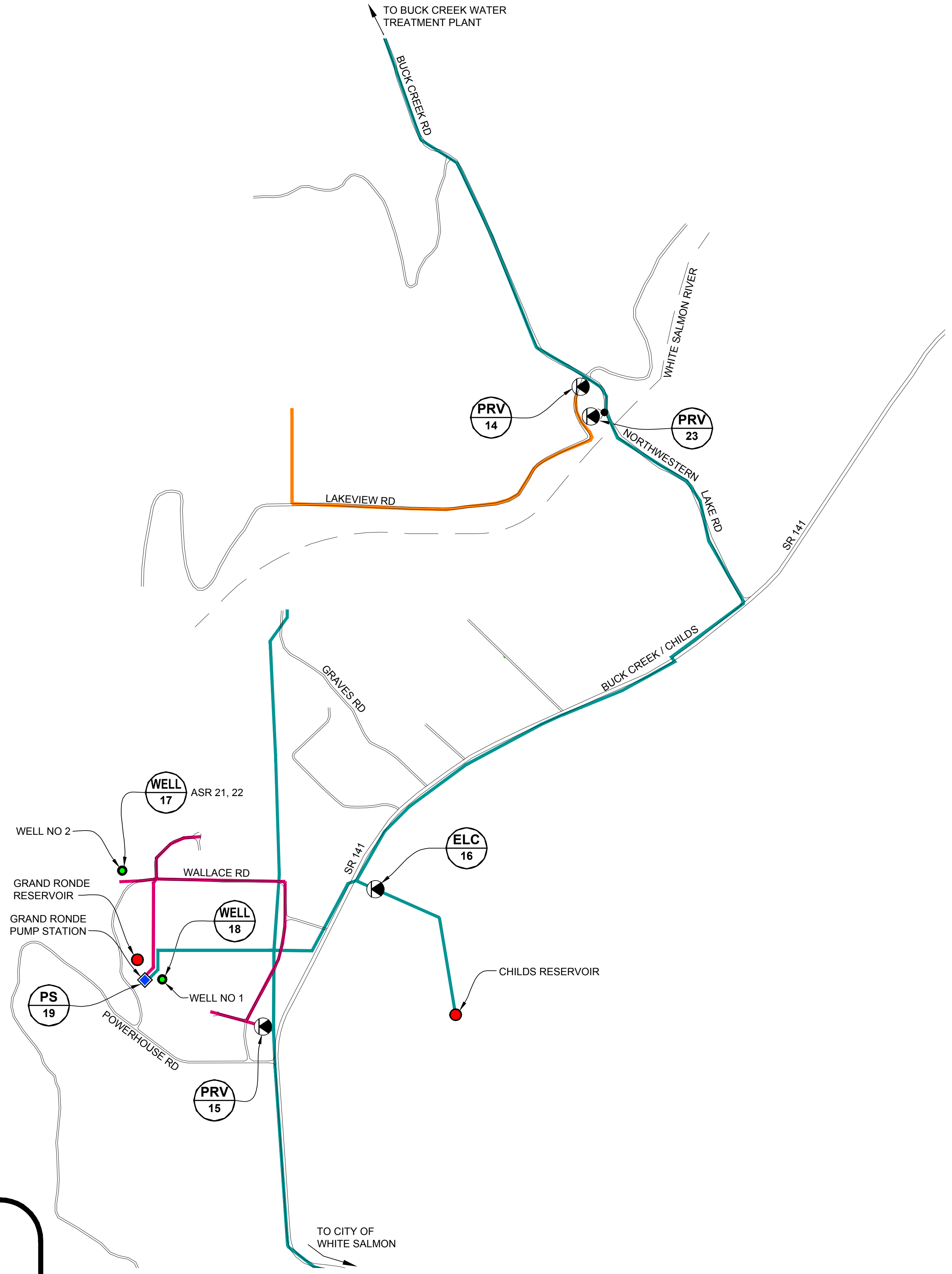
LEGEND

BUCK CREEK/CHILDS	🟩
LAKEVIEW RD	🟧
FORESTER LANE	🟪
PUMP STATION	🟦
RESERVOIR	🔴
CHECK VALVE	⊘
ISOLATION VALVE	⊗
CONTROL VALVE (PRV-ALT-ELC)	◐

ABBREVIATIONS

ALT - ALTITUDE CONTROL VALVE
PS - PUMP STATION
ELC - ELECTRONIC CONTROL VALVE
PRV - PRESSURE REDUCING VALVE





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CITY OF WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN

EXISTING PRESSURE ZONES
NORTHERN REGION

FIGURE
3-5

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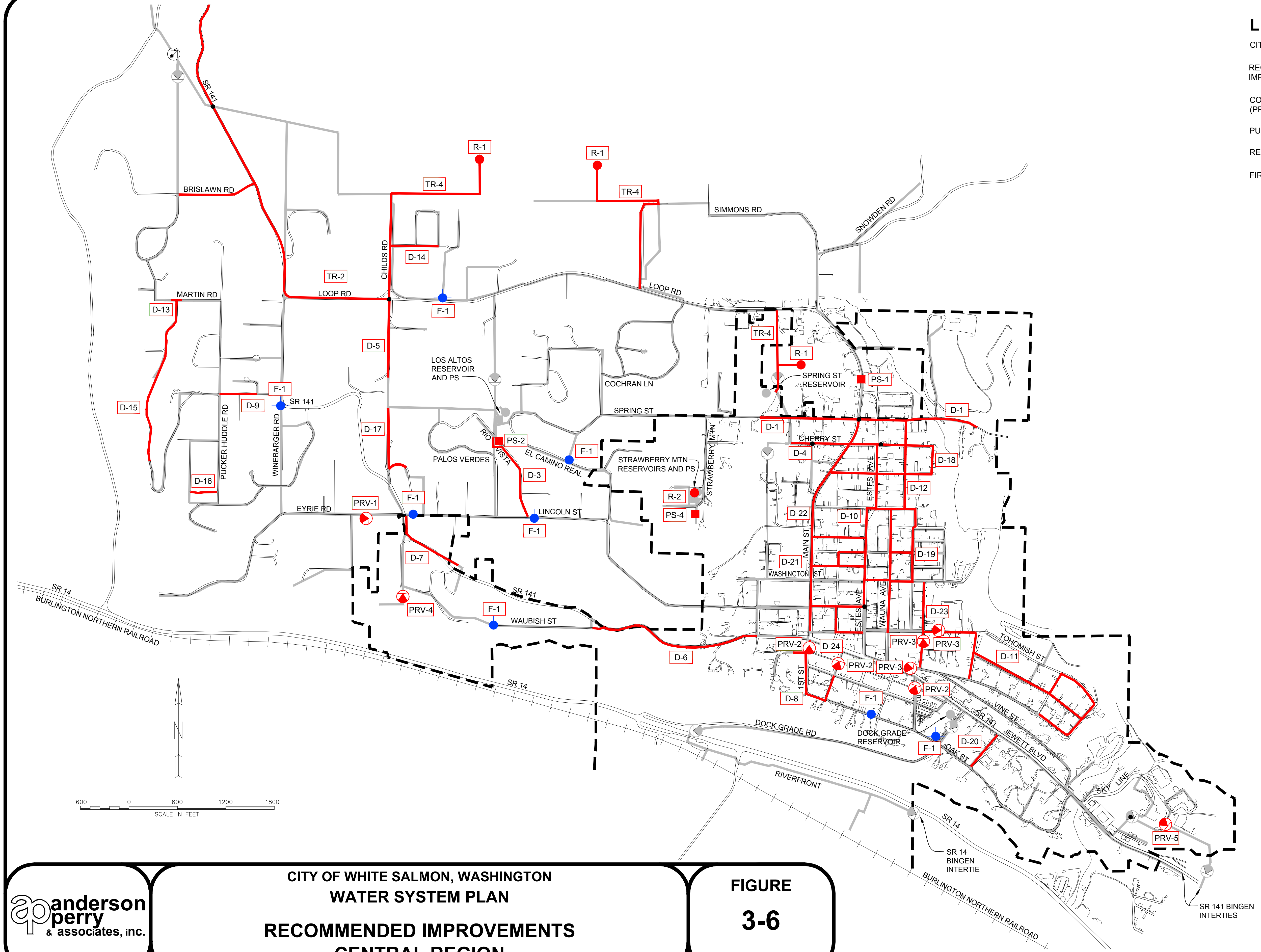

LEGEND

CITY LIMITS	‒ ‒ ‒
RECOMMENDED IMPROVEMENTS	―
CONTROL VALVE (PRV-ALT-ELC)	◔
PUMP STATION	■
RESERVOIR	●
FIRE HYDRANT	⊕

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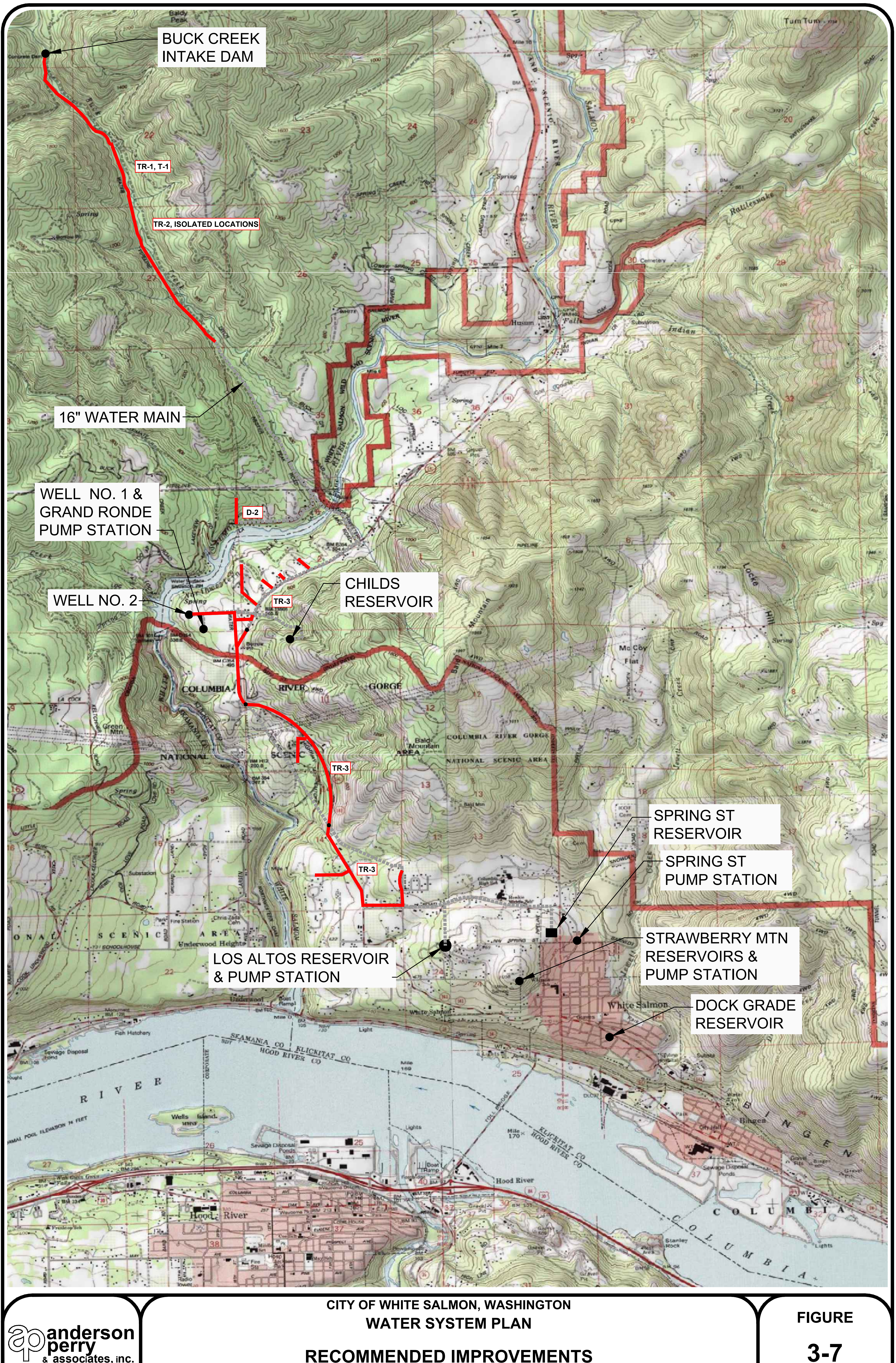
CITY OF WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN

RECOMMENDED IMPROVEMENTS CENTRAL REGION

FIGURE
3-6

R:\Clients\White Salmon\250-12 Water System 2021\020 Planning-Studies\Figures\Fig 3-6 Recommend Imp 1.dwg, 11/11/2022 7:23:16 AM



R:\Clients\White Salmon\250-12 Water System 2021\020 Planning-Studies\Figures\Fig 3-7 Recommend Imp 2.dwg, 11/8/2022 8:40:44 AM

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CITY OF WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN

RECOMMENDED IMPROVEMENTS
NORTHERN REGION

FIGURE
3-7

CITY OF WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN
SUMMARY OF WATER SYSTEM DEFICIENCIES AND PROPOSED PROJECTS

No.	Improvement	Reason
Sources		
S-1	**Buck Creek WTP Roof Restoration and Improvements** - Replace existing roof sheathing with marine-grade plywood, along with a vapor barrier and new roof. Raise the existing roof trusses 12 inches to increase clearance between the sand and bottom truss chord.	Due to passive ventilation in the building and the use of general building type plywood, the plywood sheathing on the roof structure is deteriorating in several places. During sand scraping of the filter, low clearance between the bottom chord of the roof trusses and the sand creates cleaning difficulties and safety issues for City staff.
S-2	**Roughing Filter for Buck Creek WTP** - Construct a gravel upflow roughing filter at the location of the existing settling basin and construct a new sedimentation basin with piping between the roughing filter and sedimentation basin.	Due to high turbidity events in Buck Creek that the WTP cannot effectively treat, the WTP must be taken offline at times during the winter. A roughing filter would reduce solids loading to the slow sand filters and allow increased water production over a wider range of raw water turbidity conditions.
S-3	**White Salmon River Diversion and WTP** - Construct new infrastructure for diversion and treatment of water from the White Salmon River. The proposed WTP capacity would be 4.0 cfs based on the City's water rights from Buck Creek, Jewett Springs, and White Salmon River. Location and WTP treatment method need to be determined.	Additional source water is needed to provide for future demand, provide source redundancy for the system, and overcome withdrawal limits from Buck Creek during the warmer months. Reducing the City's withdrawals during the warmer months would increase streamflow in Buck Creek and improve conditions for aquatic habitat.
Reservoirs		
R-1	**New 1.0 MG Reservoir** - Construct a new reservoir at approximately the same elevation as the Los Altos Reservoir. Potential locations include off Childs Road, N.W. Bruin Country Road, and next to existing reservoir. Property would need to be purchased for any of these sites. This project requires simultaneous construction of Project TR-4.	The existing Spring Street Reservoir is more than 80 years old and has been considered a probable source of leakage. A new reservoir would provide more storage for future demands. To replace the existing Spring Street Reservoir volume and provide for future reservoir storage, a 1.0 MG capacity tank would be required.
R-2	**New 300,000-gallon Reservoir Tank at Strawberry Mountain** - Construct a new reservoir at the existing site.	Additional reservoir storage is needed to provide fire flow to the school area associated with the current North Main/Simmons Road pressure zone. The proposed capacity of the reservoir would match the volume of the existing reservoirs.
Pump Stations		
PS-1	**North Main Pump Station** - Construct a skid-mounted, multi-pump system with variable frequency drive to handle domestic and high flow demands. The system would be housed aboveground and have emergency backup power facilities. Project D-1 should be constructed in conjunction with this improvement.	A BPS is needed to address the reservoir capacity shortage in the North Main/Simmons Road and Strawberry Mountain pressure zones. The BPS would obtain water from the Spring Street Reservoir via a new water main connection between the existing 8-inch main in North Main and the existing 10-inch main at Spring Street and Main Street.
PS-2	**New Los Altos Booster Pump Station** - Construct a BPS with duplex constant speed pumps housed in an aboveground facility with emergency backup power facilities. This project should be completed in conjunction with Project D-1.	The underground pump station is considered a high risk for flooding and requires confined space entry. The station is showing signs of corrosion and does not have emergency backup power facilities. Additional flow capacity is needed to assist with high flow demands for the area served by the Strawberry Mountain Reservoirs.
PS-3	**ASR Booster Pump Station** - Install a vertical in-line booster pump to increase the pressure and flow for ASR at Well No. 2. This project is dependent on the construction of the new 12-inch water main installed as part of project TR-2.	To increase ASR flow into Well No. 2, a booster pump is needed to overcome the existing artesian pressure and "push" water into the aquifer of Well No. 2 to fully develop the aquifer's storage capacity.
PS-4	**New Strawberry Mountain Booster Pump Station** - Install a new pump station with increased high demand flow capacity (i.e., fire flow), emergency generator, and flowmeter. This project should be completed in conjunction with Project R-2 or earlier.	The current pump station does not have an emergency supply for power outages, a flowmeter on the pump discharge side, or the ability to convey 1,000 gpm of fire flow.
Transmission Mains		
TR-1	**Transmission Main Replacement Phase I -** Install approximately 12,500 LF of 16-inch water main adjacent to or on Buck Creek Road. Construction funding has been obtained from RD and PWB.	The existing main is more than 55 years old, known for areas of leakage, and is located on a trail that is difficult to access. Placement of the water main along Buck Creek Road would provide better access for maintenance and repair. Funding: RD loan and grant, PWB loan, and the City.
TR-2	**Existing Water Main Abandonment on DNR Property** - Demolish and abandon portions of the existing 14-inch diameter transmission main that will be out of service with the completion of Project TR-1. This work is to be performed jointly by the DNR and City staff.	The work is needed to comply with the City's easement with the DNR related to Project TR-1. City staff would be responsible for removing, disposing, and capping sections of the existing transmission main. DNR staff would perform the earthwork required for the transmission main and culvert pipe removal and surface restoration.
TR-3	**Transmission Main Replacement Phase II -** Construct approximately 14,500 LF of 20-inch and approximately 2,500 LF of 12-inch diameter main for the transmission main portion of the project and approximately 11,900 LF of 4-, 6-, and 8-inch diameter main to serve existing users. The project also includes 6- and 8-inch PRV stations, fire hydrants, new service lines, and new water meters.	A larger diameter transmission main is needed to convey the current and projected MDD flow and to replace the existing 14-inch steel transmission main. The new 12-inch main would provide a direct connection between the 16-inch main used to convey water from the Buck Creek WTP to Well No. 2 for ASR and would allow the City to use Well No. 1 during ASR. A new distribution system of 4- and 8-inch pipe is needed to provide service to existing users who are not adjacent to the new 20-inch water main alignment. PRV stations are needed to reduce the high pressure in the transmission main.
TR-4	**Transmission Main for New Reservoir** - Construct a new 12-inch diameter main to connect the new reservoir to the existing distribution system and transmission main. This project is required to serve the new reservoir described under Project R-1.	With the construction of a new reservoir at an alternate site, a new transmission main is needed to connect the new tank with the existing distribution system and transmission main. The alignment and length of water main needed is dependent on the reservoir location.

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CITY OF
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WATER SYSTEM PLAN
SUMMARY OF WATER SYSTEM
DEFICIENCIES AND PROPOSED PROJECTS

FIGURE
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CITY OF WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN
SUMMARY OF WATER SYSTEM DEFICIENCIES AND PROPOSED PROJECTS

No.	Improvement	Reason
Distribution System Mains		
D-1*	**Spring Street Upgrade** - Install approximately 2,300 LF of 12-inch diameter pipe from the point where the discharge pipe from the Spring Street Reservoir meets Spring Street (approximately at N.W. Spring Street) east to the Spring Street Mobile Home Park (580 N.E. Spring Street); 400 LF of 8-inch diameter water main from the Spring Street Mobile Home Park to Navaho Road; and 300 LF of 6-inch or 8-inch diameter water main along Spring Street to connect the lower pressure users on Spring Street between N.W. Cherry Hill Road to midway between Patton Drive and North Main Avenue. Project funding has been obtained from PWB.	The project, along with PS-1, would provide water for the North Main/Simmons Road pressure zone at North Main Avenue. The new water main would extend to N.E. Fields Avenue to replace all of the existing 10-inch diameter steel main and farther east on Spring Street to improve fire flow and hydraulics to the east end of N.E. Spring Street. The parallel 6-inch or 8-inch main on Spring Street is an extension of a main off the Strawberry Mountain pressure zone and is needed to raise the pressure for several services along Spring Street. Funding: PWB loan. * Six-year Transportation Plan improvements planned for Spring Street from N.E. Estes Avenue to the
D-2	**Lakeview Line Replacement** - Install approximately 600 LF of 6-inch water main to replace a dead-end section of the existing 14-inch diameter transmission main that connects to the water main on	The existing steel water main has an active leak and serves several connections. The new pipe is needed to maintain service.
D-3	**Rio Vista Water Main** - Install approximately 1,350 LF of 12-inch diameter pipe from the Los Altos Reservoir on Rio Vista to N.W. Lincoln Street.	The project would increase the hydraulic flow to the 10-inch water main on N.W. Lincoln Street and alleviate a flow/pressure limitation near the intersection of N.W. Lincoln Street and El Camino Real.
D-4	**North Main/N.W. Cherry Area Improvements** - Install approximately 940 LF of 8-inch water main, including a new water main on North Main to N.W. Cherry Street, and along N.W. Cherry Street west to connect to the existing 8-inch steel line. Install a new 8-inch main from the Strawberry Mountain pressure zone (at Hillside Lane) to handle services west of Patton Drive.	Water main improvements on N.W. Cherry Street are needed to address low pressure in the system. The existing 3-inch steel main on North Main and N.W. Cherry Street would be replaced with 8-inch diameter main to improve hydraulics and eliminate existing steel pipe.
D-5	**S.W. Childs Road Water Main Upgrade** - Install approximately 700 LF of 8-inch pipe on S.W. Childs Road from N.W. Loop Road to the end of the existing road. This project should be constructed or	The existing line segment is 2-inch pipe, which is undersized for the length and service provided. Remaining portions of the 2-inch main should be abandoned in place.
D-6*	**W. Jewett: Waubish Street to Garfield Street** - Install approximately 2,100 LF of 8-inch pipe to connect the existing 12-inch main at W. Jewett Boulevard/SR 141 and N.W. Garfield with the existing 6-inch main on Waubish Street. This project would be within WSDOT ROW and the roadway itself.	The water main would improve system hydraulics by replacing the existing 4-inch steel main with an 8-inch main. The main is one of the two connection points between the Los Altos pressure zone and the Spring Street pressure zone (the other connection is at Lincoln and Garfield). * Six-year Transportation Plan improvements planned for Waubish Street from W. Jewett to the end of
D-7	**W. Jewett: Lincoln Street to Maxfield Lane -** Install approximately 900 LF of 8-inch main to connect Lincoln Street with Maxfield Lane. This project would be within WSDOT ROW, but the majority of the	The fire hydrant off Maxfield Lane is fed by a combination of 2- and 6-inch mains that are too small to provide sufficient fire flow. Installation of a new 8-inch main and abandonment of the existing 2-inch
D-8*	**1st Street, 2nd Street, and Oak Street Water Main Upgrades** - Install approximately 1,230 LF of 8-inch main on 1st Street (from Wyers to Oak Street), east on Oak Street to 2nd Street, then north on 2nd Street to Wyers. Install 8-inch pipe from the existing 6-inch main extending into an alleyway off S. 1st Street to the existing 6-inch main on Riverwatch Drive.	The project would increase the hydraulic capacity in the water distribution system in the lower Spring Street pressure zone by replacing the existing 3-inch diameter steel main with 8-inch diameter pipe. * Six-year Transportation Plan improvements planned for Oak Street.
D-9	**Amour Court and Peck Road Extension** - Install approximately 205 LF of 8-inch main from the existing 6-inch main on Amour Court to the existing 6-inch main on Pucker Huddle Road, and install 260 LF of 8-inch main to connect the existing 6-inch main on Peck Road to the 8-inch main on Pucker Huddle Road to the west. This project also includes connecting the existing 6-inch main serving Amour Court to the existing 8-inch steel main on W. Jewett/SR 141.	The water main extension is needed to improve fire flow to the Pucker Huddle area.

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WATER SYSTEM PLAN
SUMMARY OF WATER SYSTEM
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FIGURE
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CONT'D

CITY OF WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN
SUMMARY OF WATER SYSTEM DEFICIENCIES AND PROPOSED PROJECTS

No.	Improvement	Reason
Distribution System Mains		
D-11*	**O'Keefe, Center, and Tohomish Water Main Improvements** - Install approximately 2,800 LF of 8-inch water main on N.E. O'Keefe Avenue (from N.E. Tohomish Street and N.E. Grandview Boulevard), on N.E. Center Street (from N.E. O'Keefe Avenue to N.E. Orchard Avenue), on N.E. Orchard Avenue (from N.E. Center Street and N.E. Tohomish Street), along N.E. Tohomish Street to N.E. Park Avenue; and along N.E. Park Avenue back to N.E. Center Street. Install 8-inch pipe on N.E. Park Avenue (from N.E. Center Street to N.E. Grandview Boulevard), and along N.E. Grandview Boulevard to N.E. Orchard Avenue.	A larger water main in the area is needed to improve system hydraulics and remove undersized 4-inch AC pipe and 2-inch steel pipe serving this area. * Six-year Transportation Plan improvements planned for N.E. Grandview Boulevard to N.E. O'Keefe Avenue.
D-12	**Cherry, Fields, and Wisconsin Street Water Main Improvements** - Install 1,700 LF of 8-inch pipe on N.E. Cherry Street (from N.E. Estes Avenue to N.E. Stauch Avenue) and on N.E. Wisconsin Street (from North Main Avenue to N.E. Stauch Avenue). Install 8-inch pipe on N.E. Fields from N.E. Spring Street to N.E. Green Street. This project could be performed in conjunction with Projects D-10 and D-18.	The project would improve hydraulic flow in the area by replacing existing 4- and 6-inch AC pipe on N.E. Cherry Street, N.E. Fields Avenue, and N.E. Wisconsin Street.
D-13	**Martin Road and Thornton Drive Water Line** - Install approximately 825 LF of 8-inch water main from the existing 6-inch valve on Martin Road to Thornton Drive, then south on Thornton Drive approximately 500 LF. This project includes approximately 170 LF of 6-inch water main on Martin Road and connection to an existing 6-inch main. This main is not currently in service and needs to be accepted by the City before the installation of the 6-inch water main.	The project would improve the area's system hydraulics and would provide the ability to connect Martin Road/ Thornton Drive with the existing 8-inch water main on Sterling Boulevard. The project would also replace a portion of the 1-inch main along Thornton Drive.
D-14	**Kennedy Lane Improvements** - Install approximately 500 LF of 8-inch pipe from N.W. Childs Road to the east end of Elton Drive. This project could potentially be incorporated into Project TR-2.	A larger water main is needed to improve fire flow to the area.
D-15	**Thornton Drive Water Line** - Install approximately 1,100 LF of 8-inch water main to connect the water main installed as part of Project D-13 with the existing 8-inch water main on Sterling Drive. A portion of the roadway is currently on private property and will need to be resolved before isntallation of the water main can occur.	The project is needed to improve system hydraulics, replace an existing 1-inch main, and complete the water main loop with Sterling Drive.
D-16	**Robbins Road Water Line** - Install approximately 360 LF of 8-inch pipe on Robbins Road between S.W. Pucker Huddle Road and S.W. Stratton Road.	The project is needed to provide better system hydraulics by looping the existing water mains on S.W. Stratton Road and S.W. Pucker Huddle Road.
D-17	**Norby Lane-Westview Road Water Line** - Install approximately 1,100 LF of 8-inch water main on Norby Lane and Westview Road. This project should be constructed or coordinated with Project D-5.	A larger water main is needed at these locations to improve system hydraulics and to abandon the undersized 2-inch steel line.
D-18	**Stauch Avenue Line Replacement** - Install approximately 350 LF of 8-inch water main on N.E. Stauch Avenue between N.E. Cherry Street and N.E. Wisconsin Street.	The project would improve hydraulic flow in the area by replacing the existing 2-inch steel line on N.E. Stauch Avenue.
D-19	**Green, Snohomish, and Wauna Water Lines** - Install 8-inch pipe on N.E. Green Street (from N.E. Estes Avenue to N.E. Snohomish Avenue), on N.E. Snohomish Avenue (from N.E. Green Street to N.E. Washington Avenue), and on N.E. Wauna Avenue (from N.E. Green Street to N.E. Tohomish Avenue). Total length of 8-inch pipe is approximately 4,100 LF. The project also includes new water mains on N.E. Washington Street (from N.E. Estes Avenue to N.E. Snohomish Avenue), and on N.E. Hood Street (from N.E. Estes Avenue to N.E. Snohomish Avenue).	The project would improve hydraulic flow in the area by replacing the existing 4- and 6-inch AC pipe in N.E. Green Street, N.E. Snohomish Avenue, and N.E. Wauna Avenue.
D-20	**7th Avenue Water Line Replacement** - Install approximately 550 LF of 8-inch main on 7th Avenue between E. Jewett Boulevard and S.W. Oak Street.	The project would replace the existing 4-inch AC and PVC pipe with 8-inch pipe, which would improve system hydraulics.
D-21*	**Columbia, Hood, and Scenic Water Line Replacement** - Install approximately 1,840 LF of 8-inch water main on N.E. Columbia Avenue, on N.E. Scenic Avenue to Main Avenue, and to the existing 1-inch line on N.E. Hood Avenue. Installation also includes 8-inch main to N.E. Church Street, then on N.E. Church Street to either N.E. Columbia or N.E. Scenic Avenues.	This project is needed to increase system hydraulics and looping by replacing the existing 3-inch mains on these streets and connecting the water main on N.E. Hood Avenue with a water main on N.E. Church Street to either N.E. Columbia or N.E. Scenic Avenue. * Six-year Transportation Plan improvements planned for Columbia, Scenic, and Hood Avenues.
D-22	**North Main/Washington Water Main Replacement** - Install approximately 3,100 LF 8-inch water main from Cherry Street south on Main Street to Jewett Boulevard. This project also includes the installation of 8-inch main on N.W. Washington Street from N.W. Michigan Avenue to N. Main Avenue.	The project would replace the existing 8-inch steel pipe on these sections of the City's water main with newer pipe. The City would like to eliminate and abandon the existing 8-inch main along portions of Hillside Lane, N.W. Cherry Street, and a cross-country section of the main west of Main Street.

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No.	Improvement	Reason
Distribution System Mains		
D-23	**Pioneer Place/Tohomish Water Line Replacement** - Install approximately 1,100 LF of 8-inch water main on N.E. Pioneer Place (from N.E. Grandview Boulevard to N.E. Washington Street). The project also includes the installation of approximately 670 LF of 8-inch main on N.E. Tohomish Street (from N.E. Pioneer Place to N.E. O'Keefe Avenue).	The project would replace the existing 6-inch AC water main with a larger (8-inch) main and new pipe.
D-24	**Church, Lincoln, Tohomish Water Line Replacement** - Install approximately 1,350 LF of 8-inch water main on N.E. Church Avenue (from N.E. Tohomish Street to N.E. Lincoln Street), on N.E. Tohomish Street (from N.E. Church Avenue to N.E. Estes Avenue), and on N.E. Lincoln Street (from North Main to N.E. Estes Avenue).	The project would replace the existing 4-inch AC water main with a larger (8-inch) main and new pipe.
Pressure Reducing Valve Stations		
PRV-1	**Eyrie Road PRV Station** - Service is needed to put this station into PRV service. Currently, this station is out of service (not pressure reducing) due to a possible cross-connection with the upstream side of the feed line to the Los Altos system.	The station needs to be placed into service to reduce pressures on S.W. Eyrie Road, including S.W. Winebarger Road and N.W. Pucker Huddle Road.
PRV-2	**Oak Street Subzone PRV Station** - Install a combination of 2- and 6-inch diameter PRVs at the stations on S.E. 1st Avenue, S.E. 2nd Avenue, and S.E. 5th Avenue. This project should be constructed with Project D-8.	These stations are needed to reduce the pressure for services on portions of S.E. 1st Avenue, S.E. Oak Street (north of 5th Avenue), S.E. Wyers Street, S.E. 4th Avenue, and S.E. 5th Avenue.
PRV-3	**Grandview-Tohomish Subzone PRV Station** - Install a combination of 2- and 6-inch diameter PRVs at the stations on N.E. Grandview Boulevard (between E. Jewett Boulevard and N.E. Pioneer Place), at N.E. Pioneer Place south of N.E. Tohomish Street, and at N.E. Tohomish Street east of N.E. Pioneer Place. This project should be constructed in conjunction with Project D-11.	These stations are needed to reduce the pressure for services on portions of N.E. Park Avenue, N.E. Tohomish Street, N.E. Center Street, N.E. Grandview Boulevard, and N.E. Vine Street.
PRV-4	**West Winds Road PRV Station** - Install a 2-inch diameter PRV at the end of Westwood Winds Road.	This station is needed to reduce the pressure for the services at the end of West Winds Road.
PRV-5	**Hospital-Bingen Intertie PRV Station** - Install a combination of 2- and 6-inch diameter PRVs in a station on the south side of Skyline Hospital near Pinecrest Church of the Nazarene.	This station would reduce pressures on the line leading to the Hospital-Bingen intertie.
Fire Hydrants		
FH-1	**Individual Fire Hydrant Replacement** - Replace fire hydrants at: Osterman Road, Riggleman Lane, 185 El Camino Real, Rio Vista and N.W. Lincoln Street, S.W. Winebarger Road and W. Jewett/SR 141, W. Jewett/SR 141 and N.W. Lincoln Street, S.E. 4th Avenue and S.E. Oak Street, S.E. 6th Avenue and S.E. Oak Street, and the end of Waubish Street.	These hydrants are old or are in need of repair but appear to be located on suitably sized water mains to provide fire flow.
Telemetry and SCADA System		
T-1	**Buck Creek Telemetry Facilities** - Install approximately 13,165 LF of 2-inch conduit and 18 communication vaults installed with Project TR-1. Install approximately 14,800 LF of fiber optic cable in new and existing conduit between the Buck Creek WTP and Buck Creek Monitoring Station. Project constructed with TR-1 with available funding.	The City recently installed a Starlink Statellite system for the Buck Creek WTP. DSL is available at the Buck Creek Monitoring Station (MS) but is not considered reliable. New fiber optic line between Buck Creek WTP and MS would improve SCADA communications and data transfer.
T-2	**Buck Creek WTP -** Install and test a satellite connection for communication to and from the site.	Currently, no SCADA communication is available with the Buck Creek WTP. City staff are required to travel to the site to obtain information. Satellite or fiber internet service communication is the only viable telemetry option for this site. Satellite connection may be the more cost-effective option.
T-3	**City Shop Telemetry -** Replace the PLC, install a master SCADA terminal, and update internet connection with City Hall.	The City shop SCADA HMI computer needs to be upgraded as it is obsolete and has cybersecurity issues identified from the lack of support from Microsoft and Rockwell Automation. The PLC is considered obsolete and needs to be upgraded.
T-4	**Segment 1 Sites** - Replace the PLCs and change communication to high frequency radio.	The dedicated/bridged plain old telephone system (POTS) is currently being used by the City at most of the Segment 1 facilities. This technology tends to be reliable but limited in type, speed, and amount of data that can be conveyed. No SCADA communications are available with the Los Altos and Strawberry Mountain BPSs. The PLCs are older and need to be replaced.
T-5	**Grand Ronde Booster Pump Station** - Replace and relocate the PLC and install a master SCADA terminal.	The existing PLC location is unsuitable for a new PLC. Installation of a duplicate master SCADA terminal (matching the City shop terminal, see T-3) for redundancy purposes in the event one of the unit is out of service.

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WATER SYSTEM PLAN
SUMMARY OF WATER SYSTEM
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FIGURE
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CITY OF WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN
SUMMARY OF WATER SYSTEM DEFICIENCIES AND PROPOSED PROJECTS

No.	Improvement	Reason
Telemetry and SCADA System		
T-6	**Well No. 2** - Replace the PLC and install new communications to the site. Communication options include cellular telephone service or fiber internet service.	The existing PLC is older and needs to be replaced. The existing radio communications are not reliable, especially during high winds and precipitation events.
T-7	**Childs Monitoring Station** - Replace the PLC and install new communications to the site. Communication options include cellular telephone service or fiber internet service, with fiber internet being the most likely option.	The existing PLC is older and needs to be replaced. The existing radio communications are not reliable, especially during high winds and precipitation events.

AC = asbestos cement
ASR = aquifer storage and recovery
BPS = booster pump station
DNR = Washington Department of Natural Resources
DSL = distribution system leakage
gpm = gallons per minute
HMI = human machine interface
LF = linear feet
MDD = maximum daily demand
MG = million gallons
PLC = programmable logic controller
PRV = pressure reducing valve
PVC = polyvinyl chloride
RD = Rural Development
ROW = right-of-way
SCADA = supervisory control and data acquisition
SR = State Route
WSDOT = Washington State Department of Transportation
WTP = water treatment plant

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FIGURE
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Chapter 4 - Water Use Efficiency Program

The objective of this chapter is to describe the City of White Salmon's water use efficiency (WUE) program, which promotes efficient water use, ensures adequate water rights for future needs, and promotes system reliability and function. WUE measures consist of practices and activities that result in any beneficial reduction in water loss, waste, use, or demand. Efficient water use benefits water systems, customers, and the environment by improving water quality, reducing water system expenses, reducing the need for upgrades, and protecting water resources.

In addition to water demand parameters, various terms are used and values calculated related to water conservation. These water conservation terms are described below.

- **Authorized Consumption** - The volume of water authorized for use by the water system. If authorized uses are tracked, metered, and estimated, these volumes of water can be added into the authorized consumption category.
- **Unmetered Authorized Consumption** - The authorized uses of water that are not typically metered, including maintenance flushing of the water system, firefighting (hydrant), cleaning of water tanks or reservoirs, and street cleaning. An estimate of the volume of unmetered authorized consumption is needed to include this volume into the authorized consumption value.
- **Distribution System Leakage (DSL) -** All unauthorized water consumption. DSL is the water lost from the distribution system and includes both apparent and real losses. Neither apparent nor real losses are authorized uses of water. Therefore, these losses are considered leakage even if they are not actually leaking.
- **Apparent Losses** - The non-physical losses that occur in utility operations due to customer meter inaccuracies, systematic data handling errors in customer billing systems, and unauthorized consumption. This is water that is consumed but is not properly accounted for, paid for, or measured. These losses cost utilities revenue and distort data on customer consumption patterns. Water theft is also considered an apparent loss.
- **Real Losses** - All physical losses from the distribution system. Real losses include reservoir overflows, leaking valves and water mains, and water main breaks. These losses inflate the water utility's production costs and stress water resources since the lost water is extracted and treated yet is never used beneficially.

The City has a long history of promoting water conservation, dating back to the 1996 Multi-Jurisdictional Water Master Plan prepared by Wellman & Associates. The following is a summary of previous and current water conservation and WUE activities. In 1996, the City voluntarily compiled its first water conservation plan. In the early 2000s, this plan, along with other conservation provisions such as the mandatory odd and even sprinkling ordinance, were necessary since the production from Wells No. 1 and 2 had declined, and because the new Buck Creek slow sand filter plant had not been brought online. In May 2008, the City adopted a WUE goal of reducing water consumption by 10 percent over the next 20 years. In 2009, the City adopted a moratorium on new water services, which was lifted in 2012. The most recent WUE goals were adopted in November 2012.

WUE requirements for the State of Washington are described in the Washington State Department of Health (DOH) Water Use Efficiency Rule Guidebook (2017). The City's WUE Plan is outlined below in accordance with the DOH Water System Planning Guidebook (2020).

Source and Service Metering

The WUE rule (Washington Administrative Code 246-290) requires all production and consumption be metered in municipal systems. The City is in compliance with this rule as all active sources and customers are currently metered. Details regarding the City's source and service metering is provided below.

Source Metering

The water meters for the City's sources are summarized on Table 4-1.

TABLE 4-1
SOURCE METERS

Location	Manufacturer	Installation Date	Date of Last Calibration
Buck Creek WTP	8-inch Siemens Sitrans FM MagFlo Mag 5000	2010	2010
Buck Creek Monitoring Station	10-inch Siemens Sitrans FM MagFlo Mag 5000	2011	2011
Grand Ronde BPS	12-inch Siemens Sitrans FM MagFlo Mag 5000	2010	2010
Well No. 2	10-inch McCrometer MX Ultra Mag	2002	Unknown
Well No. 2 ASR	6-inch Siemens Sitrans FM MagFlo Mag 5000	2010	2010

ASR = aquifer storage and recovery

BPS = booster pump station

WTP = water treatment plant

All of the City's source meters are magnetic flowmeters that are considered very reliable as they contain no moving parts. All of the City's source meters have been in service for an extended period, and the calibration of these flowmeters should be verified to confirm their accuracy. Siemens Sitrans FM flowmeters can be tested with a plug-and-play Verificator case that can provide an automatic verification test of the flowmeter transmitter, insulation, and sensor magnetism. The test is not affected by liquid flow or cable length.

The McCrometer flowmeter at Well No. 2 does not have the capability to be verified or calibrated by the manufacturer without removing and returning the flowmeter back to the manufacturer. There also appears to be insufficient upstream and downstream straight flow piping for verification with an ultrasonic flowmeter. Given the age of the meter and the inability to verify or calibrate the meter, replacement of the Well No. 2 meter with a Siemens Sitrans model is recommended to streamline verification and calibration.

Service Metering

All of the City's services are metered. The City is nearing completion of the installation of all new service water meters, except the Bingen intertie meters. The City is standardizing its new water meters to Master Meter Octave (Octave) (ultrasonic type) with automated meter reading (AMR) capabilities. Currently, the City reads service meters every other month (bimonthly). The City plans to begin monthly readings once all of the new service water meters are installed and the AMR system is activated. Advanced metering infrastructure (AMI) has been successfully installed on all meters, except the larger ones. The remaining 1.5- and 2-inch meters will be replaced in 2024. The installation of a drive-by, fixed AMI base station is anticipated in 2024.

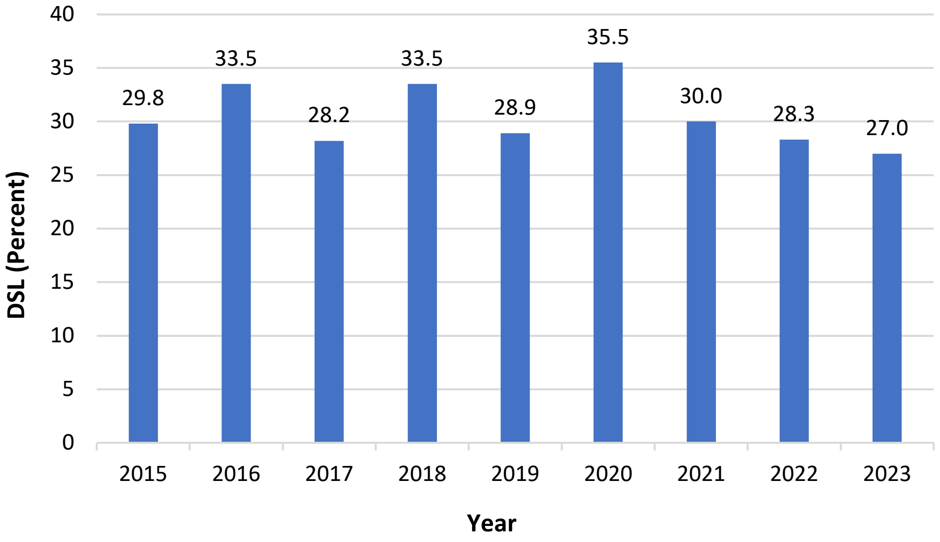
Due to the staff time and expenses required, the City has not historically calibrated service meters. Generally, it is more cost-effective for the City to replace service meters than to calibrate them. Electronic meters, such as the Octave flowmeter, do not have moving parts. Therefore, they are not subject to the same wear and tear as mechanical meters. The service line of these meters is unknown and may depend in part on the service environment and water quality. The service life for the Octave flowmeter batteries (D size lithium thionyl chloride) is ten years. The current cost for a D size lithium thionyl chloride battery ranges from approximately $25 to $50. The current cost for a 5/8-inch Octave flowmeter is $300. The cost of installation with valve box and piping is approximately $600.

The State Route (SR) 14 intertie meter with the City of Bingen is a 10-inch magnetic flowmeter manufactured by McCrometer. As previously discussed, this particular brand of flowmeter cannot be verified or calibrated unless removed and sent back to the manufacturer. Field verification of this meter with an ultrasonic meter is also not possible due to the lack of exposed piping. Given the age of the meter and the inability to verify or calibrate it, the City is planning on replacing the SR 14 meter with a Master Meter Octave to streamline verification and calibration. The other intertie meters with the City of Bingen are discussed in Chapter 3 under the “Interties” section.

Distribution System Leakage

As part of the WUE rules, a DSL standard was enacted. All unauthorized water consumption is considered DSL. Authorized consumption is defined as the volume of water authorized for use by the water system. All unauthorized uses and any water that cannot be metered or tracked, whether authorized or unauthorized, will also be considered DSL. The DSL on the City’s water system from 2015 through 2023 is shown on Chart 4-1.

CHART 4-1
ANNUAL DISTRIBUTION SYSTEM LEAKAGE (2015 THROUGH 2023)



Over the 2015 through 2023 time period, the calculated DSL has ranged from 28.2 to 35.5 percent. In the past three years, the DSL has varied from 27 to 30 percent. The State of Washington has set the DSL standard at 10 percent or less for a three-year rolling average. As discussed in Chapter 2, the City's rolling three-year average for DSL is approximately 30 percent. Therefore, the City will need to implement a Water Loss Control Action Plan (WLCAP). Recommendations for the WLCAP are discussed in Technical Memorandum No. 1 (see Appendix C).

Projected Water Demand and Source Capacity

Projected water system demand and existing source capacity were discussed in Chapters 2 and 3, respectively. Currently, the City has sufficient source capacity to handle the maximum daily demand (MDD) demand. Within the next 10 years, the City's MDD demand will exceed its source capacity. Enhanced ASR production from Well No. 2 would increase the City's source capacity but is forecasted not to fully meet the MDD demand. Additional source production and/or reduction of the current or limiting growth of future MDD demand will be needed for the City to have sufficient source capacity.

Water Use Efficiency Program Elements and Goals

The WUE program elements and goals establish the framework for the City to implement cost-effective WUE measures. The City's proposed program elements and goals, including evaluated and adopted WUE measures, are discussed below.

Current Water Use Efficiency Program

The City's current WUE program is described in Chapter 4 and Appendix E of the 2014 Water System Plan (WSP). The achievements and elements not achieved with the current WUE program are summarized below.

Achievements

Positive steps taken by the City with respect to WUE include the following:

- Adoption of a third tier block for the usage rate portion of the water rates.
- Adjustment of the tier block rate quantities and rates that reflect actual consumption data in 2018.
- Adoption of a hydrant meter permit system to track water usage by contractors and other entities.
- Replacement of several aging water mains including North Main Avenue (from Spring Street to Snowden Road and Simmons Road), N.E. Tohomish Street (from N.E. Estes Avenue to N.E. Pioneer Place), N.E. Snohomish Street (from N.E. Tohomish Street to N.W. Washington Street), Jewett Boulevard (from N.W. Garfield Avenue past Ingram Place), N.E. Wauna Avenue (from E. Jewett Boulevard to N.E. Tohomish Street), N.W. Garfield Avenue (from N.W. Lincoln Street to N.W. Washington Street), portion of N.W. Washington Street (from N.W. Michigan Avenue west), and removal of the old North Main BPS. Approximately 12,500 linear feet (LF) (approximately 2.4 miles) of new water main were installed to replace old and undersized mains with these projects (footage does not include installed new service lines or hydrant laterals).
- Four new pressure reducing stations were installed at Cochran Lane, E. Jewett Boulevard, S.W. Oak Street, and Vine Street for pressure management.
- A water leakage detection investigation was performed by United Services Associates, LLC (Seattle, Washington) in March 2019 on the central region of the City's distribution system. The water lines surveyed are shown on Figure 4-1. A total of approximately 14,500 LF of pipe was surveyed with ten defined leaks (known location), one undefined leak, and four possible leaks identified on the consumer side of the water meter. The estimated leakage from the defined leaks was 32.5 gallons per minute. The defined and undefined leaks were addressed individually or addressed in the water main replacement projects on W. Jewett Boulevard and E. Jewett Boulevard and N.W. Garfield Avenue.
- Acquired funding and began design of the transmission main upgrade projects and acquired funding for construction of a new upper Buck Creek transmission main.

Elements Not Achieved

- Annual update of International Water Association/American Water Works Association (AWWA) water audit
- Annual leak detection
- Complete meter installation and implementation of AMR system
- WUE information on the City's website
- One percent reduction in average gallons per equivalent residential units (ERUs) per day (demand side goal)

- Infrastructure Leakage Index of 3.0 or less (supply side goal)
- DSL of 25 percent or less (supply side goal)

While the City has made significant progress in replacing older water mains in its system, instituted a third tier block rate, increased the block rate prices, and implemented a hydrant meter permit system these changes have not resulted in a decrease in water demand (as measured in average gallons per ERU per day) or a decline in the DSL values for the system. Instead of a 1 percent reduction, the water demand in 2020 was approximately 3.3 percent higher. This increase in water demand is partly attributed to the previous water demand values being based on a period (2009 through 2011) of transition from water production limited to well water, a moratorium on the installation of new services to the new Buck Creek WTP being placed into service, and the lifting of the moratorium. Once the new Buck Creek WTP was placed into service and the service moratorium was lifted, the City's water customers may have become more comfortable in consuming more water. As discussed in the 2014 WSP, the historical water usage in 2009 through 2011 period was significantly lower than water demand in 2002. One possibility is that the 2009 through 2011 water demand was artificially low in relation to historical values.

Even with the City's significant investment in water main replacement and on-going repair of reported and discovered leaks, the three-year rolling average DSL slightly increased from 29.2 percent to 30 percent. Although needed, the installed water main improvements did not reduce the water system's DSL. To reduce the DSL, leaking portions of the current system need to be replaced. As discussed in Chapter 3, older sections of the existing transmission main from Buck Creek to the City's distribution system are suspected of leakage and/or theft due to the age of the pipe, high pressure, and location (primarily on private property). The City has acquired funding for the design of the transmission main upgrade projects on upper Buck Creek. Replacement of these older sections of the transmission mains are a high priority for the City.

Implemented and Evaluated Water Use Efficiency Measures

In the Water Use Efficiency Rule Guidebook, the measures that a municipal water system must implement and evaluate are listed. With more than 1,900 water service connections, the City must implement five mandatory WUE measures, evaluate conservation rates, review reclaimed water use opportunities, and evaluate or implement five additional WUE measures. These steps are summarized as follows:

- Install and operate meters on all sources and services
- Perform meter calibration
- Implement a WLCAP to control leakage
- Educate customers regarding WUE practices
- Evaluate conservation rate structures
- Evaluate reclaimed water use opportunities
- Evaluate or implement five additional measures

The proposed WUE measures are identified and discussed below. A summary of the measures to be implemented is given at the end of this discussion.

- **Installation and Operation of Source and Service Meters** - As discussed above, the City is in compliance with its in-place source and service metering. Calibration of the source meters is needed.
- **Implementation of Water Loss Control Action Plan to Control Leakage** - The three-year DSL rolling average for the City is approximately 30 percent, which is more than the 10 percent DSL standard. Therefore, the City is not in compliance with the DSL standard and compilation of a WLCAP is required. The WLCAP is discussed in detail in Technical Memorandum No. 1 (see Appendix C). The proposed WLCAP includes the following:
    - Establish WUE supply side goal of a DSL at 25 percent or less
    - Calibration of source meters
    - Better documentation and tracking of unbilled authorized consumption
    - Leak detection of water system
    - Monthly reading of service meters
    - Complete meter installation and implementation of AMR system
    - Implement advanced pressure management
    - Water main replacement and abandonment

  A WUE supply side goal of a DSL at 10 percent or less was not proposed as it was not considered realistically attainable within the six-year goal period. The City's achievement of a DSL below 10 percent is difficult to predict given the magnitude of the current DSL and uncertainty of the source(s) of DSL within the system. With implementation of the WLCAP measures and two major infrastructure projects slated to upgrade the existing transmission main, the City's DSL is anticipated to be below or near 10 percent by 2034.
- **Customer Education on Water Use Efficiency Measures** - The goal of WUE education is to inform customers regarding the importance of using water efficiently. Under the State of Washington's WUE rules, customer education on WUE measures is required at least once per year. Implementation of customer education activities or measures more than once a year is considered an additional WUE measure.

  Customer education may be in the form of mailers, workshops, or individual WUE reviews. Education topics for customers can range over a wide variety of conservation issues including the following:

    - Detecting and fixing leaks
    - Low water use landscaping (Xeriscape™) and irrigation practices
    - Efficient use of water when washing cars or other outdoor uses
    - Potential curtailment activities
    - General conservation awareness

  A significant amount of educational materials have been developed at little or no cost to the water provider from such organizations as AWWA and the DOH. Pamphlets, videos, computer programs, and other materials are available to assist the water provider in their customer education efforts. Information is available on a variety of topics and materials and can be obtained for practically any age group, demographic, or purpose.

In terms of conservation and WUE, the effectiveness of customer education measures is difficult to predict. During periods of drought, public awareness is high, and education may result in significant water consumption reductions. During other periods, the effectiveness depends greatly on the program itself.

Presently, the City's public education efforts have been primarily related to including messages within customers' monthly water bills and through the City's periodic newsletters. The water bill messages cover a wide range of topics including water efficient appliances and devices, lawn watering practices, and winterizing water systems. See Appendix B for the water bill message provided from June through November 2023. Newsletter topics include landscaping, irrigation, drip irrigation, indoor water conservation, and winterization. Copies of water conservation messages were included in the City's newsletter from February to November 2023.

- **Water Conservation Rate Pricing** - A proper water rate structure supports and encourages water conservation. The ideal conservation rate structure is one that encourages maximum participation in the WUE efforts while simultaneously providing revenue stability, user equality, and easy implementation and administration. Currently, the City uses a rate structure with both a base rate (no quantity allowance) and an inclining block rate with three tier blocks, which are dependent on meter size. This rate structure provides excellent revenue stability and promotes conservation.

  The tiered usage blocks were examined as part of the City's 2017 Water and Sewer Cost of Service Rate Study prepared by Anderson Perry & Associates, Inc., and adjusted for several meter sizes to better reflect actual usage. The water rates for the tiered usage blocks were also adjusted to provide a revenue neutral change in the water rates. Annual review of the City's water rates is recommended. The City may wish to consider increasing the upper tiered usage block rates to promote WUE.

  The City may also wish to consider implementing a seasonal rate adjustment by increasing the consumption rates during high demand months and lowering consumption rates during lower demand months. The objectives of seasonal rates are to better match price and cost recovery with demand patterns and provide a price incentive for customers to reduce their consumption during peak-use periods. Because system capacity is essentially designed to meet peak demands, peak users should assume cost responsibility for capacity required to serve peak demand. As an example, the current consumption rates could be modified by increasing the current user rates by 20 percent between June and October and reducing the user rates by 20 percent for the remainder of the year. A sample seasonal rate structure is shown on Table 4-2.

TABLE 4-2
SAMPLE SEASONAL RATE STRUCTURE

	Dollar Amount per 1,000 gallons		
Consumption Rate Tier	**Current Year-Round**	**June through October**	**November through May**
0 to 5,000 gallons	1.19	1.43	0.95
6,000 to 15,000 gallons	3.01	3.61	2.41
Over 15,000 gallons	4.03	4.84	3.22

This sample seasonal rate structure would increase the cost of water during the high demand months and likely not be revenue neutral as more water is consumed in the City's system between June through October than the rest of the year.

A seasonal rate may reduce the cost of water to all customers. If customers respond to the seasonal rate by reducing water consumption, then the City may be able to delay or avoid construction of additional water infrastructure needed to handle demand. Even if demand is not reduced, customers contributing to the peak demands pay the costs associated with that demand.

Implementing seasonal rates can place revenue stability at risk, depending on the differential in the peak season rate and customer response to the higher rate. A seasonal rate would also make the billing system more complicated. The City should communicate with all customers before each peak season, to increase awareness of the intent of seasonal rates and the impending higher rates. Additional evaluation on the potential implementation of seasonal water rates is recommended.

- **Reclaimed Water** - For water systems with more than 1,000 connections, evaluation of reclaimed water use opportunities and the use of three element cost-effectiveness evaluation criteria are required. This evaluation was completed and discussed in Technical Memorandum No. 2 (see Appendix C).

  While opportunities for reclaimed water use in the City exist, the capital costs associated with the infrastructure needed to produce, store, and convey reclaimed water to the areas of potential use are significant. At this time, it is believed the City and its resources would best be served by concentrating its efforts on reducing the system's DSL through its WLCAP.

- **Additional Water Use Efficiency Measures** - In addition to the above mandatory WUE measures, the City is implementing four additional measures. The City reviewed several potential measures to implement as its final additional WUE measure. These measures are discussed in more detail in Technical Memorandum No. 3 (see Appendix C). The City adopted two additional measures: providing WUE information on its website and providing new customer water system informational packets. The existing and additional WUE measures are discussed below:
  - **Implementation of Water Conservation Rate Structure** - The City's current rate structure of a base rate (no minimum usage) with three inclining blocks is considered a water conservation rate structure.

- **Mandatory Water Use Limitations (Chapter 13.24.30, Water Code) to Reduce Water Loss from Evaporation and Wind Drift** - From May 1 through October 31 each year, watering of lawns, gardens, or any other landscaping (whether natural or planted) is not allowed except between the hours of 6 a.m. to 9 a.m., and 6 p.m. to 9 p.m. Properties with even numbered addresses are permitted to irrigate only on even numbered days, and properties with odd numbered addresses are permitted to irrigate only on odd numbered days. Properties with no address are permitted to irrigate only on odd numbered days.
- **Customer Notification of Possible Leak** - The City notifies customers of possible leaks on the house side of the meter by an unusual or abnormally high meter reading value.
- **Consumption Histories on Customers' Water Bills** - The City has recently updated their water utility statements to include customers' consumption histories over the past 12 months.
- **Water Use Efficiency Information on City's Website (New) -** With this measure, the City would compile and post a water conservation/WUE page on its website with information and links to other helpful resources.
- **New Customer Water System Informational Packets (New)** - Packets would be given to new water system customers and could include information on WUE measures, system policies, user rates, the City's mandatory water use limitations, cross-connection control, and other information helpful to a new customer.

At the May 18, 2022, City Council meeting, several other potential WUE measures were discussed including a local rebate for water efficient fixtures, an annual newsletter on potable water, and establishment of a xeriscaping demonstration garden. The City may adopt one or more of these measures in the future.

Water Use Efficiency Goals and Program

The City's proposed WUE program elements and goals, including evaluated and adopted WUE measures, are discussed below.

A WUE goal must have measurable and definable water savings that will be achieved at a specific time in the future. The current goal is defined in terms of reducing water consumption based on the overall consumption. This type of goal is suitable if the community is not growing. However, if the community is adding new users, then any reductions in water use per person or per connection would be obscured by the new users' demand.

The following goals are recommended for the City's WUE program:

- Two percent reduction in average gallons per ERU per day, which can be observed in the average daily demand (ADD) flow values in the year 2028 (demand side goal). An ERU is defined as the average amount of water used by a typical single-family dwelling. For the City of White Salmon's water system, an ERU was defined as 78,660 gallons per year per ERU or 215.5 gallons per day (gpd) per ERU. This amount is twice the water savings proposed in the previous demand side goal but still modest in amount (4.3 gpd per ERU or 1,569 gallons per year per ERU).
- DSL of 25 percent or less by the year 2028 (supply side goal).

These goals were formally adopted by the City Council at the May 18, 2022, meeting. Prior to adopting these WUE goals, the City conducted a public hearing. A copy of the minutes from the public hearing and Council meeting and a copy of the advertisement are provided in Appendix B.

The proposed City's WUE program, including start dates, budget, comments, and additional potential measures, is summarized on Table 4-3. The intent of these measures and activities is for the City to meet its WUE goals outlined above.

TABLE 4-3
SUMMARY OF PROPOSED WATER USE EFFICIENCY PROGRAM FOR THE CITY OF WHITE SALMON (REVISED)

Installation and Operation of Source and Service Meters	
Source and Service Meters Installed	In Compliance
Implementation of Water Loss Control Action Plan (see Technical Memorandum No. 1 in Appendix C)	
Supply Side Goal: DSL of less than 25 percent	Adopted as a six-year goal in May 2022
Demand Side Goal: 2 percent reduction in average gallons per ERU per day shown in 2028 ADD.	Adopted as a six-year goal in May 2022
Verify existing source meters Install new 10-inch source meter at Well No. 2	2025; $2,000 2024; $10,000; installed cost
Better Documentation and Tracking of Unmetered Use	Implemented
Leak Detection	Annually, starting 2023; $7,500
Monthly Reading of Service Meters	Implemented
Complete New Meter Installation and AMR	2024
Implement Advanced Pressure Management	Initial Target Areas: 1) Eyrie Road pressure reducing valve review - June 2025, and 2) 6-inch main, Bingen Intertie review - 2025
Water Main Replacement and Abandonment: Water Transmission Main Upgrade Phases I and II	Phase I - Under construction Phase II - Design complete, construction funding obtained for Phase IIA.
Customer Education on Water Use Efficiency Measures	
Educational Materials Sent to Customers Annually	WUE information provided as messages in customers' monthly bills and in articles in the City's periodic newsletter
Water Conservation Rate Pricing	
Consider Implementation of Seasonal Rate	November 2022, the City decided to keep existing rate structure
Additional Measures (Four Existing)	
Implementation of Water Conservation Rate Structure	In place; annual review recommended
Mandatory Water Use Limitations	In place; Chapter 13.24.30, Water Code
Customer Notification of Possible Leak	In place; customer notified of unusual meter reading
Consumption Histories on Customers' Water Bills	In place

Installation and Operation of Source and Service Meters	
Source and Service Meters Installed	In Compliance
Two Additional Measures Selected by City Staff and/or Council	
WUE Information on City's Website	January 2025, $500 initial cost; $200 per year for updates.
New Customer Water System Informational Packets	July 2024, $50 annually for materials and revisions

Submission of Annual Performance Reports

One WUE rule requirement is the submission of an annual performance report on water use and WUE program implementation in the City. The report must include information regarding how the amount of water was produced, the amount of water lost in the distribution system, and the progress made toward achieving the water savings goals for the year. The City is in compliance with this requirement as it has submitted annual performance reports since 2008.

Water Use Efficiency Program and Goals Evaluation

The City's ability to achieve the adopted WUE goals depends in part on the implementation of its WUE program and periodic evaluation of its effectiveness. The City should review the WUE program and goals on an annual basis (at a minimum).

The WUE program should be implemented at the schedule shown on Table 4-3. The City should periodically review water usage (primarily MDD) and system leakage on an annual basis to evaluate the impact of the WUE program and goals. Water demand and system leakage are primary measures of program effectiveness. If water demand and system leakage have been reduced and are achieving the WUE goals, the program is likely effective and revisions, if any, will likely be minor. However, if the water demand and system leakage is increasing or remains the same, modifications to the WUE program and goals may be required. In this case, trends in water demand for the different user classes and system leakage should be evaluated. Additionally, modifications to existing mitigation measures may be required. Any proposed measures should be evaluated with respect to potential water savings, cost, ease of implementation, and water user acceptance.

The City will need to adopt new WUE goals in 2028 that extend to 2033 to match the WSP 10-year planning period. The evaluation and reestablishment of WUE goals must follow the same public process and the same goal criteria used to establish the goals must be adopted as part of this WSP.

Water Use Efficiency Savings

Responsible water planning should consider water use reductions in future demand projections as a result of increased WUE from water conservation and lower DSL values. Using the projected water demand from Chapter 2 and the projected WUE savings from the City's WUE program, the projected WUE savings were derived.

As part of their WUE goals, the City adopted a goal on March 18, 2022, to reduce ADD water consumption per ERU by 1 percent by year 2028. If this goal were to be pursued beyond 2028, then the proportional reductions would be 1.7 percent in 2031 and 3.3 percent in 2041. Without WUE reductions in consumption, the water consumption within the City's service area is assumed to not change from current consumption levels.

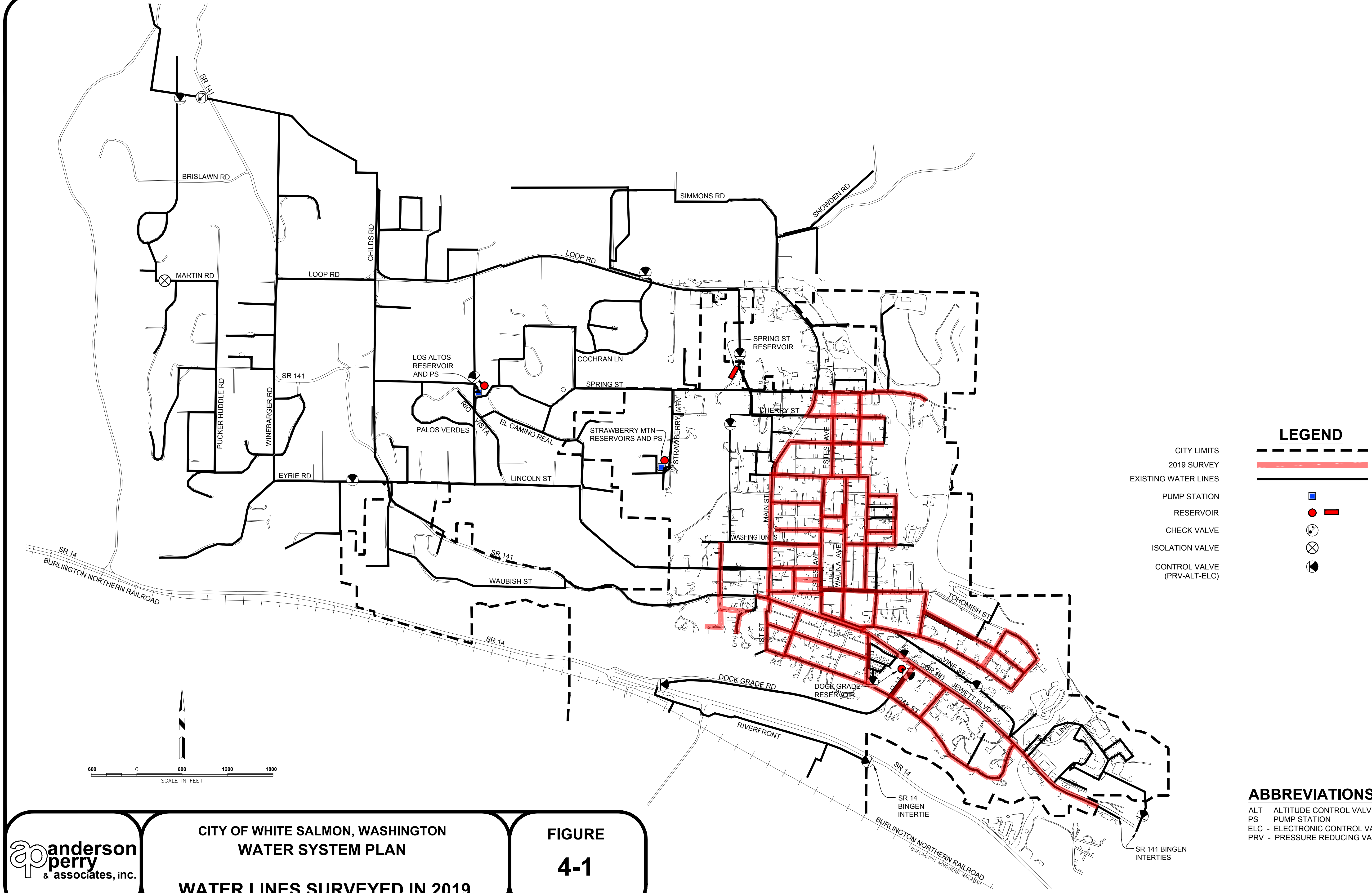
As discussed earlier, the amount of DSL was calculated to be approximately 25.7 percent based on data for 2021. To be in compliance with WUE requirements, the City will need to implement a WLCAP to reduce the DSL level to 10 percent. The City adopted a supply side goal of reducing DSL to 25 percent by 2028. Best-case scenario, the amount of DSL is further reduced to 15 percent by 2034, and 10 percent by 2044. Worst-case scenario, the current DSL of 30.0 percent remains the same through 2044.

The water demand forecast with and without projected WUE savings is shown on Table 4-4. For this water demand forecast, the water sales to the City of Bingen were assumed to be consistent with the values provided on Table 2-13 in Chapter 2.

TABLE 4-4
WATER DEMAND FORECAST WITH AND WITHOUT PROJECTED WATER USE EFFICIENCY SAVINGS

Year	ADD (gpd)		Maximum Daily Demand (gpd)	
	Without Water Use Efficiency	With Water Use Efficiency	Without Water Use Efficiency	With Water Use Efficiency
2034	1,106,100	916,100	2,812,000	2,329,900
2044	1,330,000	1,224,500	3,381,000	2,654,600

With projected WUE savings, the City would have sufficient source capacity until around 2034. With project WUE savings and enhanced ASR production, the City's source capacity would be sufficient to handle MDD until around 2044. Additional WUE savings and/or source capacity would be needed to handle future demands.



ABBREVIATIONS

ALT - ALTITUDE CONTROL VALVE
PS - PUMP STATION
ELC - ELECTRONIC CONTROL VALVE
PRV - PRESSURE REDUCING VALVE

anderson perry & associates, inc.

CITY OF WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN

WATER LINES SURVEYED IN 2019

FIGURE
4-1

R:\Clients\White Salmon\250-12 Water System 2021\020 Planning-Studies\Figures\Fig 4-1 WL SURV 2019.dwg, 1/9/2023 8:10:14 AM

Chapter 5 - Source Water Protection

In this chapter, the City's program for protection of its source waters used for potable water will be discussed. The purpose of the source water protection is to identify, monitor, limit, and control (to the extent feasible) all facilities and activities that may adversely impact the City's wells or Buck Creek's water quality. Source water protection for Group A systems is required under Washington Administrative Code (WAC) 246-290-135, 246-290-668, and 246-290-690.

Wellhead Protection Plan - Wells No. 1 and 2

A Wellhead Protection Plan (WHP) for the City of White Salmon was previously compiled in 2002 and summarized in the City's previous Water System Plan (Bell Design Company 2002, 2004). Due to the complex geology and the many faults in the area around the City's wells, the WHPA was delineated using Wellhead Analytical Element Model (WhAEM 2000) developed by the U.S. Environmental Protection Agency (EPA) Office of Research and Development and Office of Groundwater and Drinking Water.

The original WHPAs were based on a pumping rate of 142,000 cubic feet per day, or an average of 738 gallons per minute. With lower amounts of water available for pumping from the wells, the WHPAs identified in 2002 were likely overestimated. However, to be conservative, the previously identified WHPAs were retained within the City's WHP. The status of the City's WHP regarding the minimum elements required by WAC 246-290-135 is presented on Table 5-1.

TABLE 5-1
WELLHEAD PROTECTION PLAN STATUS

Element	Status
1. Sanitary Control Areas for Wells No. 1 and 2	The City owns the land where the wells are located but has not established and executed a sanitary control area (SCA) for either well. The City needs to establish the SCAs for each well to comply with WAC 246-290-135(2).
2. Susceptibility Assessment	Low susceptibility.
3. WHPA Delineation	Determined using WhAEM 2000, EPA Office of Research and Development and Office of Groundwater and Drinking Water. Map of travel zones plotted. WHPA shown.
4. Inventory of Potential Contaminant Sources	Inventory of potential contaminant sources was compiled. A summary of this inventory and a map of the WHPA areas are presented in Appendix G. This inventory needs to be updated every biennial.
5. Notification Documentation to Owners/Operators of Potential Contaminant Sources	Owners/operators of potential groundwater contaminant sources were notified (see Appendix G).
6. Notification Documentation to Regulatory Agencies and Local Governments of WHPA Boundaries and Source Contaminant Inventory	The City notified the appropriate parties in January 2022 (see Appendix G).

Element	Status
7. Contingency Plan of Adequate Supply of Water	Contingency plan is provided in the WHP.
8. Notification Documentation to Appropriate Emergency Response Agencies	The City notified the appropriate parties. A sample letter is provided in Appendix G.

The City will periodically update its inventory of potential contaminant sources, notify regulatory agencies and local governments of its WHPA boundaries and source contaminant inventory, and notify appropriate emergency response agencies of the findings of the WHP.

Buck Creek Watershed Comprehensive Management Plan

In a collaborative effort with the Washington State Department of Natural Resources (DNR), U.S. Forest Service, and Natural Resources Conservation Service, the City of White Salmon compiled the Buck Creek Watershed Comprehensive Management Plan in 2002. This program was reviewed and assessed with respect to the watershed control requirements described in WAC 246-290-668 and in Chapter 5 of the Water System Planning Handbook (Washington State Department of Health [DOH] 2020). The results of this assessment are described in Memorandum No. 1 (see Appendix G).

The previous City and DNR watershed agreement expired in 2012. Both parties have expressed an interest in developing an updated agreement and have initiated research and discussions on the new agreement. This new watershed agreement and commitment is needed for better communication and cooperation between the City and DNR in managing the Buck Creek Watershed. The City began working with the DNR on a new watershed agreement in April 2024 and anticipates adoption by March 2025. A copy of the updated watershed agreement will be sent to the DOH once executed.

Proposed White Salmon River Intake

The proposed White Salmon River intake is still in the planning and preliminary design phase. The watershed upstream of the proposed diversion location encompasses approximately 357 square miles. A preliminary review of the watershed ownership and land use found that 67 percent is held by public entities. Less than 5 percent of the watershed is developed and approximately 2.6 percent is under cultivation or is used for pasture. The development of a new source will include further evaluation of the watershed and the establishment of a watershed control program and monitoring program to meet the requirements described in WAC 246-290-668.

Beginning in 2017, the City established a stakeholder group to support planning for a new White Salmon River source, which includes the U.S. Forest Service, the Yakama Nation, Klickitat County, and the Washington State DOH, DNR, Washington State Department of Ecology, and the Washington Department of Fish and Wildlife, among others. The stakeholder group is intended to help develop an approach to design, construct, and operate and manage a future White Salmon River source, including maintenance of the health of the watershed. The stakeholder group is expected to be consulted for developing future agreements and management plans with the public agencies managing the upstream watershed.

Chapter 6 - Operation and Maintenance Programs

The objective of the operation and maintenance (O&M) program is to ensure the satisfactory management of water system operations in accordance with Washington Administrative Code (WAC) 246-290-100, 246-290-300, 246-290-320, 246-290-440, 246-290-480, and 246-290-490, as well as WAC 246-292-020, 246-290-050, and 246-290-090.

Water System Management and Personnel

The management structure of the City of White Salmon's water system starts with the mayor, who works with the City Operations Committee and City Council on overall system management and policy. The mayor is responsible for overall system management and policy implementation for the O&M of the water system. Under the mayor is the city administrator, Public Works Director, and the public works crew. The positions and associated responsibilities for the City's water system are summarized on Figure 6-1.

The position of mayor is an elective office with a four-year term. The City Operations Committee consists of two council members selected by the mayor. There are five council positions on the City Council, and each position has a four-year term.

Operator Certification

In accordance with WAC 246-292-050, Waterworks Operator Certification, the City has the following certified operators as listed on Table 6-1.

TABLE 6-1
CERTIFIED OPERATORS

Name	Level	Certification No.
Ross Lambert	WDM II, WTPO I, CCS	8177
Jeff Cooper	WDM II, WTPO I	11966
Jason Kinley	WDM I	14726
Andrew Dirks	WDM I, WTPO I	14713
Ryan Adams	WDM I	15616

CCS - Cross Connection Specialist

WDM - Water Distribution Manager

WTPO - Water Treatment Plant Operator

Additionally, the City is required to have a CCS responsible for overseeing the cross connection (CC) program and performing periodic inspections of premises for cross connections. Ross Lambert of the City's public works staff is the City's CCS.

Position Responsibilities and Qualifications

The water system position responsibilities and qualifications are described on Table 6-2.

TABLE 6-2
POSITION RESPONSIBILITIES AND QUALIFICATIONS

Responsibility	Qualified Position/Staff
Day to Day Distribution System O&M	Public works staff with Distribution System Certification WDM 1
Day to Day Water Treatment Plan (WTP) O&M	Public works staff with WTP Certification WDM 1
Water Quality Monitoring • Source sampling • WTP sampling • Distribution system sampling	 • Public works staff with WTP Certification WTPO 1 • Public works staff with WTP Certification WTPO 1 • Public works staff with Distribution System Certification WDM 1
Capital Improvement Project Management • Water System Internal Plan • Engineering Design Review • Asset Management and Facility Review • Construction Management	 • Public Works Director • Public Works Director with support from consultant • Public Works Director with support from consultant • Public Works Director with support from consultant
Sanitary Survey - Preparation, Participation, and Response	Public Works Director with support from public works staff
Preventative Maintenance	Public works staff under supervision of Public Works Director
Emergency Response • Designated Media Contact • Issuance of Health Advisories as part of Tier 1 Public Notice	 • Mayor, with input from Public Works Director
Cross Connection Control	Public works staff with CCS certification
Training and Continuing Education Units Coordination	Public Works Director
Budgeting	Public Works Director
Complaint Response	Public Works Director with support from public works staff
Disseminating Public Information	Mayor, with City Administrator/Public Works Director input
Meter Reading and Billing	Public works staff and Utility Clerk
Documentation and Records Retention	Clerk-Treasurer: accounting, policies, and council actions Public Works Director: customer complaints, Washington State Department of Health (DOH) correspondence

Work Staff Succession

The City of White Salmon's work staff succession strategy is to invest and develop the skills and capabilities of all its staff for efficient operation of its Public Works Department and to anticipate future staffing needs when possible. The City values its Public Works staff and encourages its employees to pursue career development by maintaining their existing operator certifications and pursuing advanced operator certifications through continuing education opportunities, which is compensated by the City. The Public Works Department conducts on-the-job training and cross-training in different tasks to further develop its staff's skills and experience. The Public Works Department also strives to involve and solicit staff on possible solutions to issues with the City's public works.

The City's Public Works Department has experienced significant staff turnover over the past few years but, fortunately, was able to retain core staff. Future staff turnovers are inevitable as staff retire, relocate, withdraw for medical reasons, etc. As new staff positions have opened up, the City has been aggressive in advertising for staff replacement. Recently, the City attended a career fair at the local high school to encourage the next generation and answer questions regarding future municipal employment opportunities, including water and wastewater operations.

The Public Works Department has redundancy for all certifications except cross-connection control specialist (CCS). The City will be encouraging one of its current staff members to pursue CCS certification or will hire a consultant to perform the CCS tasks.

System Operation and Control

The following description of the City's water system includes identification of major system components, routine system operation and preventative maintenance program, and equipment, supplies, and chemical listing.

Major System Components

The major water system components include a slow sand filter plant, source wells, reservoir tanks, pump stations, and water distribution systems. The locations of the City's major system components are shown on Figure 1-2. The discussion below includes the City's supervisory control and data acquisition (SCADA) system.

Sources/Water Treatment

The City operates a surface water diversion from Buck Creek and Wells No. 1 and 2. The Buck Creek source provides the base flow for the system and the wells through the Grand Ronde Reservoir Tank and Booster Pump Station (BPS), while the Childs Reservoir handles peak demand. City staff sets the flow from the Buck Creek WTP by controlling the amount of flow to each slow sand filter cell. Water from Wells No. 1 and 2 is dependent on the water level in the Childs Reservoir. The control valve on the outlet pipe from Childs Reservoir controls the amount of water in the reservoir and opens when the water levels in the Los Altos or Spring Street Reservoir drops to preset levels and the SCADA system calls for water.

Water from Buck Creek is treated via a settling basin and two slow sand filter cells followed by disinfection with the injection of sodium hypochlorite solution. Well water is also disinfected with sodium hypochlorite solution.

The City also utilizes water from the Buck Creek WTP for aquifer storage and recovery (ASR) at Well No. 2. For ASR, the City staff is required to manually operate valves to divert the water from the Buck Creek WTP to Well No. 2. Because of existing piping arrangements, neither Well No. 1 nor 2 can convey water to the City when ASR water is flowing to Well No. 2.

Reservoir Tanks

White Salmon operates seven water reservoir tanks for storing potable water (see Chapter 3 for more details). Each reservoir serves one or more pressure zones. These tanks operate by gravity, supplying water to their pressure zone based on demand. Pumps pump water from one pressure zone to another to maintain adequate storage. The water level in these tanks will fluctuate with customer demand and source water flow.

Booster Pump/Pressure Stations

The City has three pump stations in its water system: 1) Grand Ronde, 2) Los Altos, and 3) Strawberry Mountain pressure station. The Grand Ronde BPS conveys water from the Grand Ronde Reservoir to the Childs Reservoir. The BPS at Los Altos conveys water from the Los Altos Reservoir to the Strawberry Mountain Reservoirs and the Strawberry Mountain Pressure Zone. The Main Street BPS supplies water to the Simmons Road Pressure Zone. The pressure station at Strawberry Mountain supplies the customers located adjacent to the Strawberry Mountain Reservoirs. The Grand Ronde and Los Altos BPS operate off the water levels of the reservoir tank they are pumping to via SCADA. The Strawberry Mountain pressure station runs continually to maintain pressure.

Supervisory Control and Data Acquisition System

The SCADA system controls and acquires data from various parts of the City’s water system. It controls the operation of the Grand Ronde and Los Altos BPS and the discharge valve on the discharge line from the Childs Reservoir. Data collected, stored, and reported includes reservoir water levels (Childs, Los Altos, Spring Street, Dock Grade, Strawberry Mountain), flows (combined Wells No. 1 and 2, Buck Creek, Well No. 2, and State Route 14 intertie with Bingen), well water levels (Wells No. 1 and 2), pressures (booster suction pressure, Grand Ronde), and chlorine levels (Buck Creek, Childs Reservoir and the Grand Ronde BPS). It also allows City staff to monitor turbidity, flow, and chlorine levels at the slow sand filter plant.

Routine System Operation and Preventative Maintenance Program

City staff periodically reviews system operation and performance by regular maintenance including, but not limited to, the activities outlined on Table 6-3. Copies of the daily and weekly log reports are in Appendix H.

TABLE 6-3
SYSTEM OPERATION AND PREVENTATIVE MAINTENANCE PROCEDURES

Wells	
Triweekly	• Record pump run time and source meter readings; calculate water production. • Record well static level, pumping level, and flow rate. • Inspect wellheads, control valves, equipment, buildings, and fences. • Conduct security check of facilities. • Inspect operation of control valves. • Check pumping rate. • Record water level in Wells No. 1 and 2.
Monthly	• File production data report. • Inspect well pumps, motors, and controls. • Inspect all wellhouse piping for leaks and corrosion. • Read and record electric meter readings. • Well No. 2 - Check pump packing, oil level, amps, flow, water level, meter readings.
Annually	• Clean and inspect control valves. • Exercise all valves at wellhouses. • Inspect and test source meters once every six years. • Inspect and prepare facilities for winter operations. • Inspect safety equipment; repair and replace as needed. • Clean, inspect, and repair control panels. • Take required water quality sampling as required and scheduled.
Treatment	
Triweekly	• Check chlorine levels at Buck Creek WTP and Grand Ronde BPS. • Check chlorine residual, water temperature, flow (total, Basins No. 1 and 2), liquid chlorine levels, pump rate, stroke, pH at dam, water level at dam, headloss over filter basins, turbidity (raw, effluent from Basins No. 1 and 2), check raw water screen, check turbine operation. • Clean intake screens (especially in fall). • Conduct security check of facilities.

Monthly	• File Surface Water Treatment report. • Maintain 15- to 30-day supply of chlorine. • Record meter readings for total flow and flow to each basin. • Record Buck Creek flow from gauge at monitoring station. • Collect and record chlorine residual from Buck Creek WTP. • Collect total organic carbon samples from each basin prior to disinfection. • Collect coliform samples at inlet.
Quarterly	• Calibrate turbidimeters.
Annually	• Clean and/or flush solution tubing. • Inspect and prepare facilities for winter operations. • Clean out rocks and debris upstream of the Buck Creek diversion. • Clean out sand filter basins as needed.
Reservoir Tanks	
Daily	• Check revisor levels and fill patterns from the SCADA system.
Monthly	• Conduct security check of facilities. • Inspect storage tank for sanitary and structural deficiencies and defects. • Collect and record chlorine residual and water temperature at Spring Street, Dock Grade, Los Altos, Strawberry Mountain.
Annually	• Perform maintenance and cleaning as scheduled. • Exercise all valves. • Inspect ladders, hatches, floats, vents, and safety equipment. o Clean tank interior and inspect condition every five years.
Booster Pump Stations	
Triweekly	Grand Ronde Pump Station • Review and record total run hours from SCADA system. • Check chlorine feed rate and makeup flow. • Check liquid chlorine level. • Record back pressure from reservoir. • Record room temperature, upstream and downstream pressures, pumps amps, percent opening of Cla-Val, Well No. 1 static and drawdown levels. o Record Well No. 1 amps, pump amps, and current meter reading.

Monthly	• Strawberry Mountain - Collect and record chlorine residual level and pump run hours. • Los Altos - Collect and record volts, current, potential (cathodic protection), pump run hours. • Grand Ronde - Generator starts and run time, pumping level, meter readings. • Conduct security check of facilities. • Review general condition and operation of pumps. • Grand Ronde BPS - Record generator hours and fuel level.
Annually	• Inspect, clean, and repair control panels.
Distribution System	
Triweekly	• Record residual chlorine levels and water temperature at sample locations. • Record flowmeter, water temperature, chlorine residual, and room temperature at Childs monitoring station.
Monthly	• Perform coliform monitoring sampling per Coliform Monitoring Plan. • Record service meter readings. • Inspect meter for damage, leaks, and proper operation. • Perform water audit of source production and service consumption. • Compare water use to previous months to identify declining meter performance or potential water leaks. • Maintain log of repairs to water mains and equipment. • Record source meters.
Annually	• Flush one-third of distribution system and exercise one-third of hydrant and valves. • Inspect and perform maintenance on fire hydrants and guard posts; ensure fire hydrants are accessible[1]. • Exercise one-third of main line valves; record valve condition and turns to open valve. • Inspect valve box and lid; maintain access/visibility around valves and markers as needed[1]. • Inspect, rebuild, and repair control valves.

[1] The City provides public fire protection (i.e., fire hydrant) maintenance inside the city limits. Maintenance work outside the city limits would be performed by the City on a case-by-case agreement basis.

Surface Water Treatment Operational Measures

The purpose of the section is to reference the operational measures taken by the City to ensure optimal filtered water quality at all times the Buck Creek WTP produces water. The City's technology and processes that are used at the Buck Creek WTP are discussed in Chapter 3. The surface water treatment operational measures, with references, are summarized on Table 6-4.

TABLE 6-4
WATER TREATMENT PLANT OPERATIONAL MEASURES

Operational Measures/Reference
Determination of Chemical Dose Rates
City of White Salmon O&M Manual - Slow Sand Filtration, May 2010 (a copy of the Table of Contents is provided in Appendix H). Specific information on the chlorine pump settings are described in Appendix E of the O&M Manual.
WTP Operational and Maintenance Protocols
• City of White Salmon O&M Manual - Slow Sand Filtration, May 2010 (a copy of Table of Contents provided in Appendix H). Operational protocols are described in Section II - Construction, III - Initial Startup, IV - Normal Operations Valves; functions and treatment schematics are provided in Appendix D of the O&M Manual. Specific maintenance tasks are described in Section VI - Scraping and Restarting a Bay, VII - Maintenance Schedules, and Appendix H of the O&M Manual. • The Steam Engine, Personal Hydropower Owner's Manual, Ver. 1.4, 2009 (not included).
Performance Monitoring
• City of White Salmon O&M Manual - Slow Sand Filtration, May 2010 (a copy of the Table of Contents is provided in Appendix H). Pertinent sections include II - Construction, III - Initial Startup, and IV - Normal Operation. • Performance indicators include raw water turbidity, slow sand filter basin (each) turbidity, slow sand filter basin (each) flow rate, combined flow rate from the reservoir tank, and chlorine residual in the reservoir tank. • Control system takes action when the raw water turbidity is more than 1.0 nephelometric turbidity unit (NTU) (close outlet valve), finished water turbidity exceeds 0.7 NTU (close outlet valve), flows from either slow sand filter basin exceed 500 gallons per minute (partially close outlet valve), chlorine residual drops to below 0.8 milligrams per liter (mg/L) at reservoir tank (chlorine pump rate is increased), chlorine residual drops below 0.6 mg/L (chlorine outlet valve closed), and water on floor (3 inches above sump, close outlet valves).
Data Integrity/Quality Assurance Program
• City of White Salmon O&M Manual - Slow Sand Filtration, May 2010 (a copy of the Table of Contents is provided in Appendix H). • Calibrate portable turbidity reader (not included).
Reliability Features
• WTP controls include closing outlet valves to the slow sand filter bays if the water level drops below an elevation of 1,039.0 feet, if raw water turbidity increases to more than 1.0 NTU, if the finished turbidity increases to more than 0.7 NTU, or if chlorine residual drops below 0.6 mg/L. • The treatment train includes two slow sand filter bays, which can operate as separate units. • In the event that Buck Creek WTP is taken out of service, the City has two wells that can satisfy water demand for an extended period.
Response Plans for Critical WTP Process Failures
• City of White Salmon O&M Manual - Slow Sand Filtration, May 2010 (a copy of the Table of Contents is provided in Appendix H).

Watershed Plan Emergency Response Planning
• As mentioned in Chapter 5, the Buck Creek watershed agreement between the City and the Washington State Department of Natural Resources expired in 2012 and both parties have expressed an interest in developing an updated agreement and have initiated research and discussions on the new agreement. The previous agreement included provisions to close the access road to the watershed at key locations in the event of a water quality or other health-related concern. Sample sites for determining the origin of a water quality issue in the watershed are discussed in the Memorandum on the Buck Creek Watershed Evaluation Report (see Appendix G).

Equipment, Supplies, and Chemical Listing

A listing of the equipment, supplies, and chemicals with associated service representatives for the City's water system is provided on Table 6-5.

TABLE 6-5
LIST OF SERVICE REPRESENTATIVES

Representative	Physical and/or Email Address	Telephone Number
Plumbing, Pipes, Valves, Fittings, and Hydrants		
On-site Supply House	1476 Markham Road Hood River, Oregon 97031 Info@onsitesupplyhouse.com	541-716-0352
H.D. Fowler Company, Ed Pettett, Outside Sales	11316 Northwest Highway 99 Vancouver, Washington 98686 ed12@hdfowler.com	360-574-9377 503-476-2804 - mobile
Consolidated Supply, Drew Baird	20625 Brinson Boulevard Bend, Oregon 97701 Drew.baird@consolidatedsupply.com	971-227-3175 503-620-7050
Control Valves (i.e., Cla-Val)		
Cimco-GC Systems Inc., Beau Swet	P.O. Box 848 Sumner, Washington 98390 office@cimco-gcsystems.com	800-525-9425 253-939-8322 253-939-3474 - fax
Prestige Worldwide Technologies LLC, Danny Dahl	205 E. 14th Street Mt. Pleasant, Texas 75455 danny@prestigewwt.com	509-552-3549 - mobile 800-283-9432
SCADA Telemetry System O&M and Technical Services		
Coburn Electric, Jon Carter	jon@coburnelec.com	541-399-3687 888-387-1266
Treatment Chemicals Listing, Laboratory Reagents, and Suppliers		
Cl17 Reagents, Cl17 Rebuild Kits, and Turbidimeter Desiccant		
Hach Company, Tanner Hartstock Municipal Drinking Water	tanner.hartstock@hach.com	503-298-8832
Chlorine Gas		
BrennTag Pacific	5700 N.W. Front Avenue Portland, Oregon 97210	503-221-6412

Comprehensive Water Quality Monitoring

The City conducts regular monitoring of its surface water source, groundwater wells, and distribution system. Except for chlorine residual determinations (performed by City staff), certified laboratories perform all required water quality analyses. The current requirements are summarized on Table 6-6, and a copy of the Water Quality Monitoring Schedule report is provided in Appendix H.

TABLE 6-6
WATER QUALITY MONITORING REQUIREMENTS

Test Panel	No. of Samples Required	Compliance Period	Frequency
Distribution System Monitoring			
Lead and Copper	20	1/2020 - 12/2022	Standard - 3 years
Asbestos	1	1/2020 - 12/2028	Standard - 9 years
Total Trihalomethanes	2	1/2023 - 12/2023	Reduced - 1 year
Halo-Acetic Acid	2	1/2023 - 12/2023	Reduced - 1 year
Source S01 Monitoring (Buck Creek)			
Nitrate	1	1/2023 - 12/2023	Standard - 1 year
Complete Inorganics (IOCs)	1	1/2020 - 12/2028	Waiver - 9 years
Volatile Organics (VOCs)	1	1/2017 - 12/2022	Waiver - 6 years
Herbicides	1	1/2014 - 12/2022	Waiver - 9 years
Pesticides	0	1/2020 - 12/2022	Waiver - 3 years
Soil Fumigants	0	1/2020 - 12/2022	Waiver - 3 years
Gross Alpha	1	1/2020 - 12/2025	Standard - 6 years
Radium 228	1	1/2020 - 12/2025	Standard - 6 years
Source S03 Monitoring (Well No. 1)			
Nitrate	1	1/2023 - 12/2023	Standard - 1 year
Complete IOCs	1	1/2020 - 12/2028	Waiver - 9 years
VOCs	1	1/2017 - 12/2025	Waiver - 6 years
Herbicides	1	1/2014 - 12/2022	Waiver - 9 years
Pesticides	0	1/2020 - 12/2022	Waiver - 3 years
Soil Fumigants	0	1/2020 - 12/2022	Waiver - 3 years
Gross Alpha	1	1/2020 - 12/2025	Standard - 6 years
Radium 228	1	1/2020 - 12/2025	Standard - 6 years
Source S04 Monitoring (Well No. 2)			
Nitrate	1	1/2023 - 12/2023	Standard - 1 year
Complete IOCs	1	1/2020 - 12/2028	Waiver - 9 years
VOCs	1	1/2017 - 12/2025	Waiver - 6 years
Herbicides	1	1/2014 - 12/2022	Waiver - 9 years
Pesticides	0	1/2020 - 12/2022	Waiver - 3 years
Soil Fumigants	0	1/2020 - 12/2022	Waiver - 3 years
Gross Alpha	1	1/2020 - 12/2025	Standard - 6 years
Radium 228	1	1/2020 - 12/2025	Standard - 6 years

Coliform Monitoring Program

All Group A public water systems are required by the “Group A Public Water Systems” regulations (WAC 246-290) to collect samples for coliform bacteria analysis. Coliform bacteria sample collection must be based on a written monitoring plan that identifies sampling sites throughout the distribution system. A copy of the City's Coliform Monitoring Plan is provided in Appendix H.

Other Monitoring Programs/Plans

Copies of the City's Lead and Copper Monitoring Program and Disinfection Byproducts Monitoring Plan are provided in Appendix H.

A map showing the sampling locations for the Coliform Monitoring Plan and Disinfection Byproducts Plan is included in Appendix H. The sampling sites for the Lead and Copper Monitoring Plan were too numerous to plainly show in this map. Instead, a copy of the addresses for the lead and copper monitoring sample sites is provided in Appendix H.

Emergency Preparedness and Response

The O&M section of WAC 246-290-415 (2)(d) requires public water systems in Washington to have an emergency response plan as part of a Water System Plan. The City has an emergency response plan based on a vulnerability assessment, but it has not been included in this Plan because it includes a vulnerability assessment, which is considered sensitive and restricted information.

The City has developed and adopted a Water Shortage Response Plan. A copy of this plan is provided in Appendix H.

Cross Connection Control Program

The City has developed and implemented a CC program as required by WAC 246-290-490. The status of the City's CC program regarding the minimum elements required by WAC 246-290-490 is presented on Table 6-7.

TABLE 6-7
CC PROGRAM STATUS

Element/Status
Ordinance Establishing Authority - Authority established under the City's municipal code, Chapter 13.20, Control of Backflow and Cross Connection to the City Water System (Ordinance 2004-5-748 § l(part), 2004).
Procedures for Evaluating New and Existing Connections New connections - City staff reviews all new plumbing permits and investigates any new irrigation systems being installed for potential cross connection issues. Existing connections - City staff reviews an existing connection with respect to its CC program when any complaint or problem is brought to the City's attention.
Procedures for Eliminating Cross Connections - The City utilizes procedures presented in CC Manual Accepted Practices and Procedures, latest edition.
Provide CCS on Staff - Ross Lambert of City staff is the certified CCS.
Procedures for Test Requirements – The City has procedures to track and enforce backflow device test requirements.

Element/Status
Assembly Testing Quality Control - The City does not do any assembly testing itself but requires certified testers to submit their certification and calibration assembly testing results to the City on an annual basis.
Backflow Event Response Procedures - The City has a customer complaint response program in place and specific procedures for responding to a backflow incident.
Cross Connection Education Program - The City provides CC information in its annual testing notice to customers with backflow devices.
CC Database - The City maintains electronic and paper documentation of cross connection records. A copy of the current database is provided in Appendix H.
Extra Requirements for Reclaimed Water - Not applicable; the City does not distribute reclaimed water.

Sanitary Survey Findings

A routine sanitary survey inspection was performed on July 27, 2023; a copy of the December 26, 2023, letter summarizing the survey findings is provided in Appendix H. Several significant deficiencies were identified related to the Spring Street Reservoir for which corrective actions were recommended including sealing any gaps or holes on the reservoir roof to prevent contamination and replacing the worn or rotten screens on the vents located around the sides of the reservoir and components. The City has corrected these deficiencies. Proposed construction of a new reservoir tank to replace the existing Spring Street Reservoir is discussed in Chapters 3 and 8.

Customer Complaint Response Procedures

The City has procedures to respond to customer complaints. Customer complaints are typically taken by the utility clerk at City Hall. The complaint is recorded, and a work order is then made, or, depending on severity, a phone call is made. The work order is issued to the Public Works Director and the public works crew. The Public Works Director or one of the public works staff will investigate the complaint, visit the site, and take any necessary samples and perform any needed tests. If a member of the public works crew performs the investigation, the results of their findings are reported to the Public Works Director. The Public Works Director then contacts the customer with the complaint, informing them of the City's findings, any corrective steps taken by the City, and any suggestions that might assist the customer. The work order with the findings and the report to the customer are returned to City Hall for filing by the utility clerk.

Substantiated complaints and findings are brought to the attention of the Public Works Director, who then notifies the mayor. The mayor and/or Public Works Director inform the City Council at the Council meeting immediately following the complaint and/or findings. Copies of the minutes from the City Council meetings are stored at City Hall.

Recordkeeping and Reporting

Records kept and maintained by the City are summarized on Table 6-8.

TABLE 6-8
SUMMARY OF RECORDS MAINTAINED BY THE CITY OF WHITE SALMON

Type of Record	Minimum Time of Required Storage
Bacteriological results	Five years
Daily chlorine residuals	Ten years
Chemical analysis results	Indefinitely
Lead and copper sampling results	12 years
Stage 2 disinfection byproducts rule data	Ten years
Daily source meter readings	Ten Years
Monthly service meter readings	Six years
Monthly Treatment Reports	Three years
Record of action taken to correct violations of primary drinking water standards and exceedances of State Action Levels	Ten years
Copies of sanitary surveys and associated records	Ten years
Level 1 or Level 2 Assessments or other summary of sanitary defects and corrective actions	Five years after completion of the assessment or corrective actions
Other O&M records (actions taken to correct maximum contaminant level violations, water quality complaints, etc.)	Three years after the last action taken to correct the violation or complaint
Copies of public notices	Three years after issuance
Customer service agreements and notification of customer to install backflow preventer	Indefinitely
CCC correspondence with DOH and local administrative authority	Five years
CCC annual summary reports	Five years
Backflow incident reports, CCC test records	Indefinitely
Annual Consumer Confidence Reports (CCRs)	Three years
Project reports, construction documents, Drawings, inspection reports, and approval of system facilities	Life of the facility

The above records will be filed and stored either at City Hall or the City's public works shop.

Reporting requirements to the DOH for the City of White Salmon include, but are not limited to, the following:

- Failure to comply with monitoring requirements or the violation of a primary maximum contaminant list
- Copies of water quality monitoring results required by the DOH
- Copies of information relating to the status of monitoring waivers
- Monthly treatment reports
- Annual CCR
- Annual water facilities inventory form
- Annual water use efficiency form

- Notification to the DOH of any positive coliform samples (reporting requirements are in the Coliform Sampling Plan)
- CCC Annual Summary Report

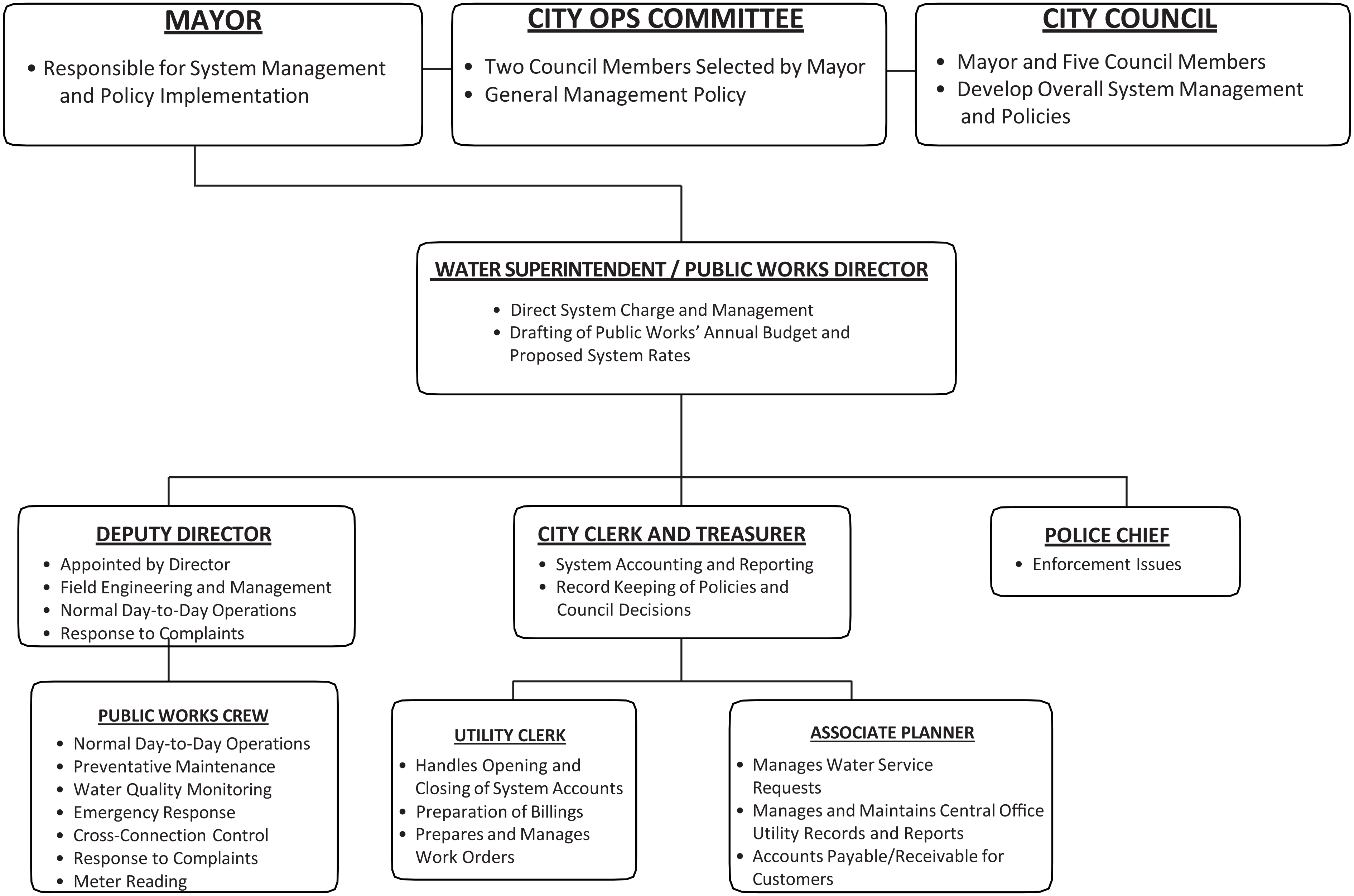
Operation and Maintenance Plan Improvements

Improvements to the O&M of the system are summarized in Chapter 8.

Equipment and Instrumentation

The following is a list of equipment and instrumentation the City staff has identified as being useful in its O&M of the water system. The City should strive to acquire this equipment and instrumentation when budget and other financial resources are available.

- New hydro-excavation truck
- Updated GIS/mapping
- Boring machine
- Leak detection equipment



MAYOR

- Responsible for System Management and Policy Implementation

CITY OPS COMMITTEE

- Two Council Members Selected by Mayor
- General Management Policy

CITY COUNCIL

- Mayor and Five Council Members
- Develop Overall System Management and Policies

WATER SUPERINTENDENT / PUBLIC WORKS DIRECTOR

- Direct System Charge and Management
- Drafting of Public Works' Annual Budget and Proposed System Rates

DEPUTY DIRECTOR

- Appointed by Director
- Field Engineering and Management
- Normal Day-to-Day Operations
- Response to Complaints

CITY CLERK AND TREASURER

- System Accounting and Reporting
- Record Keeping of Policies and Council Decisions

POLICE CHIEF

- Enforcement Issues

PUBLIC WORKS CREW

- Normal Day-to-Day Operations
- Preventative Maintenance
- Water Quality Monitoring
- Emergency Response
- Cross-Connection Control
- Response to Complaints
- Meter Reading

UTILITY CLERK

- Handles Opening and Closing of System Accounts
- Preparation of Billings
- Prepares and Manages Work Orders

ASSOCIATE PLANNER

- Manages Water Service Requests
- Manages and Maintains Central Office Utility Records and Reports
- Accounts Payable/Receivable for Customers

anderson perry & associates, inc.

CITY OF WHITE SALMON, WASHINGTON

WATER SYSTEM PLAN
ORGANIZATIONAL CHART

FIGURE
6-1

S:\DOCS\WHITE SALMON\250-02 WSP\WSP\FIGURE 6-1.indd

Chapter 7 - Distribution Facilities Design and Construction Standards

In this chapter, the project review procedures, design and construction standards, and required project documentation for the design and construction of distribution facilities within the City are described and discussed. The City intends to apply for a waiver to construct distribution facilities without Washington State Department of Health (DOH) approval. The following provides an overview for developers and their design engineers on the City's project review procedures, policies, and design and construction standards. Specific information on the subjects is found in the City of White Salmon's Development Review Packet (2022) and Construction Standard: Specifications and Standard Plans (2023).

The City's design and construction standards include five elements for distribution facilities:

- Project review process
- Policies and requirements for outside parties
- Design standards
- Construction standards
- Construction certification and follow-up procedures

These elements are discussed in further detail below.

Project Review Process

To ensure the proposed improvements are in conformance with state and City standards, all projects, except distribution system improvements, will be reviewed and approved by the DOH, the City, and the City's consultants. Distribution system improvements will be reviewed by the City via the Development Team (DT) and the City's consultants.

Upon the proposal of a distribution system development or project, the developer contacts the Special Projects Coordinator, who then initiates the DT process. The DT members consist of the associate planner, the special projects coordinator, the building inspector, the Public Works Director, and foreman (as well as the mayor, city administrator, and consultants as needed).

The DT review process is listed below. A full copy of the Development Review Packet (City of White Salmon 2022) is provided in Appendix H.

- **Step 1:** The owner decides they want to do a development/remodel, etc., in the City of White Salmon.
- **Step 2:** The developer contacts the City. The preferred contact is the planning technician, who receives the inquiry and determines the desire of the developer to meet with the DT. The planning technician schedules the customer into the regular meeting time for the DT. The planning technician creates a central file for the project. The DT is sent info on the proposal no later than Tuesday at noon to be on the following week's DT meeting agenda.

- **Step 3:** The developer meets with the DT and gets a complete orientation to the City, specifically the requirements and process for development. The developer receives a copy of Public Works construction standards including, but not limited to, the Development Review Packet (City of White Salmon 2022) and Construction Standard: Specifications and Standard Plans (City of White Salmon 2023), and other pertaining documentation. (Form 1: Initial Review.)
- **Step 4:** The developer meets with the DT to provide plans and applications according to City codes. (Form 2: Initial Application Review.) The DT may also call for a pre-application meeting as an option.
- **Step 5:** Construction for the project has started, and the Public Works Department does periodic on-site inspections as requested by the developer or referencing the rolling calendar of projects. (Form 3: Inspector's Project Report.) This process could take years to complete.
- **Step 6:** The project is completed and ready for final inspection and acceptance by the City. (Form 4: Final Inspection/Acceptance Form.)

Policies and Requirements for Outside Parties

The policy and procedures for new water requests and the required information for the City to address a request were previously summarized on Table 1-6. Plans and Specifications must be stamped and signed by a professional engineer registered in the State of Washington who has experience and competence in water system design. All fees and necessary easements need to be received by the City before approval is granted. The developer will be responsible for reimbursing the City for expenses incurred by the City's consultant in reviewing the proposed development.

Design Standards (Performance and Sizing Criteria)

The design of the water distribution system for the City of White Salmon will be in accordance with DOH's Water System Design (WSD) Manual (latest edition), WAC 246-290, the City's design standards shown on Table 3-1, and other accepted good engineering criteria and practices.

The following are general, but not inclusive, guidelines for the design of water system components within the City.

Storage

- Storage capacity shall conform to the WSD Manual. Design shall comply with the latest edition of American Water Works Association (AWWA) D100, D102, D103, D104, or D110 where applicable.
- Telemetry of the reservoir storage tanks shall be compatible with the City's telemetry system and record and transmit high and low water levels.
- Tanks may be welded steel; glass-fused-to-steel bolted; reinforced concrete; or post-tensioned, pre-stressed concrete.
- Interior and exterior coating systems shall be selected by the City. Color for the tank's exterior shall be selected by the City. Coating for the interior of the welded steel tanks shall include a corrosion inhibiting agent, such as a zinc-rich primer.

- Steel tanks shall have some form of cathodic protection: welded (automatically controlled impressed current) and glass-fused-to-steel (sacrificial anode).
- Permanent ladders and fall protection shall be provided on the interior and exterior of the tank. Vandal protection shall be provided for exterior ladders. Outside ladder material shall be aluminum, stainless steel, or fiberglass, and inside ladder material shall be stainless steel or fiberglass.
- Water circulation systems shall be incorporated into new storage reservoir, unless waived by the City. Passive (non-mechanical) systems are preferred. The tank shall have separate inlet and outlet pipes with adequate separation for mixing.
- Reservoir outlet piping for tank exit shall be a minimum of 12 inches in diameter.

Transmission and Distribution

- The maximum velocity for the system will be less than 8 feet per second (fps) at peak hourly demand flow conditions.
- All customer water users shall be metered.
- Service lines shall be installed so each residential, commercial, and industrial structure will have a separate service from the water main.
- Every structure shall be equipped with its own water service meter, with the exception of those complexes where future water utility line subdivision is impractical.
- There shall be no cross connection between the distribution system and any pipes, pumps, hydrants, or tanks of non-potable sources.
- Where practical, mains shall be looped to increase reliability and water quality. All dead-end mains shall be provided with a blow-off or a hydrant of adequate size to generate 2.5 fps average velocity in the pipe to flush the line.
- Water mains shall not be located under permanent concrete structures unless cased.
- Where possible, valves shall be clustered at the tee or crosses of connecting intersecting water lines. All hydrants shall be valved at the main with a flange valve.
- Water lines shall be in public rights-of-way (ROWs) whenever possible. If the City allows a main on private property, the property owner shall provide an easement a minimum of 20 feet wide centered on the pipeline to the City and easement documentation satisfactory to the City.
- The bury for all water mains shall be a minimum of 36 inches and a recommended 42 inches as measured from the top of pipe to the top of finished grade, unless otherwise approved by the City.
- Water and non-potable mains separation shall conform to Washington State Department of Ecology and DOH standards. For all other utilities, the water main shall have a minimum horizontal separation of 36 inches, unless waived by the City.
- Vertical separation from utilities other than sanitary sewers shall be a minimum of 6 inches.

- Extensions that are not to the benefit of the City shall be private and isolated from the system with an approved backflow assembly.

Water Services

- Service lines shall only be connected to public distribution mains. Connection to hydrant runs, fire lines, private mains, or dedicated transmission mains will not be allowed. The City may reconsider this standard at their discretion if there is a public health benefit.
- All water service lines and meter boxes are to be located along the street address side of the lot and installed perpendicularly to the water main and street centerline.
- Meter boxes shall be located within ROWs and within sidewalks whenever possible. Where sidewalks do not exist, the boxes shall be adjacent to the ROW lines whenever possible.
- Meter boxes shall be installed with sufficient clearance from side sewers, transformers, pedestals, and other utility service equipment to provide for safe maintenance access and to maintain water quality. Generally clearance required is 10 feet from side sewers and 3 feet from dry utilities.

Pump Station

- Where practical, structures shall be non-combustible and vandal-proof.
- Structures shall have adequate heating, cooling, ventilation, insulation, lighting, and work space necessary for safe and efficient operation and maintenance.
- Underground vaults shall be avoided if possible.
- Sites shall be fenced to reduce vandalism and City liability.
- Stations shall be fully equipped with all instrumentation and alarms necessary to assist personnel in operation and troubleshooting.
- A connection for emergency power shall be provided in all new pump stations.
- Fire pumps are discouraged and allowed only if construction of storage is impractical or delayed.
- Stations shall be constructed with the ability to increase capacity in the future. This shall be accomplished by adding space for additional pumps and/or by over-sizing the facility to install larger pumps in place of the original pumps.
- Stations shall include a control valve to pass water from the upper zone to the lower. Control valves shall include pressure relief functionality to permit operation of the station if the receiving reservoir is out of service.

Construction Standards (Materials and Methods)

AWWA standards need to be followed for the design and construction of distribution system facilities for the City of White Salmon. These AWWA standards include:

- Standards C104-C153 (American National Standards Institute (ANSI) Standards for Ductile Iron Pipe and Fittings)
- Standards C500-C560 (Standards for Valves and Hydrants for Waterworks)
- Standard C600-10 (Installation of Ductile-Iron Water Mains and Their Appurtenances)
- Standard C605-05 (Underground Installation of Polyvinyl Chloride [PVC] Pressure Pipe and Fittings for Water)
- Standard C651-05 (Disinfecting Water Mains)
- Standard C652-11 (Disinfection of Water-Storage Facilities)
- Standard C800-05 (Underground Service Line Valves and Fittings)
- Standards C900-950 (Plastic Pipe)
- Standard D100-11 (Welded Steel Tanks for Water Storage)
- Standard D102-11 (Coating Steel Water-Storage Tanks)
- Standard D103-09 (Factory-Coated Bolted Steel Tanks for Water Storage)
- Standard D104-11 (Automatically Controlled, Impressed-Current Cathodic Protection for the Interior of Steel Water Tanks)

Both pipe zone bedding and backfill and trench width and backfill shall conform to Washington State Department of Transportation (WSDOT) M41-10, Standard Specifications for Road, Bridge, and Municipal Construction, latest edition with amendments, and WSDOT Standard Plan 8-55.20-00, Pipe Zone Bedding and Backfill.

In addition to the above standards, all pipe and appurtenance materials/products that will be in contact with potable water must be listed in ANSI/National Science Foundation Additives Standard 61 for potable water service, unless there are no listed standards for a particular pipe or appurtenance material/product.

Water services and plumbing will conform to applicable International Plumbing Code (IPC) and local and state plumbing codes.

Acceptable water main and appurtenance materials/products for installation in the City include those materials and products shown on Table 7-1. Other materials may be considered and approved depending on the proposed product and installation.

A full list of the City’s Construction Standards is included in the City’s Construction Standard: Specifications and Standard Plans (2023).

TABLE 7-1
STANDARD WATER MAIN AND APPURTENANCE MATERIALS/PRODUCTS

Water Main/Appurtenance	Material/Products
Water Main Pipe	C900 PVC pipe for water lines shall conform to AWWA C900 or DR 18 (235 pounds per square inch). Ductile iron (DI) pipe and fittings shall conform to AWWA C150, AWWA C115, AWWA C151, AWWA C153, and AWWA C110 and shall be minimum pressure Class 350 unless approved by the City.
Service Line Pipe	Rehau MUNICIPEX®, PEX-A CTS size, c904-06 cross-linked polyethylene pressure tubing
Gate Valve	C509, resilient wedge, non-rising stem, 2-inch operating nut, Kennedy KSRW or KSFW, Ken-Seal II, M&H Style 4067 or 7000, Clow
DI Fittings	Mechanical joints conforming to AWWA C111 and shall be short-bodied compact DI fittings conforming to AWWA C153, Class 350
Fire Hydrant	Mueller Super Centurion, Kennedy K81
Service Saddle	Romac 202NS Nylon coated DI service saddle with stainless steel straps
Corp Stop	Ball valve style, Ford
Water Meters	Master Meter Advanced Metering Infrastructure (AMI), 5/8-inch by 3/4-inch or 1-inch typical
Locate Wire	Blue, number 12-gauge, insulated copper

Standard Plans

Standard plans for the City's water system are included in the City's Construction Standard: Specifications and Standard Plans (City of White Salmon 2023).

Construction Certification and Follow-up Procedures

During construction, City staff or designated representatives observe construction on a regular basis to ensure the completed work complies with City standards. The contractor is required to keep a record of all pressure and leak tests, disinfection procedures and results, and any changes during construction from approved Drawings or Specifications. Prior to completion of the project, a final site visit is made to identify those items (i.e., punch list) that need to be addressed for the City to consider the project complete. Prior to final acceptance by the City, the following items must be addressed and/or submitted to the City.

- Satisfactory completion of final punch list items
- Submission of bonding, insurance, easements, and any other requirements
- As-built Drawings of completed work stamped and signed by a professional engineer registered in the State of Washington
- Completed DOH Construction Completion Report Form stamped and signed by a professional engineer registered in the State of Washington

- Documentation of pressure test and disinfection results
- Operation and Maintenance Manual, if applicable, of constructed facilities
- Submission of warranty by the contractor or developer on the project materials and workmanship with a one-year correction period
- All fees paid

The City typically performs an 11-month review of the constructed facilities to determine if there are any correction items to be addressed by the contractor or developer.

Chapter 8 - Improvement Program

Objective

In this chapter, the City of White Salmon's Improvement Program for its water system is summarized. The Improvement Program includes a summary and schedule of all capital improvements and system measures identified in previous chapters. The program provides the City Council, staff, and customers with a systematic approach to dealing with short-term and long-term infrastructure needs and demands of its water system. Washington Administrative Code (WAC) 246-290-100 requires the City identify planned improvements in its Water System Plan (WSP). In certain health-threatening situations, Washington Department of Health (DOH) has the legal authority to order specific improvements pursuant to WAC 246-290-050.

The following is a discussion and summary of the improvement schedule for the proposed capital improvements and system measures for the City's system.

Improvement Priority

The priority of proposed capital improvements and system measures were discussed and developed in previous chapters. The system deficiencies and proposed capital improvements projects are shown on Figures 3-6 and 3-7 and are summarized by improvement type on Figure 3-8.

Priority of system measures was determined based on regulatory compliance issues, discussions with City staff, available funding, and other factors. The priority of a specific improvement may be revised depending on changes in the water system, available funding, and other issues unknown at the time this WSP was compiled.

The system improvements were categorized into assignment of a particular improvement into a specific priority group based on of the following considerations: identified health concerns, regulatory non-compliance, potential improvements to water efficiency use (i.e., reducing leakage) and system operation, coordination with other infrastructure improvements schedules (i.e., repaving or chip sealing a street), improvement financing, and projected growth. Higher priority was given to those improvements that address identified health concerns and regulatory non-compliance. A brief description of each type of project improvement is provided below.

- **Planned Improvements** - Improvements to be constructed in the next five years (planned). Projects would be funded either by outside funding agencies or internally. Improvements in this category include the replacement of sections of the existing transmission main, upgrading the supervisory control and data acquisition (SCADA) system, replacing a water line on Lakeview Road, construction of new a pump station on North Main Avenue and water main improvements on Spring Street, and upgrading the Los Altos BPS and transmission main. These projects are considered the most critical and should be undertaken as soon as funding is obtained or funds become available.
- **Proposed Improvements -** Improvements that are planned for design and construction in the next six to ten years. These projects include improvements to increase reservoir capacity, improvements to the Buck Creek water treatment plant (WTP), upgrading several water mains, replacing fire hydrants, and installing pressure reducing valve stations.

- **Future Improvements** - Improvements proposed to be designed and constructed in the next ten to 20 years. Projects in this category are proposed to implement additional improvements at the Buck Creek WTP, construct additional reservoir capacity at Strawberry Mountain, and replace several water mains in the distribution system.

Project Cost Estimates

The cost estimates presented in this WSP typically include five components: construction; contingencies; legal and administrative; permits, reporting, and investigations; and engineering costs. The estimates presented are preliminary and are based on the level and detail of planning presented in this WSP. As projects develop and as site-specific information becomes available, these estimates will need to be revised accordingly.

Construction

The estimated construction costs are based on actual construction bidding results from similar work, published cost guides, other construction cost experience, and material prices. System maps of the existing facilities were referenced to determine construction quantities and locations of distribution lines. The estimated construction costs were compiled in September 2022.

Future changes in the price of labor, equipment, and materials will require comparable changes in the cost estimates. The amount of adjustment will depend on future cost changes and when the improvements are scheduled for construction.

Contingencies

A planning level contingency factor equal to 25 percent of the estimated construction cost has been added. In recognition that the cost estimates are based on conceptual planning, allowances must be made for variations in final quantities, bidding market conditions, adverse construction conditions, unanticipated specialized investigations and studies, and other difficulties that cannot be foreseen at this time but may tend to increase final costs. The amount of contingency applied for a specific cost estimate was based on the amount of information available on the proposed improvement and site conditions.

Legal and Administrative

An allowance of 5 percent of construction cost has been added for legal and administrative services. This allowance is intended to include internal project planning and budgeting, grant administration, liaison, interest on interim loan financing, legal services, review fees, legal advertising, and other related expenses.

Permits, Reports, and Investigations

Permits, reports, and investigations are required to provide documentation needed for project design and/or identify potential cultural and environmental resources. Documentation needed for design or project construction includes a geotechnical review and evaluation of reservoir subsurface and trench conditions along the proposed water main alignment, well source approval reports, and hydrogeologic investigations. The purpose of cultural and environmental reports is to consider any adverse effects the project may have on existing cultural resources and surrounding environment and to propose mitigation measures to minimize potential impacts.

Engineering

The cost of engineering services for major projects typically includes special investigations, a predesign report, surveying, foundation exploration, preparation of Drawings and Technical Specifications, bidding services, construction assistance, project observation, construction staking, start-up services, and the preparation of operation and maintenance manuals. The cost for engineering services typically depends on the size and type of the project, as well as engineering services to be utilized. In most instances, the cost of engineering is estimated to be 20 to 25 percent of the construction cost.

Sales Tax

A sales tax of 7.5 percent of the construction cost was included as part of the total project cost.

Capital Improvement Plan and Schedule

The plan and schedule for the City's Capital Improvements Program for the water system is provided in this section. The recommended improvements were derived from proposed capital improvements to correct system deficiencies, perform conservation system tasks, and other system measures and recommendations presented in previous chapters.

A summary of the City's Capital Improvements Program is presented on Table 8-1. Table 8-1 includes a brief project description, estimated costs, funding source, and year or range of years of anticipated construction.

TABLE 8-1
CAPITAL IMPROVEMENTS PROGRAM

Description	Total Cost Estimate[1] (Dollars)	Anticipated Funding Source[2]	Estimated Year
Planned Improvements[3] (0 to 5 Years)			
PS-1: North Main Pump Station	$925,000	PWB	2024-25
PS-2: New Los Altos Booster Pump Station	$672,000	Outside	2026-27
TR-1: Transmission Main Replacement Phase I and T-1: Buck Creek Telemetry Facilities	$3,476,000	RD/PWB	2024
TR-2: Existing Water Main Abandonment on DNR Property	$50,000	Reserves	2025
TR-3A: Transmission Main Replacement Phase IIA, Manifold to Check Valve	$8,045,000	PWB	2024-26[4]
TR-3B: Phase IIB, Check Valve to and up Childs Road	$4,450,000	Outside	2027-28
TR-3C: Phase IIC, Waterline and Connections North of Henderson Lane	$1,578,000	Outside	2028-29
TR-3D: Ph IID, ASR Main and Controls	$2,000,000	Outside	2026-27
D-1: Spring Street Upgrade[5]	$1,100,000	PWB	2024-25

Description	Total Cost Estimate[1] (Dollars)	Anticipated Funding Source[2]	Estimated Year
D-2: Lakeview Line Replacement	$104,000	Outside/Reserves	2025
S-1: Buck Creek WTP Roof Restoration and Improvements	$1,350,000	PWB	2025
T-2: T-7 SCADA Improvements	$395,000	Reserves	2024
D-8: 1st Street, 2nd Street, and Oak Street Water Main Upgrades[5]	$530,000	PWB/DWSRF	2025-2026
TOTAL PLANNED IMPROVEMENTS	**$24,675,000**		
Proposed Improvements[3] (6 to 10 Years)			
R-1: New 1.0 MG Reservoir	$3,600,000	Outside	2029-33
TR-4: Transmission Main for New Reservoir[6]	$590,000	Outside	2029-33
D-5: S.W. Childs Road Water Main Upgrade	$331,000	Outside/Reserves	2029-33
D-11: O'Keefe, Center, and Tohomish Water Main Improvements[5]	$1,208,000	Outside	2029-34
D-17: Norby Lane-Westview Road Water Line	$339,000	Outside/Reserves	2029-34
D-18: Stauch Avenue Line Replacement	$160,000	Reserves	2029-34
D-20: 7th Street Water Line Replacement	$217,000	Reserves	2029-34
D-21: Columbia, Hood, and Scenic Water Line Replacement[5]	$663,000	Outside	2029-34
FH-1: Individual Fire Hydrant Replacement (Miscellaneous Locations)	$72,000	Reserves	2029-34
TOTAL PROPOSED IMPROVEMENTS	**$7,180,000**		
Future Improvements[3] (More Than 10 Years, or as Needed)			
S-2: Roughing Filter for Buck Creek WTP	$850,000	Outside	2034-44
S-3: White Salmon River Diversion and WTP	$15,000,000	Outside	2034-44
R-2: New 300,000-gallon Reservoir Tank at Strawberry Mountain	$2,200,000	Outside	2034-39
PS-3: ASR Booster Pump Station	$590,000	Outside	2034-44
PS-4: New Strawberry Mountain Booster Pump Station	$847,000	Outside	2034-44
D-3: Rio Vista Water Main	$450,000	Outside	2034-44
D-4: North Main/N.W. Cherry Area Improvements	$396,000	Outside	2034-44
D-6: W. Jewett: Waubish Street to Garfield Street	$789,000	Outside	2034-44
D-7: W. Jewett: Lincoln Street to Maxfield Lane	$276,000	Outside/Reserves	2034-44
D-9: Amour Court and Peck Road Extension	$220,000	Outside/Reserves	2034-53
D-10: Cherry - Estes Water Main Improvements	$1,030,000	Outside	2034-53
D-12: Cherry, Fields, and Wisconsin Street Water Main Improvements	$1,045,000	Outside	2034-53
D-13: Martin Road and Thornton Drive Water Line	$344,000	Private/Reserves	2034-53
D-14: Kennedy Lane Improvements	$219,000	Outside/Reserves	2034-53
D-15: Thornton Drive Water Line	$341,000	Private/Reserves	2034-53
D-16: Robbins Road Water Line	$162,000	Outside/Reserves	2034-53
D-19: Green, Snohomish, and Wauna Water Lines	$1,440,000	Outside	2034-53

Description	Total Cost Estimate[1] (Dollars)	Anticipated Funding Source[2]	Estimated Year
D-22: North Main/Washington Water Main Replacement	$1,083,000	Outside	2034-53
D-23: Pioneer Place/Tohomish Street Water Line Replacement	$673,000	Outside	2034-53
D-24: Church, Lincoln, and Tohomish Water Line Replacement	$500,000	Outside	2034-53
PRV-2: Oak Street Subzone PRV Station	$410,000	Outside	2034-53
PRV-3: Grandview-Tohomish Subzone PRV Station	$410,000	Outside	2034-53
PRV-4: West Winds Road PRV Station	$25,000	Reserves	2034-53
PRV-5: Hospital-Bingen Intertie PRV Station	$135,000	Reserves	2034-53
TOTAL FUTURE IMPROVEMENTS	**$29,435,000**		

[1] *Total cost estimate based on September 2022 values.*

[2] *Outside funding sources includes DWSRF, RD, and PWB. See Chapter 9 for more information.*

[3] *See Figure 3-8 in Chapter 3 for more information on the improvements.*

[4] *Phase II project may need to be extended to 2027-2028 depending on financing and if the project is phased.*

[5] *Improvements included in areas identified in six-year Transportation Plan; project timing will likely depend on whether proposed road improvements are made.*

[6] *Project cost depends on location of new reservoir tank. Estimated project cost for transmission mains ranges from approximately $465,000 to $590,000.*

ASR = aquifer storage and recovery
DNR = Washington State Department of Natural Resources
DWSRF = Drinking Water State Revolving Fund
MG = million gallons
PRV = pressure reducing valve
PWB = Washington State Public Works Board
RD = Rural Development
SCADA = supervisory control and data acquisition
WTP = Water Treatment Plant

Actual funding and construction of the improvements may change depending on available grant funding, appropriations for infrastructure improvements, and regulatory mandates.

System Measure Plan and Schedule

The plan and schedule for the City's System Measure Improvement Program are presented on Table 8-2. Table 8-2 includes an anticipated budget, start date, and measure frequency/completion date. Implementation of these system measures may vary from those shown on Table 8-2 depending on new information, customer feedback, funding, and regulatory mandates.

TABLE 8-2
SYSTEM MEASURE IMPROVEMENTS PROGRAM

Description	Budget	Start Date	Comments
WUE Program[1]			
Procure Flowmeter Verifier Services	$2,000	2025	For calibration of large meters
Well No. 2 Flowmeter Replacement	$10,000	2025	To standardize/calibrate flowmeter
SR 14 Flowmeter Replacement	$5,000	2024	To standardize/ calibrate flowmeter
Implement Additional Tracking of Water	N/A	October 2022	See Technical Memorandum No.1
Leak Detection of Water System	$10,000	2025	Biannually
Complete Implementation of AMR	N/A	2025	Installation by City staff
PRV-1: Eyrie PRV Station	$5,000	2025	Make this PRV station functional
Review SR 141 Intertie Line	N/A	2025	Bingen Intertie, behind hospital
WUE Educational Materials	500	July 2023	Annual cost
Review of Water Rates	N/A	October Annually	Annual review recommended
WUE Information on City's Website	$200	January 2025	Initial cost: $1,000, periodic revisions
New Customer Water System Informational Packets	$50	July 2024	$50 annually
Adopt New WUE Goals	$100	By January 2028	New goals need to be adopted through Year 2033 to match WSP planning period.
Operation and Maintenance[1]			
Childs Reservoir Inlet Valve Evaluation	$10,000	2025	Valve not working as designed
Recoating of Los Altos Reservoir	$368,000	2024-2029	Coatings typically have a service life of 20 years
LSL Inventory	N/A	October 2024	Inventory being performed by City staff with DOH consultant.
Source Protection[1]			
Establish Sanitary Control Areas for Observation Wells No. 1 and 2	$5,000	2025	Survey and recording fees
Update Inventory of Potential Contaminants	N/A	2024	Every two years
Notification of Agencies and Government	N/A	2024	Every two years
Notification of Emergency Response Agencies	N/A	2024	Every two years
Develop and execute a Watershed Agreement with the DNR	$5,000	April 2024	Anticipated completion is March 2025.

Description	Budget	Start Date	Comments
Administrative, Management, and Planning Measures[1]			
WSP Update	$140,000	2034-2035	Every 10 years

[1] Refer to Chapters 3, 4, 5, and 8 for additional information.

AMR = automated meter reading

LSL = lead service line

N/A = not applicable

SR = State Route

WSP = Water System Plan

WUE = water use efficiency

In addition to the above system measure improvements, the City should plan and budget for an update of its WSP. This WSP includes 10- and 20-year water demand projections; however, the DOH requires a WSP to be updated every ten years. The next update should be prepared in 2034/35 and is estimated to cost approximately $140,000 .

Chapter 9 - Financial Program and Implementation

The objective of a financial program is to identify the total cost of providing water service, provide a utility improvements schedule for implementation, and help determine adequate fees for service. Statutory authority for the financial program is derived from Chapters 43.20, 70.116, and 70.119A of the Revised Code of Washington. The financial program chapter satisfies requirements of Washington Administrative Code 246-290-100. The financial program and implementation schedule for the City of White Salmon's water system are discussed in this chapter.

Socioeconomic Characteristics

A community's ability to pay user fees for utilities is dependent primarily on the rates established by the utility and the income of the utility customers. Select socioeconomic characteristics for the City were compiled to help identify the affordability of the existing and projected water rates. Unfortunately, socioeconomic data are not available for the City's entire water service area. While limited to City residents, these data provide some pertinent information on the majority of users in the City's water system.

The American Community Service (ACS) serves as the primary data source to develop the affordability measures recommended throughout this chapter. The ACS is a household survey conducted by the U.S. Census Bureau with a current annual sample size of approximately 3.5 million households. The ACS replaced sample (long-form) data from the Census and is now the only national data source for income, poverty status, employment, and most housing characteristics. The ACS is considered the most reliable source of detailed socioeconomic data currently available and is the only data source available for small geographies (down to the Census Block Group level). Socioeconomic data for the City were derived from the ACS for 2020, which is a five-year average (2016 through 2020). Key socioeconomic indicators for the City, Washington State, and the United States are presented on Table 9-1.

TABLE 9-1
KEY SOCIOECONOMIC INDICATORS[1]

Indicator	White Salmon	Washington State	United States
Year	2020	2020	2020
Median Age (years)	43.6	37.8	38.1
MHI	$65,781	$77,006	$64,994
Percent Unemployment from Civilian Labor Force	0.0	3.1	3.4
Percent Not in Labor Force	40.0	35.3	36.6
Percent of All People with Income Below the Poverty Level	4.5	10.2	12.8
Percent with Social Security Income	36.2	29.4	31.4
Percent with Supplemental Security Income	1.8	4.6	5.2
Percent with Cash Public Assistance Income	0	3.0	2.4
Percent with Food Stamps/SNAP Benefits	5.2	11.1	11.4

[1] Source: U.S. Census Bureau White Salmon, Washington, 2020: ACS 5-Year Estimates Tables DP03, DP05 and S1701; Washington State 1-Year 2020 ACS, Tables DP03, DP05, and S1701; United States 1-Year 2020 ACS, Tables DP03, DP05, and S1701.
MHI = median household income
SNAP = Supplemental Nutrition Assistance Program

Except for the Percent Unemployment from Civilian Labor Force, all indicators on Table 9-1 show the City of White Salmon's socioeconomic condition is better than both Washington State and the United States as a whole. For example, White Salmon's percentage of households requiring public assistance is less than both the state and the nation, and the City's MHI is slightly higher than the United States but lower than Washington State.

MHI is one of the most commonly used indicators of a community's economic need. Many funding programs such as the Washington State Department of Commerce's Community Development Block Grant (CDBG) or the Washington State Department of Health's (DOH) Drinking Water State Revolving Fund (DWSRF), as well as regulatory agencies such as the U.S. Environmental Protection Agency, rely on a community's overall MHI as an indicator of a community's ability to pay utility fees.

As discussed above, ACS data are based on surveys. Since only a percentage of the City's population was surveyed, the MHI results are estimates and include a margin of error. Depending on the results of the survey, the MHI margin of error can be significant. The margin of error percentage, which is the quotient of the margin of error and the MHI estimate, is one means of assessing and comparing the MHI estimates. A high margin of error percentage (greater than 40 percent) reflects skewed survey results, which most likely are not reflective of the City's true MHI. The City's MHI estimates, margin of error, and margin of error percentage for 2016 to 2020 are summarized on Table 9-2.

TABLE 9-2
CURRENT AND PAST MEDIAN HOUSEHOLD INCOME ESTIMATES

Year	MHI Estimate (Dollars)	Margin of Error (Dollars)	Margin of Error Percentage
2020	$65,781	± $14,229	± 21.6
2019	$55,652	± $14,251	± 25.6
2018	$55,677	± $10,833	± 19.5
2017	$47,418	± $16,914	± 35.7
2016	$46,651	± $13,351	± 28.6

The 2020 MHI estimate is the highest observed for the City. The reason for the approximately $10,000 increase from 2019 to 2020 is unknown.

As shown on Tables 9-1, 9-2, and 9-3, the City's overall MHI is $65,781. However, since the MHI is the median of the entire community, it does not identify potentially vulnerable populations within the community and may not truly reflect a community's socioeconomic characteristics. The MHI for different types of households is shown on Table 9-3.

TABLE 9-3
2020 MEDIAN HOUSEHOLD INCOME BY HOUSEHOLD TYPE[1]

Household Type	MHI
All Households	$65,781
Young (less than 25 years old)	-
Elderly (greater than 65 years old)	$60,271

Household Type	MHI
Renter-occupied	$46,131
Owner-occupied	$81,658

[1] Source: U.S. Census Bureau ACS -Year Estimates, White Salmon, Washington; ACS 2020 5-Year Estimates, Tables B19049 and B25119.

The households with the lowest MHI and, thus, the most vulnerable to additional utility fee increases, are typically renter-occupied, young, and/or elderly households. No information was available in the 2020 ACS 5-Year data for the MHI of young households. The MHI for renter-occupied households in White Salmon is considerably less than the average MHI for all households.

Income distribution also provides insight on how increased water rate increases might impact different economic classes. As shown on Table 9-4 approximately 10 percent of the City's households have an estimated annual income of less than $25,000 (poverty level income for a family of four was $26,200 in 2020).

TABLE 9-4
HOUSEHOLD INCOME DISTRIBUTION[1]

Income	No. of Households	Percentage	Cumulative Percentage
Less than $10,000	0	0.0	0.0
$10,000 - $14,999	29	2.6	2.6
$15,000 - $24,999	82	7.2	9.8
$25,000 - $34,999	115	10.1	19.9
$35,000 - $49,999	124	10.9	30.8
$50,000 - $74,499	272	24.0	54.8
$75,000 - $99,999	247	21.8	76.6
$100,000 - $149,999	110	9.7	86.3
$150,000 - $199,999	67	5.9	92.2
Greater than $200,000	88	7.8	100
TOTAL	**1,134**	**100**	**-**

[1] Source U.S. Census Bureau White Salmon, Washington; 2020 ACS 5-Year Estimates, Table No. DP03.

Financial Status

The financial management of the City of White Salmon's water system was reviewed by examining the current water system charges, number of connections, and system revenues and expenditures.

Current Water Rates

The City of White Salmon charges water system fees to finance operation and maintenance (O&M) of its potable water system. Starting in 2023, the City will assess a residential base rate of $49.13 per month and a monthly unit rate of $1.31 per 1,000 gallons for up to 5,000 gallons and $3.31 per 1,000 gallons for more than 5,000 gallons, and $8.36 per 1,000 gallons for usage more than

15,000 gallons. The City has a number of other rates including commercial and combination residential/commercial. The City also provides rate break assistance for low-income senior citizens and disabled persons upon meeting specified criteria. White Salmon and the City of Bingen have an existing agreement for Bingen's purchase of water from the City of White Salmon. The current charges through December 31, 2022, include a base rate of $48,324 per year and a usage rate of $1.87 per 1,000 gallons. White Salmon and Bingen have negotiated a new agreement for water purchases from 2023 through 2025 (see Appendix B). For 2023, the new base rate will be $53,160 per year and a usage rate of $2.06 per 1,000 gallons up to 288,000 gallons per day (gpd). Over 288,000 gpd, the 2023 usage rate will be $4.18 per 1,000 gallons.

The City assesses an impact fee depending on meter size in accordance with Table 1-5 in Chapter 1. For hook-up fees, outside users are charged more than inside users. The City connects new services and is compensated for this work through a connection fee. All excavation, bedding, backfill, and surface restoration required for the connection is the responsibility of the applicant.

The number of water connections and equivalent residential units (ERUs) were previously compiled as part of Table 2-9 in Chapter 2. The number of connections and ERUs for inside the City, outside the City, and for Bingen are summarized on Table 9-5.

TABLE 9-5
NUMBER OF WATER UNITS/CONNECTIONS AND EQUIVALENT RESIDENTIAL UNITS

User	No. of Units/Connections	No. of ERUs
Inside the City	1,398	1,547
Outside the City	736	822
City of Bingen	3	554
TOTAL	**2,137**	**2,923**

Water Funds

The City utilized seven funds to finance its water system.

- **Fund 401 - Water Fund** - All monies collected from user charges, connection fees, and other sources are placed in this fund. Fund 401 covers the system O&M charges and capital expenditures.
- **Fund 408 - Water Reserve Fund** - Fund 408 is a reserve fund for financing improvements to the City's water system. With the establishment of Fund 418 - Short-Lived Asset Reserve, the reserves in Fund 408 should be utilized for emergency repairs and replacement and for larger capital projects.
- **Fund 412 - Water Rights Acquisition Fund (WRAF)** - The purpose of Fund 412 is to receive and disperse monies collected to pay off the City's debt for the purchase of water rights from the White Salmon Irrigation District (WSID). Currently, the City assesses its customers a WRAF surcharge ranging from $7.50 to $30 per month depending on meter size. Monies collected are deposited directly into this fund and loan payments are made directly out of this fund. This fund operates in parallel to the other water system funds and will be reviewed and discussed separately.

- **Fund 413 - Water Bond Redemption Fund** - Fund 413 exists to receive all monies for the repayment of bond debt on the water system. Monies are transferred from Fund 401 to this fund for annual bond payments. Currently, Fund 413 is being used to make the bond payments for the water portion of the Capmark 1981 Water/Sewer Bond and the Rural Development (RD) Tohomish Street Water Improvements project.
- **Fund 415 - Water Bond Reserve** - Fund 415 includes monies as a reserve for repayment of the City's water portion of the RD Tohomish Street bond and the RD Jewett Water Main Improvements project. At a minimum, the amount held in this fund should be equal to one annual bond payment.
- **Fund 418 - Short-Lived Asset Reserve** - Monies in this reserve fund are to be used for the replacement of short-lived assets within the City's water system. The City established Fund 418 in accordance with its RD requirements for financing the Tohomish Street, Jewett Water Main, and the Transmission Main Replacement Phase I improvements. Short-lived asset reserves are for system components anticipated to require repair or replacement within a 15-year period. Short-term assets do not typically include items normally covered under the system O&M budgets (e.g., chemical and laboratory supplies, sample bottles, etc.) and do not include infrastructure requiring long-term financing (e.g., water tank or booster pump station replacement).
- **Fund 420 - U.S. Department of Agriculture (USDA) RD: Buck Creek** - Fund 420 was established to handle the financing for the proposed Transmission Main Replacement Phase I project with funding from USDA RD.

Historical Water Revenue and Operating Expenditures

The water revenue and expenditures, excluding capital-related items and including interfund transfers, for Years 2016 through 2021 are summarized on Table 9-6. Additional information on the historical water revenue and operating expenditures (Fund No. 401) for 2015 through 2021 are presented in Appendix I.

TABLE 9-6
HISTORICAL WATER SYSTEM REVENUES AND OPERATING EXPENDITURES

Description	2016	2017	2018	2019	2020	2021
Revenue[1]	$1,710,596	$1,831,150	$1,913,237	$1,919,620	$1,921,432	$2,050,424
Expenditures[1]	($1,685,627)	($1,614,260)	($1,538,802)	($1,854,241)	($1,862,241)	($1,922,825)
Net Amount	**$24,969**	**$216,890**	**$374,435**	**$65,379**	**$59,191**	**$127,599**

[1] *Amounts have be rounded.*

From 2016 through 2021, revenue has increased approximately 20 percent. Revenue between 2018 through 2020 changed slightly. The majority of the revenue increase occurred between 2016 and 2018 and in 2021. Expenditures have varied ranging from approximately $1.54 to $1.92 million. Expenditures were trending downward between 2016 and 2018, then increased from 2019 through 2021. Revenue exceeded expenditures each year.

Approximately 85 to 93 percent of the City's revenue is generated from water sales and varies depending on the number of new water connections added to the system in a year. In 2010 and

2011, the revenue from water connections was significant ($128,000 to $230,000), which added substantially to the City's overall revenue for the year.

Based on the 2021 data, approximately 73 percent of the revenue was generated from base rate fees and 27 percent originated from the usage rate. The relative sources of revenue from inside the City, outside the City, and Bingen are summarized on Table 9-7, with respect to percent revenue, percent usage and revenue obtained per ERU.

TABLE 9-7
SOURCES OF WATER SALES REVENUE IN 2021[1]

Location	Percent Usage	Percent Revenue	ERUs	Dollar per ERU
Inside the City	48.8	52.7	1,547	652
Outside the City	32.2	43.3	816	1,014
Bingen	19.0	4.0	554	139

[1] *Excludes distribution system leakage (DSL).*

From the data presented on Table 9-7, the water revenue generated by outside users per ERU is higher since the City imposes a 50 percent surcharge for users outside the City. Typically, most municipalities impose a surcharge (generally greater than 50 percent) to users outside a city's or town's boundary.

Revenue generated per ERU of water delivered to Bingen is almost ten times less than that generated from the users inside and outside the City of White Salmon. In 2021, Bingen utilized 19 percent of the consumed water within the White Salmon system and provided approximately 4 percent of the system revenue. Part of the difference in the revenue generated is due to Bingen being a large wholesale user with only three connections. Thus, Bingen is provided with a different level of service than the typical inside or outside customer.

The City is repaying one bond and two loans related to the water system. In addition, the City has submitted and obtained funding for two additional projects (Tohomish Street and Snowden Road Water Main projects), which will add to the City's debt service. A summary of the current and proposed debt service is provided on Table 9-8.

TABLE 9-8
CURRENT AND PROJECTED DEBT SERVICE

Bond/Loan	Interest Rate (Percent)	Annual Payment (Dollars)[1]	Termination Year
Current Debt			
Snowden Road-Simmons Road Water Main DWSRF	1.00	$32,223	2035
WSID - Water Rights	3.00	$123,970	2034
Transmission Main Replacement Design	1.58	$43,992	2039
Tohomish Street RD Loan	2.625	$16,646	2052
Jewett Water Main Improvements, RD Loan	1.75	$95,040	2061
Subtotal	**-**	**$311,871**	**-**

Bond/Loan	Interest Rate (Percent)	Annual Payment (Dollars)[1]	Termination Year
Future Debt			
Transmission Main Replacement Phase I, RD Loan/ Grant[2]	1.75	$81,609	2063
Transmission Main Replacement Phase I, PWB Loan[3]	1.39	$20,160	2043
Transmission Main Replacement Phase IIA, PWB Loan	1.38	393,885	2044
North Main/Spring Street Water Improvements	1.39	$111,816	2043
Subtotal	-	**$607,470**	-
TOTAL	-	**$919,341**	-

[1] *Annual payment based on 2022 amount or estimated amount (for new loans).*
[2] *Secured RD grant and loan.*
[3] *Awarded, projected.*

DNR = Washington State Department of Natural Resources

PWB = Washington State Public Works Board

Two simple ratios can be used to determine the financial health of a water system: operating ratio (OR) and a debt service coverage ratio (DSCR). The OR shows whether or not a system has enough revenue to cover its expenses. The DSCR measures a system's ability to cover its debt over and above its operating expenses. Using data from 2021 given on Tables 9-6 and 9-8, these ratios for the City's water system are calculated as follows:

OR = Total OR/O&M Expenses (without Debt Service and Bond Reserves)

= $2,050,424/($1,922,825 - $196,414) = 1.19

An OR of 1.2 or greater indicates a system is in good financial health. For 2021, the City collected just slightly less revenue over current expenses for an OR slightly less than considered for "good" financial health.

DSCR = Annual Gross Revenue - (O&M Expenses - Debt Service)/Annual Debt Service

= $2,050,424 - $1,726,411/$196,414 = 1.65

A DSCR of 1.5 or greater is considered "very good," meaning the City is in good financial health with its current debt service. With the new debt service that will be added in 2023 or 2024, the total annual payments will be approximately $470,447 per year.

Historical Capital Funding and Expenditures

Over the past six years, the City of White Salmon completed a number of capital improvements including aquifer storage and recovery (ASR) improvements; water meter replacement; the Tohomish Street Improvements, Strawberry Mountain Pump Station Improvements, Jewett Water Main Improvements, Garfield Avenue Improvements, El Camino Real Improvements projects; and the design of the Transmission Main Replacement projects. The larger projects were financed with funds from outside funding agencies including RD, DWSRF, the Washington State Department of

Ecology, PWB, and the Department of Commerce. Total capital expenditures for projects funded internally was approximately $374,000 over the past six years.

Fund 412 - Water Rights Acquisition Fund

As discussed earlier, Fund 412 is operated as a stand-alone fund for revenue collection and loan payments associated with the purchase of water rights from the WSID. To date, the revenue collected has exceeded loan payments resulting an ending balance of approximately $332,500 in a 2021. Annual loan payments are approximately $123,980. Two typical measures of loan security are collecting and retaining one year's worth of annual payments and having a DSCR of at least 1.2. Fund 412 satisfies both measures as its balance is in excess of the annual loan payment and the amount currently collected (approximately $160,000) is greater than the amount needed with a DSCR of 1.2 ($148,700). With the addition of new users to the system, the amount of revenue collected should also increase. Given that Fund 412 has sufficient reserves for an annual loan payment, the City may wish to limit future rate increases to its WRAF surcharge or continue to save any excess funds for more expedient retirement of the existing WRAF debt.

Summary

The City's current water system finances appear to be in good condition with adequate revenues to cover current operating expenses and existing debt service. Additional revenue will be needed to boost finances and cover the anticipated debt service.

Improvement Program Financing

Improvements are typically financed through a combination of grant and loan programs, and/or local funding sources. The following is a brief discussion of the available grant and loan programs and local funding sources.

Outside Funding Programs

Outside funding assistance, in the form of grants or low-interest loans, will likely be necessary for the City to finance some of the proposed improvements and to repay the associated debt service in a manner affordable to the residents of White Salmon. The amount and types of outside funding will dictate the amount of local funding the City will have to secure. In evaluating grant and local programs, the major objective is to select a program or a combination of programs that are most applicable and available for the intended project.

A summary of the major federal and state funding programs, which are typically utilized to assist qualifying communities with financing major water system improvement programs, is presented in Appendix I as Table I-1. Each of the government assistance programs has prerequisites and requirements. With each program having its specific requirements, not all communities or projects may qualify for each of these programs. With any of these funding sources, the City is advised to confirm specific funding amounts with the appropriate funding agencies prior to making local financing arrangements.

Eligibility for the funding sources outlined on Table I-1 is dictated by factors such as the percent of low- to moderate-income residents, MHI, population, and job creation. Competition for a number of these funding sources (e.g., CDBG and RD) is based on the severity of the issue to be resolved and whether the improvement will result in bringing the applicant into compliance with federal or state wastewater and water quality regulations. Typically, more funding sources are available for improvements proposed to correct a federal and/or state compliance issue than for general infrastructure upgrades (e.g., replacement of existing water main with new, larger diameter pipe).

Three potential funding sources may be funding alternatives for the City's water improvements: the DOH DWSRF, the Department of Commerce's PWB Construction Loan Program, and the RD Rural Water and Waste Disposal Grants and Loans. Another possible funding source is the CDBG program administered by the Department of Commerce. While White Salmon has previously been eligible for CDBG funding, there is insufficient household income data on water system customers outside city limits to determine CDBG eligibility for these users and overall eligibility of the City for water system improvements. To address this eligibility issue, the City would need to conduct an income survey of the customers outside the city limits to determine if the combined percentage of low-moderate income for inside and outside City users would be more than 50 percent. However, performing an income survey of the outside users would be costly (approximately $20,000) and would not provide any assurance the City would be eligible for CDBG funding. Since the City is not currently eligible and would have to perform an extensive income survey to demonstrate eligibility, CDBG funding for the City's water system is not considered a viable source.

A brief discussion of the DWSRF, PWB, and RD funding follows.

Drinking Water State Revolving Fund

The DOH provides low-interest loans and potential loan forgiveness for community and non-community water improvements. Once this Water System Plan (WSP) has been reviewed and approved by DOH, the City will be eligible to apply for funding. Current terms for state fiscal year 2021 are 1.75 to 2.25 percent for loan terms for 20 to 24 years or the life of the project, whichever is less. For communities with projected water rates greater than 2 percent of the areas' MHI, the interest rate is 1.75 percent and varying degrees of loan principal forgiveness are provided based on the rate's percent of the MHI. A 1 percent loan fee is assessed for administration of the awarded funding.

The MHI reported for the City of White Salmon is $65,781. At this projected MHI of $65,781, the City would only qualify for principal forgiveness if monthly rates average $109.64 per month or more. Based on the 2022 budget, the calculated average residential monthly rate in the City is $56.96 per month, which is approximately 1.04 percent of the MHI.

Washington State Public Works Board

The Department of Commerce typically solicits applications for the Construction Loan Program on a biennial basis. The last solicitation for PWB construction loan funding was in September 2022, which included low-interest loans ranging from 0.35 to 0.70 percent over five years and 0.70 to 1.39 percent over 20 years with no local match required. For rate-based systems, an affordability index is used to identify non-distressed, distressed (greater than 2.1 percent of MHI), and severely distressed applicants (greater than 3.6 percent of MHI). Potential funding for White Salmon would be based on a 2 percent loan over 20 years.

Rural Development Loan and Grant

Grant/loan package consists of approximately 20 to 40 percent grant, 60 to 80 percent loan, with interest rates ranging from 2.125 percent to 3.50 percent (current rates), and a maximum 40-year term on the loan. If desired, the loan term can be reduced to a 30-year term if the funding is loan only. To provide equitable funding packages, RD formulates its grant loan package by comparing projected average water rates on the proposed improvements with the average rates from similar or comparable communities. Factors affecting water rates for different communities include service population, timing of the last significant system upgrade, debt circumstances, household income, and operations complexity.

Based on the water rates for comparable communities, White Salmon would likely need to have a monthly water rate in the range of $55 to $60 to qualify for grant funding. As the City's current average monthly water rate is close to this range (i.e., $56.96), the City appears to qualify for grant funding.

While historically funding packages have been provided with grants in the 50 percent or more range, the more current trend is for RD to provide funding packages with grants ranging from 20 to 40 percent of the total funds provided. The 20 to 40 percent range of grants from RD will be used for calculating potential funding from RD.

Another outside funding source is a direct appropriation from the federal and/or state legislatures. This funding is obtained through bills passed by Congress or the state legislature. An appropriation is money set aside for a specific purpose, which for the City would be a specific capital improvements project. To obtain an appropriation, the City would solicit and convince their local Congressional and State legislature representatives on the need and benefits of a specific City improvement. Projects with regional benefits (e.g., the proposed Transmission Main Replacement projects, affecting the Cities of Bingen and White Salmon) are likely to be more attractive for a direct appropriation.

Local Funding Sources

The amount and type of local funding obligations for water system improvements will depend, in part, on the amount of grant funding anticipated and the requirements of potential loan funding. Local revenue sources for capital expenditures include assessments, various types of bonds, impact fees, loans, taxes, and user charges. Local funding sources are briefly summarized on Table I-2 in Appendix I.

Currently, the City collects revenue from monthly user fees, connection fees, and impact fees from new users. The most significant portion of the City's water system revenue is derived from user rates. Revenue from user rates originates from the base rate and usage rate charges. The base and usage rate revenues for 2020 and 2021 are summarized on Table 9-9.

TABLE 9-9
2020 AND 2021 USER RATE REVENUE

Year	Base Rate		User Rate		Total Amount
	Amount	**Percent**	**Amount**	**Percent**	
2020	$1,336,919.54	74.6	$454,229.69	25.4	$1,791,149.23
2021	$1,398,742.45	73.1	$513,939.86	26.9	$1,912,682.13

The base rate provides approximately three-quarters of the user rate revenue with the usage rate providing approximately one-quarter.

Over the last seven years, the amount of hook-up or connection charges collected by the City have ranged from approximately $55,800 (2015) to $230,980 (2017) per year, which represents approximately 3 to 11 percent of the total system revenue. The City should consider reviewing the hook-up fee amounts as it appears the last revision to these fees was carried out in 2009.

Financing Strategy and Plan

A financing strategy and plan is needed to generate capital funds in sufficient amounts to pay for the proposed improvements over the relatively short duration of design and construction, generally not more than three years. The financing strategy must also identify potential methods by which the annual revenue will be generated to cover the expense for long-term debt repayment and the ongoing O&M of the system. The objectives of a financial strategy include the following.

- Identify the capital improvement cost for the project and the estimated expense for O&M.
- Evaluate the potential funding sources and select the most viable program.
- Determine the availability of outside funding sources and identify the local cost share.
- Determine the cost to users to finance the local share and the annual cost for O&M.

With any of the proposed funding sources within the financial strategy, the City is advised to confirm specific funding amounts with the appropriate funding agencies prior to making local financing arrangements.

Several financial strategies can be used for financing the construction of capital improvements. The decision on the best strategy depends on several factors including the anticipated monthly user charge, amount, and length of time for debt service; schedule for improvements; and required transfers to the existing capital reserve fund. Ideally, the planned improvements described on Table 8-1 in Chapter 8 and the system measure improvements scheduled for implementation and shown on Table 8-2 would be completed in the next five years. The exception is the proposed Transmission Main Replacement Phase II (TR-3) improvements project, which due to the magnitude of the project cost, could extend into 2028. The system improvements and measures are summarized in the Preliminary Project Schedule included in Appendix I along with anticipated cost, year, and whether the project is internally or externally financed.

All of the system measure improvements on Table 8-2 are projected to be financed internally (i.e., City funds). The capital improvements anticipated to be funded internally are the SCADA improvements (T-2 to T-7), the Lakeview Line Replacement (D-2), and the 7th Street Water Line Improvements (D-20).

The remainder of the capital improvement projects will need to be financed with outside project funding. The annual debt service cost was determined for those improvements to be financed with outside project funding. The different funding alternatives for financing for the above improvement scenarios are summarized in Appendix I.

Funding has been secured for the North Main/Spring Street Water Improvements (PS-1/D-1), the Transmission Main Replacement Phase I and Buck Creek Telemetry Facilities (TR-1/T-1) projects, and the Transmission Main Replacement Phase IIA (TR-3A) project. Due to the project size, the remaining portions of the Transmission Main Replacement Phase II project will need to be addressed in the future depending on available project funding opportunities and projected effect of debt service on user rates. Projected future debt service for the entire Phase II project is anticipated to range from $24.14 to $35.40 per user per month.

With any of the proposed funding alternatives, additional revenue will be needed to repay the accumulated debt. The impact on water rates is addressed below under Rate Assessment.

Financial Viability Test

The purpose of the financial viability test (FVT) is to ensure the water system meets all regulatory and prudent business practices. The FVT demonstrates that the total cost of providing service to the water system has been taken into consideration. Four related tests were performed to assess the FVT of the City's financial plan for its water system:

- Ten-year operation period
- Operating cash reserve
- Emergency reserve
- Household income index

Utility System Financial Capacity worksheets (Version 1.1), developed by the Environmental Finance Center at Boise State University, were utilized to assist in determining the financial viability of the City's water system and a financial strategy/plan for the construction of the proposed improvements. The worksheets allow for input of initial cost values and inflation rates to determine future expenses and rates required for future budgets. The information generated from these worksheets can be used to determine if a public water system will have the financial capabilities necessary for sustained water service for its customers. Also, the worksheets assist public water systems in determining whether key criteria of financial viability are being met, or will be met, based on current and future operations, by investments in the system, and by the establishment of certain reserves.

One major consideration in deciding on any proposed capital improvements is the users' ability to support the full cost, including debt repayment, of utility service. Several measures of household affordability or ability-to-pay have been proposed or are currently being utilized. One of the most common affordability indicators used in the financing community is the ratio of annual user charges to the MHI. The threshold of affordability for this ratio varies from 1.5 to 2.5 percent of MHI. For this WSP, a value of 2 percent of the MHI was utilized to assess affordability of the proposed rates.

The basis for the City's financial plan includes the following:

- The first two years were based on 2022 and 2023 actual revenue and expenditures (see Appendix I). Subsequent years were based on 2023 actual revenue and expenditures.
- The initial number of customers, in terms of ERUs, was assumed to be 2,923. To be conservative, a growth rate of approximately 0.55 percent was assumed to occur within the five-year period (2024 through 2034).
- A MHI within the City of $65,781.
- An estimated inflation rate of 3 percent per year for the MHI and 5 percent per year for operating expenses.
- Capital improvements projects constructed, system measure improvements scheduled per Chapter 8, and as discussed earlier.
- A Preliminary Projected Schedule of the capital improvements is provided in Appendix I. To be conservative, future financing of capital improvements projects was based primarily on loans anticipated to be acquired.
- Fund 418 - WRAF was not included in the financial plan as it appears to be self-sufficient.
- Annual contributions of $83,565 to Fund 418 - Short-Lived Asset Reserve fund was included as required by RD for several financed projects.
- The operating reserve was increased to meet one-eighth of the annual O&M expenses, plus general and administrative expenses within the six-year budget schedule.
- The emergency reserve budget for the water fund was set at $200,000 (considered absolute minimum). Once this budget amount was achieved, an annual set-aside of $15,000 was added to this fund.
- The construction of planned and proposed improvements and start of loan payments.

A copy of the compiled financial plan is presented in Appendix I. A summary of the FVTs is shown on page 3 of the financial plan worksheets. With this suggested plan, the City could satisfy all of the FVTs and also maintain the debt services coverage ratio of greater than 1.1.

Meeting the FVT requirements and minimizing the annual average rate increases was challenging given the projected inflation rate (5 percent) and the cost of capital improvements recommended over the next 10 years. The future inflation rate is difficult to predict. If future inflation rates are higher than 5 percent, then the projected user rates in the compiled financial plan will need to be increased in proportion to the inflation increase and vice versa (lower inflation rate, lower user rates).

Financing and raising customer rates for the construction of the recommended capital improvements will be challenging primarily due to the projected $29.6 million in capital improvements over the next 10 years. Of these projects, the proposed Transmission Main Replacement Phase II project (current estimate of $13.7 million) is the largest. The projected debt service could be reduced if the City were able to obtain grants, loan forgiveness, contributions from the City of Bingen, or federal or state direct appropriations.

Rate Assessment

The projected average monthly user rates based on the financial plan along with the overall water system charges, including the WRAF surcharge, and percent of annual user rate charge of the MHI are summarized on Table 9-10. For the monthly water rights surcharge per ERU, the total revenue collected in 2021 ($161,299) was divided by the total number of ERUs (2,363, minus Bingen and DSL) and 12 months. The average monthly water rights surcharge per ERU was calculated to be $5.69 per month per ERU. This surcharge is set with no anticipated increases for the remainder of the debt service term (2034). The MHI values for this calculation were based on the 2020 MHI of $65,781 and projected 3 percent annual increase from 2020 to 2027.

TABLE 9-10
SUMMARY OF PROJECTED AVERAGE MONTHLY USER RATES

	Monthly Rates		Overall Charges	
Year	Cost per Month	Percent Increase	Overall	Percent of MHI
2022	$57.92	-	$63.61	1.0
2023	$68.27	8	$73.96	1.1
2024	$73.33	8	$79.02	1.1
2025	$79.63	8	$85.32	1.2
2026	$86.00	8	$91.69	1.3
2027	$92.88	8	$98.57	1.3
2028	$100.31	8	$106.00	1.4
2029	$108.33	8	$114.02	1.5
2030	$117.00	8	$122.69	1.6
2031	$125.19	7	$130.88	1.6
2032	$133.95	7	$139.64	1.7
2033	$140.65	5	$146.34	1.7
2034	$147.68	5	$153.37	1.8

The projected schedule for average monthly user rates between 2023 and 2027 includes rate increases ranging from 5 to 8 percent. The large rate increases from 2023 through 2030 are needed primarily due to recent inflation on all system expenses and assumption of new debt service for anticipated construction of the Transmission Main Replacement Phase I and Buck Creek Telemetry Facilities Improvements (TR-1/T-1) and the North Main/Spring Street Water Improvements (PS-1/T-1).

The projected average monthly user rate increase is between 7 and 8 percent for 2028 to 2032. These rate increases are needed to address projected inflation on all system expenses (estimated at 5 percent), assumption of new debt service for a new project, and the internal funding of several projects. Overall, the average monthly user rates need to be set at 2 to 3 percent above the inflation rate to meet the anticipated expenses for 2028 to 2032.

The percent of the annual user rates to the MHI is also shown to be between 1.1 and 1.8 percent, which is less than 2 percent of the MHI and, thus, considered affordable by the regulatory and funding agencies.

While the proposed rates are considered affordable, the anticipated increases are significant (approximately 60 percent increase over five years) and will adversely affect the customers with lower income. As mentioned earlier, affordability based on the MHI does not identify potentially vulnerable populations within the community and may not truly reflect a community's socioeconomic characteristics. Based on the information provided, approximately 4.5 to 31 percent of the customers would most likely be affected by the proposed rate increases.

- Households with annual income of less than $50,000 = 30.9 percent.
- Renter-occupied households with a MHI of $46,131.
- Households with an annual income below the poverty level income (family of four) = 10 percent (approximately).
- Percent of people below the poverty line = 4.5 percent.

In consideration of the preliminary financial plan and FVT, the City Council adopted a new water system rate ordinance at its December 3, 2022, meeting. Table 9-11 shows the proposed monthly rate increases over the next five years (Rate Ordinance 2022-12-1115, see Appendix B).

TABLE 9-11
ADOPTED MONTHLY USER RATE INCREASES

Parameter/Year	2022	2023	2024	2025	2026	2027
Percent Increase	-	10	8	8	8	8

The adopted user rate increases are lower than the suggested average monthly user rate increases presented on Table 9-12. The above rate increases will take effect each year, unless the City Council institutes a revision to the water rates.

An exception to the above monthly user rate increases is the increased rate for all of the third-tier block group water usage from $3.69 to $8.36 per 1,000 gallons of usage. This significant increase (107 percent) for the third-tier block group was made to encourage better water use efficiency by the large water users in the system.

Project Implementation

Table 9-12 is a schedule identifying the key tasks or activities and approximate implementation dates of the recommended projects.

TABLE 9-12
PROJECT IMPLEMENTATION SUMMARY (2024-2034)

Key Task or Activity	Implementation Date
Submit revised WSP to DOH for Review and Comment.	May 2024
Construction of Transmission Main Replacement Project Phase I and Buck Creek Telemetry (TR-1/T-1), SCADA Improvements (T-2 through T-7)	January 2024 - September 2024
City Acceptance and DOH Approval of WSP.	July 2024
Design and Construction of North Main Pump Station (PS-1) and Spring Street Water Improvements (D-1).	2023 through 2024

Key Task or Activity	Implementation Date
Apply for Funding of Buck Creek WTP Roof Restoration and Improvements (S-1).	2023
Design the New Los Altos Booster Pump Station (PS-2), Construction of Buck Creek WTP Roof Restoration and Improvements (S-1), and Complete Existing Water Main Abandonment on DNR Property (TR-2) and State Route 14 Flowmeter Replacement.	2024
Secure Funding for All or a Portion of the Transmission Main Replacement Phase II Improvements (TR-3); Construction of the New Los Altos Booster Pump Station (PS-2); Recoating the Los Altos Reservoir; and Completion of the Eyrie PRV (PRV-1), Well No. 2 Flowmeter Replacement, and Childs Reservoir Inlet Valve Evaluation projects.	2025
Design and Construction of Lakeview Line Replacement (D-2) and start Construction of Transmission Main Replacement, Phase II (TR-3).	2026
Finish Construction of Transmission Main Replacement, Phase II (TR-3).	2027
Pursue Funding for New Reservoir Tank and Transmission Main (R-1/TR-4).	2028
Design of the New Reservoir Tank and Transmission Main (R-1/TR-4) and 1st Street, 2nd Street, and Oak Street Water Main Upgrades (D-8).	2029
Construction of the 1st Street, 2nd Street, and Oak Street Water Main Upgrades (D-8) and of the New Reservoir Tank and Transmission Main (R-1/TR-4).	2030
Pursue funding for the following projects: O'Keefe, Center, Tohomish Water Main Improvements (D-11), Norby Lane-Westview Road Water Line (D-17), Stauch Avenue Line Replacement (D-18), and Columbia, Hood, and Scenic Water Line Replacement (D-21). Design and Construction of 7th Avenue Water Line Replacement (D-20).	2031
Design of S.W. Childs Road Water Main Upgrade (D-3), O'Keefe, Center, Tohomish Water Main Improvements (D-11), Norby Lane-Westview Road Water Line (D-17), Stauch Avenue Line Replacement (D-18), and Columbia, Hood, and Scenic Water Line Replacement (D-21). Procure and construct the Individual Fire Hydrant Replacements (FH-1).	2032

Chapter 10 - Miscellaneous Documents

This chapter provides documentation on this Water System Plan's (WSP) compliance with the requirements of the State Environmental Policy Act (SEPA) (Chapter 43.21 Revised Code of Washington), as well as agreements, County/adjacent utility correspondence, meeting documentation, and references to other supportive documents for the WSP.

State Environmental Policy Act

The City of White Salmon must comply with all applicable SEPA requirements for the WSP per Washington Administrative Code 246-290-100(4)(k)(i). The City will be the lead agency for meeting the SEPA requirements. A copy of the completed SEPA checklist and Determination of Non-significance are included in Appendix J.

Agreements

A copy of the City's 2023-2025 Water Purchase Agreement with the City of Bingen is provided in Appendix A.

Meetings

A meeting was held on April 1, 2020, to discuss the elements of the WSP. Participants in this meeting included the mayor and City staff, Anderson Perry & Associates, Inc. (AP), and Washington State Department of Health staff. A copy of the Pre-Plan Agreement is included in Appendix B.

Elements of the WSP were further discussed at the following meetings. The dates and a summary of information provided at these meetings is given below.

- May 18, 2022 - This meeting included a public hearing on the proposed water use efficiency (WUE) goals with an AP presentation on the current status of the WSP and the WUE program, including the Water Loss Control Action Plan, WUE measures, and the proposed WUE goals. The City Council reviewed and adopted the WUE goals during its regularly scheduled Council meeting (after the public hearing).
- November 16, 2022 - This meeting included a presentation to City Council at its regularly scheduled meeting on the overall findings of the WSP with emphasis on the recommended improvements and costs, 5-year rate projections, and affordability.

Copies of the presentations, signed meeting minutes, and appropriate Public Notice are provided in Appendix B.

County/Adjacent Utility Correspondence

The Planning Departments of Klickitat and Skamania Counties and the City of Bingen were provided with a draft copy of the WSP for review, comment, and completion of Local Government Consistency Determination Forms. Copies of the completed forms are provided in Appendix B.

Other neighboring water systems adjacent to or within the proposed water service area were notified and offered a copy of the WSP for their review and comment. No comments were received by the neighboring water systems.

Other Supportive Documents

All supportive documents referred to or used in the writing of this WSP are included in Appendix B.

Appendices Table of Contents

APPENDIX A

Background Water System Information

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

WATER FACILITIES INVENTORY (WFI) FORM

ONE FORM PER SYSTEM

Quarter: 1
Updated: 03/21/2024

Printed: 7/30/2024
WFI Printed For: On-Demand
Submission Reason: Contact Update

RETURN TO: Central Services - WFI, PO Box 47822, Olympia, WA, 98504-7822 or email wfi@doh.wa.gov

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
96350 B	WHITE SALMON CITY OF	KLICKITAT	A	Comm

6. PRIMARY CONTACT NAME & MAILING ADDRESS

ANDREW J. DIRKS [MANAGER]
PO BOX 21329
WHITE SALMON, WA 98672

STREET ADDRESS IF DIFFERENT FROM ABOVE

ATTN
ADDRESS 100 N MAIN AVE
CITY WHITE SALMON STATE WA ZIP 98672

7. OWNER NAME & MAILING ADDRESS

WHITE SALMON, CITY OF
MARLA KEETHLER MAYOR
PO BOX 2139
WHITE SALMON, WA 98672-2139

STREET ADDRESS IF DIFFERENT FROM ABOVE

ATTN
ADDRESS 100 N MAIN AVE
CITY WHITE SALMON STATE WA ZIP 98672

9. 24 HOUR PRIMARY CONTACT INFORMATION

Primary Contact Daytime Phone: (509) 493-1133 x500
Primary Contact Mobile/Cell Phone: (541) 399-2674
Primary Contact Evening Phone: (xxx)-xxx-xxxx
Fax:
E-mail:

10. OWNER CONTACT INFORMATION

Owner Daytime Phone: (509) 493-1133 x206
Owner Mobile/Cell Phone: (509) 774-7491
Owner Evening Phone: (xxx)-xxx-xxxx
Fax:
E-mail: mxxxr@ci.white-salmon.wa.

1. SATELLITE MANAGEMENT AGENCY - SMA (check only one)

- ☒ Not applicable (Skip to #12)
- ☐ Owned and Managed
- ☐ Managed Only
- ☐ Owned Only

SMA NAME: ____________________ SMA Number:

2. WATER SYSTEM CHARACTERISTICS (mark all that apply)

- ☐ Agricultural
- ☒ Commercial / Business
- ☒ Day Care
- ☒ Food Service/Food Permit
- ☐ 1,000 or more person event for 2 or more days per year
- ☒ Hospital/Clinic
- ☐ Industrial
- ☒ Licensed Residential Facility
- ☒ Lodging
- ☒ Recreational / RV Park
- ☒ Residential
- ☒ School
- ☐ Temporary Farm Worker
- ☒ Other (church, fire station, etc.): ____________________

. WATER SYSTEM OWNERSHIP (mark only one)

- ☐ Association
- ☒ City / Town
- ☐ County
- ☐ Federal
- ☐ Investor
- ☐ Private
- ☐ Special District
- ☐ State

14. STORAGE CAPACITY (gallons)

2,119,400

15	16 SOURCE NAME	17 INTERTIE	18 SOURCE CATEGORY										19 USE			20	21 TREATMENT						22 DEPTH	23	24 SOURCE LOCATION			
Source Number	LIST UTILITY'S NAME FOR SOURCE AND WELL TAG ID NUMBER. Example: WELL #1 XYZ456 IF SOURCE IS PURCHASED OR INTERTIED, LIST SELLER'S NAME Example: SEATTLE	INTERTIE SYSTEM ID NUMBER	WELL	WELL FIELD	WELL IN A WELL FIELD	SPRING	SPRING FIELD	SPRING IN SPRINGFIELD	SEA WATER	SURFACE WATER	RANNEY / INF. GALLERY	OTHER	PERMANENT	SEASONAL	EMERGENCY	SOURCE METERED	NONE	CHLORINATION	FILTRATION	FLUORIDATION	IRRADIATION (UV)	OTHER	DEPTH TO FIRST OPEN INTERVAL IN FEET	CAPACITY (GALLONS PER MINUTE)	1/4, 1/4 SECTION	SECTION NUMBER	TOWNSHIP	RANGE
01	Buck Creek									X			X			Y		X	X					1000	SE SE	16	04N	10E
02	Jewett Springs					X									X			X						100	NE NW	19	03N	11E
03	Well #1		X										X			Y		X					755	600	SW SE	03	03N	10E
04	Well #2		X										X			Y		X					804	55	SW SE	03	03N	10E

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
96350 B	WHITE SALMON CITY OF	KLICKITAT	A	Comm

	ACTIVE SERVICE CONNECTIONS	DOH USE ONLY! CALCULATED ACTIVE CONNECTIONS	DOH USE ONLY! APPROVED CONNECTIONS
25. SINGLE FAMILY RESIDENCES (How many of the following do you have?)		1836	2831
A. Full Time Single Family Residences (Occupied 180 days or more per year)	~~1510~~ 1,752		
B. Part Time Single Family Residences (Occupied less than 180 days per year)	~~90~~ 136		
26. MULTI-FAMILY RESIDENTIAL BUILDINGS (How many of the following do you have?)			
A. Apartment Buildings, condos, duplexes, barracks, dorms	~~0~~ 51		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	~~236~~ 182		
C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	0		
27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)			
A. Recreational Services and/or Transient Accommodations (Campsites, RV sites, hotel/motel/overnight units)	0	0	0
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	72	72	0
28. TOTAL SERVICE CONNECTIONS		1908	2831

29. FULL-TIME RESIDENTIAL POPULATION

A. How many residents are served by this system 180 or more days per year? ~~3930~~ 4070.6

30. PART-TIME RESIDENTIAL POPULATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many part-time residents are present each month?	91.5											
B. How many days per month are they present?	2											

31. TEMPORARY & TRANSIENT USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many total visitors, attendees, travelers, campers, patients or customers have access to the water system each month?												
B. How many days per month is water accessible to the public?												

32. REGULAR NON-RESIDENTIAL USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. If you have schools, daycares, or businesses connected to your water system, how many students, daycare children and/or employees are present each month that are NOT already included in the residential population?												
How many days per month are they present?												

3. ROUTINE COLIFORM SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	4	4	4	4	4	4	4	4	4	4	4	4

4. NITRATE SCHEDULE One Sample per source by time period)	QUARTERLY	ANNUALLY	ONCE EVERY 3 YEARS

5. Reason for Submitting WFI:

☒ Update - Change ☐ Update - No Change ☐ Inactivate ☐ Re-Activate ☐ Name Change ☐ New System ☐ Other ______

36. I certify that the information stated on this WFI form is correct to the best of my knowledge.

SIGNATURE: ______ DATE: 7/30/24

PRINT NAME: Andrew Dirks TITLE: Public Works Director

White Salmon Zoning

- ▨ MPUD Multi Family Planned Unit Development Overlay
- ▨ PUD Planned Unit Development Overlay
- ■ RL Single Family Large Lot Residential
- ■ R-1 Single Family Residential
- ■ R-2 Two-Family Residential
- ■ R-3 Multi-Family Residential
- ■ MHR Mobile Home Residential
- ■ C Commercial
- ■ RD Riverfront District
- ■ PU Public

Digitized from City of White Salmon Zoning Map

Klickitat County Zoning

- ▨ Extensive Agriculture
- ▨ Forest Resource
- ▨ General Commercial
- ▨ General Rural
- ▨ Industrial Park
- ▨ Open Space
- ▨ Public
- ▨ Residential
- ▨ Resource Lands
- ▨ Rural Residential 1
- ▨ Rural Residential 2
- ▨ Suburban Residential

Source: Klickitat County GIS

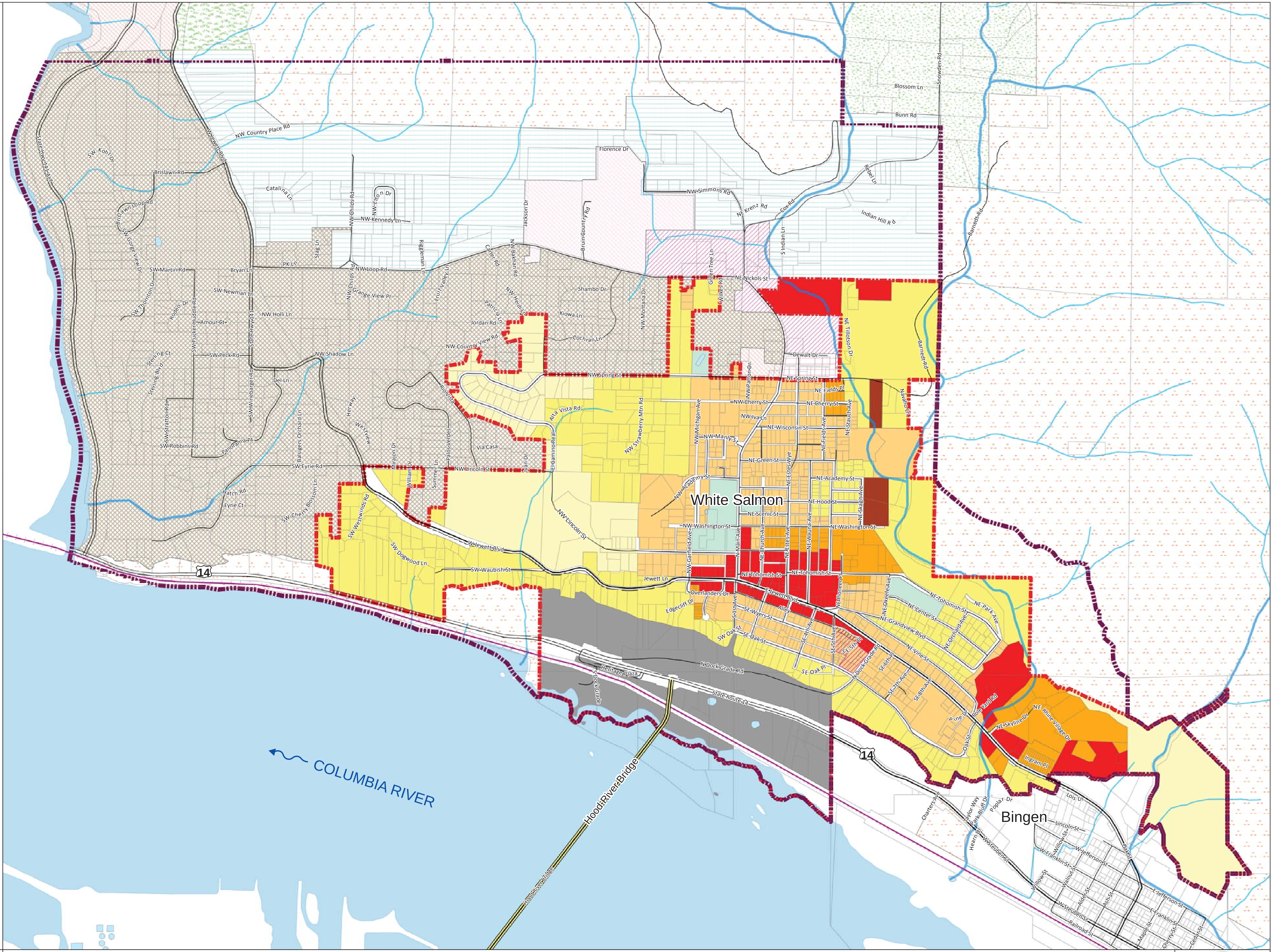
Map Symbols

- ▭ White Salmon City Limits
- ▭ White Salmon Urban Area
- □ Parcel Lines
- ■ Water Bodies

Roads
- ═ Bridge
- — City; County; Other Govt
- ┄ Private
- ═ State
- ┼ railroad

N

0 500 1,000 2,000 Feet



BergerABAM

White Salmon Zoning Map

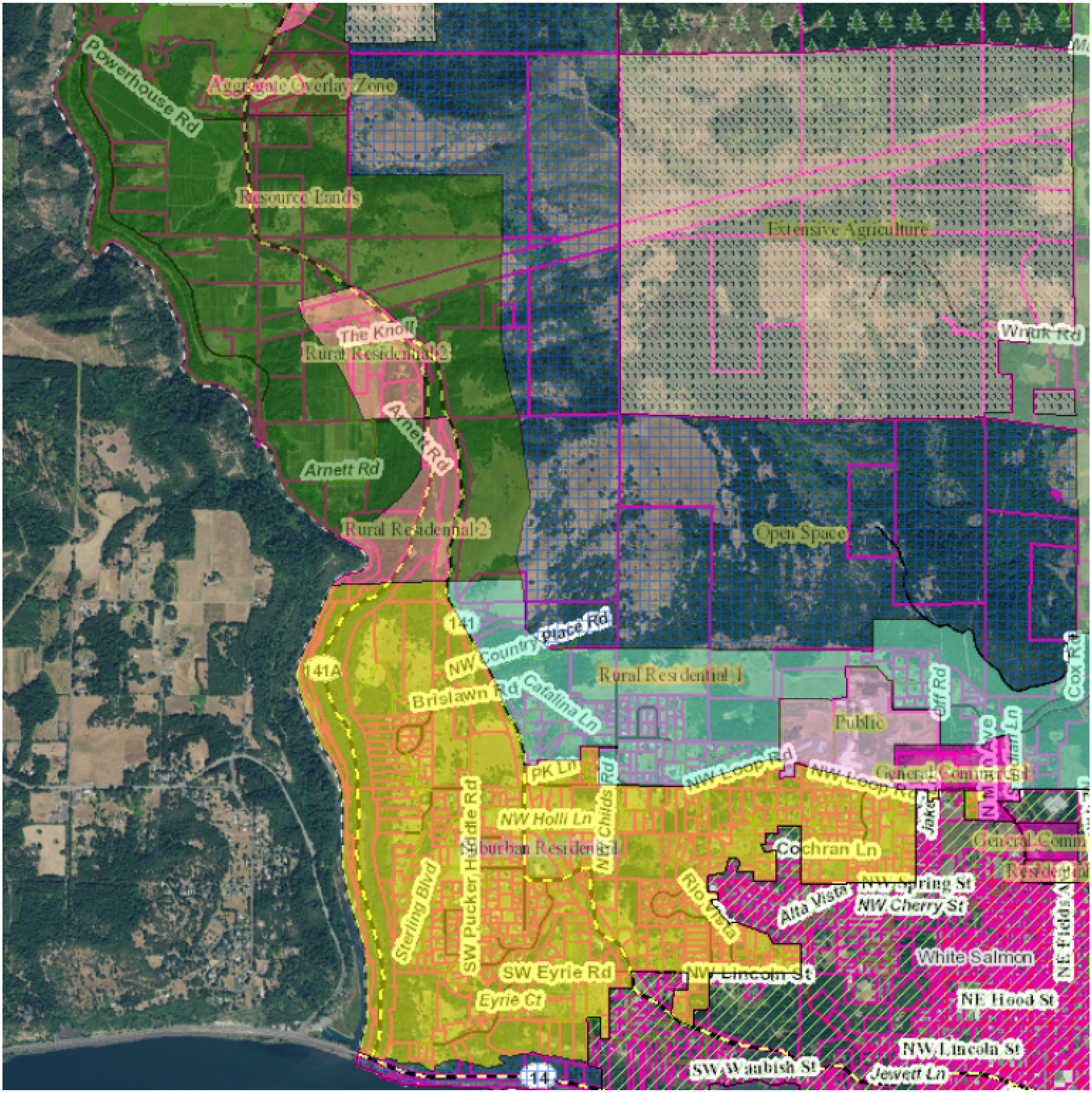
Approval Date: 02 March 2016

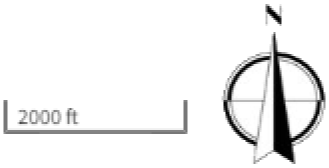
CITY OF WHITE SALMON

Document Path: Q:\Vancouver\2013\A13.0277\Planning\GIS\02_MXD\03_Comp Plan\05_Zoning\05_Zoning 02Mar2016\White Salmon Zoning 02Mar2016.mxd

Klickitat County Map

County Zoning





Legend

Zoning

- ▩ Aggregate Overlay Zone
- 🟦 Airport Development
- ▨ Extensive Agriculture
- ⬚ Extensive Agriculture- Cluster
- 🌲 Forest Resource
- 🟥 Forest Resource-Cluster
- 🟪 General Commercial
- 🟫 General Industrial
- 🟩 General Rural
- 🟦 General Rural- Cluster
- ◼ Industrial Park
- ▦ Open Space
- 🟧 Open Space- Cluster
- 🟪 Public
- 🟩 R3- Cluster
- 🟥 Residential
- 🟨 Residential 1
- 🟪 Residential 3
- 🟩 Resource Lands
- 🟪 Rural
- 🟦 Rural Center
- 🟩 Rural Residential 1
- 🟧 Rural Residential 2
- ⬜ Single Family Residential R1
- 🟨 Suburban Residential
- 🟩 Tourist Commercial

County Boundary

—

Towns (Points)

●

City Limits

▨

Roads

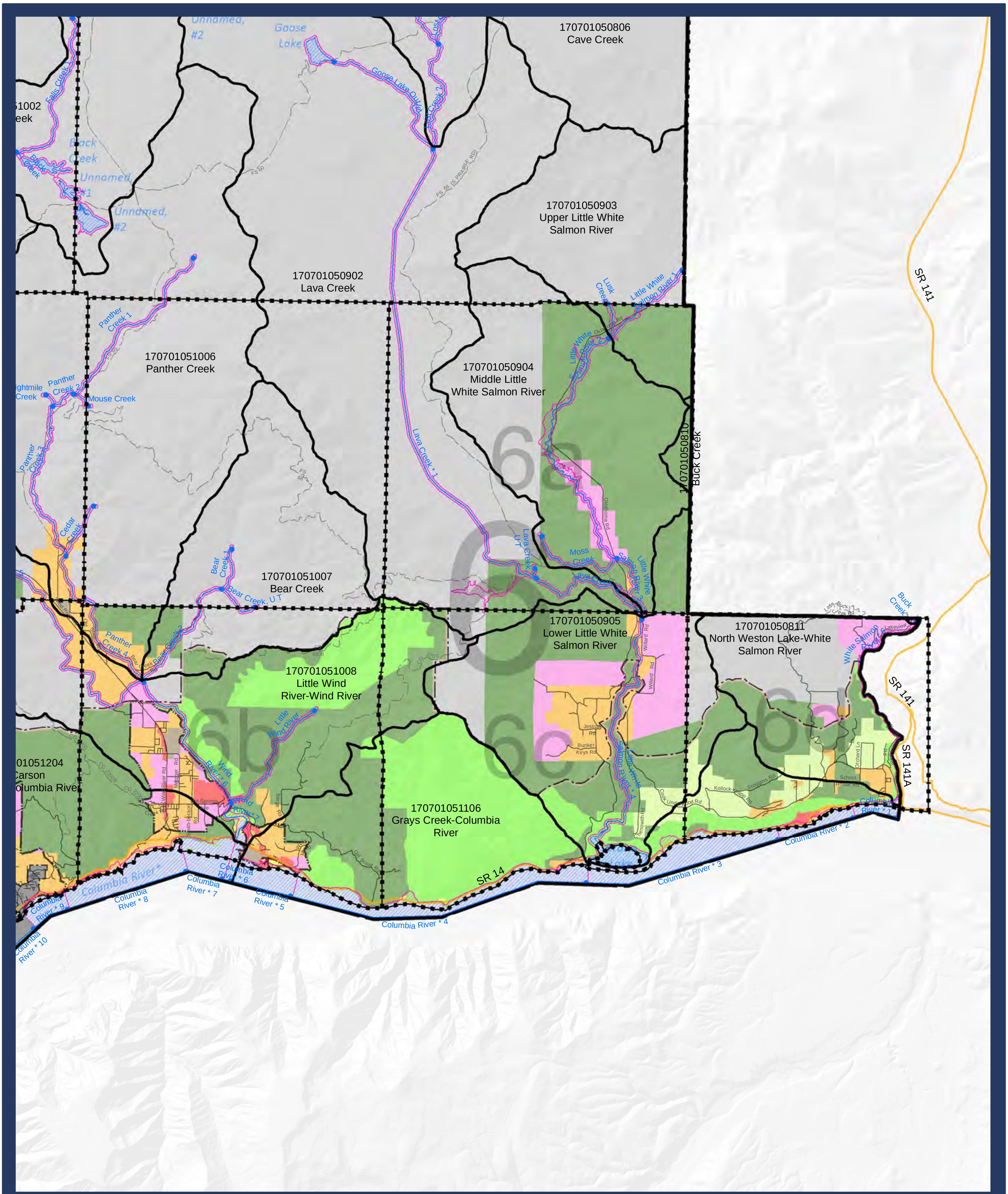
- ┄ City
- — County
- — Other Govt
- ═ Private
- — State

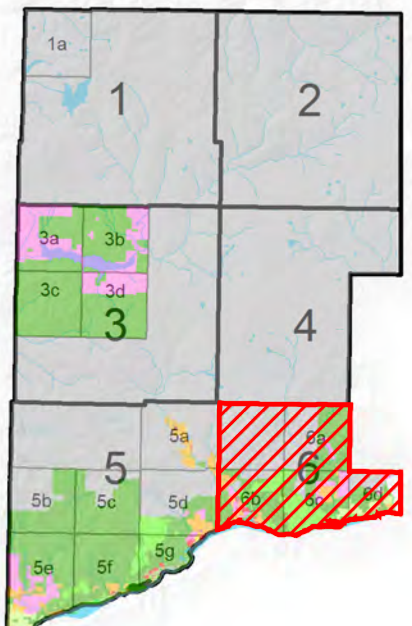
Parcels

□

Map 9: Land Use

Zoning





MAP AREA

0 0.5 1 2 Miles

N

Absolute Scale:
1:120,000

SKAMANIA COUNTY
Department of Assessment
and GIS

LEGEND:

- ▨ Approximate Shoreline Area (reaches)
- ☐ HUC 12 Boundary
- Streams (Reach breaks at dots)
- Lakes
- Map index grid
- Skamania County boundary
- Nat'l Scenic Area Bndy
- Urban Area Bndy
- City Limits
- Extended City Jurisdiction
- State highway
- Local road
- Forest road

Zoning (Generalized Classes)

- Residential - Lower Density
- Residential - Higher Density
- Commercial
- Industrial
- Government / Service
- Public Recreation
- Open Space / Conservancy
- Agriculture
- Forest
- Unzoned
- Water

DISCLAIMER: This map product was prepared by Skamania County and is for information purposes only. It may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

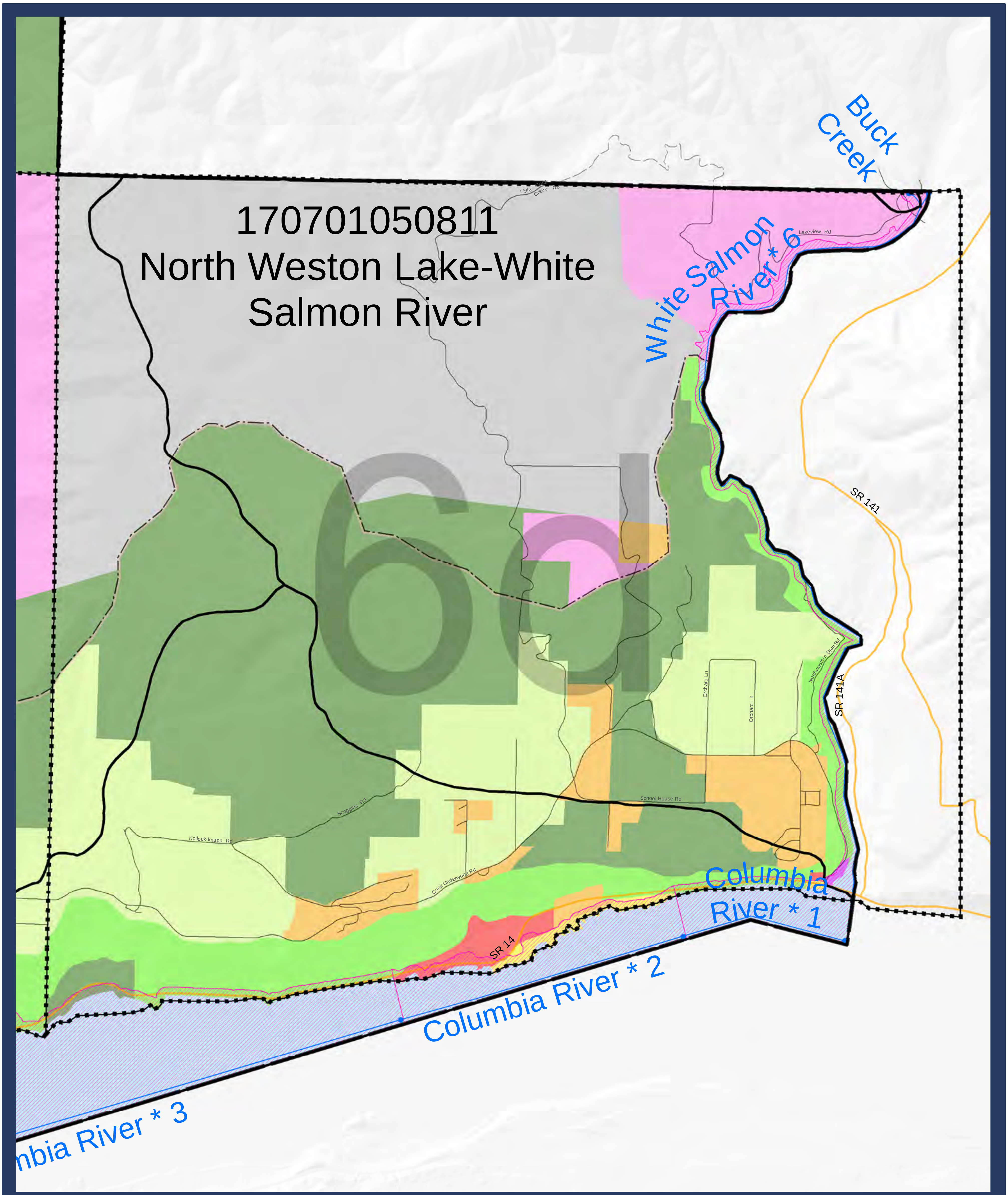
SHORELINES DISCLAIMER: Shoreline jurisdiction boundaries depicted on this map are approximate. They have not been formally delineated or surveyed and are for planning purposes only. Additional site-specific evaluation may be needed to confirm or verify information shown on this map. Shoreline jurisdiction will be determined at time of project review using the best available site-specific information.

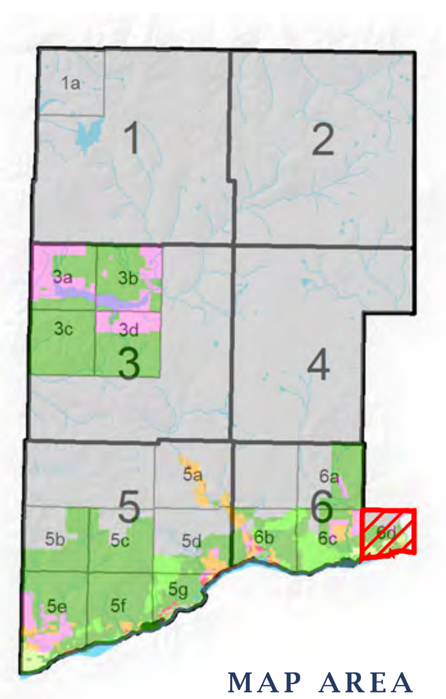
-Map 09-

Land Use: Zoning

Sheet 6

Updated: 03/10/2016 by R. Hollatz   Data Sources: USGS, Col. River Gorge Commission, Skamania County GIS, WA Dept of Ecology





N

0 0.5 1 2 Miles

Absolute Scale:
1:32,000

SKAMANIA COUNTY
Department of Assessment and GIS

LEGEND:

- ▨ Approximate Shoreline Area (reaches)
- ▭ HUC 12 Boundary
- Streams (Reach breaks at dots)
- Lakes
- Map index grid
- Skamania County boundary
- Nat'l Scenic Area Bndy
- Urban Area Bndy
- City Limits
- Extended City Jurisdiction
- State highway
- Local road
- Forest road

Zoning (Generalized Classes)

- 🟪 Residential - Lower Density
- 🟧 Residential - Higher Density
- 🟥 Commercial
- 🟫 Industrial
- 🟪 Government / Service
- 🟨 Public Recreation
- 🟩 Open Space / Conservancy
- 🟩 Agriculture
- 🟩 Forest
- ⬜ Unzoned
- 🟦 Water

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-Map 09-

Land Use: Zoning

Sheet 6d

Updated: 03/10/2016 by R. Hollatz Data Sources: USGS, Col. River Gorge Commission, Skamania County GIS, WA Dept of Ecology

2023-2025 AGREEMENT TO PURCHASE WATER

Agreement is made and entered into the day and year below stated by and between the City of White Salmon, Washington, hereinafter called "White Salmon" and the City of Bingen, Washington, hereinafter called "Bingen", Witnesseth:

Whereas, the parties are committed to a relationship based upon cooperation and joint development of regional solutions for addressing their water supply needs; as set forth in the 2001 Interlocal Agreement for Construction, Operation, Maintenance and Use of Water System Improvements;

Whereas, White Salmon has water to supply to White Salmon Water customers;

Whereas, Bingen has a need for water for its customers, including the Port of Klickitat;

Whereas, Bingen and the Port have an equity interest totaling 25% of the "current reliable maximum water supply production capacity" as defined in the 2001 Interlocal Agreement for Construction, Operation, Maintenance and Use of Water System Improvements (2001 Agreement, 20% Bingen, 5% Port supplied by Bingen);

Whereas, Bingen has designated through the Department of Ecology a Water Rights Permit G4-33106 allowing up to 200 gpm to be drawn from Regional Wells #1 and #2 located in White Salmon;

Whereas White Salmon and Bingen have met as required in the 2001 Agreement and forecasted demand for the period from January 1, 2023 through December 31, 2025;

Whereas White Salmon and Bingen have met as required in the 2001 Agreement to discuss appropriate water rates and charges for the period from January 1, 2023 through December 31, 2025;

Now therefore, in consideration of the mutual covenants herein, the parties agree as follows:

1. From January 1, 2023 to December 31, 2025, White Salmon shall furnish to Bingen up to 200 gpm and 73 million gallons per year. The 200 gpm is intended to be averaged on a daily basis (288,000 gpd) but daily fluctuations should not be significant (e.g. generally within 10%) without written/email notice and approval by White Salmon or an emergency situation. Bingen agrees to operate in good faith to meet these quantities.
2. For said water, Bingen agrees to pay White Salmon a base annual fee billed monthly for the existing 3 interties with Bingen plus a usage fee paid on the 10th day of the month following billing for the previous month's usage. The annual and usage fees shall be:
    a. $53,160/ year ($4,430 / month) plus $2.06 per 1,000 gallons from January 1, 2023 to December 31, 2023.
    b. $57,408/ year ($4,784/ month) plus $2.23 per 1,000 gallons from January 1, 2024 to December 31, 2024.

   c. $62,004/ year ($5,167/ month) plus $2.41 per 1,000 gallons from January 1, 2025 to December 31, 2025.
   d. If the City of Bingen exceeds 200 gpm per minute on a daily basis or average between meter readings, the price per 1,000 gallons of water over 200 gpm will be $~~2.07~~ 4.18 for January 1, 2023 to December 31, 2023; $4.48 for January 1, 2024 to December 31, 2024; $4.80 for January 1, 2025 to December 31, 2025. If the City of Bingen exceeding 200 gpm for more than 10 consecutive days becomes repetitive, the City of White Salmon may choose to limit water sales to Bingen to 200 gpm on a daily basis.
   e. The City of White Salmon shall charge usage rates at 1.5 times the normal rate for an emergency in which White Salmon is notified that such an emergency exists, and the City of Bingen exceeds 200 gpm (288,000 gpd) as long as the emergency does not exceed 30 days. The 1.5 times the normal rate is only applied to that amount of water exceeding the 200 gpm (288,000 gpd). If the emergency is one in which the water is necessary to protect the interests of both cities, the City of White Salmon shall charge normal usage rates for the period of the emergency.
   f. If the City of White Salmon is unable to provide any water for 30 consecutive days or longer due to an extended emergency, the two cities will negotiate a proration of base rates.
3. Fees collected for replacement of the existing interties (current capacity/configuration) are included in the existing base rate, and Bingen will not be billed for their replacement.
4. Costs associated with future planned improvements related to delivery of water from the well field to Bingen, including the cost sharing basis, will be negotiated prior to initiating the planned improvement.
5. White Salmon and Bingen own and operate their own public water system as described in RCW 70.119A.020—Definitions. Bingen and White Salmon will be responsible for water quality standards in their respective boundaries as defined by their individual water comprehensive master plan. White Salmon's water purveyor shall notify Bingen in accordance with WAC 246-290-71001 of water quality not meeting potable water standards as established by Washington State Law. Nonetheless, Bingen agrees to hold harmless and indemnify White Salmon from any negligence, or intentional acts, attributable to Bingen, including its officers, agents and employees and White Salmon agrees to hold harmless Bingen, including its officers and agents from any negligence, or intentional acts, attributable to White Salmon.
6. Bingen acknowledges that this agreement is dependent on water availability at the wells, which have a "current reliable maximum water supply production capacity" of 655 gpm. Said wells have demonstrated declines in recent years and are monitored on a monthly basis by White Salmon. Bingen's share of this capacity (including the Port's 5% share) is 200 gpm and (223 acre-feet, based on Bingen's Water Right G4-33106).

7. Interlocal Cooperation Act

   This is an interlocal agreement pursuant to RCW Ch 39.34 and the parties make the following RCW 39.34.030 representations:

   a. Duration. The term of this agreement is from January 1, 2023 to December 31, 2025.
   b. Organization. No new entity will be created under this agreement.
   c. Purpose. The purpose is to enable the City of White Salmon to supply water to the City of Bingen as a special municipal customer.
   d. Manner of Financing. The parties intend to finance this agreement through cash appropriations as set forth in their annual budgets.
   e. Termination of Agreement. Either Party shall have the right to terminate this agreement upon not fewer than ninety (90) days written notice to the other; otherwise, this agreement shall terminate on December 31, 2025.
   f. Other. All terms are covered by this Agreement. No additional terms are contemplated.
   g. Selection of Administrator. The White Salmon City Administrator shall be the Administrator for this Interlocal Agreement.
   h. Filing. Prior to its entry into force, this agreement shall be filed with the Klickitat County Auditor or, alternatively, listed by subject on a public agency's web site or other electronically retrievable public source.

This agreement shall be effective on January 1, 2023 following execution, and shall terminate on December 31, 2025, unless renewed by joint agreement of the parties. Bingen and White Salmon intend to meet, at a minimum, by June each year, to forecast water demands and discuss future rate adjustments.

In Witness Whereof, the parties have affixed their hands and seal this 7 day of December, 2022.

CITY OF WHITE SALMON

Marla Keethler, Mayor

Date: 12/7/22

ATTEST:

Clerk of the City of White Salmon

Date: 12/7/22

APPROVED AS TO FORM:

Attorney for the City of White Salmon

Date: 12-12-22

CITY OF BINGEN

Catherine Kiewit, Mayor

Date: 12/6/22

ATTEST:

Clerk of the City of Bingen

Date: 12/6/22

APPROVED AS TO FORM:

Attorney for City of Bingen

Date: 12/6/2022

Application for Water/Sewer Service

Service Address ____

Effective Date ____

New Construction _____ **New Owner** _____ **New Renter*** _____

Proof of Purchase for new owners is required with Application (<u>FINAL</u> Alta Settlement Statement or <u>RECORDED</u> Warranty Deed). Completed applications may be brought to 100 N Main St White Salmon, WA, mailed to PO Box 2139 White Salmon, WA 98672 or emailed to: utilityclerk@ci.white-salmon.wa.us.

Active garbage service is required inside city limits. If garbage service is not maintained, fees and penalties may apply. Please contact Republic Services at (509) 773-5825 or at www.republicservicesNW.com

Occupant Name ____ **Additional Name** ______________________________

Mailing/Forwarding Address____

City, State, Zip____

Home Phone______________________________ **Cell / Business / Emergency Phone**__________________________________

Email address____

____ _______________________________________ ____________________

Signature of Applicant **Occupant Printed Name** **Date**

*** *MUST BE COMPLETED IF YOU ARE A RENTER*—PROPERTY OWNER INFORMATION**

Per WSMC 13.16.065c "The City, upon written request of a property owner, will send a duplicate monthly bill to a tenant." ***I certify that I am the owner of record, and I understand that as the property owner I am ultimately responsible for all City of White Salmon utility billing , including any usage, late fees, and shut off fees that may be incurred by tenants. I agree to have a duplicate bill for my account sent to the occupant/tenant listed above. <u>No new account will be created for tenants</u>. Property Management Company must provide management contract to complete on behalf of owner.***

Landlord Signature_______________________________________ **Printed Name**_____________________________________

LANDLORD CONTACT INFORMATION: ***Landlord Account Number:***___________________________

Mailing Address____ **City, State and Zip** ________________________________

E-mail Address____ **Phone**____

For City of White Salmon Use Only:

Was proof of purchase provided? Yes No **Duplicate Billing? Yes No**

Service Location _______________

Off Account Number _______________ **New Account Number** ______________

Work Order# _________ **Reading** __________ **Date** _______________

Inside / Outside City Limits **If inside city, has garbage service been confirmed? Yes No** **Date** ______________

Account updated by ____ **Date** ______________

Account reviewed by ____ **Date** ______________

The City of White Salmon is an equal opportunity employer and provider.

CITY OF WHITE SALMON

SERVICE INSTALLATION APPLICATION

Date: _________________________ Tax Parcel: ____

Service Address: ____

Billing Address: ____

Owner: ____________________________________ Phone: ___________________________________

Email: ____

Contractor: ________________________________ Phone: ___________________________________

Email: ____

Property Location: ☐ Inside City Limits ☐ Outside City Limits

Connection Type: ☐ Water ☐ Wastewater

Structure Type: ☐ Single Family ☐ Town House ☐ Duplex ☐ Commercial ☐ Irrigation Only

*Scheduling connection is at the availability of the Public Works Team and weather. Installation may take up to 6 weeks.

The undersigned applicant hereby applies for a water connection to the above described property. The applicant is the owner of the described property or the authorized agent of the owner. By signing this application, the applicant agrees, as a condition of the City of White Salmon providing the continuing service to the above described property, to comply with all provisions of the current WSMC 13.16.015, and other such rules and regulations now existing or which may be established from time to time governing the public water system. The applicant specifically agrees to install and maintain at all times their plumbing system in compliance with the most current edition of the plumbing code having jurisdiction as it pertain to the prevention of water system contamination, prevention of pressure surges and thermal expansion in their water piping. For thermal expansion, it shall be assumed that a check valve is installed by the applicant/ owner on the water service pipe. Further, the applicant agrees not to make a claim against the City of White Salmon or its agents or employees for damages and/or loss of production, sales or service, in case of water pressure variations, or the disruption of the water supply for water system repair, routine maintenance, power outages, and other conditions normally expected in the operation of a water system.

Applicant Signature: ____

CITY OF WHITE SALMON

SERVICE INSTALLATION APPLICATION

Work Order No. ______________________________

BIAS Account Number: ________________________

Service Address: _____________________________

BIAS Service Location Number: ________________

Service Physical Location: ____

Date of Installation: __________________________

Size of meter: ¾ 1 1 ½ 2 3 4 6

Current Read: _______________________________

Register ID: __________________________________

Completed by: _______________________________

Meter SN: ____________________________________

Comment: ____

Location of Meter Installed:

Water Meter Impact Fee		
Meter Size	In City	Outside City
¾ inch	$ 5,287.00	$ 7,464.00
1 inch	$ 7,705.00	$ 9,883.00
1½ inch	$ 14,615.00	$ 16,792.00
2 inches	$ 24,289.00	$ 26,466.00
3 inches	$ 51,927.00	$ 54,105.00
4 inches	$ 91,166.00	$ 93,888.00
6 inches	$ 202,265.00	$ 205,531.00

Water Meter Installation Fee		
	In City	Outside City
Minimum Installation Fee	$ 250.00	$ 350.00

White Salmon Municipal Code (WSMC) 13.16.025 – Monthly Water Fees, "Monthly water fees apply to water users. As it is used herein the term water users shall mean anyone having paid a connection fee, regardless of whether water is being used. All charges follow the meter regardless of who owns the property being served. In addition to the meter charge, water users will be charged for water use per one thousand gallons or part thereof accordingly."

Wastewater Connection Fee		
	In City	Outside City
Wastewater Connection Fee	$ 2,000.00	$ 2,000.00

WSMC 13.16.055 – Monthly Sewer Rates, "Sewer rates shall apply to sewer users. As it is used herein the term sewer users shall mean anyone having paid a connection fee, regardless of whether sewage is being collected. All changes follow the property. Billing for new customers shall begin the month following payment of the connection fee"

I acknowledge that I have read the attached packet of statements, and hereby indemnify and hold harmless the City of White Salmon, and its employees from any liability arising from interpretation pertaining to water and/or wastewater installation.

Applicant Signature: ____

NEW UTILITY SERVICE CHECKLIST

The following presentation is a procedural information guide for applicants and contractors applying for new water or wastewater utility service with the City of White Salmon.

Definitions

Backflow: Backflow is the reverse flow of water or other liquids, mixtures or substances into the potable water system.

Certified Backflow Assembly Tester: A person holding a current certificate of competency issued by the Washington State Dept. of Health as a Backflow Assembly Tester (BAT)

Cross-connection: Any physical arrangement or connection of potable water system, directly or indirectly, to anything other than another potable water system that could allow contamination as a result of back-pressure or back-syphon.

Excess Water Pressure: Static water pressure in excess of 80 PSI.

Installation and Connection

Prior to installation of any water or wastewater service, it is necessary for the Applicant to provide the City with the information as regards to:

1. Contractor’s name, WA contractor’s license number, address and phone number.
2. Set of plans for construction/ installation, approved by the City, that includes provisions for all conditions of approval, and evidence of approval from the Washington State Dept. of Health (if applicable).
3. Confirm of utilities locates.
4. Evidence of a secured easement or right-of-way permit for utilities placement (if applicable). A $2,500.00 bond will be required prior to any street cut.
5. Any work conducted within the public right-of-way shall require a permit.
6. Actual schedule for project construction/ installation as Public Work Dept. schedule allows.

Closure of any city street or alleyway during project construction must be authorized by the Public Works Operations Manager or their designee. For public safety, it is the responsibility of the contractor to appropriately barricade all open trenches.

All costs and expenses incidental to the installation and connection of the water/ wastewater service line shall be borne by the owner. It shall be the responsibility of the applicant/ owner to accomplish all excavation, bedding, backfill, pavement repair and restoration as may be required to make connection from the City water/ wastewater facilities (mainline) to the service location in accordance with applicable City, County and State requirements. Excavated natural materials may have to be hauled off site. All lateral trench backfill within the right-of-way shall be Controlled Density Fill (CDF) only, unless otherwise approved by the Public Works Operations Manager or their designee.

Trench Backfill

No pipes or plumbing shall be covered, nor trench backfilled until the Public Works Operation Manager or their designee has inspected and approved the installation for these utilities services. All pipes and appurtenances must have appropriate bedding material that meets City specifications.

City Utilities

Service	Inside	Outside
Water – Base Fee	$ 44.66	$ 65.73
Sewer – Base Fee	$ 55.15	$ 60.61
Water Rights – Base Fee	$ 6.25	$ 6.25
Minimum Monthly Bill	**$ 106.06**	**$ 132.59**
Consumption* 1-5	$ 1.19 per unit	
Consumption* 6-15	$ 3.01 per unit	
Consumption* - over 16	$ 4.03 per unit	

2022 Residential rates for inside city limits and outside city limits service are as follow.

*Consumption is billed every other month. The rate table above is for a two-month cycle and is for 1000 gallon increments.
You are billed for all water used (no water use is included in the base fees).

Due Date – Payments are due on the 20th of the month. Delinquent accounts are subject to a $10.00 late charge. If payment is not received by the following due date, water service can be terminated for non-payment.
Payment Methods – The City of White Salmon accepts payment by cash, check, ACH, credit card and debit card with a Discover, Visa or Master Card logo.

13.16.020 Hook up charges.

A. The charges for hooking up to the city's water system include the impact fee, connection fee and installation costs.

B. Impact Fees Based Upon Meter Size.

C. Connection Fees. The city will facilitate the water tap if needed and supply, install and connect the water meter valves and service piping not to exceed a distance of thirty feet from the line connection to the meter. The connection fees for this work are actual cost plus 17%. In City Minimum Installation Cost: $250.00. Outside City Minimum Installation Cost: $350.00.

D. Installation Costs. It shall be the responsibility of the applicant or owner to accomplish all excavation, bedding, backfill, pavement repair and restoration as may be required to make connection from the City's facilities to the service location in accordance with applicable City, County and State requirements. Each applicant or owner may elect to accomplish the necessary work by private contract. The minimum fee for installation work by City forces shall be two hundred fifty dollars inside City limits, and three hundred fifty dollars outside City limits. Charges for additional work such as rock blasting will be billed at actual cost for labor, equipment and materials, plus for work performed by City forces.

E. Miscellaneous Fees. Charges for work such as relocation or up-size of existing water meters or service, repair of meter or service damaged by others, or installation of additional meters for existing customers shall be billed at actual cost for labor, equipment and materials, plus 17% percent.

F. Waiver of Impact Fees. The City Council may waive all or a part of an impact fee under the following circumstances: 1.The applicant is a local government; 2.The proposed use will serve the public interest; and 3.Residents of the city of White Salmon will benefit from the proposed use.

Water Service Connection

- Water service laterals shall be buried at a minimum of 36 inches of depth.
- All water service laterals shall have a Blue #14 AWG Tracer Wire placed in the trench with the water pipe prior to bedding and backfilling the pipe. Tracer wire shall be secured to the pipe with tape or other reliable means no less than every 10 feet.
- The City shall be responsible to make the service tap of the City's water main and to extend the service lateral from the water main to the meter setter. The City shall reserve the right to determine the proper placement of the Meter Box. The applicant/ owner is responsible to construct the water service lateral from the meter setter "tail piece" to the building to be served.
- Water pressure in excess of 80 psi shall require the applicant/ owner to install a pressure reducing valve on the homeowner's side of the Meter Setter. (UPC Sect. 1007)
- A full port ball or gate valve shall be placed between the Meter Setter and the residence, commercial establishment or institution to be served. (UPC Sect 1005) Under no circumstances shall the Meter Shut-off valve on the City side of the meter be exercised, operated or manipulated by anyone other than a representative of the public works department. Said operation shall be considered tampering with a Public Water System and shall be punishable to the full extent of the law.
- A state approved Double Check Valve Assy (DCVA) shall be installed on irrigation systems. The DCVA shall be tested immediately upon activation of the service and then annually thereafter by a person holding a certificate of competency from the Washington State Dept. of Health as a Backflow Assembly Tester (BAT). (WAC 246-290-490)
- No "Cross-connection" to the City's water system or the water service lateral shall be permitted.
- The trench for the water service lateral shall not be covered or backfilled until inspection by the Public Works Operations Manager or their designee.

Chapter 13.16 - Water and wastewater service connection fees and charge.

Prior to the actual construction of any Water Service or Side Sewer, the applicant/ owner shall have paid in full the Water or Wastewater Connection/ Impact Fees in effect at the time and, if applicable, any meter change.

13.16.010 - New water connections—Hookup deadline after approval and related matters.

A. Impact fees for water hookups must be paid in full within thirty days of the date of approval, or the approval is void.
B. It is the applicant's responsibility to procure easements, franchises or permits from the City, County or other entity as necessary to connect the City's facilities to the service location.
C. All required easements and permits shall be obtained and all hookup charges paid in full prior to request for physical hookup.

Wastewater Collection Service Connections

- A minimum six inch diameter wastewater collector pipe shall be used for Wastewater Collector Service Laterals (side sewers). Forced Flow (pumped) Wastewater Collector Systems shall be minimum two inch diameter PVC pipe.
- All Side Sewers shall be buried a minimum of thirty six inches in depth unless approved otherwise by the Public Works Operations Manager or their designee.
- All side sewers constructed shall have a green #14 AWG tracer wire placed in the trench with the sewer pipe prior to bedding and backfilling the pipe. Tracer wire shall be secured to the pipe with tape or other reliable means no less than every 10 feet
- The applicant/owner shall be responsible for all side sewer piping, valves, pumps and vaults located outside of the Right of Way or utility held easement.
- In no case shall a sewer line be located in a common trench with a potable water line.
- The size and slope of the building sewer located within the right of way or utility held easement shall be subject to the approval of the Public Works Operations Manager or their designee, but in no case shall the diameter be less than 6 inches. The slope of said pipe shall be no less than a 2.0% flow gradient (one-fourth inch per foot).
- An approved backwater valve shall be installed in the side sewer if the building served is below the flood elevation of the nearest downstream manhole cover.
- An approved cleanout shall be located within 3 feet of where the ABS pipe leaves the building being served. Cleanouts shall also be required for any bend or combination of bends that equals or exceeds 45 degrees of direction change.
- The applicant/ owner’s contractor shall be responsible to provide the labor and materials necessary to make the tap into the City’s wastewater main line. All new connections to the mainline shall be witnessed by the Public Works Operations Manager or their designee.
- All trenching shall be the responsibility of the applicant/ owner. No trench or side sewer within the public right-of-way or utility held easement shall be covered or backfilled until inspected by the public works operations manager or their designee.

APPENDIX B

Correspondence and Supportive Documents

- New Planning Guidebook in progress
- New Water System Design Manual

Department of Health, Office of Drinking Water
Eastern Regional Office
Pre-Plan Agreement

- Jewett main line replacement project
- Feasibility study for slow sand filter on river
- ASR project
- SCADA replacement

Water system name: White Salmon
Public Water System ID No.: 96350
Planning Purpose: Large System WAC 246-290-100(2)(a)
Operating Permit Color: Green
Initial/Update/Amend: Update
Number of Connections: 1908 of 2831

Preplan date: April 1, 2020
WSP submittal due date: January 1, 2021
Target year of approval: 2021
Existing WSP expiration date: June 6, 2020
End of "plan approval period": 2031
(last year of all projections)

WAC 246-290-100 requires purveyors of new water systems, systems in a water coordination act area, systems serving 1,000 or more service connections, systems with an unspecified number of approved connections and systems that are growing or experiencing capacity problems to gain approval for a Water System Plan (WSP). The purpose of this preplan is to determine the level of detail of the WSP and establish an approval schedule. This agreement is valid until the WSP submittal due date above. After that date, the agreement will need to be renegotiated. The operating permit color will change to yellow for planning purposes if the WSP is not approved by the existing WSP expiration date noted above.

The Water System Planning Guidebook (2020 draft) can be found HERE.

Pre-Plan Attendees:
Jamie Gardipe, DOH Regional Planner
Andres Cervantes, PE, DOH Engineer
Dave Jepsen, PE, Anderson Perry & Assoc.
Marla Keethler, Mayor
Patrick Munyan, City Admin/PW Dir.
Jan Brending, City Clerk/Treasurer
Russ Avery, City Operations Manager

Include in plan	***Content Description***	***WSP Page #***
Y	Water System Plan Submittal Form – DOH Pub. 331-397-F	
Y	Signed and dated stamp from a Professional Engineer licensed in the State of Washington	
Chapter 1 – Description of Water System		
Y	Ownership and management, ~~including Satellite Management Agency (SMA)~~	
Y	System history and background	
Y	Related plans: City & County comp plans. Note that City comp plan is currently in update process (est. 2021 approval).	
Y	Service area, maps, land uses: • Service area map including retail service area, service area/~~future service area~~/water rights place of use • Existing zoning map(s) for all jurisdictions within service area (city & county) • Future land use map(s) for all jurisdictions within service area (city & county)	
Y	Service area and other applicable policies	
Y	Duty to serve statement for the retail service area	
Y	Local Government Consistency Determination Forms: City and County planning depts., + Bingen, Skamania County	
N	Consistency with the watershed plan for Wind-White Salmon WRIA #29.	

Primary source of water for Bingen but not considered "in service area" because separate system – wholesale water. Include in service area/WRPOU if consolidation is possible.

Chapter 2 – Basic Planning Data		
Y	Existing population, service connections & equivalent residential units (ERUs)	
Y	Existing water production/usage: monthly/annual per source, annual by customer class, distribution system leakage (DSL)	
Y	Seasonal variations in use by customer class (1000+ connections) – show at least most recent year broken down by month	
Y	Water supply characteristics	
Y	Water supply reliability evaluation: Include depth-to-water measurements	
Y	Future population projections and land use	
Y	Interties: agreements, existing/proposed, emergency, metering 3 interties with Bingen, all currently only one way to Bingen	
Y	**Plan approval period & 20-year projections for:** Population, service connections, & ERUs	
Y	Future water demand <u>without</u> water use efficiency savings	
Y	**Water rights self-assessment: Consult with Ecology prior to plan submittal** Describe water rights and complete water rights self-assessment form for existing, plan approval period, and 20 years.	
Chapter 3 – System Analysis		
Y	Asset Management Inventory: description of major assets, asset management table/spreadsheet	
Y	Asset Condition Assessment and criticality (recommended)	
Y	Water quality analysis – ASR projections, treatment, LCR, DBP	
Y	System design standards – Required vs. desired level of service, standards used	
Y	Capacity analysis (Must include Worksheet 4-1, ERU Capacity Summary) – identify and discuss limiting factor	
Y	Hydraulic analysis	
Y	Summary of system deficiencies	
Chapter 4 – Water Use Efficiency (WUE)		
Y	**Metering Program:** sources, services, and non-emergency interties – 100% metered	
Y	**Distribution System Leakage (DSL)** – <u>3-yr= 31.7%</u> - discuss anticipated drop with mainline replacement and change to meter reads Summarize DSL and compare to WUE annual reports; discuss DSL calculation methodology, leak detection plan	
Y	**Water Loss Control Action Plan (WLCAP)** If DSL exceeds 10 percent (3-year average), submit the WLCAP per <u>WAC 246-290-820(4)</u>	
Y	**Water Use Efficiency WUE Program**	
Y	1. Describe the current (WUE) program	
Y	2. Updated WUE goal(s). Document public adoption process (include public notice, signed minutes, signed resolution).	
Y	3. Describe measure(s) that will be implemented to achieve the goal(s). Include schedule & costs in the budget – 1,000 to 2,499 connections: 5 additional methods.	
Y	4. Describe process used to evaluate the WUE measure(s) you did not implement	
Y	5. Describe or provide example of yearly consumer education (cannot count as a measure)	
Y	6. Estimate projected water savings from selected WUE measure(s)	
Y	7. Describe process that will be used to determine effectiveness of the WUE program	
Y	8. Plan approval period and 20-year water demand projection <u>with</u> WUE savings	
Y	**Additional WUE for systems with 1000+ Connections** • Estimate water saved from implemented WUE measure(s) over the previous plan approval period • Water demand forecast (if all cost-effective WUE measure(s) are implemented)	

City has mgmt. software package that includes AM. They have not started using it, but plan to utilize soon. Recommend using guidebook table or RCAC spreadsheet for this plan.

	• For WUE measure(s) evaluated, but not implemented: ○ Quantitative evaluation of WUE measure(s) cost-effectiveness, including marginal costs of water production ○ Evaluate WUE measure(s) for cost-effectiveness if shared with other systems ○ Quantitative/qualitative evaluation of measure(s) to determine cost-effectiveness from societal perspective • Explore reclaimed water opportunities	
Chapter 5 – Source Water Protection		
Y	Sanitary Control Area (groundwater sources) description and documentation of covenants, restrictions, etc.	
Y	Wellhead protection program/update for all groundwater sources	
Y	Watershed control program for all surface water/GWI sources – GWI for Jewett Springs. Address any fire/flooding concerns.	
Chapter 6 – Operation and Maintenance Program		
Y	Water system management and personnel, including operator certification and CCS – identify backup operator	
Y	Operations and preventative maintenance schedule – groundwater and surface water O&M, distribution, etc.	
Y	Comprehensive water quality monitoring: Will ASR require additional monitoring from Ecology? • Provide LCR and DBP monitoring schedule(s), map(s), and letters. • Coliform monitoring plan, including addresses and map. Update for RTCR & groundwater rule.	
Y	Emergency response program: Service reliability requirements & Water Shortage Response Plan per WAC 246-290-420. Consider Tier 1 Public Notification process, and multiple channels for notification.	
Y	Cross-connection control (CCC) program – Identify new CCS if Ross out for too long (out on medical leave). • Systems with 1000+ connections, provide a copy of your CCC annual summary report form	
Y	Sanitary survey findings – survey 2020 TBD	
Y	Recordkeeping, reporting, and customer complaint program	
Y	Water treatment (surface, disinfection, contaminant) operations – potential ASR, slow sand filter on White Salmon River.	
Y	Summary of O&M deficiencies, include cost in budget	
Chapter 7 – Distribution Facilities Design and Construction Standards (optional)		
Y	Project review procedures/submittal process	
Y	Policies and requirements for outside parties	
Y	Design and construction standards for distribution-related projects. Provide specs on CD or USB if large.	
Y	Construction certification	
Chapter 8 – Capital Improvement Program (CIP)		
Y	CIP summary and schedule for the plan approval period (consider prioritization, project assessment and value planning)	
Y	20-year (minimum) CIP for projects beyond the plan approval period	
Chapter 9 – Financial Program		
Y	Financial viability (full cost of service, cost recovery, reserves)	
Y	Summary of past income and expenses, sufficient to establish trends (previous plan approval period ~~or minimum 3 years~~)	
Y	Balanced operational and capital budget projections for plan approval period	
Y	Show operational, capital, and emergency reserve goals. Describe the revenue requirements to achieve them. Demonstrate annual progress toward goals.	
Y	Debt financed capital improvements	

Y	Water rate evaluation: • Describe current rate structure: Base rate + inclining block rate – will go up with water right debt and mainline replace. • Evaluate the feasibility of implementing a rate structure that encourages water demand efficiency • Evaluate rate affordability. Provide rate that would be unaffordable, income below which current and future rates are unaffordable, and programs available for low income customers.	
N	Water system regulated by the Utilities and Transportation Commission (UTC)?	
Chapter 10 – Miscellaneous Documents		
Y	Updated Water Facilities Inventory with authorized signature	
Y	Informational meeting for the consumers (include public notice and signed minutes)	
Y	Adjacent utilities notice, review, and comment of draft WSP. Attach notice and comments received.	
Y	SEPA: Signed Environmental Checklist and Threshold Determination. The water system is lead agency.	
Y	Agreements: SMA, intertie, service area, franchise, wheeling, mutual aid, inter-local and other agreements	
Y	Correspondence	
Y	Supporting documents	
Miscellaneous Documents – Post review		
	Plan approval by water system governing body. Include signed meeting minutes or signed resolution. NOTE: DO NOT approve the plan until after the draft review is completed and you have received authorization to proceed with approval from the Regional Planner.	

GENERAL INFORMATION AND REQUIREMENTS:

- **Copies – Provide two (2) copies of the WSP. DOH sends one copy for the Dept. of Ecology (CD or USB preferred). DOH copy must be paper.**
- **Paper copy format – 3-ring binder.** Split into two binders if pages exceed 4” binder width. Consider electronic appendix for large plans (construction specs, detailed calculations, meter reads, etc.)
- **Mapping – All maps must be a minimum of 11”x17”**
- **Provide this document with first draft.** Use the right side column of the checklist to provide page numbers for required content.
- **Fee – The total review fee for the first and second drafts for 1,000 to 9,999 connections is $3,705. Additional drafts are an additional $926.25.**
- **REVIEW TIMELINE – Plans are reviewed in the order received.** DOH will respond within ninety (90) days of receiving draft plans (i.e. 90 days after the first draft, and again, 90 days after the second draft). Dept. of Ecology has 60 days to review, and that is concurrent with the DOH 90-day period.

WAC 246-290-100 – Water System Plans
DOH Pub. 331-432 – Service Area Guidance
DOH Pub. 331-438 – Service Area Policies
DOH Pub. 331-366 – Duty to Provide Service
DOH Pub. 331-568 – Local Government Consistency Determination Form
DOH Pub. 331-370 – Water Right Self-Assessment
WAC 246-290-221 – Water Demand Design Criteria
DOH Pub. 331-123 – Water System Design Manual
DOH Pub. 331-375 – Water Use Efficiency Guidebook
DOH Pub. 331-036 – Coliform Monitoring Plan
DOH Pub. 331-211 – Emergency Response Planning Guide
DOH Pub. 331-234 – Cross Connection Control Planning Guide
DOH Pub. 331-355 – Cross Connection Guidance
RCAC Asset Management Interactive Spreadsheet

Appendix B - City of White Salmon -
Water Conservation Messages in Monthly Bills

Update your appliances!

Many old appliances use significantly more water than modern water- and energy-saving ones. Research the toilets, faucets, showerheads, dishwashers, and clothes washers in your home to determine how much water they use, and look into options that use less water, like dual-flush toilets. While replacing an appliance can be expensive, a water-efficient appliance can offer substantial savings on your water bill. Smaller fixes, like faucet aerators and low-flow showerheads, can still make a huge improvement for water conservation.

The June 29, 2023, bill has now been uploaded to your account. We bill actual usage every month. The usage included on your bill is for the month of May 2023.

Please take time to look at the attached city newsletter. It includes important information regarding utility billing and about upcoming community events.

Appendix B - City of White Salmon -
Water Conservation Messages in Monthly Bills

Water Conservation Tip: Be mindful of lawn-watering practices. A green lawn is a significant water investment—it can account for up to one-third of a household's water use in the summer months. If you're intent on keeping a traditional lawn, be mindful of your watering practices. Opt. for a good soak once a week rather than daily routine watering. Water in the early morning or evening rather than the afternoon when evaporation happens faster. Plant trees for shade to protect your grass and plants from the afternoon sun. Use mulch around plants to retain soil moisture. Ensure your sprinklers are well-positioned and aren't watering the pavement. Adjust your irrigation system to water less in rainy or cool months. Finally, if you feel like your lawn requires too much water, replace the grass in favor of Xeriscaping practices like gravel and water-saving plants.

The July 28, 2023, bill has now been uploaded to your account. We bill actual usage every month. The usage included on your bill is for the month of June 2023.

Please take time to look at the attached city newsletter. It includes important information regarding utility billing and about upcoming community events.

Appendix B - City of White Salmon - Water Conservation Messages in Monthly Bills

Use the dishwasher, if possible. It may seem counterintuitive, but washing dishes by hand typically uses more water than the dishwasher. If you don't have a dishwasher, there are ways to conserve water during the dish washing process. Simply turn off the water when you wash dishes, instead of letting it run. If you have a dishwasher, avoid rinsing your dishes before loading them into the washer.

The August 30, 2023, bill has now been uploaded to your account. We bill actual usage every month. The usage included on your bill is for the month of July 2023.

Please take time to look at the attached city newsletter. It includes important information regarding utility billing and about upcoming community events.

Be weather wise and winterize! Any above ground / exposed pipes should be wrapped with insulation and or heat tape to prevent cracks or breaks. This also includes winterizing any irrigation you have on your property. Not properly winterizing irrigation can cause these pipes to freeze and then burst without knowing until the spring when you start watering again. Save yourself some headaches and prep early!

The September 28, 2023, bill has now been uploaded to your account. We bill actual usage every month. The usage included on your bill is for the month of August 2023.

Please take time to look at the attached city newsletter. It includes important information regarding utility billing and about upcoming community events.

Pipes that freeze most frequently are those that are exposed to severe cold, such as outdoor hose bibs, swimming pool supply lines, water sprinkler lines and water supply pipes in unheated interior areas such as basements and crawl spaces, attics, garages, or kitchen cabinets. Pipes that run against exterior walls that have little or no insulation are also subject to freezing.

The October 30, 2023, bill has now been uploaded to your account. We bill actual usage every month. The usage included on your bill is for the month of September 2023.

Please take time to look at the attached city newsletter. It includes important information regarding utility billing and about upcoming community events.

Pipes that freeze most frequently are those that are exposed to severe cold, such as outdoor hose bibs, swimming pool supply lines, water sprinkler lines and water supply pipes in unheated interior areas such as basements and crawl spaces, attics, garages, or kitchen cabinets. Pipes that run against exterior walls that have little or no insulation are also subject to freezing.

The November 29, 2023, bill has now been uploaded to your account. We bill actual usage every month. The usage included on your bill is for the month of October 2023.

Please take time to look at the attached city newsletter. It includes important information regarding utility billing and about upcoming community events.

The City Connection

March 2023

Water Conservation: Every drop counts!

Let's Talk Landscaping...

Of the estimated 29 billion gallons of water used daily by households in the United States, nearly 9 billion gallons (30 percent) is used outdoors. In the hot summer months, or in dry climates, a household's outdoor water use can be as high as 70 percent.

Native and drought tolerant plants can make a beautiful alternative to unused turf areas in your yard. WSU Cooperative Extension has many resources to assist home gardeners with landscaping using native plants.

Benefits of Landscaping: Landscaping can help reduce soil erosion and stormwater runoff, provide habitat for wildlife, help reduce excess carbon dioxide levels, and help keep homes cooler in the summer and warmer in the winter.

A beautiful front yard with a diversity of trees, shrubs, and groundcovers, with some lawn, can increase curb appeal. A well-designed backyard can serve as a place to relax, entertain friends, and cultivate a garden.

Decorative basalt columns and stones of different sizes complement the ground-hugging conifers in this drought-tolerant design.

Perennial Ryegrass (left) has a lighter and finer texture than the tall fescue (right). Both are turf grass that are drought tolerant.

Ryegrass only needs 1 inch of supplemental irrigation per week during the hot months of summer in order to stay green!

Choosing Plants: Home gardeners have a multitude of plants to choose from when they shop for drought-tolerant plants at garden centers or work with a landscape contractor. When it comes to selecting a group of plants for a drought-tolerant landscape, one should first consider Drought Tolerance, Plant Invasiveness and Hydro zones.

Horticulturists define drought-tolerant plants as those that can withstand a moderate period of limited moisture. While they may not prefer periods of hot, dry weather, they can withstand them . *Examples: Woody plants, Plants with small, fine, or deeply divided foliage, and* ***Turf grass****, such as perennial ryegrass.*

When choosing a drought-tolerant landscape design, group as many of the plants as possible in a low-water-use hydro zone. Landscape trees, screening hedges, and evergreen groundcovers all fall into the low-water hydro zone.

Before selecting a particular plant, check the plant's hardiness zone rating to ensure that it will survive the minimum winter temperatures found at the planting site. Gardeners can use zip codes to look up United States Department of Agriculture hardiness zones (USDA Hardiness Zone Map 2014)

Calendar of Events

Council Meetings are held the first and third Wednesday of each month at 6:00 p.m. Meetings are held in person and via Zoom teleconference. Agendas are posted at the Post Office, Library, City Hall and online at www.white-salmon.net each Friday before the meeting.

Upcoming Council Meetings
March 1, 2023 (Regular Meeting)
March 15, 2023 (Regular Meeting)

Planning Commission Meetings are held the second and fourth Wednesday of each month at 5:30 p.m. Meetings are held in person and via Zoom teleconference. Agendas are posted at the Post Office, Library, City Hall and online at www.white-salmon.net each Wednesday before the meeting.

Upcoming Planning Commission Meetings
~~March 8, 2023~~ (Regular Meeting) ***CANCELLED***
March 22, 2023 (Regular Meeting)

TreeFest

NATIVE PLANT SALE
& PRE-ORDER PICK-UP
LIVE MUSIC, INFORMATIONAL BOOTHS, ACTIVITIES, AND FUN!

Resolution 2023-02-556 Declaring March 18, 2023 as Arbor Day

City of White Salmon Celebrates Arbor Day!

Join us on March 18, 2023 starting at 9am for TreeFest at Rheingarten Park, White Salmon.

Scan this QR code or visit:

repd.us/white_salmon

Ask questions about the City of White Salmon!

The City Connection

April 2023

WATER CONSERVATION: EVERY DROP COUNTS!

Let's Talk Irrigation…

Why should residential homeowners care about irrigation management?

$$$ Water costs money $$$

Someone who does a good job of irrigation management will have a greener lawn, better landscaping, and a lower water bill than someone who doesn't. Poor irrigation management also has an environmental impact because water is a limited resource. The more we use, the less water is available for alternate uses. Water is also the primary vehicle that moves fertilizers and pesticides off of landscapes and carries them into our streams and water bodies where they can cause environmental damage.

What are the environmental and health consequences of poor irrigation management?

Water is the primary vehicle for moving fertilizers and pesticides out of the soil where they are needed and useful into groundwater, streams, and water bodies. Drinking fertilizers and pesticides that are pumped out of wells from the groundwater can have negative health effects.
Fertilizers help plants grow. In streams and water bodies, excessive fertilizers and nutrients will promote aquatic vegetation and algae to the point that they choke out other native plant species and consume so much of the water's oxygen that fish and other aquatic animals are negatively impacted. When too much irrigation water is applied, water will either run off or move down through the soil past the bottom of the root zone (Also referred to as the root depth or effective rooting depth. The depth or volume of soil from which plants effectively extract water from. Typically this is defined as the depth of soil containing 80 percent of the plant roots.) where the plants can no longer reach it. When this happens, it can cause erosion and/or move nitrogen and soluble phosphorous with it.

I have an automatic irrigation system. How should I set my timer?

Let's start with what not to do. Don't set it once and leave it on the same setting all summer long (e.g. 15 minutes every morning). Your lawn and garden do not need the same amount of water in the spring and fall as they do in the middle of the summer. For example, lawns in Yakima, WA use about ¼ of an inch per week in April and October, 1¼ inches per week in May and September, 1.6 inches per week in June and August, and a little over 2 inches per week in July. If you left it on a single setting, you would typically be over-irrigating in the spring and fall (wasting water) and under-irrigating in the middle of the summer. You should reset your timer at least once a month.
On a silt-loam soil, I recommend putting all of the water on in one irrigation and leaving the timer off the rest of the week. Soil can only hold so much water and we don't want to put on more than it can hold, so during the hot summer months, split it and put on half of the total irrigation requirement in two irrigations per week. On sandy soils, you will have to irrigate more often than that. However, try not to irrigate every day. The more often the leaves and soil surface are wet, the worse your irrigation efficiency will be and the more problems you will have with plant diseases. Also since you aren't watering very deep, your roots won't grow very deep and will be more prone to drought stress.
The bottom line, water deeper at less frequent intervals.
Irrigation systems should be turned off when it rains. This can be done with an automatic rain shut-off sensor. This will save you money, save your utility company water, and be environmentally responsible.

For More information on smart irrigation please visit: http://irrigation.wsu.edu/Content/FAQs-Tutorials/Residential-Irrigator-FAQs.php#q4

Calendar of Events

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Upcoming Council Meetings

April 5, 2023 (Regular Meeting)
April 19, 2023 (Regular Meeting)

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Upcoming Planning Commission Meetings

April 12, 2023 (Regular Meeting)
April 26, 2023 (Regular Meeting)

Rotary | Mt. Adams Chamber of Commerce and Visitor Center | Bingen & White Salmon

Community Cleanup

April 21-22 FRI & SAT 9-5

Reuse ♻ Repurpose ♻ Recycle

This years ***Community Clean Up Event*** will be Friday and Saturday only, at the Bingen Recycle Center on Marina Way from 9am to 4pm each day. The event focuses on providing residents a place to take yard debris, electronics, used items such as clothing, building materials, scrap metal, foam, electronics, batteries, appliances, household goods, furniture, bicycles and more. By sorting to appropriate stations, the recycling of much of this is possible. **WHAT A GREAT WAY TO CELEBRATE EARTH DAY!**

New for 2023 is a ***Community Wide Yard Sale Map*** the weekend of 4/15. We are encouraging everyone to have an at home sale and reduce the reusable items they would potentially be bringing to the event. Our "Free-Cycle Zone" is very popular but we hope this effort will minimize what is being handled on site. There is no charge to be included on the map. Patty Fink is managing this aspect.

For information on home pick up assistance for the elderly and disabled, call the Mt. Adams Chamber of Commerce at 509-493-3630 **BEFORE 4/20 to schedule**. The City of Bingen will assist Bingen residents with the removal of yard debris and household items. Contact Bingen City Hall at 509-493-2122 to schedule a pick up.

THIS EVENT REQUIRES MORE THAN 175 VOLUNTEERS WHO PROVIDE MORE THAN 600 HOURS OF THEIR TIME. IF YOU WANT TO VOLUNTEER OR LEARN MORE, CALL MT. ADAMS CHAMBER AT 509-493-3630 TO PARTICIPATE. REFRESHMENTS FOR VOLUNTEERS WILL BE PROVIDED BY LOCAL BUSINESSES.

Tree of Heaven Control Project: with Underwood Conservation District (UCD)

What can you do? First, learn to identify the Tree of Heaven and Spotted Lanternfly. Tree of Heaven bark is smooth and gray; it is often com-pared to cantaloupe skin. Leaves are alternate and pinnately compound with 10-27 leaflets. **Margins of the leaves are smooth**. The tree can be easily confused with Smooth Sumac (*Rhus glabra*) and staghorn sumac (*Rhus typhina*) as well as Black Walnut (*Juglans nigra*). If you have seen SLF in the area, report it online at http://invasivespecies.wa.gov/ or reporting directly to pestprogram@agr.wa.gov.

Treatment of the tree: Beware – simply cutting the trees down can result in prolific regrowth and exacerbate the problem. Underwood Conser-vation District is working with County Noxious Weed personnel to start assisting with control treatments of the Tree of Heaven. We can provide advice on best treatment methods and will also start with public lands and then move to private properties while limited grant funds last. If you need assistance identifying the tree or if you are interested in treatments, **please contact our office through email: toh@ucdwa.org or by calling 509-493-1936, ext. 6. Use the QR code be-low with a smart phone to learn more about identification and treatment methods.**

UNDERWOOD CONSERVATION DISTRICT
509.493.1936

The City Connection

May 2023

WATER CONSERVATION: EVERY DROP COUNTS!

Let's Talk Drip Irrigation and Drought Resistance Landscaping…

You may have noticed a new look on the north side of City Hall. The City received donations from local residents to help replace the landscaping with something beautiful to represent our city.

The City of White Salmon believes in Water Conservation and made the choice to install drought resistance landscaping, including drip irrigation, to show what a beautiful water conscious landscape could look like for anyone in our area!

With the help of our newest Public Works Member, Ethan Adkins, the planter bed turned out beautiful.

We encourage all residents to look at how they can be more water conscious with their choice of plants, landscaping, and irrigation.

For More information on drought resistant landscaping please visit:
https://extension.wsu.edu/water/landscaping/

http://pubs.cahnrs.wsu.edu/publications/wp-content/uploads/sites/2/ publications/fs030e.pdf

Calendar of Events

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Upcoming Council Meetings

May 3, 2023 (Regular Meeting)
May 17, 2023 (Regular Meeting)

Planning Commission Meetings are held the second and fourth Wednesday of each month at 5:30 p.m. Meetings are held in person and via Zoom teleconference. Agendas are posted at the Post Office, Library, City Hall and online at www.white-salmon.net each Wednesday before the meeting.

Upcoming Planning Commission Meetings

May 10, 2023 (Regular Meeting)
May 25, 2023 (Regular Meeting)

Benefits of Pet Licensing

A license is your pet's ticket home should he or she become lost. Many pets go into the local veterinary hospital every year and if not identified within five days, sadly these animals are moved into adoption programs. When a lost animal is found with current identification, our Officers can give the pet a ride home or quickly notify the pet's owners that it is safe. Your pet's license helps us provide better service to you, your family, and your neighborhood. Don't delay, purchase a license for your pet now!

Pet Licensing Requirement

If you live in the City of White Salmon, you are required by law to license dogs over the age of six months. New residents should obtain a pet license within 30 days of moving into the city. Other animals that also require licensing are chickens, ducks, rabbits, goats and lambs.

Pet License Tags

License tags must be worn by dogs at all times, regardless of microchip. Keep in mind, that even indoor-only pets confined to fenced yards can get loose. If you lost your pets tag contact us to receive a replacement tag.

The White Salmon CityLab Board wants to hear from you on Climate Action Priorities for the City of White Salmon!

Click here or go to: tinyurl.com/whitesalmon to take the survey now.

Interested in how you can get involved? Click **here** to apply to become a member of the CityLab Board or go to the www.white-salmon.net/bc/page/citylab-board.

Tree of Heaven Control Project with the Underwood Conservation District

What can you do? First, learn to identify the Tree of Heaven and Spotted Lanternfly. Tree of Heaven bark is smooth and gray; it is often com-pared to cantaloupe skin. Leaves are alternate and pinnately compound with 10-27 leaflets. **Margins of the leaves are smooth**. The tree can be easily confused with Smooth Sumac (*Rhus glabra*) and staghorn sumac (*Rhus typhina*) as well as Black Walnut (*Juglans nigra*). If you have seen SLF in the area, report it online at http://invasivespecies.wa.gov/ or reporting directly to pestprogram@agr.wa.gov.

Treatment of the tree: **Beware** – simply cutting the trees down can result in prolific regrowth and exacerbate the problem. Underwood Conservation District is working with County Noxious Weed personnel to start assisting with control treatments of the Tree of Heaven. We can provide advice on best treatment methods and will also start with public lands and then move to private properties while limited grant funds last.

UNDERWOOD CONSERVATION DISTRICT
509.493.1936

If you need assistance identifying the tree or if you are interested in treatments, please contact our office through email: toh@ucdwa.org or by calling 509-493-1936, ext. 6. Use the QR code with a smart phone to learn more about identification and treatment methods.

The City Connection

June 2023

WATER CONSERVATION: EVERY DROP COUNTS!

Let's Talk Drip Irrigation and Drought Resistance Landscaping…

You may have noticed a new look on the north side of City Hall. The City received donations from local residents to help replace the landscaping with something beautiful to represent our city.

The City of White Salmon believes in Water Conservation and made the choice to install drought resistance landscaping, including drip irrigation, to show what a beautiful water conscious landscape could look like for anyone in our area!

We encourage all residents to look at how they can be more water conscious with their choice of plants, landscaping, and irrigation.

This landscaping includes drought resistant plants and a drip irrigation system.

For More information on drought resistant landscaping please visit:
https://extension.wsu.edu/water/landscaping/

http://pubs.cahnrs.wsu.edu/publications/wp-content/uploads/sites/2/ publications/fs030e.pdf

Calendar of Events

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Upcoming City Council Meetings
June 7, 2023 (Regular Meeting)
June 21, 2023 (Regular Meeting)

Planning Commission Meetings are held the second and fourth Wednesday of each month at 5:30 p.m. Meetings are held in person and via Zoom teleconference. Agendas are posted at the Post Office, Library, City Hall and online at www.white-salmon.net each Wednesday before the meeting.

Upcoming Planning Commission Meetings
June 14, 2023 (Regular Meeting)
June 28, 2023 (Regular Meeting)

WHITE SALMON SPRING FESTIVAL
JUNE 2ND & 3RD
RHEINGARTEN PARK
N MAIN AVE & NE LINCOLN ST
Live music
Concessions
Bouncy houses
Beer garden
The reptile man
Fireman's breakfast
Kids play zone
Contact: (509) 637-5758
wsspringfestival@gmail.com
whitesalmonspringfestival.com

The Rock Doctors
7 pm Friday

Parade
11 am Saturday

Livewire
9 pm Saturday

WHITE SALMON
FARMERS MARKET
A LONGER SEASON! JUNE 6TH - SEPTEMBER 26TH
TUESDAYS 4PM - 7PM
IN THE PARK: 282 N MAIN AVE.
MORE VENDORS & FRESH PRODUCE!

Join your neighbors in a push for
CLIMATE ACTION NOW!

Your fellow White Salmon residents are working with the City to make a **Climate Action Plan:** a document that will map out the most effective actions that we can take to mitigate & adapt to climate change. We need your help!

Share Your Opinions!
bit.ly/survey1wscap
Fill out our climate priorities survey

Share Your Skills, Time, or Expertise!
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Fill out a form to volunteer or get involved in the process

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UNDERWOOD CONSERVATION DISTRICT
509.493.1936

The City Connection

July 2023

WATER CONSERVATION: EVERY DROP COUNTS!

- **Always turn taps off tightly** so they do not drip.
- **Promptly repair any leaks** in and around your taps—*One leak can waste several thousand gallons of water per year!*
- **Use an aerator and/or a water flow-reducer attachment** on your tap to reduce your water usage.
- **When hand-washing dishes, never run water continuously.** Wash dishes in a partially filled sink and then rinse them using the spray attachment on your tap.
- **Turn the water off while you are actually brushing your teeth!** Use short bursts of water for cleaning your brush. (This saves about 80% of the water normally used.)
- **Partially fill the sink when washing or shaving**, and use that water rather than running the tap continuously. (This saves about 60% of the water normally used.) Use short bursts of water to clean razors.
- **By installing low-flush toilets, you can reduce water usage by 40% to 50% .**

TIPS FROM www.thewaterproject.org

Calendar of Events

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Upcoming City Council Meetings

CANCELLED—July 5, 2023

July 19, 2023 (Regular Meeting)

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Upcoming Planning Commission Meetings

July 12, 2023 (Regular Meeting)

July 26, 2023 (Regular Meeting)

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Share Your Opinions!

bit.ly/survey1wscap

Fill out our climate priorities survey

Share Your Skills, Time, or Expertise!

bit.ly/wscapvolunteer

Fill out a form to volunteer or get involved in the process

Beginning July 1, an additional 0.1% sales tax will go into effect within city limits. This sales tax was passed by city council earlier this year, and all proceeds will fund the White Salmon Transportation Benefit District.

To learn more about the Transportation Benefit District and how the funds will be used to support transportation projects within the city, visit https://bit.ly/WS-TBD

WHITE SALMON

FARMERS MARKET

A LONGER SEASON! JUNE 6TH - SEPTEMBER 26TH

TUESDAYS 4PM - 7PM

IN THE PARK: 282 N MAIN AVE.

MORE VENDORS & FRESH PRODUCE!

Tree of Heaven Control Project with the Underwood Conservation District

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UNDERWOOD CONSERVATION DISTRICT

509.493.1936

The City Connection

August 2023

WATER CONSERVATION: EVERY DROP COUNTS!

- **When brushing your teeth**, turn the water off while you are actually brushing. Use short bursts of water for cleaning your brush—This saves about 80% of the water normally used.
- **Use either low-flow shower heads or adjustable flow-reducer devices** on your shower heads—They reduce flow by at least 25%.
- **Wash only full loads in your washing machine.**
- **Lawns and gardens require only 5 millimeters of water per day** during warm weather. Less is needed during spring, fall, or cool weather.
- **Water during the cool part of the day**, in the morning or evening. Do not water on windy days
- **Use shut-off timers or on-off timers**, if possible. Do not turn on sprinklers and leave for the day
- **By installing low-flush toilets, you can reduce water usage by 40% to 50% .**

TIPS FROM www.thewaterproject.org

Calendar of Events

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Upcoming City Council Meetings

August 2, 2023 (Regular Meeting)
August 16, 2023 (Regular Meeting)

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Upcoming Planning Commission Meetings

August 9, 2023 (Regular Meeting)
August 23, 2023 (Regular Meeting)

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WHITE SALMON FARMERS MARKET

A LONGER SEASON! JUNE 6TH - SEPTEMBER 26TH

TUESDAYS 4PM - 7PM

IN THE PARK: 282 N MAIN AVE.

MORE VENDORS & FRESH PRODUCE!

Tree of Heaven Control Project with the Underwood Conservation District

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If you need assistance identifying the tree or if you are interested in treatments, please contact our office through email: toh@ucdwa.org or by calling 509-493-1936, ext. 6. Use the QR code with a smart phone to learn more about identification and treatment methods.

The City Connection

September 2023

WATER CONSERVATION: EVERY DROP COUNTS!

- **Fall is Here!**
- **Be weather wise and winterize!** Any above ground / exposed pipes should be wrapped with insulation and or heat tape to prevent cracks or breaks. This also includes winterizing any irrigation you have on your property. Not properly winterizing irrigation can cause these pipes to freeze and then burst without knowing until the spring when you start watering again. Save your self some headaches and prep early!
- **Dishwashers** use the same amount of water full or half full. Save water and only wash full loads.
- **Washing laundry** run only full loads of laundry. If you do not have adjustable water levels. This can save an average of 40 gallons per load you don't run.
- **Show Heads,** older shower heads can use up to 5 gallons per minute more than new low-flow shower heads.

TIPS FROM:

Calendar of Events

Council Meetings

held the first and third Wednesday of each month at 6:00 p.m. Meetings are held in person and via Zoom teleconference. Agendas are posted at the Post Office, Library, City Hall and online at www.whitesalmonwa.gov each Friday before the meeting.

Upcoming City Council Meetings

September 6, 2023 (Regular Meeting)
September 20, 2023 (Regular Meeting)

Planning Commission Meetings

held the second and fourth Wednesday of each month at 5:30 p.m. Meetings are held in person and via Zoom teleconference. Agendas are posted at the Post Office, Library, City Hall and online at www.whitesalmonwa.gov each Wednesday before the meeting.

Upcoming Planning Commission Meetings

September 13, 2023 (Regular Meeting)
September 27, 2023 (Regular Meeting)

WHITE SALMON
FARMERS MARKET
A LONGER SEASON! JUNE 6TH - SEPTEMBER 26TH
TUESDAYS 4PM - 7PM
IN THE PARK: 282 N MAIN AVE.
MORE VENDORS & FRESH PRODUCE!

The **White Salmon City Council has authorized an expansion Low Income Discount Programs** for households that receive Water and/or Sewer Services from the City of White Salmon.

All applications are processed through Washington Gorge Action Programs. Please visit their website here to begin your application: **https://www.wagap.org/start**.

If you need assistance printing or submitting your application, please reach out to White Salmon Utility Clerk
Troy Rosenburg at 509-493-1133 x203 or by email at **utilityclerk@ci.white-salmon.wa.us**.

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Fill out our climate priorities survey

Share Your Skills, Time, or Expertise!
bit.ly/wscapvolunteer
Fill out a form to volunteer or get involved in the process

Tree of Heaven Control Project with the Underwood Conservation District

September is the ideal time to handle the removal process of the Tree of Heaven!

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Use the QR code with a smart phone to learn more about identification and treatment methods.

The City Connection

October 2023

WATER CONSERVATION: EVERY DROP COUNTS!

Be weather wise and winterize! Any above ground / exposed pipes should be wrapped with insulation and or heat tape to prevent cracks or breaks. This also includes winterizing any irrigation you have on your property. Not properly winterizing irrigation can cause these pipes to freeze and then burst without knowing until the spring when you start watering again. Save your self some headaches and prep early!

The White Salmon City Council has authorized an expansion Low Income Discount Programs

for households that receive Water and/or Sewer Services from the City of White Salmon.

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The City of White Salmon and Klickitat County Fire District 3

have jointly placed a measure on the November General Election ballot to combine forces by creating the West Klickitat Regional Fire Authority (RFA), funded by an initial levy rate of $0.76 per thousand of assessed value, to be collected beginning 2025.

Attend one of the below upcoming open house events to learn more about and ask questions regarding the proposal.

Monday, October 2 at 7 pm:
Husum Fire Hall
200 Husum St, Husum, WA 98623

Tuesday, October 3 at 7 pm:
White Salmon Library
77 NE Wauna Ave, White Salmon, WA 98672

Monday, October 10 at 7 pm:
Snowden Fire Hall
429 Snowden Road, White Salmon, WA 98672

Calendar of Events

Council Meetings

held the first and third Wednesday of each month at 6:00 p.m. Meetings are held in person and via Zoom teleconference. Agendas are posted at the Post Office, Library, City Hall and online at www.whitesalmonwa.gov each Friday before the meeting.

Upcoming City Council Meetings
October 4, 2023 (Regular Meeting)
October 18, 2023 (Regular Meeting)

Planning Commission Meetings

held the second and fourth Wednesday of each month at 5:30 p.m. Meetings are held in person and via Zoom teleconference. Agendas are posted at the Post Office, Library, City Hall and online at www.whitesalmonwa.gov each Wednesday before the meeting.

Upcoming Planning Commission Meetings
October 11, 2023 (Regular Meeting)
October 25, 2023 (Regular Meeting)

The City Connection

November 2023

WATER CONSERVATION: EVERY DROP COUNTS!

How should I prepare for winter?

Freezing weather may bring discomforts, but one of them, frozen water pipes, can be avoided with a little planning and a few simple steps. When frigid arctic air hits, water freezes it expands—causing pipes to burst and possible flooding to occur.

Pipes that freeze most frequently are those that are exposed to severe cold, such as outdoor hose bibs, swimming pool supply lines, water sprinkler lines and water supply pipes in unheated interior areas such as basements and crawl spaces, attics, garages, or kitchen cabinets. Pipes that run against exterior walls that have little or no insulation are also subject to freezing.

The White Salmon City Council has authorized an expansion Low Income Discount Programs

Apply for Assistance

for households that receive Water and/or Sewer Services from the City of White Salmon.

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Calendar of Events

Council Meetings

held the first and third Wednesday of each month at 6:00 p.m. Meetings are held in person and via Zoom teleconference. Agendas are posted at the Post Office, Library, City Hall and online at www.whitesalmonwa.gov each Friday before the meeting.

Upcoming City Council Meetings
November 1, 2023 (Regular Meeting)
November 15, 2023 (Regular Meeting)

Planning Commission Meetings

held the second and fourth Wednesday of each month at 5:30 p.m. Meetings are held in person and via Zoom teleconference. Agendas are posted at the Post Office, Library, City Hall and online at www.whitesalmonwa.gov each Wednesday before the meeting.

Upcoming Planning Commission Meetings
November 8, 2023 (Regular Meeting)
November 22, 2023 (Canceled)

City of White Salmon Halloween Fest October 31, 2023

Haunted House - 4:30 PM to 7:00 PM
146 W Jewett Blvd

Festival of Light - 5:00 PM to 7:00 PM
60 NE Wauna Ave (Bubba's Brew Espresso Parking Lot)

Trunk or Treat - 5:00 PM to 7:00 PM
Mt Adams Elks Lodge, 124 NE Church Ave (next to the White Salmon Fire Hall)

Community Treats - 5:00 PM to 7:00 PM
Jewett Blvd between Estes Ave and Main Ave

Costume Parade - 5:30 PM to 5:45 PM
White Salmon City Hall Parking Lot, 100 N Main Ave

Additional Calendar Events

November 2, 2023 – Joint Work Session
November 6, 2023 – Council Work Session
November 10, 2023 – City Hall will be closed for Veterans Day
November 15, 2023 – Preliminary Budget at City Council Meeting
November 22-23, 2023 – City Hall will be closed for Thanksgiving

The City Connection

December 2023

WATER CONSERVATION: EVERY DROP COUNTS!

Into Winter and Cold Temperatures!

Heading into freezing temperatures please be mindful of the following :

1. Insulate water pipes in unheated areas.
2. Allowing your faucets to drip during freezing temperatures can reduce pipes freezing.
3. Cover and insulate outside water spigots.
4. Check for leaks after the first thaw.
5. Location where your water shut-off is.

The White Salmon City Council has authorized an expansion Low Income Discount Programs

Apply for Assistance

for households that receive Water and/or Sewer Services from the City of White Salmon.

All applications are processed through Washington Gorge Action Programs. Please visit their website here to begin your application: **https://www.wagap.org/start**.

If you need assistance printing or submitting your application, please reach out to White Salmon Utility Clerk Troy Rosenburg at 509-493-1133 x203 or by email at **utilityclerk@whitesalmonwa.gov**.

Calendar of Events

Council Meetings

held the first and third Wednesday of each month at 6:00 p.m. Meetings are held in person and via Zoom teleconference. Agendas are posted at the Post Office, Library, City Hall and online at www.whitesalmonwa.gov each Friday before the meeting.

Upcoming City Council Meetings

December 6, 2023 (Regular Meeting)
December 20, 2023 (Regular Meeting)

Planning Commission Meetings

held the second and fourth Wednesday of each month at 5:30 p.m. Meetings are held in person and via Zoom teleconference. Agendas are posted at the Post Office, Library, City Hall and online at www.whitesalmonwa.gov each Wednesday before the meeting.

Upcoming Planning Commission Meetings

December 13, 2023 (Regular Meeting)
December 27, 2023 (Regular Meeting)

Holiday Tree and Menorah Lighting
December 2, 2023 at 5:00pm
at Riverview Bank

- Santa will roll in on a local fire department truck to help us turn on the lights.
- Enjoy cookies and cider from Encounter Church.
- S'mores to make over the firepits provided by Community Partners of Bingen-White Salmon.
- Come early and wander downtown White Salmon and Bingen for holiday sales and unique, local products and services.

City Hall Holiday Closures:

Monday, December 25, 2023
Monday, January 1, 2024
For after-hours water or sewer emergencies, please call 509-637-3307

City Council Public Hearings

December 6:

Ordinance 2023-12-1156 Amending WSMC 17-Zoning
Ordinance 2023-12-1155 Final 2024 Budget Hearing

December 20:

Ordinance 2023-12-1156 Amending WSMC 12.20 Boards, Committees and Commissions

CITY OF WHITE SALMON
City Council Meeting – Wednesday, May 18, 2022
In Person and Via Zoom Teleconference

Council and Administrative Personnel Present

Council Members:	**Staff Present:**
Patty Fink	Marla Keethler, Mayor
Ben Giant	Jan Brending, Clerk Treasurer
Jason Hartmann	Paul Koch, Interim City Administrator
David Lindley	Jeff Cooper, Public Works Foreman
Jim Ransier	Brendan Conboy, Land Use Planner
	Ken Woodrich, City Attorney

I. Call to Order and Roll Call

Marla Keethler, Mayor called the meeting to order at 6:00 p.m. There were approximately 10 members of the public in attendance in person and via teleconference.

II. Changes to the Agenda

There were no changes to the agenda.

III. Consent Agenda

A. Resolution 2022-05-483, Amending Travel Policy
B. Job Description- Land Use Planner
C. Approval of Vouchers

Vouchers audited and certified as required by RCW 42.24.080 and expense reimbursement claims as required by RCW 42.24.090 as of this 18th day of May 2022.

Type	Date	From	To	Amount
Claims	5/18/2022	EFT	EFT	9,943.37
		38089	38124	200,761.53
			Claims Total	**210,704.90**
Payroll	5/20/2022	EFT	EFT	69,174.09
			Payroll Total	**69,174.09**
Manual Claims	5/5/2022	EFT	EFT	2,023.02
	5/10/2022	EFT	EFT	7,920.00
	5/10/2022	38084	38088	8,889.30
	.		**Manual Total**	**18,832.32**
			Total All Vouchers	**298,711.31**

Moved by Jason Hartmann. Seconded by Ben Giant.
Motion to approve Consent Agenda as presented. CARRIED 5-0.

IV. Public Comment

There was no public comment.

V. Presentations

Jewish American Heritage Month

Jim Ransier, Council Member introduced Benjamin Lewitt with Hood River Havarah. Benjamin Lewitt said the Hood River Havarah is a community organization representing the Gorge Area. He provided an overview of the celebrations the organization hosts.

Jim Ransier, Council Member asked how new families can connect with the Hood River Havarah.

Benjamin Lewitt said it is mostly through community connections. He said there is a limited website but outreach is limited.

VI. Business Items

A. Resolution 2022-05-451 Six-Year Transportation Improvement Program for 2023-2028

Jason Hartmann, Council Member said when the City Operations Committee reviewed the Six-Year Transportation Improvement Program moving Oak Street up in importance it was related to grant funding. He noted the committee did not receive any comments in support of fixing Oak Street.

Jan Brending, Clerk Treasurer reviewed the proposed Six-Year Transportation Improvement Program. She said no new projects have been added to the list. Brending said the list was modified slightly based on grant opportunities the city is currently pursuing. She said last year's costs were increased by 5%. Brending said no specific funding has been identified for any of the projects. She said it is staff's intent to bring back proposed amendments once the city's transportation plan is adopted.

Marla Keethler, Mayor opened the public hearing.

Ruth Olin, White Salmon said she is glad to know that the program is a working document. She said she is also glad to see that Oak Street was moved down in priority based on the City Operations Committee's recommendation. Olin said she is in favor of green stormwater infrastructure to filter water. She reminded the city council of the Jeff Speck presentation where he talked about advisory lanes versus sidewalks. Olin said there are lot of option for addressing pedestrian safety. She said it is important to use experts in the field of green infrastructure when developing transportation projects. Olin said she feels like the 4th Street project created a superhighway. She said she will keep reminding the city council of options for transportation projects.

Marla Keethler, Mayor closed the public hearing.

Council members and staff discussed the issue of delaying maintenance on city streets and the potential increase in costs that may cause. It was noted that many of the streets in the city are in disrepair and there is a need to determine how to prioritize the work and what type of work should take place. Council members commented on the need for accessibility and that potholes can cause problems for individuals with accessibility issues. It was noted there are a variety of ways to slow traffic down through a neighborhood that can be implemented and a number of ways to address pedestrian and bicycle accessibility. Council members and staff also discussed connectivity of existing streets with future streets. Staff noted that the city's transportation plan is underway and that classification of streets, street standards, etc. will be presented in the plan.

Moved by Ben Giant. Seconded by Jim Ransier.
Motion to adopt Resolution 2022-05-541 Adopting Six-Year Transportation Improvement Program for 2023-2028. CARRIED 5-0.

B. Resolution 2022-05-541 Adopting Six-Year Capital Facilities Plan/Capital Improvement Plan 2023-2028

Jan Brending, Clerk Treasurer provided an overview of the Six-Year Capital Plan/Capital Improvement Plan. She said the documents takes existing known capital projects and puts them into one list. Brending said the intent will be to amend the plan after the Park Plan, Transportation Plan and the Water System Plan are completed by the end of the year. She said the plan should help drive city council decisions on budgets and funding. Brending noted the plan incorporates the Six-Year Transportation Plan that was just adopted by the city council.

Marla Keethler, Mayor opened the public hearing.

Jeff Cooper, Public Works Foreman noted that the picnic shelter in the park that needs new structural beams is also used as a bus shelter for school buses.

Jan Brending, Clerk Treasurer said that based on Bill Hunsaker's proposed costs to replace the structural beams, the costs are not high enough to consider it a capital cost and the replacement of the beams will take place this year.

Marla Keethler, Mayor closed the public hearing.

Jim Ransier, Council Member asked why the community center is not listed there and also the White Salmon River project.

Jan Brending, Clerk Treasurer said that a community center feasibility study is being conducted. She said there are no specific plans as to what the center will look like or how much it will cost so that is why it has not been included at this time. Brending said the city is also updating its Water System Plan will likely result in additional capital projects being included in the list. She noted that the White Salmon River project is a feasibility study and that it is not clear if that project will move ahead or how much it will cost. Brending said that as plans and feasibility studies are completed the capital facilities plan/capital improvement plan can be amended.

Marla Keethler, Mayor said adoption of the proposed plan will also allow the city to spend real estate excise tax (REET) funds for projects that are budgeted in the 2022 budget.

Moved by Jason Hartmann. Seconded by David Lindley.
Motion to adopt Resolution 2022-05-541 Adopting Six-Year Capital Facilities Plan/Capital Improvement Plan 2023-2028.

C. Resolution 2022-05-543 Adopting Water Use Efficiency Goals and Measures

Dave Jepsen, Anderson Perry provided a review of the status of updating the city's water system plan. He said the state now allows for a water system plan to be updated every 10 years versus every 6 years. Jepsen provided a review of the proposed water use efficiency goals and measures. He noted the city needs to identify an additional measure for which he has provided six possible options.

David Lindley, Council Member commented that the two proposed goals are very similar to those adopted previously. He noted the city did not meet those goals.

Dave Jepsen, Anderson Perry noted that it is difficult to change people's habits when it comes to water consumption. He said he feels that a larger portion of the city's distribution system leakage (DSL) is coming from the 14-inch transmission main that the city is working on replacing. Jepsen said he hopes that when that is replaced there is a significant change in the DSL for the better.

Paul Koch, Interim City Administrator noted that staff and Dave Jepsen are discussing priorities and policies that will be established by the city council, particularly as they relate to infrastructure.

Marla Keethler, Mayor opened the public hearing.

There was no public comment.

Marla Keethler, Mayor closed the public hearing.

Council members and staff discussed additional water use goals to be added. There was consensus of the council us provide water use efficiency information on the city's website and to provide information packets to new customers on the water system.

Moved by Jason Hartmann. Seconded by Ben Giant.
Motion to adopt Resolution 2022-05-543 Adopting Water Use Efficiency Goals and Measure identifying "WUE Information on City's Website" and "New Customer Water System Informational Packets" for the additional measures. CARRIED 5-0.

D. **2021 Annual Report (Financial Report)**

Jan Brending, Clerk Treasurer presented the 2021 Annual Report to the city council. She note the City's Personnel and Finance Committee has reviewed the report along with an in-depth review by Stephanie Porter, Deputy Clerk. Brending said the city is required to submit the annual report by the end of May.

Moved by Jim Ransier. Seconded by Jason Hartmann.
Motion to authorize the Clerk Treasurer to submit the 2021 Annual Report to the Washington State Auditor's Office. CARRIED 5-0.

E. **Request for Reimbursement of Material Costs – Moving Water Line, Nate Reagan**

Jan Brending, Clerk Treasurer said Nate Reagan owns property at 455 Strawberry Mountain Place and has obtained a building permit for a new single-family dwelling. She said Reagan and his contractor were initially directed by public works staff as to the location for the water meter installation and connection to the city's water line that would result in the meter be located on the Reagan property but due to a miscommunication, Reagan was subsequently notified that the water line needed to be extended to where a water meter currently exists which is located on city property inside a fence that surrounds the property. Brending said Public Works determined that communication was in error and the original location was where the water meter should be installed. She said unfortunately, the miscommunication resulted in the water line being extended when it was not needed resulting in extra costs to the property owner. Brending said the property owner is asking for reimbursement, of the material costs only, related to extending the water line which total $280.17 (see attached receipts). She said she does not have authority to provide the reimbursement and am seeking council authorization.

Moved by Ben Giant. Seconded by Jason Hartmann.
Motion to reimburse Nate Reagan for the costs of materials ($280.17) related to moving a water line when the water line did not need to be moved. CARRIED 5-0.

VII. Reports and Communications

A. **Department Heads**

Jeff Cooper, Acting Public Works Operations Manager said the department has started working 4 10-hour shifts. He said the city is working on a number of water leaks. Cooper noted he met with Jim Ransier regarding the painting of the park restrooms in preparation for the mural.

Jim Ransier, Council Member thanked Jeff Cooper and Ryan Adams for the work related to the park restroom. He said it was a good experience.

Paul Koch, Interim City Administrator said a special meeting will be held with Klickitat County Fire District 3 Board of Commissioners on June 21st at 6 p.m. possibly in a Zoom format.

Stephanie Porter, Deputy Clerk said staff is working on moving back to monthly water meter reads. She said the process for water meter reads is taking much less time now that the majority of the city's customers have radio-read meters installed.

B. Council Members

Jim Ransier, Council Member asked about the status of the property the city agreed to sell.

Jan Brending, Clerk Treasurer said a full title report on the property has been requested. She said it does appear the city owns the property but a review needs to take place, particularly related to any covenants and restrictions on the subdivision.

Patty Fink, Council Member said she has had four neighbors talk to her about yard waste pickup. She asked where that would get talked about.

Jason Hartmann, Council Member said at the City Operations Committee. He said he has been trying to figure out how to address yard debris for a while.

Ben Giant, Council Member thanked Jan Brending for her work on the annual report.

C. Mayor

Marla Keethler, Mayor said that new staff assignments for council committees will spread the work across staff. She said the council will start to see Stephanie Porter at council meetings in the future. Keethler said Stephanie Porter has taken the lead on the postal delivery project. She said interviews for the City Administrator position will take place this week. Keethler said SpringFest will be held as a one-day event on June 4. She said the city will host a booth at the festival. Keethler said the Port of Hood River has submitted an application for infrastructure funding for the new bridge. She said the city provided a letter of support. Keethler noted the bridge group hopes to make a trip to Washington DC to talk to federal legislators about the project. Keethler reminded council members that the AWC Conference is taking place June 21 through June 23 in Vancouver.

VIII. Executive Session (if needed)

There was no additional Executive Session.

IX. Adjournment

The meeting adjourned at 8:26 p.m.

Marla Keethler, Mayor

Jan Brending

Jan Brending, Clerk Treasurer

CITY OF WHITE SALMON
City Council Workshop and Meeting –
Wednesday, November 16, 2022
In Person and Via Zoom Teleconference

Council and Administrative Personnel Present

Council Members:

Ben Giant
Patty Fink
Jason Hartmann
Jim Ransier
David Lindley

Staff Present:

Jan Brending, Staff Assistant
Jeff Broderick, Land Use Planner
Jeff Cooper, Public Works Foreman
Mike Hepner, Police Chief
Bill Hunsaker, Fire Chief/Code Enforcement
Marla Keethler, Mayor
Paul Koch, Interim City Administrator
Stephanie Porter, Clerk Treasurer
Troy Rayburn, City Administrator
Ken Woodrich, City Attorney

I. Council Workshop – Transportation Benefit District (5:00pm)

City staff presented information to the council about Transportation Benefit District. Staff explained the district can be created by the City Council by Ordinance. The powers of the district can be assumed by the City Council if the boundaries of the district are the same as the city limits. The City Council can implement a sales tax of .1% Manically (without the vote of the people) and/or a vehicle registration fee of up to $20.

Staff explained that the revenues created by the either the sales tax or vehicle registration would be available only for city capital street projects, specifically that are identifies in the Transportation System Plan.

Staff explained how the revenue would generate, including the projected timeline of when the first revenuer could be received if the district was created, powers assumed, and tax established by the council.

It was clarified that if the district boundaries were outside of the city limits, an independent board would have to be established and the revenue would be divided with Klickitat County.

It was also clarified that because Klickitat County chooses not to be a Growth Management Act County, the city is not eligible for impact fees.

Council confirmed they would like to move forward with the next steps to create the Transportation Benefit District, assume the poser of the district and get additional information on implementing a .1% sales tax and a $20 Vehicle Registration Fee.

Workshop ended at 5:45pm

II. Call to Order and Roll Call

Mayor Marla Keethler called the meeting to order at 6:00p.m. There were approximately 8 members of the public in attendance in person and via teleconference.

II. Changes to the Agenda

Staff requested the removal of Business Item B – Ordinance 2022-11-1116 Amending WSMC 13.16.020 Water Hook Up Fees.

Staff Request a change to Business Item C - Ordinance 2022-11-~~1117~~ 1116 Amending WSMC 13.16.055 Sewer Rates.

Council Member Jim Ransier requested the addition of a business item Resolution 2022-11-55

Moved by Jason Hartmann. Seconded by Jim Ransier.
Motion to approve changes to the agenda as proposed.
CARRIED 5-0.

III. Consent Agenda

A. Approval of CivicPlus Municipal Code Supplementation Subscription
B. Approval of Meeting Minutes - October 5, 2022
C. Approval of Meeting Minutes - October 19, 2022
D. Approval of Meeting Minutes - October 27, 2022 Special Meeting
E. Approval of Meeting Minutes - October 28, 2022 Special Meeting
F. Approval of Meeting Minutes - November 2, 2022
G. Approval of Vouchers

Vouchers audited and certified as required by RCW 42.24.080 and expense reimbursement claims as required by RCW 42.24.090 as of this 16th day of November 2022.

Type	Date	From	To	Amount
Claims	11/16/2022	38611	38645	211,539.66
			Claims Total	**211,539.66**
Payroll		EFT	EFT	0.00
			Payroll Total	**0.00**
Manual Claims	11/3/2022	38608	38610	63,947.50
	11/15/2022	EFT	EFT	110.00
			Manual Total	**64,057.50**

			Total All Vouchers	**275,597.16**

Moved by Patty Fink. Seconded by Jason Hartmann.
Motion to approve Consent Agenda as presented. CARRIED 5-0.

IV. Public Comment

No public comment.

V. Presentation

Native American Heritage Month

A video was presented about the Mill Creek Pond impact on the Warm Spring Tribes.

Water System Plan Update – Dave Jepsen

Dave Jepsen, Anderson Perry and Associates, presented the Water System Plan Assessment and needs of the city's water system.

Jepsen covered the current deficiencies in the water system and the recommended improvements including Planned Improvements, Proposed Improvements, and Future Improvements.

Jepsen explained that over the next 20 years more than half of the water system infrastructure needs replaced with $41 million in improvements to water system assets worth $81 million.

Jepsen explained the three upcoming projects for 2023: Phase 1 Transmission Line Replacement, SCADA System, and Booster Pump Station. Jepsen noted that the Transmission Line Replacement alone will have a cost of $13.7 million.

Jepsen outlined the recommended water rate increases from the engineers: 2023 – 12% increase, 2024- 11% increase, 2025- 10% increase, 2026 and 2027- 8% increase.

Jepsen covered options to help with affordability for those residents that would struggle financially to afford higher increase in rates.

Jepsen noted that the base fees rates should be able to effectively sustain the maintenance, repair, and replacement of water system infrastructure. Water Rate should be designed to aid in water conservation. Jepsen noted that the city needs to reduce demand on the system in water volume. He noted the transmission line replacement will help with water loss and Phase 2 will help with overall servability but especially for the City of Bingen.

Jepsen confirmed the debt requirements should be part of the base rate increases.

VI. Business Items

A. Ordinance 2022-11-1115 Amending WSMC 13.16.025 Monthly Water Fees

Jan Brending presented the proposed water rate increases for 2023-2027. The rate increases include a 10% increase for water rates for 2023 and a 8% increase for 2024-2027.

Brending noted that the base water rates provide funding for the outstanding and future debt incurred for infrastructure improvements.

The total water debt in 2023 is $11,639,516.

Council discussed the presented rates.

Council discussed the removal of the ADU rate (1.3% of the residential rate). Council requested a more equitable option for multi-unit properties.

Mayor, Marla Keethler, opened the public hearing for Ordinance 2022-11-1115, Amending WSMC 13.16.025 Monthly Water Fees, at 7:26pm.

Peter Wright, White Salmon Resident

Peter Wright commented that using information provided through a Public Records Request, the City of White Salmon has 29 permitted ADUs and 6 are registered as Short-Term Rentals. Peter Wright noted that the change in the ADU rate from 1.3% the residential base rate to 2 times the residential base rate is severe for those not using their ADU as a Short-Term Rental.

Tao Berman, White Salmon Resident

Tao Berman requested a review of the apartment rate. Tao Berman noted there is a significant disparity when a 900 square foot apartment in being billed the same rate as a 2500 square foot home. Tao Berman noted he would like to see incentive for building more high-density housing.

Closed public hearing at 7:33pm.

The council and staff discussed the options available for identifying and correcting any disparities present in the current rate system. Staff noted that the base fees should sustainably cover the cost of infrastructure needs both current and future. It was noted that the debt requirements will still be the same regardless of the water used.

Dave Jepsen noted that the fixed costs to maintaining the water system should be covered by a fixed rate base fee and variable costs to the water system can be covered by tier rates.

The council reached a consensus that they would like to have more options on increasing the highest water tier rates and expanding the Low-Income Discount for utility rates to include all low-income households.

Council tabled Ordinance 2022-11-1115 to the next council meeting for requested edits.

B. **Ordinance 2022-11-1116 Amending WSMC 13.16.055 Sewer Rates**

Jan Brending presented the proposed sewer/wastewater rate increases for 2023-2027. The rate increases include a 5% increase for 2023-2027.

Brending noted that the base sewer rates provide funding for the outstanding and future debt incurred for infrastructure improvements.

The total wastewater debt for 2023 in $2,513,095. This is 79% of the City of Bingen Department of Ecology Loan for improvements to the Sewer Treatment Plant, in which White Salmon produces 79% of the waste by population.

Mayor, Marla Keethler, opened the Public Hearing at 8:20 pm.

No public comment was received.

Public Hearing was closed at 8:21pm.

The council reached a consensus that they would like to have more options on expanding the Low-Income Discount for utility rates to include all low-income households.

Council tabled Ordinance 2022-11-1116 to the next council meeting for requested edits.

C. **Preliminary 2023 Budget**

Mayor Marla Keethler presented the draft 2023 budget and narrative. Mayor Keethler noted that council would receive an overview of the budget as it currently stands and hear from department heads.

Stephanie Porter, Clerk Treasurer, gave a presentation with a high-level overview of the proposed 2023 fund balances and projected revenue and expenditures. The presentation included a detailed outline of the add on expenditures/one-time cost expenditures.

Bill Hunsaker, Fire Chief and Code Enforcement

Bill Hunsaker noted that the Fire Department need a new fire truck. Hunsaker wants to see more money going into the Fire Reserve Fund to have enough funds to purchase a new engine by 2025.

Hunsaker approved of the Brightly Software Purchase for new permitting software.

Jeff Broderick, Land Use Planner

Jeff Broderick noted he is happy with the planning budget. Broderick noted that the only additional expenditure he would like to see increased in the Contractual services for legal services, to aid in the clean-up of current housing codes and correction of existing decisions and applications.

Jeff Cooper, Public Works
Jeff Cooper requested the council seriously consider purchasing a Bucket Truck. The current system creates a liability issue. With the seasonal decorating and the increased upkeep of the park, a bucket truck would be widely used.

Stephanie Porter, Clerk Treasurer
Stephanie Porter requested the council consider contracting services to aid in transitioning the cities eligible Public Record to electronic records.

Mike Hepner, Police Chief
Mike Hepner thanked council for approving the sixth officer.

Mayor Marla Keethler opened the public hearing at 8:53pm.

No public comment was received.

Public hearing was closed at 8:54pm.

Council discussed the presented budget. Council requests for the next council meeting included creation of a carry over project list to identify what project will be carried over from 2022 to 2023, highlighting the addition of a 6th police officer in the narrative, adding what projects were completed in 2022, creating a priority list of additional funding options to consider if additional funds are identified in 2023, changing fund 307 from New Pool Fund to Open Park Fund, and creation of a vehicle replacement program.

D. **Interlocal Agreement - Law Enforcement Services**
Jan Brending presented the information for the Interlocal Agreement for Law Enforcement Services. If approved, the City of Bingen will pay 31% of the overall Police Budget.

Moved by Jim Ransier. Seconded by Ben Giant.
Motion to authorize the mayor to sign the 2023-2025 Interlocal Agreement with the City of Bingen for Law Enforcement Services.
CARRIED 5-0.

E. **Interlocal Agreement - Bingen ERUs**
Jan Brending presented the information for the Interlocal Agreement with the City of Bingen for the 2023 ERU rates related to the wastewater system. This agreement increases the price per ERU from $15.25 per ERU to $15.50 per ERU for 2023.

Moved by Jason Hartmann. Seconded by David Lindley.
Motion to authorize the mayor to sign the Interlocal Agreement with the City of Bingen for ERUs.

CARRIED 5-0.

F. Resolution 2022-11-559 Land Acknowledgment

Jim Ransier, Council member presented the Land Acknowledgement Resolution.

David Lindley, council member appreciated the effort behind the resolution. Lindley confirmed that the city had reached out to the tribes but had not collaborated on the land acknowledgment with the tribes. Lindley requested the whereas stating the collaboration with the tribes is removed.

Moved by Patty Fink. Seconded by Jim Ransier.
Motion to adopt Resolution 2022-11-559 Land Acknowledgment with edits to strike "in collaboration with the tribes".
CARRIED 5-0.

VII. Reports and Communications

A. Line of Sight Update

Nothing to report.

B. Wildfire Mitigation Update

Bill Hunsaker confirmed that 5 homeowners in the city limits have signed up for the county mitigation program.

C. Short Term Rentals Update

Jeff Broderick reported that there are five pending conditional use permits for ADU's but he is unsure if they will be used as Short-Term Rentals.

Planning department is still working with Granicus to get our enforcement letters.

D. Department Heads

Bill Hunsaker, Fire Chief/Code Enforcement Officer/Building Official

All annual testing has been completed.

Jeff Cooper, Interim Public Works Operation Manager

The Green Street tree removal is scheduled for completion and the DNR trees will be removed soon.

Department of Transportation will be providing sand, deicer and rock for snow.

Stephanie Porter, Clerk Treasurer

The cluster mail boxes have been ordered. They will be delivered before the end of the year.

B. Council Members

David Lindley, Council Member
Thank you to staff for work on the budget.

Jason Hartmann, Council Member
Thank you to staff for work on the budget.

Jim Ransier, Council Member
Thank you to staff for work on the budget.

Ben Giant, Council Member
Thank you to staff for work on the budget.

C. Mayor

Mayor Marla Keethler reported that the city met with the Governors aid and had good conversations regarding upcoming legislation.

The Childcare Let's Talk was well attended and productive. Mayor Keethler noted there would be recommendation coming forward soon.

Rep'd Program is up and running. This program allows residents to submit questions they seek answers to that can be answered by video response.

Public Works Board awarded the City of White Salmon 2 loans; one for the booster pump and the other for the transmission main line.

VIII. Executive Session

No Executive meeting was needed.

IX. Adjournment

The meeting was adjourned at 9:32 p.m.

Marla Keethler, Mayor

Stephanie Porter

Stephanie Porter, Clerk Treasurer

White Salmon City Council Meeting
AGENDA
November 16, 2022 – 5:00 PM
119 NE Church and Via Zoom Teleconference
Meeting ID: 826 7122 6276 Passcode: 089545
Call in Numbers:

669-900-6833 929-205-6099 301-715-8592
346-248-7799 253-215-8782 312-626-6799

I. **Council Workshop - Transportation Benefit District (5:00pm)**

II. **Call to Order, Presentation of the Flag and Roll Call (6:00pm)**

III. **Changes to the Agenda**

IV. **Consent Agenda**
   A. Approval of CivicPlus Municipal Code Supplementation Subscription
   B. Approval of Meeting Minutes - October 5, 2022
   C. Approval of Meeting Minutes - October 19, 2022
   D. Approval of Meeting Minutes - October 27, 2022 Special Meeting
   E. Approval of Meeting Minutes - October 28, 2022 Special Meeting
   F. Approval of Meeting Minutes - November 2, 2022 (will be provided before meeting)
   G. Approval of Vouchers

V. **Public Comment**

Any public in attendance at the meeting (either in person or via Zoom) will be provided an opportunity to make public comment of a general nature in the time allotted. No registration is required. Each person will be allowed three minutes for comment.

VI. **Presentations**
   A. Native American Heritage Month
   B. Water System Plan Update - Dave Jepsen, Anderson Perry

VII. **Business Items**
   A. Ordinance 2022-11-1115 Amending WSMC 13.16.025 Monthly Water Fees
      1. Presentation
      2. Public Hearing
      3. Discussion and Action
   B. Ordinance 2022-11-1116 Amending WSMC 13.16.020 Water Hook Up Fees
      1. Presentation
      2. Public Hearing
      3. Discussion and Action
   C. Ordinance 2022-11-1117 Amending WSMC 13.16.055 Sewer Rates
      1. Presentation
      2. Public Hearing
      3. Discussion and Action
   D. Preliminary 2023 Budget (additional documents will be provided before meeting)
      1. Presentation
      2. Public Hearing
      3. Discussion

- E. Interlocal Agreement - Law Enforcement Services
    1. Presentation
    2. Discussion
    3. Action
- F. Interlocal Agreement - Bingen ERUs
    1. Presentation
    2. Discussion
    3. Action

VIII. Reports and Communications

- A. Line of Sight Update - Bill Hunsaker
- B. Wildfire Mitigation Update - Bill Hunsaker, Fire Chief
- C. Granicus Update - Short Term Rentals - Jeff Broderick
- D. Department Heads
- E. Council Members
- F. Mayor

IX. Executive Session (if needed)

X. Adjournment

CITY OF WHITE SALMON
NOTICE OF PUBLIC HEARING
Proposed Water Use Efficiency Goals

Notice is hereby given that the White Salmon City Council will hold a Public Hearing regarding proposed Water Use Efficiency Goals. The public hearing will be held on Wednesday, May 18, 2022 at 6:00 p.m. The City Council will meet in person and via teleconference. Anyone in attendance in person or via teleconference who wishes to provide comments regarding the Water Use Efficiency Goals will be provided an opportunity. A copy of the proposed Water Use Efficiency Goals is available on the city's webpage at http://www.white-salmon.net or by calling Jan Brending at 509-493-1133 #205.

May 11, 2022
#473

Affidavit of Publication

STATE OF WASHINGTON, {SS
County of Klickitat

I, Lisa Kawachi, being first duly sworn, depose and say that I am the principal clerk of the Columbia Gorge News, a newspaper of general circulation, printed and published in Salem, Oregon in the aforesaid state and county of Klickitat; that I know from my personal knowledge that the **Notice of Public Hearing,(water use)** a printed copy of which is hereto annexed, was published in the entire issue of said newspaper once in each of one consecutive weeks in the following issues:
May 11, 2022

Lisa Kawachi

Subscribed and sworn to before me this 11th day of May 2022

CHELSEA V MARR
NOTARY
My Comm. Expires
February 22, 2025
No. 21010478

Notary Public for Washington
My commission expires 2/22/25

2023-2025 AGREEMENT TO PURCHASE WATER

Agreement is made and entered into the day and year below stated by and between the City of White Salmon, Washington, hereinafter called "White Salmon" and the City of Bingen, Washington, hereinafter called "Bingen", Witnesseth:

Whereas, the parties are committed to a relationship based upon cooperation and joint development of regional solutions for addressing their water supply needs; as set forth in the 2001 Interlocal Agreement for Construction, Operation, Maintenance and Use of Water System Improvements;

Whereas, White Salmon has water to supply to White Salmon Water customers;

Whereas, Bingen has a need for water for its customers, including the Port of Klickitat;

Whereas, Bingen and the Port have an equity interest totaling 25% of the "current reliable maximum water supply production capacity" as defined in the 2001 Interlocal Agreement for Construction, Operation, Maintenance and Use of Water System Improvements (2001 Agreement, 20% Bingen, 5% Port supplied by Bingen);

Whereas, Bingen has designated through the Department of Ecology a Water Rights Permit G4-33106 allowing up to 200 gpm to be drawn from Regional Wells #1 and #2 located in White Salmon;

Whereas White Salmon and Bingen have met as required in the 2001 Agreement and forecasted demand for the period from January 1, 2023 through December 31, 2025;

Whereas White Salmon and Bingen have met as required in the 2001 Agreement to discuss appropriate water rates and charges for the period from January 1, 2023 through December 31, 2025;

Now therefore, in consideration of the mutual covenants herein, the parties agree as follows:

1. From January 1, 2023 to December 31, 2025, White Salmon shall furnish to Bingen up to 200 gpm and 73 million gallons per year. The 200 gpm is intended to be averaged on a daily basis (288,000 gpd) but daily fluctuations should not be significant (e.g. generally within 10%) without written/email notice and approval by White Salmon or an emergency situation. Bingen agrees to operate in good faith to meet these quantities.
2. For said water, Bingen agrees to pay White Salmon a base annual fee billed monthly for the existing 3 interties with Bingen plus a usage fee paid on the 10th day of the month following billing for the previous month's usage. The annual and usage fees shall be:
    a. $53,160/ year ($4,430 / month) plus $2.06 per 1,000 gallons from January 1, 2023 to December 31, 2023.
    b. $57,408/ year ($4,784/ month) plus $2.23 per 1,000 gallons from January 1, 2024 to December 31, 2024.

   c. $62,004/ year ($5,167/ month) plus $2.41 per 1,000 gallons from January 1, 2025 to December 31, 2025.
   d. If the City of Bingen exceeds 200 gpm per minute on a daily basis or average between meter readings, the price per 1,000 gallons of water over 200 gpm will be $~~2.07~~ 4.18 for January 1, 2023 to December 31, 2023; $4.48 for January 1, 2024 to December 31, 2024; $4.80 for January 1, 2025 to December 31, 2025. If the City of Bingen exceeding 200 gpm for more than 10 consecutive days becomes repetitive, the City of White Salmon may choose to limit water sales to Bingen to 200 gpm on a daily basis.
   e. The City of White Salmon shall charge usage rates at 1.5 times the normal rate for an emergency in which White Salmon is notified that such an emergency exists, and the City of Bingen exceeds 200 gpm (288,000 gpd) as long as the emergency does not exceed 30 days. The 1.5 times the normal rate is only applied to that amount of water exceeding the 200 gpm (288,000 gpd). If the emergency is one in which the water is necessary to protect the interests of both cities, the City of White Salmon shall charge normal usage rates for the period of the emergency.
   f. If the City of White Salmon is unable to provide any water for 30 consecutive days or longer due to an extended emergency, the two cities will negotiate a proration of base rates.

3. Fees collected for replacement of the existing interties (current capacity/configuration) are included in the existing base rate, and Bingen will not be billed for their replacement.
4. Costs associated with future planned improvements related to delivery of water from the well field to Bingen, including the cost sharing basis, will be negotiated prior to initiating the planned improvement.
5. White Salmon and Bingen own and operate their own public water system as described in RCW 70.119A.020—Definitions. Bingen and White Salmon will be responsible for water quality standards in their respective boundaries as defined by their individual water comprehensive master plan. White Salmon's water purveyor shall notify Bingen in accordance with WAC 246-290-71001 of water quality not meeting potable water standards as established by Washington State Law. Nonetheless, Bingen agrees to hold harmless and indemnify White Salmon from any negligence, or intentional acts, attributable to Bingen, including its officers, agents and employees and White Salmon agrees to hold harmless Bingen, including its officers and agents from any negligence, or intentional acts, attributable to White Salmon.
6. Bingen acknowledges that this agreement is dependent on water availability at the wells, which have a "current reliable maximum water supply production capacity" of 655 gpm. Said wells have demonstrated declines in recent years and are monitored on a monthly basis by White Salmon. Bingen's share of this capacity (including the Port's 5% share) is 200 gpm and (223 acre-feet, based on Bingen's Water Right G4-33106).

7. Interlocal Cooperation Act

   This is an interlocal agreement pursuant to RCW Ch 39.34 and the parties make the following RCW 39.34.030 representations:

   a. Duration. The term of this agreement is from January 1, 2023 to December 31, 2025.
   b. Organization. No new entity will be created under this agreement.
   c. Purpose. The purpose is to enable the City of White Salmon to supply water to the City of Bingen as a special municipal customer.
   d. Manner of Financing. The parties intend to finance this agreement through cash appropriations as set forth in their annual budgets.
   e. Termination of Agreement. Either Party shall have the right to terminate this agreement upon not fewer than ninety (90) days written notice to the other; otherwise, this agreement shall terminate on December 31, 2025.
   f. Other. All terms are covered by this Agreement. No additional terms are contemplated.
   g. Selection of Administrator. The White Salmon City Administrator shall be the Administrator for this Interlocal Agreement.
   h. Filing. Prior to its entry into force, this agreement shall be filed with the Klickitat County Auditor or, alternatively, listed by subject on a public agency's web site or other electronically retrievable public source.

This agreement shall be effective on January 1, 2023 following execution, and shall terminate on December 31, 2025, unless renewed by joint agreement of the parties. Bingen and White Salmon intend to meet, at a minimum, by June each year, to forecast water demands and discuss future rate adjustments.

In Witness Whereof, the parties have affixed their hands and seal this 7 day of December, 2022.

CITY OF WHITE SALMON

Marla Keethler, Mayor

Date: 12/7/22

ATTEST:

Clerk of the City of White Salmon

Date: 12/7/22

APPROVED AS TO FORM:

Attorney for the City of White Salmon

Date: ______________________

CITY OF BINGEN

Catherine Kiewit, Mayor

Date: 12/6/22

ATTEST:

Clerk of the City of Bingen

Date: 12/6/22

APPROVED AS TO FORM:

Attorney for City of Bingen

Date: 12/6/2022

CITY OF WHITE SALMON
ORDINANCE NO. 2022-12-1115

AN ORDINANCE OF THE CITY OF WHITE SALMON, WA, AMENDING WHITE SALMON MUNICIPAL CODE 13.16.025 REVISING WATER MONTHLY FEES, REPEALING SECTIONS AND PROVIDING FOR SEVERABILITY AND AN EFFECTIVE DATE

WHEREAS, the city council has reviewed the current rate schedule for monthly water fees and has determined that an increase in the rates is necessary to meet the operations and maintenance, debt service and capital reserve requirements; and

NOW THERFORE, THE CITY COUNCIL OF THE CITY OF WHITE SALMON DO ORDAIN AS FOLLOWS: by the City Council of the City of White Salmon that the following amendments be made to White Salmon Municipal Code Chapter 13.16.025:

SECTION 1 – Amendment to WSMC 13.16.025

Section 13.16.025 is hereby amended to read:

Key: **Underlined** = added language
~~Strikethrough~~ = deleted language

13.26.025 Monthly water fees.

The following monthly water fees apply to water users as listed below. As it is used herein the term "water users" shall mean anyone having paid a connection fee, regardless of whether water is being used. All charges follow the meter regardless of who owns the property being served. Billing for new customers shall begin the month following payment of the connection fee.

A. Residential Monthly Fees.

Basic Rate:

~~Residential~~	**~~2018~~**	**~~2019~~**	**~~2020~~**	**~~2021~~**	**~~2022~~**	**~~WRAF* Surcharge~~**
~~Inside~~	**~~38.98~~**	**~~39.61~~**	**~~40.60~~**	**~~41.52~~**	**~~44.66~~**	**~~$6.25~~**
~~Outside~~	**~~57.39~~**	**~~58.30~~**	**~~58.76~~**	**~~61.14~~**	**~~65.73~~**	**~~$6.25~~**

Residential	**2023**	**2024**	**2025**	**2026**	**2027**	**WRAF* Surcharge**
Inside	**49.13**	**53.06**	**57.30**	**61.88**	**66.84**	**$6.25**
Outside	**72.30**	**78.09**	**84.33**	**91.08**	**98.37**	**$6.25**

*Water Rights Acquisition Fund

Water use:

In addition to the Basic Rate, water users will be charged for water use per one thousand gallons or part thereof according to the following schedule:

~~Residential~~	~~2018~~	~~2019~~	~~2020~~	~~2021~~	~~2022~~
~~1st Tier Block 1-5,000 gallons~~	~~1.09~~	~~1.11~~	~~1.14~~	~~1.16~~	~~1.19~~
~~2nd Tier Block 5,001-15,000 gallons~~	~~2.76~~	~~2.80~~	~~2.87~~	~~2.94~~	~~3.01~~
~~3rd Tier Block 15,001 + gallons~~	~~3.69~~	~~3.75~~	~~3.84~~	~~3.93~~	~~4.03~~

Residential	2023	2024	2025	2026	2027
1st Tier Block 1-5,000 gallons	1.31	1.41	1.53	1.65	1.78
2nd Tier Block 5,001-15,000 gallons	3.31	3.58	3.86	4.17	4.50
3rd Tier Block 15,001 + gallons	8.36	9.03	9.75	10.53	11.37

~~B. Residential with ADU Monthly Fees.~~

~~Basic Rate:~~

~~Residential~~	~~2018~~	~~2019~~	~~2020~~	~~2021~~	~~2022~~	~~WRAF* Surcharge~~
~~Inside~~	~~50.68~~	~~51.49~~	~~52.78~~	~~53.99~~	~~58.05~~	~~$6.25~~
~~Outside~~	~~74.61~~	~~75.79~~	~~76.69~~	~~79.48~~	~~85.45~~	~~$6.25~~

~~*Water Rights Acquisition Fund~~

~~Water use: In addition to the Basic Rate, water users will be charged for water use per one thousand gallons or part thereof according to the following schedule:~~

~~Residential~~	~~2018~~	~~2019~~	~~2020~~	~~2021~~	~~2022~~
~~1st Tier Block 1-5,000 gallons~~	~~1.09~~	~~1.11~~	~~1.14~~	~~1.16~~	~~1.19~~
~~2nd Tier Block 5,001-15,000 gallons~~	~~2.76~~	~~2.80~~	~~2.87~~	~~2.94~~	~~3.01~~

~~3rd Tier Block 15,001 + gallons~~	~~3.69~~	~~3.75~~	~~3.84~~	~~3.93~~	~~4.03~~

~~C~~B. Commercial and Irrigation Water Users.

Basic Rate (according to meter size):

~~Customer Class~~	~~2018~~	~~2019~~	~~2020~~	~~2021~~	~~2022~~	~~WRAF* Surchage~~
~~5/8-inch Inside~~	~~38.98~~	~~39.61~~	~~40.60~~	~~41.53~~	~~44.66~~	~~$6.25~~
~~5/8-inch Outside~~	~~57.39~~	~~58.30~~	~~58.76~~	~~61.14~~	~~65.73~~	~~$6.25~~
~~1-inch Inside~~	~~73.94~~	~~75.12~~	~~77.00~~	~~78.77~~	~~84.69~~	~~$7.50~~
~~1-inch Outside~~	~~106.69~~	~~108.40~~	~~111.11~~	~~113.66~~	~~122.21~~	~~$7.50~~
~~1.5-inch Inside~~	~~175.62~~	~~178.43~~	~~182.85~~	~~187.09~~	~~201.16~~	~~$7.50~~
~~1.5-inch Outside~~	~~249.20~~	~~253.19~~	~~259.51~~	~~265.48~~	~~285.45~~	~~$7.50~~
~~2-inch Inside~~	~~318.20~~	~~323.31~~	~~331.39~~	~~339.01~~	~~364.52~~	~~$8.00~~
~~2-inch Outside~~	~~449.00~~	~~456.09~~	~~467.59~~	~~478.35~~	~~514.32~~	~~$8.00~~
~~4-inch Inside~~	~~1,275.09~~	~~1,295.49~~	~~1,327.88~~	~~1,358.42~~	~~1,460.57~~	~~$30.00~~
~~4-inch Outside~~	~~1,794.15~~	~~1,827.94~~	~~1,873.64~~	~~1,916.73~~	~~2,060.87~~	~~$30.00~~

Customer Class	2023	2024	2025	2026	2027	WRAF* Surchage
5/8-inch Inside	49.13	53.06	57.30	61.88	66.84	$6.25
5/8-inch Outside	72.30	78.09	84.33	91.08	98.37	$6.25
1-inch Inside	93.16	100.61	108.66	117.35	126.74	$7.50
1-inch Outside	134.43	145.19	156.80	169.34	182.89	$7.50
1.5-inch Inside	221.28	238.98	258.10	278.74	301.04	$7.50
1.5-inch Outside	314.00	339.11	366.24	395.54	427.19	$7.50
2-inch Inside	400.97	433.05	467.69	505.11	545.52	$8.00
2-inch Outside	565.75	611.01	659.89	712.68	769.70	$8.00
4-inch Inside	1606.63	1735.16	1873.97	2023.89	2185.80	$30.00
4-inch Outside	2266.96	2448.31	2644.18	2855.71	3084.17	$30.00

*Water Rights Acquisition Fund

Water use:

In addition to the Basic Rate, water users will be charged for water use per one thousand gallons or part thereof according to the following schedule:

~~Meter Size~~	~~Tier Block~~	~~2018~~	~~2019~~	~~2020~~	~~2021~~	~~2022~~
~~5/8 – 3/4 inch~~	~~0 – 5,000 gallons~~	~~1.09~~	~~1.11~~	~~1.14~~	~~1.16~~	~~1.19~~
~~5/8 – 3/4 inch~~	~~5,001 – 15,000 gallons~~	~~2.76~~	~~2.80~~	~~2.87~~	~~2.94~~	~~3.01~~
~~5/8 – 3/4 inch~~	~~15,001+ gallons~~	~~3.69~~	~~3.75~~	~~3.84~~	~~3.93~~	~~4.03~~
~~1 inch~~	~~0 – 10,000 gallons~~	~~1.09~~	~~1.11~~	~~1.14~~	~~1.16~~	~~1.19~~
~~1 inch~~	~~10,001 – 25,000 gallons~~	~~2.76~~	~~2.80~~	~~2.87~~	~~2.94~~	~~3.01~~
~~1 inch~~	~~25,001+ gallons~~	~~3.69~~	~~3.75~~	~~3.84~~	~~3.93~~	~~4.03~~
~~1.5 inch~~	~~0 – 12,000 gallons~~	~~1.09~~	~~1.11~~	~~1.14~~	~~1.16~~	~~1.19~~
~~1.5 inch~~	~~12,001 – 40,000 gallons~~	~~2.76~~	~~2.80~~	~~2.87~~	~~2.94~~	~~3.01~~
~~1.5 inch~~	~~40,001+ gallons~~	~~3.69~~	~~3.75~~	~~3.84~~	~~3.93~~	~~4.03~~
~~2 inch~~	~~0 – 40,000 gallons~~	~~1.09~~	~~1.11~~	~~1.14~~	~~1.16~~	~~1.19~~
~~2 inch~~	~~40,001 – 100,000 gallons~~	~~2.76~~	~~2.80~~	~~2.87~~	~~2.94~~	~~3.01~~
~~2 inch~~	~~100,001+ gallons~~	~~3.69~~	~~3.75~~	~~3.84~~	~~3.93~~	~~4.03~~
~~3 inch~~	~~0 – 48,000 gallons~~	~~1.09~~	~~1.11~~	~~1.14~~	~~1.16~~	~~1.19~~
~~3 inch~~	~~48,001 – 160,000 gallons~~	~~2.76~~	~~2.80~~	~~2.87~~	~~2.94~~	~~3.01~~
~~3 inch~~	~~160,001+ gallons~~	~~3.69~~	~~3.75~~	~~3.84~~	~~3.93~~	~~4.03~~
~~4 inch~~	~~0 – 85,000 gallons~~	~~1.09~~	~~1.11~~	~~1.14~~	~~1.16~~	~~1.19~~
~~4 inch~~	~~85,001 – 280,000 gallons~~	~~2.76~~	~~2.80~~	~~2.87~~	~~2.94~~	~~3.01~~
~~4 inch~~	~~280,001+ gallons~~	~~3.69~~	~~3.75~~	~~3.84~~	~~3.93~~	~~4.03~~
~~6 inch~~	~~0 – 192,000 gallons~~	~~1.09~~	~~1.11~~	~~1.14~~	~~1.16~~	~~1.19~~
~~6 inch~~	~~192,001 – 640,000 gallons~~	~~2.76~~	~~2.80~~	~~2.87~~	~~2.94~~	~~3.01~~
~~6 inch~~	~~640,001+ gallons~~	~~3.69~~	~~3.75~~	~~3.84~~	~~3.93~~	~~4.03~~

Meter Size	Tier Block	2023	2024	2025	2026	2027
5/8 – 3/4 inch	0 – 5,000 gallons	1.31	1.41	1.53	1.65	1.78
5/8 – 3/4 inch	5,001 – 15,000 gallons	3.31	3.58	3.86	4.17	4.50
5/8 – 3/4 inch	15,001+ gallons	8.36	9.03	9.75	10.53	11.37
1 inch	0 – 10,000 gallons	1.31	1.41	1.53	1.65	1.78
1 inch	10,001 – 25,000 gallons	3.31	3.58	3.86	4.17	4.50
1 inch	25,001+ gallons	8.36	9.03	9.75	10.53	11.37
1.5 inch	0 – 12,000 gallons	1.31	1.41	1.53	1.65	1.78
1.5 inch	12,001 – 40,000 gallons	3.31	3.58	3.86	4.17	4.50
1.5 inch	40,001+ gallons	8.36	9.03	9.75	10.53	11.37
2 inch	0 – 40,000 gallons	1.31	1.41	1.53	1.65	1.78
2 inch	40,001 – 100,000 gallons	3.31	3.58	3.86	4.17	4.50
2 inch	100,001+ gallons	8.36	9.03	9.75	10.53	11.37
3 inch	0 – 48,000 gallons	1.31	1.41	1.53	1.65	1.78
3 inch	48,001 – 160,000	3.31	3.58	3.86	4.17	4.50

	gallons					
3 inch	160,001+ gallons	8.36	9.03	9.75	10.53	11.37
4 inch	0 – 85,000 gallons	1.31	1.41	1.53	1.65	1.78
4 inch	85,001 – 280,000 gallons	3.31	3.58	3.86	4.17	4.50
4 inch	280,001+ gallons	8.36	9.03	9.75	10.53	11.37
6 inch	0 – 192,000 gallons	1.31	1.41	1.53	1.65	1.78
6 inch	192,001 – 640,000 gallons	3.31	3.58	3.86	4.17	4.50
6 inch	640,001+ gallons	8.36	9.03	9.75	10.53	11.37

D. Private Fire Service.

All customers connected to a water line for private fire services will be charged the monthly Commercial Basic Rate in addition to regular commercial use rates.

~~Customer Class~~	~~2018~~	~~2019~~	~~2020~~	~~2021~~	~~2022~~
~~4-inch Inside~~	~~15.79~~	~~16.04~~	~~16.44~~	~~16.82~~	~~17.23~~
~~4-inch Outside~~	~~23.24~~	~~23.61~~	~~24.21~~	~~24.76~~	~~25.36~~

Customer Class	2023	2024	2025	2026	2027
4-inch Inside	18.95	20.47	22.11	23.88	25.79
4-inch Outside	27.90	30.13	32.54	35.14	37.95

E. All rates shall be subject to an automatic annual rate of ~~three~~ **five** percent (~~3~~**5**%), beginning January 1, 202~~3~~**8**, unless modified by City Council prior to the adjustment date.

F. **Residential properties with more than one residential unit (e.g. apartments, multi-plexes, homes with accessory dwelling units) will be charged the applicable monthly Residential Basic Rate times the number of residential units.** ~~The owner or operator of each multiple residential facility shall pay the applicable monthly Residential Basic Rate, based on location (inside or outside city) and classification (apartments and multi-plexes versus ADU's), times the number of units, plus water usage charges for residential users.~~

G. Combination residential/commercial users shall be charged at the following rate, whichever is greater:

1. The monthly Residential Basic Rate based on location (inside or outside city) and classification (apartments and multi-plexes ~~versus ADU's~~), times the number of **residential** units, plus water usage charges applicable to residential users, or

2. The monthly Commercial and Irrigation Water User Basic based upon the location (inside or outside city) and meter size, plus water usage charges applicable to commercial or irrigation water users.

H. Miscellaneous Services Charges.

Charge Description	**In City**	**Outside City**
Service Call Fee	$40.00*	$56.00*
Shut-off for Non-payment	$40.00*	$46.00*
New Account Fee	$25.00	$33.00
Late Charge-Delinquent Fee	$10.00	$10.00

*After Working Hours additional $100.00

No later charge or delinquent fee shall be charged against any municipal corporation or political subdivision of the state.

I. Date of Imposition of Monthly Fee. Monthly water fees shall be charged from the date of meter installation and shall continue until the meter is removed.

J. Credit for monthly water fees for irrigation users during period of low water usage.

1. The clerk-treasurer may grant an irrigation water user a credit against future monthly water fees if the irrigation user affirmatively established each of the following conditions to the satisfaction of the clerk-treasurer:

    a. During any period of at least three months but not more than six months, the average monthly water use per irrigation meter was less than one thousand gallons; and

    b. The application for credit is submitted to the clerk-treasurer within thirty days after the first moth of the period for which the credit is requested.

2. The credit shall be the difference between the applicable monthly water fee and the lowest monthly water fee for irrigation users then in effect, based upon the user's location (in city or outside city).

3. Nothing in this section shall be interpreted to require any refund of monthly water fees by the city to any water user.

4. No credit shall be granted unless monthly water fees for the period claimed have been paid on or before the date due.

5. Credits authorized under this section shall apply only to irrigation water used after November 1, 1996.

6. Only one credit per period of not more than six months shall be granted per irrigation water user per year.

7. Prior to processing a request for credit under this section, the clerk-treasurer shall collect an administrative fee of ten dollars per application for credit.

SECTION 2 - SEVERABILITY.

If any section, sentence, or phrase of this Chapter is held to be invalid or unconstitutional by a court of competent jurisdiction, such invalidity or unconstitutionality shall not affect the validity or constitutionality of any other section, sentence or phrase of this Chapter.

SECTION 4 - EFFECTIVE DATE.

This ordinance shall become effective January 1, 2023.

PASSED in regular session this 7th day of December, 2022.

____
Marla Keethler, Mayor

____
Stephanie Porter, Clerk/Treasurer

Approved as to form:

____
Kenneth B. Woodrich, City Attorney

City of White Salmon

Water System Plan Update

May 18, 2022

anderson perry & associates, inc.

TASKS ACCOMPLISHED

- Ten-year Plan vs. Six-year Plan
- Projected Water System Demand
- Compiled System Map and Hydraulic Model
- Updated Wellhead Protection Area (City)
- Identified Long-term Projects
- Water Audit and Draft Water Use Efficiency (WUE) Program

WATER USE EFFICIENCY PROGRAM

- WUE Goals
- Source and Service Metering
- Consumer Education on WUE
- Water Conservation Rate Pricing
- Five Mandatory Measures

WATER LOSS CONTROL ACTION PLAN

- Current Distribution System Leakage Loss = 32.6 Percent; Required = Less than 10 Percent
- Water Audit Completed
  - Verify and Install New Source Meters
  - Complete New Meter Installations
  - Switch to Monthly Meter Readings
  - Perform Annual Leak Detection (Hire or In-house)
  - Implement Advanced Pressure Management

OTHER WATER USE EFFICIENCY MEASURES

- Annual Consumer Education on WUE Measures
- Additional Measures
  - Existing Conservation Rates, Consider Seasonal Rates
  - Mandatory Water Use Limitations
  - Customer Notification of Leak
  - Customer Consumptive History on Bill
  - New Measure - Additional Education or Rebates

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POTENTIAL NEW MEASURES

- WUE Information on City Website
- Additional WUE Information
- New Customer Information Packets
- WUE Education Display Board
- Rebate for Water-efficient Fixtures
- Ultra-flow Flush Toilet Rebate

IMMEDIATE PLAN TASKS

- System Asset Inventory
- Hydraulic Model Review
- Complete List of Proposed Water System Improvements
- Proposed Financial Plan for Water System
- Source Protection, Operation and Maintenance, and Standards Chapters (City)

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City of White Salmon

Water System Plan Update

November 16, 2022

anderson perry & associates, inc.

UPDATE TOPICS

- System Assets
- System Deficiencies
- Recommended Improvements and Costs
- 5-Year Rate Projections
- Affordability
- Next Steps

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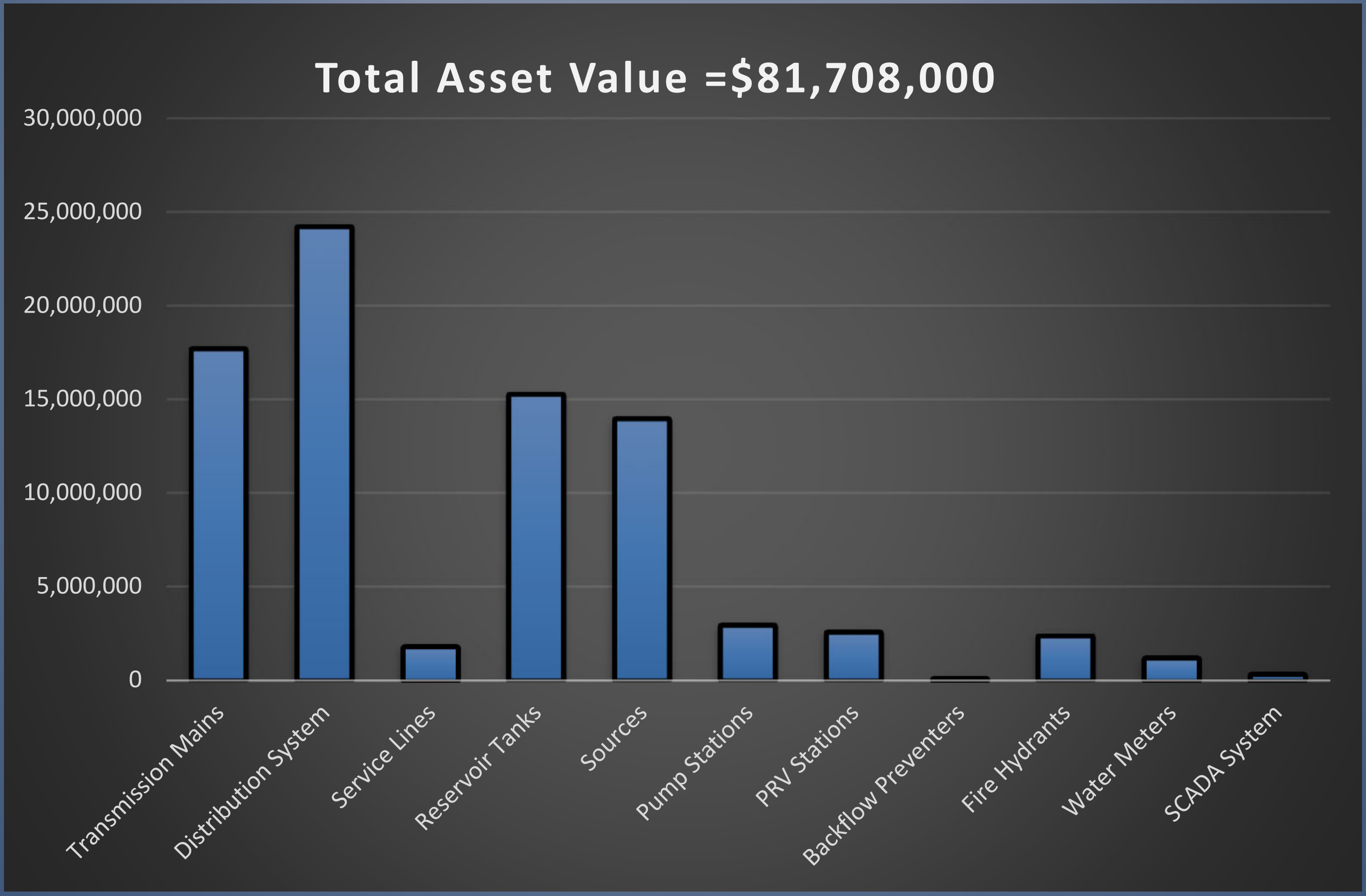
SYSTEM ASSETS



anderson perry & associates, inc.

SYSTEM DEFICIENCIES

- Old, Undersized Water Mains
- Need Additional Reservoir Storage
- Areas of High Pressure
- Max. Day Demand Nearing Source Capacity
- Capacity Issues (Buck Creek WTP, ASR, Los Altos PS)
- System Communication Limitations (SCADA/Telemetry)

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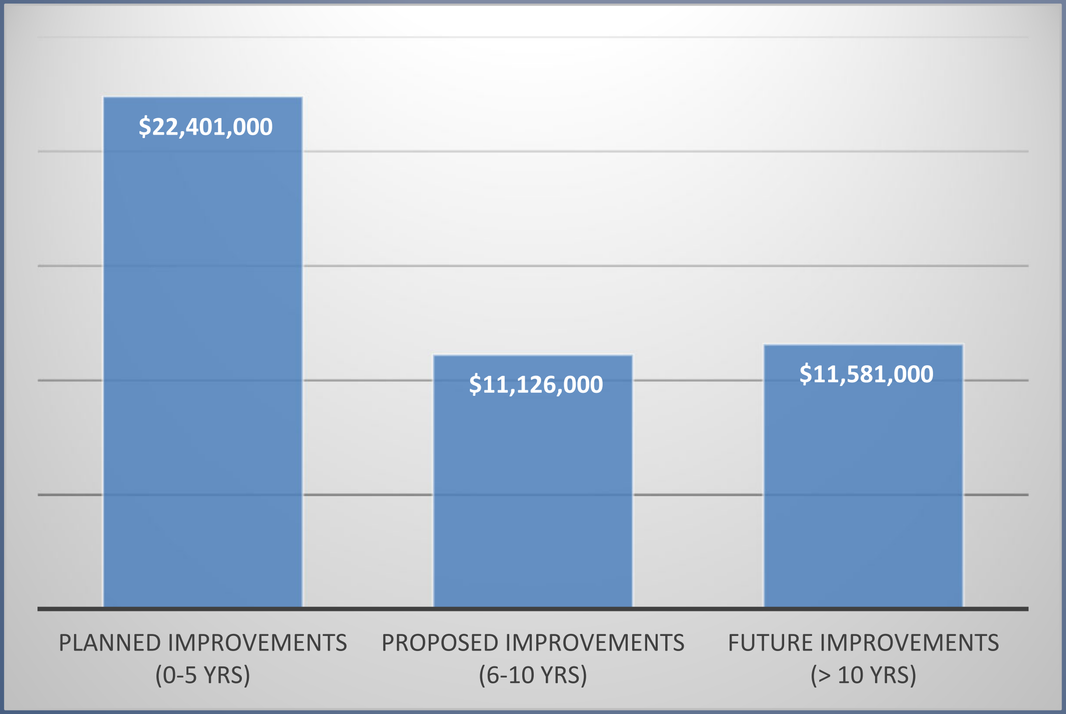
RECOMMENDED IMPROVEMENTS

- Replace Transmission Main Segments (Phases I and II)
- North Main – Spring St Water Improvements
- SCADA Upgrade
- Additional Reservoir Storage (Spring St/Strawberry Mtn)
- Water Main Replacement (Numerous)
- Renewal, Capacity, and Pressure Reduction Improvements

anderson perry & associates, inc.

EST. IMPROVEMENT COSTS



anderson perry & associates, inc.

5-YEAR RATE PROJECTIONS

Projected Rate Increases

2023	2024	2025	2026	2027
12%	11%	10%	8%	8%

AFFORDABILITY

- **City Median Household Income (MHI) = $65,781**
- **Percent People Below Poverty Line = 4.5%**
- **Population Below $50,000 Annual Income = 30.9%**
- Defined (EPA) as 2% of MHI = $109 per month
- Defined (DOH) as 1.5% of MHI = $82 per month

NEXT STEPS

- **Finish Plan send to City and Counties for review**
- **Prepare SEPA Documentation**
- **Submit to DOH for Review and Draft Approval**
- City Council Formally Adopt Plan
- Plan Span – 10 Years

City of White Salmon
Fire Department
PO Box 2139, 112 NE Church Ave., White Salmon, WA. 98672

January 10, 2023

Anderson Perry & Associates
PO Box 1687
Walla Walla, WA 99362

ATTN: David Jepsen PE

RE: Proposed Water System Improvements and Fire Flow Requirements

Dear Mr. Jepsen,

I am familiar with and endorse the proposed water system improvements described in the City of White Salmon's draft water system plan. These improvements will significantly improve the City's ability to fight fires and protect properties in White Salmon and the surrounding area.

I also approve the nesting of the standby storage and fire suppression storage for calculation of White Salmon's storage capacity.

If you have any questions about this letter or White Salmon's fire department, please contact me.

Sincerely,

Bill Hunsaker
Fire Chief

PO Box 2139
100 N. Main Ave.
White Salmon, WA 98672

Office: (509) 493-1133 ext. 201

Web Site: white-salmon.net

RESOLUTION NO. 2022-05-543

A RESOLUTION OF THE CITY OF WHITE SALMON APPROVING AND ADOPTING WATER USE EFFICIENCY GOALS AND MEASURES

WHEREAS, the Washington Department of Health has adopted the Water Use Efficiency Rule pursuant to RCW 43.20.230; and

WHEREAS, the City of White Salmon is required to adopt Water Use Efficiency Goals and Measures; and

WHEREAS, the City of White Salmon held a public hearing on May 18, 2022 to review and discuss the proposed water use efficiency goals of the City of White Salmon; and

NOW THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL FOR THE CITY OF WHITE SALMON, WASHINGTON as follows:

Section 1.

The following Water Use Efficiency Goals are adopted:

Goal No. 1: Reduce the average gallons per equivalent residential unit (ERU) per day by two percent (2%) that can be observed in the average daily demand flow values in Year 2028). An ERU is defined as the average amount of water used by a resident. For the City of White Salmon's water system, an ERU was defined as 73,864 gallons per year per ERU or 202.4 gallons per day per ERU. The two percent reduction goal equates to 4 gallons per day per ERU or 1,477 gallons per year per ERU.

Goal No. 2: Reduce distribution system leakage (DSL) to 25 per cent less in Year 2028.

Section 2.

The following measures and activities are adopted to promote achieving the Water Use Efficiency Goals:

Summary of Proposed Water Use Efficiency Program for the City of White Salmon

Measure/Activity	Implementation, Budget, and Notes
Installation and Operation of Source and Service Meters	
Source and service meters already installed	In compliance
Implementation of WLCAP	
Supply Side Goal: DSL of less than 25 percent	May 2022, recommended adoption as a 6-year goal
Demand Side Goal: 2 percent reduction in average gallons per ERU per day in 2028 ADD.	May 2022; recommended adoption as a 6-year goal
Verify existing source meters Install new 10-inch source meter at Well No. 2	2022; $1,700 2023: $9,200; installed cost
Better Documentation and Tracking of Unmetered Use	June 2022; Implement additional internal tracking
Leak Detection	Annually starting 2023; $7,500
Monthly Reading of Service Meters	June 2022; coincide with AMR implementation
Complete New Meter Installation and AMR	June 2022; in budget
Implement Advanced Pressure Management	Initial Target Areas: 1) Eyrie Rd PRV review – Jun 2022, and 2) 6-inch Main, Bingen Intertie review – Jul 2022
Water Main Replacement and Abandonment: Water Transmission Main Upgrade Phases I & II	Phase I – Construction funding obtained Phase II – Under design, need construction funds
Customer Education on WUE Measures	
Educational Materials Sent to Customers Annually	June 2022; $1,500; Material and distribution costs
Water Conservation Rate Pricing	
Consider Implementation of Seasonal Rate	Sept 2022; consider implementation in 2023
Additional Measures (Five Mandatory)	
Implementation of Water Conservation Rate Structure	In place; annual review recommended.
Mandatory Water Use Limitations	In place; Chapter 13.24.30, Water Code
Customer Notification of Possible Leak	In place; customer notified of unusual meter reading
Consumption Histories on Customers' Water Bills	In place
Additional Measures Selected by Council	
WUE Information on City's Website	$1,000 initial cost; assume $200 per year for updates
New Customer Water System Informational Packets	$50 annually for materials and revisions

ADOPTED by the City Council of the City of White Salmon, Washington, at a regularly scheduled open public meeting thereof this 18th day of May, 2022.

Marla Keethler, Mayor

Attest:

Jan Brending, Clerk-Treasurer

Approved as to Form:

Kenneth Woodrich, City Attorney

anderson perry

214 E. Birch Street, Suite 1, P.O. Box 1687
Walla Walla, WA 99362
(509) 529-9260
www.andersonperry.com

Engineering Surveying Natural Resources Cultural Resources GIS

June 16, 2023

John Shields
Underwood Water System
P.O. Box 500
Carson, Washington 98600

RE: City of White Salmon Water System Plan

Dear Mr. Shields:

The City of White Salmon has recently compiled and submitted a draft Water System Plan to the Washington State Department of Health for review and comment. As an adjoining water system purveyor, you are also invited to review and comment on the City's Water System Plan. Electronic copies of the Plan may be obtained directly from our office, and a hard copy version may be reviewed at City Hall (please call ahead at 509-493-1133).

Please direct any comments on the Plan to me by July 31, 2023.

Sincerely,

ANDERSON PERRY & ASSOCIATES, INC.

By David Jepsen
David Jepsen P.E.

DJ/rw
cc: File No. 250-12-03
Andrew Dirks, City of White Salmon

S:\Docs\White Salmon\250-12 Water System Plan 2021\Adjacent Water Purveyor WSP Ltr\Underwood Water System.docx

anderson perry

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Walla Walla, WA 99362
(509) 529-9260
www.andersonperry.com

Engineering Surveying Natural Resources Cultural Resources GIS

June 16, 2023

Stan Trout
Fordyce Water Association
P.O. Box 288
Husum, Washington 98623

RE: City of White Salmon Water System Plan

Dear Mr. Trout:

The City of White Salmon has recently compiled and submitted a draft Water System Plan to the Washington State Department of Health for review and comment. As an adjoining water system purveyor, you are also invited to review and comment on the City's Water System Plan. Electronic copies of the Plan may be obtained directly from our office, and a hard copy version may be reviewed at City Hall (please call ahead at 509-493-1133).

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Sincerely,

ANDERSON PERRY & ASSOCIATES, INC.

By David Jepsen
David Jepsen P.E.

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cc: File No. 250-12-03
Andrew Dirks, City of White Salmon

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Walla Walla, WA 99362
(509) 529-9260
www.andersonperry.com
Engineering Surveying Natural Resources Cultural Resources GIS

June 16, 2023

Stan Trout
Mt. Adams Orchard
541 Highway 141
White Salmon, Washington 98672

RE: City of White Salmon Water System Plan

Dear Mr. Trout:

The City of White Salmon has recently compiled and submitted a draft Water System Plan to the Washington State Department of Health for review and comment. As an adjoining water system purveyor, you are also invited to review and comment on the City's Water System Plan. Electronic copies of the Plan may be obtained directly from our office, and a hard copy version may be reviewed at City Hall (please call ahead at 509-493-1133).

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David Jepsen P.E.

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Andrew Dirks, City of White Salmon

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Washington State Department of
Health
Division of Environmental Health
Office of Drinking Water

Local Government Consistency Determination Form

Water System Name: City of White Salmon PWS ID: 96350 B

Planning/Engineering Document Title: Water System Plan Plan Date: ______________

Local Government with Jurisdiction Conducting Review: City of Bingen

Before the Department of Health (DOH) approves a planning or engineering submittal under Section 100 or Section 110, the local government must review the documentation the municipal water supplier provides to prove the submittal is consistent with **local comprehensive plans, land use plans and development regulations** (WAC 246-290-108). Submittals under Section 105 require a local consistency determination if the municipal water supplier requests a water right place-of-use expansion. The review must address the elements identified below as they relate to water service.

By signing this form, the local government reviewer confirms the document under review is consistent with applicable local plans and regulations. If the local government reviewer identifies an inconsistency, he or she should include the citation from the applicable comprehensive plan or development regulation and explain how to resolve the inconsistency, or confirm that the inconsistency is not applicable by marking N/A. See more instructions on reverse.

	For use by water system	For use by local government
Local Government Consistency Statement	**Identify the page(s) in submittal**	**Yes or Not Applicable**
a) The water system service area is consistent with the adopted land use and zoning within the service area.	1-7:1-9, Figs 1-3: 1-10	Y
b) The growth projection used to forecast water demand is consistent with the adopted city or county's population growth projections. If a different growth projection is used, provide an explanation of the alternative growth projection and methodology.	2-14:2-16	Y
c) For cities and towns that provide water service: All water service area policies of the city or town described in the plan conform to all relevant utility service extension ordinances.	1-10:1-17	Y
d) Service area policies for new service connections conform to the adopted local plans and adopted development regulations of all cities and counties with jurisdiction over the service area.	1-10:1-13	Y
e) Other relevant elements related to water supply are addressed in the water system plan, if applicable. This may include Coordinated Water System Plans, Regional Wastewater Plans, Reclaimed Water Plans, Groundwater Management Area Plans, and the Capital Facilities Element of local comprehensive plans.	Source Capacity: 3-32:3-33;CIP: 8-3:8-5	Y

I certify that the above statements are true to the best of my knowledge and that these specific elements are consistent with adopted local plans and development regulations.

Signature

8-9-23
Date

Public Works Superintendent
Printed Name, Title, & Jurisdiction

Consistency Review Guidance

For Use by Local Governments and Municipal Water Suppliers

This checklist may be used to meet the requirements of WAC 246-290-108. When using an alternative format, it must describe all of the elements; 1a), b), c), d), and e), when they apply.

For **water system plans (WSP)**, a consistency review is required for the service area and any additional areas where a municipal water supplier wants to expand its water right's place of use.

For **small water system management programs**, a consistency review is only required for areas where a municipal water supplier wants to expand its water right's place-of-use. If no water right place-of-use expansion is requested, a consistency review is not required.

For **engineering documents,** a consistency review is required for areas where a municipal water supplier wants to expand its water right's place-of-use (water system plan amendment is required). For noncommunity water systems, a consistency review is required when requesting a place-of-use expansion. All engineering documents must be submitted with a service area map (WAC 246-290-110(4)(b)(ii)).

A) Documenting Consistency: The planning or engineering document must include the following when applicable.

a) A copy of the adopted **land use/zoning** map corresponding to the service area. The uses provided in the WSP should be consistent with the adopted land use/zoning map. Include any other portions of comprehensive plans or development regulations that relate to water supply planning.

b) A copy of the **growth projections** that correspond to the service area. If the local population growth projections are not used, explain in detail why the chosen projections more accurately describe the expected growth rate. Explain how it is consistent with the adopted land use.

c) Include water service area policies and show that they are consistent with the **utility service extension ordinances** within the city or town boundaries. *This applies to cities and towns only.*

d) All **service area policies** for how new water service will be provided to new customers.

e) **Other relevant elements** the Department of Health determines are related to water supply planning. See Local Government Consistency – Other Relevant Elements, Policy B.07, September 2009.

B) Documenting an Inconsistency: Please document the inconsistency, include the citation from the comprehensive plan or development regulation, and explain how to resolve the inconsistency.

C) Documenting a Lack of Local Review for Consistency: Where the local government with jurisdiction did not provide a consistency review, document efforts made and the amount of time provided to the local government for review. Please include: name of contact, date, and efforts made (letters, phone calls, and emails). To self-certify, please contact the DOH Planner.

Washington State Department of Health

Local Government Consistency Determination Form

Water System Name: City of White Salmon PWS ID: 96350 B

Planning/Engineering Document Title: Water System Plan Plan Date: May 2023

Local Government with Jurisdiction Conducting Review: Klickitat County

Before the Department of Health (DOH) approves a planning or engineering submittal under Section 100 or Section 110, the local government must review the documentation the municipal water supplier provides to prove the submittal is consistent with **local comprehensive plans, land use plans and development regulations** (WAC 246-290-108). Submittals under Section 105 require a local consistency determination if the municipal water supplier requests a water right place-of-use expansion. The review must address the elements identified below as they relate to water service.

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		For use by water system	**For use by local government**
Local Government Consistency Statement		**Identify the page(s) in submittal**	**Yes or Not Applicable**
a)	The water system service area is consistent with the adopted land use and zoning within the service area.	1-7:1-9, Figs 1-3: 1-10	Yes
b)	The growth projection used to forecast water demand is consistent with the adopted city or county's population growth projections. If a different growth projection is used, provide an explanation of the alternative growth projection and methodology.	2-14:2-16	Yes
c)	For cities and towns that provide water service: All water service area policies of the city or town described in the plan conform to all relevant utility service extension ordinances.	1-10:1-17	Yes
d)	Service area policies for new service connections conform to the adopted local plans and adopted development regulations of all cities and counties with jurisdiction over the service area.	1-10:1-13	Yes
e)	Other relevant elements related to water supply are addressed in the water system plan, if applicable. This may include Coordinated Water System Plans, Regional Wastewater Plans, Reclaimed Water Plans, Groundwater Management Area Plans, and the Capital Facilities Element of local comprehensive plans.	Source Capacity: 3-30:3-32;CIP: 8-3:8-5	Yes

I certify that the above statements are true to the best of my knowledge and that these specific elements are consistent with adopted local plans and development regulations.

David Kavanagh, EHD 7/5/23

Signature Date

David Kavanagh, EHD, Klickitat Co.

Printed Name, Title, & Jurisdiction

Consistency Review Guidance

For Use by Local Governments and Municipal Water Suppliers

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d) All **service area policies** for how new water service will be provided to new customers.

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Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

Local Government Consistency Determination Form

Water System Name: City of White Salmon PWS ID: 96350 B

Planning/Engineering Document Title: Water System Plan Plan Date: May 2023

Local Government with Jurisdiction Conducting Review: Skamania County

Before the Department of Health (DOH) approves a planning or engineering submittal under Section 100 or Section 110, the local government must review the documentation the municipal water supplier provides to prove the submittal is consistent with **local comprehensive plans, land use plans and development regulations** (WAC 246-290-108). Submittals under Section 105 require a local consistency determination if the municipal water supplier requests a water right place-of-use expansion. The review must address the elements identified below as they relate to water service.

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	For use by water system	For use by local government
Local Government Consistency Statement	**Identify the page(s) in submittal**	**Yes or Not Applicable**
a) The water system service area is consistent with the adopted land use and zoning within the service area.	1-7:1-9, Figs 1-3: 1-10	Yes
b) The growth projection used to forecast water demand is consistent with the adopted city or county's population growth projections. If a different growth projection is used, provide an explanation of the alternative growth projection and methodology.	2-14:2-16	Yes
c) For cities and towns that provide water service: All water service area policies of the city or town described in the plan conform to all relevant utility service extension ordinances.	1-10:1-17	Not Applicable
d) Service area policies for new service connections conform to the adopted local plans and adopted development regulations of all cities and counties with jurisdiction over the service area.	1-10:1-13	Yes
e) Other relevant elements related to water supply are addressed in the water system plan, if applicable. This may include Coordinated Water System Plans, Regional Wastewater Plans, Reclaimed Water Plans, Groundwater Management Area Plans, and the Capital Facilities Element of local comprehensive plans.	Source Capacity: 3-30:3-32;CIP: 8-3:8-5	Yes

I certify that the above statements are true to the best of my knowledge and that these specific elements are consistent with adopted local plans and development regulations.

Mandy Hertel 6/22/23
Signature Date

Mandy Hertel, Land Use Planner, Skamania County
Printed Name, Title, & Jurisdiction

Consistency Review Guidance

For Use by Local Governments and Municipal Water Suppliers

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Washington State Department of Health

Division of Environmental Health
Office of Drinking Water

Local Government Consistency Determination Form

Water System Name: City of White Salmon PWS ID: 96350 B

Planning/Engineering Document Title: Water System Plan Plan Date: May 2023

Local Government with Jurisdiction Conducting Review: City of White Salmon

Before the Department of Health (DOH) approves a planning or engineering submittal under Section 100 or Section 110, the local government must review the documentation the municipal water supplier provides to prove the submittal is consistent with **local comprehensive plans, land use plans and development regulations** (WAC 246-290-108). Submittals under Section 105 require a local consistency determination if the municipal water supplier requests a water right place-of-use expansion. The review must address the elements identified below as they relate to water service.

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	For use by water system	**For use by local government**
Local Government Consistency Statement	**Identify the page(s) in submittal**	**Yes or Not Applicable**
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I certify that the above statements are true to the best of my knowledge and that these specific elements are consistent with adopted local plans and development regulations.

Signature

8/8/2023
Date

Andrew Dirks, Public Works Director-City of White Salmon
Printed Name, Title, & Jurisdiction

Consistency Review Guidance

For Use by Local Governments and Municipal Water Suppliers

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e) **Other relevant elements** the Department of Health determines are related to water supply planning. See Local Government Consistency – Other Relevant Elements, Policy B.07, September 2009.

B) Documenting an Inconsistency: Please document the inconsistency, include the citation from the comprehensive plan or development regulation, and explain how to resolve the inconsistency.

C) Documenting a Lack of Local Review for Consistency: Where the local government with jurisdiction did not provide a consistency review, document efforts made and the amount of time provided to the local government for review. Please include: name of contact, date, and efforts made (letters, phone calls, and emails). To self-certify, please contact the DOH Planner.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Central Region Office
1250 West Alder St., Union Gap, WA 98903-0009 • 509-575-2490

August 21, 2023

Marla Keethler
City of White Salmon Water System
PO Box 21329
White Salmon, WA 98672
Email: mayor@ci.white-salmon.wa.us

Re: City of White Salmon, Water System; ID # 96350; Klickitat County
Water System Plan; DOH Project # **23-0609**

Dear City of White Salmon Water System:

Thank you for the opportunity to review the above referenced Water System Plan (WSP), received on June 28, 2023. Consistent with the Memorandum of Understanding between the Department of Health (DOH) and Department of Ecology (Ecology), regarding joint review and approval of WSPs, this letter is being sent to your office with Ecology's comments. Specific elements of the WSP review included the Water Rights Self-Assessment as well as additional water rights documentation, including Ecology's water right files and previous WSPs and project reports, as applicable.

Ecology found that the annual quantity of Certificate 10252 is non-additive to Certificates 3474 and 7109. The total annual quantity allowed under the City's existing rights is correct at 1,468 acre-feet per year.

Contact information

Please direct all questions about this letter to:

Christopher Kossik
Permitting & Operations Unit Supervisor
Water Resources Program
Central Region Office
Phone: 509-379-1826
Email: christopher.kossik@ecy.wa.gov

Americans with Disabilities Act information

Accommodation Requests

To request ADA accommodation including materials in a format for the visually impaired, call Ecology at 360-407-7668 or visit https://ecology.wa.gov/accessibility. People with impaired hearing may call Washington Relay Service at 711. People with speech disability may call TTY at 877-833-6341.

Signature

Sincerely,

Christopher Kossik
Permitting & Operations Unit Supervisor
Water Resources Program
Central Region Office

CK:aa (230827)

ecc: DOH ERO ADMIN, Department of Health, EROADMIN@DOH.WA.GOV
Jamie Clark, Department of Health, Jamie.clark@doh.wa.gov
David Jepsen, PE, djepsen@andersonperry.com
Andrew Dirks, andrewd@ci.white-salmon.wa.us
Klickitat County Health Department, davidk@klickitatcounty.org

From: DOH EPH DW ERO ADMIN
To: mayor@ci.white-salmon.wa.us
Cc: Kavanagh, David (DOHi); mo-chil@klickitatcounty.org; "building@co.skamania.wa.us"; "permitcenter@co.skamania.wa.us"; "administrator@bingenwashington.org"; andrewd@ci.white-salmon.wa.us; Dave Jepsen; Kossik, Christopher (ECY); Clark, Jamie C (DOH); Cervantes, Andres (DOH); Guillot, Nikki (DOH); Hoffman, Stan (DOH); DOH EPH DW ERO ADMIN
Subject: White Salmon, City of; PWS ID # 96350; Klickitat County; Water System Plan; Submittal #23-0609; DOH Comments
Date: Tuesday, December 12, 2023 8:04:00 AM
Attachments: image003.png
WhiteSalmon_23-0609_Invoice.pdf
WhiteSalmon_23-0609_EcologyLtr-20230821.pdf
DOH COMMENT RESPONSE FORM.doc

STATE OF WASHINGTON
DEPARTMENT OF HEALTH
EASTERN DRINKING WATER REGIONAL OPERATIONS
16201 E Indiana Avenue, Suite 1500, Spokane Valley, Washington 99216-2830
(509) 329-2100 • 711 Washington Relay Service

December 12, 2023

Dear Mayor Keethler:

Subject: White Salmon, City of; PWS ID # 96350; Klickitat County
Water System Plan; Submittal #23-0609; DOH Comments

Thank you for providing the draft Water System Plan (WSP) for the city of White Salmon received in this office on June 12, 2023. The following comments will need to be addressed before the Department of Health (DOH) can approve the document:

Chapter 1

1) On page 1-8, Future Service Area, the WSP discussed conditions in which the city will provide service to Mt. Adams Orchard Water System, as well as stating the system is within the FSA. Please add information in the WSP in the most appropriate location what the city's stance is on providing service to Fordyce Water Association or Underwood Water System in the future. Are any portions of their service areas within the FSA?

2) On Figure 1-1, state what the solid red line is in the legend.

Chapter 2

3) On page 2-8, please clarify if "No. of units" equals number of service connections. If or if not, please provide an explanation in a table footnote.

4) Page 2-15, Projected Land Use, add to the discussion the potential for infill development and "middle housing". The state legislature has made a push to require or promote increased density and affordable housing. Due to the growth demand in White Salmon and

the shortage of buildable land, discuss if the city will consider these methods to accommodate demands and affordable housing.

Chapter 3

5) Page 3-2, Water Quality Analysis, second paragraph – DOH recommends making a statement regarding the SDWA requirement that the treatment of Buck Creek requires the city to maintain a residual disinfectant concentration within the distribution system (WAC 246-290-662).

6) How is the system security? For example, with SCADA, are there any improvements needed to limit cybersecurity risks? Understanding this is sensitive information, DOH wants to make sure the city is addressing those risks. Address in Chapter 3 or Chapter 6, whichever is most appropriate.

7) On Table 3-8, Current production is operating Well #2 at 24 hours a day and the plant online 24 hours a day; what about when conducting ASR; what about when turbidity is high? Add a footnote that explains whether the current production numbers shown in this table are the best case without the limiting operational constraints. Table E-1 lists source capacity for the wells pumping 20 hrs./day.

8) Table 3-13 shows the limiting component is transmission/distribution at 4,033 ERUs. What does that equate to in number of connections? When the city approves new construction for anything other than single-family residential, how do staff calculate the ERU component?

9) On page 3-45 Model, when was the hydraulic model last calibrated with city staff? "Since the existing hydraulic model was previously calibrated, further reconciliation and calibration of the model for this WSP were not performed." Does the City maintain this model in-house?

10) Page 3-50: In Chapter 2, DOH read that the city's ERU values are 215.5 gpd (ADD) and 554 gpd (MDD) using the year 2021 values; however, here the MDD is listed as 584.9 gpd per ERU. Table E-1 specifies 584.9.

Chapter 4

11) On page 4-3, Service Metering:
- The WSP states that "new meters and AMR implementation is planned for 2022". Please provide a status update. Did this occur or has the schedule been modified?
- The WSP discusses the intertie meter on SR14 but not the other two interties. Provide information on the meters at all three interties with the city of Bingen.

12) On page 4-3, Distribution System Leakage/Chart 4-1, DSL appears to be trending slightly upwards instead of down. DOH requests the addition of 2022 and 2023 DSL values to see if this trend is changing following some meter upgrades and water main replacements. Adjust the text discussion to reflect new data.

13) On page 4-6, Implementation of Water Loss Control Action Plan to Control Leakage, add a goal or discussion on when the city plans to be at the 10 percent or less DSL mark. White

Salmon has one of the highest DSL values in the state; while any decrease to DSL would be an improvement, the city needs be working towards compliance with DSL as the end goal.

14) On page 4-7, Customer Education on Water Use Efficiency Measures, the text does not discuss public education during the last planning cycle. Did the city provide annual education? How so? Provide a copy of written or published documents in the appendix.

15) Please note that DOH will allow certain WUE measures to be counted as more than one measure, when used across multiple customer classes. Based on the presented measures in the text, the use of an inclining block rate across multiple customer classes and consumption histories on customer water bills would allow this. DOH will count each of these measures as the number of applicable customer classes in generic categories, such as single-family residential, multi-family residential, commercial, industrial, etc.

16) Table 4-3 states twice a recommendation to adopt a six-year goal. Because the city is seeking approval of a WSP and has over 1,000 connections, the goal should be adopted at the time of each WSP update.

Chapter 5

17) Is the wellhead model still accurate following the removal of the dam? Did the removal of the dam have any effect on the wells? Provide an updated model, confirm the existing model information is still accurate, and add a date on the map confirming such, or provide a new map with calculated-fixed-radius time-of-travel zones until a new model can be done.

18) State in Chapter 5 when the notification letters for the Wellhead Protection Program were last sent.

19) Discuss in Chapter 5 preliminary watershed planning efforts completed and steps to be completed in the future to establish watershed ownership and management for the use of the White Salmon River as a drinking water source.

Chapter 6

20) Provide an Emergency Response Program. DOH understands the city's current program contains sensitive information. Provide the current program with sensitive information redacted or complete an Emergency Response Program using the DOH template (DOH Pub.# 331-211).

21) Recordkeeping and Reporting, page 6-12 and 6-13; this section is missing the monthly treatment reporting and annual consumer confidence reporting.

22) Regarding Sanitary Survey Findings, DOH conducted a sanitary survey in 2023. As of the date of this letter, the survey letter has not been issued. The city will receive this letter in early 2024. Provide a discussion in this section on any significant findings or other pertinent information found during this survey. Update the Appendix with the 2023 letter once received.

Chapter 7

23) Page 7-2 Policies and Requirements for Outside Parties; DOH does not understand this statement: "Developers intending to install water systems on the City's water system that are not specifically exempt in Washington Administrative Code (WAC) 246-290-125 need to submit the proposed improvements to the City for review and approval". We would think that all infrastructure that is connected to the City's water system will be submitted to the city, including the exemptions in WAC 246-290-125. WAC 246-290-125 applies to Group A water systems, not independent developers.

24) Page 7-2; general guidelines for storage and pump stations. Please note, based on the information provided in the plan, the approval of the plan will include a submittal exception for distribution mains. To receive an exception for storage tanks and pump stations, please refer to WAC 246-290-125(3).

25) Construction Standards Specs, Water Main Installation: DOH was not able to locate a specification for horizontal separation for water main installation. The Water–Sewer Crossings section refers to Ecology criteria which includes horizontal separation—ECY C1-9.1; however, you do have a standard plan 4-10. What separation do you want from other utility lines?

26) Construction Standards Specs, Page 26 E.1. DOH does not have a disinfection standard but does have acceptable standards for disinfection. WAC 246-290-120(4) (iii) requires disinfection procedures to conform with AWWA standards (C651) or other standards acceptable to the department which could be the WSDOT/APWA standard specifications (Division 7). To avoid a contractor calling the department directly to learn what must be done, please change the wording to the appropriate standards the city prefers.

Chapter 8

27) Page 8-6, System Measure Improvements Program; DOH did not see in the plan a discussion on workforce training and succession planning. How does the city plan for and address keeping required operators on staff?

28) DOH did not see any mention of the lead service line inventory and replacement plan requirement. Is this because the city is all non-lead? Note in the plan in the appropriate location and add the inventory (and any replacement projects) to the CIP.

Chapter 9

29) In Chapter 9, DOH did not find a reference to the appendix for the proposed budget for the plan approval period. The budget was found in Appendix I. Please reference the budget in the text. If the reference is already there and we missed it, please disregard this comment.

Chapter 10/Appendix

30) Appendix A, the WFI provided in the WSP with 2022 date, as well as a recent 2023 version available on Sentry, has the same number of active connections reported in 2020 of 1,908. Assumed connection numbers in the draft WSP do not correspond to the WFI numbers and do not seem like a realistic representation of a growing city. Provide an

updated WFI to DOH as soon as possible correcting the number of connections.

31) Appendix B, provide a signed copy of Resolution 2022-05-543.

32) Appendix B, provide signed copies of the Local Government Consistency Determination Form from the city of White Salmon Planning Department, Klickitat County Planning Department, Skamania County Planning Department, and the city of Bingen Planning Department.

33) Appendix G/Watershed Control Program:
    - Provide any additional information from the last plan approval period and any missing items from the bulleted list in Section 5.3.3 of the Water System Planning Guidebook (DOH Pub.# 331-068).
    - DOH has strong concerns regarding the lack of an active agreement with DNR. Why has the agreement with DNR not been renewed for over a decade? DOH generally requires a copy of the current, approved agreement to be in the WSP update. In an effort to not delay this update substantially, please discuss how the city will actively work to resolve this issue over the next couple years, provide a completion timeline, and add the completion of the agreement to the CIP.
    - DOH Source Water Protection staff may provide additional comments following the issuance of this letter, if determined necessary.

34) Appendix H, provide sampling maps. Maps may be combined if different sample types are adequately distinguished.

Other

35) The final WSP must be stamped, signed, and dated by a Professional Engineer licensed in the State of Washington prior to DOH approval.

36) The Department of Ecology has issued a comment letter regarding this submittal dated August 21, 2023. Please address the issues contained in the letter in the second draft submittal.

37) Provide signed SEPA checklist and signed Threshold Determination.

38) The water system must meet the consumer input process outlined in WAC 246-290-100(8). Please include documentation of a consumer meeting discussing the Water System Plan prior to its approval, including public notice and signed meeting minutes.

39) DOH interprets WAC 246-290-100 approval language to mean that the approved number of years is based on the “plan approval period” projections provided in the WSP, i.e., the date of the last projected year will be the year the WSP will be approved through. The Preplan Agreement and the Water System Planning Guidebook page 4, Plan Approval Period, also address this.

    A significant amount of time has occurred since the preplan meeting due to staff changes at the city, resulting in a delayed WSP submittal. As a result, the previously discussed "plan approval period" ending in 2031 would no longer result in a 10-year approval. If the city desires to maximize the life of the WSP with a 10-year approval, please revise all "plan approval period" projections to 2034 (assuming an approval sometime in 2024). Adjust this year as needed if the second draft is delayed for any reason. Additionally, make sure any text reference to the plan's approval date is clear that ten years is based on provided data and is not guaranteed.

The relevant sections include projections for population, service connections, and ERUs; capacity analysis; water demand forecast (before and after WUE savings); capital improvement program; and budget.

40) When DOH is ready to approve the document, we will notify you. At that time, the governing body will need to officially approve the Water System Plan and send DOH documentation of plan approval by the governing body, such as a copy of the signed meeting minutes or a copy of the signed resolution. When the documentation is received, we will send a letter documenting DOH approval. Approval by the governing body before DOH notification may result in re-approvals.

END OF COMMENTS

The department's review of your planning document does not confer or guarantee any right to a specific quantity of water. Our review is based on your representation of available water quantity. If the Washington Department of Ecology, a local planning agency, or other authority responsible for determining water rights and water system adequacy determines that you have use of less water than you represent, the number of approved connections may be reduced commensurate with the actual amount of water and your legal right to use it.

We hope that you have found these comments to be clear, constructive, and helpful in the development of your final planning document. We ask that you submit **one electronic copy** of the revised WSP **on or before March 12, 2024.** To expedite the review of your revised submittal, please complete the enclosed DOH Comment Response Form summarizing how each of the above comments was addressed in the revised WSP and where each response is located (i.e., page numbers, Appendices, etc.).

Regulations establishing a schedule for fees for review of planning, engineering, and construction documents have been adopted (WAC 246-290-990). Please note that we have included an invoice for **$3,705** for the review of the Water System Plan. This fee covers our cost for review of the initial submittal, plus the review of one revised document. Please remit your complete payment within thirty days of the date of this letter. If paying by check or money order, mail to: DOH, Revenue Section, P.O. Box 1099, Olympia, WA 98507-1099. Or if you prefer, you can now pay online—follow the instructions at *Online Payment Guide* 331-688.(PDF).

Thank you again for submitting your draft Water System Plan for our review. If you have any comments or questions concerning our review, please contact Sheri Miller at (509) 329-2123 or by email at sheri.miller@doh.wa.gov; or Jamie Clark at (509) 329-2137 or by email at jamie.clark@doh.wa.gov.

Sincerely,

Jamie Clark
Office of Drinking Water, Regional Planner

Sheri Miller, PE
Office of Drinking Water, Regional Engineer

Attachments: Invoice
Department of Ecology Correspondence
DOH Comment Response Form

cc: Klickitat County Health Department
Klickitat County Planning Department
Skamania County Planning Department
City of Bingen Planning Department
Andrew Dirks, PW Superintendent, City of White Salmon
Christopher Kossik, Dept. of Ecology CRO
David Jepsen, PE, Anderson Perry & Associates
Andres Cervantes, PE, DOH Regional Engineer
Nikki Guillot, DOH Source Water Protection Program Manager
Stan Hoffman, DOH Watershed Protection Program Coordinator

DOH COMMENT RESPONSE FORM

No.	DOH Comment	Water System Response	Page No.
DOH Comments, December 12, 2023			
Chapter 1			
1	On page 1-8, Future Service Area, the WSP discussed conditions in which the city will provide service to Mt. Adams Orchard Water System, as well as stating the system is within the FSA. Please add information in the WSP in the most appropriate location what the city's stance is on providing service to Fordyce Water Association or Underwood Water System in the future. Are any portions of their service areas within the FSA?	The City already provides water service to Mt. Adams Orchard water system. The City has no plans to provide water service to Fordyce Water Association or Underwood Water System. The text has been revised to reflect the reference to Mt. Adams Orchard water system under the "Retail Service Area" paragraph and references to the Fordyce Water Association and Underwood Water System are made under "Future Service Area."	1-8
2	On Figure 1-1, state what the solid red line is in the legend.	The solid red line in Figure 1-1 is part of the USGS base map and is noted as scenic areas; specifically, the Columbia River Gorge National Scenic Area and the White Salmon River Wild and Scenic Area. No changes to Figure 1-1 are proposed.	N/A
Chapter 2			
3	On page 2-8, please clarify if "No. of units" equals number of service connections. If or if not, please provide an explanation in a table footnote.	The number of units represents the housing or residential units in the system. The "units" would be equivalent to the term "connections" used by DOH in its WFI form. The number of units does not equate to the number of physical connections. A correction to the number of ERUs shown for residential units on Table 2-8 was made. See "Other Revisions Made to Plan Initiated by City and/or Consultant," Item C below.	2-12
4	Page 2-15, Projected Land Use, add to the discussion the potential for infill development and "middle housing." The state legislature has made a push to require or promote increased density and affordable housing. Due to the growth demand in White Salmon and the shortage of buildable land, discuss if the city will consider these methods to accommodate demands and affordable housing.	Added language regarding the City's Housing Action Plan to address affordable housing now and in the years to come.	2-15
Chapter 3			
5	Page 3-2, Water Quality Analysis, second paragraph - DOH recommends making a statement regarding the SDWA requirement that the treatment of Buck Creek requires the city to maintain a residual disinfectant concentration within the distribution system (WAC 246-290-662).	The recommended language was added to the text.	3-2

No.	DOH Comment	Water System Response	Page No.
6	How is the system security? For example, with SCADA, are there any improvements needed to limit cybersecurity risks? Understanding this is sensitive information, DOH wants to make sure the city is addressing those risks. Address in Chapter 3 or Chapter 6, whichever is most appropriate.	System security information was not provided because the City does not wish to divulge any security system issues in a public document. Cybersecurity upgrades are discussed in Chapter 3.	3-22
7	On Table 3-8, current production is operating Well #2 at 24 hours a day and the plant online 24 hours a day; what about when conducting ASR; what about when turbidity is high? Add a footnote that explains whether the current production numbers shown in this table are the best case without the limiting operational constraints. Table E-1 lists source capacity for the wells pumping 20 hours a day.	A note will be added to Table 3-8 that production values provided are for all sources providing water for customer consumption. ASR is only conducted in the winter months when water demand is low and the turbidity in Buck Creek is suitable for the WTP operation (i.e., low turbidity). The source capacity on Table E-1 will be corrected to reflect 24-hour production from Well No. 2 since this well is artesian.	Table 3-8, 3-30, Table E-1, Appendix E
8	a) Table 3-13 shows the limiting component is transmission/distribution at 4,033 ERUs. b) What does that equate to in number of connections? c) When the city approves new construction for anything other than single-family residential, how do staff calculate the ERU component?	a) The transmission main capacity value has been revised. See "Other Revisions Made to Plan Initiated by City and/or Consultant," Item D. Revised transmission main capacity of 4,510 ERUs. b) Based on 2021 data, the number of units represents approximately 50.8 percent of the number of ERUs. For 4,510 ERUs, the number of units is projected to be 2,291. c) The ERUs for a multi-family residential complex are based on the number of individual living units (i.e., apartment, duplexes, etc.). The ERUs for non-residential is estimated by comparing the maximum capacity in gpm of the sized meter to maximum capacity of a 3/4-inch meter (30 gpm). As an example, a 2-inch meter has a maximum capacity of 160 gpm. The estimated number of ERUs for this meter would the quotient of 160 and 30 gpm, or 5.3 ERUs.	a) 3-50 and 3-51, Appendix E-1
9	On page 3-45 Model, when was the hydraulic model last calibrated with city staff? "Since the existing hydraulic model was previously calibrated, further reconciliation and calibration of the model for this WSP were not performed." Does the City maintain this model in-house?	The hydraulic model was last calibrated with data provided by City staff in the previous WSP (i.e., 2012). An updated hydraulic model of the City's system is maintained by Anderson Perry & Associates, Inc. and is used, when requested by the City.	N/A
10	Page 3-50: In Chapter 2, DOH read that the city's ERU values are 215.5 gpd (ADD) and 554 gpd (MDD) using the year 2021 values; however, here the MDD is listed as 584.9 gpd per ERU. Table E-1 specifies 584.9.	MDD/ERU value has been changed to 554 gpd. Changes are reflected on Tables E-1, E-2, and E-3 and minor revisions were made to Tables 3-14, 3-15, and 3-16.	3-50 through 3-53, Appendix E

No.	DOH Comment	Water System Response	Page No.
Chapter 4			
11	On page 4-3, Service Metering: a) The WSP states that "new meters and AMR implementation is planned for 2022." Please provide a status update. Did this occur or has the schedule been modified? b) The WSP discusses the intertie meter on SR14 but not the other two interties. Provide information on the meters at all three interties with the City of Bingen.	a) AMI has been successfully installed on all meters except the larger ones. The remaining 1.5-inch and 2-inch meters will be replaced in 2024. A drive-by, fixed AMI base station is anticipated be installed in 2024. b) Intertie meters were described in Chapter 3 under "Interties" on page 3-28. Reference was added to the text back to the "Interties" section. The text was also revised for the City's preference to install a Master Meter Octave meter at SR 14 intertie instead of the proposed Siemens Sitrans meter.	4-3
12	On page 4-3, Distribution System Leakage/Chart 4-1, DSL appears to be trending slightly upwards instead of down. DOH requests the addition of 2022 and 2023 DSL values to see if this trend is changing following some meter upgrades and water main replacements. Adjust the text discussion to reflect new data.	The DSL values for 2022 (28.3 percent) and 2023 (27.0 percent) have been added to Chart 4-1. The additional data indicates a slight downward trend in DSL.	4-4
13	On page 4-6, Implementation of Water Loss Control Action Plan to Control Leakage, add a goal or discussion on when the city plans to be at the 10 percent or less DSL mark. White Salmon has one of the highest DSL values in the state; while any decrease to DSL would be an improvement, the city needs be working towards compliance with DSL as the end goal.	A WUE supply side goal of a DSL at 10 percent or less was not proposed as it was not considered realistically attainable within the six-year goal period. The City's achievement of a DSL below 10 percent is difficult to predict given the magnitude of the current DSL and uncertainty of the source(s) of DSL within the system. With implementation of the WLCAP measures and two major infrastructure projects slated to upgrade the existing transmission main, the City's DSL is anticipated to be below or near 10 percent by 2034.	4-7
14	On page 4-7, Customer Education on Water Use Efficiency Measures, the text does not discuss public education during the last planning cycle. Did the city provide annual education? How so? Provide a copy of written or published documents in the appendix.	In the fifth paragraph under Consumer Education on WUE Measures (page 4-7), the City's primary effort for consumer education was through its monthly water bills. Samples of the WUE messages sent with the customer bills generated between June through December 2023 are provided in Appendix B. The text has also been revised to reflect the latest WUE messages. Reference to water conservation messages in the City's newsletter was also added to the text and to Appendix B.	4-8, Appendix B

No.	DOH Comment	Water System Response	Page No.
15	Please note that DOH will allow certain WUE measures to be counted as more than one measure, when used across multiple customer classes. Based on the presented measures in the text, the use of an inclining block rate across multiple customer classes and consumption histories on customer water bills would allow this. DOH will count each of these measures as the number of applicable customer classes in generic categories, such as single-family residential, multi-family residential, commercial, industrial, etc.	Noted.	N/A
16	Table 4-3 states twice a recommendation to adopt a six-year goal. Because the city is seeking approval of a WSP and has over 1,000 connections, the goal should be adopted at the time of each WSP update.	Two goals (supply side and demand side) for a six-year period were proposed and adopted by the City. The City plans to revise these goals in 2028 to match the WSP planning period (2033). Adoption of new WUE goals in 2028 were highlighted in Chapter 4 and added to Table 8-2.	4-10 and 4-11, 8-6
Chapter 5			
17	Is the wellhead model still accurate following the removal of the dam? Did the removal of the dam have any effect on the wells? Provide an updated model, confirm the existing model information is still accurate, and add a date on the map confirming such, or provide a new map with calculated-fixed-radius time-of-travel zones until a new model can be done.	Water levels in Wells No. 1 and 2 were discussed at length in Chapter 3. Well No. 1 is completed in a semi-confined aquifer and Well No. 2 is completed in confined aquifer. Of the two wells, Well No. 1 is more likely to be affected by the Condit Dam removal. However, as discussed in Chapter 3, the static water level in Well No. 1 has steadily increased over time and appears to not to have been affected by the Condit Dam removal. An updated wellhead model does not appear warranted at this time.	N/A
18	State in Chapter 5 when the notification letters for the Wellhead Protection Program were last sent.	Notification was made in January 2022 and added to Table 5-1.	5-1
19	Discuss in Chapter 5 preliminary watershed planning efforts completed and steps to be completed in the future to establish watershed ownership and management for the use of the White Salmon River as a drinking water source.	Discussion was added to the end of Chapter 5.	5-2
Chapter 6			
20	Provide an Emergency Response Program. DOH understands the city's current program contains sensitive information. Provide the current program with sensitive information redacted or complete an Emergency Response Program using the DOH template (DOH Pub.# 331-211).	A copy of the City's Emergency Response Plan is provided in Appendix H.	Appendix H
21	Recordkeeping and Reporting, page 6-12 and 6-13; this section is missing the monthly treatment reporting and annual consumer confidence reporting.	Monthly treatment and annual consumer confidence reporting were added to Table 6-8 and to the text after Table 6-8.	6-13 and 6-14

No.	DOH Comment	Water System Response	Page No.
22	Regarding Sanitary Survey Findings, DOH conducted a sanitary survey in 2023. As of the date of this letter, the survey letter has not been issued. The city will receive this letter in early 2024. Provide a discussion in this section on any significant findings or other pertinent information found during this survey. Update the Appendix with the 2023 letter once received.	The City received the DOH 2023 Sanitary Survey results documentation. A copy of the December 26, 2023, letter is provided in Appendix H. The text in Chapter 6 under Sanitary Survey Findings was revised to reflect the findings of the December 26, 2023, letter. The City has responded to the findings; please refer to Appendix H for documentation sent to the DOH.	6-12, Appendix H
Chapter 7			
23	Page 7-2 Policies and Requirements for Outside Parties; DOH does not understand this statement: "Developers intending to install water systems on the City's water system that are not specifically exempt in Washington Administrative Code (WAC) 246-290-125 need to submit the proposed improvements to the City for review and approval." We would think that all infrastructure that is connected to the City's water system will be submitted to the city, including the exemptions in WAC 246-290-125. WAC 246-290-125 applies to Group A water systems, not independent developers.	Sentence removed.	7-2
24	Page 7-2; general guidelines for storage and pump stations. Please note, based on the information provided in the plan, the approval of the plan will include a submittal exception for distribution mains. To receive an exception for storage tanks and pump stations, please refer to WAC 246-290-125(3).	The City is not pursuing submittal exception for storage and pump stations.	N/A
25	Construction Standards Specs, Water Main Installation: DOH was not able to locate a specification for horizontal separation for water main installation. The Water-Sewer Crossings section refers to Ecology criteria which includes horizontal separation-ECY C1-9.1; however, you do have a standard plan 4-10. What separation do you want from other utility lines?	Horizontal and vertical separation information was added to Standard Plan 1-1.	Std Plan 1-1
26	Construction Standards Specs, Page 26 E.1. DOH does not have a disinfection standard but does have acceptable standards for disinfection. WAC 246-290-120(4) (iii) requires disinfection procedures to conform with AWWA standards (C651) or other standards acceptable to the department which could be the WSDOT/APWA standard specifications (Division 7). To avoid a contractor calling the department directly to learn what must be done, please change the wording to the appropriate standards the city prefers.	Paragraph in Construction Standards was revised to reflect AWWA Standards C651 and other standards acceptable to DOH.	Page 26 of Const. Stds Specs
Chapter 8			

No.	DOH Comment	Water System Response	Page No.
27	Page 8-6, System Measure Improvements Program; DOH did not see in the plan a discussion on workforce training and succession planning. How does the city plan for and address keeping required operators on staff?	A description of the City's work staff succession is provided in Chapter 6, after Table 6-2, Position Responsibilities and Qualifications. A system measure improvement program item is not warranted based on the City's present work staff succession activities.	6-2 and 6-3
28	DOH did not see any mention of the lead service line inventory and replacement plan requirement. Is this because the city is all non-lead? Note in the plan in the appropriate location and add the inventory (and any replacement projects) to the CIP.	LSL inventory measure was added to Table 8-2. Text regarding the LSL was revised in Chapter 3.	8-6, 3-23
Chapter 9			
29	In Chapter 9, DOH did not find a reference to the appendix for the proposed budget for the plan approval period. The budget was found in Appendix I. Please reference the budget in the text. If the reference is already there and we missed it, please disregard this comment.	Reference to Appendix I was added.	9-13
Appendices			
30	Appendix A, the WFI provided in the WSP with 2022 date, as well as a recent 2023 version available on Sentry, has the same number of active connections reported in 2020 of 1,908. Assumed connection numbers in the draft WSP do not correspond to the WFI numbers and do not seem like a realistic representation of a growing city. Provide an updated WFI to DOH as soon as possible correcting the number of connections.	The City's WFI has been revised and a copy is provided in Appendix A.	Appendix A
31	Appendix B, provide a signed copy of Resolution 2022-05-543.	A copy of Resolution 2022-05-543 has been added to Appendix B.	Appendix B
32	Appendix B, provide signed copies of the Local Government Consistency Determination Form from the city of White Salmon Planning Department, Klickitat County Planning Department, Skamania County Planning Department, and the city of Bingen Planning Department.	Completed Local Government Consistency Determination Forms have been added to Appendix B.	Appendix B

No.	DOH Comment	Water System Response	Page No.
33	Appendix G/Watershed Control Program: a) Provide any additional information from the last plan approval period and any missing items from the bulleted list in Section 5.3.3 of the Water System Planning Guidebook (DOH Pub.# 331-068). b) DOH has strong concerns regarding the lack of an active agreement with DNR. Why has the agreement with DNR not been renewed for over a decade? DOH generally requires a copy of the current, approved agreement to be in the WSP update. In an effort to not delay this update substantially, please discuss how the city will actively work to resolve this issue over the next couple years, provide a completion timeline, and add the completion of the agreement to the CIP. c) DOH Source Water Protection staff may provide additional comments following the issuance of this letter, if determined necessary.	a) Updated information on the Buck Creek Watershed was provided in the *Buck Creek Watershed Evaluation Report* provided in Appendix G. Details on watershed control program can be found in The Buck Creek Watershed Comprehensive Management Plan, DNR and City of White Salmon, August 2002 (not included in WSP due to size). b) The Watershed Agreement lapsed due to an oversight and the City handling other pressing matters. The City proposed to initiate development of a new watershed agreement with the DNR in April 2024 with a target completion date of March 2025. The development of a new watershed agreement is discussed in Chapters 5 and 8 (i.e., Table 8-2). c) No additional comments from DOH Source Water Protection staff were received by the City.	Appendix G 5-2, 8-6 N/A
34	Appendix H, provide sampling maps. Maps may be combined if different sample types are adequately distinguished.	The sampling map was inadvertently left out of the submitted draft but has been added to the revised draft.	Appendix H
Other			
35	The final WSP must be stamped, signed, and dated by a Professional Engineer licensed in the State of Washington prior to DOH approval.	Noted.	N/A
36	The Department of Ecology has issued a comment letter regarding this submittal dated August 21, 2023. Please address the issues contained in the letter in the second draft submittal.	In Table 3-9 (page 3-35), the annual volume for Certificate 10252 was revised by removing 688 ac-ft from the Annual Volume (Qa), ac-ft under the "Primary" column and moving this value to the "Non-Additive Volume" column.	N/A
37	Provide signed SEPA checklist and signed Threshold Determination.	Signed SEPA Checklist and Threshold Determination were added to Appendix J.	Appendix J
38	The water system must meet the consumer input process outlined in WAC 246-290-100(8). Please include documentation of a consumer meeting discussing the Water System Plan prior to its approval, including public notice and signed meeting minutes.	Two public presentations were made on the WSP: May 18, 2022, and November 16, 2022, and are discussed in Chapter 10. Signed meeting minutes and the appropriate Public Notice are provided in Appendix B.	Chapter 10, Appendix B

No.	DOH Comment	Water System Response	Page No.
39	DOH interprets WAC 246-290-100 approval language to mean that the approved number of years is based on the "plan approval period" projections provided in the WSP, i.e., the date of the last projected year will be the year the WSP will be approved through. The Preplan Agreement and the Water System Planning Guidebook page 4, Plan Approval Period, also address this. A significant amount of time has occurred since the preplan meeting due to staff changes at the city, resulting in a delayed WSP submittal. As a result, the previously discussed "plan approval period" ending in 2031 would no longer result in a 10-year approval. If the city desires to maximize the life of the WSP with a 10-year approval, please revise all "plan approval period" projections to 2034 (assuming an approval sometime in 2024). Adjust this year as needed if the second draft is delayed for any reason. Additionally, make sure any text reference to the plan's approval date is clear that ten years is based on provided data and is not guaranteed. The relevant sections include projections for population, service connections, and ERUs; capacity analysis; water demand forecast (before and after WUE savings); capital improvement program; and budget.	The WSP was revised to the 2024-2034-2044 planning periods. The revised planning periods primarily affected relevant sections of Chapters 2, 3, 4, 8, and 9. The WSP is only a plan; none of the population, water demand/consumption, capital improvement program, and system income/expense projections are guaranteed.	Chapters 2, 3, 4, 8, and 9
40	When DOH is ready to approve the document, we will notify you. At that time, the governing body will need to officially approve the Water System Plan and send DOH documentation of plan approval by the governing body, such as a copy of the signed meeting minutes or a copy of the signed resolution. When the documentation is received, we will send a letter documenting DOH approval. Approval by the governing body before DOH notification may result in re-approvals.	Noted.	N/A
Other Revisions Made to Plan Initiated by City and/or Consultant			
A	Table 1-1, Water System History was revised to include notable 2023 activities.		1-4
B	Added reference to The Buck Creek Watershed Comprehensive Management Plan, DNR and City of White Salmon, August 2002.		1-7
C	The ERUs for the residential users (both inside and outside the City) shown on Table 2-8 were revised to reflect and equal the number of units.		2-12

No.	DOH Comment	Water System Response	Page No.
D	Modeling of Existing Transmission Main - The value of 1,551 gpm for the transmission main capacity was under specific hydraulic conditions performed to compare the capacity of the existing 14-inch diameter main with potential new 16-inch and 20-inch diameter mains as replacements. In reviewing the hydraulics of the City's system, this value does not appear correct as the calculated number of ERUs of 4,033 is below the actual number of ERUs being served. Yet, the existing transmission main appears to be able to handle existing peak flows satisfactorily. To better represent the transmission main's peak capacity, the reservoir conditions at Los Altos and Spring Street reservoir tanks were set at an elevation of 888.0 feet (approximately 11 feet down at the Los Altos Reservoir and 1 foot down at the Spring Street Reservoir). This elevation was selected as approximately halfway level in the Los Altos Reservoir (below the OS and ES levels but still in the SB/FSS portion of the storage). Higher reservoir elevation levels would result in lower flows and, likewise, lower reservoir elevations would result in higher flows. This reservoir value was selected as a reasonable measure for the transmission capacity. The flow capacity of the transmission main under these conditions is 1,735 gpm. This new value was used to calculate the transmission main capacity.		3-49 and 3-50, Appendix E
D	The information on Table 4-3 was updated to reflect the current status of the WUE measures. The title was changed to include "Revised" to note this change.		4-11
E	In recalculating values for the revised planning period starting in 2024, the water consumption data used for the reservoir calculations in different service areas were revised to 2021 data. This change in the basis year affected some values but the overall comments and conclusions for the reservoir capacity analysis did not change. The reservoir calculation data provided in the Excel spreadsheet form in Appendix E were considered overly complicated and removed. This spreadsheet is available upon request.		Table 3-11, 3-39
F	Following revisions were made to Table 6-8, Summary of Records Maintained by the City of White Salmon: 1) Lead and Copper Sampling Results - minimum time of storage changed to 12 years. 2) Daily Source Meter Reports - changed to 10 years. 3) Added "Record of action taken to correct violations of primary drinking water standards and exceedances of State Action Levels" - 10 years retention. 4) Added "Level 1 or Level 2 Assessments or other summary of sanitary defects and corrective actions" - Five years after completion of the assessment or corrective actions.		6-13
G	Table 8-1, Capital Improvements Program, and Table 8-2, System Measure Improvements Table, were updated to reflect current conditions, primarily with respect to the projected schedule for improvements and measures.		8-3 through 8-7
H	Chapter 10 - Text for Chapter 10 was provided.		10-1
I	Appendix I - Several files were provided in duplicate. The duplicate files have been removed. In addition, the preliminary financial calculations spreadsheets were removed to save room in the WSP.		Appendix I
J	Ecology letter with comments on water rights, dated November 1, 2024. For response, refer to Comment No. 36 above.		See above.

ADD = average daily demand
AMI = advanced metering infrastructure
AMR = automated meter reading
APWA = American Public Works Association
ASR = aquifer storage and recovery

AWWA = American Water Works Association
CIP = Capital Improvements Plan
DNR = Washington State Department of Natural Resources
DOH = Washington State Department of Health
DSL = distribution system leak
Ecology = Washington State Department of Ecology
ERUs = equivalent residential unit
ES = equalizing storage
FSA = future service area
FSS = fire suppression storage
gpd = gallons per day
gpm = gallons per minute
LSL = lead service line
MDD = maximum daily demand
N/A = not applicable
OS = operational storage
SB = standby
SCADA = supervisory control and data acquisition
SDWA = Safe Drinking Water Act
SEPA = State Environmental Policy Act
SR 14 = State Route 14
USGS = U.S. Geological Survey
WAC = Washington Administrative Code
WFI = Water Facilities Inventory
WLCAP = Water Loss Control Action Plan
WSDOT = Washington State Department of Transportation
WSP = Water System Plan
WTP = Water Treatment Plant
WUE = water use efficiency

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Central Region Office
1250 West Alder St., Union Gap, WA 98903-0009 • 509-575-2490

November 1, 2024

Marla Keethler, Mayor
City of White Salmon
P.O. Box 2139
White Salmon, WA 98672
Email: mayor@ci.white-salmon.wa.us

Re: White Salmon, City of Water System; ID #96350; Klickitat County
Second Draft Water System Plan; DOH Project # 23-0609

Dear Marla Keethler:

Thank you for the opportunity to review the above referenced Water System Plan (WSP), received on date. Consistent with the Memorandum of Understanding between the Department of Health (DOH) and Department of Ecology (Ecology), regarding joint review and approval of WSPs, this letter is being sent to your office with Ecology's comments. Specific elements of the WSP review included the Water Rights Self-Assessment as well as additional water rights documentation, including Ecology's water right files and previous WSPs and project reports, as applicable.

The issues identified are listed below, please address the following items prior to finalizing the WSP.

Ecology found that the annual quantity of certificate 10252 (S4-*17759CWRIS) is non-additive to certificates 3474 and 7109. The total annual quantity allowed under the City's existing rights is correct at 1,468 acre-feet per year.

Contact information

Please direct all questions about this letter to:

Christopher Kossik
Permitting Unit Supervisor
Water Resources Program
Central Region Office

Phone: 509-379-1826
Email: christopher.kossik@ecy.wa.gov

Americans with Disabilities Act information

Accommodation Requests

To request ADA accommodation including materials in a format for the visually impaired, call Ecology at 360-407-7668 or visit https://ecology.wa.gov/accessibility. People with impaired hearing may call Washington Relay Service at 711. People with speech disability may call TTY at 877-833-6341.

Signature

Sincerely,

Christopher Kossik
Permitting Unit Supervisor
Water Resources Program
Central Region Office

CK:aa (241109)

ecc:
Jamie Clark, Department of Health, jamie.clark@doh.wa.gov
Eastern Regional Operations Admin, Department of Health, eroadmin@doh.wa.gov
Andrew Dirks, PW Superintendent, andrewd@ci.white-salmon.wa.us
David Jepsen, Anderson Perry, djepsen@andersonperry.com
Klickitat County Health Department, davidk@klickitatcounty.org
Klickitat County Planning Department, mo-chil@klickitatcounty.org

From: Kossik, Christopher (ECY) <CKOS461@ECY.WA.GOV>
Sent: Wednesday, November 6, 2024 2:28 PM
To: Dave Jepsen
Cc: Clark, Jamie C (DOH); andrewd@ci.white-salmon.wa.us; pwsoperations@ci.white-salmon.wa.us; Jay Peninger; Simmons, Heather (ECY); Bingham, Rachael (ECY); Kavanagh, David (DOHi); mo-chil@klickitatcounty.org; Clerk Treasurer
Subject: RE: City of White Salmon WSP ID #96350 DOH Project #23-0609 Comment letter

Hi David,

Thank you for making those edits. This fully addresses my concerns stated in my comment letter.

Thanks,
Christopher Kossik
Water Resources Program
509-379-1826

From: Dave Jepsen <djepsen@andersonperry.com>
Sent: Wednesday, November 6, 2024 2:16 PM
To: Kossik, Christopher (ECY) <CKOS461@ECY.WA.GOV>
Cc: Clark, Jamie C (DOH) <Jamie.Clark@doh.wa.gov>; andrewd@ci.white-salmon.wa.us; pwsoperations@ci.white-salmon.wa.us; Jay Peninger <jpeninger@andersonperry.com>; Simmons, Heather (ECY) <hsim461@ECY.WA.GOV>; Bingham, Rachael (ECY) <rbin461@ECY.WA.GOV>; Kavanagh, David (DOHi) <davidk@klickitatcounty.org>; mo-chil@klickitatcounty.org; Clerk Treasurer <clerktreasurer@ci.white-salmon.wa.us>
Subject: FW: City of White Salmon WSP ID #96350 DOH Project #23-0609 Comment letter
Importance: High

Christopher:

Thank you for calling me back about the water rights comment on the City of White Salmon's Water System Plan. It is my understanding that the best way to address the water rights comment is as follows:

In Table 3-9. (page 3-35), the annual volume for Certificate 10252 shall be revised by removing 688 acre-ft from the Annual Volume (Qa), ac-ft under the "Primary" column and move this value to the "Non-Additive Volume" column. I have shown this change below using track changes:

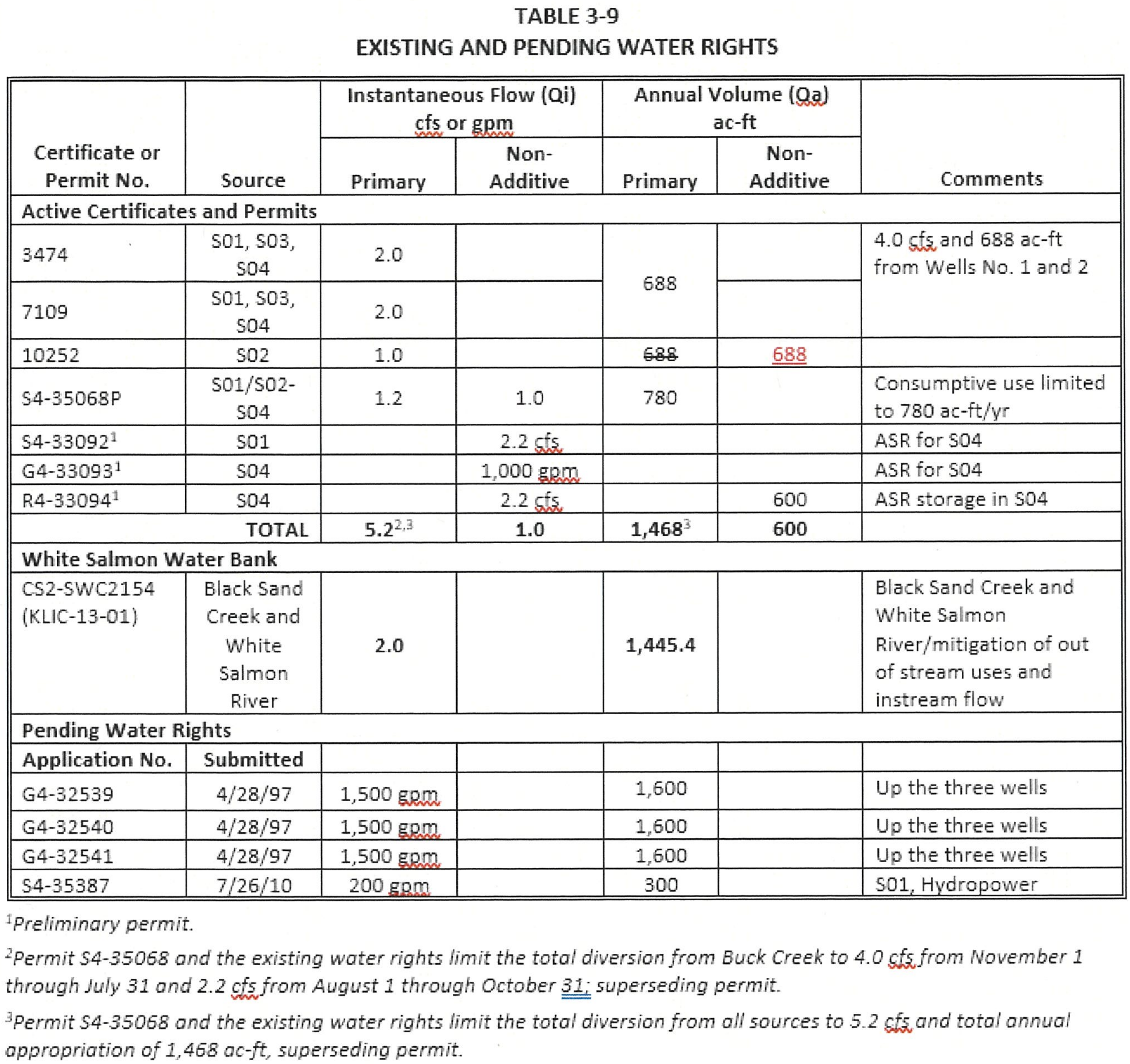

TABLE 3-9
EXISTING AND PENDING WATER RIGHTS

Certificate or Permit No.	Source	Instantaneous Flow (Qi) cfs or gpm		Annual Volume (Qa) ac-ft		Comments
		Primary	Non-Additive	Primary	Non-Additive	
Active Certificates and Permits						
3474	S01, S03, S04	2.0		688		4.0 cfs and 688 ac-ft from Wells No. 1 and 2
7109	S01, S03, S04	2.0				
10252	S02	1.0		~~688~~	688	
S4-35068P	S01/S02-S04	1.2	1.0	780		Consumptive use limited to 780 ac-ft/yr
S4-33092[1]	S01		2.2 cfs			ASR for S04
G4-33093[1]	S04		1,000 gpm			ASR for S04
R4-33094[1]	S04		2.2 cfs		600	ASR storage in S04
	TOTAL	**5.2**[2,3]	**1.0**	**1,468**[3]	**600**	
White Salmon Water Bank						
CS2-SWC2154 (KLIC-13-01)	Black Sand Creek and White Salmon River	**2.0**		**1,445.4**		Black Sand Creek and White Salmon River/mitigation of out of stream uses and instream flow
Pending Water Rights						
Application No.	**Submitted**					
G4-32539	4/28/97	1,500 gpm		1,600		Up the three wells
G4-32540	4/28/97	1,500 gpm		1,600		Up the three wells
G4-32541	4/28/97	1,500 gpm		1,600		Up the three wells
S4-35387	7/26/10	200 gpm		300		S01, Hydropower

[1] *Preliminary permit.*

[2] *Permit S4-35068 and the existing water rights limit the total diversion from Buck Creek to 4.0 cfs from November 1 through July 31 and 2.2 cfs from August 1 through October 31; superseding permit.*

[3] *Permit S4-35068 and the existing water rights limit the total diversion from all sources to 5.2 cfs and total annual appropriation of 1,468 ac-ft, superseding permit.*

We did check the water rights self-assessment form in Appendix F and find that the 688 ac-ft for Certificate 10252 is in the correct column ("Non-Additive").

We plan to modify our response to the water rights comment in our DOH Comment Response Table also so that we can properly track changes made to the WSP.

DOH staff has requested that we obtain confirmation that the water rights comment has been resolved with your Department. Could you send us confirmation that the proposed changes properly address the water rights comment?

Thank you again!

ap anderson perry

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David Jepsen | *Senior Engineer*
509-529-9260 office | 509-540-9584 cell/text

From: Dave Jepsen
Sent: Wednesday, November 6, 2024 1:34 PM
To: Kossik, Christopher (ECY) <CKOS461@ECY.WA.GOV>
Cc: Clark, Jamie C (DOH) <Jamie.Clark@doh.wa.gov>; Andrew Dirks <andrewd@ci.white-salmon.wa.us>; pwsoperations@ci.white-salmon.wa.us; Jay Peninger <jpeninger@andersonperry.com>; Simmons, Heather (ECY) <hsim461@ECY.WA.GOV>; Bingham, Rachael (ECY) <Rbin461@ECY.WA.GOV>; Kavanagh, David (DOHi) <davidk@klickitatcounty.org>; mo-chil@klickitatcounty.org
Subject: FW: City of White Salmon WSP ID #96350 DOH Project #23-0609 Comment letter
Importance: High

Mr. Kossik:

I am following up on my email of last week that I sent you and had hope to get a reply from you. The City of White Salmon has a Council meeting tonight and would like to adopt the compiled Water System Plan. However, we need some clarification on your comment on the City's water rights, which I have attempted to address below. If possible, I would appreciate a call today on my cell phone [(509) 540-9584] if you are available. The Department of Health has requested resolution of your comment before they will issue formal approval.

Thank you.

anderson perry
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David Jepsen | *Senior Engineer*
509-529-9260 office | 509-540-9584 cell/text

From: Dave Jepsen
Sent: Friday, November 1, 2024 1:56 PM
To: Kossik, Christopher (ECY) <CKOS461@ECY.WA.GOV>
Cc: Clark, Jamie C (DOH) <Jamie.Clark@doh.wa.gov>; Andrew Dirks <andrewd@ci.white-salmon.wa.us>; Jay Peninger <jpeninger@andersonperry.com>; hsim461@ECY.WA.GOV; Rbin461@ECY.WA.GOV; Kavanagh, David (DOHi) <davidk@klickitatcounty.org>; mo-chil@klickitatcounty.org
Subject: FW: City of White Salmon WSP ID #96350 DOH Project #23-0609 Comment letter
Importance: High

Christopher:

Thank you for your review and comments on the City of White Salmon's water rights section of the Water System Plan (WSP). There is some confusion on the City and our part with respect to your comment. First you indicate that there is an issue (specifically, Ecology found that the annual quantity of certificate 10252 (S4-*17759CWRIS) is non-additive to certificates 3474 and 7109. The total annual quantity allowed under the City's existing rights is correct at 1,468 acre-feet per year).We agree that total annual quantity allowed under the City's existing rights is correct at 1,468 acre-feet per year. Is there still an issue if we are agreement with the 1,468 acre-feet per year?

The only potential point of confusion that we could find is that we included the water right values for C2-SWC2154 in the water rights self-assessment table, as it is our understanding that the values from this water right could be asserted by the City in the future. We noted that the inclusion of this water right in the notes to the water rights self-assessment table. However, the "issue" noted in your comment letter does not refer to this water right. We would appreciate additional clarification on your comment and noted issue, and whether additional revisions are needed to the WSP text or water rights self-assessment table.

anderson perry
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David Jepsen | *Senior Engineer*
509-529-9260 office | 509-540-9584 cell/text

From: Andreas, Angela (ECY) <anan461@ECY.WA.GOV>
Sent: Friday, November 1, 2024 9:01 AM
To: mayor@ci.white-salmon.wa.us
Cc: Clark, Jamie C (DOH) <Jamie.Clark@doh.wa.gov>; DOH EPH DW ERO ADMIN <EROADMIN@DOH.WA.GOV>; andrewd@ci.white-salmon.wa.us; Dave Jepsen <djepsen@andersonperry.com>; Kavanagh, David (DOHi) <davidk@klickitatcounty.org>; mo-chil@klickitatcounty.org; Kossik, Christopher (ECY) <CKOS461@ECY.WA.GOV>; Simmons, Heather (ECY) <hsim461@ECY.WA.GOV>; Bingham, Rachael (ECY) <rbin461@ECY.WA.GOV>
Subject: City of White Salmon WSP ID #96350 DOH Project #23-0609 Comment letter

Please respond to this email communication indicating you have received your document(s) referenced above.

Good morning,

Attached please find the Department of Ecology's WSP Comment letter for City of White Salmon, ID #96350, DOH Project #23-0609 in the above referenced matter.

If you have any questions, please contact Christopher Kossik directly at christopher.kossik@ecy.wa.gov.

Thank you.

Americans with Disabilities Act information

Accommodation Requests

To request ADA accommodation including materials in a format for the visually impaired, call Ecology at 360-407-7668 or visit https://ecology.wa.gov/accessibilty. People with impaired hearing may call Washington Relay Service at 711. People with speech disabilities may call TTY at 877-833-6341.

Angie Andreas

Angie Andreas | Secretary Senior
Department of Ecology | Water Resources |Central Regional Office
1250 W. Alder St. | Union Gap, WA. 98903-0009
Cell: (509) 406-5300 | Main (509) 575-2490

angie.andreas@ecy.wa.gov

RESOLUTION 2024-11-610

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF WHITE SALMON, WASHINGTON, ADOPTING THE CITY OF WHITE SALMON WATER SYSTEM PLAN.

WHEREAS, the City of White Salmon is required to update their Water System Plan every 10 years; and

WHEREAS, WAC 246-290-100 dictates the Water System Plan update process; and

WHEREAS, the City of White Salmon City Council held a public hearing on Water Use Efficiency Goals on May 18, 2022, and discussed the proposed Water System Plan at its regularly scheduled meeting on November 16, 2022; and

WHEREAS, the City was issued a Determination of Non-Significance for the Water System Plan under SEPA on October 4, 2023; and

WHEREAS, Washington State Departments of Health comments of December 23, 2023, and Washington State Department of Ecology comments of August 23, 2023, and November 1, 2024, were addressed in the current version for adoption; and

NOW THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF WHITE SALMON, WASHINGTON, as follows:

1. The White Salmon Water System Plan attached as Exhibit A is hereby accepted.

PASSED by the Council of the City of White Salmon, Washington. Dated this 6th day of November, 2024.

CITY OF WHITE SALMON, WASHINGTON

DocuSigned by:
361DCEFEBE64421...
Marla Keethler, Mayor

ATTEST:

DocuSigned by:
Stephanie Porter
F5160DB6A85C4B3...
Stephanie Porter, Clerk/Treasurer

APPROVED AS TO FORM:

Signed by:
Shawn MacPherson
8D43A75E83504E9...
Shawn MacPherson, City Attorney

APPENDIX C

Technical Memorandums

anderson perry & associates, inc.

214 E. Birch Street, P.O. Box 1687
Walla Walla, WA 99362
(509) 529-9260, Fax (509) 529-8102
www.andersonperry.com

engineering ▪ surveying ▪ natural resources

TECHNICAL MEMORANDUM NO. 1

To: Pat Munyan, Public Works Director/City Administrator,
City of White Salmon, Washington

From: David Jepsen, P.E., Anderson Perry & Associates, Inc.

Re: Water Loss Control Action Plan

Date: February 22, 2022

Job/File No.: 250-12-02, w/attach

DAVID THEODORE JEPSEN
42991
David Theodore Jepsen
2/22/2022

Introduction

The proposed Water Loss Control Action Plan (WLCAP) for the City of White Salmon is described herein. To comply with the State of Washington's Water Use Efficiency (WUE) rules, a Distribution System Leakage (DSL) standard was enacted. Any authorized water that is not tracked or estimated will be considered DSL. The State of Washington has set the DSL standard at 10 percent or less for a three-year rolling average. The City's rolling three-year average for DSL is 32.6 percent, which is above the DSL standard. The current DSL in the City is 35.5 percent. Consequently, the City will need to implement a WLCAP.

WLCAP Required Elements

The required elements of a WLCAP based on Chapter 6.7 of the Washington State Department of Health (DOH) Water Use Efficiency Guidebook (DOH 331-375, 2017) are as follows:

- Completed water audit
- Proposed water loss control methods
- An estimate of the time necessary to achieve the DSL standard
- Identify actions and benchmarks to achieve water loss reductions
- Implement the recommended "functional focus areas" based on water audit validity score
- Establish a supply side goal, including a timeframe to achieve an Infrastructure Leakage Index (ILI) of 3.0 or lower
- Implement water loss control activities that strive to achieve an ILI of 3.0 or lower
- Include a copy of the water audit results within the WUE Program of a Water System Plan

AWWA Water Audit

A water audit was performed using American Water Works Association (AWWA) Free Water Audit Software (v6.0 2020) which operates as a Microsoft Excel spreadsheet. This software is the industry standard tool for conducting annual water audits and using the results to guide a program for cost-effective water loss control and revenue recovery. The AWWA Water Audit method features consistent definitions for the major forms of water consumption and water loss encountered in drinking water utilities, as well as a set of rational performance indicators that evaluate utilities on system-specific attributes.

The performance indicators allow water utilities to make a meaningful assessment of their water loss standing, benchmark themselves with other water utilities, and set performance targets. The water audit shows how much of each type of loss is occurring and how much it is costing the water utility. The key concept around this method is that all water is quantified, via measurement or estimate, as either a form of beneficial consumption or as wasteful loss. A cost is placed on each volume component to assess its financial impact on the water utility.

Along with quantifying volumes of real and apparent losses, the audit software provides the capability to rate or grade the water audit data and also provides guidance on the next best steps (i.e., functional focus areas) to take based upon the volume of losses, costs, and the degree of reliability of the audit data.

Version 6 of the AWWA Water Audit software has several significant revisions from previous versions that required more time and input on how the water data was generated, verified, and reviewed. The results from a 2020-2021 water audit on the City's water system are summarized on the attached worksheet, performance dashboard, water balance, and water loss control planning guide. An electronic copy of the completed water audit will be provided in the Water System Plan. The following is a summary of the water audit results.

- Calculated DSL value for the entire system (including transmission and distribution systems) was 43.7 percent
- Annual cost of water losses is an estimated $81,380
- Real losses equal 190.9 gallons per connection per day, a total of 135.8 million gallons (MG) per year
- ILI is 6.1, but should be less than 3.0
- Water Audit Data Validity Data Score equals 50, Level II (highest level is V)
- Priority Areas for Attention (Functional Focus Areas)
    - Volume from Own Sources
    - Customer Metering Inaccuracies
    - Variable Production Cost

Based on the performance dashboard results, the City has a high ILI and high relative total and real water losses compared to other entities. Given the high DSL observed in the past, these findings are not surprising. The calculated DSL value from the Water Audit spreadsheet is higher than the 2020 DSL value reported by the City due in part to the inclusion of losses from the Buck Creek Transmission Main.

The 2020 water audit score (50) was lower than the score in 2011 (81). This scoring difference is attributed to the Version 6 software placing more scrutiny on the water audit data accuracy, collection, and review. To improve this score, the City will need to place more emphasis on water data accuracy, collection, and review.

The identified priority areas of 1) Volume from Own Sources and 2) Customer Meter Inaccuracies stem from the lack of calibration of the source meters or verification of the accuracy of the customer meters.

Proposed Water Loss Control Methods

We recommend the following water loss control methods to reduce the DSL value.

Establish WUE Supply Side Goals – City adoption of a WUE supply goal for DSL of less than 25 percent in the next 6 years is recommended. While the proposed DSL goal of 25 percent is significantly higher than the ultimate goal of 10 percent, the 25 percent goal is considered achievable. To achieve the DSL goal of 10 percent or less (based on 2020 data), the City would need to reduce their water supplied by 119 MG while maintaining their authorized consumption at around 176 MG. The 119 MG amount is equivalent to approximately 326,000 gallons per day or 226 gallons per minute (gpm). This amount of water loss reduction does not appear to be achievable in a 6-year period.

A more realistic goal would be for the City to reduce DSL to 25 percent within the next six-year period. To achieve a DSL of 25 percent with 2011 water consumption figures and no growth in water usage, a reduction of 49 MG per year is needed, which translates to 93 gpm. With a concerted WLCAP effort, this water loss reduction appears feasible over the next six years.

The use of an ILI goal value was not selected as the ILI is more complicated to calculate and the City is already familiar with performing the DSL calculations on an annual basis.

Calibration of Source Meters – All the City's source meters are magnetic flowmeters, which are very reliable as they contain no moving parts. However, all the City's source meters have been in service for an extended period and the calibration of these flowmeters should be verified to confirm their accuracy. If a flowmeter cannot be adequately calibrated or its operation verified, then the City should consider replacing the flowmeter.

Better Documentation and Tracking of Unbilled Authorized Consumption – The City should continue to expand and improve its tracking of unbilled authorized consumption within its system. Specific areas to improve tracking of water use include the following.

- Street cleaning
- Tractor truck usage
- Hydrant flushing and firefighting
- Other fire districts utilizing City water from City's standpoint at the Fire Station or from fire hydrants
- Flushing related to new water main construction or repairs on existing mains

Leak Detection in Water System – While the City has been actively repairing visible and reported leaks, most of the leakage points in the system are likely not observed. Performance of leak testing on the City's water system would likely identify additional areas of leakage that need repair. The City hired a consultant to perform leak detection in 2019 of the core area of the City's water system. Based on this investigation, estimated leakage from defined leaks was 32.5 gpm. The defined and undefined leaks were addressed individually or addressed in the water main replacement projects on West and East Jewett Boulevard and NW Garfield Avenue.

Periodic leak detection should be performed annually, starting in 2024, over the next six years on a portion of the City's water system to detect and isolate leakage within the system. This leak detection can be performed by City staff or a consultant. Recommended areas for leak detection include the areas not included in the 2019 investigation (Vine Street, older 8-inch main serving Skyline Hospital, 6-inch main to Bingen intertie), piping in the Los Altos pressure zone, and piping in the Dock Grade pressure zone.

Perform Monthly Water Meter Readings – The City currently reads its customer meters every other month (January, March, May, July, September, November). Monthly meter readings are recommended to provide more immediate feedback to both the customer and the City on water consumption. The City plans to begin monthly meter readings when all of the new water meters have been installed, which is slated for completion in June 2022.

Complete Meter Installation and Automated Meter Reading (AMR) – The City is currently nearing the completion of installing new water meters on all its services. The only exceptions are the Bingen intertie meters. The new water meters are capable of automated meter reading (AMR), which should improve meter reading accuracy and reduce City staff time spent reading meters. The City believes that all of the new meters should be installed by June 2022 and the AMR implemented in the same time frame.

Implement Additional Pressure Management – Municipal water systems typically operate at a pressure of between 55 and 85 pounds per square inch (psi); the average operating pressure in the City's water system is 114 psi. Water leakage through cracks, breaks, and splits on a water main is greater with higher operating pressures.

The high pressure is needed for portions of the City's water system, such as the transmission main from Buck Creek and the source wells, to convey water to town and are thus unavoidable. The best means for these areas is to minimize the high-pressure areas and keep the existing water system in good operating condition.

High pressure in other segments of the City's water system is due to existing topographic elevation differences within the water service area. These areas of high pressure can be addressed through pressure management utilizing pressure reducing valves (PRV). An example of this pressure management is the three PRV stations that were installed as part of the Jewett Water Main Improvements project to reduce water pressure on the lower section of the Jewett water main. As an example, these stations reduced the pressure at the intersection of Skyline Drive and Jewett Boulevard from 216 psi to 120 psi. While 120 psi is still high for a water system, this pressure is considerably better than over 200 psi. The high pressure in this area is needed to maintain a minimum pressure of 75 psi to serve Skyline Hospital.

In previous versions as well as the current version of City's Water System Plan, the implementation of cascading pressure zones has been recommended. The concept of cascading pressure zones is a valid and practical approach but will take time and significant finances to implement. The City should first review implementing additional pressure management in the higher pressure areas (e.g., greater than 150 psi). Two such areas include the southwest portion of the City's water system (i.e., Eyrie Road) and the 6-inch diameter water main behind Skyline Hospital that is intertied with Bingen. The Eyrie Road area has an existing PRV station but is not active as there is some backflow occurring in the system that needs to be investigated. The 6-inch diameter water main with an intertie to Bingen originally had a PRV upstream, which was removed during the Jewett Water Main Improvements project due to installation of PRVs farther upstream.

Water Main Replacement and Abandonment – The City is currently in the process of designing for the replacement of the existing 14-inch diameter transmission main segments that are still in service. These water main segments are at the end of their service life with portions of the main having a working pressure over 200 psi. Replacement of these transmission main segments should remain a priority.

Within the distribution system, the City staff has identified steel water mains less than 3 inches in diameter and asbestos-cement pipe as the types of pipe most susceptible for leakage. In most cases, these pipes should be replaced with either PVC or ductile iron pipe of a larger diameter. In addition, there are a number of instances in the City where two parallel pipes are still in service. In these cases, the pipe considered most susceptible to leakage should be abandoned unless there is an overriding reason for a parallel pipe installation. Leak detection may be able to identify specific segments of the distribution system that need to be replaced.

WLCAP Summary

The proposed City WLCAP, including start dates, budget, comments, and additional potential measures, is summarized in Table 1. These measures and activities are for the City to reduce its reported DSL value towards the ultimate goal of below 10 percent.

TABLE 1
Summary of Proposed Water Loss Control Action Plan for the City of White Salmon

Measure/Activity	Implementation Date and Notes
Establish a Water Supply Goal of DSL of less than 25 percent by 2028	2022– Recommended for adoption as a 6-year goal, calculated on an annual basis
Calibration of Source Meters	Dec 2023 – Calibration or replacement of source meters
Better Documentation and Tracking of Unbilled Unauthorized Consumption	June 2022 – City staff to implement additional internal tracking
Leak Detection of Water System	Internal – Ongoing verification of visible or reported leaks Use of Consultant – Starting annually in 2023
Monthly Reading of Service Meters	June 2022 – Coincide with AMR implementation
Complete Meter Installation and AMR	June 2022 – Budgeted for 2022, AMR Equipment to be installed by staff
Additional Pressure Management	Initial Target Areas: Eyrie Rd PRV review – June 2022 6-inch Main, Bingen Intertie review – July 2022
Water Main Replacement and Abandonment – Water Transmission Main Upgrade Phases I and II	Phase I – Construction funding obtained Phase II – Under design, need construction funds

Projected Compliance with the DSL Standard

It is difficult to predict when the City will be in compliance with the DSL goal given that the exact sources of leakage and losses within the system are not yet fully understood or identified. Given the magnitude of the current DSL value, compliance with 10 percent or less DSL is not projected in the next six years.

ATTACHMENTS
Attachment 1 - 2020-2021 AWWA Water Audit

DJ/ct

ATTACHMENT I
2020-2021 AWWA Water Audit

AWWA Free Water Audit Software:
Worksheet

FWAS v6.0

Water Audit Report for: City of White Salmon
Audit Year: 2020 | Jan 07 2020 - Jan 11 2021 | Calendar

Click 'n' to add notes
Click 'g' to determine data validity grade

To edit water system info: go to start page

To access definitions, click the input name

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

WATER SUPPLIED

Water Supplied Error Adjustments
choose entry option:

VOS	Volume from Own Sources:	n g	3	357.110	MG/Yr	n g	8	1.00%	percent	under-registration	VOSEA
WI	Water Imported:	n g	n/a	0.000	MG/Yr						WIEA
WE	Water Exported:	n g	3	47.616	MG/Yr	n g	3		percent		WEEA

WATER SUPPLIED: 313.101 MG/Yr

AUTHORIZED CONSUMPTION

BMAC	Billed Metered:	n g	8	173.297	MG/Yr
BUAC	Billed Unmetered:	n g	n/a	0.000	MG/Yr
UMAC	Unbilled Metered:	n g	2	1.789	MG/Yr
UUAC	Unbilled Unmetered:	n g	6	1.348	MG/Yr

choose entry option: custom 1.348 MG/Yr

AUTHORIZED CONSUMPTION: 176.434 MG/Yr

WATER LOSSES

136.667 MG/Yr

Apparent Losses

Default option selected for Systematic Data Handling Errors, with automatic data grading of 3

choose entry option:

SDHE	Systematic Data Handling Errors:	n g	3	0.433	MG/Yr	0.25%	default	
CMI	Customer Metering Inaccuracies:	n g	1	0.000	MG/Yr		percent	under-registration
UC	Unauthorized Consumption:	n g	3	0.433	MG/Yr	0.25%	default	

Default option selected for Unauthorized Consumption, with automatic data grading of 3

Apparent Losses: 0.866 MG/Yr

Real Losses

Real Losses: 135.801 MG/Yr

WATER LOSSES: 136.667 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 139.804 MG/Yr

SYSTEM DATA

Lm	Length of mains:	n g	6	44.2	miles	(including fire hydrant lead lengths)
Nc	Number of service connections:	n g	10	1,949		(active *and* inactive)
	Service connection density:			44	conn./mile main	

Are customer meters typically located at the curbstop/property line? Yes

Lp		n g	10		

Average length of customer service line has been set to zero and a data grading of 10 has been applied

AOP	Average Operating Pressure:	n g	6	114.0	psi

COST DATA

CRUC	Customer Retail Unit Charge:	n g	9	$2.16	$/1000 gallons (US)
VPC	Variable Production Cost:	n g	3	$572.26	$/Million gallons

Total Annual Operating Cost: $1,402,000 $/yr (optional input)

WATER AUDIT DATA VALIDITY TIER:

***** The Water Audit Data Validity Score is in Tier II (26-50). See Dashboard tab for additional outputs. *****

go to dashboard

A weighted scale for the components of supply, consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

1: Volume from Own Sources (VOS)
2: Customer Metering Inaccuracies (CMI)
3: Variable Production Cost (VPC)

KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

Unit Total Losses:		gal/conn/day
Unit Apparent Losses:		gal/conn/day
Unit Real Losses^:		gal/conn/day
Unit Real Losses^o:		gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)

FWAS v6.0

AWWA Free Water Audit Software: Dashboard

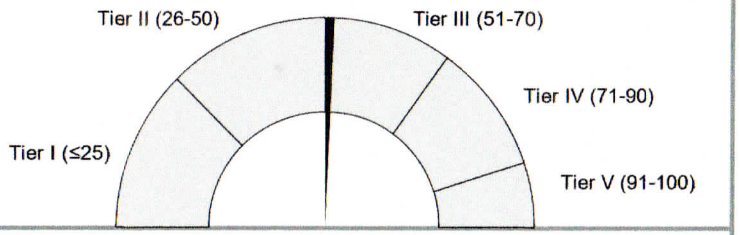
go to worksheet | go to grading | go to references

Water Audit Report for: City of White Salmon
Audit Year: 2020 Calendar Jan 07 2020 - Jan 11 2021

Data Validity

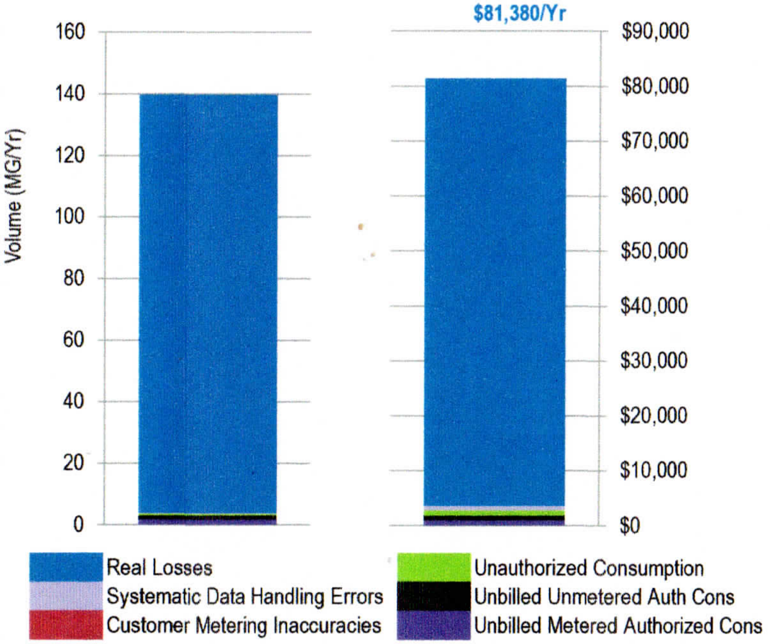
Data Validity Score: 50 **Data Validity Tier:** Tier II (26-50)

See Loss Control Planning for Tier Details



NRW Components Summary

Total Volume of NRW = 140 MG/Yr
Total Cost of NRW = $81,380/Yr

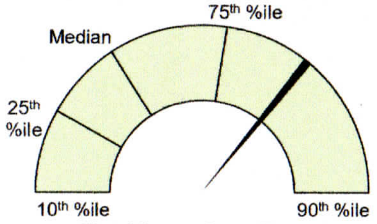


	Volume MG/Yr	Value $/Yr	Basis of Valuation
Apparent Losses	0.9	$1,872	CRUC
Real Losses	135.8	$77,713	VPC
Unbilled Authorized Cons	3.1	$1,795	VPC
Non-Revenue Water	139.8	$81,380	Blended

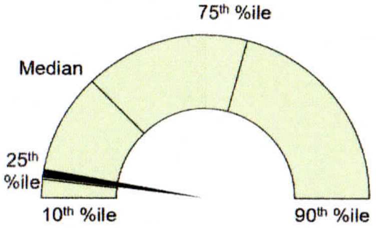
Key Performance Indicators

Actual KPI result ▬ Target (see Worksheet) ┈┈

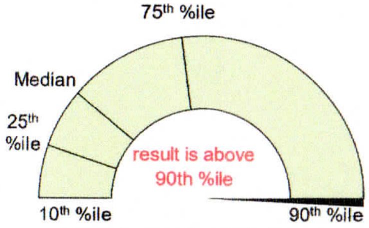
gauge %iles per validated industry ranges[2]



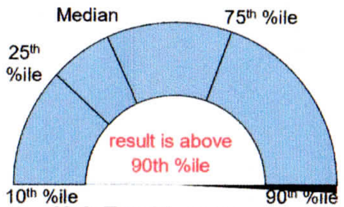
Total Loss Cost Rate
40.83 $/conn/year



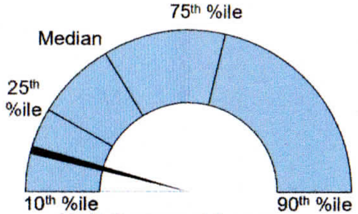
Apparent Loss Cost Rate
0.96 $/conn/year



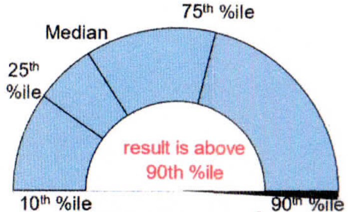
Real Loss Cost Rate
39.87 $/conn/year



Unit Total Losses
192.1 gal/conn/day

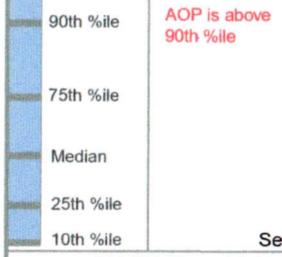


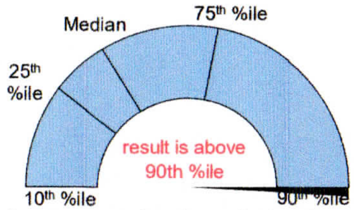
Unit Apparent Losses
1.2 gal/conn/day



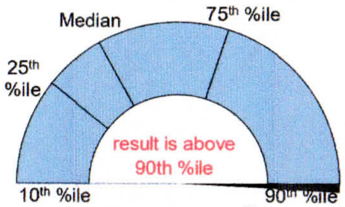
Unit Real Losses[A]
190.9 gal/conn/day

Average Operating Pressure
114 psi





Infrastructure Leakage Index (ILI)
6.1 dimensionless



Unit Real Losses[B]
8,409 gal/mile/day

See UARL definition for additional guidance on the ILI

(UARL) Unavoidable Annual Real Losses	22.1	MG/Yr	31.1	gal/conn/day

Guidance Information for Key Performance Indicators

- The eight indicators shown are the recommended suite per the AWWA Water Loss Control Committee 2020 Position on KPIs[1].
- A suite of KPIs is necessary, as no single KPI can holistically communicate water loss performance for a given water system.
- See Table 1 below for Uses and Limitations for each KPI, excerpted from the AWWA Water Loss Control Committee Report (2020)[1], with naming conventions updated.
- Percentiles (%iles) shown on KPI gauges come from Level 1 validated data in the AWWA WLCC Reference Water Audit Dataset (2020)[2].
- KPI %iles shown above are not segregated by cohorts. Limited KPI data by cohorts may be found in WRF 4695 Guidance Manual, Appendix B (2019)[5].
- Actual KPI results that fall below 10th %ile or above 90th %ile do not necessarily imply error, but should be viewed with scrutiny.
- Percentiles not intended to imply targets. Targets may be input by user for operational KPIs, if desired, on Worksheet.
- See UARL and ILI in Definitions tab for discussion of size and pressure limitations.
- Systems that fall on the extreme ends of size or connection density should use caution when interpreting Unit Losses KPIs.

Table 1

Source: AWWA Water Loss Control Committee Report (2020)[1], with naming conventions updated

2020 AWWA Water Audit Method – Water Audit Outputs and Key Performance Indicators: Uses and Limitations

Type	Indicator	Description	Suitable Purposes					Uses and Limitations	Principal Users
			Assessment	Bench-Marking	Target-Setting	Planning	Tracking		
Attribute	Apparent Loss Volume	Calculated by Free Water Audit Software	✓				✓	Assess loss level	Utility, Regulators
	Apparent Loss Cost	Calculated by Free Water Audit Software	✓				✓	Assess cost loss level	Utility, Regulators
	Real Loss Volume	Calculated by Free Water Audit Software	✓				✓	Assess loss level	Utility, Regulators
	Real Loss Cost	Calculated by Free Water Audit Software	✓				✓	Assess loss cost level	Utility, Regulators
	Unavoidable Annual Real Loss (UARL)	Calculated by Free Water Audit Software	✓				✓	Reveal theoretical technical low level of leakage	Utility, Regulators
Volume	Unit Apparent Losses (vol/conn/day)	Strong and understandable indicator for multiple users.	✓	✓	✓	✓	✓	Used for performance tracking and target-setting	Utility, Regulators
	Unit Real Losses[A] (vol/conn/day)	Strong and understandable indicator for multiple users.	✓	✓	✓	✓	✓	Used for performance tracking and target-setting	Utility, Regulators, Policy Makers
	Unit Real Losses[B] (vol/pipeline length/ day)	Strong and understandable indicator for use by utilities with low connection density.	✓	✓	✓	✓	✓	Data collection and assessment of systems with "low" connection density	Utility, Regulators, Policy Makers
	Unit Total Losses (vol/conn/day) **New KPI**	Strong and understandable indicator, suitable for high-level performance measurement.	✓				✓	High level indicator for trending analysis. Not appropriate for target-setting or benchmarking	Utilities, Customers
	Infrastructure Leakage Index (ILI)	Robust, specialized ratio KPI; can be influenced by pressure and connection density.	✓	✓			✓	Benchmarking after pressure management is implemented	Utilities
Value	Apparent Loss Cost Rate (value/conn/year) **New KPI**	Indicators with sufficient technical rigor. Provide the unit financial value of each type of loss, which is useful for planning and assessment of cost efficiency of water loss reduction and control interventions and programs.	✓			✓	✓	Data collection and assessment on AWWA indicators or contextual parameters to use in conjunction with Loss Cost Rates	Utilities, Regulators, Customers
	Real Loss Cost Rate (value/conn/year) **New KPI**		✓			✓	✓		Utilities, Regulators, Customers
Validity	Data Validity Tier (DVT)	Strong indicator of water loss audit data quality, if data has been validated. Tier provides guidance on priority areas of activity.	✓	✓		✓	✓	Assess caliber of data inputs of the water audit	Regulators, Utilities

AWWA Free Water Audit Software
Water Balance

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Water Audit Report for: City of White Salmon
Audit Year: 2020 Jan 07 2020 - Jan 11 2021
Data Validity Tier: Tier II (26-50)

Volume from Own Sources (VOS) (corrected for known errors) *360.717*	System Input Volume *360.717*	Water Exported (WE) (corrected for known errors) *47.616*	Billed Water Exported			Revenue Water (Exported) **47.616**
		Water Supplied *313.101*	Authorized Consumption *176.434*	Billed Authorized Consumption *173.297*	Billed Metered Consumption (BMAC) (water exported is removed) *173.297*	Revenue Water **173.297**
					Billed Unmetered Consumption (BUAC) *0.000*	
				Unbilled Authorized Consumption *3.137*	Unbilled Metered Consumption (UMAC) *1.789*	Non-Revenue Water (NRW) **139.804**
					Unbilled Unmetered Consumption (UUAC) *1.348*	
			Water Losses *136.667*	Apparent Losses *0.866*	Systematic Data Handling Errors (SDHE) *0.433*	
					Customer Metering Inaccuracies (CMI) *0.000*	
					Unauthorized Consumption (UC) *0.433*	
Water Imported (WI) (corrected for known errors) *0.000*				Real Losses *135.801*	Leakage on Transmission and/or Distribution Mains *Not broken down*	
					Leakage and Overflows at Utility's Storage Tanks *Not broken down*	
					Leakage on Service Connections *Not broken down*	

Water Audit Report for: City of White Salmon
Audit Year: 2020 Jan 07 2020 - Jan 11 2021
Data Validity Tier: Tier II (26-50)

Water Loss Control Planning Guide

Functional Focus Area	Water Audit Data Validity Tier (Score Range)				
	Tier I (1-25)	**Tier II (26-50)**	**Tier III (51-70)**	**Tier IV (71-90)**	**Tier V (91-100)**
Audit Data Collection	Launch auditing and loss control team; address supply metering deficiencies	Analyze business process for customer metering and billing functions and water supply operations; Identify data gaps; improve supply metering	Establish/revise policies and procedures for data collection	Refine data collection practices and establish as routine business process	Annual water audit is a reliable gauge of year-to-year water efficiency standing
Short-term loss control	Research information on leak detection programs; Begin flowcharting analysis of customer billing system	Conduct loss assessment investigations on a sample portion of the system: customer meter testing, leak survey, unauthorized consumption, etc	Establish ongoing mechanisms for customer meter accuracy testing, active leakage control and infrastructure monitoring	Refine, enhance or expand ongoing programs based upon economic justification	Stay abreast of improvements in metering, meter reading, billing, leakage management and infrastructure rehabilitation
Long-term loss control		Begin to assess long-term needs requiring large expenditure: customer meter replacement, water main replacement program, new customer billing system or AMR/AMI system	Begin to assemble economic business case for long-term needs based upon improved data becoming available through the water audit process	Conduct detailed planning, budgeting and launch of comprehensive improvements for metering, billing or infrastructure management	Continue incremental improvements in short-term and long-term loss control interventions
Target-setting			Establish long-term apparent and real loss reduction goals (+10 year horizon)	Establish mid-range (5 year horizon) apparent and real loss reduction goals	Evaluate and refine loss control goals on a yearly basis
Benchmarking			Preliminary Comparisons - can begin to rely upon with PIs for performance comparisons for real losses	Performance Benchmarking with PIs is meaningful in comparing real loss standing	Identify Best Practices/ Best in class; PIs are very reliable as real loss performance indicators for best in class service

For validity scores of 50 or below, the shaded blocks should not be focus areas until better data validity is achieved.

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engineering ▪ surveying ▪ natural resources

TECHNICAL MEMORANDUM NO. 2

To: Pat Munyan, Public Works Director/City Administrator,
City of White Salmon, Washington

From: David Jepsen, P.E., Anderson Perry & Associates, Inc.

Re: Reclaimed Water Use Evaluation

Date: February 22, 2022

Job/File No.: 250-12-02

DAVID THEODORE JEPSEN
42991
2/22/2022

Introduction

In this technical memorandum, the opportunities for reclaimed water use in the City of White Salmon are evaluated as a potential water use efficiency measure to be included in the City's Water Use Efficiency (WUE) Program. Evaluation of reclaimed water use opportunities is required under the State of Washington's Water Use Efficiency Rules for water systems with 1,000 or more service connections. Since the City has approximately 1,989 service connections, an evaluation of reclaimed water use opportunities will be performed. The basis and cost-effective evaluation of reclaimed water use by the City of White Salmon will be examined and discussed herein.

Potential Reclaimed Water Use

The best potential use of reclaimed water within White Salmon appears to be irrigation of parks, school yards, and ballfields. The City does not have any golf courses and limited (if any) land for pasture irrigation or sod farms that would require substantial water demand. Reclaimed water use in the City of Bingen may be a possibility if one of its industrial or commercial users (e.g., SDS lumber) were willing to utilize reclaimed water. Like White Salmon, Bingen does not have a golf course, and limited land for pasture irrigation or sod farming. There are two parks in the Bingen area where reclaimed water may potentially be used: Daubenspeck Park and Marina Park.

Reclaimed water used for irrigation in open access areas (i.e., parks, playgrounds, school yards, and residential landscape) would require Class A reclaimed water quality, which is the highest quality category of water recognized by the State. The three largest demands for irrigation in 2011 were at 1) the White Salmon Valley School District's Henkle Middle School and Columbia High School located off Loop Road, 2) Whitson Elementary School (off Main Street), and 3) the City's Rhinegarten Park. Approximately 5.3 million gallons (MG) of water was used for irrigation at the Middle and High Schools area in 2011. The Middle and High Schools are located at an elevation of approximately 820 feet.

At Whitson Elementary School and Rhinegarten Park (located adjacent to each other), approximately 1.6 MG of water was used for irrigation in 2011. The Elementary School and Park are located at an approximate elevation of 715 feet.

The total estimated amount of irrigation available for reclaimed water is estimated to be approximately

6.9 MG. Assuming another 20 percent of reclaimed water use can be identified and implemented, the total amount of reclaimed water use is estimated to be approximately 8.3 MG, which represents a little less than 6 percent of the water used within the City's service area

Existing Reclaimed Water Production Facilities and Distribution Piping

There are currently no existing reclaimed water production facilities and distribution system piping in the City of White Salmon. However, the City of Bingen's wastewater treatment plant (WWTP) could be modified to provide reclaimed water.

Existing Wastewater Treatment Plant and Process – The City of Bingen collects and treats its own wastewater and that of the City of White Salmon. The WWTP is located at 208 Marina Drive in Bingen. The existing WWTP process includes gravity grit removal channels; a rotating fine screen for primary treatment; oxidation ditches and clarification for secondary treatment; a UV system for disinfection; and aerobic digestion for sludge treatment. The treated and disinfected effluent flows into the Columbia River at river mile 170.2. The effluent is discharged via a 16-inch diameter ductile iron pipe into 25-foot-deep water that is approximately 450 feet from the shoreline. The elevation at the WWTP is approximately 120 feet. Bingen recently completed upgrades to the WWTP to increase its capacity.

Reclaimed Water Treatment Facilities – For production of Class A reclaimed water from Bingen's WWTP, construction of additional treatment processes and facilities would be required. The additional facilities would be needed to provide coagulation, flocculation, and filtration of the Bingen WWTP effluent. The standard treatment train designs for the production of Class A reclaimed water include conventional filtration, direct filtration, and in-line filtration. One possible treatment train is a packaged water treatment plant (e.g., Siemens MicroFloc Trident) to provide coagulation and flocculation of the wastewater followed by a filter (e.g., Aqua-Aerobics Aqua Disk or Schreiber Fuzzy Filter). An order of magnitude cost for such a water treatment plant facility (assumed 175 gallons per minute) is approximately $1,000,000. In addition to the treatment process, a pumping facility and storage reservoir tank would be required to convey and store the effluent before being conveyed for beneficial use. The cost for this conveyance and storage facilities is approximately $750,000. Total project cost including sales tax, engineering, special studies, contingency, legal, and financing would be around $2.625 million.

The current WWTP site does not appear to have sufficient room for construction of the proposed reclaimed water facilities; additional land would be required adjacent to the existing WWTP.

Reclaimed Water Distribution System Infrastructure – A storage and distribution system would need to be installed to store and convey reclaimed water from the Bingen WWTP to the point of use. A new reclaimed water main (nominal diameter 8 inches) would need to be installed between the Bingen WWTP and the two identified reclaimed water use areas: 1) Henkle Middle School and Columbia High School, and 2) Whitson Elementary School and Rhinegarten Park. Along existing City streets and using a direct route, the distance between the Bingen WWTP and the Middle and High Schools is approximately 2.7 miles. An additional 0.3 mile of pipeline would be required to install a water line from the main line to the Whitson School/Rhinegarten Park area. Assuming an installation cost of $180 per linear foot for 8-inch diameter pipe (including mobilization/demobilization, surface restoration, etc.), the construction cost for the reclaimed water main would be approximately $2.85 million.

In addition to the reclaimed water main, pumping facilities would be required to convey the water to the point of use. The vertical elevation difference between the Bingen WWTP site and the Middle and

High Schools site and the Elementary School/Rhinegarten Park sites is approximately 700 feet and 595 feet, respectively. At least two pump stations would be needed to lift the reclaimed water to these sites. For each site, there would need to be a reservoir tank and irrigation pump station for control and pressurization of the on-site irrigation system. An order of magnitude cost estimate for the main pump stations is $250,000 each. The approximate cost for an on-site reservoir tank and booster pump station for irrigation is $450,000.

The total order of magnitude construction cost for the proposed reclaimed water distribution system is $3.80 million. Total project cost for the distribution system (including sales tax, engineering, contingency, legal, and financing) is approximately $5.7 million.

In addition to capital cost for construction, there would be ongoing operation and maintenance (O&M) costs including electrical costs for pumping, labor costs for attending to the system, treatment costs for chemical and labor used, and other miscellaneous charges. For the sake of simplicity and to put the use of reclaimed water in its most favorable light, the O&M expenses will be assumed to be covered by revenue collected by the City on the use of the reclaimed water. This assumption may not necessarily be reflective of reality as there are additional restrictions in using reclaimed water. In most instances, reclaimed water is sold at rates cheaper than potable water.

Potential Barriers to Reclaimed Water Use

Potential barriers to the implementation of reclaimed water use in White Salmon include the following.

- **Cost** – The cost of installing and operating a reclaimed water system is significant. Assuming a low interest loan of 1.0 percent over 20 years, the estimated annual debt service cost for a $8.55 million loan is $473,670 per year. With anticipated 8.3 MG usage per year (25.5 acre-feet/year), the cost is $18,575 per acre-feet. If the City were to obtain a 40-year loan at 3 percent, the cost would be roughly $14,520 per acre-feet. The City purchased water rights from the White Salmon Irrigation District for approximately $1,280 per acre-feet. Previously, the City was leasing water rights from Klickitat Public Utility District (KPUD) for $280 per acre-feet of consumed water (i.e., water that does not end in the wastewater collection system and eventually discharged to the Columbia River). The cost difference between what the City has paid for outright purchase or leasing water rights over that for reclaimed water is over an order of magnitude.

- **Separation Distance Between Reclaimed Water Main and Other Utilities** – The standard horizontal pipe separation for new reclaimed water in a developed utility corridor is 10 feet separation between it and the water main <u>and</u> the sewer main. Ideally, the reclaimed water main should be 18 inches below the bottom of the water main and 18 inches above a sewer main. When these minimum separation distances cannot be achieved, then additional measures such as the installation of casing pipe and controlled density fill (CDF) may be necessary. Depending on site conditions and location, these additional measures could increase the cost of the reclaimed water main another 20 to 50 percent over the estimated costs given above.

- **Public Perception** – Over the past 15 to 20 years, there has been a gradual increase in public acceptance of properly treated wastewater used in lieu of potable water for certain applications. However, it is likely that there would be some public resistance to the use of reclaimed water. Additional public education and outreach would likely be needed to address possible public objections and uncertainties.

Cost Effectiveness Evaluation

The cost-effectiveness of a specific water use efficiency measure is typically estimated and considered in the decision as to whether or not to implement the measure. The measures that are exceptions include public education or metering, both mandatory measures that must be implemented whether or not they are cost effective. For the evaluation of reclaimed water use in water systems with greater than 1,000 connections, the following three-element cost effectiveness evaluation criteria must be considered.

- **Water System's Perspective** – This element evaluates the cost of using reclaimed water versus the cost of developing new sources of supply or obtaining sufficient water rights. As discussed above, the City has leased or purchased water rights ranging from approximately $285.70 to $1,280 per acre-feet. The proposed use of reclaimed water within the City would cost at least nine times more than leasing or purchasing water rights. Even with the purchase of water rights at $3,000 per acre-feet, the cost of reclaimed water would still be three times higher.

  The City believes that the money needed for the reclaimed water system could be more effectively used in implementing its Water Loss Control Action Plan to reduce its Distribution System Leakage (DSL), which is currently at 35.5 percent. If the City is unable to obtain sufficient fees to cover the O&M costs associated with the reclaimed water operation, then the cost for reclaimed water would be even greater than shown above.

- **Cost-Sharing Perspective** – This evaluation element reviews the possibility and cost-effectiveness of sharing the cost of reclaimed water use with neighboring water systems and other water users. Some form of cost-sharing may be attainable with the City of Bingen to the extent that Bingen has demand for reclaimed water. Assuming that White Salmon and Bingen were equal partners for the treatment portion and 30 percent for the distribution system of the reclaimed water facilities, the White Salmon cost portion of the facilities would be $5.985 million or approximately $10,160 to $13,000 per acre-feet, depending on the financing terms (20 years at 1 percent or 40 years at 3 percent). While cost-sharing of the reclaimed water facilities improves the financial outlook for the use of reclaimed water, the overall cost is still substantial compared to what the City paid for leasing or purchasing water rights.

- **Societal Perspective** – For this element, the cost-effectiveness of the reclaimed water use is evaluated holistically, taking into account all the potential costs and benefits, including environmental, recreational, and aesthetic benefits. From a societal perspective, reducing the City's water demand through reclaimed water use would be beneficial to the environment by allowing more water to stay in the river (if Buck Creek production is reduced) and beneficial to the City by maintaining more groundwater in its aquifers (if water production is reduced at Wells No. 1 and No. 2). Given groundwater production from the City's wells has been diminishing, the City would likely continue to maximize the Buck Creek water diversion. The City's proposed aquifers storage and recovery (ASR) with Buck Creek water and Well No. 2 would appear to be a more effective way of keeping more water in the streams during the low flow months. Financing the City's Water Loss Control Action Plan to reduce its DSL also appears to be more effective way to reduce the City's water diversions and maintaining more water in the streams.

Summary

Opportunities for reclaimed water use in White Salmon exist but the capital costs associated with the infrastructure needed to produce, store, and convey reclaimed water to the areas of use are significant. The substantial distance and elevation difference between the Bingen WWTP (point where reclaimed water would be produced) and the point of use contributed to the anticipated cost for the proposed reclaimed water system. The projected annual costs for financing the needed improvements for a reclaimed water system are roughly nine times higher than what the City has previously paid for purchasing water rights. Cost-sharing with Bingen on the development of a reclaimed water system would likely be beneficial to both Cities but still would likely also be expensive for both communities to implement. At this time, we believe that the City of White Salmon and its resources would be best served by concentrating its efforts on reducing the system's DSL through its Water Loss Control Action Plan.

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TECHNICAL MEMORANDUM NO. 3

To: Jan Brending, City Clerk-Treasurer
From: David Jepsen, P.E., Anderson Perry & Associates, Inc.
Re: Water Use Efficiency Program
Date: May 2, 2022
Job/File No.: 250-12-02

DAVID THEODORE JEPSEN
David Theodore Jepsen
42991
5/2/2022

Introduction

Water use efficiency measures are evaluated and recommended herein for implementation as a program for efficient water use at the City of White Salmon's water system. Water use efficiency measures consist of practices and activities that result in any beneficial reduction in water losses, waste, usage, or demand. Water use efficiency requirements for the State of Washington are described primarily in the Washington State Department of Health's (DOH) Water Use Efficiency Rule Guidebook (2017). In this memorandum, each of the above elements will be addressed and discussed as they pertain to the City's water system.

Current Water Use Efficiency Program

The City adopted a Water Use Efficiency (WUE) program as part of the Water System Plan (WSP) approved in 2014. The City's WUE program includes the following:

- Metering sources and services
- Repair of water leaks when reported or discovered
- Implementation of a water loss control action plan to control leakage, including
    - Installation of new service meters
    - Leak detection of water system
    - Better documentation and tracking of unmetered use
    - Advanced pressure management
    - Water main replacement and abandonment
- Educating customers about WUE practices
- Use of a base rate plus three tier inclining block user rates to encourage WUE
- Mandatory water use limitations (Chapter 13.24.30, Water Code)
- Customer notification of possible leaks
- Consumption history shown on customer's water bill

As part of the WUE Program, the following WUE goals were adopted:

- One percent reduction in average gallons per equivalent residential unit (ERU) per day that can be observed in the Average Daily Demand (ADD) flow values in Year 2018 (demand side goal). An ERU is defined as the average amount of water used by a resident. For the City of White Salmon's water system, an ERU is defined as 71,471 gallons per year (gpy) per ERU or 195.8 gallons per day (gpd) per ERU
- Distribution system leakage (DSL) of 25 percent or less in Year 2018 (supply side goal)

With the above WUE program activities, the City was not able to achieve either the demand side or supply side goals. Instead of a one percent reduction (demand side goal), the water demand in 2020 was approximately 3.3 percent higher. This increase in water demand is partly attributed to the previous water demand values being based on a period (2009-2011) of transition from water production limited to well water and a moratorium on the installation of new services to the new Buck Creek Water Treatment Plant (WTP) being placed into service and lifting of the moratorium for installation of new services. Once the new Buck Creek WTP was placed into service and the service moratorium was lifted, the City's water customers may have become more comfortable in consuming more water. As discussed in the 2014 WSP, the historical water usage in 2009 -2011 period was significantly lower to water demand in 2002. One possibility is that the 2009-2011 water demand was artificially low in relation to historical values.

Even with the City's significant investment in water main replacement (e.g., Jewett, Tohomish, North Main, etc.) and ongoing repair of reported and discovered leaks, the 3-year rolling average DSL slightly increased from 29.2 percent to 32.6 percent. The supply side goal of the DSL being 25 percent or less was not achieved. Although necessary, the installed water main improvements did not reduce the water system's DSL.

The City did not implement the following features of the WUE Program: 1) annual update of International Water Association (IWA)/ American Water Works Association (AWWA) water audit, 2) calibration of source meters, 3) annual leak detection, 4) complete meter installation and implementation of Automated Meter Reading (AMR) system, and 5) incorporating WUE Information onto the City's website.

Water Use Efficiency Program Elements and Goals

The program elements and goals for water use efficiency establish the framework for the City to implement cost-effective water use efficiency measures. The City's proposed program elements and goals, including evaluated and adopted water use efficiency measures, are discussed below.

A water use efficiency goal must have measurable and definable water savings that will be achieved at a specific time in the future. The current goal is defined in terms of reducing water consumption based on the overall consumption. This type of goal is suitable if the community is not growing. However, if the community is adding new users, then any reductions in water use per person or connection would be obscured by the new users' demand.

The following goals are recommended for water use efficiency in the City of White Salmon:

- Two percent reduction in average gallons per ERU per day that can be observed in the ADD flow values in Year 2028 (demand side goal). An ERU is defined as the average amount of water used by a resident. For the City of White Salmon's water system, an ERU was defined as 73,864 gpy per ERU or 202.4 gpd per ERU. This water saving is twice that amount proposed in the previous demand side goal but still modest in amount (4 gpd per ERU or 1,477 gpy per ERU).

- DSL of 25 percent or less in the Year 2028 (supply side goal).

These goals need to be formally adopted by the City of White Salmon City Council. Prior to adopting a water use efficiency goal, the City will need to engage its users and interested members of the public in a public forum. Most municipalities hold a public hearing on the proposed water use efficiency goals on the same date and time of their regularly scheduled public Council meeting. The public hearing is held to solicit comments from the system customers and the general public. Once all comments are received, the public hearing is closed and the City conducts its regular meeting with adoption of the proposed water use efficiency goal as one of its possible action items to be addressed.

The City will also need to provide at least two weeks' notice to the public and its customers prior to the meeting. To notify the general public, AP recommends that the City publish a meeting notice in the same fashion as it would its other public meetings. Documentation on the City's efforts to notify its customers and the general public will need to be compiled and submitted to the DOH as part of the City's completed WSP.

Implemented and Evaluated Water Efficiency Use Measures

The proposed water use efficiency measures are identified and discussed below. A summary of the measures to be implemented is given at the end of this discussion.

Installation and Operation of Production and Consumption Meters - The Water Use Efficiency Rule requires that all production and consumption be metered in municipal systems. The City complies with this rule, as all active sources and customers are currently metered. As discussed in Technical Memorandum No. 1, the City's source meters should be calibrated/verified or replaced with a model that can be calibrated or verified.

Implementation of Water Loss Control Action Plan (WLCAP) - As part of the water use efficiency rules, a DSL standard was enacted. The State has set the DSL standard at 10 percent or less for a three-year rolling average. Since the City's rolling three-year average of 32.6 percent is above the DSL standard, the City is required to develop and implement a WLCAP. Recommendations for this plan were previously discussed in Technical Memorandum No. 1.

Customer Education on Water Use Efficiency Measures - The goal of water use efficiency education is to inform customers about the importance of using water efficiently. Educating customers about how they can use water efficiently at least once per year is required under the State's water use efficiency rules. Implementation of customer education activities or measures more than once per year is considered an additional water use efficiency measure.

Presently, the City's public education efforts have been primarily related to including messages within customers' monthly water bills. These messages are typically related to the status of the mandatory water use limitations (May 1st through October 31st, Chapter 13.24.30) and occasionally discuss water conservation. For the City's mandatory public education measure, AP recommends that the City continue to include its messages about the mandatory water use limitations but also include water efficiency informational handouts in customer water bills at least once per year, or include this information in its Consumer Confidence Report (CCR).

Water Conservation Rate Pricing - A proper water rate structure can support and encourage water conservation. The ideal conservation rate structure would encourage maximum participation in water use efficiency efforts while providing revenue stability, user equality, and easy implementation and administration. The City currently uses a rate structure with a base rate (no quantity allowance) with an inclining block rate with three blocks. This rate structure provides excellent revenue stability and promotes conservation.

To provide a price incentive for customers to reduce water consumption during peak-use periods, the City may wish to consider implementing a seasonal rate adjustment by increasing the consumption rates during high demand months and lowering consumption rates during lower demand months. Because system capacity is essentially designed to meet peak demands, peak users should assume cost responsibility for capacity required to serve peak demand. As an example, the current consumption rates could be modified by increasing the current user rates by 20 percent between June and October and reducing the user rate by 20 percent for the rest of the year. Such a seasonal rate structure is summarized in Table 1.

TABLE 1
EXAMPLE SEASONAL RATE STRUCTURE

Consumption Rate Tier	$/1,000 gallons		
	Current Year-Round	June - October	November - May
0 – 5,000 Gallons	1.19	1.43	0.95
6,000 – 15,000 Gallons	3.01	3.61	2.41
Over 15,000 Gallons	4.03	4.84	3.22

This example seasonal rate structure would increase the cost of water during the high demand months and likely not be revenue neutral as more water is consumed in the City's system between June through October than the rest of the year.

A seasonal rate may reduce the cost of water to all customers. If customers respond to the seasonal rate by reducing water consumption, then the City may be able to delay or avoid construction of additional water infrastructure needed to handle demand. Even if demand is not reduced, customers contributing to the peak demands pay the bulk of the costs associated with that demand.

Implementing seasonal rates can potentially place revenue stability at risk, depending on the differential in the peak season rate and customer response to the higher rate. A seasonal rate will also make the billing system more complicated. As a result, the City should communicate with all customers before each peak season to increase customer awareness of the intent of seasonal rates and the impending higher rates. Additional evaluation on the potential implementation of seasonal water rates in the City is recommended.

Reclaimed Water - For water systems with more than 1,000 connections, evaluation of reclaimed water use opportunities and the use of three-element cost-effectiveness evaluation criteria are required. This evaluation was completed and discussed in Technical Memorandum No. 2.

While opportunities for reclaimed water use in White Salmon exist, the capital costs associated with the infrastructure needed to produce, store, and convey reclaimed water to the areas of use are significant. At this time, the implementation of reclaimed water in White Salmon does not appear to be cost-effective. The City would be best served by concentrating its efforts on reducing the system's DSL through its WLCAP.

Additional Water Use Efficiency Measures - In addition to the above mandatory water use efficiency measures, five additional measures need to be evaluated or implemented. The City has already implemented the following four additional measures: 1) implementation of water conservation rate structure, 2) mandatory water use limitations (Chapter 13.24.30, Water Code), 3) customer notification of possible leaks, and 4) including consumption history on customers' water bills.

The following is a list of potential measures that the City could implement as its final additional WUE measure. This list is not exhaustive but represents typical measures that would assist the City in achieving its water use efficiency goals. A brief comparison of proposed measures, in terms of the water system, cost-sharing, and societal perspectives, is provided in Attachment A.

- **WUE Information on City's Website** – with this measure, the City would compile and post a water conservation/water use efficiency page on its website with information and links to other helpful websites.
- **Additional WUE Information Handouts** – submitting additional informational handouts in the customer's bills (over and above the once per year requirement).
- **New Customer Water System Informational Packets** – these packets would be given to new water system customers and could include information on water use efficiency measures, system policies, user rates, the City's Mandatory Water Use Limitations, cross-connection control, and other information that might be helpful to a new customer.
- **WUE Educational Display Board** – the City would compile a display board showing the importance and benefits of efficient water use in the City. This board could possibly be displayed at City Hall, the library, or at public events.
- **Local Rebate for Water Efficient Fixtures** – with this measure, the City would team up with local businesses to provide a limited rebate program toward the purchase of water efficient fixtures and appurtenances such as faucet aerators, low flow showerheads, shower timers, and hose repair kits. Estimated rebate amount per household/participant - $30. Annual water savings and cost estimates were based on the level of participation for the number of units served by the City's water system (see Attachment A).
- **Toilet Rebate Program** – this program would provide a $100 (or as decided upon) rebate per toilet for the replacement of toilets that use more than 1.6 gallons per flush. Non-conserving toilets commonly used before 1980 used about five to seven gallons per flush. In the 1980s, low flush toilets (3.5 gallons per flush) were manufactured and installed. In the 1990s, plumbing standards were revised to require the installation of ultra-low flush toilets (1.6 gallons per flush). Annual water savings and cost estimates were based on the quantity of pre-1994 housing and an estimate of participation in the City limits of White Salmon (because of available housing data) and are summarized in Attachment A.

As mentioned above, the City will need to implement one additional measure into its water use efficiency program. AP will need the City's input as to which one or more measures the City would like to implement.

Summary

The proposed City's water use efficiency program, including start dates, budget, comments, and additional potential measures, is summarized in Table 2. The intent of these measures and activities is for the City to meet its water use efficiency goal outlined above.

TABLE 2
Summary of Proposed Water Use Efficiency Program for the City of White Salmon

Measure/Activity	Implementation, Budget, and Notes
Installation and Operation of Source and Service Meters	
Source and service meters already installed	In compliance
Implementation of WLCAP (see Technical Memorandum No. 1)	
Supply Side Goal: DSL of less than 25 percent	Apr 2022, recommended adoption as a 6-year goal
Demand Side Goal: 2 percent reduction in average gallons per ERU per day in 2028 ADD.	Apr 2022; recommended adoption as a 6-year goal
Verify existing source meters Install new 10-inch source meter at Well No. 2	2022; $1,700 2023: $9,200; installed cost
Better Documentation and Tracking of Unmetered Use	June 2022; Implement additional internal tracking
Leak Detection	Annually starting 2023; $7,500
Monthly Reading of Service Meters	June 2022; coincide with AMR implementation
Complete New Meter Installation and AMR	June 2022; in budget
Implement Advanced Pressure Management	Initial Target Areas: 1) Eyrie Rd PRV review – Jun 2022, and 2) 6-inch Main, Bingen Intertie review – Jul 2022
Water Main Replacement and Abandonment: Water Transmission Main Upgrade Phases I & II	Phase I – Construction funding obtained Phase II – Under design, need construction funds
Customer Education on WUE Measures	
Educational Materials Sent to Customers Annually	June 2022; $1,500; Material and distribution costs
Water Conservation Rate Pricing	
Consider Implementation of Seasonal Rate	Sept 2022; consider implementation in 2023
Additional Measures (Five Mandatory)	
Implementation of Water Conservation Rate Structure	In place**;** annual review recommended.
Mandatory Water Use Limitations	In place**;** Chapter 13.24.30, Water Code
Customer Notification of Possible Leak	In place**;** customer notified of unusual meter reading
Consumption Histories on Customers' Water Bills	In place
One Additional Measure to be Selected by City Staff and/or Council	
WUE Information on City's Website	$1,000 initial cost; assume $200 per year for updates
Additional WUE Information Handouts	$200 to $700 materials, and $900 postage cost annually
New Customer Water System Informational Packets	$50 annually for materials and revisions
WUE Educational Display Board(s)	$100 materials, $300 construction
Local Rebate for Water Efficient Fixtures	$600/yr; 40 parties over 6 years at $30 rebate per party
Ultra-Low Flush Toilet Program	$1,750/yr; Estimated 52 parties over 6 years at $100 per toilet, 2 toilets per address

Annual Performance Reports

One of the water use efficiency rule requirements is the submission of an annual performance report on the water use and water use efficiency program implementation in the City. The report must include information about how much water is produced, how much water is lost in the distribution system, and what progress has been made toward achieving the water savings goals for the year. The City is in compliance with this requirement as it has submitted annual performance reports since 2008.

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ATTACHMENT A

Perspective Comparison of Proposed Additional WUE Measures

Technical Memorandum No. 3 - Attachment A
Perspective Comparison of Proposed Additional WUE Measures

Proposed Measure	Perspective		
	Water System	Cost-Sharing	Societal
WUE Information on City's Website **Advantages:** Web accessible; **Disadvantages:** Unknown effectiveness and views on website.	$1,000 startup, $200 annually; limited additional staff time	Limited	Educational (1) – Potential wide audience
Additional WUE Information Handouts **Advantages:** Sent to all customers; **Disadvantages:** Unknown effectiveness, more annual expenses if commercially available brochures sent	$200-$700 materials and $900 per year based on bulk mailing; additional staff time once a year.	Possible – Coordinated purchase of materials with Bingen	Educational (1) – All customers are contacted
New Customer Water System Informational Packets **Advantages**: Provide WUE and City service information to new customers; **Disadvantages**: Limited audience	$50 per year; limited additional staff time.	Limited, some information is City specific	Educational (1) – Limited to new customers
WUE Educational Display Board(s) **Advantages:** Portable, use of multiple venues; **Disadvantages:** Needs periodic updates, unknown outcome	$100 materials, $300 for construction; need volunteers or staff for display	Possible – If generic in material, could utilize with Bingen	Educational (1) – Possible broader audience and venues
Local Rebate Program for Water Efficient Fixtures **Advantages:** Small required investment; **Disadvantages:** Dependent on installation and participation	Savings – 1.06 ac-ft Cost – $600 per year; $3,387 per acre-feet; more staff time	Possible – Bulk purchase of kits with Bingen	Less definitive water savings, depends on installation and use, participation difficult to estimate
Toilet Rebate Program **Advantages:** Potential definitive water savings; **Disadvantages:** Installation cost if installed by plumber; dependent on participation	Savings – 2.15 ac-ft Cost – $1,120 per year; $3,103 per ac-ft; more staff time	Limited	Definitive water savings though small overall, participation difficult to estimate

(1) – Water savings from educational WUE measures are difficult to ascertain

(2) – Water savings and cost based on 6-year period.

ATTACHMENT B

Local Rebate Program for Water Efficient Fixtures

Technical Memorandum No. 3 - Attachment B
Local Rebate Program for Water Efficient Fixtures

Measure	Value	Comments
Measure Cost		
Start-up	$ 1,800	Establish program and rules, legal review
Administration	$ 400	$10/party
Marketing	$ 200	Brochures, advertisement
Rebate	$ 1,200	$30/rebate per household
Total Cost – 6-Year Period	$ 3,600	
Measure Savings		
No. of Services	1986	No. of Units minus Bingen Interties
Participation Level	2%	
Total Party Units	40	6-Year Period
Number of Gallons Per Household-Day w/ Showerhead	6	2.3 persons/household, 3.5 gpcd, 3/4 use
Number of Gallons Per Household-Day w/ Faucet	0.3	2.3 persons/household, 0.5 gpcd, 1/4 use
Sum of Water Saved, gpd	6	
Total 6-Year Dry Season Savings, gpy	114,799	Critical Period: June – September, 121 days
Total 6-Year Annual Savings, gpy	346,294	365 days, 6 Years
Summary Cost Per Water Saved		
Total Savings – 6-Year Period, gallons	114,799	0.018 gpm
Total Savings – 6-Year Period, AF	0.35233	
Cost Per MG – Dry Season, 6-Year Period, $/MG	$ 31,359	Total 6-Year Cost/Total 6-Year Savings in MG: Dry Season
Cost Per AF – Dry Season, 6-Year Period, $/AF	$ 10,218	Total 6-Year Cost/Total 6-Year Savings in AF: Dry Season
Total Annual Savings – 6-Year Period, gallons	346,294	0.055 gpm
Total Annual Savings – 6-Year Period, AF	1.06281	
Annual Cost Per MG – 6 Years, $/MG	$ 10,396	Total 6-Year Cost/Total 6-Year Savings in MG: Year-Round
Annual Cost Per AF – 6 Years, $/AF	$ 3,387	Total 6-Year Cost/Total 6-Year Savings in AF: Year-Round

ATTACHMENT C
Toilet Rebate Program

Technical Memorandum No. 3 - Attachment C
Toilet Rebate Program

Measure	Value	Comments
Measure Cost		
Start-up	$ 2,500	Establish program and rules, legal review
Administration	$ 800	$50/party, est. of staff time
Marketing	$ 200	Brochures, advertisement
Incentive – Rebate	$ 3,200	$100/toilet, 2 toilets per unit
Total Cost – 6-Year Period	$ 6,700	
Measure Savings		
Pre 1980 Housing Units		
No. of Pre 1980 Housing Units	920	Based on 2019 ACS for City of White Salmon
Participation Level	2%	
Total Units	14	6-Year Period
Number of Flushes/Day	10	Assumes 2.5 persons/household, 4 flushes/day-person
Gallons Saved per Flush	3.4	Old models 5 gal/flush; new model 1.6 gal/flush
Total Gallons Conserved Per Household/day	34	Number of flushes/day X gallons saved/flush
Total 6-Year Dry Season Savings, gpy	215,985	Critical Period: June – September, 121 days 6 years
Total 6-Year Savings, gpy	651,525	6 years, 365 days
1980-1994 Housing Units		
No. of 1980-94 Housing Units	225	Based on 2019 ACS for City of White Salmon
Participation Level	1%	
Total Units	2	5-Year Period, 20% of Households per Year
Number of Flushes/Day	10	Assumes 2.5 persons/household, 4 flushes/day-person
Gallons Saved per Flush	1.9	Old models 3.5 gal/flush; new model 1.6 gal/flush
Total Gallons Conserved Per Household/day	19	Number of flushes/day X gallons saved/flush
Total 6-Year Dry Season Savings, gpy	17,243	Critical Period: June – September, 121 days
Total 6-Year Annual Savings	52,013	6 years, 365 days
Summary Cost Per Water Saved		
Total Savings – 6-Year Period, gallons	233,228	Average 0.07 gpm
Total Savings – 6-Year Period, AF	0.71580	
Cost Per MG – Dry Season, 6 Year Period, $/MG	$ 28,727	Total 6-Year Cost/Total 6-Year Savings in MG: Dry Season
Cost Per AF – Dry Season, 6 Year Period, $/AF	$ 9,360	Total 6-Year Cost/Total 6-Year Savings in AF: Dry Season
Total Annual Savings – 6-Year Period, gallons	703,538	Average 0.21 gpm
Total Annual Savings – 6-Year Period, AF	2.15922	
Annual Cost Per MG – 6 Years, $/MG	$ 9,523	Total 6-Year Cost/Total 6-Year Savings in MG: Year-Round
Annual Cost Per AF – 6 Years, $/AF	$ 3,103	Total 6-Year Cost/Total 6-Year Savings in AF: Year-Round

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TECHNICAL MEMORANDUM NO. 4

DAVID THEODORE JEPSEN
42991
5/26/2022

To: Jan Brending, City Clerk/Treasurer,
City of White Salmon, Washington

From: David Jepsen, P.E., Anderson Perry & Associates, Inc.

Re: Exempt Wells

Date: May 26, 2022

Job/File No.: 250-12-02

Permit-exempt (exempt) wells are private wells allowed by the State of Washington for specific, restricted uses that are exempt from the requirement of obtaining a permit for groundwater withdrawals. Specific exemptions include the following.

- Stock watering
- Irrigation of a lawn or non-commercial garden not exceeding 0.5 acre in size
- Single or group domestic purposes in amounts less than 5,000 gallons per day
- Industrial purposes in an amount less than 5,000 gallons per day

Exempt wells have become an accepted method of ensuring water supplies and serving unique water needs in rural settings. However, there has been a proliferation of exempt wells with estimates of 8,000 new wells per year in the 1990s, leveling off to 2,600 per year between 2008 and 2014. Exempt withdrawals have the potential to negatively impact groundwater resources and/or public health and allow potential City customers to forego connection to the City's water system. In this technical memorandum, the effect of exempt wells on the City's water system and its service area are reviewed and discussed.

Exempt wells are typically installed and used for domestic and/or irrigation purposes. Concerns for the construction and operation of exempt wells include the following.

Duty-to-Serve - The City has a "Duty to Serve" water as outlined in the 2003 Municipal Water Law, in its current service and retail service areas. The City is meeting its "Duty to Serve" and continues to invest monies into its water system to maintain its obligation to serve current and future customers in its retail service area and possibly its future service area. City water system customers have a reasonable expectation that all entities seeking water service within the current service and retail service areas should connect to the City's water system and contribute to the capital and operational costs associated with the water system.

Entities that choose to drill and use an exempt well and not connect to the City's water system are bypassing the City's Duty-to-Serve requirements and avoiding financial contributions to the City's water system. In some instances, existing residents enjoy some of the benefits of the City's water system (e.g., nearby fire hydrants) without having to financially contribute for the benefits.

Water Quality and Quantity - Every well is a potential source of contamination to the aquifer it is connected to. Per federal and state regulations, the City is required to perform extensive water quality testing and monitoring of its municipal wells, control activities in the immediate area of the wells, and periodically notify residents in, and local agencies and emergency responders of the City's wellhead protection areas.

Exempt wells do not have the same requirements as the City. The water quality of Exempt wells is typically tested when the wells are completed and at the time the well property is sold. Irrigation wells have no water quality testing or monitoring requirements. Other than maintaining adequate separation from a property's septic tank and drainfield, there are not restrictions to land use (e.g., raising animals) and management (e.g., application of herbicides and fertilizers) in the immediate area of exempt wells.

The water quality areas of concern related to exempt wells for the City are the wellhead protection areas and the immediate vicinity around its Wells No. 1 and No. 2. The City wells are connected to confined and semi-confined aquifers that are approximately 750 to 790 feet below the ground surface. While there does not appear to be any other wells that have penetrated the aquifers used by the City at this time, there is the potential for future wells to access these aquifers.

At this time the Washington State Department of Ecology does not require exempts wells to be metered. There is no accountability for the amount of water withdrawn by exempt wells from an aquifer.

Enforcement - There is not currently any oversight of exempt wells, neither is there enforcement should they be operated outside of their required limitations. Exempt well owners could easily extract more than the limitations on quantity and reduce water levels in an aquifer, pay no attention to the distribution of fertilizers or other chemicals near the well and contaminate the aquifer, or allow domestic animals to roam near/to the wellhead and potentially contaminate the aquifer with fecal bacteria. No one will know if the aquifer is depleted or contaminated until it is too late; the risk to municipal systems is too great. The City's wells are monitored daily and all water quality and withdrawal exceptions are reported immediately. City customers expect and rely on this level of service, yet exempt wells with no enforcement to any standards have the potential to negatively impact the water quality and quantity of the City's municipal wells without consequence.

Recommendations - The following are the recommended actions for the City to implement in regards to exempt wells.

- Adopt an ordinance restricting the drilling and use of exempt wells within the city limits after the date of the ordinance.

- Lobby Klickitat County and Skamania County to adopt ordinances requiring the water availability verification associated with new building permit applications include a provision that all properties within the City's water retail service area to connect to the City's water system, unless an exemption is specifically granted by the City.

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TECHNICAL MEMORANDUM NO. 5

DAVID THEODORE JEPSEN
42991
7/15/22

To: Jan Brending, City Clerk/Treasurer,
City of White Salmon, Washington

From: David Jepsen, P.E., Anderson Perry & Associates, Inc.

Re: Reservoir Capacity Issues in the Strawberry Mountain and North Main /Simmons Road Pressure Zones

Date: July 15, 2022

Job/File No.: 250-12-02, w/attach

Based on preliminary calculations on reservoir capacity, the reservoir capacity at the Strawberry Mountain Reservoirs is insufficient to handle current and future water demand in the Strawberry Mountain and North Main/Simmons Road pressure zones. In this technical memorandum, the basis for the current and future reservoir capacity needed at the Strawberry Mountain Reservoirs are reviewed along with possible solutions to address the reservoir capacity needs of the supplied pressure zones.

Background

Due to the location of its sources and topographic elevation changes in its service area, the City of White Salmon has several different pressure zones for supplying water to its customers. The City's pressure zones for the Central Region (where the bulk of the City's customers reside) are shown in the attached draft Figure 3-4. The Strawberry Mountain, Strawberry Reservoir, and North Main /Simmons Road pressure zones are served by the Strawberry Mountain Reservoirs. Water is conveyed from the Los Altos Reservoir to the Strawberry Mountain Reservoirs through the Los Altos Pump Station, which is located on the Los Altos Reservoir site. For the purposes of this technical memorandum, the Strawberry Mountain and Strawberry Reservoir pressure zones will be referred to as the Strawberry Mountain pressure zone.

The Strawberry Mountain Reservoirs supply of the Strawberry Mountain and North Main/Simmons Road pressure zones is a relatively recent development. Historically, these pressure zones were supplied water from different reservoirs. The Strawberry Mountain pressure zone was served by the Strawberry Mountain Reservoirs and the North Main/Simmons Road pressure zone was supplied water from the Spring Street Reservoir by a booster pump station referred to as the Main Street Pump Station.

The Main Street Pump Station consisted of two 320 gallon per minute (gpm) pumps located in a below ground vault adjacent to Spring Street. The station pumps could only be controlled from within the vault and required to be manually switched to allow alternate operation of the pumps. The pumps could not operate at the same time; one pump operated continually, requiring a pressure relief value to expel high pressure water during low demand. As a belowground facility, the Main Street station was considered a high risk for failure due to flooding and a safety concern for entry as a confined space. In addition, this station was unable to provide the 2,000 gpm fire flow that was needed in the North Main /Simmons

Road pressure zone. For these reasons, decommissioning of this pump station was recommended in the City's 2014 Water System Plan (WSP).

To provide sufficient fire flow to the North Main/Simmons Road pressure zone and to eliminate the Main Street Pump Station, the construction of an additional reservoir tank at Strawberry Mountain and installation of at least two pressure reducing valve (PRV) stations were recommended to serve the North Main/Simmons Road area from the Strawberry Mountain Pressure Zone. One of PRV stations would be located on Cochran Lane (just north of Loop Road); the other station would be located off a new 10-inch diameter line on Spring Street that would connect to the Main Street Pump Station piping (off the Strawberry Mountain Reservoir). In the 2014 WSP, construction of another 99,200-gallon tank was recommended at the Strawberry Mountain Reservoir site to provide an additional 55,000 to 65,000 gallons of nested standby and fire flow storage projected to be needed with the addition of the North Main/Simmons Road pressure zone. Since the 2014 WSP, the implemented improvements included decommissioning and removal of the Main Street Pump Station and installation of the Cochran PRV station (installed adjacent to Loop Road). The additional reservoir storage tank and installation of a new 10-inch main and pressure reducing valve station were not constructed.

Based on 2020 consumption records and revised capacity calculations, the Strawberry Mountain Reservoirs lack sufficient storage and additional storage of approximately 140,000 gallons, 210,000 gallons, and 290,000 gallons are needed for 2021, 2031, and 2041, respectively (assuming nesting of standby and fire flow storage). Since 2014, water demand has increased more than anticipated, which has resulted in the increase in reservoir storage amount over than forecasted. With these reservoir capacity deficits at the Strawberry Mountain Reservoirs, the City would need to implement a solution or institute a moratorium on new water services in the Strawberry Mountain and North Main/Simmons Road pressure zones.

Options

Two basic options for resolving the current and future reservoir deficit at the Strawberry Mountain Reservoirs are as follows: 1) construct new reservoir storage tank at Strawberry Mountain or 2) construct a new pump station off North Main Avenue to serve the North Main/Simmons Road pressure zone. A more detailed description of the components and work needed to implement each of these basic options is discussed below.

Option 1: New Reservoir Storage at Strawberry Mountain Site

This option would include the construction of a nominal 300,000-gallon (minimum) reservoir tank at the Strawberry Mountain Reservoir site. The proposed tank construction is glass-fused-to-steel because of the City's familiarity with this type of tank (same type of construction at Dock Grade and Childs Reservoirs) and the ability to increase capacity in the future (raise the tank walls) if the foundation is overdesigned at initial construction. Nominal dimensions of the new tank would be 45-feet diameter and 29 feet tall, with the possibility of raising the tank to a max water level height of 47 feet or taller (additional 210,000-gallon capacity with 47-feet sidewall). The new reservoir tank would work at the same water level as the existing reservoirs until additional height was added. This option would likely require the relocation of the existing booster pump station, depending on the needed realignment of the existing Strawberry Mountain Road (private). This existing road occupies a significant portion of the site and realignment is needed to provide more space on the site.

The new tank and existing reservoirs would be used to supply Strawberry Mountain and North Main /Simmons Road pressure zones. Once the tank is raised, the existing reservoirs would exclusively supply the booster pump station serving the Strawberry Reservoir area. Since the existing reservoirs would likely have too much storage for the Strawberry Reservoir area (not enough turnover in the tanks), one of the reservoirs could be taken out of service or decommissioned (most likely the West Reservoir) or both reservoirs could be operated at a reduced water level.

In addition to a new reservoir tank at Strawberry Mountain, the installation of a new booster pump station and transmission main are needed to replace the existing Los Altos Pump Station and convey higher flows to the Strawberry Mountain Reservoir site. These booster pump station and transmission main improvements are needed regardless of a new reservoir tank is constructed at the Strawberry Mountain site. This station is in an underground vault, has outdated controls, no drain, covered with rust along the bottom edge, no standby emergency generator or transfer switch, and limited flow capacity (approximately 175 gpm). The Washington State Department of Health (DOH) considers the location of the Los Altos Booster Station as a high risk for failure due to flooding and a safety concern for entry as a confined space.

A new aboveground booster pump station is recommended to convey water from the Los Altos Reservoir to the Strawberry Mountain Reservoirs. The proposed two pump system would have a 500 to 900 gpm range capacity and located in a fiberglass enclosure downhill from the reservoir, most likely in public right-of-way. Emergency backup power generator is also recommended; diesel or natural gas are potential generator fuel sources. The emergency generator would be installed on a concrete pad and have a residential grade cover to minimize noise during operation.

To convey the new booster pump station flow to the Strawberry Mountain Reservoirs, a larger diameter transmission water main (10- or 12-inch diameter) would need to be installed from the new station location to the existing 10-inch diameter water main located at the intersection of NW Spring Street and NW Country View Road (length approximately 1,600 linear feet).

While this option provides needed reservoir storage needed in the City (specifically to serve the Strawberry Mountain Reservoirs and North Main/Simmons Road pressure zones), additional reservoir storage is needed to supplement the Los Altos/Spring Street Reservoirs' capacity. Due to the age of the existing Spring Street Reservoir and future capacity needs off the Los Altos and Spring Street pressure zones, a nominal 1.0 million gallon reservoir is proposed to replace the existing Spring Street Reservoir. With this option, the proposed new reservoir tank to replace the existing Spring Street Reservoir will be needed between 2031 and 2041.

In addition, the replacement of the Spring Street water main on Spring Street from where the water main enters NW Spring Street from the reservoir tank to NE Fields Avenue is needed with either option (see below for further discussion of this main).

Option 2: New North Main Avenue Pump Station

This option would include the construction of a new booster pump station to supply the domestic need and a portion of the fire flow need for the North Main/Simmons Road pressure zone. It is proposed that this new pump station would be supplied water from the Spring Street Reservoir instead of the Strawberry Mountain Reservoir. The existing Cochran Lane PRV would remain in service but reconfigured to operate only during high flow demand events (i.e., fire flow). The new result of these changes is that the current reservoir capacity deficit at Strawberry Mountain Reservoirs is eliminated, and the future reservoir capacity deficits are reduced to approximately 9,000 gallons and 50,000 gallons in 2031 and 2041. If the Los Altos Pump Station is replaced with larger capacity pumps that are greater than the peak hour demand for the Strawberry Mountain pressure zone, then the future reservoir deficits are eliminated in 2031 and reduced to 20,000 gallons in 2041, respectively.

The proposed station would have two or three pumps to handle domestic usage, and minimum one pump to handle high demand. At a minimum, two domestic pumps and one high demand pump would be needed immediately. In the future, an additional domestic supply pump would be needed at later date to handle future demand. Due to the potential size and number of pumps, the pump skid would need to be housed in a large fiberglass structure or building (approximately 12 by 16 feet). The location of this booster pump station needs to be adjacent to North Main Avenue, ideally between NW Spring Street and the intersection of NW Loop Road and North Main Avenue. A specific location for this station has not been identified.

Standby on-site backup power generator would be essential for this pump station to operate during a power outage. One possible fuel source for this station is natural gas as an existing main is in North Main Avenue. The emergency generator would be installed on a concrete pad and have a residential grade cover to minimize noise during operation.

Connections with the existing 8-inch diameter piping on Main Avenue would need to be made to the new booster pump station and to the water main on Spring Street. City staff has indicated that the existing 10-inch diameter steel water main on Spring Street between where existing main enters Spring Street from the reservoir to NE Fields Avenue needs to be replaced as part of this option (approximately 1,600 linear feet). The existing steel water main has been a continuing source of leak repair work for City staff. The new water main in this street is recommended to be 12-inch diameter to improve hydraulics not only to the North Main/Simmons Road pressure zone but also the Spring Street pressure zone. Along with the new 12-inch diameter main, extension of approximately 300 linear feet of 8-inch diameter pipe, connected to the Strawberry Mountain pressure zone, is recommended to serve some of the existing services on Spring Street that have lower pressures due to their proximity to the Spring Street Reservoir.

One ramification of shifting the North Main/Simmons Road pressure zone demand from Strawberry Mountain Reservoir to Spring Street Reservoir is the accelerated need to replace the existing Spring Street Reservoir tank from between 2031 and 2041 to sometime before 2031. As mentioned under Option 1 above, the replacement of the Los Altos Pump Station and installation of new transmission main is needed with either option.

Comparison of Options

A comparison of Options No. 1 and No. 2 in terms of estimated project cost (both short term and long term), project timing, advantages and disadvantages, and uncertainties is summarized in Table 1. Short-term costs refer to the immediate construction cost for implementing the option. Long-term costs refer to the cost for other improvements that would need to be eventually implemented (at current dollars) in the next 15 years. Estimated project costs include construction, contingency, sales tax, engineering, environmental and cultural review, and legal, administration, and financing costs. The project contingency was set at 25 percent as an attempt to address current inflation rate and supply chain issues. The project costs for each option (short-term costs) do not include the cost for property acquisition.

TABLE 1
COMPARISON OF OPTIONS NO. 1 AND NO. 2

No. 1 – New Reservoir Tank at Strawberry Mountain	No. 2 – New North Main Ave. Pump Station
Estimated Project Cost (Short Term): $3.6 million New Reservoir Tank: $2.2 million New Booster Pump Station: $580,000 New Transmission Main: $800,000	**Estimated Project Cost (Short Term): $1.8 million** New Pump Station: $900,000 New Transmission Main: $875,000
Estimated Project Cost (Long Term): $5.6 million New Spring Street Water Main: $875,000 Spring Street Reservoir Replacement (2031-2041): $4.0 million Transmission Main with New Reservoir: $750,000	**Estimated Project Cost (Long Term): $6.2 million** Additional Pump at Station: $35,000 Los Altos Pump Station: $580,000 New Los Altos Transmission Main: $800,000 Spring Street Reservoir Replacement (before 2031): $4.0 million Transmission Main with New Reservoir: $750,000
Total Estimated Project Cost (Short and Long Term): $9.2 million	**Total Estimated Project Cost (Short and Long Term): $8.0 million**
Project Timing: 19 months Design: 7 months Bidding and Contract Execution: 2 months Construction (including submittal review and approval): 10 months Electrical Transformer Ordered by KPUD: 6 months	**Project Timing: 14 months** Design: 6 months Bidding and Contract Execution: 2 months Construction (including submittal review and approval): 6 months Electrical Transformer Ordered by KPUD: 6 months
Advantages: • Provides additional reservoir storage for both pressure zones • Flexibility for future storage capacity • Operation of reservoir tank instead of booster pump station (easier and less operational costs) • More time to construct replacement tank for Spring Street Reservoir **Disadvantages:** • Higher short-term capital costs • Longer time needed to address reservoir capacity issues	**Advantages:** • Eliminates reservoir deficit at Strawberry Mountain thereby eliminating need for new reservoir tank at site • Least short-term capital costs • Shortest anticipated lead time to implement • Provides fire flow from two directions in North Main/Simmons Road pressure zone **Disadvantages:** • Operation of a booster pump station instead of a reservoir (harder and more operational costs) • Less time to construct replacement tank for Spring Street Reservoir
Uncertainties: • Realignment of the Strawberry Mountain Road • Location of and electrical service for the new booster pump station • Type of tank construction and location of replacement tank for Spring Street Reservoir	**Uncertainties:** • Location of and electrical service for the new booster pump station • Connection point for new booster pump station • Type of construction and location of replacement tank for Spring Street Reservoir • Energy building code requirements for new station

Conclusions

Options No. 1 and No. 2 both a viable options for the City to implement to mitigate the current and future reservoir deficit at the Strawberry Mountain Reservoirs. Option No. 2, New North Main Avenue Pump Station appears to be a more cost-effective solution and can be implemented in a more timing fashion. However, this option accelerates the need for replacing the Spring Street Reservoir tank within the next 10 years.

Option No. 1, New Reservoir Tank at Strawberry Mountain provides needed reservoir capacity in the City but appears to be more costly and take longer to construct. However long term, the new reservoir tank should take less maintenance and have lower operating costs than the new booster pump station in Option No. 2. With this option, the replacement of Spring Street Reservoir is not needed until between 2031 and 2041.

With both options, there are a number of uncertainties, including the location of and electrical service for the North Main Avenue Pump Station and Los Altos Pump Station, realignment of Strawberry Mountain Road, connection point for piping associated with and energy code requirements for the North Main Avenue Pump Station, and type of construction and location for the reservoir tank to replace the Spring Street Reservoir.

Ultimately, the City will need to weigh project costs, timing, advantages and disadvantages, and uncertainties for each option to determine which option best fits its current and future needs.

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TECHNICAL MEMORANDUM NO. 6

DAVID THEODORE JEPSEN
42991
7/15/22

To: Jan Brending, City Clerk/Treasurer,
City of White Salmon, Washington

From: David Jepsen, P.E., Anderson Perry & Associates, Inc.

Re: Proposed Water Improvements Related to 6-year Transportation Plan

Date: July 15, 2022

Job/File No.: 250-12-02

The City recently adopted its 6-year Transportation Plan. For most of the transportation projects, replacement of the existing water system is recommended before or with the construction of the transportation improvements. A list of the proposed water system improvements associated with the 6-year Transportation Plan improvements is summarized in Table 1.

TABLE 1
Proposed Water System Improvements

Oak Street - 1st to 6the - Existing 2- and 3-inch diameter main at S 1st Street, SE Oak Street, and SE 2nd Street should be replaced with 8-inch diameter pipe.
SW Waubish Street - Jewett to End - Existing 4-inch steel water main at intersection of SW Waubish Street and W Jewett Boulevard should be replaced with 8-inch diameter pipe.
NE Spring Street - NE Estes to City Limits - New 8- and/or 12-inch water main are slated to be installed in NE Spring Street from NE Estes Avenue to city limits. Section from NE Fields Avenue to the east appears to be in private property.
NE Scenic Avenue - Main to Estes - Existing 3-inch steel main should be replaced with new 8-inch diameter pipe from Estes Avenue and connected to the existing 8-inch steel main on North Main Avenue.
NE Hood Avenue - Main to Estes - Existing 3-inch steel main should be replaced with new 8-inch diameter pipe from NE Estes Avenue to NE Church Street and then in NE Church Street to either NE Columbia Street or NE Scenic Avenue for connection to existing 3-inch diameter main or proposed 8-inch diameter main.
Church Street - Jewett to Hood - New 8-inch diameter water main is proposed on NE Scenic Avenue. New 8-inch diameter main on Hood Avenue is proposed that may go to either NE Columbia Street or NE Scenic Avenue.
2nd Street - Jewett to Oak - Existing 3-inch steel main on SE 2nd Street between SE Wyers Street and SE Oak Street should be replaced with 8-inch diameter main.
Grandview Street - Jewett to O'Keefe - Existing 4-inch water main on O'Keefe Avenue is slated to be replaced with 8-inch diameter pipe.
NE Columbia Street - Main to Estes - Existing 3-inch steel main should be replaced with new 8-inch diameter pipe from Estes Avenue and connected to the existing 8-inch steel main on North Main Avenue.
Achor Avenue - Academy to End - No water system improvements currently proposed on Achor Avenue.

The water system improvements should include all water main pipe, valves, hydrants, service line replacement, and other miscellaneous work that might be affected by the 6-year Transportation Plan improvements.

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TECHNICAL MEMORANDUM NO. 7

DAVID THEODORE JEPSEN
42991
10/3/22

To: Stephanie Porter, City Clerk/Treasurer,
City of White Salmon, Washington

From: David Jepsen, P.E., Anderson Perry & Associates, Inc.

Re: Asset Inventory for Water System

Date: October 3, 2022

Job/File No.: 250-12-02, w/attach

The City of White Salmon's water system is made up of assets, some buried, the rest visible. These assets are the physical components of the system and can include wells, treatment facilities, storage tanks, pumps, pipes, valves, fire hydrants, meters, and any other components that make up the system. The assets that make up a water system lose value over time as the system ages and deteriorates. As the assets deteriorate, the level of service the City can provide may decline, the City's ability to comply with federal and state permitting regulations may become compromised, operation and maintenance (O&M) costs can increase, and the City may be faced with excessive costs it can no longer afford.

One strategy the City can utilize to care for its aging water assets, is an approach called asset management. The intent of asset management would be to ensure the long-term sustainability of the City’s water system. Systems implementing asset management, develop detailed asset inventories, perform O&M tasks, conduct long-range financial planning, and undertake other activities to build system capacity, all of which help move systems along the path toward long-term sustainability. Asset management can have numerous benefits to a system, including, but not limited to, prolonging asset life, meeting customer demands, identifying sustainable rates, institutionalizing budget planning, meeting regulatory requirements, and improving emergency response times and methods.

Until now, the City has not created or implemented an asset management plan for its water system. In this technical memorandum, the asset inventory of the City’s water system is discussed and summarized.

Asset Inventory

An asset inventory is a critical underlying component of all other aspects of a system's asset management plan. As such, it is crucial for systems to have an inventoried list or survey of all system assets. Developing an accurate inventory of the City's water assets is important to the overall management. As all other steps in the asset management plan will refer to the data gathered during this step. Asset inventory also helps the City establish the relative importance or criticality of the equipment and components of its system. For this step, the available records and information on the City’s water system were reviewed and compiled. Specifically, the following information was collected or determined for each asset, based on availability.

- **Description, Including Location** – Derived from existing drawings and computer assisted drafting (CAD) maps of the City's existing transmission and distribution system, wells, storage facilities and treatment facilities, and from the City's 2014 Water System Plan. Where possible, asset descriptions reflect previously used designations in existing drawings and reports.

- **Age** – Estimated based on drawing information, staff knowledge, or other documentation.

- **Condition** – Assessed based on visual observations, City staff assessments of system performance, and other documentation.

- **Criticality** – Consideration of how critical the asset is for system operation and protecting public health and the environment. Criticality determination included consideration of the impact of asset failure on the number of and exposure to system users, and potential environmental ramifications. The basis for the criticality determination is summarized in Table A of Attachment A.

- **Prioritization** – Prioritization of each asset was determined using a rating system with consideration of criticality, its remaining useful life, the availability of other assets to replace it or be used as a backup for it, its maintenance history, and any other factors important in evaluating its priority for receiving funding. Each asset was ranked on a scale from "1" to "5," where "1" is the highest priority and "5" is the lowest. Information shown in Table B, Basis for Prioritization Rating (Attachment A), was utilized to determine how each asset should be rated.

- **Replacement Cost** – Estimated cost to replace an asset in 2022 was based on recent bid results for similar types of work, considering the local bidding climate where possible. The estimated replacement cost included local sales tax, engineer/environmental services, contingency, and other “additional" costs equal to 72.5 percent of the total construction cost. These replacement costs should be considered nominal and do not take into account site specific requirements, including, but not limited to, asphalt removal and restoration, rock excavation, concrete curbs and sidewalk removal and restoration.

  For some existing pipes, the replacement of the same material and diameter as the existing pipe is not recommended. For example, replacement of a 3-inch steel water main with the same size and material is not recommended due to 3-inch diameter pipe being an odd and undersized line (in most instances) and steel not being the preferred pipe material by the City. For 3-inch diameter lines, the replacement cost reflects a 4-inch diameter PVC pipe being installed instead.

The City's water assets were subdivided into several categories including distribution system, transmission mains, reservoir tanks, sources, pump stations, pressure reducing valve (PRV) stations, backflow preventers, fire hydrants, water meters, service lines, and SCADA system. The estimated replacement cost for valves was included in the nominal cost for transmission mains and distribution system. The results of the asset inventory for the City's water system are summarized in Excel spreadsheet format, along with other documentation, and are shown in Attachment B. Total current replacement value of the City's water system is summarized in Table 1.

TABLE 1

Nominal Replacement Value of Water System

Component	Nominal Replacement Value, $
Transmission Mains	17,623,700
Distribution System	24,144,200
Service Lines	1,729,800
Reservoir Tanks	15,197,300
Sources	13,888,000
Pump Stations	2,876,400
PRV Stations	2,501,200
Backflow Preventers	47,900
Fire Hydrants	2,306,300
Water Meters	1,131,800
SCADA System	261,000
Total	81,707,600

The total estimated nominal replacement value for the City's Water System is currently estimated to be $81.7 million. Further discussion of critical City water system assets and which assets need scheduled replacement, is provided in the body of the Water System Plan.

ATTACHMENT A

TABLE A

Basis for Criticality Determination

Critical No.	Description
1	The water system will essentially shut down if this component fails. This asset has no backup, and it is important to have an emergency plan in place, as well as the funding to replace it. Example: failure of the slow sand filter, primary transmission main, reservoir tank, or well pump.
2	This asset would have a serious impact on the water system if it failed. However, procedures could fix the problem within a reasonable time. Example: loss of well source requiring use of other well, electrical components in panels fail, backflow assembly did not pass testing, or key pipe failure that could be repaired.
3	Failure of this asset would have a moderate impact on the water system, affecting a substantial number of users with reduced service and outages. However, procedures could fix the problem within a reasonable time period. Example: line break requiring shutdown.
4	This asset's condition or failure may cause inconvenience to limited number of customers via reduced service, outages, or minor odor complaints. Examples: excessive leaks, leak repairs, or valves frozen partway closed.
5	These assets have been in service for a long time and their condition may not be well known. Evaluation should take place and a determination made as to what may be needed.

TABLE B

Basis for Prioritization Rating

Priority	Description
1	Asset's effective life exceeded and/or excessive maintenance cost incurred. A high risk of breakdown or imminent failure with serious impact on performance. No additional life expectancy: immediate replacement or rehabilitation needed. Asset is extremely critical to infrastructure of system and in providing adequate treatment and maintaining compliance.
2	Asset is near end of physical life. Substantial ongoing maintenance with short, recurrent maintenance levels required to keep the asset operational. Unplanned corrective maintenance is common. Renewal (refurbishment or replacement) is expected within one to five years.
3	Asset functions but requires a sustained high level of maintenance to remain operational. Shows substantial wear and performance is likely to deteriorate significantly. Renewal (refurbishment or replacement) is expected within five to ten years.
4	Asset is sound and well-maintained but may be showing some signs of wear. Provides full efficiency with little or no performance deterioration. At worst, only minor repair might be needed at this time.
5	Asset is like new, fully operable, well-maintained, and performs consistently at or above current standards. Minor wear shown and no further action is required.
NR	Not rated due to insufficient information on current condition.

Distribution System

				Life, Years				Replacement
Asset and Description	**Type**	**Length, LF**	**Install Date**	**Service**	**Remaining**	**Criticality**	**Priority**	**Value**
1-In. Dia. Pipe	Steel	2,793				3	**2**	$ 164,300
1.5-In. Dia. Pipe	PVC	138				4	4	$ 8,100
2-In. Dia. Pipe	Steel	12,676	1950s	50 - 70	0	3	2	$ 745,600
2-In. Dia. Pipe	PVC	1,227	Various	100	60 - 80	4	4	$ 72,200
3-In. Dia. Pipe	Steel	6,742	1950s	50 - 70	0	3	2	$ 857,100
4-In. Dia. Pipe	DI	67		100		2	4	$ 8,500
4-In. Dia. Pipe	Steel	3,213	1950s	50 - 70	0	3	2	$ 408,500
4-In. Dia. Pipe	PVC	5,369	Various	100	60 - 80	4	4	$ 682,600
4-In. Dia. Pipe	AC	14,689	1951-1965	50 - 70	0 - 13	4	3	$ 1,867,400
6-In. Dia. Pipe	DI	1,279	2002	100	80	4	4	$ 162,600
6-In. Dia. Pipe	AC	8,069	1959	50 - 70	0 - 8	4	3	$ 1,025,800
6-In. Dia. Pipe	PVC	56,590	1976-2014	100	54 - 92	4	4	$ 7,194,400
8-In. Dia. Pipe	Steel	15,399	1950s	50 - 70	0	3 or 4	2	$ 2,279,100
8-In. Dia. Pipe, Various	PVC	10,405	Various	100	60 - 80	3 or 4	4	$ 1,540,000
8-In. Dia. Pipe, Tohomish and Snohomish	PVC	1,520	2015	100	93	4	5	$ 225,000
8-In. Dia. Pipe, Fire Hall Alley	PVC	345	2015	100	93	4	5	$ 51,100
8-In. Dia. Pipe, Estes - Lincoln and Tohomish	PVC	340	2015	100	93	4	5	$ 50,300
8-In. Dia. Pipe, Garfield/Washington - Lincoln to Washington	PVC	500	2021	100	99	4	5	$ 74,000
8-In. Dia. Pipe, Various Jewett Blvd. Project	DI	591	2020	100	98	4	5	$ 87,500
8-In. Dia. Pipe, Dock Grade to Childs Res. Tie-In	DI	141	2020	100	98	4	5	$ 20,900
8-In. Dia. Pipe, Pine Dr.	DI	325	2020	100	98	4	5	$ 48,100
8-In. Dia. Pipe, Wauna Ave. - Jewett to Tohomish	DI	340	2020	100	98	4	5	$ 50,300
8-In. Dia. Pipe, Jewett Blvd. - Ingram to Master Meter	DI	280	2020	100	98	3	5	$ 41,400
8-In. Dia. Pipe, Skyline Dr. and Hospital Connect.	DI	1,494	2020	100	98	3	5	$ 221,100
8-In. Dia. Pipe, Rhine Village Dr.	DI	412	2020	100	98	4	5	$ 61,000
10-In. Dia. Pipe, Snowden Rd./Main St.	DI	840	2014	100	92	3	5	$ 140,600
10-In. Dia. Pipe, Snowden Rd./Main St.	PVC	3,045	2014	100	92	3	5	$ 509,500
10-In. Dia. Pipe, Spring St. - Res to NE Fields	Steel	2,353	1950s	50 - 70	0	3	2	$ 464,200
10-In. Dia. Pipe	DI	7,725	2001	100	79	3	4	$ 1,524,500
10-In. Dia. Pipe	PVC	7,646	1998-2002	100	76 - 80	3	4	$ 1,508,900
12-In. Dia. Pipe, Reservoir Feed - Loop to Los Altos Res.	PVC	1,500	2013	100	91	2	5	$ 296,000
12-In. Dia. Pipe, Loop Rd. - Childs to Scotts Rd.	PVC	3,655	2011	100	89	2	5	$ 721,300
12-In. Dia. Pipe, Jewett Blvd. - Garfield to Ingram Pl.	DI	5,231	2020	100	98	3	5	$ 1,032,300
Subtotal		**176,939**						**$ 24,144,200**
		228,360						

Distribution System Cont.

Asset and Description	Connections	Length, LF	Replacement Value	
Service Lines	1922	57,660	$ 1,729,800	Rough estimate is based on 30 feet per service. The City is working on a detailed list of services.

Transmission Main

Asset and Description	Type	Length, LF	Install Date	Life, Years Service	Life, Years Remaining	Criticality	Priority	Replacement Value
12-In. Dia. Pipe, Hwy 141 Cross at Bald Mtn Curves	PVC	223	2019	100	97	1	5	$ 43,600
14-In. Dia. Pipe, Remaining in Service	Steel	31,247	1957	50 - 70	0-7	1	1	$ 10,909,600
16-In. Dia. Pipe, Buck Cr Rd to Childs Res. Connect	DI	13,281	2011	100	89	1	5	$ 4,107,700
16-In. Dia. Pipe, Loop Road - Childs to Dillion Road	PVC	1,118	2011	100	89	1	5	$ 345,800
20-In. Dia. Pipe, Inter-Tie to Childs Reservoir	DI	5,552	2000	100	78	1	5	$ 2,159,700
Subtotal		**51,421**						**$ 17,566,400**

Reservoirs

Asset and Description	Type	Volume, gal	Install Date	Life, Years Service	Life, Years Remaining	Criticality	Priority	Replacement Value
Grande Ronde	Concrete	99,200	2009	75	62	2	5	$ 360,000
Childs	GFTS	203,000	2000	60	38	2	5	$ 1,150,000
Los Altos	Welded Steel	1,000,000	1981	75	34	1	3	$ 3,360,000
Spring St.	Concrete	500,000	1939	75	-8	1	1	$ 2,000,000
Strawberry Mountain - East	Concrete	99,200	2009	75	62	2	5	$ 360,000
Strawberry Mountain - West	Concrete	99,200	1991	75	44	2	4	$ 360,000
Dock Grade	GFTS	218,000	2001	60	39	2	5	$ 1,220,000
							Subtotal	**$ 8,810,000**
							Additional	**$ 6,387,250**
							Total	**$ 15,197,250**

Pump Stations

Asset and Description	Number of Pumps	Horsepower	Install Date	Life, Years Service	Remaining	Criticality	Priority	Replacement Value
Pumps								
Grande Ronde	2	250	2000	25	3	2	4	$ 250,000
Grande Ronde	1	100	2000	25	3	2	4	$ 85,000
Grande Ronde	2 (not in service)	200	2000	25	3	NR	4	$ 210,000
Los Altos*	2	15	1981	25	-16	2	1	$ 260,000
Strawberry Mountain	4	2,15	2017	25	20	2	5	$ 215,000
							Subtotal	**$ 1,020,000**
Structure								
Grande Ronde	CMU	Above Ground	2000	80	58	2	4	$ 607,500
Los Altos*	Steel Vault	Below Ground	1981	40	-1	2	1	See pumps
Strawberry Mountain	Wood framed & Sided	Above Ground	1991	60	29	2	4	$ 40,000
							Subtotal	**$ 647,500**

**Station needs to be replaced and relocated.*

Subtotal Pumps and Structure	**$ 1,667,500**
Additional	**$ 1,208,938**
Total	**$ 2,876,438**

PRV Valves

	PRV Valves			Life, Years				Replacement
Asset and Description	**Main**	**Bypass**	**Install Date**	**Service**	**Remain.**	**Criticality**	**Priority**	**Value**
ASR - Alt	10-In.	None	2009	45	32	4	4	$ 60,000
ASR - ELC, PRV/PSV	8-In.	None	2009	45	32	4	4	$ 85,000
Brislawn PRV	4-In.	None	1985	45	8	3	2	$ 45,000
Childs Monitor Sta - ELC	12-In.	None	2000	45	23	3	4	$ 115,000
Childs Res - Alt	12-In.	None	2000	45	23	3	4	$ 115,000
Cochran PRV	8-In.	2-In.				3	5	$ 85,000
Dock Grade & SR 14 - PRV	10-In.	4-In.	2001	45	24	3	4	$ 95,000
Dock Grade Res - Alt/PSV	6-In.	6-In.	2001	45	24	4	4	$ 85,000
Forester Ln. - PRV	4-In.	1.5-In.	-			4	4	$ 50,000
Jewett - PRV	8-In.	2-In.	2021	45	44	3	5	$ 110,000
Lakeview Test Station - PRV	4-In.	1.5-In.				4	4	$ 50,000
Lakeview Rd. - PRV	6-In.	1.5, 2-In.	2011	45	34	4	4	$ 90,000
Michigan - PRV	6-In.	None	2004	45	27	4	4	$ 80,000
NW Lake Hydrant - PRV	4-In.	0.75-In.	2011	45	34	4	4	$ 50,000
Oak St.- PRV	6-In.	2-In.	2021	45	44	4	5	$ 85,000
Spring St. Res. - Alt	12-In.	None				3	4	$ 35,000
SR 14 Intertie - Alt/PSV	8-In.	None	2001	45	24	3	4	$ 85,000
SR 141 Intertie - PSV	4-In.	None	1990	45	13	4	4	$ 45,000
Vine St. - PRV	6-In.	2-In.	2021	45	44	4	5	$ 85,000
							Subtotal	**$ 1,450,000**
							Additional	**$ 1,051,250**
							Total	**$ 2,501,250**

Service Life assumed to be 15 years without scheduled maintenance; with maintenance service line extended to 45 years.
Replacement value is for valves only.
Alt - altitude valve
CV - control valve
ELC - electric control valve
PVC - pump control valve
PRV - pressure reducing valve
PSV - pressure substanting valve

Source Water

Asset and Description	Capacity	Install Date	Life, Years Service	Life, Years Remaining	Criticality	Priority	Replacement Value
Source Water							
Well No. 1 - Submersible	600 gpm	2008	20	6	1	4	$ 75,000
Well No. 1 - 10-In. Dia., 750 Feet bgs		1998	100	76	1	4	$ 750,000
Well No. 1 - Structure		1998	50	26	3	4	$ 40,000
Well No. 2 - Line-shaft Turbine/ASR, disabled 2008; artesian conditions	200 gpm	2001	NR	NR	1	4	$ 150,000
Well No. 2 - 16-In. Dia., 1,242 Feet bgs		2001	100	79	1	4	$ 1,100,000
Well No. 2 - Structure and Piping		2001	80	59	2	4	$ 286,000
Nathan Wellman Memorial Buck Creek Slow Sand Plant (Buck Creek WTP)	1,000 gpm	2010	40	28	1	4	$ 5,350,000
						Subtotal	**$ 7,751,000**
Power Generation							
Grand Ronde Booster Station - Emergency Power Generator	480 KW	2000	30	10	2	4	$ 200,000
Public Works Building - Emergency Power Generator	30 KW		30		1	4	$ 100,000
						Subtotal	**$ 300,000**

Source Water and Power Generation Subtotal	**$ 8,051,000**
Additional	**$ 5,836,975**
Total	**$ 13,887,975**

Backflow Preventers

Make	Model	Size, In.	Type	Serial No.	Installed	Location	Life, Years Service	Life, Years Remaining	Criticality	Priority	Replacement Value
Febco	870V	8	DCVA	0112041354	?	Bingen-White Salmon Intertie	40		2	4	$ 11,250
Febco	850U	2	DCVA	01582	4/4/2007	Center St. Little League Field on O'Keefe	40	25	2	4	$ 1,350
Watts	007M1QT	2	DCVA	140847	3/4/2007	Little League Field Center St.	40	25	2	4	$ 1,350
Watts	009M2	2	DCVA	186141	?	City Shop Mobile	40	25	2	4	$ 1,350
Wilkins	975XL	2	RPBA	229828	4/15/2014	Next to hydrant in Vault on Amore Ct.	40	32	2	4	$ 1,500
Watts	007M1QT	1	DCVA	254441	5/9/2009	Flower Bed Estes & Jewett Blvd., NE Corne	40	27	2	4	$ 450
Watts	077M1	1	DCVA	254453	?	City Hall Flower Bed	40		2	4	$ 450
Watts	007M1QT	1	DCVA	254457	6/14/2010	Mark's Auto Flower Bed on E Jewett Blvd.	40	28	2	4	$ 450
Watts	009M2	1	RPBA	285099	?	Inside Park-n-Ride Lift Station	40		2	4	$ 600
Watts	007M1	2	DCVA	46476	5/9/2010	Fire Hall Ice Machine	40	28	2	4	$ 1,350
Watts	007M3	0.75	DCVA	85619	6/7/2020	Planter Bed - Police Department	40	38	2	4	$ 300
Conbraco	DCV	2	DCVA	9110	5/14/2010	NW Washington St. by Ped City Park	40	28	2	4	$ 1,350
Watts	007M3	1	DCVA	94773	6/14/2010	Planter Bed in Front of Pioneer Build	40	28	2	4	$ 450
Wilkins	950XLT	1	DCVA	966980	5/9/2010	Pioneer Park	40	28	2	4	$ 450
Watts	007M3	0.75	DCVA	98849	6/7/2020	West of Estes, North of Jewett Blvd.	40	38	2	4	$ 300
Colt	400N	3	RPBA	EH0184	1/1/1995	City Shop, NE Corner of Shop	40	13	2	4	$ 4,500
Conbraco	40104A2T	0.75	DCVA	R9688	6/9/2010	550 E Jewett Blvd., Firemens Park	40	28	2	4	$ 300
										Subtotal	**$ 27,750**
										Additional	**$ 20,119**
										Total	**$ 47,869**

Fire Hydrants

		Storz			Existing			Life, Years				Replacement
No.	Location	Coupling	Manufacturer	Date	Main, In.	PRV	Pressure	Service	Remaining	Criticality	Priority	Value
1	61 Lakeview Rd.		Waterous	1993	6		PSI = 150, raise foot valve can	60	31	2	4	$ 6,500
2	Osterman Rd.		Pacific States	1966	6		PSI = 137	60	4	2	1	$ 6,500
3	Above Park on Lakeview Rd.	X	Mueller	2011	8		PSI = 144	60	49	2	4	$ 6,500
4	Lakeview & Nester Peak	X	Mueller	2011	16		PSI = 156	60	49	2	4	$ 6,500
5	15 Northwestern Lake Rd.	X	Mueller	2011	16	X	PSI = 104	60	49	2	4	$ 18,500
6	579 Hwy 141		Kennedy	1999	20		PSI = 190, north cap cross threaded, leaks	60	37	2	4	$ 6,500
7	570 Hwy 141		Kennedy	1999	20		PSI = 186	60	37	2	4	$ 6,500
8	Corner of Wallace & Forester	X	Mueller	2003	6		PSI = 80	60	41	2	4	$ 6,500
9	21 Wallace Dr.	X	Mueller	2003	6		PSI = 100	60	41	2	4	$ 6,500
10	2 Wallace Dr.	X	Mueller	2003	6		PSI = 90	60	41	2	4	$ 6,500
11	1 Acorn Ln.		Waterous	1993	6		PSI = 72	60	31	2	4	$ 6,500
12	NW of 1635 Jewett Blvd.		Waterous	1994	14		PSI = 132	60	32	2	4	$ 6,500
13	1480 Catalina		Mueller	2004	8		PSI = 76	60	42	2	4	$ 6,500
14	1450 Catalina		Mueller	2004	8		PSI = 84	60	42	2	4	$ 6,500
15	West of 1425 Catalina		Mueller	2003	8		PSI = 100	60	41	2	4	$ 6,500
16	Corner of Childs & Kennedy		Kennedy	2000	6		PSI = 44	60	38	2	4	$ 6,500
17	1418 Elton		Dresser	1972	6		PSI = 46, needs new can & lid	60	10	2	2	$ 6,500
18	1501 Childs		Mueller	2002	14		PSI = 51	60	40	2	4	$ 6,500
19	858 Loop	X	Mueller	2010	16		PSI = 70	60	48	2	4	$ 6,500
20	Riggleman		Waterous	2000	6		PSI = 62, north cap frozen, front cap leaks, foot valve will not seat completely	60	38	2	1	$ 6,500
21	1220 Fruit Valley		Kennedy	2015	12		PSI = 51	60	53	2	5	$ 6,500
22	657 Loop Rd.		Mueller	1998	612		PSI = 62	60	36	2	4	$ 6,500
23	Bus Barn	X	Mueller	2011	8		PSI = 58	60	49	2	4	$ 6,500
24	393 Loop Rd.	x	Mueller	2011	12		PSI = 50	60	49	2	4	$ 6,500
25	245 Loop Rd.	X	Mueller	2011	12		PSI = 44	60	49	2	4	$ 6,500
26	Morris Motors	X	Mueller	2015	8		PSI = 110	60	53	2	5	$ 6,500
27	1395 Main	X	Mueller	2014	8		PSI = 100	60	52	2	5	$ 6,500
28	160 Simmons	X	Mueller	2015	8		PSI = 80	60	53	2	5	$ 6,500
29	252 Simmons	X	Mueller	2015	8		PSI = 80	60	53	2	5	$ 6,500
30	High School Baseball Field		Mueller	2002	8		PSI = 80, Res PSI 20-21	60	40	2	4	$ 6,500

Fire Hydrants Cont.

No.	Location	Storz Coup.	Manufacturer	Date	Existing Main, In.	PRV	Pressure	Life Years Service	Life Years Remaining	Criticality	Priority	Replacement Value
31	Corner Wedrick & Simmons	X	Mueller	2017	8		PSI = 72, Res PRI -22	60	55	2	5	$ 6,500
32	1272 Main	X	Mueller	2015	8		PSI = 100	60	53	2	5	$ 6,500
33	ICE Driveway & Main Corner		Mueller	2008	8		PSI = 100	60	46	2	4	$ 6,500
34	ICE		Mueller	2008	8		PSI = 120	60	46	2	4	$ 6,500
35	Hunsaker	X	Mueller	2014	8		PSI = 100, hydrant backed into, needs repair	60	52	2	5	$ 6,500
36	Corner of Field & Spring		Rensselaer	1952	6		PSI = 72	60	-10	2	1	$ 6,500
37	Orchard & Center		Clow	1952	4			60	-10	2	1	$ 6,500
38	Corner Cherry & Fields		Mueller	1980	6		PSI = 71	60	18	2	3	$ 6,500
39	Corner Wisconson & Fields		Rensselaer	1953	6		PSI = 76	60	-9	2	1	$ 6,500
40	Corner Green & Fields		Mueller	1979	4		PSI = 80	60	17	2	2	$ 6,500
41	Corner Academy & Snohomish		Iowa	N/A	4		PSI = 80, Can't operate foot valve	60		2	2	$ 6,500
42	Corner Columbia & Skagit		Iowa	N/A	4		PSI = 102	60		2	2	$ 6,500
43	Corner Scenic & Skagit		Iowa	1966	4		PSI = 118, foot valve can needs raised	60	4	2	1	$ 6,500
44	Pioneer Community Center	X	Mueller	2003	4 or 6		PSI = 122	60	41	2	4	$ 6,500
45	Corner Pioneer & Tohomish	X	Mueller	2015	6		PSI = 120	60	53	2	5	$ 6,500
46	588 Tohomish		Waterous	1976	6			60	14	2	3	$ 6,500
47	Corner of Tohomish & Orchard		Iowa	1961	4		PSI = 140	60	-1	2	1	$ 6,500
48	MT Adams LL, 663 Center St.	X	Mueller	1962	4		PSI = 142, foot valve leaking	60	0	2	1	$ 6,500
49	Corner Orchard & Grandview		Mueller	1991	6		PSI = 145	60	29	2	4	$ 6,500
50	Corner O'Keef & Grandview		Mueller	1991	6		PSI = 136	60	29	2	4	$ 6,500
51	555 Vine		Mueller	2002	6		PSI = 132	60	40	2	4	$ 6,500
52	Rhine Village Apt. No. 5		Waterous	1976	6		PSI = 70	60	14	2	2	$ 6,500
53	Rhine Village Apt. No. 6		Waterous	1976	6		PSI = 62	60	14	2	2	$ 6,500
54	Rhine Village Apt. No. 7		Waterous	1976	6		PSI = 65	60	14	2	2	$ 6,500
55	Skyline Parking Lot		Mueller	2020	8			60	58	2	5	$ 6,500
56	Skyline Entrance		Mueller	2020	8			60	58	2	5	$ 6,500
57	Corner Vine & E Jewett Blvd.		Mueller	2020	8			60	58	2	5	$ 6,500
58	118 Ingram Pl.	X	Mueller	2009	6		PSI = 214	60	47	2	4	$ 6,500
59	101 Ingram Pl.	X	Mueller	2006	8		PSI = 220	60	44	2	4	$ 6,500
60	North Shore Dr.	X	Mueller	1997	10		PSI = 100, foot valve can needs cleaned	60	35	2	3	$ 6,500

Fire Hydrants Cont.

No.	Location	Storz Coup.	Manufacturer	Date	Existing Main, In.	PRV	Pressure	Life Years Service	Life Years Remaining	Criticality	Priority	Replacement Value
61	Ice Plant	X	Mueller	1997	10		PSI = 102	60	35	2	4	$ 6,500
62	Bridge RV Park	X	Mueller	1997	10		PSI = 100	60	35	2	4	$ 6,500
63	Park & Ride	X	Mueller	1996	10		PSI = 110	60	34	2	4	$ 6,500
64	Bottom Dock Grade		Mueller	1999	10	X	PSI = 100	60	37	2	4	$ 18,500
65	Corner 7th & Oak		Waterous	1978	6		PSI = 200, west cap frozen	60	16	2	2	$ 6,500
66	East of 707 Oak		Mueller	1996	6		PSI = 218, raise foot valve	60	34	2	4	$ 6,500
67	939 Oak		Mueller	1987	6		PSI = 220, raise foot valve can	60	25	2	3	$ 6,500
68	955 Oak		Mueller	2000	6		PSI = 250	60	38	2	4	$ 6,500
69	102 Pine		Mueller	2002	6		PSI = 210	60	40	2	4	$ 6,500
70	6th & Oak		Waterous	1973	6		PSI = 220, front cap leaks	60	11	2	1	$ 6,500
71	5th & Oak		Waterous	1973	6		PSI = 170	60	11	2	2	$ 6,500
72	4th & Oak		Waterous	1973	6		PSI = 170, front cap leaks	60	11	2	1	$ 6,500
73	2nd & Oak		Waterous	1973	6		PSI = 155	60	11	2	2	$ 6,500
74	1st & Wyers		Waterous	1978	6		PSI = 130	60	16	2	2	$ 6,500
75	210 Riverwatch		Mueller	1993	6		PSI = 145	60	31	2	4	$ 6,500
76	Overlander & Riverwatch		Mueller	1993	6		PSI = 130	60	31	2	4	$ 6,500
77	201 Edgecliff	X	Mueller	2008	6		PSI = 135	60	46	2	4	$ 6,500
78	Garfield & Jewett		Mueller	2020	10			60	58	2	5	$ 6,500
79	476 West Jewett		Iowa	1961	4		PSI = 100, raise foot valve can	60	-1	2	1	$ 6,500
80	601 Waubish		Iowa	1961	4		PSI = 120	60	-1	2	1	$ 6,500
81	End of Waubish		Waterous	1978	6		PSI = 115, oper nut stiff, hydrant needs rebuilt	60	16	2	1	$ 6,500
82	West of M.P.2 (Jewett)		Iowa	1964	4		PSI = 95, no valve can, valve nut sticking out of ground	60	2	2	1	$ 6,500
83	Maxfield		Waterous	1991	6		volume	60	29	2	2	$ 6,500
84	Sunridge & Dogwood		Kennedy	1997	6		PSI = 120	60	35	2	4	$ 6,500
85	203 Dogwood		Mueller	1988	6		PSI = 150	60	26	2	4	$ 6,500
86	120 Westwinds		Waterous	1992	6		PSI = 105, raise foot valve	60	30	2	4	$ 6,500
87	280 Westwinds		Waterous	1992	6		PSI = 130, raise foot valve	60	30	2	4	$ 6,500
88	141 & Lincoln		MH	1968	8		PSI = 100, weepers malfunctioning	60	6	2	1	$ 6,500
89	West of 275 Cherry Blossom Blf.		Waterous	1930	4		PSI = 170 ish	60	-32	2	1	$ 6,500
90	257 Cherry Blossom		Waterous	1973	6		PSI = 150	60	11	2	3	$ 6,500
91	Eyrie & Lambert Ln.		Mueller	2002	8		PSI = 140, raise foot valve	60	40	2	4	$ 6,500

Fire Hydrants Cont.

No.	Location	Storz Coup.	Manufacturer	Date	Existing Main, In.	PRV	Pressure	Life Years		Criticality	Priority	Replacement Value
								Service	Remaining			
92	287 Eyrie	X	Waterous	1974	8		PSI = 165, raise foot valve	60	12	2	2	$ 6,500
93	Eyrie Ct. & Eyrie Rd.		Kennedy	1996	6		PSI = 190, front port leaks, slow drainage	60	34	2	3	$ 6,500
94	390 Eyrie		Mueller	1999	6		PSI = 205	60	37	2	4	$ 6,500
95	470 Eyrie		Mueller	1999	6		PSI = 220	60	37	2	4	$ 6,500
96	730 Westview		Mueller	2002	6		PSI = 90	60	40	2	4	$ 6,500
97	1000 Panorama Pt.		Waterous	2000	6		PSI = 120, raise foot valve	60	38	2	4	$ 6,500
98	1021 Panorama Pt.		Waterous	1999	6		PSI = 110	60	37	2	4	$ 6,500
99	1151 Panorama Pt.		Waterous	1999	6		PSI = 125	60	37	2	4	$ 6,500
100	821 Panorama Ct.		Waterous	1999	6		PSI = 125, front & east cap leak, raise foot valve	60	37	2	3	$ 6,500
101	1189 Panorama Pt.		Waterous	2000	6		PSI = 130, raise foot valve	60	38	2	4	$ 6,500
102	1221 Panorama Pt.		Kennedy	2020	6			60	58	2	5	$ 6,500
103	808 Puckerhuddle		Mueller	1995	6		PSI = 130	60	33	2	4	$ 6,500
104	Capt. Cook & Puckerhuddle	X	Mueller	2004	8		PSI = 125	60	42	2	4	$ 6,500
105	Sterling Blvd. & Puckerhuddle	X	Mueller	2004	8		PSI = 120	60	42	2	4	$ 6,500
106	1411 Sterling Ct	X	Waterous	2004	8		PSI = 135, slow drainage	60	42	2	4	$ 6,500
107	Sterling Blvd. (Power Vault)		Mueller	2006	8		PSI = 135	60	44	2	4	$ 6,500
108	Sterling Blvd. Corner		Mueller	2007	8		PSI = 165	60	45	2	4	$ 6,500
109	254 Sterling Blvd.		Mueller	2011	8		PSI = 190	60	49	2	4	$ 6,500
110	1196 Puckerhuddle		Mueller	2005	6		PSI = 125, unable to locate foot valve	60	43	2	4	$ 6,500
111	130 Amor Ct.		Mueller	2005	6		PSI = 120	60	43	2	4	$ 6,500
112	Rodeo Dr. & Puckerhuddle		Mueller	2005	6		PSI = 125	60	43	2	4	$ 6,500
113	Neal Rd. & Peck Rd.		Waterous	1991	6		PSI = 120, raise foot valve	60	29	2	4	$ 6,500
114	Winebarger & Jewett		Iowa	1969	8		PSI = 120	60	7	2	1	$ 6,500
115	Newman Ln. & 141		Mueller	2004	6		PSI = 110	60	42	2	4	$ 6,500
116	High School Entrance		Mueller	1997	8		PSI = 80	60	35	2	4	$ 6,500
117	William Dr. & Lincoln		Clow	2005	8		PSI = 70, no gasket in west cap	60	43	2	4	$ 6,500
118	Summer Ln.		Waterous	1996	8		PSI = 50	60	34	2	4	$ 6,500
119	Rio Vista & Lincoln		Clow	1980	10		PSI = 40, caps & oper nut leak, water in foot valve can, broken can	60	18	2	1	$ 6,500

Fire Hydrants Cont.

No.	Location	Storz Coup.	Manufacturer	Date	Existing Main, In.	PRV	Pressure	Life Years Service	Life Years Remaining	Criticality	Priority	Replacement Value
120	70 Rio Vista		Waterous	1972	6		PSI = 105, foot valve can on op nut, unable to operate	60	10	2	2	$ 6,500
121	214 Rio Vista		Waterous	1992	6		PSI = 110	60	30	2	4	$ 6,500
122	325 Rio Vista	X	Kennedy	2016	6		PSI = 110	60	54	2	5	$ 6,500
123	172 Palos Verdes		Waterous	1992	6		PSI = 55	60	30	2	4	$ 6,500
124	154 Palos Verdes		Waterous	1992	6		PSI = 40	60	30	2	4	$ 6,500
125	85 Palos Verdes		Waterous	1990	6		PSI = 45, raise foot valve	60	28	2	4	$ 6,500
126	550 Lincoln		Clow	1980	10		PSI = 30, unable to operate foot valve	60	18	2	3	$ 6,500
127	544 Lincoln		Waterous	1992	10		PSI = 90	60	30	2	4	$ 6,500
128	Lincoln		Clow	1980	10		PSI = 50, front cap leaking	60	18	2	3	$ 6,500
129	NW Lincoln	X	Clow	1980	10		PSI = 65, caps leak	60	18	2	3	$ 6,500
130	352 NW Lincoln		Clow	1980	10		PSI = 65, caps, packing, valve & seal all leak, slow drainage	60	18	2	2	$ 6,500
131	NW Lincoln & Garfield		Kennedy	2020	10			60	58	2	5	$ 6,500
132	185 El Camino Real		Waterous	1973	6		PSI = 85, front cap leaks, foot valve won't shut	60	11	2	1	$ 6,500
133	103 Alta Vista		Mueller	1997	6		PSI = 80	60	35	2	4	$ 6,500
134	497 El Camino Real		Waterous	1972	6			60	10	2	2	$ 6,500
135	El Camino Real & Spring	X	Mueller	1991	6		PSI = 50	60	29	2	4	$ 6,500
136	480 NW Spring	X	Mueller	1991	10		PSI = 50	60	29	2	4	$ 6,500
137	Strawberry Mtn. Rd. & Spring		Mueller	1991	10		PSI = 60, raise foot valve can	60	29	2	4	$ 6,500
138	Strawberry Mtn. Rd. (Reservoir)		Mueller	1990	10		PSI = 5, front & south caps frozen, foot valve can on op. nut, unable to operate	60	28	2	3	$ 6,500
139	415 Strawberry Mtn. Ln.		Waterous	1991	6		PSI = 80	60	29	2	4	$ 6,500
140	1050 Schoolview	X	Mueller	2002	6		PSI = 95, valve can needs re-aligned	60	40	2	4	$ 6,500
141	Champion & Spring		Kennedy	2015	8			60	53	2	5	$ 6,500
142	Champion Ln.	X	Kennedy	2017	8			60	55	2	5	$ 6,500
143	Spring St. (above yard)		Mueller	1988	10		PSI = 80	60	26	2	4	$ 6,500
144	Cherry Hill Estates & Spring		Waterous	1994	8		PSI = 110	60	32	2	4	$ 6,500
145	Country View & Cochran		Mueller	1996	8		PSI = 65	60	34	2	4	$ 6,500
146	Hedi Ln. & Country View		Waterous	1994	6		PSI = 80	60	32	2	4	$ 6,500

Fire Hydrants Cont.

		Storz			Existing			Life Years				Replacement
No.	Location	Coup.	Manufacturer	Date	Main, In.	PRV	Pressure	Service	Remaining	Criticality	Priority	Value
147	645 Country View		Mueller	1998	6		PSI = 90	60	36	2	4	$ 6,500
148	Cochran & Shambo	X	Mueller	2006	6		PSI = 85	60	44	2	4	$ 6,500
149	567 Kiowa		Mueller	2006	6		PSI = 90	60	44	2	4	$ 6,500
150	Shambo & Kiowa		Mueller	2006	6		PSI = 90, front cap leaks	60	44	2	4	$ 6,500
151	Shambo & Cochran	X	Mueller	2006	6		PSI = 100	60	44	2	4	$ 6,500
152	544 Cochran		Mueller	1996	8		PSI = 90	60	34	2	4	$ 6,500
153	534 Cochran		Mueller	1996	8		PSI = 100	60	34	2	4	$ 6,500
154	Loop & Cochran		Mueller	1996	8		PSI = 115, foot valve can on valve, unable to operate	60	34	2	3	$ 6,500
155	Spring & Main		Kennedy	2012	10		PSI = 100	60	50	2	4	$ 6,500
156	Cherry & Estes	X	Mueller	1998	4		PSI =70, set screw missing	60	36	2	4	$ 6,500
157	185 NW Cherry		Kennedy	1999	8		PSI = 50, uable to locate foot valve	60	37	2	4	$ 6,500
158	Cherry (Manlys)	X	Mueller	2004	8		PSI = 90	60	42	2	4	$ 6,500
159	Achor & Michigan	X	Mueller	2003	8		PSI = 110	60	41	2	4	$ 6,500
160	Wisconsin & Main		Iowa	1966	4		PSI = 70, raise foot valve	60	4	2	1	$ 6,500
161	Estes & Wisconsin		Iowa	1967	4		PSI = 75	60	5	2	1	$ 6,500
162	Soroptimists Prk.-Green &Estes		Mueller	2004	4		PSI = 80, packing, valve & seal all leaking	60	42	2	4	$ 6,500
163	Green & Main		Rensselaer	N/A	4		PSI = 80	60		2	1	$ 6,500
164	Snohomish & Hood		Iowa	1966	4		PSI = 100, caps leak	60	4	2	1	$ 6,500
165	Wauna & Hood		Mueller	1998	4		PSI = 90	60	36	2	4	$ 6,500
166	Estes & Hood		Iowa	1964	4		PSI = 90	60	2	2	1	$ 6,500
167	Whitson Elementry Playground		Mueller	1989	8		PSI = 80	60	27	2	4	$ 6,500
168	Snohomish & Washington	X	Mueller	2015	8		PSI = 115	60	53	2	5	$ 6,500
169	Church & Washington		Mueller	1991	6		PSI = 90	60	29	2	4	$ 6,500
170	Washington & Main	X	Waterous	1972	8		PSI = 85, Raise foot valve	60	10	2	3	$ 6,500
171	Washington & Michigan		Waterous	1972	8		PSI = 85	60	10	2	3	$ 6,500
172	575 Michigan	X	Mueller	2004	8		PSI = 70, replace valve can, missing op. nut	60	42	2	4	$ 6,500
173	Lincoln & Estes	X	Iowa	1954	4		PSI = 110, caps leak, valve can is on op. nut (somewhat usable)	60	-8	2	1	$ 6,500
174	Wauna & Tohomish	X	Mueller	2015	8		PSI = 125	60	53	2	5	$ 6,500
175	Tohomish & Estes	X	Mueller	2015	8		PSI = 120	60	53	2	5	$ 6,500
176	Fire Department	X	Mueller	2015	6			60	53	2	5	$ 6,500

Fire Hydrants Cont.

No.	Location	Storz Coup.	Manufacturer	Date	Existing Main, In.	PRV	Pressure	Life Years Service	Life Years Remaining	Criticality	Priority	Replacement Value
177	Lincoln & Main		Waterous	1978	10		PSI = 100	60	16	2	2	$ 6,500
178	Tohomish & Church		Mueller	1997	6		PSI = 115	60	35	2	4	$ 6,500
179	Jewett & Main		Mueller	2020	12			60	58	2	5	$ 6,500
180	Riverwatch & Jewett		Mueller	2020	12			60	58	2	5	$ 6,500
181	186 Jewett		Mueller	2020	12			60	58	2	5	$ 6,500
182	Jewett & 2nd		Mueller	2020	12			60	58	2	5	$ 6,500
183	Jewett & Estes		Mueller	2020	12			60	58	2	5	$ 6,500
185	Grandview & Jewett		Mueller	2020	12			60	58	2	5	$ 6,500
186	Dock Grade & Jewett		Mueller	2020	12			60	58	2	5	$ 6,500
187	5th & Wyers		Waterous	1979	6		PSI = 165	60	17	2	4	$ 6,500
188	Wauna & Jewett		Mueller	2020	12			60	58	2	5	$ 6,500
189	Skyline Dr. (Power Vault)		Mueller	2020	8			60	58	2	5	$ 6,500
190	Skyline Parking lot west		Mueller	2020	8			60	58	2	5	$ 6,500
191	Skyline & Rhine Village		Mueller	2020	8			60	58	2	5	$ 6,500
192	Rhine Village East Entrance		Mueller	2020	8			60	58	2	5	$ 6,500
193	Eagle Ridge Entrance		MH	2017	6			60	55	2	5	$ 6,500
194	5th Pl. & Jewett		Mueller	2020	12			60	58	2	5	$ 6,500
195	7th & Jewett		Mueller	2020	12			60	58	2	5	$ 6,500
196	8th & Jewett		Mueller	2020	12			60	58	2	5	$ 6,500
197	817 E Jewett		Mueller	2020	12			60	58	2	5	$ 6,500
198	Oak & Jewett		Mueller	2020	12			60	58	2	5	$ 6,500
199	1169 W Jewett		Mueller	2020	12			60	58	2	5	$ 6,500
200	Church Pl. & Pioneer		Mueller	2020	6			60	58	2	5	$ 6,500
201	Michigan & Sophil Ln.		United Fireflo	2018	8			60	56	2	5	$ 6,500
202	Sports Complex by High School		Clow	2021				60	59	2	5	$ 6,500
203	Washington & Garfield		Kennedy	2021	8			60	59	2	5	$ 6,500
											Total	**$ 1,337,000**
											Additional	**$ 969,325**
											Total	**$ 2,306,325**

Water Meters

Manufacturer/Size	Size, In.	No.	Year Installed	Life, Years Service	 Remaining	Criticality	Priority	Replacement Value	Location/Notes
Master Meters									
Buck Crk WTP	8	3	2010	20	8	2	5	$ 8,200	Mag meter
Buck Crk MS	10	1	2010	20	8	2	5	$ 9,400	Mag meter
Well No. 2	10	1	2002	20	0	2	1	$ 9,400	Mag meter
Well No. 2 ASR	6	1	2009	20	7	2	5	$ 7,000	Mag meter
Grand Ronde BPS	12	1	2002	20	0	2	5	$ 12,400	Mag meter
Childs MS	12	1	2011	20	9	2	5	$ 12,400	Mag meter
Los Altos Res	8	1	2011	20	9	4	5	$ 8,200	Mag meter
							Subtotal	**$ 67,000**	
Bingen Master Meters									
SR-14:	8	1		20		4	1	$ 8,200	Mag meter
SR 141: Intertie	4	1		20		4	2		Turbine meter
SR-141: Jewett	3	1	2020	20	18	4	5		Octave, Ultrasonic
							Subtotal	**$ 8,200**	
Service Meters									
Master Meter (Octave)									Various - see sheets
3/4-In.		1699	2017-22	20	16-20	5	5	$ 523,292	
1-In.		42	2017-22	20	16-20	5	5	$ 17,556	
1.5-In.		2	2017-21	20	16-20	5	5	$ 1,452	
2-In.		1	2017	20	15	4	5	$ 726	
4-In.		3	2021-22	20	19-20	4	5	$ 2,178	
Octave Meters									Various - see sheets
2-In.		12	2014-16	20	14-16	4	5	$ 16,380	
4-In.		2	2016	20	14	4	5	$ 2,730	
Sensus Meters (Remaining water meters to be replaced)									Various - see sheets
3/4-In.		132				5	1	$ 40,656	
1-In.		1				5	1	$ 308	
1.5-In.		2				5	1	$ 616	
2-In.		11				4	1	$ 3,388	
3-In.		2				4	1	$ 616	
4-In.		1				4	1	$ 2,613	
							Subtotal	**$ 612,511**	
							Subtotal All Meters	**$ 687,711**	
							Additional	**$ 444,070**	
							Total	**$ 1,131,781**	

SCADA Assets

Location	Equipment Communication [1]	Year Installed [2]	Life, Years		Criticality	Priority	Replacement Value
			Service	Remaining			
City Shop	Master HMI / DSL	2002	15	-5	1	1	$ 90,000
Buck Creek WTP	PLC / None	2010	15	3	1	4	$ 10,000
Buck Creek Monitoring Station (MS)	PLC / DSL	2002	15	-5	1	1	$ 20,000
Grande Ronde Pump Station (PS)	PLC / DSL-Radio	2002	15	-5	1	1	$ 25,000
Well No. 2	PLC / Radio	2002	15	-5	1	1	$ 18,000
Childs Monitoring Station (MS)	PLC / Radio	2002	15	-5	1	1	$ 18,000
Spring Street Reservoir	PLC / POTS	2002	15	-5	1	1	$ 15,000
Los Altos Reservoir and Pump Station	PLC / POTS	2002	15	-5	1	1	$ 15,000
Strawberry Mountain Reservoirs and PS	PLC / POTS	2002	15	-5	1	1	$ 15,000
Dock Grade Reservoir	PLC / POTS	2002	15	-5	1	1	$ 15,000
Hwy 14 Intertie	PLC / DLS	2002	15	-5	2	1	$ 20,000
						Total	**$ 261,000**

(1) PLC: programmable logic controller; DSL: digital subscriber line; POTS: plain old telephone service

(2) With numerous upgrades, year unknown

APPENDIX D

Water Production and Usage Data

	Buck Creek			Wells				Total		ASR to	Percent Withdrawn			
Month	**Withdrawn**	**ac-ft/yr**	**Distributed**	**No. 1**	**ac-ft/yr**	**No. 2**	**ac-ft/yr**	**Withdrawn**	**Distributed**	**Well No. 2**	**Buck Crk**	**No. 1**	**No. 2**	**Wells**
2014														
Jan	-		-	21,389,400		-		21,389,400	21,389,400	-				
Feb	-		-	18,751,000				18,751,000	18,751,000	-				
Mar	-		-	20,140,400				20,140,400	20,140,400	-				
Apr	-		-	19,664,400				19,664,400	19,664,400	-				
May				10,186,367		1,247,667		11,434,034	11,434,034	-				
Jun	15,003,173		7,047,700	7,749,333		2,977,333		25,729,839	17,774,366	-				
Jul	23,702,567		29,910,700	7,317,550		2,642,000		33,662,117	39,870,250	-				
Aug	32,584,550		30,989,050	7,411,800		2,669,500		42,665,850	41,070,350					
Sep	30,334,400		28,370,050	5,016,100		1,820,500		37,171,000	35,206,650	259,350				
Oct	31,679,063		30,683,600	2,498,250		7,000		34,184,313	33,188,850	5,807,500				
Nov	22,328,697		21,738,320	4,942,960		-		27,271,657	26,681,280	4,554,000				
Dec	11,078,365		10,273,280	12,268,640		-		23,347,005	22,541,920	-				
Total	166,710,815	511.7	159,012,700	137,336,200	421.5	11,364,000	34.9	315,411,015	307,712,900	10,620,850	52.9%	43.5%	3.6%	47.1%
2015														
Jan	15,620,993		14,309,367	8,254,100		214,000		24,089,093	22,777,467	173,500				
Feb	21,052,594		19,917,900	1,140,767		-		22,193,361	21,058,667	50,200				
Mar	18,234,067		17,100,033	4,624,383		708,000		23,566,450	22,432,416	79,500				
Apr	8,688,692		845,100	11,774,350		3,949,000		24,412,042	16,568,450	-				
May	20,102,853		18,628,433	9,191,533		3,200,333		32,494,719	31,020,299	-				
Jun	30,434,017		28,888,267	7,838,667		2,842,667		41,115,351	39,569,601	-				
Jul	34,179,250		32,515,800	8,638,600		3,121,000		45,938,850	44,275,400	-				
Aug	32,042,184		30,704,100	7,257,800		2,561,000		41,860,984	40,522,900	-				
Sep	26,990,800		25,434,700	4,698,100		1,681,000		33,369,900	31,813,800	-				
Oct	24,045,312		22,872,833	3,040,800		1,110,333		28,196,445	27,023,966	-				
Nov	14,781,550		13,520,867	4,498,300		1,555,667		20,835,517	19,574,834	-				
Dec	10,067,140		8,684,880	8,251,960		2,798,600		21,117,700	19,735,440	-				
Total	256,239,452	786.4	233,422,280	79,209,360	243.1	23,741,600	72.9	359,190,412	336,373,240	303,200	71.3%	22.1%	6.6%	28.7%
2016														
Jan	10,501,347		9,819,887	7,231,973		2,478,400		20,211,720	19,530,260	-				
Feb	6,098,202		5,497,833	9,861,567		3,285,000		19,244,769	18,644,400	-				
Mar	7,678,900		7,199,450	8,556,700		3,180,000		19,415,600	18,936,150	-				
Apr	19,195,267		17,793,883	3,010,733		1,040,667		23,246,667	21,845,283	-				
May	21,428,933		19,969,067	8,558,667		2,909,333		32,896,933	31,437,067	-				
Jun	28,122,250		26,569,050	6,702,800		2,307,000		37,132,050	35,578,850	-				
Jul	26,297,756		24,922,950	11,297,733		3,610,667		41,206,156	39,831,350	-				
Aug	27,041,900		25,508,100	12,142,800		384,400		39,569,100	38,035,300	-				
Sep	26,817,767		25,286,267	5,426,533		1,846,667		34,090,967	32,559,467	-				
Oct	13,634,616		13,041,200	7,923,700		2,540,000		24,098,316	23,504,900	-				
Nov	11,735,482		10,612,000	6,763,700		2,223,667		20,722,849	19,599,367	-				
Dec	14,283,276		13,120,100	5,952,633		1,903,333		22,139,242	20,976,066	-				

Total	212,835,696	653.2	199,339,787	93,429,539	286.7	27,709,134	85.0	333,974,369	320,478,460	-	63.7%	28.0%	8.3%	36.3%
2017														
Jan	14,488,422		13,217,233	9,810,545		2,785,667		27,084,634	25,813,445	-				
Feb	9,725,055		9,528,000	8,617,800		2,704,500		21,047,355	20,850,300	-				
Mar	8,848,900		8,370,750	10,253,250		3,262,000		22,364,150	21,886,000	-				
Apr	13,714,733		12,473,300	5,397,333		1,905,333		21,017,399	19,775,966	-				
May	16,905,917		15,618,400	7,145,967		2,425,167		26,477,051	25,189,534	-				
Jun	26,800,250		25,335,600	7,048,100		2,331,500		36,179,850	34,715,200	-				
Jul	30,242,125		28,710,400	9,513,925		3,115,500		42,871,550	41,339,825	-				
Aug	29,553,625		28,033,100	10,911,725		3,461,000		43,926,350	42,405,825	-				
Sep	20,676,714		19,373,913	10,044,650		3,185,833		33,907,197	32,604,396	-				
Oct	12,883,713		12,785,033	8,565,800		2,752,333		24,201,846	24,103,166	-				
Nov	9,571,053		8,989,000	8,315,100		2,652,000		20,538,153	19,956,100	-				
Dec	11,538,295		10,060,500	7,521,292		2,492,833		21,552,420	20,074,625	-				
Total	204,948,802	629.0	192,495,229	103,145,487	316.6	33,073,666	101.5	341,167,955	328,714,382	-	60.1%	30.2%	9.7%	39.9%
2018														
Jan	1,483,252		2,030,700	13,235,375		4,308,500		19,027,127	19,574,575	-				
Feb	10,753,229		9,868,100	5,843,800		2,144,500		18,741,529	17,856,400	-				
Mar	6,536,182		5,585,100	10,521,233		3,385,500		20,442,915	19,491,833	-				
Apr	6,948,693		6,416,200	10,845,017		3,357,500		21,151,210	20,618,717	-				
May	11,867,544		11,464,800	16,678,050		4,949,500		33,495,094	33,092,350	-				
Jun	30,202,633		28,714,733	7,058,767		2,310,667		39,572,067	38,084,167	-				
Jul	30,768,039		29,447,467	11,618,033		3,632,333		46,018,405	44,697,833	-				
Aug	34,962,475		33,231,550	7,050,050		2,312,500		44,325,025	42,594,100	-				
Sep	28,509,225		26,861,350	4,557,250		1,504,500		34,570,975	32,923,100	-				
Oct	18,699,429		17,626,450	4,581,450		1,535,500		24,816,379	23,743,400	-				
Nov	1,582,655		14,463,750	3,637,717		1,205,500		6,425,872	19,306,967	-				
Dec	7,419,056		7,226,550	9,234,783		3,016,500		19,670,339	19,477,833	-				
Total	189,732,412	582.3	192,936,750	104,861,525	321.8	33,663,000	103.3	328,256,937	331,461,275	-	57.8%	31.9%	10.3%	42.2%
2019														
Jan	10,068,761		9,504,850	6,358,800		2,290,500		18,718,061	18,154,150	-				
Feb	14,918,700		13,721,300	3,121,000		1,052,000		19,091,700	17,894,300	556,200				
Mar	27,497,124		26,594,100	2,790,800		-		30,287,924	29,384,900	7,706,900				
Apr	5,638,935		4,078,900	16,852,400		-		22,491,335	20,931,300	264,833				
May	9,518,385		9,352,483	15,962,233		4,062,333		29,542,951	29,377,049	-				
Jun	16,756,133		15,404,667	15,537,967		5,100,667		37,394,767	36,043,301	-				
Jul	20,392,950		19,023,900	15,884,400		5,210,500		41,487,850	40,118,800	-				
Aug	21,553,276		19,576,600	12,537,850		4,221,250		38,312,376	36,335,700	-				
Sep	20,253,300		19,535,600	7,563,300		2,010,250		29,826,850	29,109,150	-				
Oct	14,081,601		13,612,300	5,002,750		1,804,500		20,888,851	20,419,550	-				
Nov	14,061,060		12,741,680	4,178,840		1,011,000		19,250,900	17,931,520	64,400				
Dec	13,527,130		12,691,417	8,957,238				22,484,368	21,648,655	1,894,700				
Total	188,267,355	577.8	175,837,797	114,747,578	352.2	26,763,000	82.1	329,777,933	317,348,375	10,487,033	57.1%	34.8%	8.1%	42.9%

2020														
Jan	5,170,394		2,723,456	16,448,789		-		21,619,183	19,172,245	-				
Feb	20,377,767		20,177,933	2,829,533		1,000		23,208,300	23,008,466	4,703,633				
Mar	22,101,400		20,753,333	2,767,900		-		24,869,300	23,521,233	3,490,867				
Apr	15,474,900		14,174,200	8,857,900		-		24,332,800	23,032,100	-				
May	16,638,100		15,290,600	12,905,267		1,646,000		31,189,367	29,841,867	-				
Jun	21,349,400		20,007,300	11,435,800		4,019,000		36,804,200	35,462,100	-				
Jul	25,591,367		24,117,467	15,316,200		5,257,000		46,164,567	44,690,667	-				
Aug	26,772,383		25,539,483	14,502,000		4,980,000		46,254,383	45,021,483	-				
Sep	23,077,350		21,169,050	11,238,350		3,763,000		38,078,700	36,170,400	-				
Oct	13,351,192		12,662,567	7,752,650		2,774,167		23,878,009	23,189,384	-				
Nov	4,329,197		4,233,833	11,068,900		3,989,833		19,387,930	19,292,566	-				
Dec	6,525,043		6,622,540	10,521,680		3,778,100		20,824,823	20,922,320	-				
Total	200,758,493	616.1	187,471,762	125,644,969	385.6	30,208,100	92.7	356,611,562	343,324,831	8,194,500	56.3%	35.2%	8.5%	43.7%
2021														
Jan	6,556,857		6,531,460	10,292,520		3,712,400		20,561,777	20,536,380	0				
Feb	4,332,506		4,194,400	9,893,500		3,443,000		17,669,006	17,530,900	0				
Mar	667,350		629,900	13,328,200		4,865,500		18,861,050	18,823,600	0				
Apr	11,441,217		10,180,000	9,511,283		3,492,833		24,445,333	23,184,116	0				
May	18,508,513		17,493,880	10,722,027		3,727,067		32,957,607	31,942,974	0				
Jun	25,303,170		23,508,670	10,337,490		3,490,600		39,131,260	37,336,760	0				
Jul	25,908,183		24,382,250	15,729,350		5,104,000		46,741,533	45,215,600	0				
Aug	25,714,567		24,200,000	14,378,400		4,664,000		44,756,967	43,242,400	0				
Sep	20,392,414		19,479,500	9,810,900		3,295,000		33,498,314	32,585,400	0				
Oct	13,104,936		11,786,800	9,280,700		2,031,000		24,416,636	23,098,500	0				
Nov	6,943,938		5,975,300	10,010,800		2,887,000		19,841,738	18,873,100	0				
Dec	6,479,754		5,625,680	9,425,531		3,466,714		19,371,999	18,517,925	0				
Total	165,353,405	507.5	153,987,840	132,720,701	407.3	44,179,114	135.6	342,253,220	330,887,655	-	48.3%	38.8%	12.9%	51.7%

2020 Water Usage

		Inside City			Outside City		
Codes	User Class	Cust	Units	Usage	Cust	Units	Usage
Unknown							
1,2	Residential	34	64	85	6	6	3
10,11	COMM/IRR - 5/8"	45	45	133			
11	COMM IRR 1"	5	5				
12	COMM/IRR 1.5	2	2	2			
85	Vacant Lot	12	12				
99	No Meter Pulled	1	1				
	Subtotal	99	129	220	6	6	3
RESIDENTIAL (001)							
0	Miscellaneous	1	1				
1,2	Residential - General	10,341	11,157	66,835	6,855	6,892	50495
10,20	COMM/IRR - 5/8"	60	60	243	12	12	124
11,21	COMM/IRR - 1"	22	27	170	12	12	113
23	Comm/IRR 2"				-	-	
75,79	Senior Discount - 50%	226	226	1,042	72	72	324
76,78	Senior Discount - 25%	36	36	73	24	24	65
85,86	Vacant Lot	82	82	220	24	24	332
102,103	Residential	281	281	2432	170	170	1698
104	Senior Discout				1	1	13
	Subtotal	11,049	11,870	71,015	7,170	7,207	53,164
COMMERCIAL (002)							
1,2	Residential	72	204	539	36	36	342
10,20	Commercial, 5/8"	838	838	4593	144	144	1450
11, 21	Commercial, 1"	96	96	996	24	24	211
13, 23	Commercial, 2"	96	96	7014	12	12	16
25	Commercial, 4"				12	12	1096
61	Bingen - 2"				12	12	688
62	Bingen - 4"				12	12	113
63	Bingen - 8"				12	12	37121
75,79	Senior Discount	12	12	62			
85	Vacant Lot	12	12	1			
	Subtotal	1126	1258	13205	264	264	41037
IRRIGATION (003)							
1,2	Residential	12	12	31	12	12	22
10,20	Comm/Irr, 5/8"	84	84	1055	48	48	328
11,21	Comm/Irr, 1"	12	12	1781	24	24	562
13, 23	Comm/Irr, 2"	36	36	3615	6	6	1091
22	Comm/Irr, 1.5"				12	12	769
25	Comm/Irr - 4"				6	6	3593
85	Vacant Lot	12	12				
96	WSVS Winter Billing Rate	3	3	720	-	-	
97	WSVS Winter Billing Rate	1	1	199			
98	WSVS Winter Billing Rate	2	2	129			

	Subtotal	162	162	7530	108	108	6365
CHURCH (004)							
1	Residential	48	48	271			
10,20	Comm/Irr - 5/8"	12	12	146	12	12	127
21	Comm/Irr - 1"				36	36	910
23	Comm/Irr - 2"				12	12	
	Subtotal	60	60	417	60	60	1,037
MOTEL (005)							
13	Commercial	12	12	543			
	Subtotal	12	12	543	-	-	
RV PARK (006)							
12	Comm/Irr - 1.5"	12	12	317			
13	Comm/Irr - 2"	12	12	318			
	Subtotal	24	24	635	-	-	
MULTI-FAMILY (007)							
1,2	Residential	341	1,632	5,030	12	72	394
102	Residential	12	12	139			
	Subtotal	353	1,644	5,169	12	72	394
COMBINED COMMERCIAL/RESIDENTIAL (008)							
1,2	Residential	12	12	41			
20	COM/IRR 5/8"				24	24	230
	Subtotal	12	12	41	24	24	230
NEW CONSTRUCTION (010)							
1,2	Residential	388	388	1,759	253	253	1015
85, 86	Vacant Lot	12	12		12	12	7
	Subtotal	400	400	1,759	265	265	1,022
RENTAL -RESIDENTIAL (011)							
1,2	Residential	108	204	1,016	81	93	275
10, 20	COM/IRR - 5/8"	24	24	134			
11, 21	COM/IRR - 1"	36	36	387	12	24	424
79	Senior Discount - 4				3	3	9
102	Residential	12	12	66			
	Subtotal	180	276	1,603	96	120	708
VACANT LOT (013)							
1,2	Residential	78	78	60	24	24	17
10	Comm/Irr - 5/8"	12	12				
85,86	Vacant Lot	318	318	10	240	240	145
	Subtotal	408	408	70	264	264	162
SEASONAL (014)							
1,2	Residential	241	241	1,416	288	288	1564
79	Senior Discount				12	12	90
	Subtotal	241	241	1,416	300	300	1,654
ON WELL (015)							
2	Residential				12	12	
	Subtotal	-	-		12	12	
EMPTY RESIDENTIAL (016)							

2	Residential					24	24	17
		Subtotal	-	-		24	24	17
RESIDENTIAL DUPLEX (017)								
1	Residential		60	84	240			
102	Residential		24	24	167			
		Subtotal	84	108	407	-	-	
	TOTAL		14,210	16,604	104,030	8,605	8,726	105,793
	OVERALL TOTALS							
	Inside City		14,210	16,604	104,030			
	Outside City		8,605	8,726	105,793			
	Sum		22,815	25,330	209,823			
	Total							

2020 Water Usage Total

		Inside City			Outside City		
Codes	User Class	Cust	Units		Cust	Units	
1, 102	Residential - IN	11,345	13,734	76,861			
1,2	Residential - Seasonal	241	241	1,416	300	300	1,654
2	Residential - OUT				7,172	7,281	53,207
	Residential - Empty				24	24	17
	Resiidential - New Const	388	388	1,759	253	253	1,015
75	Senior Discount - 50%, In	238	238	1,104			
76	Senior Discount - 25%, In	36	36	73			
78	Senior Discount - 25%, Out				24	24	65
79	Senior Discount - 50%, Out				75	75	333
104	Senior Discount				1	1	13
1,10, 85	Residential - IN Vacant	526	526	291			
2,86	Residential - OUT Vacant				300	300	501
	Irrigation - IN	156	156	6,482			
	Irrigation - OUT				108	108	6,365
10	Commercial - IN, 5/8"	979	979	5,249			
20	Commercial - OUT, 5/8"		0		192	192	1,931
11	Commercial - IN, 1"	159	164	1,553			
21	Commercial - OUT, 1"				84	96	1,658
12	Commercial - IN, 1.5"	14	14	319			
22	Commercial - OUT, 1.5"						
13	Commercial - IN, 2"	120	120	7,875			
23	Commercial - OUT, 2"				24	24	16
25	Commercial - OUT, 4"				12	12	1,096
61	Bingen - 2"				12	12	688
62	Bingen - 4"				12	12	113
63	Bingen - 6"				12	12	37,121
96	WSVS Winter Billing Rate	6	6	1,048	0	0	0
99	No meter Pulled/Misc	2	2	0			
	Total	**14,210**	**16,604**	**104,030**	**8,605**	**8,726**	**105,793**
	Total	**22,815**	**25,330**	**209,823**			

	In	In		Out	Out	
Residential	968	1,167	78,038	606	615	53,618
Residential, Seasonal	20	20	1,416	25	25	1,654
Residential, Vacant	44	44	291	27	27	518
Residential, New Const.	32	32	1,759	21	21	1,015
Commercial	106	106	14,996	26	27	4,701
Irrigation	14	14	7,530	9	9	6,365
Misc/Bingen	0	0	0	3	3	37,922
Subtotal	1,184	1,384	104,030	717	727	105,793
Total	1,901	2,111	209,823			

Residential	968	1,167	78,038	606	615	53,618	131,656
Residential, Misc	64	64	1,707	52	52	2,172	3,879
New Construction	32	32	1,759	21	21	1,015	2,774
Commercial/Irrigation	120	120	22,526	35	36	11,066	33,592
Misc/Bingen	0	0	0	3	3	37,922	37,922
	1,184	1,384	104,030	717	727	105,793	209,823
Total	1,901	2,111	209,823				

Residential	131,656,000	gallons
Units	1,782	
	73,863.76	gallons per ERU

ERUs	Inside	Outside	Total
Residential	1,167	615	1,782.4
Residential, Misc	23.1	29.4	52.5
New Construction	23.8	13.7	37.6
Commercial/Irrigation	305.0	149.8	454.8
Misc/Bingen	0	513.4	513.4
DSL	1,418		1,418.4
			2,841

2021 Water Usage

		Inside City					Outside City					
Codes	User Class	Cust	Units	Usage	Base C	Usage C	Cust	Units	Usage	Base C	Usage C	
Unknown												
1,2	Residential	36	72	158	$ 2,961.31	$ 182.86						
10	COMM/IRR - 5/8"	55	55	186	$ 2,284.15	$ 408.89						
21	COMM IRR 1"	12	12		$ 945.24							
22	COMM/IRR 1.5											
85	Vacant Lot	12	12		$ 498.24							
99	No Meter Pulled											
	Subtotal	115	151	344	$ 6,688.94	$ 591.75	-	-	-			$ 7,280.69
RESIDENTIAL (001)												
0	Miscellaneous											
1,2	Residential - General	10,578	11,386	72,419	$ 472,547.71	$ 159,404.19	7,032	7,083	55322	$ 433,130.85	$ 129,521.72	
10,20	COMM/IRR - 5/8"	53	53	150	$ 2,201.09	$ 186.02	12	12	139	$ 733.68	$ 359.30	
11,21	COMM/IRR - 1"	36	37	273	$ 2,914.49	$ 431.81	15	15	92	$ 1,704.90	$ 144.08	
23	Comm/IRR 2"						-	-				
75,79	Senior Discount - 50%	163	163	740	$ 3,383.88	$ 1,241.20	92	92	436	$ 2,812.44	$ 750.88	
76,78	Senior Discount - 25%	56	56	164	$ 1,743.84	$ 231.00	12	12	99	$ 550.32	$ 230.20	
85,86	Vacant Lot	105	105	110	$ 4,330.14	$ 136.18	84	84	662	$ 5,135.76	$ 1,750.43	
100	Inside City Well	1	1									
102,103	Residential	284	284	2431	$ 15,289.62	$ 5,550.46	237	237	2330	$ 18,865.29	$ 5,649.94	
104	Senior Discout											
	Subtotal	11,276	12,085	76,287	$ 502,410.77	$ 167,180.86	7,484	7,535	59,080	$ 462,933.24	$ 138,406.55	$ 1,270,931.42
COMMERCIAL (002)												
1,2	Residential	70	190	730	$ 8,153.99	$ 960.52	36	36	285	$ 2,201.04	$ 637.80	
10,20	Commercial, 5/8"	834	834	4551	$ 34,614.18	$ 11,247.60	144	144	1275	$ 8,804.16	$ 3,059.54	
11, 21	Commercial, 1"	108	108	1188	$ 8,507.16	$ 2,562.33	24	24	298	$ 2,727.84	$ 618.97	
13, 23	Commercial, 2"	96	96	7213	$ 32,544.96	$ 21,022.84	23	23	54	$ 11,947.99	$ 62.60	
25	Commercial, 4"						12	12	830	$ 23,000.76	$ 1,230.86	
61	Bingen - 2"						12	12	1075	$ 8,208.00	$ 1,892.00	
62	Bingen - 4"						12	12	0	$ 12,300.00		
63	Bingen - 8"						12	12	42524	$ 25,080.00	$ 74,842.24	
76	Senior Discount	3	3	18	$ 93.42	$ 20.70						
85	Vacant Lot	7	7	2	$ 290.64	$ 2.30						
	Subtotal	1118	1238	13702	$ 84,204.35	$ 35,816.29	275	275	46341	$ 94,269.79	$ 82,344.01	$ 296,634.44
IRRIGATION (003)												
1,2	Residential	24	24	35	$ 996.48	$ 67.30	12	12	25	$ 733.68	$ 34.34	
10,20	Comm/Irr, 5/8"	107	107	1162	$ 4,455.77	$ 3,845.81	36	36	160	$ 2,333.18	$ 488.29	
11,21	Comm/Irr, 1"	12	12	1348	$ 945.24	$ 4,957.24	24	24	634	$ 2,727.84	$ 1,771.46	
13, 23	Comm/Irr, 2"	36	36	4811	$ 12,204.36	$ 15,271.30	6	6	1454	$ 2,870.10	$ 4,864.45	
22	Comm/Irr, 1.5"						12	12	1473	$ 3,185.76	$ 5,326.95	
25	Comm/Irr - 4"						6	6	3734	$ 11,500.38	$ 12,647.61	
85, 86	Vacant Lot	12	12		$ 498.24		12	12	88	$ 733.68	$ 234.22	
96	WSVS Winter Billing Rate	3	3	1275		$ 3,998.05	-	-				
97	WSVS Winter Billing Rate	1	1	514		$ 1,679.62						

98	WSVS Winter Billing Rate	2	2	342		$ 761.27						
	Subtotal	197	197	9487	$ 19,100.09	$ 30,580.59	108	108	7568	$ 24,084.62	$ 25,367.32	$ 99,132.62
CHURCH (004)												
1	Residential	72	72	442	$ 2,989.44	$ 830.62						
10,20	Comm/Irr - 5/8"	12	12	181	$ 498.36	$ 462.84	12	12		$ 733.68		
21	Comm/Irr - 1"						36	36	738	$ 4,091.76	$ 2,134.06	
23	Comm/Irr - 2"						12	12		$ 5,740.20		
	Subtotal	84	84	623	$ 3,487.80	$ 1,293.46	60	60	738	$ 10,565.64	$ 2,134.06	$ 17,480.96
MOTEL (005)												
13	Commercial	12	12	601	$ 4,068.12	$ 995.58						
	Subtotal	12	12	601	$ 4,068.12	$ 995.58	-	-				$ 5,063.70
RV PARK (006)												
12	Comm/Irr - 1.5"	12	12	308	$ 2,271.81	$ 707.61						
13	Comm/Irr - 2"	12	12	307	$ 4,068.12	$ 396.60						
	Subtotal	24	24	615	$ 6,339.93	$ 1,104.21	-	-				$ 7,444.14
MULTI-FAMILY (007)												
1,2	Residential	351	1,707	4,840	$ 70,874.64	$ 6,709.84	12	72	529	$ 4,402.08	$ 911.79	
10	Comm/Irr	1	1		$ 20.09							
102	Residential	12	12	168	$ 647.88	$ 460.24						
	Subtotal	364	1,720	5,008	$ 71,542.61	$ 7,170.08	12	72	529	$ 4,402.08	$ 911.79	$ 84,026.56
COMBINED COMMERCIAL/RESIDENTIAL (008)												
1,2	Residential	12	12	45	$ 498.24	$ 61.00						
20	COM/IRR 5/8"						24	24	218	$ 1,467.36	$ 468.47	
	Subtotal	12	12	45	$ 498.24	$ 61.00	24	24	218	$ 1,467.36	$ 468.47	$ 2,495.07
NEW CONSTRUCTION (010)												
1,2	Residential	244	244	1,151	$ 10,142.93	$ 2,172.41	187	187	860	$ 11,433.18	$ 1,793.60	
21	Out of City/Irr 1"						4	4			$ 454.64	
85, 86	Vacant Lot	24	24	7	$ 1,077.29	$ 8.10						
	Subtotal	268	268	1,158	$ 11,220.22	$ 2,180.51	191	191	860	$ 11,433.18	$ 2,248.24	$ 27,082.15
RENTAL -RESIDENTIAL (011)												
1,2	Residential	108	204	1,593	$ 8,458.03	$ 3,513.29	12	12	14	$ 704.10	$ 16.18	
10, 20	COM/IRR - 5/8"	24	24	148	$ 996.72	$ 258.12						
11, 21	COM/IRR - 1"	24	24	79	$ 1,890.48	$ 98.62	12	24	285	$ 2,727.84	$ 564.00	
79	Senior Discount - 4											
102	Residential	12	12	91	$ 647.88	$ 171.22						
	Subtotal	168	264	1,911	$ 11,993.11	$ 4,041.25	24	36	299	$ 3,431.94	$ 580.18	$ 20,046.48
VACANT LOT (013)												
0		1	1		$ 61.14							
1,2	Residential	93	93	108	$ 3,912.26	$ 171.44	63	63	32	$ 3,851.82	$ 37.02	
10,20	Comm/Irr - 5/8"	25	25		$ 1,045.65		2	2		$ 122.28		
85,86	Vacant Lot	249	249	5	$ 10,408.13	$ 5.80	180	180	17	$ 11,003.46	$ 19.70	
	Subtotal	368	368	113	$ 15,427.18	$ 177.24	245	245	49	$ 14,977.56	$ 56.72	$ 30,638.70
SEASONAL (014)												
1,2	Residential	228	228	1,853	$ 9,466.56	$ 4,853.69	288	288	1963	$ 17,720.74	$ 4,884.87	
79	Senior Discount						12	12	109	$ 366.84	$ 245.81	
	Subtotal	228	228	1,853	$ 9,466.56	$ 4,853.69	300	300	2,072	$ 18,087.58	$ 5,130.68	$ 37,538.51

ON WELL (015)												
2	Residential						12	12		733.68		
	Subtotal	-	-				12	12		733.68		$ 733.68
EMPTY RESIDENTIAL (016)												
2	Residential											
	Subtotal	-	-				-	-	-			
RESIDENTIAL DUPLEX (017)												
1	Residential	78	108	367	$ 4,481.40	$ 522.96						
102	Residential	18	18	98	$ 971.82	$ 177.01						
	Subtotal	96	126	465	$ 5,453.22	$ 699.97	-	-				$ 6,153.19
	TOTAL	14,330	16,777	112,212			8,735	8,858	117,754			
	OVERALL TOTALS											$ 1,912,682.31
	Inside City	14,330	16,777	112,212								
	Outside City	8,735	8,858	117,754								
	Sum	23,065	25,635	229,966								
	Total											

2021 Water Usage Total

		Inside City					Outside City					
Codes	User Class	Cust	Units		Base C	Usage C	Cust	Units		Base C	Usage C	
1, 102	Residential - IN	11,632	14,078	83,382	$ 588,521.96	$ 178,544.21						
1,2	Residential - Seasonal	228	228	1,853	$ 9,466.56	$ 4,853.69	300	300	2,072	$ 18,087.58	$ 5,130.68	
2	Residential - OUT						7,341	7,452	58,480	$ 460,037.04	$ 136,737.43	
	Residential - Empty						0	0	0	$ -	$ -	
	Resiidential - New Const	244	244	1,151	$ 10,142.93	$ 2,172.41	187	187	860	$ 11,433.18	$ 1,793.60	
75	Senior Discount - 50%, In	166	166	758	$ 3,477.30	$ 1,261.90						
76	Senior Discount - 25%, In	56	56	164	$ 1,743.84	$ 231.00						
78	Senior Discount - 25%, Out						12	12	$ 99.00	$ 550.32	$ 230.20	
79	Senior Discount - 50%, Out						92	92	$ 436.00	$ 2,812.44	$ 750.88	
104	Senior Discount						0	0	$ -	$ -	$ -	
1,10, 85	Residential - IN Vacant	515	515	232	$ 21,562.35	$ 323.82						
2,86	Residential - OUT Vacant						327	327	711	$ 19,991.04	$ 1,807.15	
	Irrigation - IN	191	191	7,356	$ 19,100.09	$ 24,141.65						
	Irrigation - OUT						108	108	7,568	$ 24,084.62	$ 25,367.32	
10	Commercial - IN, 5/8"	979	979	5,216	$ 40,614.59	$ 12,563.47						
20	Commercial - OUT, 5/8"		0				194	194	1,632	$ 11,738.88	$ 3,887.31	
11	Commercial - IN, 1"	180	181	1,540	$ 14,257.37	$ 3,092.76						
21	Commercial - OUT, 1"						91	103	1,413	$ 11,252.34	$ 3,915.75	
12	Commercial - IN, 1.5"	12	12	308	$ 2,271.81	$ 707.61						
22	Commercial - OUT, 1.5"											
13	Commercial - IN, 2"	120	120	8,121	$ 40,681.20	$ 22,415.02						
23	Commercial - OUT, 2"						35	35	54	$ 17,688.19	$ 62.60	
25	Commercial - OUT, 4"						12	12	830	$ 23,000.76	$ 1,230.86	
61	Bingen - 2"						12	12	1,075	$ 8,208.00	$ 1,892.00	
62	Bingen - 4"						12	12	0	$ 12,300.00	$ -	
63	Bingen - 6"						12	12	42,524	$ 25,080.00	$ 74,842.24	$ 76,734.24
96	WSVS Winter Billing Rate	6	6	2,131	$ -	$ 6,438.94	0	0	0	$ -	$ -	

0 Vacant Lot	1	1	0	$ 61.14	0					
Total	**14,330**	**16,777**	**112,212**	**$ 751,901.14**	**$ 256,746.48**	**8,735**	**8,858**	**117,754**	**$ 646,264.39**	**$ 257,648.02**
Total	**23,065**	**25,635**	**229,966**	**$ 1,398,165.53**	**$ 514,394.50**	Not matching Water Use by Class				**$ 1,912,560.03**

	In	In				Out	Out			
Residential	988	1,192	84,304	$ 593,743.10	$ 180,037.11	620	630	59,015	$ 463,399.80	$ 137,718.51
Residential, Seasonal	19	19	1,853	$ 9,466.56	$ 4,853.69	25	25	2,072	$ 18,087.58	$ 5,130.68
Residential, Vacant	43	43	232	$ 21,623.49	$ 323.82	27.25	27.25	711	$ 19,991.04	$ 1,807.15
Residential, New Const.	20	20	1,151	$ 10,142.93	$ 2,172.41	16	16	860	$ 11,433.18	$ 1,793.60
Commercial	108	108	15,185	$ 97,824.97	$ 38,778.86	28	29	3,929	$ 63,680.17	$ 9,096.52
Irrigation	16	16	9,487	$ 19,100.09	$ 30,580.59	9	9	7,568	$ 24,084.62	$ 25,367.32
Misc/Bingen	0	0	0	$ -	$ -	3	3	43,599	$ 45,588.00	$ 76,734.24
Subtotal	1,194	1,398	112,212	$ 751,901.14	$ 256,746.48	728	738	117,754	$ 646,264.39	$ 257,648.02
Total	1,922	2,136	229,966	**$ 1,398,165.53**	**$ 514,394.50**					**$ 1,912,560.03**

Residential	988	1,192	84,304	620	630	59,015	143,319
Residential, Misc	62	62	2,085	52	52	2,783	4,868
New Construction	20	20	1,151	16	16	860	2,011
Commercial/Irrigation	124	124	24,672	37	38	11,497	36,169
Misc/Bingen	0	0	0	3	3	43,599	43,599
	1,194	1,398	112,212	728	738	117,754	229,966
Total	1,922	2,136	229,966				

Residential	143,319,000	gallons		
Units	1,821			
	78,689.06	gallons per ERU	215.59	gal/ERU-day

ERUs	Inside	Outside	Total
Residential	1,192	630	1,821.3
Residential, Misc	26.5	35.4	61.9
New Construction	14.6	10.9	25.6
Commercial/Irrigation	313.5	146.1	459.6
Misc/Bingen	0	554.1	554.1
DSL	1,331		1,331.4
			2,922

APPENDIX E

System Analysis Information

Gray & Osborne, Inc.
CONSULTING ENGINEERS

TECHNICAL MEMORANDUM

TO: TIM FLYNN, L.H.G., C.G.W.P.
FROM: MIKE JOHNSON, P.E.
RYAN WALTERS, P.E.
ABBEY MCDONALD, P.E.
DATE: NOVEMBER 1, 2019
SUBJECT: ASR SYSTEM ASSISTANCE
CITY OF WHITE SALMON,
KLICKITAT COUNTY, WASHINGTON
G&O #19281.00

BACKGROUND

The City of White Salmon has contracted with Aspect Consulting and Gray & Osborne, Inc. to complete an engineering analysis of potential water system upgrades to improve performance of the City's aquifer storage and recovery (ASR) system.

The primary water system issues to be reviewed within this engineering analysis are the following:

1. Childs Reservoir Control Valve Issues
2. Buck Creek Slow Sand Filter Roof Improvements and Capacity Limitations
3. Well 2 ASR Injection Capacity
4. Well 2 ASR Production Capacity
5. Piping Modifications Between Well 2 and the Buck Creek Transmission Main (to Allow Well 1 to Supply Water While Water Is Injected into Well 2)

CHILDS RESERVOIR CONTROL VALVE ISSUES

Inlet Vault

The existing inlet control valve for the Childs Reservoir is located in a vault near the intersection of SR 141 and Wallace Road. This valve is not currently functioning properly and does not open as designed. City staff have also tried to utilize the bypass piping around the control valve to send water up to the Childs Reservoir but these attempts have also been unsuccessful. Additionally, the valve does not appear to have been properly connected to the City's telemetry and control system to allow the valve to be controlled remotely.

The existing Cla-Val control valve appears to be the correct valve for this application. The control valve should be assessed by a technician from valve manufacturer's representative, GC Systems, in order to identify and correct the existing issues with the valve operation. The telemetry and programming related to the valve operation should be reviewed by a programmer/integrator to determine how to correct it so that the valve functions properly using remote operation. Ideally, the GC Systems representative and the programmer/integrator should be on site at the same time to coordinate their investigation activities and corrections. The estimated cost to have a GC Systems technician assess the valve operation is approximately $1,500. The estimated cost to have a programmer/integrator assess the telemetry and controls and modify them to function as intended is approximately $6,500. A detailed preliminary cost estimate can be found within Attachment A.

Outlet Vault

The existing outlet control valve for the Childs Reservoir is located in a vault near the inlet control valve vault. The outlet control valve also does not appear to be functioning properly as the valve appears to be letting water back into the reservoir, meaning that the valve's check feature does not appear to be working. If the slow sand filter plant production exceeds demand in the system and the check feature is not working correctly, water will back-feed into the Childs Reservoir. This back-feed can result in an overflow event at the reservoir.

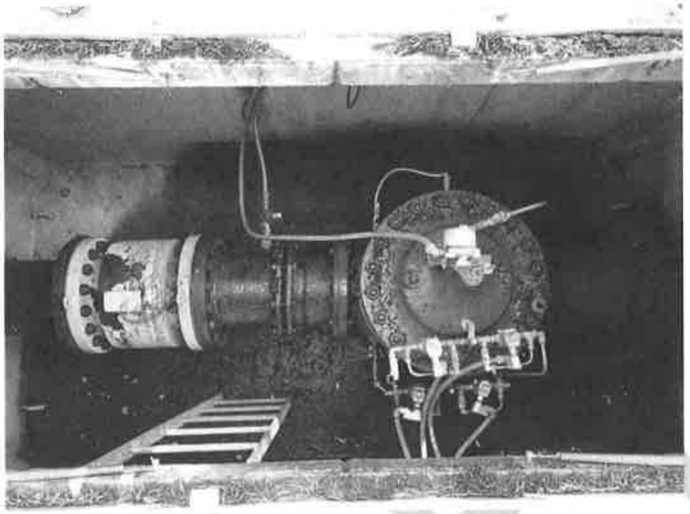


FIGURE 1

Childs Reservoir Outlet Control Valve

The check feature on Cla-Val valves can be unreliable when there is limited differential pressure across the valve. When the GC Systems technician checks out the inlet control valve, they can also determine if the outlet control valve check feature can be corrected to work properly. If not, the existing outlet valve vault and piping configuration appears to have adequate room to install a double-door check valve. This type of check valve will operate more reliably than the check feature on a Cla-Val valve and would prevent overflow events at the Childs Reservoir. The estimated cost for installing a double-door check valve in the outlet valve vault is approximately $15,000. A detailed preliminary cost estimate can be found within Attachment A.

Valve Vault Site Telemetry

City water system operators have noted that the telemetry between the master telemetry unit at the Grand Ronde Pump Station and the Childs Reservoir control valve site has not been very reliable, particularly during snowfall events. This issue is a concern for operators since if the Childs Reservoir inlet control valve becomes fully functional, all water from the Grand Ronde Pump Station must pass through it. If the Grand Ronde pumps are called to run and the inlet control valve does not open, the pumps or piping could be damaged if they pump against shutoff head for an extended period of time. This problem could be mitigated by adding some additional control logic to the Grand Ronde Pump Station that does not allow pumps to run unless it receives a signal that the inlet control valve is open or shuts down the pumps if no discharge flow registers while they are operating. The estimated cost of programming these modifications is $3,000.

Alternatively, the telemetry at the control valve site could be improved. The existing telemetry system at the control valve site uses a Banner radio to relay information to the Grand Ronde Pump Station as shown on Figure 2.

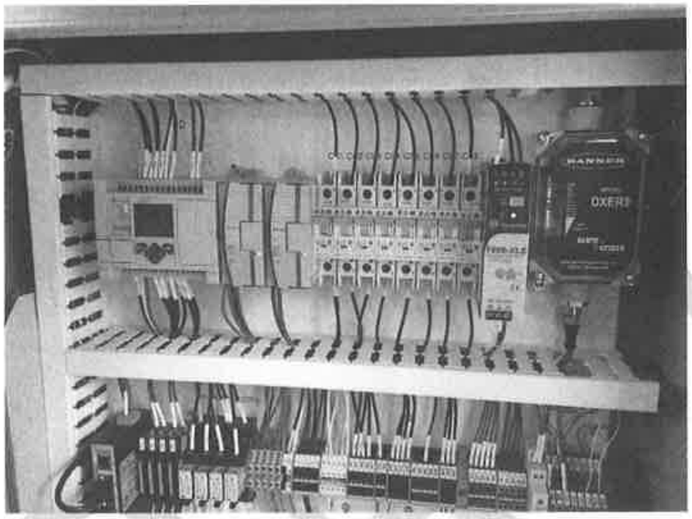


FIGURE 2

Childs Reservoir Control Panel

Three potential alternatives for upgrading the existing telemetry system are as follows:

Alternative A – Continue to utilize a radio system but upgrade to an ultrahigh frequency (UHF) radio with higher power than the existing radio and a licensed frequency. This alternative could potentially provide a more reliable radio signal; however, this option is more reliant on "line-of-sight" communication. A radio survey would need to be completed to verify its effectiveness before selecting this option. The estimated cost for this alternative is $88,000. The estimated cost for a radio survey is $2,000.

Alternative B – Utilize a cellular-based telemetry system to provide more reliable communication. Reliability of cellular service in the area would need to be verified before deciding whether to pursue this option. The estimated cost for this alternative is $91,000.

Alternative C – Install approximately 2,800 linear feet of conduit and fiber optic cable from the Grand Ronde Pump Station to the existing control valve site. This option is the most expensive but has the highest level of certainty and reliability. The estimated cost for this alternative is $315,000. There may be some opportunity to reduce the cost of this alternative if the conduit were installed with a pipeline project to connect Well 2 to the Buck Creek Transmission Main.

Detailed preliminary cost estimates for all three alternatives can be found within Attachment A.

BUCK CREEK SLOW SAND FILTER ROOF IMPROVEMENTS AND CAPACITY LIMITATIONS

The existing Buck Creek Slow Sand Filter Plant (SSFP) is located approximately 7 miles north of the City of White Salmon. The SSFP has a design capacity of 1,000 gallons per minute) gpm. It consists of a covered concrete pre-settling basin, covered concrete filter basins, a sodium hypochlorite feed system, and a circular concrete reservoir that provides chlorine contact time. The plant is in good condition but operating staff have identified some issues with the filter building roof. There is also a desire to improve the reliability of supply from the SSFP to increase the amount of water that can be available for ASR in winter and spring months.

Slow Sand Filter Plant Roof

The wooden roof trusses on the slow sand filter structure were designed and constructed with approximately 6 feet of clearance above the sand level. The slow sand filter runs year-round and is typically scraped once per year. Scraping is completed by members of the City's maintenance and operations team using rakes, shovels, and wheelbarrows. Because of the low clearance, the operations staff must duck beneath the bottom chord of the trusses during scraping activities. In order to improve the working clearance in the filters, the existing slow sand filter roof could be jacked up 12 inches and blocked in place to alleviate the head clearance issues for the operations staff. The estimated cost to raise the roof trusses is $135,000. A detailed preliminary cost estimate can be found within Attachment A.

The existing slow sand filter site has no outside electrical power and thus the ventilation within the plant is passive. The plywood sheeting for the roof does not appear to be marine grade as there are visual indications that the plywood is rotting in several places. The plywood sheeting should be replaced with marine-grade sheeting, along with a vapor barrier and new roofing. The estimated cost to replace the roof sheeting is $320,000.

If the plywood sheeting was replaced at the same time that the roof was raised, it is likely that some cost savings could be realized. The estimated cost for completing these improvements at the same time is $410,000.

FIGURE 3

Slow Sand Filter Plant Roof Interior

Treatment Process Improvements

The SSFP was built in 2009 and treats water from Buck Creek. The SSFP has a rated capacity of 1,000 gpm, but operators note that they are not able achieve 1,000 gpm through the filter at all times. Operators also indicate that SSFP must be taken offline at times during the winter due to high-turbidity events in Buck Creek that the SSFP cannot effectively treat. SSFP operating records for the last several years were reviewed. It appears that the slow sand filters were scraped about once per year prior to reaching terminal head loss. Due to changing flow rates through the filters, it was difficult to draw conclusions regarding the rate of head loss accumulation.

Based on discussions with the SSFP operator, the flow rate through the SSFP is adjusted manually based on the estimated lowest daily demand in the water system. This is done to avoid potentially overflowing the Childs Reservoir because the current inlet/outlet valves do not close to prevent water from entering the reservoir when the reservoir is full. Water from Wells 1 and 2 is used to supplement peak demands. The SSFP could be operated at a higher flow rate if the Childs Reservoir inlet/outlet valves would close when the reservoir was full.

Another way to potentially improve the performance of the SSFP would be to add a gravel upflow roughing filter prior to the slow sand filters. This type of pretreatment technology has been used successfully to slow sand filters at other locations throughout Washington State including Naselle, Pe Ell, Coulee Dam, and Roslyn. The gravel upflow roughing filters reduce the solids loading onto the slow sand filters allowing them to be used through a wider range of raw water turbidity conditions and also extending the length of filter runs. This could allow the SSFP to produce more water for ASR during winter and spring months.

FIGURE 4

Existing Settling Basin (Left) and SSFP (Right)

The existing settling basin could be converted into a roughing filter. It has a surface area of 1,500 square feet (sf). Gravel upflow roughing filters are typically operated at a surface loading rate of 1 gpm/sf so the existing settling basin would be large enough to treat up to 1,500 gpm. The existing wood baffles would need to be removed from the basin. The existing wood frame roof would need to be removed to install distribution lateral piping and collectors and gravel media. The roof would then need to be replaced.

Gravel upflow roughing filters are typically cleaned through routine backflushing with water every 1 to 2 months. The flushed water would need to be discharged to a settling tank/basin to settle out accumulated solids prior to discharge back to Buck Creek. This discharge would be covered by the SSFP's Ecology General NPDES Permit for Water Treatment Plants. The existing settling basin is equipped with bypass piping that could be used in the event raw water needs to be discharged directly into the slow sand filters. Figure 5 shows a potential location of the settling tank/basin and new piping associated with this alternative.

In order to verify the effectiveness of a gravel upflow roughing filter, a pilot test should be conducted. The pilot test would utilize a small-scale roughing filter and slow sand filter unit. The pilot equipment should be operated for at least 6 months through the winter and spring seasons. The estimated cost of constructing the roughing filter and settling basin is approximately $670,000. A detailed preliminary cost estimate can be found within Attachment A.

SSFP operations staff have also noted that it can take approximately 2 days to backfill the slow sand filters and float off floatable debris out the overflow pipes. City staff have expressed a desire to see if this can be improved. After reviewing the plant piping configuration, it does not appear that there is much ability to easily improve the time to backfill. Backfill water is supplied initially by the reservoir on site. However, this reservoir is only 26 feet in diameter with a capacity of approximately 38,000 gallons above the floor of the slow sand filter. Each slow sand filter bay has a volume of approximately 285,000 gallons (assuming a porosity of 0.5 for the filter sand and underdrains. After the 38,000 gallons is used from the reservoir, the remainder of backfilling water comes from the other filter. In order to provide more backfill water to complete this process more quickly, additional finished water storage would need to be constructed on site between elevations 1,042.1 and 1,032.5. There does not appear to be enough room on site to construct a significant amount of additional storage between these elevations. One operational change that could be tried is to not drain all of the water from the filters before scraping. If the water level is maintained about 2 to 3 feet below the top of the sand, City staff could still have a stable platform to walk on while reducing the amount of water that would be required to backfill the filter.

WELL 2 ASR INJECTION CAPACITY

The hydraulic conditions from the Buck Creek SSFP to Well 2 were evaluated based on our understanding of the existing piping configuration. Figure 6 shows a simplified hydraulic profile. The existing reservoir at the Buck Creek SSFP site sets the upper available static head for the system. This reservoir is a 26-foot diameter by 25.5-foot tall concrete reservoir with an overflow elevation of 1,042 feet and a fixed outlet elevation of 1,037 feet. Water from the Buck Creek SSFP flows through approximately 11,600 linear feet of 14-inch transmission main, 13,200 linear feet of 16-inch main, 1,500 linear feet of 20-inch main, and 1,200 linear feet of 10-inch main to Well 2. The estimated friction loss in this pipe is 45 feet. (See Attachment B for head loss calculations). This provides a hydraulic grade of 992 feet at the Well 2 wellhead at 1,000 gpm.

Well 2 is under artesian pressure. The current artesian shut-in pressure is approximately 50 pounds per square inch (psi). When the well was originally drilled, the shut-in pressure was 98 psi. Therefore, the static head at Well 2 currently is approximately:

$$434\, feet + (50\, psi \times 2.31) = 550\, feet$$

The static head at Well 2 when originally drilled would have been:

$$434\, feet + (98\, psi \times 2.31) = 660\, feet$$

The existing Well 2 has a finished floor elevation of approximately 434 feet. The well pump extends to an elevation of -368.5 feet below ground into an open hole (non-screened) with a 14.75-inch diameter. This hole continues to a depth of approximately -804 feet (1,242 feet below grade). If we assume that all 1,000 gpm injected into the well goes to the bottom of the hole, there would be approximately 11 feet of friction losses. Therefore, the required driving head to get 1,000 gpm into the Well 2 wellhead under static conditions would be 561 feet at 50 psi shut-in pressure and 671 feet at 98 psi shut-in pressure. With a hydraulic grade of 992 feet from the Buck Creek SSFP at 1,000 gpm, there is approximately 320 to 431 feet of available driving head at Well 2 under static conditions without additional pumping. We do not currently have much data available on the hydraulic conditions within the well and how much dynamic head would be added by the formation during injection. The well log noted a drawdown of 725 feet at 1,380 gpm. If we assume that the injection resistance head is similar to the well drawdown, the required additional driving head to force 1,000 gpm into the well would be approximately 293 feet with a static artesian pressure of 50 psi and 404 feet with a static artesian pressure of 98 psi. These conditions would require a pump of approximately 100 to 150 horsepower (hp) near the wellhead to inject 1,000 gpm. The head conditions during injection operations should be monitored so that the size of any required booster pump can be verified.

Operating staff note that there appear to be limitations on the amount of water that can be forced into Well 2 by gravity. There is an 8-inch Cla-Val control valve installed in a valve vault near Well 1 where the piping from Buck Creek connects to piping from Wells 1 and 2 as well as piping from the Grand Ronde Pump Station and Reservoir (see Valve 6A on Figures 7 and 8). It appears that this valve is a reduced-port, solenoid-controlled pressure sustaining/pressure reducing valve. The valve is likely reducing the driving head available for forcing water into Well 2. The pressure set point on this valve will likely need to be adjusted to allow more water to flow into Well 2. Since the potential available static pressure at Well 2 is approximately 260 psi, it is probably beneficial to maintain the functionality of this valve and just modify its target pressure set point. This valve should be adjusted to determine how much water can be forced by gravity into Well 2.

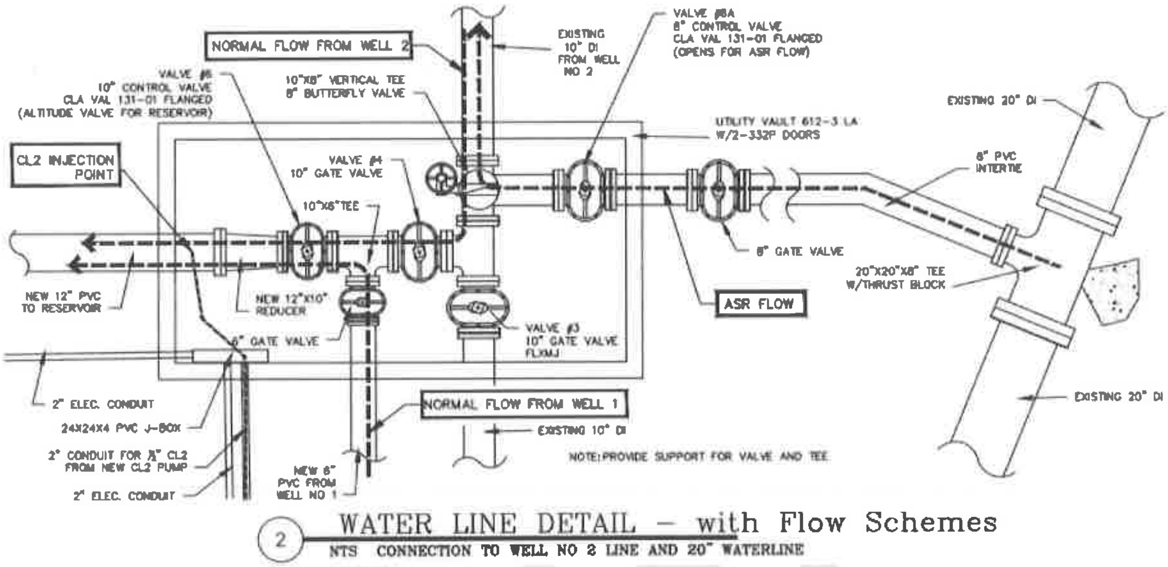


FIGURE 7

Wellfield Control Valve Vault Near Well 1

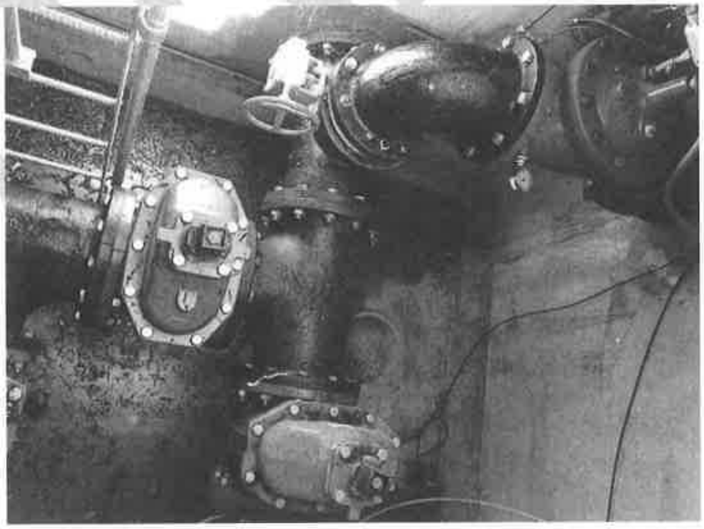


FIGURE 8

Wellfield Control Valve Vault (Valve 6A in Upper Right Corner)

WELL 2 ASR PRODUCTION CAPACITY

The existing Well 2 was constructed in 2001 and contains a 400 hp vertical turbine pump that is capable of delivering water to the system at a rate of 1,400 gpm. The pump column is 10-inch diameter within a 16-inch diameter casing installed to a depth of -368.5 feet (see Figure 9). The well itself is free flowing (artesian) with a shut-in pressure of approximately 98 psi at the time of drilling. The shut-in pressure has since decreased to approximately 50 psi. The 400 hp pump has been disabled since 2008 as it has not been able to consistently and continuously withdraw water from Well 2. City staff report that they are currently able to obtain about 200 gpm out of Well 2 under artesian pressure.

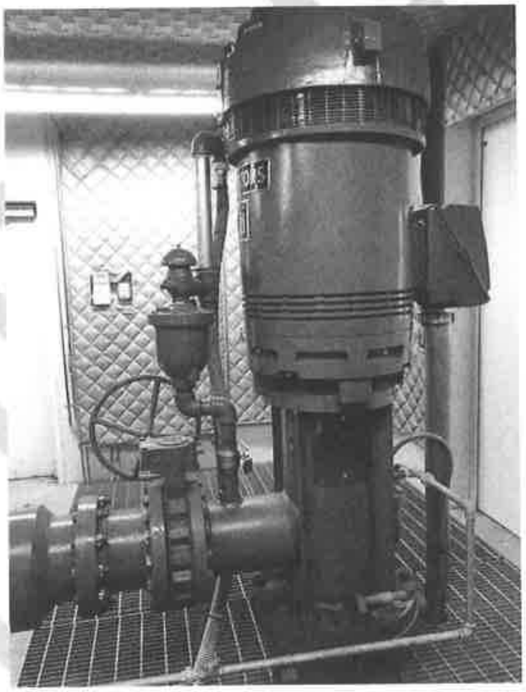


FIGURE 9

Existing Well 2 Pump

System hydraulics between Well 2 and the Grande Ronde Reservoir were reviewed for flows of 1,000 gpm, 1,500 gpm, and 2,000 gpm out of Well 2. At a shut-in pressure of 50 psi, the hydraulic grade at the Well 2 wellhead is approximately 550 feet. At a shut-in pressure of 98 psi, the hydraulic grade at Well 2 is approximately 660 feet. The well log shows a drawdown of 725 feet at 1,380 gpm in 2001. With that drawdown, there would be a pumping water level of approximately -175 feet at 50 psi shut-in and -65 feet at 98 psi shut-in. The Grand Ronde Reservoir has an overflow elevation of 449 feet. There are about 1,200 feet of 10-inch pipe and 100 feet of 12-inch pipe between Well 2 and the Grand Ronde Reservoir. There is also a short section of 8-inch pipe in the valve vault in Well 1. The friction losses in the well and site piping range from 18 to 70 feet with flow rates from 1,000 to 2,000 gpm. At 1,000 gpm, approximately 180 to 220 hp would be required to convey water from Well 2 to the reservoir. At 2,000 gpm, approximately 400 to 470 hp would be required. Based on discussions with system operators, it appears that the current well pump is oversized for current conditions. To determine the appropriate size pump, the existing well pump could be used to test pump the well. If flow rate, pressure within the well, and pump discharge pressure were monitored, the proper pump could be determined for current conditions.

PIPING MODIFICATIONS BETWEEN WELL 2 AND THE BUCK CREEK TRANSMISSION MAIN

The City would like to be able to store excess water from the Buck Creek SSFP in the Well 2 aquifer in the winter/spring months and withdraw it in the summer months. Currently, there is only a single pipe between the Wells 1 and 2 area and the Buck Creek Transmission Main. This means that water cannot be injected into Well 2 and be withdrawn from Well 1 at the same time. This restriction limits the amount of water that can be injected into Well 2. To eliminate this restriction, a second pipe should be run between Well 2 and the Buck Creek Transmission Main. Since this pipe will convey approximately 1,000 gpm, a 12-inch pipe diameter pipe is proposed.

Two alternative routes for this pipeline have been identified as shown on Figure 10 and are described below. A detailed preliminary cost estimate for each alternative can be found within Attachment A.

Alternative A – Tie into the 14-inch transmission line from Buck Creek and run approximately 1,750 linear feet of 12-inch water main west, across SR 141, through an easement across private property to Forester Lane then down an easement on Wallace Road to connect to the existing 10-inch water main near Well 2. Install a new control valve/pressure reducing valve at this location. New control power will need to run to this new vault. This alternative will require both a WSDOT permit and easement acquisition from two property owners. The estimated cost of this alternative is $747,000.

Alternative B – Tie into the 14-inch transmission line from Buck Creek and run approximately 2,250 linear feet of 12-inch water main west, across SR 141, turning south, running parallel to SR 141, then turning west on an easement along

Wallace Lane and connecting to the existing 10-inch water main near Well 2. Install a new control valve/pressure reducing valve at this location. New control power will need to be run to this new vault. This alternative will require both a WSDOT permit and easement acquisition from one property owner. The estimated cost of this alternative is $924,000.

Due to the lower cost, Alternative A is the preferred alternative, provided that easements can be obtained.

ATTACHMENT A

PRELIMINARY COST ESTIMATE

CITY OF WHITE SALMON
Childs Reservoir Inlet Valve Telemetry Evaluation
Troubleshooting Existing Valve Programming, no additional equipment or software required
G&O #19281

Item No.	Description	Units	Quantity	Unit Price	Contract Amount
1	One site visit to gather information on their existing PLCs and HMI	HRS	4	$150	$600
2	Review and troubleshooting the PLC programming	HRS	8	$150	$1,200
3	One site visit to install programming modifications and update HMI (if needed)	HRS	8	$150	$1,200
4	Travel from Seattle	HRS	20	$150	$3,000
5	Expenses	DAYS	3	$150	$450
				Total Estimated Cost	**$6,500**

CITY OF WHITE SALMON
Childs Reservoir Outlet Valve Modification
Installation of Double Door Check Valve
G&O #19281

Item No.	Description	Units	Quantity	Unit Price	Contract Amount
1	Mobilization/Demobilization	LS	1	$1,000	$1,000
2	12" Double Door Check Valve	EA	1	$6,000	$6,000
3	Valve Installation	LS	1	$3,000	$3,000
				Subtotal	$9,000
				Sales Tax (7%)	$700
				Subtotal	$9,700
				Contingency (20%)	$2,000
				Subtotal	$11,700
				Engineering/Construction Management (25%)	$ 3,000
				Total Estimated Construction Cost	**$ 15,000**

CITY OF WHITE SALMON

Childs Reservoir Outlet Valve Modification

Telemetry

G&O #19281

Alternative A: Radio

Item No.	Description	Units	Quantity	Unit Price	Contract Amount
1	Mobilization/Demobilization	LS	1	$4,056	$4,056
2	20 ft Antenna Mast, attch. to existing structure	LS	1	$50,700	$50,700

Subtotal	$54,800
Sales Tax (7%)	$3,900
Subtotal	$58,700
Contingency (20%)	$11,800
Subtotal	$70,500
Engineering/Construction Management (25%)	$ 17,700
Total Estimated Construction Cost	**$ 88,000**

Alternative B: Cellular

Item No.	Description	Units	Quantity	Unit Price	Contract Amount
1	Mobilization/Demobilization	LS	1	$4,208	$4,208
2	20 ft Antenna Mast, attch. to existing structure	LS	1	$52,600	$52,600

Subtotal	$56,900
Sales Tax (7%)	$4,000
Subtotal	$60,900
Contingency (20%)	$12,200
Subtotal	$73,100
Engineering/Construction Management (25%)	$ 18,300
Total Estimated Construction Cost	**$ 91,000**

Alternative C: Fiber

Item No.	Description	Units	Quantity	Unit Price	Contract Amount
1	Mobilization/Demobilization	LS	1	$14,504	$14,504
2	Fiber cable in conduit, pull box every 500 ft	LS	1	$181,300	$181,300

Subtotal	$195,900
Sales Tax (7%)	$13,800
Subtotal	$209,700
Contingency (20%)	$42,000
Subtotal	$251,700
Engineering/Construction Management (25%)	$ 63,000
Total Estimated Construction Cost	**$ 315,000**

Client:	Aspect / White Salmon	Developed By:	MJB
Project Name:	ASR	Checked By:	
G&O Job No:	19281.00	Date:	October 18, 2019
Subject:	Preliminary Structural Cost Estimate		

Summary

Direct Costs				Indirect Costs	
Material	Labor	Equipment	Labor Burden	Project overhead	Subtotal
			30%	12%	
$115,154.00	$112,454.00	$23,982.00	$33,736.20	$34,239.14	$319,565.34

Other Costs:					
Profit	Bond	Contingency	Subtotal	Sales Tax	**Total**
10%	2%	0%		7.5%	
$31,956.53	$6,391.31	$0.00	$357,913.19	$26,843.49	**$384,800.00**

Raise Trusses

Direct Costs				Indirect Costs	
Material	Labor	Equipment	Labor Burden	Project overhead	Subtotal
			30%	12%	
$15,254.00	$36,854.00	$21,282.00	$11,056.20	$10,133.54	$94,579.74

Other Costs:					
Profit	Bond	Contingency	Subtotal	Sales Tax	**Total**
10%	2%	20%		7.5%	
$9,457.97	$1,891.59	$18,915.95	$124,845.26	$9,363.39	**$134,300.00**

Replace Roof Sheathing

Direct Costs				Indirect Costs	
Material	Labor	Equipment	Labor Burden	Project overhead	Subtotal
			30%	12%	
$99,900.00	$75,600.00	$2,700.00	$22,680.00	$24,105.60	$224,985.60

Other Costs:					
Profit	Bond	Contingency	Subtotal	Sales Tax	**Total**
10%	2%	20%		7.5%	
$22,498.56	$4,499.71	$44,997.12	$296,980.99	$22,273.57	**$319,300.00**

CITY OF WHITE SALMON
Buck Creek SSFP Renovations
Convert Existing Settling Basin to Roughing Filter
G&O #19281

Item No.	Description	Quantity		Unit Price	Contract Amount
1	Mobilization/Demobilization (10%)	LS	1	$42,000	$42,000
2	Remove Existing Baffles	LS	1	$5,000	$5,000
3	Remove and Reinstall Roof	LS	1	$20,000	$20,000
4	Roughing Filter Piping and Modifications	LF	1	$25,000	$25,000
5	8" Gate Valves	EA	2	$2,000	$4,000
6	Pea Gravel	TN	215	$85	$18,300
7	7/8" Gravel	TN	160	$85	$13,600
8	1 1/2" Drain rock	TN	110	$85	$9,400
9	Sitework	LS	1	$40,000	$40,000
10	Concrete Settling Basin, 12,000 gallons	LS	1	$160,000	$160,000
11	8" DI Piping from Roughing Filter to Settling Basin	LF	400	$150	$60,000
12	Restoration	LS	1	$20,000	$20,000

Subtotal	$417,300
Sales Tax (7%)	$29,211
Subtotal	$446,511
Contingency (20%)	$89,302
Subtotal	$535,813
Engineering/Construction Management (25%)	$133,953
Total Estimated Construction Cost	**$670,000**

CITY OF WHITE SALMON
New 12" ASR Piping
Option A
G&O #19281

Item No.	Description	Quantity		Unit Price	Contract Amount
1	Unexpected Site Changes	EST	1	$ 5,000.00	$ 5,000.00
2	Mobilization and Demobilization	LS	1	$ 40,000.00	$ 40,000.00
3	Locate Existing Utilities	LS	1	$ 2,000.00	$ 2,000.00
4	Temporary Traffic Control	LS	1	$ 10,000.00	$ 10,000.00
5	Temporary Erosion and Sedimentation Control	LS	1	$ 2,000.00	$ 2,000.00
6	Trench Excavation Safety Systems	LS	1	$ 5,000.00	$ 5,000.00
7	Unsuitable Materials	CY	300	$ 35.00	$ 10,500.00
8	Imported Backfill Gravel	TN	1,800	$ 25.00	$ 45,000.00
9	Crushed Surfacing Base Course	TN	500	$ 35.00	$ 17,500.00
10	HMA CL 1/2" PG 58H-22	TN	200	$ 150.00	$ 30,000.00
11	Topsoil	CY	60	$ 3.00	$ 180.00
12	12" DI watermain, incl. pipe bedding	LF	1,750	$ 140.00	$ 245,000.00
13	8" PRV Station	LS	1	$ 25,000.00	$ 25,000.00
14	Electrical	LS	1	$ 15,000.00	$ 15,000.00
15	Telemetry	LS	1	$ 60,000.00	$ 60,000.00
				Subtotal	$465,180
				Sales Tax (7%)	$32,563
				Subtotal	$497,743
				Contingency (20%)	$99,549
				Subtotal	$597,291
				Engineering/Construction Management (25%)	$149,323
				Total Estimated Construction Cost	**$747,000**

CITY OF WHITE SALMON
New 12" ASR Piping
Option B
G&O #19281

Item No.	Description	Quantity		Unit Price	Contract Amount
1	Unexpected Site Changes	EST	1	$ 5,000.00	$ 5,000.00
2	Mobilization and Demobilization	LS	1	$ 47,000.00	$ 47,000.00
3	Locate Existing Utilities	LS	1	$ 2,000.00	$ 2,000.00
4	Temporary Traffic Control	LS	1	$ 15,000.00	$ 15,000.00
5	Temporary Erosion and Sedimentation Control	LS	1	$ 2,000.00	$ 2,000.00
6	Trench Excavation Safety Systems	LS	1	$ 5,000.00	$ 5,000.00
7	Unsuitable Materials	CY	380	$ 35.00	$ 13,300.00
8	Imported Backfill Gravel	TN	2,300	$ 25.00	$ 57,500.00
9	Crushed Surfacing Base Course	TN	600	$ 35.00	$ 21,000.00
10	HMA CL 1/2" PG 58H-22	TN	300	$ 150.00	$ 45,000.00
11	12" DI watermain, incl. pipe bedding	LF	2,250	$ 140.00	$ 315,000.00
12	8" PRV Station	LS	1	$ 25,000.00	$ 25,000.00
13	Electrical	LS	1	$ 15,000.00	$ 15,000.00
14	Telemetry	LS	1	$ 60,000.00	$ 60,000.00
				Subtotal	$575,800
				Sales Tax (7%)	$40,306
				Subtotal	$616,106
				Contingency (20%)	$123,221
				Subtotal	$739,327
				Engineering/Construction Management (25%)	$184,832
				Total Estimated Construction Cost	**$924,000**

ATTACHMENT B

HEAD LOSS CALCULATIONS

Buck Creek Reservoir		
Diameter	26	ft
Height	25.5	ft
Height to Outlet	19	ft
Base Elevation	1018	ft
Minimum Water El	1037	ft
Volume (to outlet)	75,456	gallons
Volume (to top)	101,269	gallons

Well No. 2		
Open Hole Diameter	14.75	in
Pump Column Diameter	10	in
Casing Diameter	16	in
Finish Floor Elevation	434	ft
Bottom of Casing El.	-368.5	ft
Bottom of Well El.	-804	ft
Depth to bottom of casing	802.5	ft
Depth to well bottom	1238	ft
Original Shut in Pressure	98	psi
Current Shut in Pressure	50	psi

Static Head at Top of Well	549.5	ft
Desired Injection Rate	1000	gpm

Friction Head: Piping from SSFP to top of Well No. 2

	14 inch Transmission	16 inch Transmission	12 inch, New from SR141 to Existing 10 inch	10 inch, existing to Well 2	8" Reduced Port Cla-Valve (valve 6A)
C	100	120	120	120	
D (inches)	14	16	12	10	
Q (gpm)	1000	1000	1000	1000	
F (ft/100 ft of pipe)	0.1960	0.0730	0.2961	0.7190	
Length (ft)	10560	13200	2600	400	
Friction Head (ft)	**20.70**	**9.64**	**7.70**	**2.88**	**4.2**

Segment: Bottom of Pump to Ground Level

Pipe Characteristics		Casing	Pump Column	Open Hole	6" ASR Piping
Input:	Flow (gpm)	1000	1000	1000	1000
	Pipe length, L (ft)	802.5	802.5	435.5	20
	Pipe dia., D (in)	16	10	14.75	6
	Pipe material	Steel	DI	Rock	DI
	H-W Coefficient (C)	100	120	90	120
Computed:	Pipe Area (sf)	1.396	0.545	1.187	0.196
	Velocity (fps)	1.6	4.1	1.9	11.3
	Pipe Area between Casing and Pump Column (sf)	0.9			
	Velocity between Casing and Pump Column (fps)	2.6			
Pipe Friction Loss		**0.83**	**5.85**	**0.82**	**1.75**
		6.68			

Fitting Characteristics *6 inch ASR piping at wellhead

Fitting Type	Number	Equivalent Length (ft)	Minor Loss Coef.	Minor Loss
Entrance	1		0.5	0.130
Exit	1		1	0.259
Reducer	2		0.05	0.200
Gate Valve	1	3.5		
BF	2	19		
Elbow (90)	2	15.2		
Tee Through	1	10.1		
Tee Branch	2	30.3		
Total Eq. Length		142.6		1.04
Fitting Friction Loss			**1.63**	
Total			**10.88 feet**	

Velocity (fps) between casing and pump column	Velocity (fps) in open hole	Pipe Friction Loss (ft)	Minor Loss from entrance/exit/reducer	Minor Loss from Equivalent length of fittings	Total fitting friction loss (ft)	**Total Friction Losses between Top of Pump and Bottom of Well (ft)**
2.6	1.9	9.25	0.59	1.04	1.63	**10.88**

Static Head at Buck Cr Res	1037	ft
Headloss between Buck Cr Res and top of well	45.11	ft
Total Head at top of well	**992**	ft

	50 psi	98 psi	
Shut in Head	549.5	660.38	ft
Total Friction Losses between Groundlevel and Bottom of Well	10.88	10.88	ft
Total Head at top of well due to shut in pressure	**560.38**	**671.26**	ft
Available Driving Head (ft)	432	321	ft
Pressure (psi)	187	139	psi
Needed Driving Head (from intial pump test)	725	725	ft
Additional Head Required	293	404	ft
Required Pump HP	99	136	hp

Static Head and Wellhead	603	ft
	261	psi

Buck Creek Reservoir		
Diameter	26	ft
Height	25.5	ft
Height to Outlet	19	ft
Base Elevation	1018	ft
Minimum Water El	1037	ft
Volume (to outlet)	75,456	gallons
Volume (to top)	101,269	gallons

Well No. 2		
Open Hole Diameter	14.75	in
Pump Column Diameter	10	in
Casing Diameter	16	in
Finish Floor Elevation	434	ft
Bottom of Casing El.	-368.5	ft
Bottom of Well El.	-804	ft
Depth to bottom of casing	802.5	ft
Depth to well bottom	1238	ft
Original Shut in Pressure	98	psi
Current Shut in Pressure	50	psi

Static Head at Top of Well	549.5	ft
Desired Injection Rate	1000	gpm

Friction Head: Piping from SSFP to top of Well No. 2

	14 inch Transmission	**16 inch Transmission**	**14 inch to Forester Ln**	**20 inch to BPS vault**	**8 inch between valves in BPS vault**	**10 inch from BPS to Well 2**
C	100	120	120	120	130	120
D (inches)	14	16	14	20	8	10
Q (gpm)	1000	1000	1000	1000	1000	1000
F (ft/100 ft of pipe)	0.1960	0.0730	0.1399	0.0247	1.8362	0.7190
Length (ft)	10560	13200	1000	1500	20	1200
Friction Head (ft)	**20.70**	**9.64**	**1.40**	**0.37**	**0.37**	**8.63**

Segment: Bottom of Pump to Ground Level

Pipe Characteristics		Casing	Pump Column	Open Hole	6" ASR Piping
Input:	Flow (gpm)	1000	1000	1000	1000
	Pipe length, L (ft)	802.5	802.5	435.5	20
	Pipe dia., D (in)	16	10	14.75	6
	Pipe material	Steel	DI	Rock	DI
	H-W Coefficient (C)	100	120	90	120
Computed:	Pipe Area (sf)	1.396	0.545	1.187	0.196
	Velocity (fps)	1.6	4.1	1.9	11.3
	Pipe Area between Casing and Pump Column (sf)	0.9			
	Velocity between Casing and Pump Column (fps)	2.6			
Pipe Friction Loss		**0.83**	**5.85**	**0.82**	**1.75**
		6.68			

Fitting Characteristics	*6 inch ASR piping at wellhead			
Fitting Type	Number	Equivalent Length (ft)	Minor Loss Coef.	Minor Loss
Entrance	1		0.5	0.130
Exit	1		1	0.259
Reducer	2		0.05	0.200
Gate Valve	1	3.5		
BF	2	19		
Elbow (90)	2	15.2		
Tee Through	1	10.1		
Tee Branch	2	30.3		
Total Eq. Length		142.6		1.04
Fitting Friction Loss			**1.63**	
Total				**10.88 feet**

Velocity (fps) between casing and pump column	Velocity (fps) in open hole	Pipe Friction Loss (ft)	Minor Loss from entrance/exit/reducer	Minor Loss from Equivalent length of fittings	Total fitting friction loss (ft)	**Total Friction Losses between Top of Pump and Bottom of Well (ft)**
2.6	1.9	9.25	0.59	1.04	1.63	**10.88**

Static Head at Buck Cr Res	1037	ft
Headloss between Buck Cr Res and top of well	45.30	ft
Total Head at top of well	**992**	ft

	50 psi	98 psi	
Shut in Head	550	660	ft
Total Friction Losses between Groundlevel and Bottom of Well	11	11	ft
Total Head at top of well due to shut in pressure	**560**	**671**	ft
Available Driving Head (ft)	431	320	ft
Pressure (psi)	187	139	psi
Needed Driving Head (from intial pump test)	725	725	ft
Additional Head Required	294	405	ft
Required Pump HP	99	136	hp

8" Reduced Port Cla-Valve (valve 6A)

Static Head and Wellhead	603	ft
	261	psi

4.2

Well No. 2	
Open Hole Diameter	14.75 in
Pump Column Diameter	10 in
Casing Diameter	16 in
Finish Floor Elevation	434 ft
Bottom of Casing El.	-368.5 ft
Bottom of Well El.	-804 ft
Depth to bottom of casing	802.5 ft
Depth to well bottom	1238 ft
Original Shut in Pressure	98 psi
Current Shut in Pressure	50 psi

Grand Ronde Reservoir	
Finished Floor El.	424 ft
Height	25 ft
Diameter	26 ft
Overflow El.	449 ft

Friction Head: Piping fromWell 2 to Grand Ronde Res

	10 inch from Well 2 to Well 1 Valve Vault	**12 inch from Valve vault to Res**
C	120	130
D (inches)	10	12
Q (gpm)	1000	1000
F (ft/100 ft of pipe)	0.7190	0.2554
Length (ft)	1150	120
Friction Head (ft)	**8.27**	**0.31**

Segment: Well 2 and Flowmeter

Pipe Characteristics		10" vault piping
Input:	Flow (gpm)	1000
	Pipe length, L (ft)	20
	Pipe dia., D (in)	10
	Pipe material	DI
	H-W Coefficient (C)	120
Computed:	Pipe Area (sf)	0.545
	Velocity (fps)	4.1
Pipe Friction Loss		**0.15**

Fitting Characteristics *10 inch vault piping

Fitting Type	Number	Equivalent Length (ft)	Minor Loss Coef.	Minor Loss
Entrance	0		0.5	0.000
Exit	0		1	0.000
Reducer			0.05	0.000
Gate Valve	2	6.68		
Butterfly Valve	1	29.2		
45 Degree Bend	13.4	5		
90 Degree Bend	25.1	4		
Tee Through	1	16.7		
Tee Branch	2	50.1		
Total Eq. Length		326.86		2.38
Fitting Friction Loss			**2.38**	
Total			**8.84 feet**	

Flow (gpm)	Velocity (fps) in open hole	Pipe Friction Loss (ft)	Minor Loss from entrance /exit/reducer	Minor Loss from Equivalent length of fittings	Total fitting friction loss (ft)	**Total Friction Losses between Top of Pump and Bottom of Well (ft)**
1000	4.1	0.15	0.00	2.38	2.38	**2.53**

Static Head at Grand Ronde Res	449	ft
Headloss between Res and top of well	17	ft
Total Head at top of well from res level	**466**	ft

	50 psi	98 psi	
Shut in Head	550	660	ft
Total Friction Losses between Groundlevel and Bottom of Well	7	7	ft
Total Head at top of well due to shut in pressure	**543**	**654**	ft
Difference across pump	76	187	ft
Pressure difference across pump (psi)	33	81	psi
Drawdown	725	725	ft
TDH	649	538	ft
Estimated Pump HP Required	218	181	hp

Segment: **Well 1 Valve Vault**

Pipe Characteristics		8" vault piping
Input:	Flow (gpm)	1000
	Pipe length, L (ft)	5
	Pipe dia., D (in)	8
	Pipe material	DI
	H-W Coefficient (C)	120
Computed:	Pipe Area (sf)	0.349
	Velocity (fps)	6.4
Pipe Friction Loss		**0.11**

Fitting Characteristics *8 inch vault piping

Fitting Type	Number	Equivalent Length (ft)	Minor Loss Coef.	Minor Loss
Entrance	0		0.5	0.000
Exit	0		1	0.000
Reducer	2		0.05	0.063
Gate Valve	1	5.32		
Globe Valve	1	226		
45 Degree Bend	10.6			
90 Degree Bend	20			
Tee Through	1	13.3		
Tee Branch	1	39.9		
Total Eq. Length		284.52		6.14
Fitting Friction Loss			**6.21**	

Well No. 2	
Open Hole Diameter	14.75 in
Pump Column Diameter	10 in
Casing Diameter	16 in
Finish Floor Elevation	434 ft
Bottom of Casing El.	-368.5 ft
Bottom of Well El.	-804 ft
Depth to bottom of casing	802.5 ft
Depth to well bottom	1238 ft
Original Shut in Pressure	98 psi
Current Shut in Pressure	50 psi

Grand Ronde Reservoir	
Finished Floor El.	424 ft
Height	25 ft
Diameter	26 ft
Overflow El.	449 ft

Friction Head: Piping fromWell 2 to Grand Ronde Res

	10 inch from Well 2 to Well 1 Valve Vault	12 inch from Valve vault to Res
C	120	130
D (inches)	10	12
Q (gpm)	1500	1500
F (ft/100 ft of pipe)	1.5222	0.5406
Length (ft)	1150	120
Friction Head (ft)	**17.51**	**0.65**

Segment: **Well 2 and Flowmeter**

Pipe Characteristics		10" vault piping
Input:	Flow (gpm)	1500
	Pipe length, L (ft)	20
	Pipe dia., D (in)	10
	Pipe material	DI
	H-W Coefficient (C)	120
Computed:	Pipe Area (sf)	0.545
	Velocity (fps)	6.1
Pipe Friction Loss		**0.31**

Fitting Characteristics *10 inch vault piping

Fitting Type	Number	Equivalent Length (ft)	Minor Loss Coef.	Minor Loss
Entrance	0		0.5	0.000
Exit	0		1	0.000
Reducer			0.05	0.000
Gate Valve	2	6.68		
Butterfly Valve	1	29.2		
45 Degree Bend	13.4	5		
90 Degree Bend	25.1	4		
Tee Through	1	16.7		
Tee Branch	2	50.1		
Total Eq. Length		326.86		5.05
Fitting Friction Loss			**5.05**	
Total			**18.74 feet**	

Flow (gpm)	Velocity (fps) in open hole	Pipe Friction Loss (ft)	Minor Loss from entrance /exit/reducer	Minor Loss from Equivalent length of fittings	Total fitting friction loss (ft)	**Total Friction Losses between Top of Pump and Bottom of Well (ft)**
1500	6.1	0.31	0.00	5.05	5.05	**5.36**

Static Head at Grand Ronde Res	449	ft
Headloss between Res and top of well	37	ft
Total Head at top of well from res level	**486**	ft

	50 psi	98 psi	
Shut in Head	550	660	ft
Total Friction Losses between Groundlevel and Bottom of Well	7	7	ft
Total Head at top of well due to shut in pressure	**543**	**654**	ft
Difference across pump	57	168	ft
Pressure difference across pump (psi)	25	73	psi
Drawdown	725	725	ft
TDH	668	557	ft
Estimated Pump HP Required	337	281	hp

Segment: Well 1 Valve Vault

Pipe Characteristics		8" vault piping
Input:	Flow (gpm)	1500
	Pipe length, L (ft)	5
	Pipe dia., D (in)	8
	Pipe material	DI
	H-W Coefficient (C)	120
Computed:	Pipe Area (sf)	0.349
	Velocity (fps)	9.6
Pipe Friction Loss		**0.23**

Fitting Characteristics *8 inch vault piping

Fitting Type	Number	Equivalent Length (ft)	Minor Loss Coef.	Minor Loss
Entrance	0		0.5	0.000
Exit	0		1	0.000
Reducer	2		0.05	0.142
Gate Valve	1	5.32		
Globe Valve	1	226		
45 Degree Bend	10.6			
90 Degree Bend	20			
Tee Through	1	13.3		
Tee Branch	1	39.9		
Total Eq. Length		284.52		13.02
Fitting Friction Loss			**13.16**	

Well No. 2	
Open Hole Diameter	14.75 in
Pump Column Diameter	10 in
Casing Diameter	16 in
Finish Floor Elevation	434 ft
Bottom of Casing El.	-368.5 ft
Bottom of Well El.	-804 ft
Depth to bottom of casing	802.5 ft
Depth to well bottom	1238 ft
Original Shut in Pressure	98 psi
Current Shut in Pressure	50 psi

Grand Ronde Reservoir	
Finished Floor El.	424 ft
Height	25 ft
Diameter	26 ft
Overflow El.	449 ft

Friction Head: Piping fromWell 2 to Grand Ronde Res

	10 inch from Well 2 to Well 1 Valve Vault	**12 inch from Valve vault to Res**
C	120	130
D (inches)	10	12
Q (gpm)	2000	2000
F (ft/100 ft of pipe)	2.5918	0.9205
Length (ft)	1150	120
Friction Head (ft)	**29.81**	**1.10**

Segment: Well 2 and Flowmeter

Pipe Characteristics		10" vault piping
Input:	Flow (gpm)	2000
	Pipe length, L (ft)	20
	Pipe dia., D (in)	10
	Pipe material	DI
	H-W Coefficient (C)	120
Computed:	Pipe Area (sf)	0.545
	Velocity (fps)	8.2
Pipe Friction Loss		**0.53**

Fitting Characteristics	*10 inch vault piping			
Fitting Type	Number	Equivalent Length (ft)	Minor Loss Coef.	Minor Loss
Entrance	0		0.5	0.000
Exit	0		1	0.000
Reducer			0.05	0.000
Gate Valve	2	6.68		
Butterfly Valve	1	29.2		
45 Degree Bend	13.4	5		
90 Degree Bend	25.1	4		
Tee Through	1	16.7		
Tee Branch	2	50.1		
Total Eq. Length		326.86		8.60
Fitting Friction Loss			**8.60**	
Total			**31.94 feet**	

Flow (gpm)	Velocity (fps) in open hole	Pipe Friction Loss (ft)	Minor Loss from entrance /exit/reducer	Minor Loss from Equivalent length of fittings	Total fitting friction loss (ft)	**Total Friction Losses between Top of Pump and Bottom of Well (ft)**
2000	8.2	0.53	0.00	8.60	8.60	**9.13**

Static Head at Grand Ronde Res	449	ft
Headloss between Res and top of well	63	ft
Total Head at top of well from res level	**512**	ft

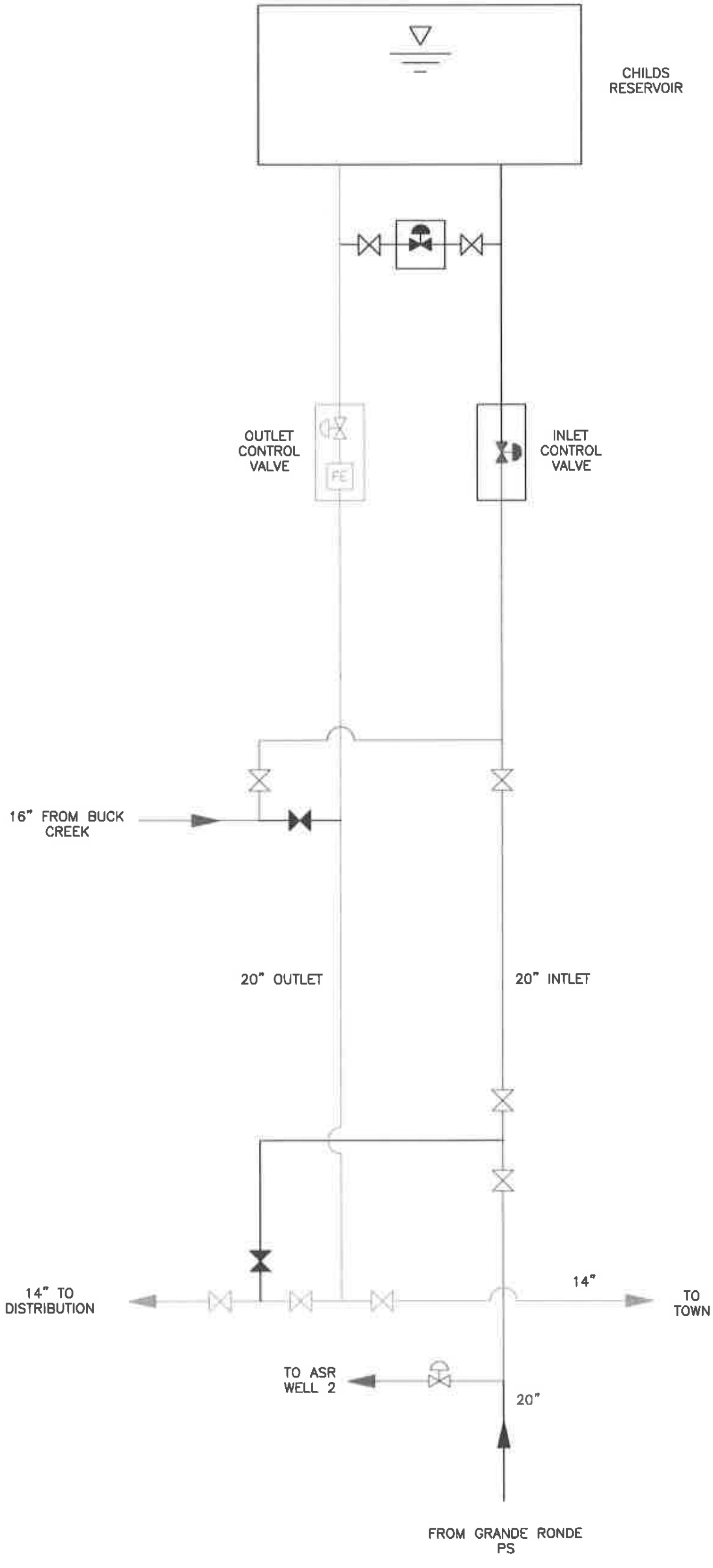
	50 psi	98 psi	
Shut in Head	550	660	ft
Total Friction Losses between Groundlevel and Bottom of Well	7	7	ft
Total Head at top of well due to shut in pressure	**543**	**654**	ft
Difference across pump	31	142	ft
Pressure difference across pump (psi)	13	61	psi
Drawdown	725	725	ft
TDH	694	583	ft
Estimated Pump HP Required	467	393	hp

Segment: Well 1 Valve Vault

Pipe Characteristics		8" vault piping
Input:	Flow (gpm)	2000
	Pipe length, L (ft)	5
	Pipe dia., D (in)	8
	Pipe material	DI
	H-W Coefficient (C)	120
Computed:	Pipe Area (sf)	0.349
	Velocity (fps)	12.8
Pipe Friction Loss		**0.39**

Fitting Characteristics *8 inch vault piping

Fitting Type	Number	Equivalent Length (ft)	Minor Loss Coef.	Minor Loss
Entrance	0		0.5	0.000
Exit	0		1	0.000
Reducer	2		0.05	0.253
Gate Valve	1	5.32		
Globe Valve	1	226		
45 Degree Bend	10.6			
90 Degree Bend	20			
Tee Through	1	13.3		
Tee Branch	1	39.9		
Total Eq. Length		284.52		22.17
Fitting Friction Loss			**22.43**	



LEGEND

FE	FLOWMETER
⋈	NORMALLY OPENED VALVE
⧓	NORMALLY CLOSED VALVE
	NORMALLY OPEN HYDRAULIC CONTROL VALVE
	NORMALLY CLOSED HYDRAULIC CONTROL VALVE
——→	FLOW DIRECTION
- - - →	FLOW FROM BUCK CREEK
— - — →	FLOW FROM CHILDS RESERVOIR

CITY OF WHITE SALMON

ASR ENGINEERING ASSISTANCE

FIGURE 1

FEED ASR WATER (RESERVOIR FULL)

Gray & Osborne, Inc.
CONSULTING ENGINEERS

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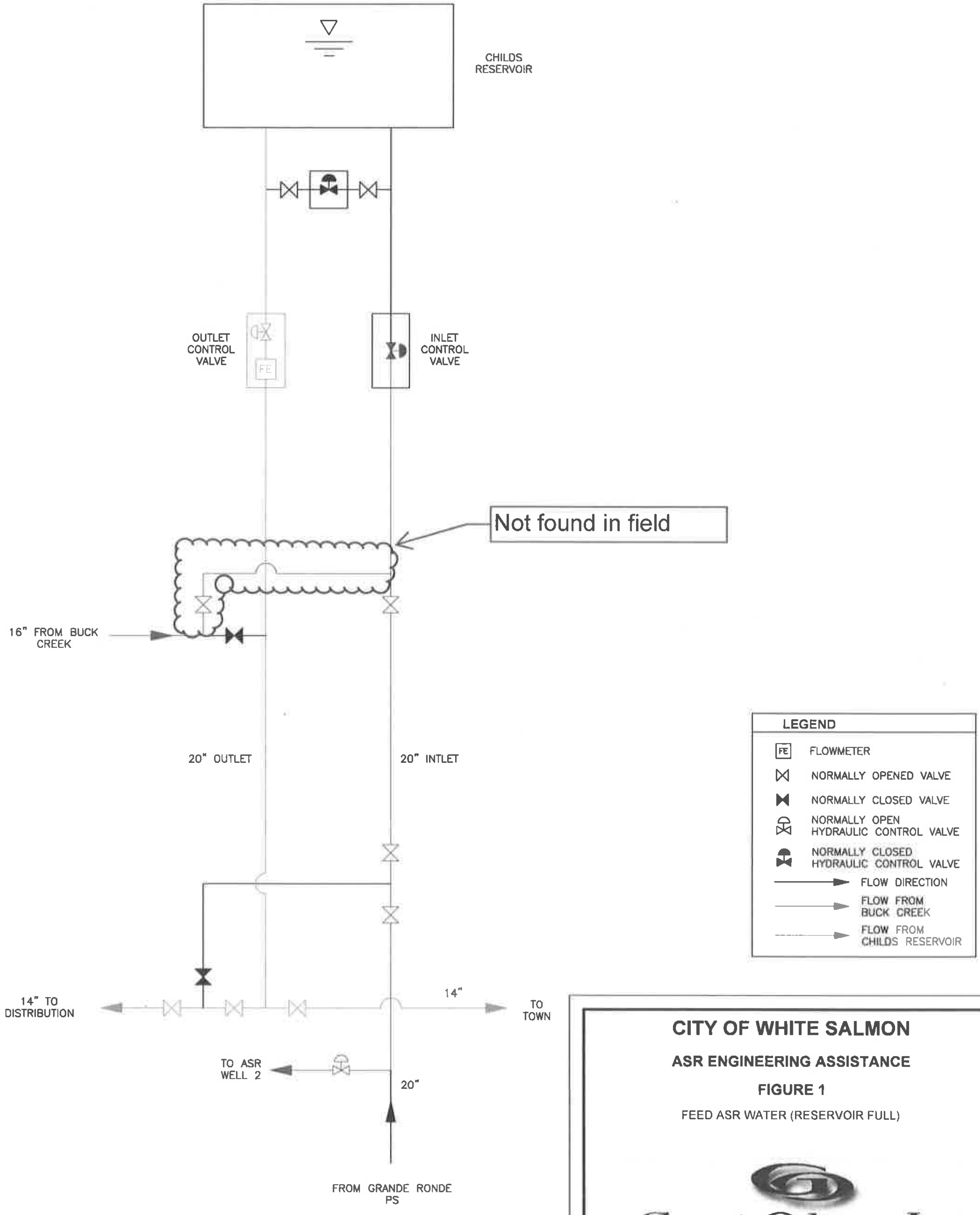

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CITY OF WHITE SALMON

ASR ENGINEERING ASSISTANCE

FIGURE 1

FEED ASR WATER (RESERVOIR FULL)

Gray & Osborne, Inc.
CONSULTING ENGINEERS

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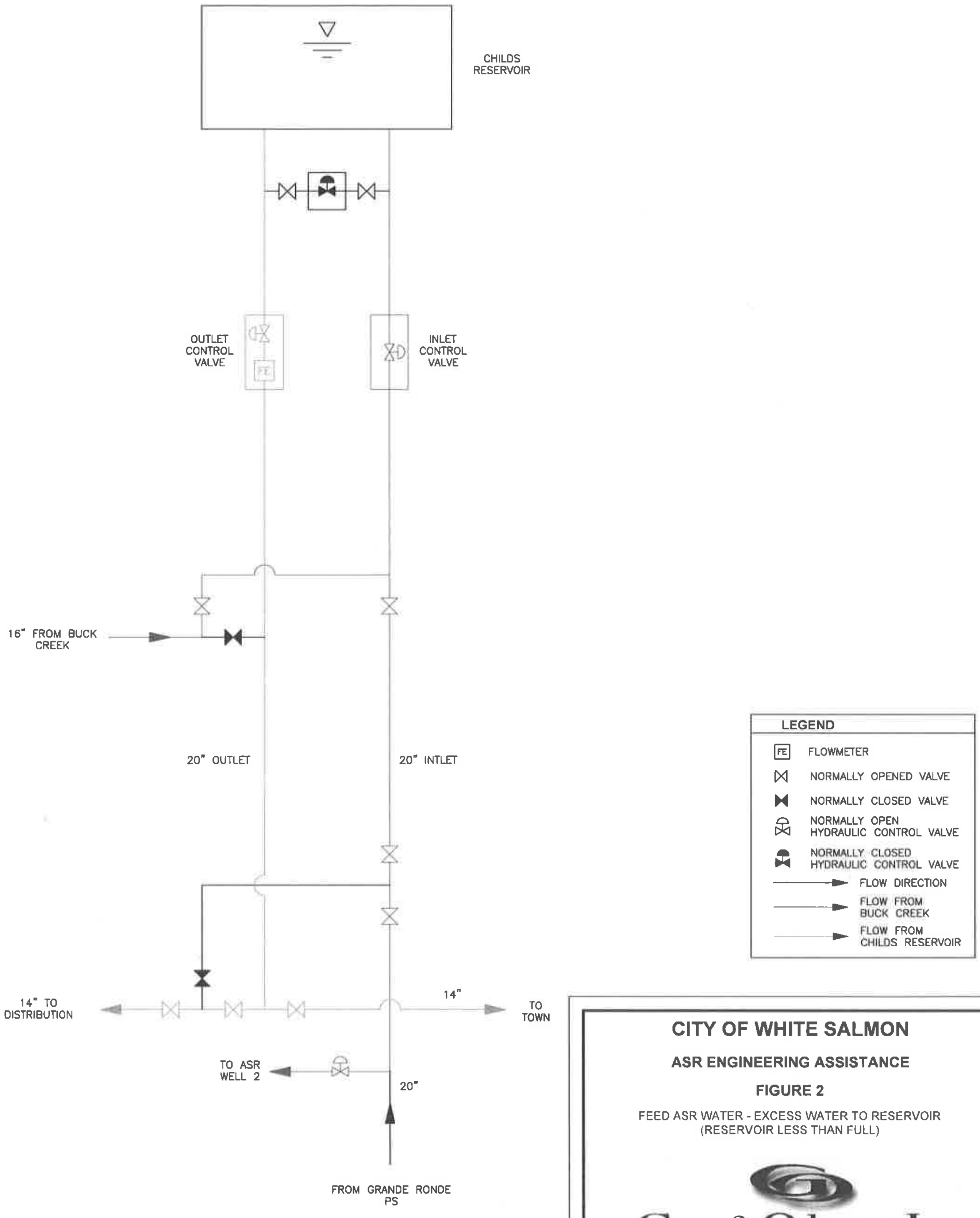

CITY OF WHITE SALMON

ASR ENGINEERING ASSISTANCE

FIGURE 2

FEED ASR WATER - EXCESS WATER TO RESERVOIR
(RESERVOIR LESS THAN FULL)

Gray & Osborne, Inc.
CONSULTING ENGINEERS

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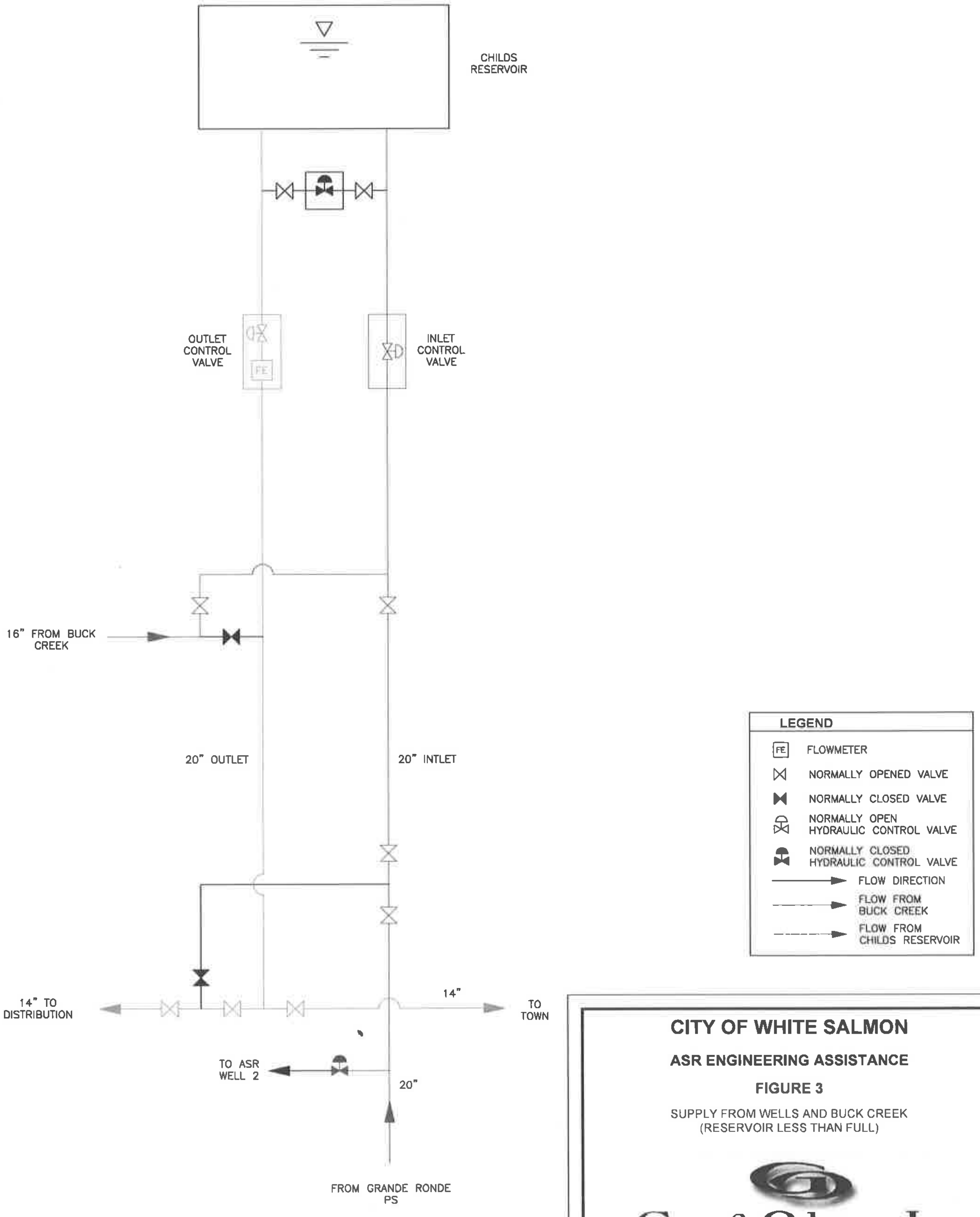

CITY OF WHITE SALMON

ASR ENGINEERING ASSISTANCE

FIGURE 3

SUPPLY FROM WELLS AND BUCK CREEK
(RESERVOIR LESS THAN FULL)

Gray & Osborne, Inc.
CONSULTING ENGINEERS

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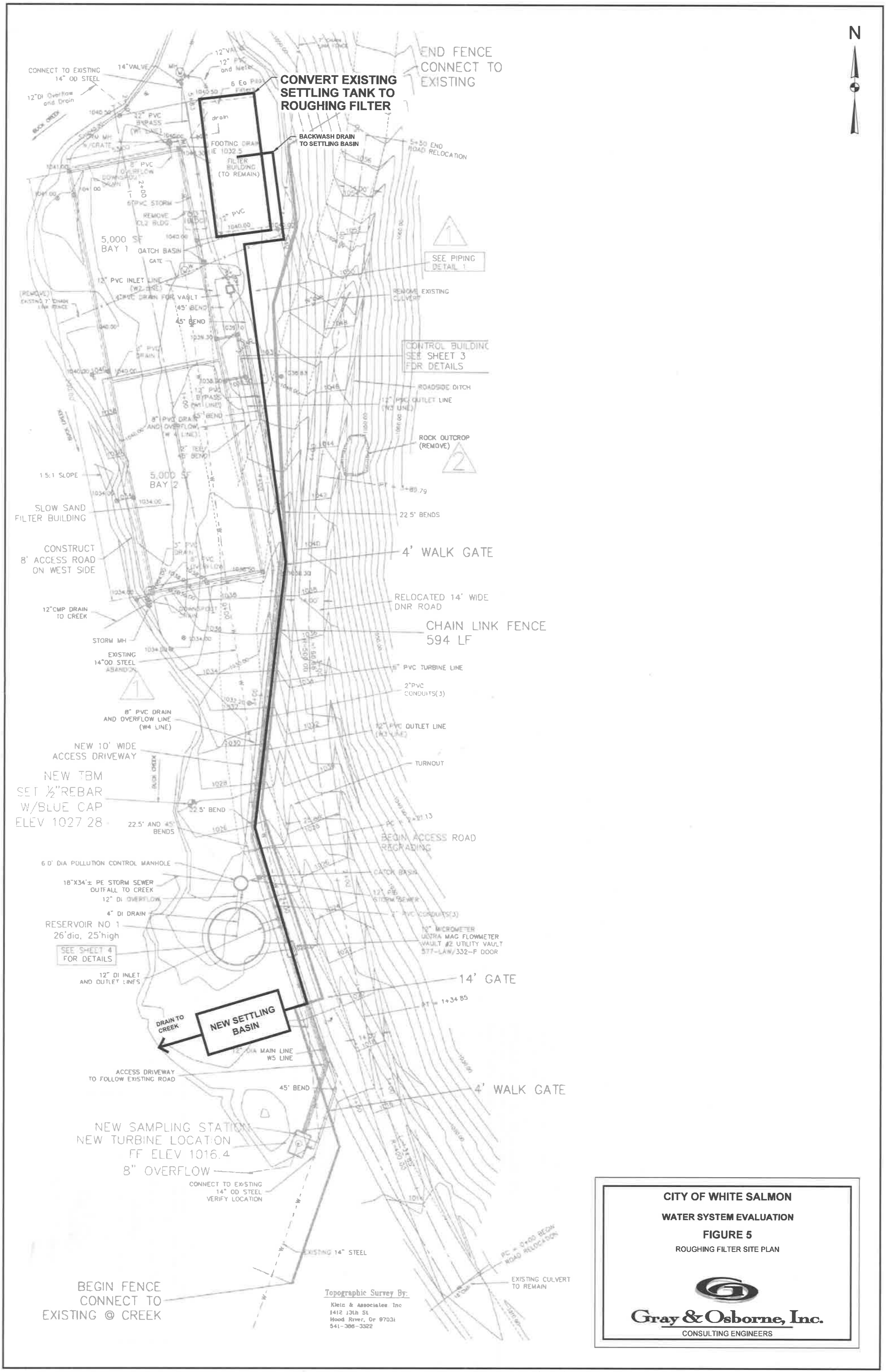

CITY OF WHITE SALMON

WATER SYSTEM EVALUATION

FIGURE 5

ROUGHING FILTER SITE PLAN

Gray & Osborne, Inc.
CONSULTING ENGINEERS

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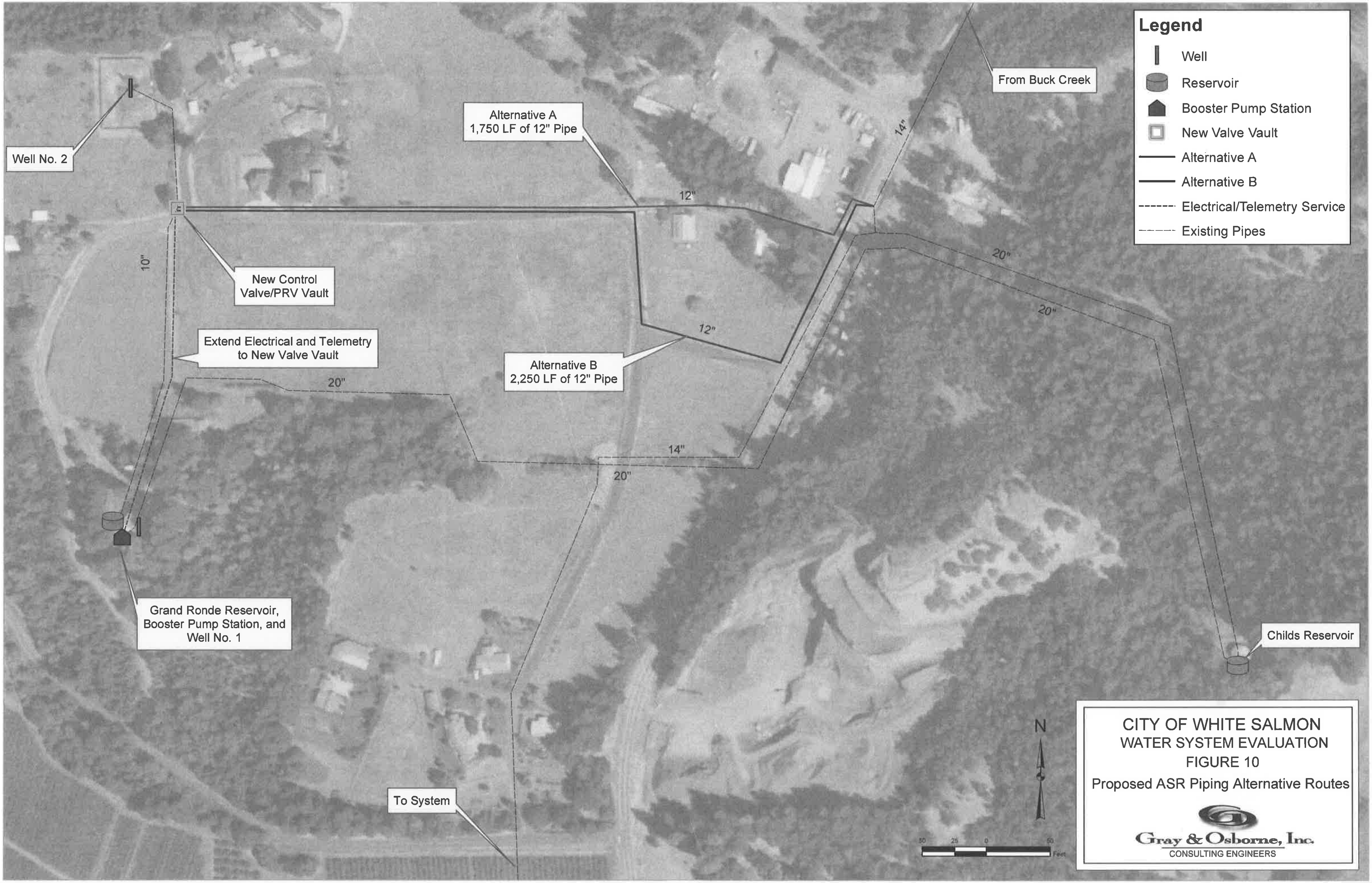
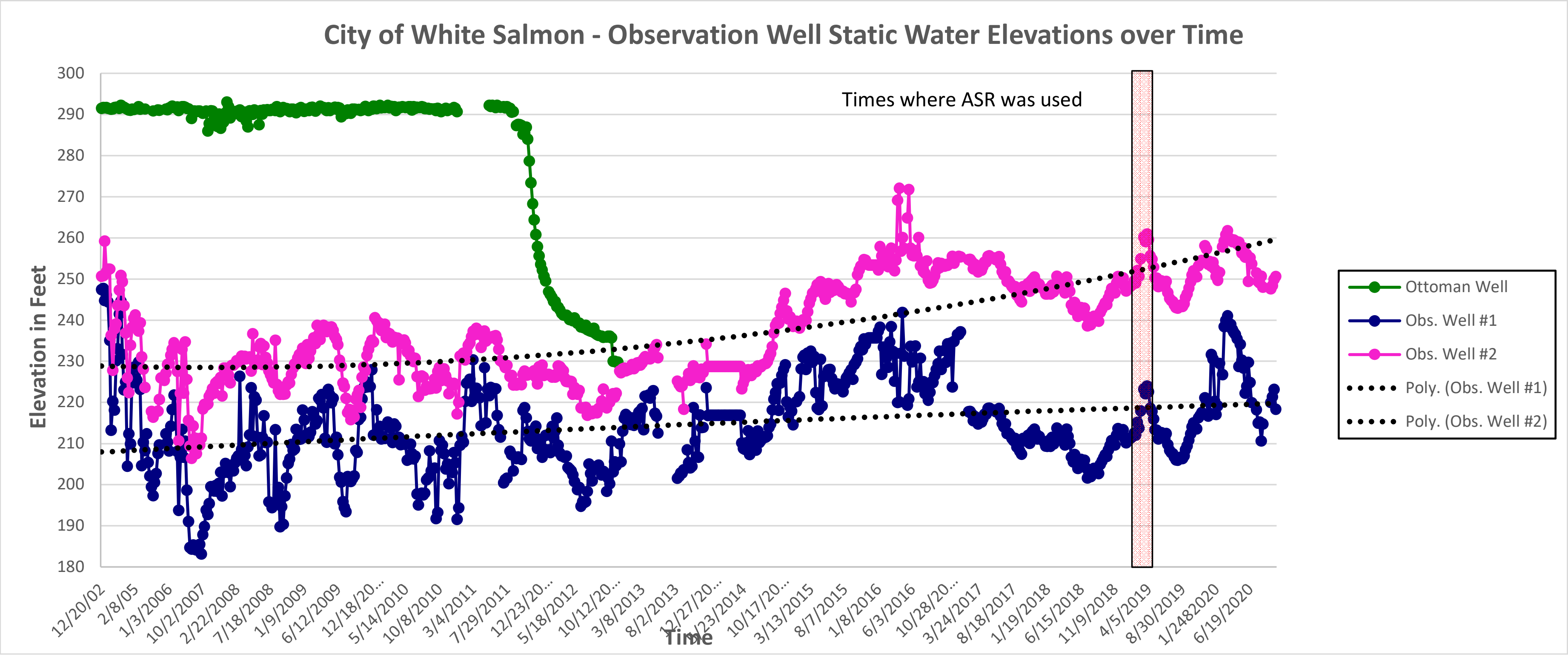


CITY OF WHITE SALMON
WATER SYSTEM EVALUATION
FIGURE 10
Proposed ASR Piping Alternative Routes

Gray & Osborne, Inc.
CONSULTING ENGINEERS



City of White Salmon - Observation Well Static Water Elevations over Time

Reservoir Volume Calculations								
City of White Salmon Water System Plan								
Total Reservoir Volume and Operating Volume								
	Total	Total Water	Gallons /	Operating	Operating			
Reservoir	Gallons	Height ft	Foot	Range, ft	Volume, gal			
Childs	203,680	20	10,184	3.75	38,190			
Los Altos	1,000,000	22	45,455	1.92	87,273			
Strawberry East	99,200	25	3,968	2.750	10,912			
Strawberry West	99,200	25	3,968	2.750	10,912			
Spring Street	500,000	14	35,714	0.417	14,881			
Dock Grade	218,000	14.5	15,034	1	15,034			
	2,120,080			Total	177,202			
				Rounded	177,200			
Standby Storage for White Salmon and Unicorporated Area only (Excluding Bingen)								
Year 2021	ADD, gpd	ERUs	ADD/ERUs	tm	Qs	Ql	Days	SB
SB 1	814,270	3982	204.49	1440	1800	1000	2	476,540
Min SB		3982	200.00				2	1,592,800
Equalizing Storage								
Year 2021	PHD, gpm	Qs	ES					
EQ 1	2692.0	1800	133,800					
EQ 2	2692.0	800	283,800					
Equalizing Storage	Value, gal	Feet						
Childs	12,854	1.26						
Los Altos	63,111	1.39						
Strawberry Mtn	12,521	1.58						
Spring St	31,555	0.88						
Dock Grade	13,758	0.92						
Total	133,800							
Fire Suppression Storage (FSS)								
FSS	gpm	duration	Zones	FSS				
3 zones	2000	120	3	720,000		Spring, Dock Grd, Los Altos		
2 zones	1000	120	2	240,000		Childs, Strawberry Mt		
			Total	960,000				
Nesting of SB and FSS				1,592,800		SB> FSS		
Dead Storage								
Childs	5,092							
Los Altos	22,727							
Strawberry Mtn	15,872							
Spring St	17,857							
Dock Grade	7,517							
Total	69,066							
Summary of Reservoir Storage								
Item		Min.	Scenario 1					
Total Volume		2,120,080	2,120,080	2,120,080				
OS		177,200	177,200	177,200				
SB/FSS		1,592,800	1,592,800	1,703,800				
ES		133,800	281,000	170,000				
DS		69,066	69,066	69,066				
Difference / Excess		147,214	14	14				

Reservoir Calculations - Existing, Simultaneous Feed (Los Altos and Spring Street Reservoirs Feeding Spring Street Pressure Zone)

ERU, gal/yr	73,864							
Average Peaking Factor, PHD/ADD	4.22							
Est. DSL for 2020	37.4%		50% Los Altos, 50% Spring St.					
Year 2021	Childs	Los Altos	Spring St. w/o Bingen	Strawberry Mtn.	Dock Grade	Dock Grade w/o Bingen	Total	
Consumed ADD, gpy	11,640,000	49,145,000	79,217,000	30,175,000	38,786,000	1,665,000	208,963,000	
Produced ADD, gpy	18,597,220	78,518,933	126,564,946	48,210,577	61,968,366	2,660,169	333,860,042	
ADD, gpd	50,951.29	392,141.07	177,020.71	132,083.77	169,776.34	7,288.14	921,973	
MDD, gpd	128,907	992,117	447,862	334,172	429,534	18,439	2,332,592	
PHD, gpm	223.7	1,200.4	596.2	469.3	575.3	56.4	3,004.7	
Consumption ERUs w/o Bingen	157.6	1,212.9	547.5	408.5	525.1	22.5	2,851.6	
Total ERUs Including DSL	251.8	1,937.8	868.0	652.7	839.0	36.0	4,549.2	
OS	38,225	87,273	14,880	13,227	15,034	15,034	168,639	
ES	(236,445)	(89,947)	(180,563)	44,145	86,289	8,462	52,607	
SB - 1	22,703	(79,718)	(509,959)	33,768	(524,447)	(64,624)	0	
SB-2, 200 gal/ERU*2	100,711	775,108	347,206	261,078	335,581	14,406	1,498,508	
FSS	120,000	120,000	240,000	240,000	240,000	240,000	960,000	
DS	9,060	22,727	17,857	15,872	7,517	7,517	73,033	
With Nesting								
Total Storage Needed	167,285	885,108	379,943	334,322	444,421	271,013	2,037,671	
Total Storage Available	203,680	1,000,000	500,000	198,400	218,000	218,000	2,120,080	
Surplus	36,395	114,892	120,057	(135,922)	(226,421)	(53,013)	**82,409**	
Without Nesting								
Total Storage Needed	267,996	1,005,108	619,943	574,322	684,421	285,419	2,752,787	
Total Storage Available	203,680	1,000,000	500,000	198,400	218,000	218,000	2,120,080	
Surplus	(64,316)	(5,108)	(119,943)	(375,922)	(466,421)	(67,419)	**(632,707)**	
Gallons per Foot Height	10,193	45,454	35,714	7,936		15,034		
Ground Elevation	925	879.85	875.85	1067		500		
Top of FSS/SB Storage Height	936.77	892.50	888.17	1097.24		512.50		

Reservoir Calculations - 2031, Simultaneous Feed (Los Altos and Spring Street Reservoirs Feeding Spring Street Pressure Zone)							
ERU, gal/yr	73,864						
Average Peaking Factor, PHD/ADD	4.22						
Est. DSL for 2020	37.4%						
Est. Percent Increase in Consumption	18.40%		50% Los Altos, 50% Spring St.				
Year 2031	Childs	Los Altos	Spring St.	Strawberry Mtn.	Dock Grade	Dock Grade w/o Bingen	Total
Consumed ADD, gpy	14,264,706	60,226,716	97,079,657	36,979,167	43,431,441	2,040,441	251,981,686
Produced ADD, gpy	22,787,070	96,208,811	155,079,324	59,072,151	69,379,299	3,259,491	402,526,655
ADD, gpd	62,430.33	480,488.27	216,902	161,841.51	190,080.27	8,930.11	1,111,743
MDD	157,948.73	1,215,635.32	548,763.29	409,459.02	480,903.09	22,593.18	2,812,709
PHD, gpm	264.0	1,448.7	707.7	553.0	632.3	65.1	3,606
Consumption ERUs w/o Bingen	193.1	1,486.3	671.0	500.6	588.0	27.6	2,878.7
Total ERUs Including DSL	308.5	2,374.3	1,071.8	799.7	939.3	44.1	5,493.7
OS	38,225	87,273	14,880	13,227	15,034	15,034	168,639
ES	(230,394)	(52,694)	(163,840)	56,693	94,850	9,760	(52,694)
SB - 1	45,661	96,977	(430,195)	93,283	(771,839)	(270,140)	0
SB-2, 200 gal/ERU*2	123,400	949,736	428,731	319,897	375,714	17,651	1,839,415
FSS	120,000	120,000	240,000	240,000	240,000	240,000	960,000
DS	9,060	22,727	17,857	15,872	7,517	7,517	73,033
With Nesting							
Total Storage Needed	170,685	1,059,736	461,468	405,689	493,115	272,311	2,369,889
Total Storage Available	203,680	1,000,000	500,000	198,400	218,000	218,000	2,120,080
Surplus	32,995	(59,736)	38,532	(207,289)	(275,115)	(54,311)	**(249,809)**
Without Nesting							
Total Storage Needed	290,685	1,179,736	701,468	645,689	733,115	289,963	3,107,540
Total Storage Available	203,680	1,000,000	500,000	198,400	218,000	218,000	2,120,080
Surplus	(87,005)	(179,736)	(201,468)	(447,289)	(515,115)	(71,963)	**(987,460)**
Gallons per Foot Height	10,193	45,454	35,714	7,936	15,034	15,034	
Ground Elevation	925	879.85	875.85	1067	500	500	
SB Storage Height From Bottom	937.11	900.74	887.85	1107.31	524.99	501.17	

Reservoir Calculations - 2041, Simultatneous Feed (Los Altos and Spring Street Reservoirs Feeding Spring Street Pressure Zone)								
ERU, gal/yr	73,864							
Average Peaking Factor, PHD/ADD	4.22							
Est. DSL for 2020	37.4%							
Percent Increase in Consumption	32.3%							
Year 2041	. Childs	Los Altos	Spring St.	Strawberry Mtn.	Dock Grade	Dock Grade w/o Bingen	Total	
Consumed ADD, gpy	17,187,915	72,568,737	116,973,805	44,557,160	52,912,531	2,458,581	304,200,148	
Produced ADD, gpy	27,456,734	115,924,500	186,859,113	71,177,572	84,524,809	3,927,445	485,942,728	
ADD, gpd	75,223.93	526,682.53	313,621.74	195,007.05	231,574.82	10,760.12	1,342,110	
MDD, gpd	190,316.54	1,332,506.80	793,463.00	493,367.83	585,884.30	27,223.11	3,395,538	
PHD, gpm	309.0	1,895.4	979.6	646.2	749.0	82.5	4,579	
Consumption ERUs w/o Bingen	232.7	1,629.2	983.5	603.2	716.4	33.3	3,481.9	
Total ERUs Including DSL	371.7	2,602.6	1,549.8	963.6	1,144.3	53.2	6578.9	
OS	38,225	87,273	14,880	13,227	15,034	15,034	168,639	
ES	(201,901)	36,055	(101,306)	70,678	112,347	12,371	106,733	
SB - 1	71,248	189,365	(236,757)	159,614	(400,850)	(57,680)	0	
SB-2, 200 gal/ERU*2	148,688	1,041,044	619,907	385,452	457,732	21,269	2,216,359	
FSS	120,000	120,000	240,000	240,000	240,000	240,000	960,000	
DS	9,060	22,727	17,857	15,872	7,517	7,517	73,033	
With Nesting								
Total Storage Needed	195,973	1,151,044	652,644	485,229	592,630	274,922	2,759,811	
Total Storage Available	203,680	1,000,000	500,000	198,400	218,000	218,000	2,120,080	
Surplus	7,707	(151,044)	(152,644)	(286,829)	(374,630)	(56,922)	**(639,731)**	
Without Nesting								
Total Storage Needed	315,973	1,307,099	892,644	725,229	832,630	296,191	3,537,135	
Total Storage Available	203,680	1,000,000	500,000	198,400	218,000	218,000	2,120,080	
Surplus	(112,293)	(307,099)	(392,644)	(526,829)	(614,630)	(78,191)	**(1,417,055)**	
Gallons per Foot Height	10,193	45,454	35,714	7,936	15,034	15,034		
Ground Elevation	925	879.85	875.85	1067	500	500		
SB Storage Height From Bottom	939.59	902.75	893.21	1115.57	530.45	501.41		

Reservoir Calculations - Existing, Simultaneous Feed (Los Altos and Spring Street Reservoirs Feeding Spring Street Pressure Zone)							
Brislawn Moved to Los Altos							
ERU, gal/yr	73,864						
Average Peaking Factor, PHD/ADD	4.22						
Est. DSL for 2020	37.4%						
Year 2021	Childs	Los Altos	Spring St.	Strawberry Mtn.	Dock Grade	Dock Grade w/o Bingen	Total
Consumed ADD, gpy	8,700,000	52,085,000	79,217,000	30,175,000	38,786,000	1,665,000	208,963,000
Produced ADD, gpy	13,897,764	83,202,875	126,544,728	48,202,875	61,958,466	2,659,744	333,806,709
ADD, gpd	38,076.06	404,945.51	176,992.43	132,062.67	169,749.22	7,286.97	921,826
MDD, gpd	96,332.44	1,024,512.14	447,790.84	334,118.56	429,465.53	18,436.04	2,332,220
PHD, gpm	178.5	1,467.6	595.5	469.2	575.2	70.3	3,286
Consumption ERUs w/o Bingen	117.8	1,252.7	547.5	408.5	525.1	22.5	2,349.0
Total ERUs Including DSL	188.2	2,001.0	874.6	652.6	838.8	36.0	4,555.2
OS	38,225	87,273	14,880	13,227	15,034	15,034	168,639
ES	(221,481)	(28,110)	(158,918)	44,136	86,277	10,541	44,136
SB - 1	(3,048)	(54,109)	(510,015)	33,725	(524,502)	(64,626)	0
SB-2, 200 gal/ERU*2	75,261	800,418	349,844	261,036	335,527	14,403	1,500,962
FSS	120,000	120,000	240,000	240,000	240,000	240,000	960,000
DS	9,060	22,727	17,857	15,872	7,517	7,517	73,033
With Nesting							
Total Storage Needed	167,285	910,418	382,581	334,271	444,356	273,092	2,067,647
Total Storage Available	203,680	1,000,000	500,000	198,400	218,000	218,000	2,120,080
Surplus	36,395	89,582	117,419	(135,871)	(226,356)	(55,092)	**52,433**
Without Nesting							
Total Storage Needed	242,546	1,030,418	622,581	574,271	684,356	287,495	2,757,311
Total Storage Available	203,680	1,000,000	500,000	198,400	218,000	218,000	2,120,080
Surplus	(38,866)	(30,418)	(122,581)	(375,871)	(466,356)	(69,495)	**(637,231)**
Gallons per Foot Height	10,193	45,454	35,714	7,936	15,034	15,034	
Ground Elevation	925	879.85	875.85	1067	500	500	
SB Storage Height From Bottom	932.38	897.46	885.65	1099.89	522.32	500.96	

Reservoir Calculations - 2031, Simultaneous Feed (Los Altos and Spring Street Reservoirs Feeding Spring Street Pressure Zone)							
Brislawn to Los Altos							
ERU, gal/yr	73,864						
Average Peaking Factor, PHD/ADD	4.22						
Est. DSL for 2020	37.4%						
Percent Increase in Consumption	18.00%						
						Dock Grade	
Year 2031	Childs	Los Altos	Spring St.	Strawberry Mtn.	Dock Grade	w/o Bingen	Total
Consumed ADD, gpy	10,609,756	63,518,293	96,606,098	36,798,780	43,421,488	2,030,488	250,954,415
Produced ADD, gpy	16,948,492	101,466,921	154,322,840	58,783,994	69,363,399	3,243,591	400,885,646
ADD, gpd	46,434.23	493,835.99	215,844	161,052.04	190,036.71	8,886.55	1,107,203
MDD, gpd	117,478.59	1,249,405.05	546,086.40	407,461.66	480,792.88	22,482.97	2,801,225
PHD, gpm	207.8	1,486.2	704.8	550.7	632.2	75.9	3,582
Consumption ERUs w/o Bingen	143.6	1,527.6	667.7	498.2	587.9	27.5	2,864.6
Total ERUs Including DSL	229.5	2,440.3	1,066.6	795.8	939.1	43.9	5,471.3
OS	38,225	87,273	14,880	13,227	15,034	15,034	168,639
ES	(217,075)	(25,316)	(142,536)	56,360	94,832	11,384	31,044
SB - 1	13,668	123,672	(432,311)	91,704	(483,927)	(61,427)	0
SB-2, 200 gal/ERU*2	91,782	976,119	426,639	318,336	375,628	17,565	1,830,442
FSS	120,000	120,000	240,000	240,000	240,000	240,000	960,000
DS	9,060	22,727	17,857	15,872	7,517	7,517	73,033
With Nesting							
Total Storage Needed	167,285	1,086,119	459,376	403,795	493,011	273,935	2,390,511
Total Storage Available	203,680	1,000,000	500,000	198,400	218,000	218,000	2,120,080
Surplus	36,395	(86,119)	40,624	(205,395)	(275,011)	(55,935)	**(270,431)**
Without Nesting							
Total Storage Needed	259,067	1,206,119	699,376	643,795	733,011	291,500	3,099,858
Total Storage Available	203,680	1,000,000	500,000	198,400	218,000	218,000	2,120,080
Surplus	(55,387)	(206,119)	(199,376)	(445,395)	(515,011)	(73,500)	**(979,778)**
Gallons per Foot Height	10,193	45,454	35,714	7,936	15,034	15,034	
Ground Elevation	925	879.85	875.85	1067	500	500	
SB Storage Height From Bottom	934.00	901.32	887.80	1107.11	524.99	501.17	

Reservoir Calculations - 2041, Simultaneous Feed (Los Altos and Spring Street Reservoirs Feeding Spring Street Pressure Zone)								
Strawberry Mth with Spring Street PS								
ERU, gal/yr	73,864							
Average Peaking Factor, PHD/ADD	4.22							
Est DSL for 2020	30.0%							
Percent Increase in Consumption	32.2%							
Year 2041	Childs	Los Altos	Spring St.	Strawberry Mtn.	Dock Grade	Dock Grade w/o Bingen	Total	
Consumed ADD, gpy	12,834,300	76,836,153	116,861,468	44,514,369	52,912,531	2,456,220	303,958,821	
Produced ADD, gpy	18,334,715	109,765,933	166,944,954	63,591,956	75,589,330	3,508,885	434,226,887	
ADD, gpd	50,232.10	487,527.31	280,198.09	174,224.54	207,094.05	9,613.38	1,199,276	
MDD, gpd	127,087.20	1,233,444.10	708,901.17	440,788.08	523,947.96	24,321.86	3,034,169	
PHD, gpm	221.2	1,468.5	885.7	587.8	680.2	78.4	3,843	
Consumption ERUs w/o Bingen	173.8	1,686.4	969.2	602.7	716.4	33.3	3,465.3	
Total ERUs Including DSL	248.2	2,409.1	1,384.6	860.9	1,023.4	47.5	#REF!	
OS	38,225	87,273	14,880	13,227	15,034	15,034	168,639	
ES	(215,074)	(27,976)	(115,400)	61,914	102,024	11,767	33,938	
SB - 1	21,264	111,055	(303,604)	118,049	(449,812)	(59,973)	0	
SB-2, 200 gal/ERU*2	99,289	963,649	553,841	344,373	409,343	19,002	1,980,154	
FSS	120,000	120,000	240,000	240,000	240,000	240,000	960,000	
DS	9,060	22,727	17,857	15,872	7,517	7,517	73,033	
With Nesting								
Total Storage Needed	167,285	1,073,649	586,578	435,387	533,919	274,318	2,537,217	
Total Storage Available	203,680	1,000,000	500,000	198,400	218,000	218,000	2,120,080	
Surplus	36,395	(73,649)	(86,578)	(236,987)	(315,919)	(56,318)	**(417,137)**	
Without Nesting								
Total Storage Needed	266,574	1,193,649	826,578	675,387	773,919	293,320	3,255,508	
Total Storage Available	203,680	1,000,000	500,000	198,400	218,000	218,000	2,120,080	
Surplus	(62,894)	(193,649)	(326,578)	(476,987)	(555,919)	(75,320)	**(1,135,428)**	
Gallons per Foot Height	10,193	45,454	35,714	7,936	15,034	15,034		
Ground Elevation	925	879.85	875.85	1067	500	500		
SB Storage Height From Bottom	934.74	901.05	891.36	1110.39	527.23	501.26		

<table>
<tr><td colspan="2">Option 1: Nominal 0.3 MG Glass-Fused-to-Steel (GFTS) Tank</td></tr>
<tr><td colspan="2">Description: Construction of a 300,000-gallon GFTS to provide additional reservoir capacity at the Strawberry Mountain site. Nominal tank dimensions: 45’ D x 29’ H, with the possibility of raising the tank to a max water level height of 47’ or taller (additional 210,000-gallon capacity with 47’ sidewall). New Reservoir tank would work at the same water level as the existing reservoirs until additional height was added. This option would require the relocation of the existing Booster Pump Station. The new tank and existing East Reservoir would be used to supply Strawberry Mtn zone and Strawberry Mtn Reservoir zones. Once the tank was raised, the existing East Reservoir would exclusively supply the booster pump station and Strawberry Mtn Reservoir area. The existing West Reservoir could be taken out of service or decommissioned. The existing Strawberry Mountain Road (private) would need to be realigned to provide additional space on site. Need for additional staging area.</td></tr>
<tr><td colspan="2">Estimated Project Cost: $2.20 million</td></tr>
<tr><td colspan="2">Project Timing:
Design: 7 months
Bidding and Contract Execution: 2 months
Tank Construction (including submittal review and approval): 10 months
Total: 19 months</td></tr>
<tr><th>Advantages</th><th>Disadvantages</th></tr>
<tr><td>• Maximizes use of existing structures
• Maintains current storage capacity
• Flexibility for future storage capacity
• Along with Option 2, shortest project timing
• Least capital cost</td><td>• Does not resolve the need to replace Spring Street Reservoir
• Highest $ per gallon capacity</td></tr>
</table>

Option 2: Nominal 0.4 MG Glass-Fused-to-Steel (GFTS) Tank	
Description: Construction of a 400,000-gallon GFTS to provide additional reservoir capacity at the Strawberry Mountain site. Nominal tank dimensions: 53' D x 29' H, with the possibility of raising the tank to a max water level height of 38' or taller (additional 140,000-gallon capacity with 38' sidewall). New Reservoir tank would work at the same water level as the existing reservoirs until additional height was added. This option would require the relocation of the existing Booster Pump Station. The new tank and existing reservoirs would be used to supply Strawberry Mtn zone and Strawberry Mtn Reservoir zones. Once the tank was raised, the East Reservoir would exclusively supply the booster pump station and Strawberry Mtn Reservoir area. The West Reservoir could be abandoned or mothballed. The existing Strawberry Mountain Road (private) would need to be realigned to provide additional space on site. Need for adjacent staging area.	
Estimated Project Cost: $2.44 million	
Project Timing: **Design:** 7 months **Bidding and Contract Execution:** 2 months **Tank Construction (including submittal review and approval):** 10 months **Total:** 19 months	
Advantages	**Disadvantages**
• Flexibility for future storage capacity • Along with Option 1, shortest project timing • More storage capacity than Option 1	• Does not resolve the need to replace Spring Street Reservoir

Option 3: Nominal 1.3 MG GFTS or Welded Steel Tank

Description: Construction of a 1.3-million-gallon GFTS or welded steel tank to replace the Spring Street Reservoir and provide additional reservoir capacity at the Strawberry Mountain site. Nominal tank dimensions: 60’ D x 72’ H. Max. water level height: 67’. This option would require the demolish of the existing West Reservoir, relocation of the existing Booster Pump Station and possibly removal of the shed. The existing East Reservoir would be used to supply the booster pump station and Strawberry Mtn Reservoir area. The existing Strawberry Mountain Road (private) would need to be realigned to provide additional space on site. Need for adjacent staging area. The existing Spring Street Reservoir would need to be removed from service and a new pressure reducing station would need to be installed to reduce pressures adequately to serve the Spring Street pressure zone.

Estimated Project Cost:
Strawberry Mtn Site: $4.85 million
Spring Street Reservoir Decommissioning and PRV Station: $552,800
Total: $5.40 million

Project Timing:
Design: 9 months
Bidding and Contract Execution: 2 months
Tank Construction (including submittal review and approval): 11.5 months (GFTS)
Spring Street Reservoir Decommissioning: 4 months
Total: 26.5 months

Advantages	Disadvantages
• Solve reservoir capacity issues related to Strawberry Mtn pressure zone • Allows Spring Street Reservoir to be removed from service. • Lowest $ per gallon capacity	• All water used for Strawberry Mtn and Spring St Reservoirs to be pumped to Strawberry Mtn and the pressure reduced on the portion going to Spring St. • Pressure reduction at services in the lower part of Strawberry Mtn zone due to elevated pressures • Removal of West Reservoir would further reduce reservoir capacity for Strawberry Mtn zone • Longest project completion timeframe

Option 1: New Station Near Los Altos Reservoir

Description: New aboveground booster pump station to convey water from the Los Altos Reservoir to the Strawberry Mountain Reservoirs. Proposed two pump system located in a fiberglass enclosure located downhill from the reservoir, most likely in public right-of-way. Emergency backup power unit is also recommended. Pump station needs to be downhill of reservoir for positive suction feed.

Estimated Project Cost: $500,000

Project Timing:
Design: 5 months
Bidding and Contract Execution: 2 months
Pump Station Construction (including submittal review and approval): 5 months
Electrical Transformer Ordered by KPUD: 6 months
Total: 12 months (assuming electrical transformer ordered prior to bidding)

Advantages	**Disadvantages**
• Close to Los Altos Reservoir • Provides additional flow capacity	• Station needs to be in public right-of-way or on private property • Station itself does not solve problem

<table>
<tr><th colspan="2">Option 2: Pump Station at NE Intersection of Main Street and Spring Street</th></tr>
<tr><td colspan="2">Description: New aboveground booster pump station to convey water from Spring Street Reservoir to the Strawberry Mountain Reservoirs. Proposed two pump system located in a fiberglass enclosure located downhill at the same location of the previous North Main Street Pump Station. City would need to install conduit underneath Main Street. New pole and 3-phase pole mounted transformer. Intended as temporary setup.</td></tr>
<tr><td colspan="2">Estimated Project Cost: $350,000</td></tr>
<tr><td colspan="2">Project Timing:
Design: 5 months
Bidding and Contract Execution: 2 months
Tank Construction (including submittal review and approval): 5 months
Electrical Transformer Ordered by KPUD: 6 months
Total: 12 months (assuming electrical transformer ordered prior to bidding)</td></tr>
<tr><td>Advantages</td><td>Disadvantages</td></tr>
<tr><td>• Provides water from different reservoir
• Provides additional flow capacity
• Station may be used at Los Altos</td><td>• Station is in right-of-way in an exposed location.
• Station itself does not solve problem</td></tr>
</table>

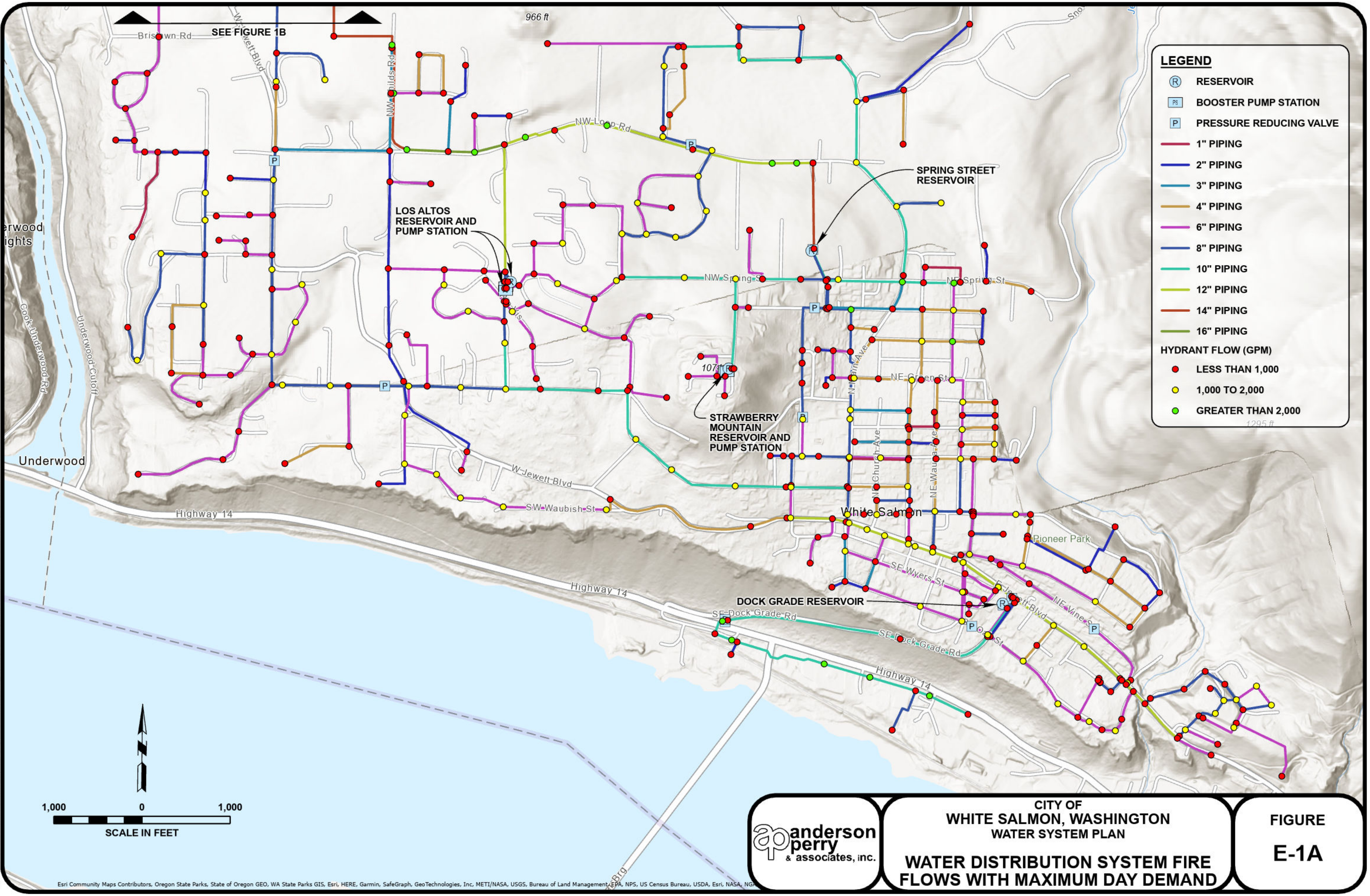
Option 3: Pump Station Near NE Intersection of Main Street and Spring Street

Description: New aboveground booster pump station to convey water from Spring Street Reservoir to the North Main-School Pressure Zone. This station would provide fire flow supplemented by the Cochran PRV (off Strawberry Mountain). Proposed station would have two or three pumps to handle domestic usage, one or two pumps to handle high demand. The pumps would need to be installed in a building if fire flow pumps needed. Site for this pump station has not been identified.

Estimated Project Cost: ?? – need further information, does not include property acq.

Project Timing:
Design: 7 months
Bidding and Contract Execution: 2 months
Tank Construction (including submittal review and approval): 5 months
Electrical Transformer Ordered by KPUD: 6 months
Total: 14 months (assuming electrical transformer ordered prior to bidding)

Advantages	**Disadvantages**
• Provides water from different reservoir • Provides additional flow capacity • May eliminate need for additional reservoir at Strawberry Mountain	• Another station to operate • Need land for building. • Need to upgrade Spring St. Main



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CITY OF
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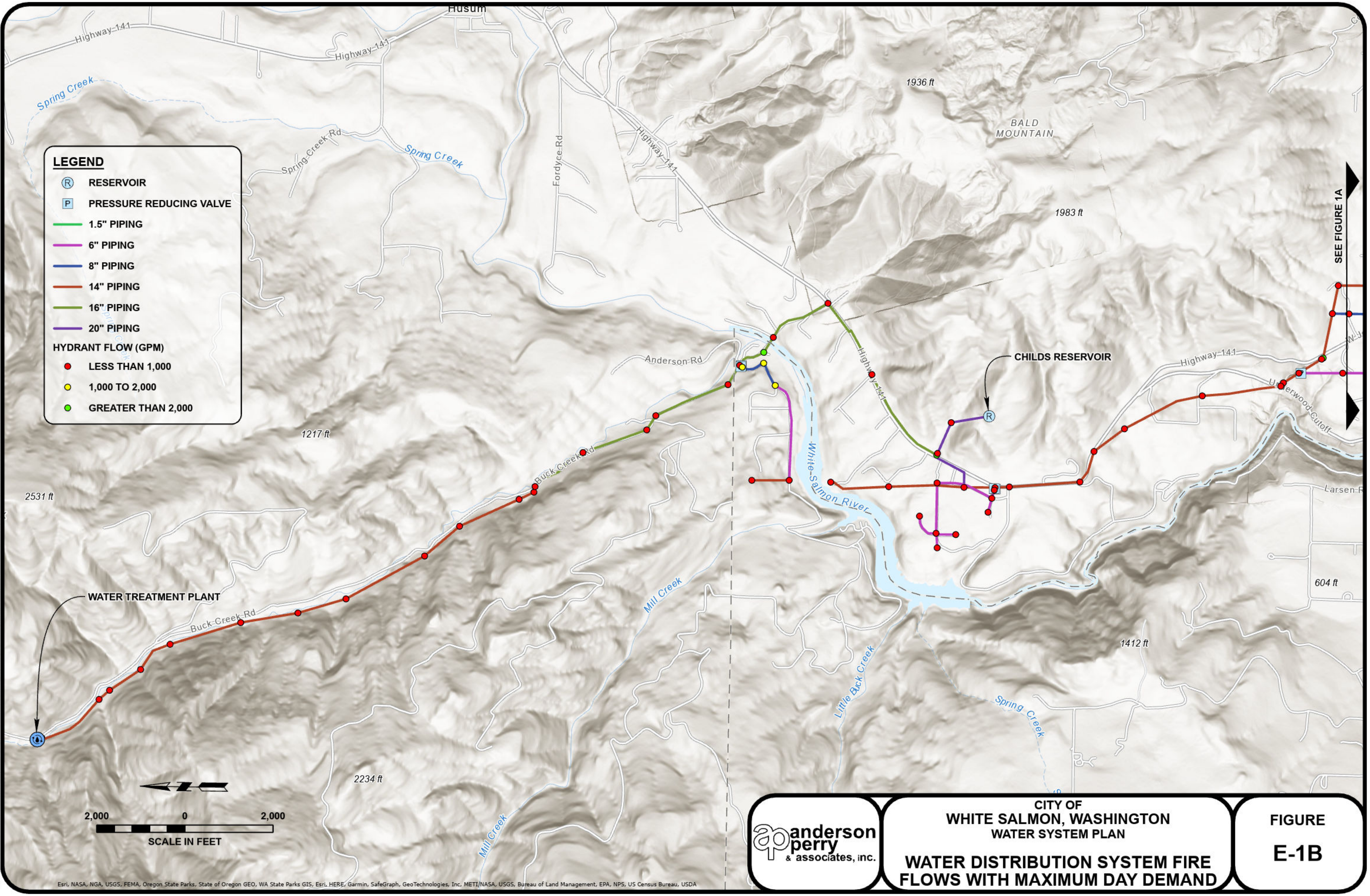
WATER SYSTEM PLAN

WATER DISTRIBUTION SYSTEM FIRE FLOWS WITH MAXIMUM DAY DEMAND

FIGURE
E-1A



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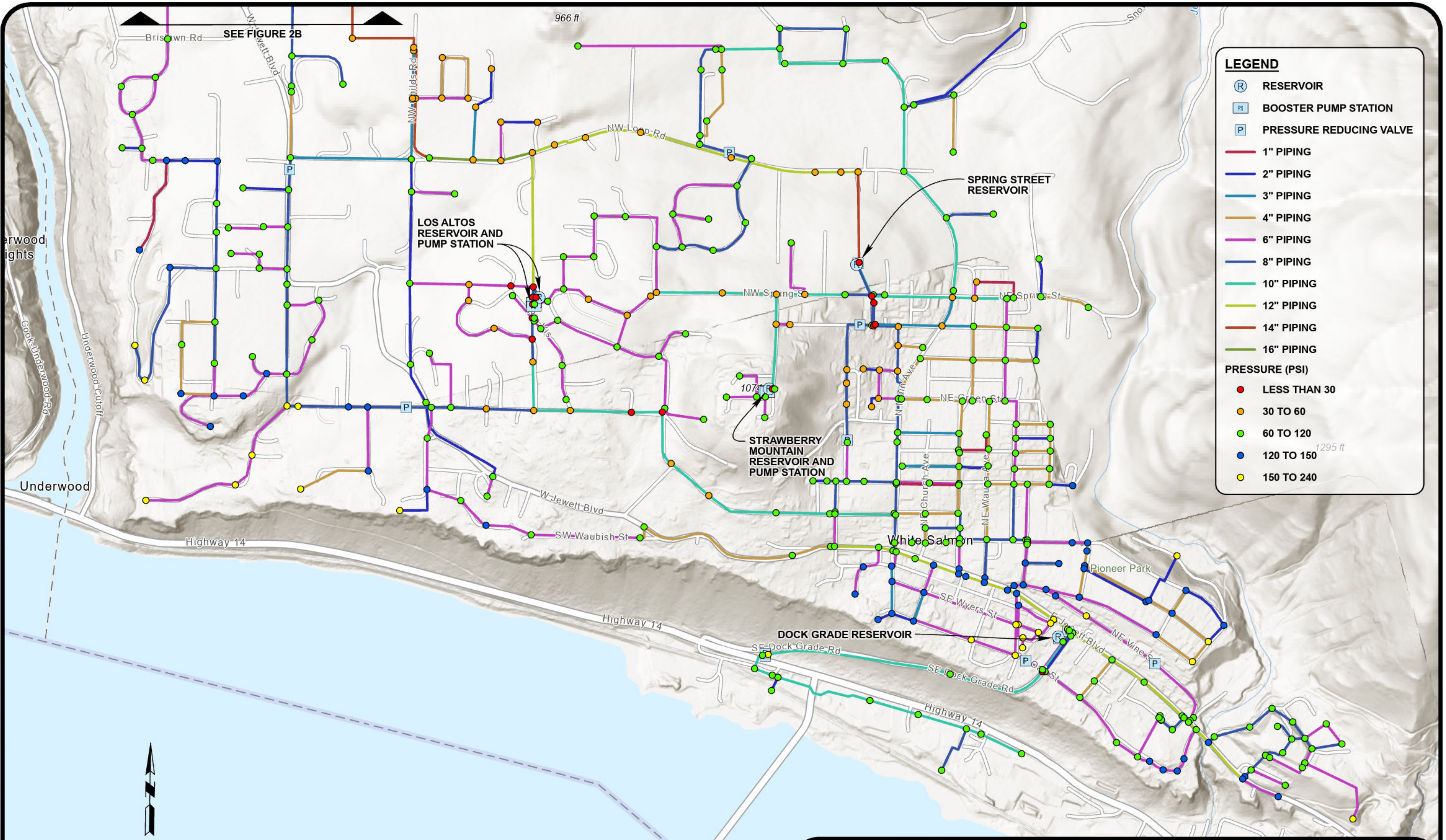
CITY OF
WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN

WATER DISTRIBUTION SYSTEM FIRE FLOWS WITH MAXIMUM DAY DEMAND

FIGURE
E-1B



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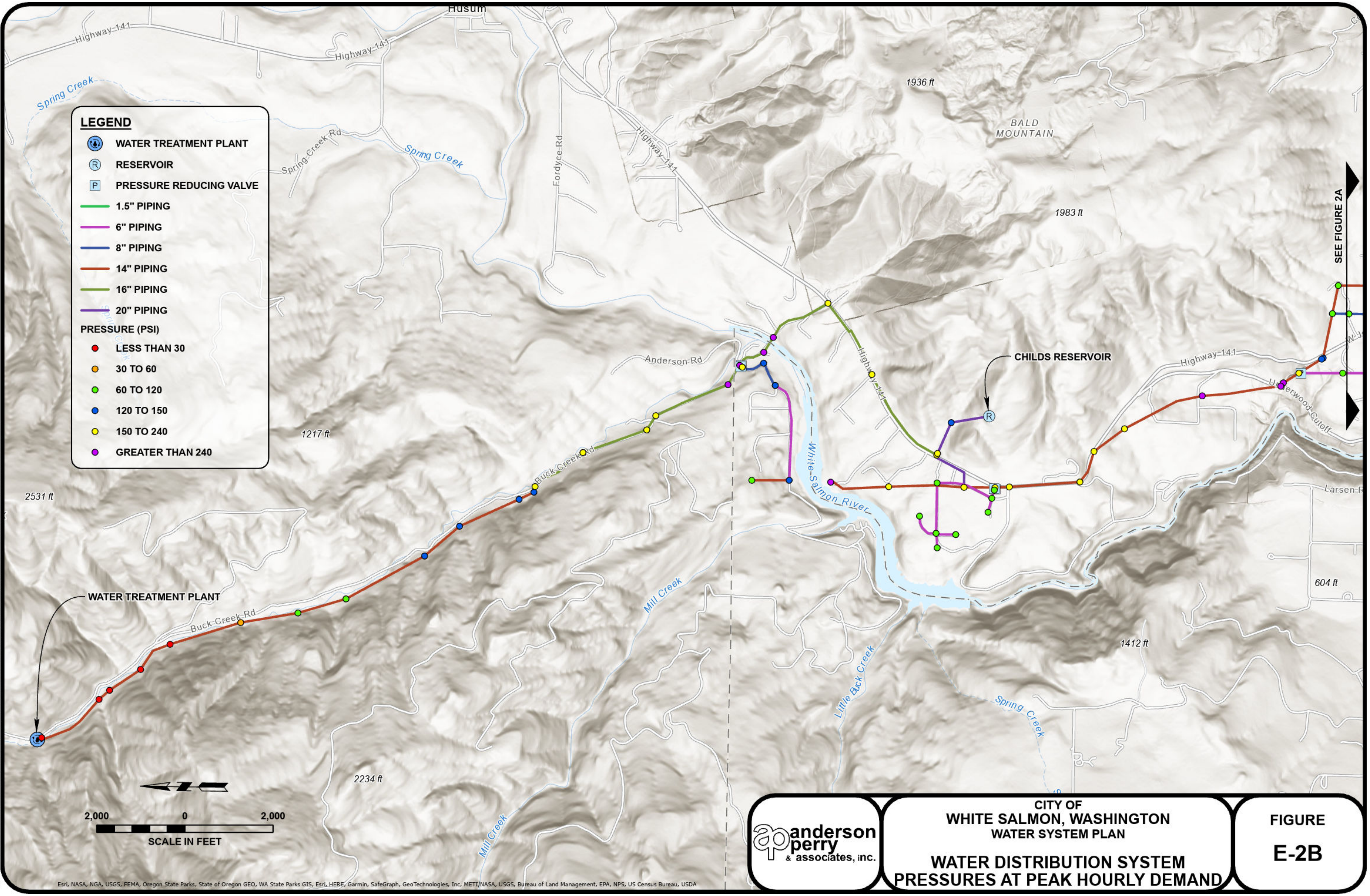
CITY OF
WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN

WATER DISTRIBUTION SYSTEM
PRESSURES AT PEAK HOURLY DEMAND

FIGURE
E-2A



Esri, NASA, NGA, USGS, FEMA, Oregon State Parks, State of Oregon GEO, WA State Parks GIS, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA

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CITY OF
WHITE SALMON, WASHINGTON
WATER SYSTEM PLAN

WATER DISTRIBUTION SYSTEM
PRESSURES AT PEAK HOURLY DEMAND

FIGURE
E-2B

Table E-1. Physical Capacity Analysis Summary - Entire System

Basis	Calculation
Current Number of ERUs = 3,982	Residential ADD = 215.5 gpd/ERU; Residential MDD = 584.9 gpd/ERU (Chapter 2,3) PHD = 2,685 gpm
Water Rights Qi Based Source flow rate Available, Qi=5.2 cfs = 2,334 gpm This analysis does not account for any potential water rights use from CS2-SWC2154 (KLIC-13-01).	**Equation 4-4a, DOH WSDM (June 2020)** N, ERU (Qi - Exist.) = Qi/(MDD/1440) = 2,334 gpm/(584.9 gpd/ERU/1440) = 5,746 ERUs Sufficient Qi water rights.
Water Rights Qa Based Source Volume Available, Qa = 1,468 Ac-ft/year = 478,316,678 gallons/year This analysis does not account for any potential water rights use from CS2-SWC2154 (KLIC-13-01).	**Equation 4-4b, DOH WSDM (June 2020)** N, ERUs = Qa/ADD X 365 = 478,316,678 gallons/(215.5 gpd/ERUs X 365d) = 6,081 ERUs Sufficient Qa water rights
Source Capacity Based Vd = Buck Creek: 1,000 gpm, 24 hrs/day; Well No. 1: 600 gpm 20 hrs/day; Well No. 2: 200 gpm, 20 hrs/day Vd = ((1,000 gpm x 24 hrs/d) + (800 gpm x 20 hrs)) X 60min/hr) = 2,400,000 gpd With enhanced ASR, Well No. 2 = 425 gpm. Total Vd = ((1,000 gpm x 24 hrs/d) + (1,025 gpm x 20 hrs)) X 60min/hr) = 2,670,000 gpd	**Equation 4-1, 4-2: DOH WSDM (June 2020)** Current N, ERUs = Vd/MDD = 2,400,000 gpd/ 584.9 gpd/ERUs = **4,103 ERUs** Enhanced ASR, N ERUs (Peak Day) = 2,670,000 gpd/584.9 gpd/ERUs = **4,565 ERUs**
Transmission Main Capacity Flow based on hydraulic model; Existing 14-inch and 16-inch diameter main: 1,551 gpm New and Existing 16-inch main (to Childs Monitoring Station [MS]) and 20-inch diameter from Childs MS to intersection of NW Loop Road and NW Childs Road = 3,300 gpm (Proposed Transmission Main Replacement Phase II).	Existing 14-inch and 16-inch diameter transmission main N, ERU = Peak Flow/(MDD/1440) = 1,551 gpm / (584.9 gpd/ERU/1440) = 3,818 ERUs **Insufficient transmission main capacity with current 14-inch and 16-inch diameter main.** New and Existing 16-inch and new 20-inch diameter transmission main N, ERU = Peak Flow/(MDD/1440) = 3,300 gpm/(584.9 gpd/ERU/1440) = 8,124 ERUs Proposed Phase II Transmission Main Replacement would provide sufficient capacity.
Equalizing Storage (ES) Capacity Based Current System ES = (PHD-Qs) x 150 min = (2,685 gpm-1,800 gpm) X 150 min = 132,750 gallons Enhanced ASR ES = (PHD-Qs) x 150 min = (2,685 gpm-2,025 gpm) X 150 min = 99,000 gallons Estimated Equalizing Capacity = 170,000 gallons	**Equation 4-6, DOH WSDM (June 2020)** Current N, ERUs = (1/C)*((1440/MDD)*((ES/150)+Qs-18))-F=(1/1.6)*(1440/584.9)*((170,000/150)+1,800-18))-225 = **4,260 ERUs** Enhanced ASR, N, ERUs = (1/C)*((1440/MDD)*((ES/150)+Qs-18))-F = (1/1.6)*(1440/584.9)*((170,000/150)+2,025-18))-225 = **4,607 ERUs** Sufficient ES capacity
Standby (SB) Storage Capacity Based Total = 2,120,080 gallons OS + ES + DS = 177,200 gal + 170,000 gal + 69,100 = 416,300 gallons Calculated FSS/SBt = 1,703,780 gallons Total ERUs = 3,982 Total ERUs w/o Bingen = 3,982 ERUs - 554.1 ERUs = 3,427.9 ERUs	**Equation 4-7, DOH WSDM (June 2020)** N, ERUs (w/ nesting) = SBt / (Sbi X td) = 1,703,780 gallons/(200 gpd/ERU X 2 days) = **4,259 ERUs** Sufficient SB capacity

Table E-2. Physical Capacity Analysis Summary - Childs Collective Pressure Zones

Basis	Calculation
Current Number of ERUs = 236	Residential MDD = 584.9 gpd/ERU (see Chapter 2) **Equation 3-1: DOH WSDM (June 2020)** PHD = (MDD /1440) [(C)(N) + F] + 18 = ((584.9 gpd/ERU/1440) X (2.0*236) +75) +18 = 240 gpm C= 2.0, F=75
Source Capacity (Peak Day) Based Vd = Buck Creek: 1,000 gpm, 24 hrs/day; Well No. 1: 600 gpm 20 hrs/day; Well No. 2: 200 gpm, 20 hrs/day Vd = ((1,000 gpm x 24 hrs/d) + (800 gpm x 20 hrs)) X 60min/hr) = 2,400,000 gpd Vd = 1,667 gpm	**Equation 4-1: DOH WSDM (June 2020)** N, ERUs (Peak Day) = Vd/MDD Los Altos Pump Station = 2,400,000 gpd/584.9 gpd/ERUs = 4,103 **ERUs** **Available ERUs = 4,103 < Existing ERUs = 236 ERUs**
Equalizing Storage (ES) Capacity Based Present ES = (PHD-Qs) x 150 min = (240 gpm- 1,667 gpm) X 150 min = 0	No ES required.
Standby Storage Based Operating Storage (OS) = 38,190 gallons, based on 3.75 feet Dead Storage (DS) = 0.5 feet x 10,184 gal/ft x 2 = 5,092 gallons Total = 203,680 gallons; OS + ES + DS = 38,190 gal + 0 gal + 5,092 gal = 43,282 gallons Net Total – OS+ES+DS = 160,698 gal, FSS/SBt (nested)	**Equation 4-7, DOH WSDM (June 2020)** N, ERUs (w/ nesting) = SBt / (Sbi X td) = 160,398 gallons / (200 gpd/ERU X 2 days) = 401 ERUs **Available ERUs = 401 ERUs > Existing ERUs = 236 ERUs** Current Standby Storage Capacity is sufficient.

Table E-3. Physical Capacity Analysis Summary - Strawberry Mountain and North Main-Simmons Road Pressure Zones

Basis	Calculation
Current Number of ERUs = 575 Strawberry Mountain ERUs = 314.6 or 315 ERUs North Main/Simmons Road ERUs = 260.4 or 261 ERUs	Residential MDD = 584.9 gpd/ERU (see Chapter 2) **Equation 3-1: DOH WSDM (June 2020)** PHD = (MDD /1440) [(C)(N) + F] + 18 = ((584.9 gpd/ERU/1440) X (1.6*575) +225) +18 = 483 gpm C= 1.6, F=225 PHD w/o North Main-Simmons Road PHD = (MDD /1440) [(C)(N) + F] + 18 = ((584.9 gpd/ERU/1440) X (1.8*315) +125) +18 = 299 gpm
Source Capacity (Peak Day) Based Two 175 gpm pumps; combined flow estimated to be 250 gpm Vd = Los Altos Booster Pump Station (BPS): 250 gpm, 20 hrs/day Vd = ((250 gpm x 20 hrs/d) X 60min/hr) = 300,000 gpd	**Equation 4-1: DOH WSDM (June 2020)** N, ERUs (Peak Day) = Vd/MDD Los Altos Pump Station = 300,000 gpd/584.9 gpd/ERUs = **513 ERUs** **Available ERUs = 513 < Existing ERUs = 575 ERUs** Current pump capacity at Los Altos BPS is insufficient. Options: 1) increase station flow capacity and/or separate North Main/Simmons Road pressure zone from Strawberry Mountain pressure zone. Separate North Main-Simmons Road pressure zone (in Spring St pressure zone) **Available ERUs = 513 > Existing – North Main-Simmons Road (575-260.4) =314.6 or 315 ERUs**
Equalizing Storage Capacity Based Present ES = (PHD-Qs) x 150 min = (483 gpm-250 gpm) X 150 min = 34,950 gallons Min. ES (w/o North Main-Simmons Road) Needed = (299 gpm-250 gpm) X 150 min = 7,350 gallons ES (set aside w/o North Main-Simmons Road) = 23,000 gallons	**Equation 4-6, DOH WSDM (June 2020)** N, ERUs = (1/C)*((1440/MDD)*((ES/150)+Qs-18))-F=(1/1.8)*(1440/584.6)*((34,950/150)+250-18))-125 = 511 ERUs **Available ERUs = 511 ERUs < Existing ERUs = 575 ERUs** Current Equalizing Storage Capacity is Insufficient If Qs greater than 483 gpm or North Main/Simmons Road pressure zone was separated from Strawberry Mountain pressure zone, there would be sufficient equalizing storage capacity. Separate North Main-Simmons Road pressure zone (in Spring St pressure zone) N, ERUs = (1/C)*((1440/MDD)*((ES/150)+Qs-18))-F=(1/2)*(1440/584.9)*((23,000/150)+250-18))-125 = 341 ERUs **Available ERUs = 349 ERUs > Existing ERUs = 315 ERUs**
Standby (SB) Storage Based Operating Storage (OS) = 21,824 gallons, based on 2.75 feet Dead Storage (DS) = 2 feet x 3,968 gal/ft x 2 = 15,872 gallons Total = 198,400 gallons; OS + ES + DS = 21,824 gal + 34,950 gal + 15,872 gal = 72,646 gallons Net Total – OS+ES+DS = 124,754 gal, FSS/SBt (nested) Calculations w/o North Main-Simmons Road OS + ES + DS = 21,824 gal + 23,000 gal + 15,872 gal = 60,156 gallons Net Total – OS+ES+DS = 138,244 gal, FSS/SBt (nested) Calculations w/o North Main-Simmons Road and ES OS + ES + DS = 21,824 gal + 0 gal + 15,872 gal = 37,696 gallons Net Total – OS+ES+DS = 160,704 gal, FSS/SBt (nested)	**Equation 4-7, DOH WSDM (June 2020)** N, ERUs (w/ nesting) = SBt / (Sbi X td) = 124,754 gallons / (200 gpd/ERU X 2 days) = 311 ERUs **Available ERUs = 311 ERUs < Existing ERUs = 575 ERUs** Current Standby Storage Capacity is insufficient. Separate North Main-Simmons Road pressure zone (in Spring St pressure zone) N, ERUs (w/ nesting) = SBt / (Sbi X td) = 138,244 gallons / (200 gpd/ERU X 2 days) = 346 ERUs **Available ERUs = 346 ERUs > Existing ERUs = 315 ERUs** With Los Altos PS flow greater than 299 gpm and separate North Main-Simmons Road pressure zone N, ERUs (w/ nesting) = SBt / (Sbi X td) = 160,704 gallons / (200 gpd/ERU X 2 days) = 402 ERUs **Available ERUs = 402 ERUs > Existing ERUs = 315 ERUs**

Table E-4. Physical Capacity Analysis Summary - Los Altos-Spring Street Collective Pressure Zones

Basis	Calculation
Current Number of ERUs = 2,607 Number of ERUs with Addition of Brislawn = 2,666	Residential MDD = 584.9 gpd/ERU (see Chapter 2) **Equation 3-1: DOH WSDM (June 2020)** PHD = (MDD /1440) [(C)(N) + F] + 18 = ((584.9 gpd/ERU/1440) X (1.6*2,607) +225) +18 = 1,804 gpm C= 1.6, F=225 PHD w/ Brislawn pressure zone PHD = (MDD /1440) [(C)(N) + F] + 18 = ((584.9 gpd/ERU/1440) X (1.6*2,666 +225) +18 = 1,842 gpm
Equalizing Storage (ES) Capacity Based Present ES = (PHD-Qs) x 150 min = (1,804 gpm-1,800 gpm) X 150 min = 600 gallons Min. ES (w Brislawn Transfer) Needed = (1,842 gpm-1,800 gpm) X 150 min = 6,300 gallons	**ES required is minimal**
Standby (SB) Storage Based Total Storage = 1,718,000 gallons Operating Storage (OS) = 117,188 gallons Dead Storage (DS) = 48,100 gallons OS + ES + DS = 117,188 gal + 600 gal + 48,100 gal = 165,888 gallons Net Total - OS + ES + DS = 1,552,112 gal, FSS/SBt (nested) Calculations w Brislawn transfer OS + ES + DS = 117,188 gal + 6,300 gal + 48,100 gal = 171,518 gallons Net Total – OS+ES+DS = 1,546,480 gal, FSS/SBt (nested)	**Equation 4-7, DOH WSDM (June 2020)** N, ERUs (w/ nesting) = SBt / (Sbi X td) = 1,552,112 gallons/(200 gpd/ERU X 2 days) = 3,880 ERUs Current Standby Storage Capacity is sufficient. Separate North Main-Simmons Rd pressure zone (in Spring Street pressure zone) N, ERUs (w/ nesting) = SBt / (Sbi X td) = 1,546,480 gallons/(200 gpd/ERU X 2 days) = 3,866 ERUs Proposed Standby Storage Capacity is sufficient.