January 2016

CITY OF SWEET HOME

WATER MANAGEMENT, CONSERVATION, AND SYSTEM MASTER PLAN

Prepared For:
City of Sweet Home
1140 12th Avenue
Sweet Home, OR 97386

Prepared By:
City of Sweet Home Staff

Engineering Oversite Provided By:
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Exp 12-31-2017

PUBLIC HEALTH DIVISION
Center for Health Protection, Drinking Water Services
Kate Brown, Governor

Oregon Health Authority

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March 7, 2016

Scott Laroque
City of Sweet Home
P.O. Box 750
Sweet Home, OR 97386

Re: **Master Plan (PR#2016-20)**
City of Sweet Home (PWS# 00851)
Final Approval

Dear Scott Laroque:

Thank you for your submittal for plan review for the Water Management, Conservation, and System Master Plan for the City of Sweet Home to the Oregon Health Authority's Drinking Water Services (DWS). On February 23, 2016, our office received the master plan and the plan review fee of $4,125. At this time DWS has determined that the Master Plan submitted is complete and grants final approval.

If you have any questions or would like this in an alternate format, please feel free to call me at (541) 726-2587 x29.

Sincerely,

Rebecca Templin, P.E.
Regional Engineer
Drinking Water Services

cc: Julie Wray, DWS Portland
Betsy Parry, DWS Springfield

City of Sweet Home – Water Management, Conservation, and System Master Plan

WMCP Amendment 2016

On or about February 16, 2016, the City of Sweet Home submitted a DRAFT *Water Management, Conservation, and System Master Plan* to the OHA Drinking Water Services (OHA) as well as the Water Resources Department (WRD) for their corresponding State review. Although the document received written **Final Approval** as a "Master Plan" from the OHA as submitted, it was found by WRD to be lacking some information and/or analysis relating to requirements for a complete Water Management Conservation Plan (WMCP) as required by OAR 690-086.

Upon written notification by the WRD of the suspected deficiencies for a complete WMCP, the City corresponded with the WRD and proposed additional information for final review and approval in order to meet the provisions of an approved WMCP for the City of Sweet Home.

The information captured within this WMCP Amendment 2016 and is to become part of the complete "*Water Management, Conservation, and System Master Plan – Appendix J"* for the City of Sweet Home and is to be adopted as such.

The corrected deficiencies identified in the review worksheet provided by the State WRD (see attachments) are listed in each section by page number and section of the review worksheet e.g. DR Pg. 2 #5.

BEFORE THE WATER RESOURCES DEPARTMENT
OF THE
STATE OF OREGON

In the Matter of the Proposed Water Management and Conservation Plan for the City of Sweet Home, Linn County	)))	FINAL ORDER APPROVING A WATER MANAGEMENT AND CONSERVATION PLAN

Authority

OAR Chapter 690, Division 086, establishes the process and criteria for approving water management and conservation plans required under the conditions of permits, permit extensions and other orders of the Department.

Findings of Fact

1. The City of Sweet Home (City) submitted a Water Management and Conservation Plan (plan) to the Water Resources Department (Department) on February 16, 2016. The required statutory fee for review of the plan was received by the Department on February 17, 2016. The plan was required by a condition set forth under the City's previously approved plan (Sp. Or. Vol. 77, Pg. 330-332) issued on March 2, 2009.

2. The Department published notice of receipt of the plan on March 1, 2016 as required under OAR Chapter 690, Division 086. No comments were received.

3. The Department provided written comments on the plan to the City on May 17, 2016. In response, the City submitted a revised plan on September 2, 2016.

4. The Department reviewed the revised plan and finds that the revised plan is consistent with the relevant requirements under OAR Chapter 690, Division 086.

Conclusion of Law

The Water Management and Conservation Plan submitted by the City of Sweet Home is consistent with the criteria in OAR Chapter 690, Division 086.

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

Now, therefore, it is ORDERED:

Duration of Plan Approval:

1. The City of Sweet Home's Water Management and Conservation Plan is approved and shall remain in effect until September 2, 2026, unless this approval is rescinded pursuant to OAR 690-086-0920.

Development Limitation:

2. The limitation of the diversion of water under Permit 49959 established in the Final Order approving the City's previous WMCP issued on March 2, 2009 remains unchanged. Subject to other limitations or conditions of the permit, therefore, the City of Sweet Home remains authorized to divert only up to 3.51 cfs (*out of the total permitted 5.5 cfs*) of water under Permit 49959.

Plan Update Schedule:

3. The City of Sweet Home shall submit an updated plan meeting the requirements of OAR Chapter 690, Division 086 within 10 years and no later than March 2, 2026.

Progress Report Schedule:

4. The City of Sweet Home shall submit a progress report containing the information required under OAR 690-086-0120(4) by September 2, 2021.

Other Requirements for Plan Submittal:

5. The deadline established herein for the submittal of an updated Water Management and Conservation Plan (consistent with OAR Chapter 690, Division 086) shall not relieve the City of Sweet Home from any existing or future requirement(s) for submittal of a Water Management and Conservation Plan at an earlier date as established through other final orders of the Department.

Dated at Salem, Oregon this 15 day of September, 2016.

Dwight French
Water Right Services Division Administrator, for
Thomas M. Byler, Director
Oregon Water Resources Department

Mailing date: SEP 23 2016

Table of Contents

Section 1 – Introduction

1.1 Background

The City of Sweet Home is located at the East-end of Linn County. Called the "Gateway to the Santiam Playground" the City of Sweet Home lies at the foot of the Cascade Mountains, and is bordered on the North by the pristine South Santiam River. Sweet Home is the third (3rd) largest city in Linn County, encompassing 6.5 square miles and was incorporated in 1893.

The City of Sweet Home owns the public water system (PWS ID 41 00851) which is currently operated jointly by City personnel and contracting partner CH2M. The City relies on the Santiam River for its drinking water source, with the point of diversion at Foster Dam, and has three storage reservoir sites with approximately 4.61 Million gallons storage capacity.

In October 1979, *James M. Montgomery, Consulting Engineers, Inc.* completed an evaluation of the City of Sweet Home's Water Supply Study and Treatment Plant System. The report was later updated in July 1980 by CH2M-Hill. Through this planning effort, various improvements and/or expansions were made to the water system.

In 1982, a Water Distribution Master Plan was prepared by *J.L. Groff Engineering* in which a subsequent update (May 14, 1997) was adopted by the City on February 10, 1998. In March 1999, a Water Treatment Plant Evaluation was completed by *Lee Engineering, Inc*. and in October 1999 a Master Water Plan Amendment was completed by *Erwin Consulting Engineering* and subsequently adopted by City Council as official updates to the City's Water System Master Plan.

The City of Sweet Home completed its current Water Management and Conservation Plan (WMCP) in 2006 which needs to be updated in 2016.

1.2 Authorization

Prior to 2006, the City of Sweet Home received final orders from the Oregon Water Resources Department (WRD) extending the time to complete full beneficial use of all permitted water by October 2050. As a special condition to that order, WRD limited the amount of water the City could use until a Water Management and Conservation Plan (WMCP) prepared per Oregon Administrative Rule (OAR) Chapter 690, Division 86 had been submitted and approved.

A "DRAFT" WMCP was submitted to WRD February 2006 in which a Final Order was received March 2, 2009 approving the City's WMCP until March 2, 2019. The approved final order however required the submittal of an updated WMCP, due by February 21, 2016 to WRD.

Per OAR 333-061-0060(5) community water systems serving 300 or more service connections must maintain a current master plan that has been reviewed and approved by the Oregon Health Authority (OHA). Due to the information overlap required of WMCP's and Master Water Plans, water suppliers are encouraged to consider updating Master Water Plans while creating a WMCP and wrapping the WMCP within the Master Water Plan.

Given the Water System Master Plan for the City of Sweet Home is beyond 20 years old; the subsequent reviews and updates focused primarily on specific aspects and changes to the water system; and the current WMCP is required to be updated; the City of Sweet Home

desires to complete a combined Water Management & Conservation Plan and Water System Master Plan.

1.3 Project Objectives

The purpose of this study is to evaluate the City's water system with respect to its existing and future needs; identify improvements and costs to meet those needs; provide the City with a design guide for future growth of the City's water system; and to document the City's use, management, and conservation of water resources as required to satisfy conservation and management requirements.

It is intended that the information contained herein will assist the City in the management, planning, and implementation of capital improvements to the water system. It will also guide the City in their efforts to manage and conserve water resources. Costs given in this plan are in 2015 dollars.

The main goals of this plan are as follows:

- Create working maps and descriptions of the City's existing overall water system.
- Update population projections and determine present and future water needs.
- Review existing conservation techniques and implement new conservation efforts.
- Implement a water supply curtailment strategy.
- Identify water system deficiencies with associated costs for recommended improvements.
- Evaluate financing options for the City of Sweet Home in order to complete any necessary upgrades.

Section 2 – Regulatory Requirements

2.1 Regulating Agencies (WMCP 690-086-0) 140-2, 170-1

Water use regulations considered under this Master Plan include the Safe Drinking Water Act (SDWA) and amendments as administered by the Oregon Health Authority (OHA) under OAR 333, as well as water rights and water use, management and conservation regulations administered by the Oregon Water Resources Department (OWRD). A brief overview of regulatory considerations and the applicability to the City is presented below. This overview is for reference only and does not include all requirements. Portions of OAR 333-061 covering water systems and the requirements for management and conservation of OAR 690-086 are included as Appendix C of this plan.

- Water Treatment & Distribution Regulations and Standards:

  Congress passed the original Title XIV of the Public Health Service Act, commonly known as the Safe Drinking Water Act, in 1974 with amendments passed in 1986 and 1996. The SDWA are federal water quality regulations affecting all public water systems. Regulations under the SDWA are promulgated by the U.S. Environmental Protection Agency (USEPA) and administered by the OHA. OHA is the primary regulating authority for public drinking water systems. The requirements of the SDWA are implemented by Oregon under Oregon's Drinking Water Quality Act of 1981 (ORS 448 as amended). In practice, the Oregon Drinking Water Standards match the national standards established under the SDWA and OHD has up to two years to adopt each federal rule after it is finalized.

  OAR 333-61 outlines the responsibilities of the water suppliers, maximum contamination levels, treatment requirements, sampling, reporting, public notice requirements, operation and maintenance requirements, and cross connection/backflow standards. It also contains the minimum construction standards and plan review requirements for construction of a new or modification of an existing public water system.

- Water Conservation and Management:

  OWRD is the state agency with the responsibility of making sure that the requirements of OAR 690-086 are met. The rules of OAR 690-086 provide a process to promote efficient use of the state's water resources and to facilitate water supply planning. The WMCP covered by these administrative rules, is intended as a tool OWRD uses to require water suppliers to implement water conservation measures and plan for future demands.

2.2 Compliance

The City strives to maintain high water quality and has had a strong record in complying with drinking water requirements and standards, particularly since 2009. The City was designated as an “Outstanding Performer" following the completion of their 2015 water system survey. The criteria for outstanding performance are: No Maximum Contaminant Level (MCL), Action Level, or Treatment Technique violations in the last 5 years; No more than one monitoring or reporting violation in the last 3 years and the violation must be resolved; No significant deficiencies or rule violations identified during the current water system survey; and has not had a waterborne disease outbreak attributable to the water system in the last five years.

In the past five years, since the construction of the new Water Treatment Plant, the City of Sweet Home has had no violations or been required to issue public notices regarding water quality.

2.3 Future Regulatory Compliance

At this time, there are no expected future regulatory requirements that will affect the Sweet Home Water System or this plan.

Section 3 – Study Area and Planning Considerations

3.1 Study Area

The City of Sweet Home is located in Linn County in the Willamette Valley 50 miles southeast of Salem and 44 miles northeast of Eugene, adjacent to the South Santiam River and Foster Lake. The Willamette Valley is located between the Oregon Coast on the west and the Cascade Mountains to the east. It covers about 3,900 square miles from Eugene in the south to Portland in the north.

Sweet Home is bordered to the north and northwest by the South Santiam River, to the east by Foster Lake, and to the south and southwest by the Chandler Mountains, which serve as a natural Urban Growth Boundary and city limit. Santiam Highway (US 20) is the main access road to the City and it passes through Sweet Home approximately 20 miles east of Interstate 5. The highway connects Sweet Home with the Cities of Lebanon to the northwest and Cascadia to the east. Other access roads to Sweet Home are State Route 228 and Route 3, which connect to Crawfordsville and Brownsville. A main east-west rail line also passes through the City.

The study area for this report is consistent with the Urban Growth Boundary (UGB) established by the City's Comprehensive Plan. Although there are several properties outside the current city limits that receive municipal water service, the City has a current policy of only servicing residents with municipal water that are within the city limits.

The city and surrounding unincorporated rural area, locally known as the Sweet Home Valley, encompass approximately 18 square miles (11,520 acres). Land use and development is governed largely by the local topography. The city is bordered by hills, resulting in the town layout occurring in an east–west orientation.

Approximately 15 percent of the vacant land within the city is unsuitable for development and the majority of the undeveloped land has been designated for urban residential development. The commercial district extends along U.S. Highway 20 and is concentrated in downtown Sweet Home between 18th and 9th avenues. This commercial district is bordered by high- and medium-density residential areas. Industrial land uses are concentrated along the highways through the center of town, but outside of the commercial areas.

The UGB for Sweet Home encompasses approximately 3,689 acres with roughly 3282 acres within the city limits. The land use within the UGB is comprised of approximately 50% residential; 8% industrial; 6% commercial; 25% Planned Recreational; 5% Public; and 6% water.

The planning area for this plan is limited to the land within the present UGB. The improvements recommended in this plan are based on development of land with the UGB in its present location. It is assumed that no significant development will occur within the study area which will require major changes to the existing zoning, and that there will be no significant expansion of the UGB within the study period. Changes in any of these assumptions could change the recommendations contained in this plan. Should significant changes in any of the above occur, this plan should be updated accordingly. The population served by the water system within the UGB is covered in Section 3.5.

3.2 Climate and Rainfall Patterns

Sweet Home generally has a moderate climate, characterized by warm, dry summers and cool winters with abundant rain and some snow. There are brief periods in the summer when temperatures exceed 80 degrees Fahrenheit (°F), as well as brief periods in the winter when temperatures drop below freezing. The coastal mountain range generally breaks the prevailing Pacific storm fronts, causing the mid-Willamette region to receive roughly half of the annual rainfall experienced in the coastal areas. All climate data reported are from the Western Regional Climate Center. The Foster Dam weather station provides data for the region near Sweet Home. Current reported data span 1969 to 2012.

The average annual precipitation at Sweet Home is 54.41 inches. Essentially all of the precipitation is in the form of rain; snow rarely exceeds minor flurries. The average annual snowfall is 1.2 inches. About 65 percent of the rainfall occurs from November through March.

The mean and extreme temperatures recorded at Foster Dam, located at the eastern end of Sweet Home, are summarized in Table 3.1. Maximum and minimum temperatures are fairly mild, although winter temperatures occasionally fall well below freezing. Freezing temperatures have been experienced from September through May. Although subfreezing temperatures may persist long enough to freeze water in aboveground facilities, they do not last long enough to be of concern for buried facilities. The highest summer temperature recorded during the period of record was 106°F.

Table 3.1 – Area Temp Summary

Month	Maximum temperature (F)	Minimum temperature (F)	Average temperature (F)
January	67	0	40.8
February	71	2	43.4
March	79	22	46.4
April	85	22	49.8
May	96	28	55.0
June	102	35	60.2
July	106	39	65.7
August	105	36	65.6
September	102	32	61.1
October	93	20	53.1
November	75	16	45.5
December	69	0	40.7
Annual	106	0	52.3

Note: Temperature data from Foster Dam, 1969–2012. Western Regional Climate Center http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?or3047

3.3 Topography

Figure 3.1 shows the study area and topography. The community of Sweet Home is located in a relatively flat area with a mean elevation of 537 feet above sea level. The elevation changes within the city limits are gradual and decrease from the southern city limit at the northern slopes of Chandler Mountains, towards the north to the South Santiam River. Also, the grade decreases gradually from Foster Lake on the east toward the City center, where it starts to increase toward the western City limit. The total elevation change within city limits is approximately 250 feet.

3.4 Planning Period

Choosing a "reasonable" design period for which a utility system should be designed is a somewhat arbitrary decision. If the design period is too short, the public faces the prospect of demands exceeding capacity, requiring the system to be continually upgraded or replaced. For systems that do not lend themselves to economical incremental expansion, short design periods lead to excess expenditures. Water system facilities fall into this category.

On the other hand, choosing a design period that is too long can lead to facilities with excess capacity that may never be needed if population growth does not occur at the projected levels. Such facilities can place economic burden upon the present population and may become obsolete before being fully used.

The OHA has established 20 years as being the proper planning period for water system improvements. This plan will evaluate the anticipated water supply, distribution, and storage needs for the next 20 years.

It should be recognized that projections into the future are subject to many variables and inaccuracies. Accordingly, it is recommended that the City review its water system capabilities and needs at 10-year intervals and update this plan as appropriate.

3.5 Population Analysis (WMCP 690-086-0)170(1)

Forecasts for populations within the Sweet Home service area were made by methodology approved by the Oregon Department of Administrative Service's Office of Economic Analysis (OEA). In 2014, the OEA adopted Division Rule 32 and the population-estimating methodology defined in OAR 660-032-0040 for counties that have not prepared a population forecast for at least 10 years. The last population forecast adopted by Linn County occurred in 1999.

In accordance with OAR 660-032-0040(7), Portland State University certified the 2014 population for the city at 9,060, and concluded that the city accounted for 7.57 percent of Linn County's total population. The 2015 OEA population estimate for Linn County is 121,142. The corresponding Sweet Home population for 2015 is therefore 9,170.

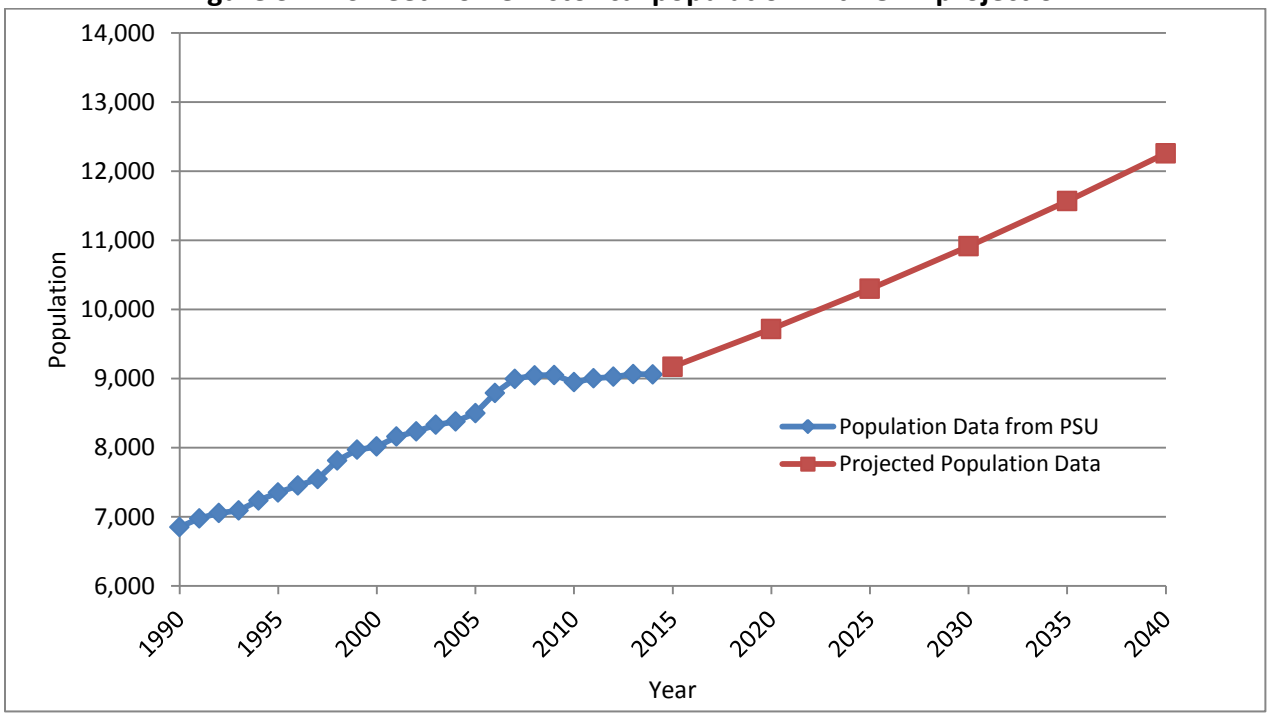
In accordance with OAR 660-032-0040(6), the annual average growth rate (AAGR) predicted for Linn County is 1.168 percent for the period 2015 to 2040; application of this growth rate to the city 2015 population estimate results in the projections as shown on Table 3.2.

Table 3.2 – Existing and Projected Population Data

Year	Total population	Increase from 2015
2015	9,170	0
2020	9,718	548
2025	10,299	1,129
2030	10,915	1,745
2035	11,567	2,397
2040	12,259	3,089

Historical population data for the city from 1990 to 2014 were obtained from the Portland State University Population Research Center. The data are shown graphically on Figure 3.2 along with the OEA population projection for the years covering 2015 to 2040.

Figure 3.2 – Sweet Home historical population with OEA projection



Reasonable growth for purposes of this Facility Plan is defined as the projected growth in the service area over the 20-year planning period in accordance with OEA's Division Rule 32, and the population-estimating methodology defined in OAR 660-032-0040.

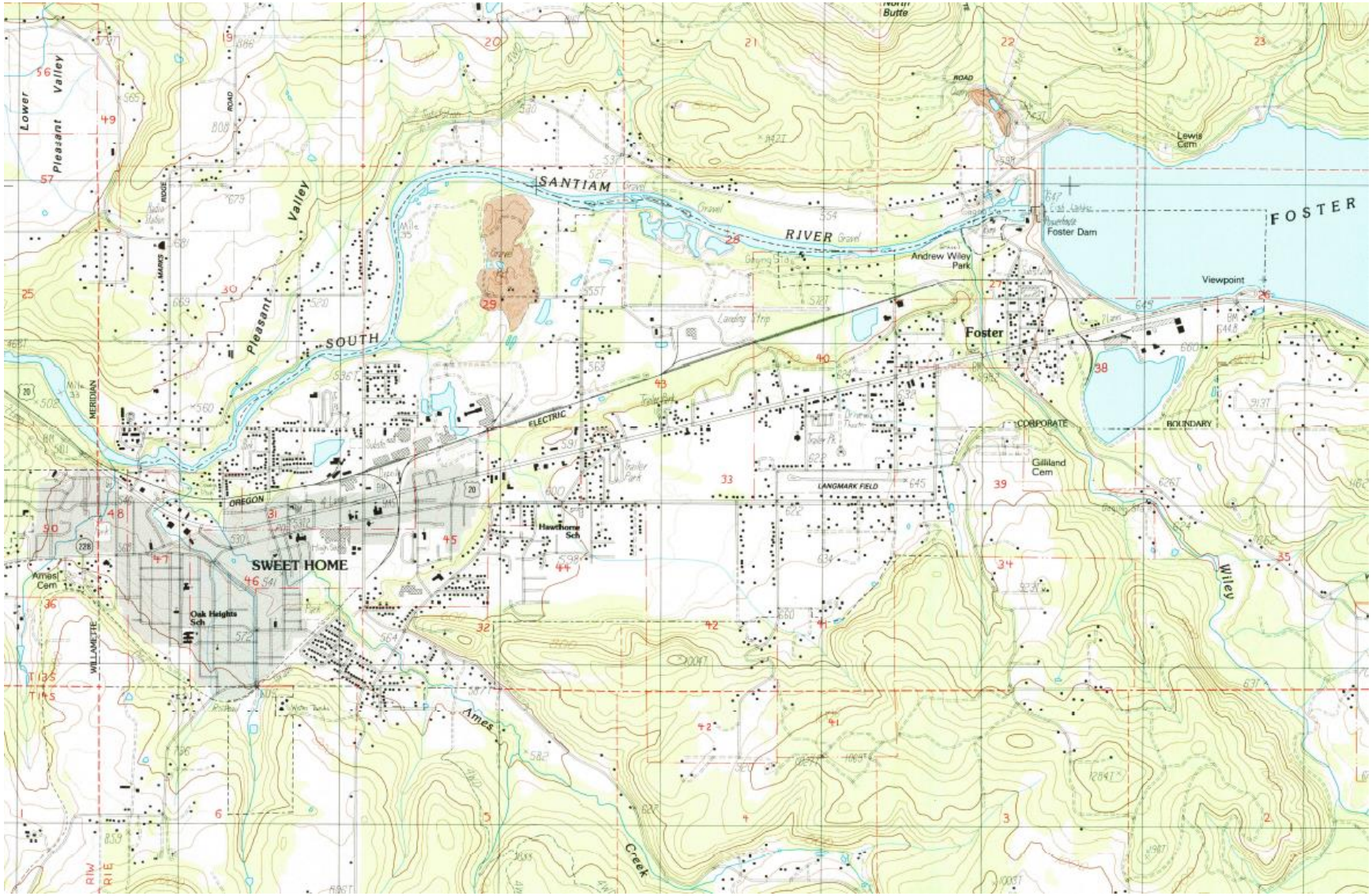


Figure 3.1 City of Sweet Home Topography

Section 4 – Description of Existing System

4.1 Source Water (WMCP 690-086-0) 140-1, 3, 5, 7

The source of water for the City of Sweet Home is Foster Reservoir, a flood control Dam placed on the South Santiam River, a tributary of the Santiam River, which is in turn a tributary of the Willamette River. The South Santiam River runs from east to west and serves as both the northern city limit and the northern Urban Growth Boundary (UGB) for the City of Sweet Home. It is situated in the Willamette Basin of Western Oregon and is recharged by precipitation from a 557-square mile area, which receives drainage for Quartzville Creek, the Middle Santiam River, and South Santiam River, which are high up in the Cascade Mountains. Wiley Creek also flows into the South Santiam River downstream of Foster Dam Reservoir.

The source water provided to the treatment plant property is received from Foster Reservoir through a supply pipe installed in Foster Dam (built by the USACE in early 1960) in which a 42" high capacity raw water intake screen was placed. Water supply then flows via gravity through approximately 5,200 linear feet of supply line to a pump house at the Water Treatment plant located at 1500 47th Avenue, approximately 1 mile to the west of Foster Dam.

The official point of diversion for the raw water supply is described as follows:

NW1/4 NE1/4, SECTION 27, T 13 S, R 1 E, W.M.; 1048 FEET SOUTH AND 697 FEET EAST FROM THE N1/4 CORNER OF SECTION 27.

4.2 Treatment Facility

In April 2008 the City began the official bid process for the construction of a new 6.0 Million Gallons per Day (MGD) water treatment plant including 17,280 sq. ft. building consisting of three (3) 1,400 gallons per minute. filter units; a clear-well, backwash ponds, holding pond and pump station; 2,000 ft. of raw water lines; and 3,150 ft. finished water lines. The project was efficiently and effectively completed and went "on-line" August 2009.

The treatment plant contains 3 filter trains and 3 finished water pumps. Each filter train is independent of one another and each designed to produce 2 MGD. The approved maximum discharge rate into the distribution system is 2600 Gallons per Minute (GPM) as per Oregon Health Authority. This is equivalent to 3.7 MGD and is equivalent to two finished water pumps running continuously.

This "3-Train system" is designed to meet 67% capacity (4 MGD) should one filter train be out of service for repairs or maintenance. This also allows the system to only use enough source water necessary to meet consumer demand.

4.3 Reservoir

There are five finished water storage reservoirs with a total capacity of 4.61 million gallons (MG) available within the City system at three separate locations. Three in-ground type concrete reservoirs are located on 10th Avenue in the southwestern part of the City and in total hold 2.5 MG finished water. The largest of all the reservoirs, with a capacity of 2 MG, is located on 49th Avenue in the southeast part of the City and an above-ground reinforced concrete reservoir. The fifth and smallest reservoir is an above ground steel structure holding 0.11 MG

and is located off of Nandina Street just west of the city limits. Table 4.1 is a summary of the available storage.

Table 4.1 – Finished Water Storage

Location	Reservoir No.	Storage (MG)	Overflow Elevation (ft)
10th Avenue	1	0.30	765
10th Avenue	2	0.70	765
10th Avenue	3	1.50	765
49th Avenue	4	2.00	765
Nandina St.	5	0.11	815
Total		4.61	

The City attempts to perform interior cleaning, maintenance, and inspection on each reservoir site every three (3) years. The last maintenance was completed on the reservoir site at 49th Avenue in 2014 by an underwater diving contractor and included interior cleaning and inspection.

4.4 Distribution (WMCP 690-086-0)170-1

The City of Sweet Home distribution system consists of approximately 288,141 linear feet of waterline which range in size from <=2" to 24". The approximate lengths of each size are shown below in Table 4.2. Two-inch pipes are fairly abundant, but a majority (75 percent of the piping) is sized from 4" through 10" in size.

The distribution system is a combination of polyvinylchloride (PVC), ductile iron, and cast iron but the exact percentage of each type is not yet known. An updated water system map has been included as part of this plan (Figure 4.1). The water system map shows the size and approximate location of waterlines, fire hydrants, valves, blow-offs, and air release valves.

Elevation changes determine the number of pressure zones in any community and the larger the elevation change, the more pressure zones there will be. Given the elevations in the City of Sweet Home gradually increase from east to west, there are only two pressure zones. The first is for elevations between approximately 600 feet to 800 feet with the second zone for those areas below 600 feet. The first zone is supplemented with 2 each 50 horsepower, 500 gallons per minute capacity pumps that operate on low and high level settings on storage reservoir #5.

Table 4.2 – Waterline System Sizes

Waterline Size	Approximate Linear Feet (LF)	% Total
24”	32.00	0.01
16”	15,147.00	5.26
12”	19,991.00	6.94
10”	55,013.00	19.09
8”	75,463.00	26.19
6”	63,223.00	21.94
4”	22,534.00	7.82
3”	5,912.00	2.05
2”	29,241.00	10.15
<2”	1,585.00	0.55
Total	288,141.00	100.00

Major improvements completed in the distribution system previously identified within the Water System Master Plan Update of 1997 include:

Priority Level 1

- Approximately 2,800 linear feet of 16” waterline placement on Airport Road,
- Approximately 1,900 linear feet of 12” waterline on 47th Avenue

Priority Level 2

- Placement of water storage reservoir for the “Strawberry Heights” development area to be used in conjunction existing area pump station.

Priority Level 4

- Placement of new water treatment facility at 47th Avenue.

Priority Level 5

- Approximately 1,600 linear feet of 12” waterline on 47th Avenue.

4.5 Services and Customers Served (WMCP 690-086-0)140-6, 150-4 b

The City of Sweet Home has 2,956 active water services as of November 2015. These services are broken down according to the following classifications:

Table 4.3 – Services

Type of Service	Number Accounts
Residential	2,646
Multi-Family	75
Hotel / Motel	3
Commercial	181
Industrial	12
Medical	6
Government	52
Irrigation / Fire	19
Other	0
Total	2,994

Although the cost of water usage in Sweet Home is the same regardless of the customer "type" as referenced above, the City does breakdown accounts based upon the following classifications. This allows the City to examine usage patterns as desired when examining potential usage and/or user rates. The actual rate charged for service (base & commodity) is described later in Section 7.5 of this report.

- *Residential* – Residential use in the City of Sweet Home is typical for use among small rural communities. Meter sizes for this type of service is normally the ¾" meter and would typically only have larger service meters if plumbing code required based upon the planned usage. Typical outdoor use would normally be for yard and/or vehicle maintenance.
- *Multi-family* – This category is used to identify services used for "residential purposes" as above but is at locations where more than a single family resides; this includes duplexes and apartments. Service meter size will typically be from the smallest ¾" meter up-to 2" meter based upon service need.
- *Hotel / Motel* – Residential type use yet at known service locations.
- *Commercial* – Services in this category include offices, retail, churches/meeting halls, restaurants, hair salons, etc. and may or may not require large amounts of water usage per month.
- *Industrial* – Water users in this category would typically include service types consistent with some sort of manufacturing expectation and/or general need for larger service meters.

- *Medical* – This category could be included within "Commercial" but is separated for general knowledge purposes herein as well as for other report needs.
- *Government* – This category of service includes School District, Municipality use, and all other levels of government in which service is provided within the City including County, State, and Federal accounts.
- *Irrigation / Fire* – Account that is specifically set up for irrigation and/or fire usage; typical assignment of this service type is athletic fields, event centers, parks, etc.
- *Other* – Services that can't be, or hasn't yet been assigned to a particular service type.

Water service readings are conducted monthly by *MeterReaders, LLC* with the readings uploaded electronically into our "Springbrook" billing software system. Water usage is measured per 100 cubic feet (CCF) and recorded into the system. Billing is then generated based upon these readings "rounding down" to the nearest CCF. Table 4.4 below shows the number of accounts per usage range.

Table 4.4 – Accounts per usage level

Usage Range (Cubic Foot)	# Accounts
0-99	360
100-400	1,479
500-1,000	948
1,100-1,500	103
1,600-2,000	35
2,100-2,500	16
2,600-3,000	6
3,100+	47
Total	2,994

4.6 System Leakage (WMCP 690-086-0)140-9

The City has a fully metered system and is able to keep track of monthly water quantities pumped from the water treatment plant as well as the amount of water provided (billed and unbilled) which is the total of all system water meters. Recent yearly totals since 2007 are shown below in Table 4.5. The data within the table also takes into account water the City uses for system/fire hydrant flushing and recorded water used by the local Fire District. The City estimates that at least 600,000 gallons, on average, are used for these items each year although the exact amount is an inexact science due to estimations being made of actual use. On average, the City typically sees yearly water loss of 28% from 2007 – 2014. The overall lost water percentages is considered higher than the 15% or lower of typical acceptance.

There is some concern over lost water as some of the monthly percentages range from negative values to as much as 42%. The best explanation for this large range in percentages is poor record keeping of authorized water use and perhaps timing of meter readings. Another reasonable explanation is the potential for unauthorized water use of fire hydrants. Service meters are typically read and recorded during a seven day period beginning on, or near the 20th of each month while the production meters are read on a calendar month. Therefore, there will be slight discrepancy when comparing monthly production with monthly use, as any use by a customer after the meters are read will be recorded as use in the following months.

Water leakage can come from older small lines, those smaller than 4", predominantly 2" in size, which deteriorate during long periods since construction. The 2" lines in particular have been found to have many slow "pin-hole" style leaks, some of which do not show up at ground level. The City has a quick response to finding and repairing the leaks that become evident on the surface, and a program to replace the older lines over time. The 2" Replacement Program and the Leak Maintenance Repair programs are described in greater detail in Section 6.3 below.

It is important that the City continues to strive to obtain accurate accounts of their water use in order to track the overall water system performance. Consistent high values raise the concern of system leaks, inaccurate metering, and/or unauthorized use.

Table 4.5 – Lost Water

Year		January (MG)	February (MG)	March (MG)	April (MG)	May (MG)	June (MG)	July (MG)	August (MG)	September (MG)	October (MG)	November (MG)	December (MG)	Fire & Flush (MG)	Total (MG)
2007	Raw Wtr	33.97	28.47	23.89	28.64	31.70	36.90	43.00	42.00	33.20	29.90	34.00	36.40		402.08
	Unaccounted Water	12.23	7.41	4.46	6.83	10.99	8.01	7.53	5.63	1.56	0.23	8.14	15.13	0.12	138.86
	% Loss	36.01%	26.02%	18.66%	23.84%	34.66%	21.70%	17.52%	13.40%	4.71%	0.77%	23.95%	41.57%		34.54%
2008	Raw Wtr	28.00	22.70	25.40	26.20	26.50	34.65	57.50	48.60	38.60	28.00	26.60	26.40		389.15
	Unaccounted Water	9.72	(1.00)	5.20	5.33	6.90	8.32	20.74	6.58	7.75	6.63	1.21	0.53	0.61	128.61
	% Loss	34.72%	-4.41%	20.46%	20.34%	26.04%	24.02%	36.07%	13.54%	20.08%	23.69%	4.54%	2.00%		33.05%
2009	Raw Wtr	25.10	21.70	21.16	22.49	23.05	28.54	36.34	28.75	23.79	37.55	23.73	23.17		315.36
	Unaccounted Water	2.66	1.68	1.71	(0.20)	(1.36)	0.17	(3.11)	(12.28)	(7.18)	13.92	(10.75)	(4.32)	1.42	31.57
	% Loss	10.59%	7.74%	8.08%	-0.91%	-5.92%	0.59%	-8.56%	-42.71%	-30.18%	37.07%	-45.29%	-18.66%		10.01%
2010	Raw Wtr	20.95	16.26	19.80	20.33	20.60	21.60	32.80	34.90	22.60	20.20	19.30	19.90		269.24
	Unaccounted Water	(0.42)	(4.07)	(0.15)	(1.44)	0.79	0.15	(3.82)	(3.66)	(4.05)	(0.28)	(3.41)	(1.68)	1.15	28.62
	% Loss	-2.03%	-25.06%	-0.73%	-7.07%	3.84%	0.72%	-11.64%	-10.48%	-17.92%	-1.39%	-17.66%	-8.43%		10.63%
2011	Raw Wtr	18.70	18.30	19.20	18.05	19.01	21.54	27.86	31.84	27.08	20.63	20.09	25.08		267.38
	Unaccounted Water	(4.26)	(3.95)	1.04	(2.83)	(1.88)	(2.35)	2.05	2.41	(9.30)	(1.59)	0.09	1.82	0.37	31.74
	% Loss	-22.79%	-21.59%	5.39%	-15.70%	-9.88%	-10.92%	7.35%	7.58%	-34.35%	-7.70%	0.43%	7.26%		11.87%
2012	Raw Wtr	27.50	25.64	28.12	27.18	29.84	28.45	34.67	39.41	32.70	32.46	29.47	29.70		365.14
	Unaccounted Water	6.67	4.92	7.16	8.25	5.87	3.15	10.32	3.01	2.93	5.93	7.42	8.78	0.34	125.10
	% Loss	24.24%	19.21%	25.48%	30.36%	19.68%	11.07%	29.78%	7.63%	8.96%	18.28%	25.18%	29.57%		34.26%
2013	Raw Wtr	33.68	29.03	32.20	30.08	32.67	31.32	38.68	30.08	30.51	28.41	27.57	34.33		378.56
	Unaccounted Water	13.14	7.13	13.07	10.33	9.56	5.57	11.00	1.30	4.89	7.45	7.14	11.92	0.29	150.36
	% Loss	39.03%	24.55%	40.58%	34.35%	29.27%	17.79%	28.45%	4.32%	16.03%	26.21%	25.89%	34.73%		39.72%
2014	Raw Wtr	31.62	28.91	28.91	28.47	30.95	32.90	32.90	47.60	33.80	30.30	29.20	29.30		384.86
	Unaccounted Water	11.33	6.89	8.75	7.52	9.04	7.44	4.08	13.35	6.64	7.30	8.41	9.27	0.49	150.71
	% Loss	35.84%	23.85%	30.27%	26.43%	29.20%	22.61%	12.39%	28.06%	19.64%	24.10%	28.79%	31.63%		39.16%
2015	Raw Wtr	29.80	28.78	26.37	29.83	30.14	36.74	41.98	42.34	32.20	31.70				329.88
	Unaccounted Water	11.01	6.54	9.05	7.82	10.22	8.49	11.14	4.96	3.75	9.57	0.00	0.00	0.07	84.89
	% Loss	36.94%	22.74%	34.32%	26.23%	33.92%	23.10%	26.53%	11.72%	11.64%	30.19%				26%

4.7 Water Rights Schedule (WMCP 690-086-0)170-2

A water right can be perfected once the user completes construction of the facilities necessary to divert and use the water for the authorized use. Once the user submits evidence showing the water has been used in compliance with the permit conditions, OWRD issues a water right certificate. The City of Sweet Home has water right certificates as described below in Table 4.6

Table 4.6 – Water Rights

Permit #	Certificate #	Certificate - Max Allowable Water Use Cubic Feet per Second (cfs)	Permit - Max Allowable Water Use Cubic Feet per Second (cfs)
S-13151	88300	0.60 cfs	0.60 cfs
S-20525	88301	7.00 cfs	7.00 cfs
S-49959	88302	3.51 cfs	5.50 cfs
	Total	11.11 cfs	13.10 cfs

Although the City holds the three water rights certificates, Certificate #88302 is a partial certificate in which the remaining 1.99 cfs remains unperfected at this time. The Final Order for the Extension of Time for Permit Number S-49959 issued by OWRD sets the deadline for applying water to full beneficial use at October 1, 2050.

Projected water use at the end of the 20 year study period for this plan will not put the unperfected water right to full beneficial use. Therefore, the City of Sweet Home will use the October 1, 2050 date as the target date for applying water to full beneficial use. This schedule will need to be reviewed and revised based upon updated projected water demands revised in the completed 10 year update of this plan.

4.8 Water Quality

The City strives to maintain high water quality and has had a strong record in complying with drinking water requirements and standards, particularly since 2009. Surface water originating from the Central Oregon Cascades is generally of good quality. The hydroelectric impoundments created by Foster and Green Peter Dams both serve as settling basins for Sweet Home's raw water intake thereby improving water quality.

The City was designated as an "Outstanding Performer" following the completion of their 2015 water system survey. The criteria for outstanding performance are: No Maximum Contaminant Level (MCL), Action Level, or Treatment Technique violations in the last 5 years; No more than one monitoring or reporting violation in the last 3 years and the violation must be resolved; No significant deficiencies or rule violations identified during the current water system survey; and has not had a waterborne disease outbreak attributable to the water system in the last five years.

In the past five years, since the construction of the new Water Treatment Plant, the City of Sweet Home has had no violations or been required to issue public notices regarding water quality. The City's goal is to maintain this high level of water quality.

4.9 Water System Map (WMCP 690-086-0)140-8

Figure 4.1, an updated water distribution system plan can be found on the following page(s).

Reservoir 5
0.11 MG MG
Elev 815 ft

Pump Station

Foster Dam

Water Intake

Water Treatment Plant

Study Area for Possible Future Reservoir 6

Reservoir 4
2.0 MG
Elev 765 ft

Reservoirs 1,2,3
0.3 MG, 0.7 MG, 1.5 MG
Elev 765 ft

City Limits & Urban Growth Boundary
Existing & Future Service Area

Waterline Legend

24" WATERLINE	8" WATERLINE	2" WATERLINE
16" WATERLINE	6" WATERLINE	LESS THAN 2" WATERLINE
12" WATERLINE	4" WATERLINE	24" RAW WATERLINE
10" WATERLINE	3" WATERLINE	12" RAW WATERLINE

CITY of SWEET HOME
PUBLIC WORKS ENGINEERING
1140 12TH AVENUE
SWEET HOME, OREGON 97386
TEL: 541-367-6977
FAX: 541-367-6440

TITLE
Water Distribution System Map

SIZE	SCALE	DATE	SHEET
B	1 inch = 1,800 feet (0 — 1,750 — 3,500)	12/15/2015	1 of 1

Section 5 – Present and Future Water Demands

5.1 General **(WMCP 690-086-0)170-3, 4**

Determining present and future water demands is the first step in assessing the City's water facilities. It is critical that current demands are evaluated to determine if existing facilities are able to meet demands. If a system is unable to successfully meet the current needs of the community, system upgrades become a high priority. A determination of the future demand is also a critical step because it establishes the capacity and size of water system components needed in the future. Water demand discussed in Section 5 is presented as the total combined water supplied from the intake structure in order to meet the needs of the City. The total produced water therefore includes all metered use, fire department use, system flushing and other lost water.

5.2 Historic and Present Demand **(WMCP 690-086-0)140-4**

Total water production for the City of Sweet Home from 2008 to September 2015 is shown in Table 5.1 below. The City averages a monthly production of 33.065 MG, with August as the month of the most production with an average of 48.283 MG and February as the lowest month with an average production of 26.833 MG produced.

Please note production numbers for 2015 were excluded from the average monthly production assumptions in the paragraph above as all twelve months have not yet been reported to the State as of the date of this report.

Table 5.1 – Reported Water Production

Year	Jan (MG)	Feb (MG)	Mar (MG)	April (MG)	May (MG)	June (MG)	July (MG)	Aug (MG)	Sept (MG)	Oct (MG)	Nov (MG)	Dec (MG)	Annual Water Production (MG)
2008	30.161	24.321	27.235	27.639	26.501	34.651	60.035	51.230	40.591	28.000	26.599	26.400	403.363
2009	25.100	21.702	21.161	22.490	23.051	28541	36.339	28.750	23.790	37.551	23.728	23.171	315.374
2010	20.949	16.260	19.799	20.330	20.600	21.601	37.000	63.029	22.601	26.501	24.579	23.601	316.850
2011	27.860	22.559	25.061	22.911	31.809	26.329	32.461	42.119	32.578	23.592	23.100	29.991	340.370
2012	34.781	32.311	35.319	35.338	37.160	36.710	41.780	49.669	40.891	42.631	36.137	37.808	460.537
2013	41.227	35.091	39757	35.088	38.063	37.352	47.359	45.899	36.873	35.244	35.544	41.057	468.553
2014	36.749	35.586	38.001	36.013	37.645	39.359	46.786	57.284	40.014	35.104	34.947	34.941	472.430
2015	36.658	32.614	36.153	35.368	38.656	47.336	51.263	44.231	44.208	-	-	-	

To ensure the existing system is adequately sized to handle the existing demand, the Average Daily Demand (ADD) and Peak Daily Demand (PDD) have been examined. A peaking factor of 2.7, *as recommended in Water Management & Conservation Plan: A Guidebook*, was applied to the average daily usage values to account for the peak water use that occurs throughout the day. It is assumed that water demand increases during peak times (i.e., mornings, evenings, and weekends) and the peaking factor adjusts the water use values to account for this timely demand. ADD and PDD from 2008-2014 are shown in Table 5.2. In 2014 ADD for Sweet Home was 1.294 Million gallons per day (mgpd), which equates to an instantaneous production of 899 gallons per minute (gpm,). Applying the peaking factor gives a 2014 PDD of 3.495 mgpd or 2,427 gpm. With a current plant production capacity capability of 4,167 gpm, the City's current PDD is easily met.

Table 5.2 - Average & Peak Demand

Year	UGB Population	Annual Water Production	Average Daily Demand				Peak Daily Demand			
			gpd	gph	gpm	gpcpd	gpd	gph	gpm	gpcpd
2008	9,045	403.363	1,105,105	46,046	767	122	2,983,783	124,324	2,072	330
2009	9,050	315.374	864,038	36,002	600	95	2,332,903	97,204	1,620	258
2010	8,945	316.850	868,082	36,170	603	97	2,343,822	97,659	1,628	262
2011	9,005	340.370	932,520	38,855	648	104	2,517,805	104,909	1,748	280
2012	9,025	460.537	1,261,745	52,573	876	140	3,406,711	141,946	2,366	377
2013	9,065	468.553	1,283,706	53,488	891	142	3,466,007	144,417	2,407	382
2014	9,060	472.430	1,294,330	53,930	899	143	3,494,690	145,612	2,427	386
Average		396.782	1,087,075	45,295	755	120	2,935,103	122,296	2,038	325

Note: gpd — gallons per day; gph — gallons per hour; gpm — gallons per minute; gpcpd — gallons per capita per day; MG/yr — million gallons per year; Est. Pop. — estimated population

5.3 Future Demand

Future demand was determined by establishing an average gallons produced per capita per day (gpcpd) from past years and applying this value to the population projection discussed in Section 3.5. From 2008 to 2014 the average per capita production was 120 gpcpd (Table 5.2).

Table 5.3 shows the estimated population and consumption growth for the City of Sweet Home to the end of the 20-year design period. Using the peaking factor of 2.7 as explained above, the peak daily demands for each year are listed. In 2040 the City will need the capability to produce approximately 1,470,387 gpd or 1,021 gpm to satisfy the average daily demand. Given the current water treatment facility has the capability in its current configuration to produce up to 6 MGD, meeting the future demand will not be a problem. In fact, utilizing the "3-train system" described in earlier Section 4.2, demand will be able to be met in 2040 while still allowing for one train to be out of service if necessary for repairs and/or maintenance.

The values in Table 5.3 should be re-evaluated within the next 10 years to make certain peak demands will continue to be met.

Table 5.3 - Projected Water Use

Year	Est. Population	Average Daily Demand - 120 gpcpd						
		Estimated Average Demand				Estimated Peak Demand (2.7 Peaking Factor)		
		(MG/Yr)	(gpd)	(gph)	(gpm)	(gpd)	(gph)	(gpm)
2015	9,166	401.463	1,099,898	45,829	764	2,969,726	123,739	2,062
2016	9,273	406.152	1,112,745	46,364	773	3,004,412	125,184	2,086
2017	9,381	410.896	1,125,742	46,906	782	3,039,504	126,646	2,111
2018	9,491	415.695	1,138,891	47,454	791	3,075,005	128,125	2,135
2019	9,602	420.550	1,152,193	48,008	800	3,110,921	129,622	2,160
2020	9,714	425.463	1,165,651	48,569	809	3,147,257	131,136	2,186
2021	9,827	430.432	1,179,266	49,136	819	3,184,017	132,667	2,211
2022	9,942	435.459	1,193,039	49,710	828	3,221,206	134,217	2,237
2023	10,058	440.546	1,206,974	50,291	838	3,258,830	135,785	2,263
2024	10,176	445.691	1,221,071	50,878	848	3,296,893	137,371	2,290
2025	10,294	450.897	1,235,334	51,472	858	3,335,401	138,975	2,316
2026	10,415	456.163	1,249,762	52,073	868	3,374,358	140,598	2,343
2027	10,536	461.491	1,264,360	52,682	878	3,413,771	142,240	2,371
2028	10,659	466.881	1,279,127	53,297	888	3,453,644	143,902	2,398
2029	10,784	472.335	1,294,067	53,919	899	3,493,982	145,583	2,426
2030	10,910	477.851	1,309,182	54,549	909	3,534,792	147,283	2,455
2031	11,037	483.433	1,324,473	55,186	920	3,576,078	149,003	2,483
2032	11,166	489.079	1,339,943	55,831	931	3,617,847	150,744	2,512
2033	11,297	494.792	1,355,594	56,483	941	3,660,103	152,504	2,542
2034	11,429	500.571	1,371,427	57,143	952	3,702,853	154,286	2,571
2035	11,562	506.418	1,387,445	57,810	964	3,746,103	156,088	2,601
2036	11,697	512.333	1,403,651	58,485	975	3,789,857	157,911	2,632
2037	11,834	518.317	1,420,045	59,169	986	3,834,123	159,755	2,663
2038	11,972	524.371	1,436,632	59,860	998	3,878,905	161,621	2,694
2039	12,112	530.495	1,453,411	60,559	1,009	3,924,211	163,509	2,725
2040	12,253	536.691	1,470,387	61,266	1,021	3,970,045	165,419	2,757

Note: gpd — gallons per day; gph — gallons per hour; gpm — gallons per minute; gpcpd — gallons per capita per day; MG/yr — million gallons per year; Est. Pop. — estimated population

5.4 Fire Flows

The Insurance Service Office of Oregon (ISO) is responsible for reviewing the firefighting capabilities of various communities and fire districts. This data is needed to help establish basic fire insurance rates and considers not only the area's water system, but many other factors related to the Fire District itself. The data is analyzed using ISO's Fire Suppression Rating Schedule (FSRS) and then a Public Protection Classification (PPC) number is assigned to a community.

In 2009 ISO completed an analysis based upon criteria contained in a Fire Suppression Rating Schedule and upon conditions in Sweet Home during September 2005. The analysis resulted in a PPC of Class 4 within the city. The Class 4 applies to properties within the city and rural areas within 1,000 feet of a fire hydrant, five (5) road miles of a fire station, and with a needed fire flow of 3,500 gpm or less. Class 8 (dwellings) and 9 (commercial) apply to properties within five (5) road miles of a fire station but beyond 1,000 feet of a fire hydrant.

Along with the community's fire department capabilities, a community's PPC is based on fire flows and water supply provided by the water system. The ISO defines these two functions as Needed Fire Flows, which are representative building locations used to determine the theoretical amount of water necessary for fire suppression purposes and water supply, which includes condition and maintenance of hydrants, alternative water supply operations, and the amount of available water compared with the amount needed to suppress fires up to 3,500 gpm.

The 2009 Public Protection Classification summary report for the Sweet Home determined the Needed Fire Flows for nine locations within the city, of which five indicated available flow deficiencies at the time of the survey; four of which was specifically due to existing fire hydrant flow restrictions. The summary of the noted deficiencies are as follows:

Table 5.4 — Needed Fire Flows

Hydrant #	Needed Flow (gpm)	Available Flow @ 20 psi (gpm)	Location	Remarks
094	4500	1200	18th Avenue, N of Santiam Hwy	Hyd. Restriction 3500 gpm also
236	4500	5100	53rd Avenue and Poplar	Hydrant Restriction 2920 gpm
162	3000	6200	S. Santiam Hwy, W of Clark Mill Rd	Hydrant Restriction 2260 gpm
119	5500	2600	951 22nd Avenue	Hydrant Restriction 2170 gpm
302	4500	3700	47th Avenue, S of Nandina St	Hydrant Restriction 1920 gpm

The **Basic Fire Flow** for the community is determined by the review of the Needed Fire Flows for selected buildings in the community. Since the FSRS develops a PPC for properties with a Needed Fire Flow of 3,500 gpm or less, the maximum that the Basic Fire Flow can be is 3,500 gpm. From the locations above the **Basic Fire Flow for Sweet Home has been determined to be 3,000 gpm**.

For maximum credit, the Needed Fire Flows should be available at each location in the City up to 3,500 gpm. Needed Fire Flows of 2,500 gpm or less should be available for 2 hours; and Needed Fire Flows of 3,000 and 3,500 gpm should be available for 3 hours.

In order to meet the maximum credit criteria, the City needs to provide fire storage of 630,000 gallons (3,500 gpm for 3 hours) for fire flows plus the volume to meet peak daily demand. This equates to a 2015 flow requirement of 3,599,726 gallons (2,969,726 gallons + 630,000 gallons) and a 2040 requirement of 4,600,045 gallons (3,970,045 gallons + 630,000 gallons).

To meet the Basic Fire Flow of 3,000 gpm, the City needs to provide fire flow of 540,000 gallons (3,000 gpm for 3 hours) for fire flows plus the volume to meet peak daily demand. This equates to a 2014 storage requirement of 3,509,726 gallons (2,969,726 gallons + 540,000 gallons) and a 2040 storage requirement of 4,510,045 gallons (3,970,045 gallons + 540,000 gallons).

With a current maximum storage capacity of 4,610,000 gallons, the City's reservoirs provide the required volume necessary to satisfy current Basic Fire Flows for three hours plus peak daily demands as well as that expected by 2040.

Section 6 – Water System Improvement Options

6.1 General

The City of Sweet Home uses surface water from Foster Reservoir, a man-made flood control lake on the Santiam River. This source water is used at the water treatment plant with a supply capacity of up to 6,000,000 gallons per day to the distribution system including storage capacity of approximately 4,610,000 gallons. The supply, storage, and distribution system does not currently have any major deficiencies that need to be addressed. However, below are some recommended improvements that will help improve the system and keep it operating at a satisfactory level.

The City uses WaterCAD by Bentley Systems, Version V8i for 500 pipes, for water modeling of the pipe network. The software module is refined and added to every few years. The City also uses AutoCAD Map 3D by Autodesk, Version 2016, for documenting and mapping the pipe network for projects. The City also uses ArcMAP by ESRI, Version 10, for GIS georeferencing and data asset management of the network.

6.2 Storage

The City currently has an annual program to ensure the reservoirs are inspected and cleaned on a rotational basis every 3 years and it is important this program continues and is properly funded and administered in order to maintain longevity of each reservoirs life. It is recommended the City consult with tank manufacturer representatives and/or qualified clean & inspection companies for regularly scheduled maintenance programs.

No additional storage requirements are necessary at this time due to fire flow and/or supply issues. However, due to the age and condition of the two smaller reservoirs located at 10th Avenue, Reservoir # 1 & 2, it is recommended they be replaced with a new reservoir as part of the capital improvement program. The estimated cost for such replacement is $3.3 Million Dollars.

Because the water system east of Wiley Creek to the Foster “District” is dependent on a single supply line on the highway bridge, it is recommended the City evaluate the feasibility of constructing a new reservoir in Foster to provide emergency water in the event of supply line failure. The average monthly water consumption in Foster is approximately 102,000 cubic feet (based on 2014-2015 meter reads). Storage of 75,000 gallons would provide a 3-day water supply for existing conditions, therefore to provide for future population growth we anticipate a 100,000 gallon storage minimum.

6.3 Distribution System & Pump Station

Given the improvements completed in the distribution system previously identified within the Water System Master Plan Update of 1997, there appear to be no areas in the water system with inadequate flows or pressures. However, there are at least a couple locations within the city with the potential of future subdivisions in the city which will be above the existing main tanks and pressure zones and as such, pump stations and possible tank reservoirs may need to be added, due to the height of the land area being served. Should these locations ever be built,

they will be required to have adequate storage tanks with continuously operating pump stations requiring backup power generation.

In addition to normally expected system improvements of line upsizing of existing 2" water mains as well as leak maintenance/replacement, the City has identified the need to upgrade the system with additional fire hydrants and/or blow-off as well as inter-connectivity improvements. One such inter-connectivity section improvement that should be considered is the continuation of the existing 12" water main on the north side of Hwy 20 about 1,400 feet to the east for connection to the existing 8" water main on Clark Mill Rd. This will complete the connection between Clark Mill Rd and 18th Avenue and should improve reservoir balancing flow between the sites on 49th Avenue and 10th Avenue.

These improvements will also focus on improving the fire flows and corresponding restrictions identified in Table 5.4 of the previous Section.

6.4 Treatment

The raw water inlet structure is located at Foster Dam. The inlet pipe located approximately 12 feet below the low water point on the dam. The structure includes a fine screen for keeping fish and large objects from entering the 24inch line. The screen goes through an air scour twice weekly in order to clear and built up debris. The Air Compressor building nearby is a concrete block building on the top of the Dam, with a buried Stainless Steel pipeline from it to the Intake Structure, through which air is forced to clear any debris that may accumulate. Foster lake allows large particulates to settle before reaching the inlet pipe, therefore the majority of the year the raw water contains less than 5 nephelometric turbidity units.

The Raw Water Intake line consists of two segments feeding the new Water Treatment Plant about 1 mile away. The above ground portion, which is located on the U.S. Army Corps Engineers Foster Dam property, is Ductile Iron and is anchored to the rock abutment from the Intake Portal on the Dam to where it drops underground in the administration office parking lot. The below ground portion from the office to the Plant Intake Pond is HDPE. Both materials are resilient and durable to with stand environmental or manmade contact.

The treatment plant contains 3 filter trains and 3 finished water pumps. Each filter train is independent of one another and each designed to produce 2 Million Gallons per Day (MGD). The approved maximum discharge rate into the distribution system is 2600 Gallons per Minute (GPM) as per Oregon Health Authority. This is equivalent to 3.7 MGD and is equivalent to two finished water pumps running continuously. Due to limitations of the distribution system, three finished water pumps cannot be operated at the same time as it produces too high of pressure.

Eventual breakdown of the filter media requires that a complete media change out will be required approximately every 12-15 years and will cost approximately $20,000 for each filter train. Other system upgrades and approximate costs would be:

- Installation of variable frequency drives on all raw water pumps @ $20,000 each
- Installation of variable frequency drives on a finished water pump @ $20,000

6.5 Sample Stations

The system has 15 Oregon Health Authority approved bacteriological sampling sites. Of those sites, 11 already have a designated sampling tap at the water meter. The 4 remaining sites are at locations that are at a business or public facility and would be open for regular access. At these locations the sampling occurs at a sink inside the facility (most often a bathroom), which leads to additional potential for contaminating the sample. It would be advantageous to install sampling taps at these sites in order to maintain continuous access and reduce potential for contamination. Future regulations will affect the need for additional or new sampling sites for bacteriological or other analytes (pH, Chlorine, disinfection byproducts, etc.).

6.6 SCADA System Upgrade

Maintaining the annual service agreement is essential to keeping the GE Simplicity SCADA program up to date. Though the agreement costs an annual fee of $3,800, the cost replacing the program in its entirety, due to failure, could cost over $30,000. The server computer will need replacement periodically, approximately every 5 years, as computers/electronics in general become outdated quickly.

6.7 Backup Power Generator

Currently there are no generators onsite in order operate the treatment plant in the event of grid power failure. Two generators are required in order to power the treatment plant: One for the raw water building and another for the main operations building. The breakers, receptacles, and cord are onsite to accommodate such connection to a mobile unit. The treatment building generator service breaker is 100 amp and the raw water building breaker is 70 amp. These are sized large enough to operate 1 filter train and 1 finished water pump.

6.8 Leak Detection

A key component to an effective Water Management and Conservation Plan is minimizing the lost water noted in Section 4.5 of this plan. Lost water due to system leaks can be minimized by re-implementing and/or initiating a new leak detection program. Such a program needs to begin with a complete leak detection survey of the entire distribution system, which can be done utilizing existing staff and resources or through a contract services agreement. In order for a comprehensive study to be completed as quickly and accurately as possible, it is recommended the City contract this work with a licensed leak detection contractor such as American Leak Detection. It is anticipated a survey can be completed in about five (5) days at a total cost of approximately $6,250, although actual cost will be dependent on the results of a local procurement process.

A leak detection survey records any leaks, irregularities or defects that may need to be addressed to maintain the integrity of the water system. A comprehensive report will then be submitted upon completion, which will identify leak locations, aid in prioritizing repairs and provide a record for future maintenance. The City will then review the completed leak detection survey and develop a repair schedule by prioritizing fixes based upon the severity of the water loss.

The survey is performed using the acoustic leak sounding survey tool. The survey tool is used to touch and listen to every accessible main valve, hydrant and service as necessary. Sensors are

placed at intervals determined by availability of access and location of contact points. Normally contact points will be at intervals no greater than 350 feet. If good contact is not available, a highly sensitive ground mike device will be used making physical contact to the ground over the pipe at intervals no greater than 6 feet. If ground cover is not of a hard surface, probe rods will be used at intervals of 10 feet. If ambient noise on a certain section during day time hours interferes with survey effectiveness, the work may need to be performed at night. During the survey process, high leak signal areas will be prioritized and reinvestigated before the pinpointing process is started. Pinpointing and verification of leak locations will be completed using a leak noise correlator. Two highly sensitive sensors are placed on either side of the suspected leak position. The sophisticated leak noise correlation process uses basic operator-supplied pipe data to pinpoint the leak location and display the results on screen.

Although City Staff may not have the time, training, and/or adequate resources to complete a comprehensive system survey, the City should continue to invest in their leak detection equipment and training as it will become useful in verifying and/or completing additional investigation of suspected leaks identified in the comprehensive survey.

Section 7 – Water Conservation (WMCP 690-086-0)150-All

7.1 System Meters

The City of Sweet Home's water system is fully metered. All individual water services are metered and are read and recorded on a monthly basis by contracting partner "MeterReaders, LLC" of Lake Oswego, Oregon. Meters manufactured by Sensus have been identified as the standard water service meter to be installed on each service.

7.2 Meter Testing & Maintenance

The City does not have a specific meter testing plan in place for water service meters however City personnel are diligent in replacing service meters that are beyond ten years in service. This replacement is completed through annual replacement program and/or when a meter shows abnormal use.

A service meter can be changed-out at request of City and/or customer. If customer requests the meter be checked for accuracy and the meter is less than ten years in service, the meter can be sent to a certified testing lab for verification. Should the test reflect the service meter reading inaccurately, the customer account is credited accordingly when it is to the customer's benefit to do so.

A significant number of water meters are older than 10 years and are approaching the end of their service lives. These meters are being replaced with new Sensus touch-read meters whenever possible rather than repairing them, as the city has determined replacement is more economical. The new meters are also faster to read, thus reducing costs by allowing a smaller number of meter readers. Potentially the end use data will be more accurate as well with the elimination of hand written notes. The city plans to test large water service meters, all city property service meters, and all production meters every five years and make appropriate repairs or replacement where needed.

7.3 Annual Water Audit

As identified in the WMCP Progress Report of 2010, the City has created and implemented an annual water audit program to track the amount of water diverted as well as to determine the amount of unaccounted-for water more accurately. Although the program is fairly rudimentary, we continue to find it to be effective and easy to modify as better information becomes available. The spreadsheet was created and first used for calendar year 2007 and has been improved annually. The 2014 audit labeled "Billed & Unbilled Consumption – 2014" can be found in the Appendix of this report.

The audit program is an Excel spreadsheet in which values are inputted based upon monthly reports from customer usage, both billed and unbilled consumption, as well as water treatment production records. It also includes data from fire hydrant rental usage including Fire District usage for emergency as well as training purposes, and water utilized for filter "backwash" purposes.

The City's methodology for accounting for un-metered authorized use and unauthorized use (lost water) is as follows:

1) The City utilizes *SpringBrook Utility Billing Software* for its account billing and usage purposes. For each calendar month, a "UB – Summary by Service Rate" report is generated to identify all "billed" consumption. This monthly total is then subtracted from the "UB – Consumption" report to determine the amount of "unbilled" consumption.
2) Monthly water production and run-time reports are generated with relevant information from treatment plant staff and provided in a monthly water read report. This information is also utilized for its annual "Water Use" reporting to the State that is required for water rights purposes.
3) Authorized water use that is metered and unmetered (system flushing, fire district use, City use, etc.) is estimated by the City and/or read from meters where applicable.
4) Information gathered in the above three steps is inputted in columnar form into the audit spreadsheet. Unaccounted for water (lost water) is calculated by subtracting the known usage quantities (billed, unbilled, authorized use, filter backwash, storage, fire hydrant, etc.) from the total amount water produced. The information is calculated on a monthly as well as annual basis.

7.4 Leak Detection Program

Yearly leak detection surveys, using listening equipment will be performed on major pipe mains, fire hydrants and valves. Any service connections, meters and service lines that show any indications of leaks will also be surveyed. Leaks found during the surveys will be repaired as soon as possible.

A large amount of 2-inch galvanized iron piping exists in the distribution system. These pipes are mostly old and are believed to be the cause of significant water leaks in the system. The City has an ongoing program to replace all 2-inch galvanized iron piping. Complete replacement of the pipes is expected in the year 2018.

7.5 Rate Structure & Billing

In 1999, the City of Sweet Home authorized a complete rate analysis for the water and sewer utilities that aimed to determine the revenue requirements for the water and sewer utilities; to determine the cost of the two services; and also to study and help set water and sewer rates. 1997/1998 was used as the base year in which various parameters that affected the three areas of study were determined and costs associated with them were quantified. Water and sewer rates were developed based on the findings of that report and annual rate review procedures were recommended and followed. The City of Sweet Home adopted the results from the report in Ordinance 1100 of the City's Code, which sets the water and sewer rates and the City Council is required to annually review water rates before May and set the new monthly rate for bills sent out each July. Prior to Year 2000, water rates had stayed constant for several years, but have increased almost annually since then to reflect the increasing costs of production.

The rates are based on meter size and water use, as summarized in Tables 7-1a and 7-1b. Water use fees are charged per 100 c.f. for commercial and bulk services and per 100 c.f. that exceed 400 c.f. for residential services within the city limits. A service factor rate of 1.5 times equivalent city rates is assessed for services outside the city limits. The city's water rates result

in larger water bills the more water a service uses. Hence, the rates help discourage water waste since that will lead to water wasters incurring unnecessarily large bills.

Table 7-1a
Meter Charge (Base Rate)

Meter Size	Base Rate
¾ Inch	$17.90
1 Inch	$22.38
1 ½ Inch	$28.35
2 Inch	$44.77
3 Inch	$165.68
4 Inch	$210.46
6 Inch	$314.95
8 Inch	$434.37

Table 7-1b
Water Use Charge (Commodity)

Customer Class	Commodity Charge
Residential (First 400 c.f. is included in base charge)	$7.48 per 100 cubic feet AFTER first 400
Commercial	$6.85 per 100 cubic feet usage
Bulk	$6.01 per 100 cubic feet usage

As demonstrated in the two tables above, the City of Sweet Home's water rates are based in part, on the quantity of water metered at the service connection as required by OAR 690, Division 86 rules. Basing the rest of the charges on the size of the customer service water meter serves as an indirect method of charging larger water users more since larger water meters are usually required by larger water users. This varying charge, based on the meter size, is also seen by the city as a way to vary the water charges according to the amount of water used by water customers.

7.6 Public Education Program

Continuing in 2015 and beyond, the City of Sweet Home will continue with a public education program that will be targeted toward water customers, particularly residential customers, in order to help in the City's conservation effort. The program will include the following and is summarized in the "Conservation Benchmarks" located in Appendix H:

- Attempt to make regular visits to schoolchildren at local schools, making presentations and/or providing material on the importance of water conservation. This program shows children simple ways to conserve water at home and at school by turning off the faucet while brushing their teeth in the morning, not using the toilet as a garbage disposal unit, taking short instead of long showers, and avoiding frequent use of the bath tub. It is expected that these visits to schools, plus the literature they take home, will help meet immediate conservation needs and develop better lifetime water use habits in children.
- Conservation messages on the City website. Simple to implement conservation practices and tips will continue to be available in a "Conservation Tips Newsletter" that can be found on the City website at www.ci.sweet-home.or.us/index.aspx?nid=181 Information on how to obtain conservation brochures will be included in the messages. The messages will be regularly updated.
- Distributing the water Conservation Tips Newsletter (See Appendix H) at least two times a year with customer water bills. These brochures will emphasize the importance of water conservation and list some simple steps that can be used to conserve water in the home. The brochures will include a simple demonstration of how customers can check for water leaks in their service meters and report them to the water utility. These mailers will remind water customers about the need to conserve water and demonstrate how simple conservation steps can go a long way in reducing water use.
- Comparison of current water use with the previous year's water use on customers' bills. This should help customers determine if their water conservation efforts are in fact helping them reduce the overall amount of water they use. Hopefully water use comparisons will encourage customers who notice significant hikes in their water use to want to conserve water.

The City believes that public education will be an important tool in its effort to encourage responsible water use among its water customers. Children who are exposed to education that encourages conservation are more likely to be responsible water users when they grow up. In addition, coordination with the local watershed council may be a method to expand educational opportunities.

7.7 Water Use Measurement and Reporting

The City of Sweet Home complies with OAR Chapter 690, Division 85 by recording monthly water production at the water treatment facility and submitting this information to Oregon Water Resources Department. The City submits the data online annually via the department's website online www.wrd.state.or.us for the previous water year (October – September).

7.8 Conservation Summary

This plan is intended to be the updated water management and conservation plan for the City of Sweet Home as required per Final Order. The City intends to use this plan as a continuing guide to implement conservation techniques discussed in this section and will institute the public education program, leak detection program, and source meter testing upon the acceptance of this plan. The City will continue to record production and use monthly and audit for lost water annually, submit water production to Oregon Water Resources Department, and use the existing rate structure that encourages water savings.

Section 8 – Water Supply Emergency Curtailment Plan

8.1 General

The City of Sweet Home currently has an emergency plan for dealing with water shortages that relies on one of six different conditions to trigger activation of various responses. The six conditions are:

1. Loss of portability
2. Water contamination event
3. Major system damage
4. Chlorine release
5. Water use restrictions
6. Power outage

Each of the conditions has specific responses to help the city handle the emergency situation. The City recognizes some shortcomings in the existing plan, as follows. The triggers listed above lack a clear definition of the point when a condition can be called an emergency in relation to the ability of the City to provide water to customers. The existing plan also centers on the event of declaring an emergency, but does not include any process to provide water subsequent to declaration of the emergency. Acknowledging the above-mentioned shortcomings of the existing plan, the City recognized the need for an improved emergency/curtailment system and plans to present this report to the City Council so that it can be used as the basis for a City water emergency curtailment ordinance.

Under the new emergency plan summarized in Table 8-1, any condition including the six listed above that is expected to prevent the city from providing water to 40 percent of the population for the duration of six hours or more shall be declared as an emergency by the city manager. The emergency shall be declared a Category A or a Category B, based on whether the condition is expected to cause a total or partial outage in the water system.

Category A –

All emergencies that a water supplier such as the City of Sweet Home is likely to experience fall under two categories. Category A involves the loss of potability of the supplier's water, or a failure of the system to supply water. The supplier's ability to produce water may remain, but due to certain circumstances, the water is not high enough quality to be supplied to the water customers for use. Category A emergencies are more likely to render most, if not all, of the water unusable. They include contamination events and over-chlorination of the water supply. Adding excessive amounts of other treatment agents may also cause this kind of emergency. In such a situation, where a total outage is expected, the city manager shall authorize public radio and television announcements of the emergency condition and request the State Emergency Management Division to provide water from external sources by tank trucks. In that event water will be distributed directly to customers at schools, the City Hall, the fire station, and other public areas. The U.S. Army Corps of Engineers resources may also be requested by the City Manager, depending on the extent of the emergency. If a complete failure of the water system occurs, severe rationing may result.

Category B –

Category B emergencies include situations such as power outages, major system damage, multiple equipment failures, or fire emergencies at the water treatment plant. These emergencies may or may not cause total system outages, and may only be expected to last for a day or two at most. In cases where they cause overall system outages for a long period, these emergencies will be treated just like category A emergencies. If total outage is not expected, then the following curtailment steps will be implemented.

Table 8.1 – Summary of Emergency Response Plan

EMERGENCY	RESPONSE
Any condition that prevents the City from being capable of providing water to 40 percent of the water customers for six or more hours.	Category A or Category B emergency is declared.
Category A: Full Service Outage Causes may include: 1. Water Contamination 2. Over Chlorination 3. Extreme situations of Category B Emergency 4. Massive equipment failures 5. Flooding 6. Earthquakes	1) Inform resident by posters, radio and television about emergency conditions. 2) Request state emergency division to provide water from external sources by tank trucks. 3) If necessary, request more water from the U.S. Army Corps of engineers. 4) Distribute the water to city residents at schools, City Hall, Fire Station and other public areas.
Category B: Reduction of Service Capacity Causes may include: 1. Power Outages 2. Major System Damage 3. Multiple Equipment Failure 4. Flooding	1) Inform residents by posters, radio and television about emergency conditions and the curtailment actions needed. 2) Based on how much water consumption is as a percentage of treatment plant capacity, implement conservation alert, moderate alert or critical alert as appropriate.

8.2 Assessing Water Supply and Storage **(WMCP 690-086-0)160-1**

No major emergencies that prevented the City of Sweet Home from supplying potable water to its residents have occurred within the last 10 years.

8.3 Curtailment Strategy **(WMCP 690-086-0)160-2, 3, 4**

The intention of this plan is to lay out a framework of actions to implement in an emergency situation that does not render the total of Sweet Home's water distribution system unusable. The course of action will depend on the extent and severity of each emergency situation and be based on the ability of the water utility to provide sufficient potable water for customers. The three emergency stages are:

- Conservation Alert
- Moderate Alert
- Critical Alert

A conservation alert is aimed at reducing the water use within the City through voluntary actions of the residents. Its goal is to reduce water use to less than 80 percent of the water treatment plant's capacity, hence frequent declarations of this alert signify the need for the expansion of the water treatment plant. A moderate alert is intended to further reduce water consumption, with a goal of 10 percent reduction of water use within the City. A critical alert calls for drastic reduction in the water use within the City.

The trigger for this stage of alert occurs when water usage reaches 80 percent of treatment plant capacity for three consecutive days. The City Manager shall declare a conservation alert emergency and request voluntary conservation measures by customers. A State-declared drought for the Sweet Home area will also be considered a trigger for the conservation alert stage. The response for this stage will require the city manager to:

- Distribute brochures that encourage conservation;
- Request customers to water lawns every other day instead of daily;
- Request customers north of Highway 20 to irrigate lawns in the morning and those south of Highway 20 to irrigate lawns during the evening;
- Request irrigation time to be limited between 7:00 a.m. and 7:00 p.m.;
- Turn City fountains off and post signs explaining the reason;
- Request customers to postpone non-essential hosing of sidewalks, walls, driveways, parking lots, open grounds, streets and roofs except when required before painting; and
- Request voluntary reduction in car, boat, and trailer & recreation vehicle washing except in facilities that recycle wash water.

A moderate alert stage is triggered when water consumption reaches 90 percent of treatment capacity for two consecutive days. The City Manager shall at this stage call for a continuation of the conservation measures listed in the conservation alert stage. However, the City Manager shall declare several of those measures as compulsory during the moderate alert stage. Compulsory measures during this stage include:

- Prohibiting lawn irrigation between 7:00 a.m. and 7:00 p.m.;
- Mandatory adherence to every other day watering schedule;
- Mandatory adherence to evening or morning irrigation schedule, depending on whether customers live north or south of Highway 20; and
- Restrict other non-essential outdoor water use as determined by the City Manager.

A critical alert shall be declared by the city manager when water consumption reaches 95 percent of treatment capacity, when total production capability is lost, or when deemed necessary by the City Manager. The following will be prohibited during the alert:

- Watering, sprinkling or irrigating lawns without explicit City approval in writing. The City will approve watering, sprinkling or irrigating of lawns, grass or turf only in the following situations:
    - New lawns, turf and grasses that were seeded before issuance of the critical alert and are less than 12 months since first planting.
    - Such grass, turf and lawn shall only be watered until established.
    - Grass, turf and lawn that are part of a commercial sod farm.
    - Golf course greens and tees.
    - Other areas that may be deemed to be essential by the City.
- Use of City-supplied water for filling private swimming pools.
- Use of City-supplied water for washing, hosing and spraying of walls, roofs, sidewalks, driveways and other hard surfaces, except where deemed necessary for health and safety reasons by the Oregon Department of Human Services - Drinking Water Program and Oregon Department of Environmental Quality and where necessary prior to painting during repairs, reconstruction and remodeling of buildings.
- Washing boats, land vehicles, including but not limited to cars, buses, trailers, and trucks, except where public health, safety and welfare depend on frequent vehicle cleaning, such

A severe loss of water production which is expected to last more than two days may include more drastic water restrictions, such as the following:

- Prohibition of all unauthorized water use, including any irrigation, swimming pools, or any form of car or truck washing.
- Restrictions on taking showers or baths.
- Restrictions on flushing toilets.

Water contamination events may also result in boil water notices.

8.4 Staff Responsibilities

The following staff members will have the tasks listed in a water curtailment event.

- Public Works Director:
    - Coordinate staff and effort to improve emergency situation. Coordinate all direct and indirect media outreach.
- Superintendents, Public Works Department:
    - Coordinate with major water users to reduce consumption.
- Police Chief, Police Department:
    - Enforce water curtailment measures.

8.5 Summary

OAR 690, Division 86 rules require that all public water suppliers such as the City of Sweet Home have an emergency curtailment plan. The City recognizes the need for such a plan to improve its preparedness and help it cope with an emergency condition. Conditions that are likely to cause a water emergency shortage in Sweet Home include a fire emergency or equipment failure at the treatment plant, water contamination events, major system damage, and multiple equipment failures. All these situations are highly unlikely to occur, but if one of them does, the City may not be able to provide water to customers in an acceptable manner. In that case, the City of Sweet Home will rely on its emergency plan summarized in Table 8.1.

Section 9 – Improvement Financing

9.1 General

There are a variety of funding programs available for improvements to drinking water systems. Both loans and grants are available to public water systems needing to design, construct, expand, or improve a system. Although these funding sources exist, each has its own particular requirements of applicants to receive funding.

The following is a brief description of available funding programs for public water systems with particular requirements to receive funding.

9.2 Oregon Infrastructure Finance Authority

Community Development Block Grant Program

The Oregon Community Block Grant (CDBG) Program receives annual grants from the U.S. Department of Housing and Urban Development. The State usually distributes funds under these categories: Public Works, Housing Rehabilitation, Community Facilities, New Affordable Housing/Regional Strategies, Economic Development, community Crisis, and Technical Assistance.

Project objectives are to increase business and employment opportunities, improve availability and adequacy of water supplies, and to resolve serious and imminent threats to community health and welfare.

All funding for Economic Development activities must meet the Low/Mod Income Jobs National Objective subcategory under 24 CFR 570.483(b)(4). This requires that funded activities create or retain permanent, full-time equivalent jobs, primarily for low and moderate-income persons. To comply with the federal requirements, at least 51% of the jobs created or retained must either be held by or be available to Low/Mod income persons. Projects must principally benefit low to moderate income people in non-entitlement cities and counties: cities less than 50,000 and counties less than 200,000 in population. Projects must serve primarily residential need and not be for capacity expansion.

“Low Income” and “Moderate Income” are defined in the federal Housing and Community Development Act of 1974, as amended. A Low-income person is a member of a family with a gross income of no more than 50 percent of the area median income. A Moderate-income person is a member of a family with a gross income of no more than 80 percent of the area median income. The “area” is either the county or the non-metropolitan portion of the state, whichever has the higher median income. The 2014 estimated median family income for non-metropolitan counties in Oregon is $60, 700 and the estimated median family income for Linn County is $5 1,600. Therefore, the City of Sweet Home would fall into the non-metropolitan median family income category because the median income is the greater of the two. With a median family income in Sweet Home, per U.S. Census data, of $45,000, Sweet Home would be considered as a Moderate income area because $45,000 is less than 80 percent of $60,700. It may be necessary for the City to conduct an income survey for the specific area to be served by a project to make certain it will benefit Low/Mod households, as required by the CDGB program.

Special Public Works Fund

The Special Public Works Fund (SPWF) provides loan and grant assistance to eligible applicants for the construction of publicly owned infrastructure needed: 1) to support economic development projects that will result in a firm business commitment and the creation and retention of jobs: or 2) to build infrastructure capacity in order to improve the community's ability to keep or attract business and industry.

Eligible applicants include cities, counties, county service districts (per ORS 451), tribal councils of Indian tribes, the Port of Portland, and districts as defined in ORS 198.010.

The proposed project must be owned by a public entity that is an eligible applicant. Eligible projects costs can include costs incurred in conducting feasibility and other preliminary studies, in the design and construction engineering costs, as well as actual construction costs. The type of projects may include but are not limited to the following:

- Purchase of rights of way and easements necessary for infrastructure;
- Roadways, bridges, etc.;
- Storm drainage systems;
- Wastewater systems;
- Water source, treatment, storage and distribution facilities.

The total loan amount per project ranges from less than $100,000 to $10 million. The Infrastructure Finance Authority offers very attractive interest rates that reflect tax-exempt market rates for highly qualified borrowers. Initial loan terms can be up to 25 years or the useful life of the project, whichever is less.

Grants, when awarded, are subject to applicant need as well as other restrictions. It is not possible to determine how much, if any, grant funds might be awarded prior to analysis of the application and financial information. If a grant is offered it cannot exceed $500,000 or 85% of the project cost, whichever is less, and are based on up to $5,000 per eligible job created or retained.

The SPWF also offers “Technical Assistance” financing for municipalities faced with the costs of studying and/or engineering an eligible project. The technical assistance funds can be used to finance preliminary planning, engineering studies and economic investigations that are related to an existing or potentially eligible public infrastructures project.

For an application or additional information contact the Oregon Infrastructure Finance Authority Salem office, at 503-986-0130 or review program details at www.orinfrastructure.ore

Water/Wastewater Financing Program

The Water/Wastewater Financing Program (WWFP) was created by the Oregon Legislature in 1993 and capitalized with lottery funds appropriated each biennium and with the sale of state revenue bonds. The purpose of the WWFP is to provide financing for the design and construction of public infrastructure needed to ensure compliance with the Safe Drinking Water Act or the Clean Water Act.

Eligible applicants include cities, counties, tribal councils of Indian tribes, port authorities, and districts as defined in ORS 198.010.

Eligible projects included projects within a system that has received or will likely receive a Notice of Non-Compliance, by the appropriate regulatory agency, with the Safe Drinking Water Act or the Clean Water Act and/or a project required to meet other state or federal water quality statues and standards. The type of projects may include but are not limited to the following:

- Purchase of rights of way and easements necessary for infrastructure;
- Water source, treatment, storage and distribution facilities;
- Storm drainage systems;
- Wastewater systems;
- Design and construction engineering;
- Planning/technical assistance for small communities

The WWFP guidelines, project administration, loan terms and interest rates ace similar to the Special Public Works Fund program. The maximum loan term is 25 years or the useful life of the project whichever, is less. The maximum direct loan amount is $1.0 million when financed with lottery funds and the maximum bonded loan, when funded through the sale of State Revenue Bonds is $10 million. Loans funded through sales of State Revenue Bonds are given only to "credit worthy" borrowers. Loans are generally repaid with Utility Revenues or voter approved bond issues.

The maximum grant through the WWPF is $750,000, in addition to the cost of issuance and debt service reserve, in the case of a bonded loan. The grant/loan amounts are determined by a financial analysis or the applicant's ability to afford additional loans.

Technical assistance grants and loans may finance preliminary planning, engineering studies and economic investigations to determine project feasibility. The basis for eligibility is similar to construction projects, those needed to assist local governments in meeting the Safe Drinking Water Act and the Clean Water Act. Up to $20,000 in grant funds and $50,00D in additional loan funds may be awarded to eligible applicants of under15,000 in population.

For an application or additional information contact the Oregon Infrastructure Finance Authority Salem office, at 503-986-0130 or review program details at www.orinfrastructure.org

Safe Drinking Water Revolving Loan Fund

The Safe Drinking Water Revolving Loan Fund (SDWRLF) is managed by The Oregon Health Authority Drinking Water Services and the loans are managed by the Oregon Infrastructure Finance Authority. The SDWRLF program is available to communities that must correct noncompliance with current or future state and federal drinking water standards, address serious human health risk, or intend to create drinking water system improvements that will substantially benefit public health.

Funding is available for all sizes of water systems, although 15 percent of the funds are reserved for systems serving a population of fewer than 10,000. The SDWRLF lends up to $6 million per project with a favorable, fixed interest rate and the possibility of a subsidized interest rate and principal forgiveness for disadvantaged communities. The standard loan term is 20 years or the useful life of the project assets, whichever is less. The term may be extended to 30

years for disadvantaged communities. Interest rates are only 80 percent of state/local bond index rate.

An eligible borrower is any water system (publicly, nonprofit or privately owned, but never federally owned or operated) that serves year-round residents numbering at least 25, or via 15 or more service connections. The following are the main types of eligible activities and expenses:

- Engineering, design, upgrade, construction or installation of system improvements and equipment for water intake, filtration, treatment, storage, transmission and metering.
- Acquisitions of property, easements or the like, as needed to site, build, operate or protect facility or water source.
- Planning, surveys, legal/technical support, environmental review and so forth, arising from or attendant to improvement.
- Investments to enhance the physical security of drinking water and associated facilities, as well as water sources.
- Projects can include the cost to add or improve security measures to protect drinking water facilities.

Community water systems are eligible for loans up to $ l00,0O for source water protection measures to carry out elements of a Source Water Protection Plan.

Those costs that are not eligible for the SDWRLF loan program include dams, water rights, administration, ongoing operations, or a project that doesn't not directly address noncompliance or health risks, or is primarily intended for fire suppression, or is intended to serve future community growth beyond that justified using conventional population projections over project life

Drinking Water Protection Loan Fund

The Drinking Water Protection Loan Fund (SDWRLF) is managed by The Oregon Department of Human Services Drinking Water Program and the loans are managed by the Oregon Infrastructure Finance Authority. The DWPLF program is designed for the protection of drinking water sources.

The DWPLF lends up to $100,000 per source protection project which can include acquisitions of property, easements or the like, as needed to protect water source or investments to enhance the physical security of drinking water sources.

The application process for the DWPLF loan program begins with the submittal of a letter of interest, which may be submitted annually, generally beginning in January. The format for this letter can be obtained from the Oregon Infrastructure Finance Authority, 775 Summer St. NE, Suite 200, Salem, Oregon 97301 or on their website, www.orinfrastructure.org.

For additional information contact the Oregon Infrastructure Finance Authority Salem office, at 503-986-0130 or review program details at www.orinfrastructure.org

9.3 Water Resources Department

Water Development Loan Fund

The Water Development Loan Fund (WDLK provides long-term financing to fund water supply projects which will be used for drinking water, fish protection, watershed enhancement, and the drainage or irrigation of agricultural lands.

Eligible applicants included individual residents, entities with principal income from farming, water-related districts, cities, counties, local soil and water conservation districts, and organizations formed for the purpose of distributing water for community water supply.

To be eligible for WDLF loan, projects must meet one of the following:

- Drainage protection: facilities installed to provide for the removal of excess water to increase soil versatility and productivity.
- Irrigation project: facilities designed to provide water to land for the purpose of irrigation.
- Community water supply project: an undertaking, in whole or part, in Oregon for the purpose of providing water for municipal use. A community is an incorporated or unincorporated town or locality with more than three service connections and a population of less than 30,000.
- Fish protection project: an undertaking, in whole or in part, in Oregon for the purpose of protecting fish or fish habitat.
- Watershed enhancement project: an undertaking, in whole or in part, in Oregon for the purpose of watershed enhancement.
- Multi-purpose project: a water development project in Oregon which provides more than one use. The primary use of the project must be one of the uses listed above. Secondary uses may include other water uses which are compatible with the primary use compatible with the primary use.

The application process begins with a pre-application conference between the applicant and a WDLF loan officer. The loan officer answers any questions regarding the WDLF program and application process. Another conference is held to review the completed application to ensure it is adequate for submission. Upon submission of the application an engineering analyst conducts a technical review and prepares a project report while the loan officer prepares a written loan recommendation. The Loan Advisory Board then reviews the report and recommendation and makes a recommendation to the Director.

All costs to operate the WDLF are paid by borrowers, not taxpayers. Borrowers pay a non-refundable application fee of $100 and a loan processing fee of $lO00 or one percent (1%) of the loan request, whichever is greater, up to $10,000. Additionally, borrowers pay closing costs and bond issuance costs.

For more information on the WDLF contact Oregon Water Resources Department, 725 Summer St. NE, Suite A, Salem, Oregon 97301, (503/986- 0900)

9.4 U.S. Department of Agriculture – Rural Development

The goal of the U.S. Department of Agriculture Rural Development (USDA- RD) is to encourage the commercial financing of essential community development services of rural communities in order to strengthen rural infrastructure, develop and improve health care, public safety, and public service facilities, and improve the economic and environmental climate.

USDA-RD offers financial assistance in the form of the Water and Waste Disposal Direct Loan program for water supply and waste disposal facilities in rural areas and towns of up to 10,000 people. USDA-RD funds may be used for the development of storage, treatment, purification, or distribution of water or for the collection, treatment, and disposal of waste in rural areas.

Applicants must be unable to obtain sufficient credit elsewhere to finance actual needs at reasonable rates and terms. Loans made in areas where: 1) the median household income of the service area falls below the higher of 80 percent of the Statewide Non-Metropolitan Median Household Income (SNMHI) or the poverty level; and 2) the project if needed to meet applicable health or sanitary standards, bear interest not in excess of 5 percent.

Loans are repayable in not more than 40 years or the useful life of the project, whichever is less. As of October 1, 2014, three interest rates exist and are based on the Median Household Income (MHI) or the applicant's service area compared to SNMHI. These rates are included only for reference and USDA- RD should be contacted to obtain the most current interest rates.

Name of Rate	Interest Rate	Description
Market Rate	4.000%	The market rate is paid by those applicants whose MHI of the service is greater than the SNMHI.
Intermediate	3.250%	The intermediate rate is paid by those applicants whose MHI of the service area is 80% to 100% of the SNMHI.
Poverty Line	2.375%	The lowest rate is paid by those applicants whose MHI of the service area is below 80% of the SNMHI and the project is needed to meet regulatory agency health and sanitary standards.

The Community Facility Grants program was authorized under the Federal Agriculture Improvement and Reform Act of 1996. In most cases, the grant program is used in conjunction with the USDA-RD loan programs to make essential community facilities affordable for the neediest communities, which often cannot afford even direct loans without additional subsidies. To be eligible for grants through USDA-RD, communities must have 75% of the

population with a MHI below the higher of the poverty line or 80% of the SNMHI and be in violation of health and sanitary standards requirements.

For applications and/or further information on the USDA-RD loan/grant programs contact USDA Rural Development state office, 1201 NE Lloyd Blvd., Suite 801, Portland, Oregon 97232, 503-414-3360.

9.5 U.S. Department of Commerce

The U.S. Department of Commerce's Economic Development Department (EDA) has a Public Works Grant Program. The EPA's Public Works Grant Program was designed to provide jobs and to remove impediments to economic development in distressed communities.

Eligible applicants include cities, counties, municipalities, domestic water supply districts, and metropolitan service districts, except Portland, Salem, and Benton County. Preference is given to rural areas, and to county or regional economic development projects.

EPA receives annual congressional appropriations for grants to help Finance economic development in Oregon. Grant awards vary, but typically only fund only 50% to 80% of the project depending on the area's level of economic distress. A local match by the applicant is required, but state or federal loan funds can be used for the matching funds.

Eligible activities include drinking water supply infrastructure projects as long as they are directly tied to job creation or removing serious impediments to area economic development.

For application or other information contact the Oregon regional representative, David Porter, One World Trade Center, Suite 244, 121 SW Salmon Street, Portland, OR 97204, 503-326-3078.

9.6 Rural Community Assistance Corporation

The Rural Community Assistance Corporation (RCAC) is a private non-profit organization serving 13 states in the western United States. The RCAC assists rural communities achieve their vision and goals through training, technical assistance, and access to resources. ROAC in Oregon works with funding and regulatory agencies and partners to address compliance issues for lower income rural communities by helping with water and wastewater infrastructure projects.

The RCAC Loan Fund provides intermediate term and construction loans for water, wastewater, solid waste and storm facilities that primarily serve low income rural communities. Eligible applicants include non-profit organizations, public agencies, and tribal governments serving rural areas with populations of 50,000 or less, or 10,000 if using USDA Rural Development as the primary loan source.

Short term construction loans up to $2 million are available for 1-3 year terms at interest rates of 5.5%. Construction loans must include a commitment letter for permanent financing and also include a 1% loan fee. Eligible projects for the intermediate term loans are typically smaller capital needs projects. Intermediate term loan amounts generally to not exceed $100,000 and have a loan term of up to 20 years at an interest rate of 5%.

Loan applications are accepted at any time during the year. For more information or a loan application contact Josh Grill, 720-898-9463 or Jgriff@rcac.ore The RCAC website, www.rcac.org also has information and application forms.

9.7 Oregon Department of Energy

The Small Scale Energy Loan Program (SELP) finances energy conservation and renewable resources energy projects in Oregon. Renewable resources would include projects involving water, wind, geothermal heat, solar radiation, biomass, and waste heat. SELP can help identify cost effective projects through its Public Energy Package (PEP) program.

Eligible applicants include public and private entities, cities, counties, special districts, school districts, state agencies, Indian tribes, corporations, cooperatives, non-profit corporations, and residences.

SELP is funded through the sale of State of Oregon general obligation bonds (GO) bonds. Interest rates vary depending on the bond market, term of the loan, the timing of the project, and the availability of funds.

Eligible activities include any energy related projects, including drinking water system improvements, which result in energy production or conservation.

Loans typically require a security interest in the project, a lien on project revenues, if applicable, and a pledge to repay the loan. Loans can cover most project-related costs and range in amounts from $20,000 to $20 million with loan terms ranging from 5-20 years. A SELP loan can be used in conjunction with other financing programs, including acting as local match for grants.

9.8 Local Funding

User Fees/Connection Fees

Monthly user rate fees and one time connection fees are the main source available to the City to finance operation and maintenance of the water system. The current rate fee schedule and connection fees are listed in Appendix G. An annual 3% increase in the base and overage fees listed are calculated prior to and effective with the July 1bill each year.

Along with routine maintenance, small water system improvement projects are ideal for utilizing cash reserves generated by the user rates and connection fees. Additionally, the 3% annual increase plays a factor in the City's ability to secure loans for larger projects.

General Obligation Bonds

General obligation (GO) bonds are municipal bonds that can be utilized to fund municipal water system projects. GO bonds are typically repaid through an increase in property taxes based on an equitable distribution of the bonded obligation across the City's assessed valuation. GO bonds do require voter approval for issuance.

Revenue Bonds

Revenue bonds differ from GO bonds in that they rely on the sales of the utility (user rates) to repay the bond. The security for the bond is the City's commitment to charge user fees sufficient to pay all operating costs and debt service. One advantage of revenue bonds is that the do not require voter approval, however, they typically have higher interest rates than GO bonds.

Local Improvement Districts

Local Improvement Districts (LIDs) are utilized to fund projects that benefit a limited area. Improvement costs are therefore distributed to customers only within the LID who utilize the improvement.

Local Loan Centers

Local financial intuitions are often able to offer municipalities reasonable loans for improvement projects at competitive interest rates. Often times these institutions require less administrative restrictions and paperwork that the public funding agencies.

9.9 Recommended Financing

For smaller maintenance and improvement projects, the City should consider the use of City funds generated by user rate fees and connection fees to finance the work. Using City funds will eliminate interest payments, decrease administrative requirements, and speed up the overall project process.

For large scale projects, the City should consider the use of public funding agencies. The available loans, and possibly grants, through Oregon IFA and U.S. Department of Agriculture — Rural Development are sources that should be considered first. A good first step in learning what financing is available from these agencies is to schedule a One-Stop meeting to present a project to the IFA, USDA-RD and other funding agencies. One-Stop meetings are held regularly in Salem each month, or can be scheduled in the water system's community. The City will be given an opportunity to discuss a proposed project, receive information about potential funding scenarios and learn about program requirements of the funding agencies.

Section 10 – Summary and Recommended Improvements

10.1 General **(WMCP 690-086-0)125-5**

The goals of this plan were to determine the amount of water required to meet the City of Sweet Home's current and future needs, determine if upgrades are required to provide reliable water supply to all areas of the city, and to document the City's current and proposed water management and conservation techniques required to satisfy conservation and management requirements.

The City of Sweet Home, Oregon is the local government that is affected by this plan, and although it is not required, notice of this plan will be provided to Linn County for their review and comment.

10.2 Summary of Findings

- **Growth** – The projected population growth for water system planning was determined to be 1.168% annually in this Plan. This results in a projected population for the City of 12,259 residents in 2040, the end of the 20 year planning period. Based on this growth, the resulting peak daily water demand in 2040 was found to be 2,757 gallons per minute (gpm) or 3,970,045 gallons per day (gpd).
- **Supply** – The perfected water rights for the City to date allows for up to 4,986 gpm of raw water for municipal use. The combined maximum available supply flow at the City water treatment plant is 4,167 gpm. Combined, there is sufficient supply to meet the current peak daily demands of 2,086 gpm in 2016 and 2,757 gpm in 2040, and as such, supply is adequate for the planning period and additional sources are not required at this time.
- **Storage** – The City's current storage capacity of 4,610,000 gallons is more than adequate than the amount the City needs to provide to meet the 4,510,000 gallons for fire flow and peak daily demands. Although there is limited storage room available for additional growth beyond that projected by 2040, the proposed storage replacement/improvement identified within this plan will provide some further additional growth capabilities.
- **Distribution** – The distribution system has few deficiencies and provides adequate flows and pressures throughout. Minor improvements to maintain and/or enhance the system are noted in Section 10.3.
- **Water Conservation** – Water conservation awareness has been implemented in the past by the City however it can be improved. The City should continue conservation efforts highlighted in this plan, which include:
    - A public education program
    - Customer service meter testing
    - A leak detection program
- **Curtailment** – The review of the water system revealed several built in features to help minimize the effects of source water issues. These include separate well sites and a

sizable storage reservoir. To further prepare for emergency situations, the City will update their water conservation ordinance. The updated ordinance, which provides stages for alert, is included as Appendix I.

- **Improvement & Planning Projects** – The system improvement and planning projects discussed below and outlined in Table 10.1 will assist the City in maintaining a viable water system throughout the 20-year planning period and beyond.

10.3 System Improvements

The City has various programs are in place for water pipeline and reservoir replacement/enhancements. The mainline replacement program will continue along with some new transmission mainlines will be constructed for regional network efficiencies. Additional reservoirs are considered for different locations, i.e. particularly serving the areas east of Willey Creek, and storage in the center of town. Most locations are dependent on local property owner approval due to the limited availability of lands. Meter systems and reading will be upgraded to provide increased user access, and city knowledge of usage, leaks, and responsiveness to customer requests.

The City has one 16" water main attached to a bridge that crosses Wiley Creek that serves the Foster "District" east of 49th Avenue. This water main had an above-ground line break in the summer of 2014, leaving the Foster neighborhood out of water until a temporary storage tank and system pressure pump could be temporarily installed. The City has identified some preliminary options to provide water across Wiley Creek to the east side with parallel mains that should be evaluated further:

- One option is placing an additional 8" mainline on the north side of the existing bridge, as a redundant backup to the existing 16" mainline. The new line would run from across Main Street (US Hwy 20) near 49th Avenue, and run eastward to 53rd Avenue with an extension to 54th Ave, and back across the highway to the south side at 53rd for network connectivity.
- A second option would be to run an 8" waterline across the existing railroad bridge downstream of the highway bridge as it crosses Wiley Creek.
- Thirdly would be the potential boring of a water line under Wiley Creek parallel to the existing Raw Water Supply Line that currently provides raw water to the Water Treatment Plant.

10.4 Recommended Financing

For smaller maintenance and improvement projects, the City should consider the use of City funds generated by user rate fees and connection fees to finance the work. For large scale projects, the City should consider the use of public funding agencies. Scheduling a One-Stop meeting to present a project to Oregon IFA, USDA-RD and other funding agencies will give the City an opportunity to discuss a proposed project, receive information about potential funding scenarios and learn about program requirements of the funding agencies.

10.5 Water Conservation

The City has a rate structure in place that attempts to create awareness that usage cost increase as more water is used. The water system is fully metered which allows the City to compare the amount of water produced and sold on a monthly basis. This allows the City complete an annual audit to review the amount of water that goes unaccounted for. To further conservation efforts it is recommended that with the approval of this plan, the City implement the Public Education Program outlined, source meter testing, and a leak detection program.

10.6 Curtailment

The City of Sweet Home has had a historically reliable system with the only known significant disruption occurring during a severe winter storm that reduced power availability to the old water treatment plant for about three consecutive days, in which no back-up power generation was available. During this time, the 4,610,000 gallons available within the storage reservoirs provides necessary protection during this short-term outage.

The *DRAFT* City Ordinance No. for 2016 (Appendix I) addresses the possibility that source water may become limited but does not give specific triggers for alert or actions to be taken. With the approval of this plan the City will formally adopt the proposed Ordinance with the three stages of alert and the associated conservation actions to be taken as outlined in this plan.

10.7 Plan Update **(WMCP 690-086-0)125-6**

The City of Sweet Home proposes to submit an updated plan ten (10) years from the submittal of this plan, approximately 2026. The City will evaluate progress on water curtailment and water conservation efforts set forth in this plan at that time. No major improvements to the City's water system or source water supply are anticipated prior to the end of this 10 year period.

10.8 Rate Study

In 1999, the City of Sweet Home authorized a complete rate analysis for the water and sewer utilities that aimed to determine the revenue requirements for the water and sewer utilities; to determine the cost of the two services; and also to study and help set water and sewer rates. In 2013, when considering financial issues related to a separate municipal utility, ECONorthwest reviewed the existing rate structure, program and methodology and determined that it continues to function as intended and is still functional.

In considering the existing local political environment, it may be beneficial for the City to consider completing a comprehensive water rate study in order to help fund the recommended projects within this plan. Rate studies typically review revenue requirements, funding options, analysis of alternate rate structures, and rates and fees by customer class. An outline of these items will assist the City with long term planning goals associated with the recommended projects. Estimated rate impacts are shown in Table 10.1 for each project phase. The rates are based on 3,000 accounts and 20 year project loan repayment.

10.9 Recommendations

In conclusion, it is recommended the City of Sweet Home:

1. Approve and adopt the Water Management, Conservation, and System Master Plan.
2. Submit this Plan to Oregon's Health Authority – Drinking Water Section and Oregon Water Resources Department for approval.
3. Make plans to complete the recommended water system improvements shown in Table 10.1.
4. Adopt and implement Conservation elements and set forth in this plan including;
    a. Public Education,
    b. Source and customer meter testing & calibration,
    c. Leak detection program.
5. Adopt Curtailment Plan by City Resolution/Ordinance to include the triggers and curtailment actions detailed in this plan.
6. Develop a policy in which City's Water Management, Conservation, and System Master Plan is evaluated every ten (10) years in order to update the contents of the plan and review growth, water demand, plant production, storage capacity, and project priority.
7. Complete Rate Study review based upon the recommended projects shown in Table 10.1.

By adopting the above list of improvements, the City of Sweet Home will continue to provide adequate water supply, storage, and distribution for many years to come as well as work to conserve water and be better prepared for a water supply emergency should one arise.

Table 10.1 – Recommended Projects

	Water Supply & Operations	Phase 1 0-5 Years	Phase 2 5-10 Years	Phase 3 10-20 Years
	Filter Media replacement (every 20 Years)	$ 20,000.00	$ 20,000.00	$ 20,000.00
	VFD on finished Water	$ 20,000.00	$ -	$ -
	SCADA System & Computer	$ 45,000.00	$ -	$ -
	WTP Backup Power (2 each)	$ 100,000.00	$ -	$ -
		$ -	$ -	$ -
	Water Distribution			
	AMR Meter Replacement	$ 1,500,000.00	$ -	$ -
	2" waterline replacement per plan	$ 332,000.00	$ 250,000.00	$ 445,000.00
	TGE Waterline per plan	$ 65,000.00	$ 305,000.00	$ -
	LMR Waterline plan	$ 350,000.00	$ -	$ -
	12" water main extension - Hwy 20	$ -	$ -	$ 200,000.00
*	12" waterline (15th Avenue) Nodes 80-25	$ -	$ -	$ 25,000.00
*	12" waterline (Green River) Nodes 57-65	$ -	$ -	$ 950,000.00
*	12" waterline (Yucca St) Nodes 28-62	$ 650,000.00	$ -	$ -
*	12" waterline (24th Avenue) Nodes 37-83	$ -	$ 300,000.00	$ -
	Secondary watermain to Foster District	$ 400,000.00	$ -	$ -
		$ -	$ -	$ -
	Water Storage			
	10th Avenue Reservior replacement	$ -	$ 3,300,000.00	$ -
	Foster District Reservior - New	$ -	$ -	$ 250,000.00
		$ -	$ -	$ -
	Water Conservation			
	Leak Detection (every 5 years)	$ 6,250.00	$ 6,250.00	$ 6,250.00
	Public Education Program ($1,000/Yr)	$ 5,000.00	$ 5,000.00	$ 5,000.00
		$ -	$ -	$ -
	Planning			
	Water Rate Study	$ 30,000.00	$ -	$ 35,000.00
	Update WMCSMP and review demand, storage, and pumping every 10 years.	$ -	$ 35,000.00	$ 35,000.00
	SCADA and BU Power pre-design	$ 15,000.00	$ -	$ -
		$ -	$ -	$ -
	Totals	$ 3,538,250.00	$ 4,221,250.00	$ 1,971,250.00
			$/Month/Account	
	Estimated Water Rate Impact/acct/month - (**Based on 3,000 acounts and 20 year loan payback**)	$ 4.91	$ 5.86	$ 2.74

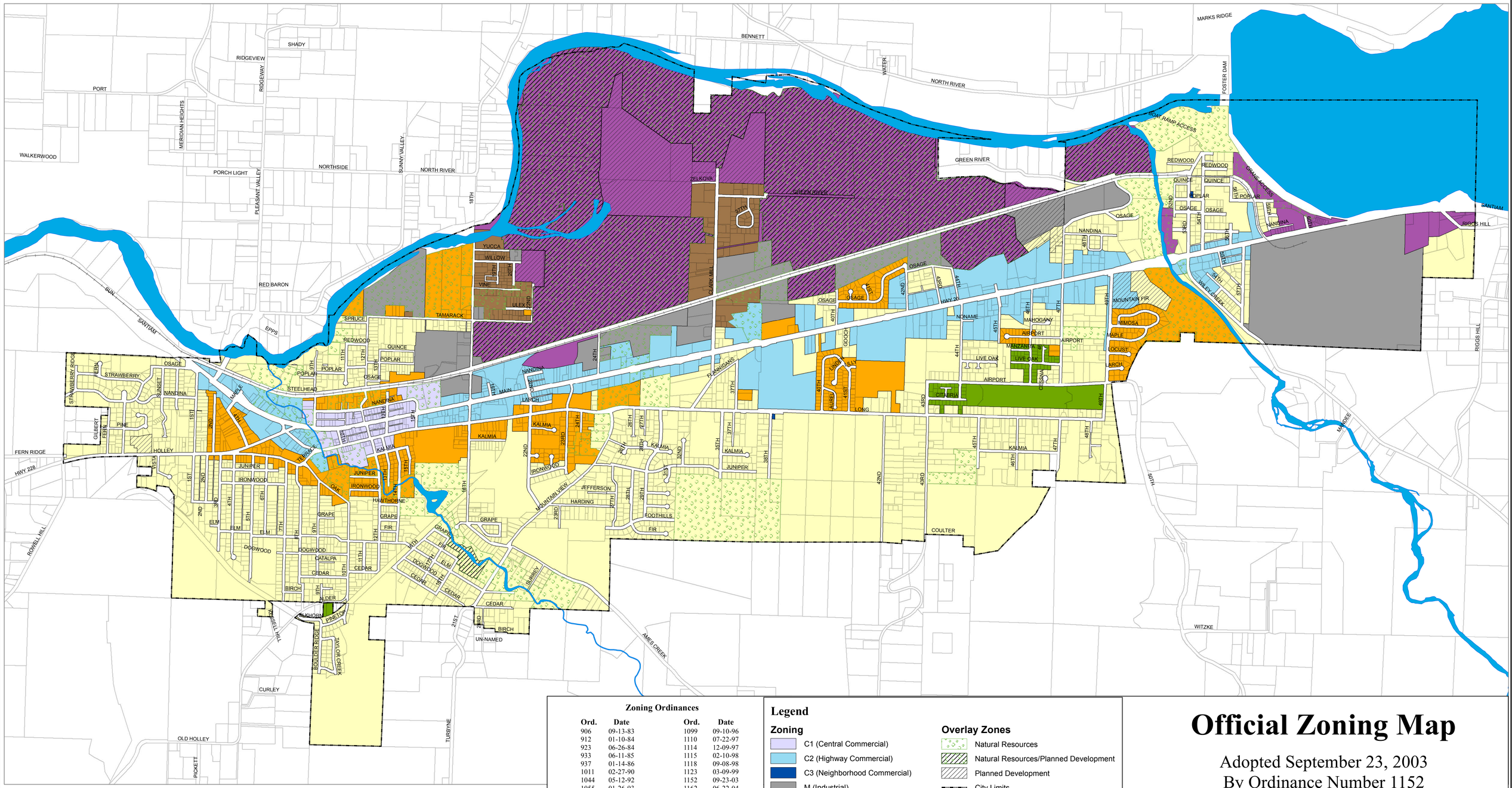
* Orginal to Table 4-4 CIP 1997-2017

Section 11 – Appendix

A. City of Sweet Home Zoning Map
B. Oregon Water Resources - Final Order Approving Water Management and Conservation Plan
C. Oregon Administrative Rules
D. WRD Water Use Report
E. Water Rights Summary and Documentation
F. Water System Computer Modeling
G. City of Sweet Home Water Rate Fee Schedule
H. Public Education Program Flyer & Benchmarks
I. "*DRAFT*" City Ordinance
J. WMCP Amendment 2016

Appendix A
City of Sweet Home Zoning Map

Sweet Home Zoning



This map was created for display purposes only and is subject to errors and/or omissions. The City of Sweet Home and Linn County disclaim any liability as to the accuracy of the data.

Reproduced by PR 3/26/15 from original by SV 01/09/09

Created By:

City of Sweet Home
Community Development

541-367-8113

Zoning Ordinances

Ord.	Date	Ord.	Date
906	09-13-83	1099	09-10-96
912	01-10-84	1110	07-22-97
923	06-26-84	1114	12-09-97
933	06-11-85	1115	02-10-98
937	01-14-86	1118	09-08-98
1011	02-27-90	1123	03-09-99
1044	05-12-92	1152	09-23-03
1055	01-26-93	1162	06-22-04
1060	06-22-93	1169	03-22-05
1069	04-26-94	1178	01-10-06
1070	04-26-94	1181	03-14-06
1080	11-08-94	1192	07-24-07
1081	12-13-94	1193	09-11-07
1083	06-19-96	1197	12-11-07
1099	09-10-96	1200	05-27-08
1102	04-22-97	1206	12-25-08
1105	05-27-97		

Legend

Zoning

- C1 (Central Commercial)
- C2 (Highway Commercial)
- C3 (Neighborhood Commercial)
- M (Industrial)
- R1 (Low Density Residential)
- R2 (High Density Residential)
- R3 (Medium Density Residential)
- RC (Recreation Commercial)
- RMT (Residential Industrial Transition)

Overlay Zones

- Natural Resources
- Natural Resources/Planned Development
- Planned Development
- City Limits
- Taxlots
- Lakes, Rivers, Streams
- Railway

Official Zoning Map

Adopted September 23, 2003
By Ordinance Number 1152
Updated by Later Zoning Ordinances

0 — 0.5 — 1 Miles

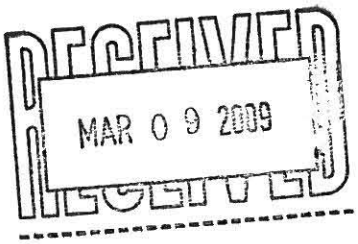
1 inch equals 0.16 miles

Appendix B
Oregon Water Resources – Final Order Approving Water Management and Conservation Plan

Oregon
Theodore R. Kulongoski, Governor

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

March 2, 2009



City of Sweet Home
Attn: Michael J. Adams, Public Works Dir.
1140 12th Avenue
Sweet Home, OR 97386

Subject: Water Management and Conservation Plan

Dear Mr. Adams:

Enclosed, please find the final order approving your water management and conservation plan. We did not receive any appeals of the proposed final order (PFO) that we issued on December 11, 2006. However, the Department did receive the City of Sweet Home's response to the PFO on December 20, 2006. Your response requested that the PFO be amended to include authorization for the City to be able to divert an additional 1.99 cubic feet per second (cfs) of water under Permit S-49959, which would free up the entire quantity of water (5.5 cfs) allowed under this permit.

The Department has evaluated your request, consistent with OAR Chapter 690 Division 86, and determined that the City's Water Management and Conservation Plan does not demonstrate a sufficient need to justify the Department's authorization of the diversion of additional water under Permit S-49959 beyond the limitation established by the extension of time approved on Permit S-49959, being 3.51 cfs.

This final order does authorize the City of Sweet Home to divert up to 7.0 cfs of water under Permit S-20525. That quantity, along with the 0.6 cfs available under the inchoate right to be perfected under Special Order Vol. 57, Pg. 994 approving Transfer T-8662 (which cancelled Certificate 13741) and the 3.51 cfs that can be diverted under Permit S-49959 authorizes the City to divert a total of 11.11 cfs of water.

Based upon the City's estimated demand figures (including Santiam River Club) shown in Table 5-4b (pg. 5-6) of the Revised June 2006 water management and conservation plan, it is anticipated that 7.17 cfs of water will be needed to meet peak demand in the year 2030. Further, it is expected that peak demand in the year 2050 will be at 8.75 cfs.

The 11.11 cfs of water available for diversion by the City far exceeds the estimated demands for the next 40 years, and it appears there would be enough excess water to supply any additional needs that may be presented by the Santiam River Club.

Therefore, pursuant to OAR 690-086-0130(2), the Department is unable to authorize additional diversion of water under Permit S-49959 at this time. The diversion limitation of 3.51 cfs of water under Permit S-49959 established by the permit extension of time remains in effect.

In the event there is a need for additional water beyond the 11.11 cfs currently authorized for diversion, the City may submit an application to the Department requesting a Limited License under ORS 537.143 through 537.144. A Limited License may be issued for a short-term or fixed duration period of up to five years.

We appreciate your cooperation in this effort. Please do not hesitate to contact us if we can provide any guidance or information as you update your plan.

Sincerely,

Lisa J. Jaramillo
Water Management and Conservation Analyst
Field Services Division

Enclosure

cc: WMCP file
Michael Mattick, Dist. #02 Watermaster
Bill Ferber, NW Regional Manager
Ann Reece, WR Permit Extensions
Scott Kudlemyer, WR Permit Extensions
Permit S-20525 (Appl. S-25810)
Permit S-49959 (Appl. S-57037)
Pace Engineers, Inc., 1300 John Adams St., Oregon City, OR 97045

BEFORE THE WATER RESOURCES DEPARTMENT
OF THE
STATE OF OREGON

In the Matter of the Proposed Water Management and Conservation Plan for City of Sweet Home, Linn County	)))	FINAL ORDER APPROVING WATER MANAGEMENT AND CONSERVATION PLAN

Authority

OAR Chapter 690, Division 086, establishes the process and criteria for approving water management and conservation plans required under the conditions of permits, permit extensions and other orders of the Department. An approved water management plan may authorize the diversion and use of water under a permit extended pursuant to OAR Chapter 690, Division 315.

Background

1. On February 21, 2006, the City of Sweet Home submitted a draft Water Management and Conservation Plan for review under OAR Chapter 690, Division 086 (November 2002). Submittal of the plan was required under approved permit extensions of time for Permits S-20525 and S-49959.

2. The Department published notice of receipt of the plan on February 28, 2006. No public comments were received.

3. The Department provided comments on the plan to the City on April 21, 2006, and in response, the City submitted a revised (final) plan on October 23, 2006.

4. On December 11, 2006, the Department issued a proposed final order to approve the City of Sweet Home Water Management and Conservation Plan, which set forth a deadline of January 11, 2007 for appeal. The proposed final order specified that the City is authorized to divert up to 7.0 cubic feet per second (cfs) of water under Permit S-20525. The proposed final order did not authorize the diversion of additional water beyond the 3.51 cfs of water identified in the final order extending the completion timelines under Permit S-49959.

5. The Department received the City of Sweet Home's response to the proposed final order on December 20, 2006. The response requested that the proposed final order be amended to include authorization for the City to divert up to 5.5 cfs of water under Permit S-49959. The request was accompanied by a copy of an agreement between the City and the Santiam River Club (SRC) in which SRC agreed to purchase and use the City's excess raw water and treated wastewater for irrigation, landscaping and water features within the SRC development.

This final order is subject to judicial review by the Court of Appeals under ORS 183.482. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.482(1). Pursuant to ORS 536.075 and OAR 137-003-0675, you may petition for judicial review or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

Findings of Fact

6. The City of Sweet Home Water Management and Conservation Plan contains all plan elements required under OAR 690-086-0125.

7. The projections of future water needs in the plan demonstrate a need for over 7.0 cfs of water available under Permit S-20525 to meet demands for the population anticipated in 20 years. These projections are reasonable and consistent with the City's land use plan.

8. The 7.0 cfs of water under Permit S-20525, along with 0.6 cfs available under the inchoate right to be perfected under Special Order Vol. 57, Pg. 994 approving Transfer T-8662 (which cancelled Certificate 13741) and 3.51 cfs currently authorized for diversion under Permit S-49959 would allow the City to divert a total of 11.11 cfs of water.

9. Based upon the City's estimated demand figures (including Santiam River Club) shown in Table 5-4b (pg. 5-6) of the Revised June 2006 water management and conservation plan, it is anticipated that 7.17 cfs of water will be needed to meet peak demand in the year 2030. Further, it is expected that peak demand in the year 2050 will be at 8.75 cfs.

10. The 11.11 cfs of water, described in Finding #8 above, far exceeds the City's estimated demands for the next 40 years, and it appears there would be enough excess water to supply any additional needs that may be presented by the Santiam River Club.

11. Pursuant to OAR 690-086-0130(2), because the projections of future water needs in the plan do not demonstrate a sufficient need, the Department is unable to authorize additional diversion of water under Permit S-49959 at this time. The diversion limitation of 3.51 cfs of water under Permit S-49959 established by the permit extension of time remains in effect.

12. The plan includes 5-year benchmarks for implementation of completely rebuilding the water treatment plant including metering the quantity of water diverted at the source rather than the output of treated water, various water conservation programs including intensive line replacement. The system is fully metered and the rate structure includes a base rate and volumetric charge. System leakage is estimated at over 15% percent.

13. The plan includes 5-year benchmarks for evaluation, development, and implementation of programs to perform ongoing leak detection and repair, pipe replacement, free customer audits, meter testing, conservation presentations and brochures twice per year and provide conservation training for large water users.

14. The plan identifies the South Santiam River as the source of the City's water rights and accurately and completely describes Pacific Lamprey, Cutthroat Trout, Steelhead, Chinook Salmon, Bull Trout and Oregon Trout as listed species.

15. The water curtailment element included in the plan satisfactorily promotes water curtailment practices and includes a list of three stages of alert with concurrent curtailment actions.

16. The diversion of water under permit S-20525 will be initiated during the next 20 years and consistent with OAR 690-086-0130(7):

    a. The plan meets OAR 690-086-0130(7)(a) by implementation of conservation measures as listed above;

    b. The plan meets OAR 690-086-0130(7)(b), as there are no nearby municipalities to interconnect to or share water; and

    c. The plan meets OAR 690-086-0130(7)(c) by implementation of new meter systems.

Conclusion of Law

The water management and conservation plan submitted by the City of Sweet Home is consistent with the criteria in OAR Chapter 690, Division 086.

Now, therefore, it is ORDERED:

1. The City of Sweet Home Water Management and Conservation Plan is approved and shall remain in effect until March 2, 2019, unless this approval is rescinded pursuant to OAR 690-086-0920.

2. The limitation of the diversion of water under Permit S-20525 established by the extension of time approved on Permit S-20525 is removed and, subject to other limitations or conditions of the permit, the City of Sweet Home is authorized to divert up to 7.0 cfs under Permit S-20525.

3. The City of Sweet Home shall submit an updated plan within ten years and no later than February 21, 2016, and shall submit progress reports containing the information required under OAR 690-086-0120(4) by February 21, 2011.

Dated at Salem, Oregon this 2nd day of March, 2009.

William E Fabre
for Phillip C. Ward, Director

Mailing date: MAR 0 5 2009

Appendix C
Oregon Administrative Rules

333-061-0060 Plan Submission and Review Requirements

(1) Plan Submission:

(a) Construction and installation plans shall be submitted to and approved by the Authority before construction begins on new systems or major additions or modifications, as determined by the Authority, are made to existing systems. Plans shall be drawn to scale;

(b) Preliminary plans, pilot studies, master plans and construction plans shall be prepared by a Professional Engineer registered in Oregon, and submitted to the Authority unless exempted by the Authority (See OAR 333-061-0060(4));

(c) Plans shall set forth the following:

(A) Sufficient detail, including specifications, to completely and clearly illustrate what is to be constructed and how those facilities will meet the construction standards set forth in these regulations. Elevation or section views shall be provided where required for clarity;

(B) Supporting information attesting to the quality of the proposed source of water;

(C) Vicinity map of the proposed project relative to the existing system or established landmarks of the area;

(D) Name of the owner of the water system facilities during construction and the name of the owner and operator of the facilities after completion of the project;

(E) Procedures for cleaning and disinfecting those facilities which will be in contact with the potable water.

(d) Prior to drilling a well, a site plan shall be submitted which shows the site location, topography, drainage, surface water sources, specifications for well drilling, location of the well relative to sanitary hazards, dimensions of the area reserved to be kept free of potential sources of contamination, evidence of ownership or control of the reserve area and the anticipated depth of the aquifer from which the water is to be derived. The Authority will review well reports from the area and in consultation with the local watermaster and the well constructor as appropriate will recommend the depth of placement of the casing seal. After the well is drilled, the following documents shall be submitted to the Authority for review and approval: Well driller's report, report of the pump test which indicates that the well has been pumped for a sufficient length of time to establish the reliable yield of the well on a sustained basis, including data on the static water level, the pumping rate(s), the changes in drawdown over the duration of the test, the rate of recovery after the pump was turned off, reports on physical, chemical and microbiological quality of the well water, performance data on the well pump, a plan of the structure for protecting above-ground controls and

appurtenances, and a plan showing how the well will be connected to the water system. (See OAR 333-061-0050(2)).

(e) Any community, non-transient non-community, or transient non-community water system that treats surface water or groundwater under the influence of surface water and that desires to make a significant change to its disinfection treatment process as defined by paragraphs (1)(e)(A) through (1)(e)(D) of this rule, is required to develop a disinfection profile and calculate a disinfection benchmark according to OAR 333-061-0036(4)(g). The water system must consult with and provide any additional information requested by the Authority prior to making such a change. The water system must develop a disinfection profile for *Giardia lamblia* and viruses, calculate a disinfection benchmark, describe the proposed change in the disinfection process, and analyze the effect(s) of the proposed change on current levels of disinfection according to the USEPA Disinfection Profiling and Benchmarking Guidance Manual and/or the USEPA LT1-ESWTR Disinfection Profiling and Benchmarking Technical Guidance Manual and submit the information to the Authority for review and approval. Significant changes to the disinfection treatment process include:

(A) Changes to the point of application:

(B) Changes to the disinfectants used in the treatment process;

(C) Changes to the disinfection process;

(D) Any other modification identified by the Authority.

(f) A water system that uses either chloramines, chlorine dioxide, or ozone for primary disinfection, and that is required to prepare a disinfection profile for *Giardia lamblia* as prescribed by subsection (1)(e) of this rule, must also prepare a disinfection profile for viruses and calculate the logs of inactivation for viruses using the methods specified in OAR 333-061-0036(4)(g).

(2) Plan review:

(a) Upon receipt of plans, the Authority shall review the plans and either approve them or advise that correction or clarification is required. When the correction or clarification is received, and the item(s) in question are resolved, the Authority shall then approve the plans;

(b) Upon completion of a project, a professional engineer registered in Oregon shall submit to the Authority a statement certifying that the project has been constructed in compliance with the approved plans and specifications. When substantial deviations from the approved plans are made, as-built plans showing compliance with these rules shall be submitted to the Authority;

(c) Plans shall not be required for emergency repair of existing facilities. In lieu of plans, written notice shall be submitted to the Authority immediately after the emergency work is completed stating the nature of the emergency, the

extent of the work and whether or not any threats to the water quality exists or existed during the emergency.

(3) Plan review fees: Plans submitted to the Authority shall be accompanied by a fee as indicated in Table 47. Those plans not accompanied by a fee will not be reviewed.

Table 47		
Nature of Plan	Community Water System	Non-Community Water System
Water source	$600	$150
Water Treatment	$600	$150
Water Treatment (full)	$600	$150
Disinfection only	$150	$45
Corrosion Control only	$150	$45
Distribution & Storage	$600	$150
Distribution only	$600	$150
Storage only	$600	$150
Combination two or more	$750	$150
Master Plan	$750	$150
Corrosion Control study	$750	$150
As-built plans & certification statement	No fee if original plans reviewed	

(4) Plan review exemptions:

(a) Water suppliers may be exempted from submitting plans of main extensions, providing they:

(A) Have provided the Authority with a current master plan; and

(B) Certify that the work will be carried out in conformance with the construction standards of these rules; and

(C) Submit to the Authority an annual summary of the projects completed; and

(D) Certify that they have staff qualified to effectively supervise the projects.

(b) Those water suppliers certifying that they have staff qualified to effectively plan, design and supervise their projects, may request the Authority for further exemption from this rule. Such requests must be accompanied by a listing of staff proposed to accomplish the work and a current master plan. To maintain the exemption, the foregoing must be annually updated;

(c) At the discretion of the Authority, Community, Transient and Non-Transient Non-Community and State Regulated water systems may be exempted from submitting engineered plans. They shall, however, submit adequate plans

indicating that the project meets the minimum construction standards of these rules.

(5) Master plans:

(a) Community water systems with 300 or more service connections shall maintain a current master plan. Master plans shall be prepared by a professional engineer registered in Oregon and submitted to the Authority for review and approval.

(b) Each master plan shall evaluate the needs of the water system for at least a twenty year period and shall include but is not limited to the following elements:

(A) A summary of the overall plan that includes the water quality and service goals, identified present and future water system deficiencies, the engineer's recommended alternative for achieving the goals and correcting the deficiencies, and the recommended implementation schedule and financing program for constructing improvements.

(B) A description of the existing water system which includes the service area, source(s) of supply, status of water rights, current status of drinking water quality and compliance with regulatory standards, maps or schematics of the water system showing size and location of facilities, estimates of water use, and operation and maintenance requirements.

(C) A description of water quality and level of service goals for the water system, considering, as appropriate, existing and future regulatory requirements, nonregulatory water quality needs of water users, flow and pressure requirements, and capacity needs related to water use and fire flow needs.

(D) An estimate of the projected growth of the water system during the master plan period and the impacts on the service area boundaries, water supply source(s) and availability, and customer water use.

(E) An engineering evaluation of the ability of the existing water system facilities to meet the water quality and level of service goals, identification of any existing water system deficiencies, and deficiencies likely to develop within the master plan period. The evaluation shall include the water supply source, water treatment, storage, distribution facilities, and operation and maintenance requirements. The evaluation shall also include a description of the water rights with a determination of additional water availability, and the impacts of present and probable future drinking water quality regulations.

(F) Identification of alternative engineering solutions, environmental impacts, and associated capital and operation and maintenance costs, to correct water system deficiencies and achieve system expansion to

meet anticipated growth, including identification of available options for cooperative or coordinated water system improvements with other local water suppliers.

(G) A description of alternatives to finance water system improvements including local financing (such as user rates and system development charges) and financing assistance programs.

(H) A recommended water system improvement program including the recommended engineering alternative and associated costs, maps or schematics showing size and location of proposed facilities, the recommended financing alternative, and a recommended schedule for water system design and construction.

(I) If required as a condition of a water use permit issued by the Water Resources Department, the Master Plan shall address the requirements of OAR 690-086-0120 (Water Management and Conservation Plans).

(c) The implementation of any portion of a water system master plan must be consistent with OAR 333-061 (Public Drinking Water Systems, Oregon Health Authority), OAR 660-011 (Public Facilities Planning, Department of Land Conservation and Development) and OAR 690-086 (Water Management and Conservation Plans, Water Resources Department).

Stat. Auth.: ORS 448.131
Stats. Implemented: ORS 431.110, 431.150, 448.131, 448.150, 448.273 & 448.279

333-061-0050 Construction Standards

(1) General:

(a) These standards shall apply to the construction of new public water systems and to major additions or modifications to existing public water systems and are intended to assure that the system facilities, when constructed, will be free of public health hazards and will be capable of producing water which consistently complies with the maximum contaminant levels;

(b) Facilities at public water systems must comply with the construction standards in place at the time the facility was constructed or installed for use at a public water system. A public water system shall not be required to undertake alterations to existing facilities, unless the standard is listed as a significant deficiency as prescribed in OAR 333-061-0076(4) and that creates a public health hazard, or if maximum contaminant levels are being exceeded.

(c) Non-public water systems that are converted to public water systems shall be modified as necessary to conform to the requirements of this rule.

(d) Facilities at public water systems shall be designed and constructed in a manner such that contamination will be effectively excluded, and the structures and piping will be capable of safely withstanding external and internal forces acting upon them;

(e) Only materials designed for potable water service and meeting NSF Standard 61, Section 9 - Drinking Water System Components -- Health Effects (Revised September, 1994) or equivalent shall be used in those elements of the water system which are in contact with potable water;

(f) New tanks, pumps, equipment, pipe valves and fittings shall be used in the construction of new public water systems, major additions or major modifications to existing water systems. The Authority may permit the use of used items when it can be demonstrated that they have been renovated and are suitable for use in public water systems;

(g) Prior to construction of new facilities, the water supplier shall submit plans to the Authority for approval as specified in OAR 333-061-0060(1)(a).

(h) Construction may deviate from the requirements of this section provided that documentation is submitted, to the satisfaction of the Authority, that the deviation is equal to or superior to the requirements of this section as specified in OAR 333-061-0055 (variances from construction standards).

(i) A public water system or other Responsible Management Authority using groundwater, or groundwater under the direct influence of surface water, derived from springs, confined or unconfined wells that wish to have a state certified wellhead protection program shall comply with the requirements as specified in OAR 333-061-0057, 0060, and 0065, as well as OAR 340-040-0140 through 0200. Additional technical information is available in the Oregon Wellhead Protection Guidance Manual.

(j) All new groundwater sources are subject to consideration for potential direct influence of surface water as prescribed in OAR 333-061-0032(7).

(2) Groundwater:

(a) Wells:

(A) For the purpose of this rule, wells are defined as holes or other excavations that are drilled, dug or otherwise constructed for the purpose of capturing groundwater or groundwater in hydraulic connection with surface water as a source of public drinking water.

(B) The area within 100 feet of the well shall be owned by the water supplier, or a perpetual restrictive easement shall be obtained by the water supplier for all land (with the exception of public rights-of-way) within 100 feet of the well. The easement shall be recorded with the county in which the well is located and with the recorded deed to the property. A certified true copy shall be filed with the Authority;

(C) Not withstanding paragraph (2)(a)(A) of this rule, wells located on land owned by a public entity, (Federal, State, County, Municipality) which is not the water supplier, a permit issued by the public entity to the water supplier shall suffice in lieu of an easement. Said permit shall state that no existing or potential public health hazard shall be permitted within a minimum of 100 feet of a well site;

(D) Public or private roadways may be allowed within 100 feet of a confined well, provided the well is protected against contamination from surface runoff or hazardous liquids which may be spilled on the roadway and is protected from unauthorized access;

(E) The following sanitary hazards are not allowed within 100 feet of a well which serves a public water system unless waived by the Authority: any existing or proposed pit privy, subsurface sewage disposal drain field; cesspool; solid waste disposal site; pressure sewer line; buried fuel storage tank; animal yard, feedlot or animal waste storage; untreated storm water or gray water disposal; chemical (including solvents, pesticides and fertilizers) storage, usage or application; fuel transfer or storage; mineral resource extraction, vehicle or machinery maintenance or long term storage; junk/auto/scrap yard; cemetery; unapproved well; well that has not been properly abandoned or of unknown or suspect construction; source of pathogenic organisms or any other similar public health hazards. No gravity sewer line or septic tank shall be permitted within 50 feet of a well which serves a public water system. Clearances greater than indicated above shall be provided when it is determined by the Authority that the aquifer sensitivity and degree of hazard require a greater degree of protection. Above-ground fuel storage tanks provided for emergency water pumping equipment may be exempted from this requirement by the Authority provided that a

secondary containment system is in place that will accommodate 125 percent of the fuel tank storage;

(F) Except as in paragraph (2)(a)(A) and (2)(a)(E) of this rule, in those areas served by community gravity sanitary sewers, the area of ownership or control may be reduced to 50 feet;

(G) Wells shall not be located at sites which are prone to flooding. In cases where the site is subject to flooding, the area around the well shall be mounded, and the top of the well casing shall be extended at least two feet above the anticipated 100-year (1 percent) flood level;

(H) Except as otherwise provided herein, wells shall be constructed in accordance with the general standards for the construction and maintenance of water wells in Oregon as prescribed in OAR chapter 690, divisions 200 through 220;

(I) Wells as defined in paragraph (2)(a)(A) of this rule that are less than 12 feet in depth must be constructed so as to be cased and sealed from the surface to a minimum of three feet above the bottom of the well. The casing may consist of concrete or metal culvert pipe or other pre-approved materials. The seal shall be watertight, be a minimum of four inches in thickness and may consist of cement, bentonite or concrete (see concrete requirements prescribed in OAR 690-210-315). The construction and placement of these wells must comply with all requirements of this rule.

(J) Before a well is placed into operation as the source of supply at a public water system, laboratory reports as required by OAR 333-061-0036 shall be submitted by the water supplier;

(K) Water obtained from wells which exceed the maximum contaminant levels shall be treated as outlined in section (4) of this rule;

(L) The pump installation, piping arrangements, other appurtenances, and well house details at wells which serve as the source of supply for a public water system, shall meet the following requirements:

(i) The line shaft bearings of turbine pumps shall be water-lubricated, except that bearings lubricated with non-toxic approved food-grade lubricants may be permitted in wells where water-lubricated bearings are not feasible due to depth to the water;

(ii) Where turbine pumps are installed, the top of the casing shall be sealed into the pump motor. Where submersible pumps are installed, the top of the casing shall be provided with a watertight sanitary seal;

(iii) A casing vent shall be provided and shall be fitted with a screened return bend;

(iv) Provisions shall be made for determining the depth to water surface in the well under pumping and static conditions;

(v) A sampling tap shall be provided on the pump discharge line;
(vi) Piping arrangements shall include provisions for pumping the total flow from the well to waste;
(vii) A method of determining the total output of each well shall be provided. This requirement may be waived by the Authority at confined wells which serve as the source of supply for Transient Non-Community water systems;
(viii) A reinforced concrete slab shall be poured around the well casing at ground surface. The slab shall be sloped to drain away from the casing;
(ix) The ground surface around the well slab shall be graded so that drainage is away from the well;
(x) The top of the well casing shall extend at least 12 inches above the concrete slab;
(xi) Provisions shall be made for protecting pump controls and other above-ground appurtenances at the well head. Where a wellhouse is installed for this purpose, it shall meet applicable building codes and shall be insulated, heated and provided with lights, except that where the wellhouse consists of a small removable box-like structure the requirement for lights may be waived by the Authority;
(xii) The wellhouse shall be constructed so that the well pump can be removed.
(xiii) Wells equipped with pitless adaptors or units are not required to meet the requirements of subparagraphs (2)(a)(L)(iii) and (viii) of this rule.

(M) The area in the vicinity of a well, particularly the area uphill or upstream, shall be surveyed by the water supplier to determine the location and nature of any existing or potential public health hazards;

(N) The requirements with respect to land ownership, clearances from public health hazards, and protection against flooding for wells in an unconfined aquifer shall be the same or more restrictive than those prescribed for wells in confined aquifers, as determined by the Authority.

(O) Before a well is placed into operation as the source of supply for a public water system, the following documents shall be submitted by the water supplier:
(i) Reports on pumping tests for yield and drawdown for unconfined wells;
(ii) Reports of laboratory analyses on contaminants in the water as required by OAR 333-061-0036;
(iii) Performance data on the pumps and other equipment;

(iv) Proposals for disinfection as required by section (5) of this rule, if applicable.

(v) Reports on determination of potential direct influence by surface water into groundwater source as prescribed in section (3) of this rule.

(b) Springs:

(A) In addition to those requirements under subsection (2)(a) of this rule, construction of spring supplies shall meet the following requirements:

(i) An intercepting ditch shall be provided above the spring to effectively divert surface water;

(ii) A fence shall be installed around the spring area unless other provisions are made to effectively prevent access by animals and unauthorized persons;

(iii) The springbox shall be constructed of concrete or other impervious durable material and shall be installed so that surface water is excluded;

(iv) The springbox shall be provided with a screened overflow which discharges to daylight, an outlet pipe provided with a shutoff valve, a bottom drain, an access manhole with a tightly fitting cover, and a curb around the manhole.

(v) Spring collection facilities that meet the definition of a well in paragraph (2)(a)(A) of this rule must comply with construction requirements specified in paragraph (2)(a)(I) of this rule.

(B) Reports on flow tests shall be provided to establish the yield of springs.

(3) Surface water and groundwater under direct surface water influence source facilities:

(a) In selecting a site for an infiltration gallery, or for a direct intake from a stream, lake, or impounding reservoir, consideration shall be given to land use in the watershed. A sanitary survey of the watershed shall be made by the water supplier to evaluate natural and man-made factors which may affect water quality and investigations shall also be made of seasonal variations in water quality and quantity. A report giving the results of this survey shall be submitted for review and approval by the Authority.

(b) A determination shall be made as to the status of water rights, and this information shall be submitted to the Authority for review.

(c) Impounding reservoirs shall be designed and constructed so that they include the following features:

(A) The capacity shall be sufficient to meet projected demands during drought conditions;

(B) Outlet piping shall be arranged so that water can be withdrawn from various depths;

(C) Facilities shall be provided for releasing undesirable water.

(d) Direct intake structures shall be designed and constructed so that they include the following features:
(A) Screens shall be provided to prevent fish, leaves and debris from entering the system;
(B) Provisions shall be made for cleaning the screens, or self-cleaning screens shall be installed;
(C) Motors and electrical controls shall be located above flood level;
(D) Provisions shall be made to restrict swimming and boating in the vicinity of the intake;
(E) Valves or sluice gates shall be installed at the intake to provide for the exclusion of undesirable water when required.

(4) Water treatment facilities (other than disinfection):
(a) General
(A) Water treatment facilities shall be capable of producing water which consistently does not exceed maximum contaminant levels. The type of treatment shall depend on the raw water quality. The Authority shall make determinations of treatment capabilities based upon recommendations in the USEPA SWTR Guidance Manual.
(B) Investigations shall be undertaken by the water supplier prior to the selection or installation of treatment facilities to determine the physical, chemical and microbiological characteristics of the raw water as appropriate. These investigations shall include a determination of the seasonal variations in water quality, as well as a survey to identify potential sources of contamination which may affect the quality of the raw water.
(C) Water obtained from wells constructed in conformance with the requirements of these rules and which is found not to exceed the maximum contaminant levels, may be used without treatment at public water systems;
(D) Laboratory equipment shall be provided so that the water supplier can perform analyses necessary to monitor and control the treatment processes.
(E) A sampling tap shall be provided following the treatment process and before the first user when any form of water treatment is in use at a water system.
(b) Best Available Technology
(A) Pilot studies or other supporting data shall be used to demonstrate the effectiveness of any treatment method other than that defined as best available technology. Pilot study protocol shall be approved beforehand by the Authority. When point-of-use (POU) or point-of-entry (POE) devices are used for compliance, programs to ensure proper long-term operation, maintenance, and monitoring shall be provided by the water system to ensure adequate performance.

(B) The Authority identifies the following as the best available technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for volatile organic chemicals:
  (i) Central treatment using packed tower aeration for all these chemicals.
  (ii) Central treatment using granular activated carbon for all these chemicals except vinyl chloride.

(C) The Authority identifies the following as the best available technology, treatment techniques or other means generally available for achieving compliance with the Maximum Contaminant Level for fluoride.
  (i) Activated alumina absorption, centrally applied.
  (ii) Reverse osmosis, centrally applied.

(D) The Authority identifies the following as the best available technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant level for total coliforms.
  (i) Protection of wells from contamination by coliforms by appropriate placement and construction;
  (ii) Maintenance of a disinfectant residual throughout the distribution system;
  (iii) Proper maintenance of the distribution system including appropriate pipe replacement and repair procedures, main flushing programs, proper operation and maintenance of storage tanks and reservoirs, and maintaining a minimum pressure of 20 psi at all service connections.
  (iv) Filtration treatment and/or disinfection of surface water or groundwater under the direct influence of surface water, or disinfection of groundwater using strong oxidants such as chlorine, chlorine dioxide, or ozone; and
  (v) For systems using groundwater, compliance with the requirements of an Authority approved wellhead protection program.

(E) The Authority identifies the following as the best available technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for organic chemicals.
  (i) Central treatment using packed tower aeration for Dibromochloropropane, Ethylene Dibromide, Hexachlorocyclopentadiene and Di(2-ethylhexyl)adipate.
  (ii) Central treatment using granular activated carbon for all these chemicals except Trihalomethanes and Glyphosate.

(iii) Central treatment using oxidation (chlorination or ozonation) for Glyphosate.

(F) The Authority identifies the following as the best available technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for inorganic chemicals. Preoxidation may be required to convert Arsenic III to Arsenic V.

(i) Central treatment using coagulation/filtration for systems with 500 or more service connections for Antimony, Arsenic V (for systems with populations 501-10,000), Asbestos, Beryllium, Cadmium, Chromium, Mercury (influent concentration ≥ 10ug/L), and Selenium (Selenium IV only).

(ii) Central treatment using direct and diatomite filtration for Asbestos.

(iii) Central treatment using granular activated carbon for Mercury.

(iv) Central treatment using activated alumina for Arsenic V (for systems with populations l0,000 or less), Beryllium, Selenium and Thallium.

(v) Central treatment using ion exchange for Arsenic V (for systems with populations 10,000 or less), Barium, Beryllium, Cadmium, Chromium, Cyanide, Nickel, Nitrate, Nitrite and Thallium.

(vi) Central treatment using lime softening for systems with 500 or more service connections for Arsenic V (for systems with populations of 501-10,000), Barium, Beryllium, Cadmium, Chromium (Chromium III only), Mercury (influent concentration ≥ 10ug/L), Nickel and Selenium.

(vii) Central treatment using reverse osmosis for Antimony, Arsenic V (for systems with populations of 501-10,000), Barium, Beryllium, Cadmium, Chromium, Cyanide, Mercury (influent concentration ≥ 10ug/L), Nickel, Nitrate, Nitrite, and Selenium.

(viii) Central treatment using corrosion control for Asbestos and Lead and Copper.

(ix) Central treatment using electrodialysis for Arsenic V (for systems with populations of 501-10,000), Barium, Nitrate, and Selenium.

(x) Central treatment using alkaline chlorination (pH≥8.5) for Cyanide.

(xi) Central treatment using coagulation-assisted microfiltration for Arsenic V (for systems with populations 501-10,000).

(xii) Central treatment using oxidation/filtration for Arsenic V (to obtain high removals, iron to Arsenic ratio must be at least 20:1).

(xiii) Point-of-use treatment using activated alumina for Arsenic V (for systems with populations 10,000 or less).

(xiv) Point-of-use treatment using reverse osmosis for Arsenic V (for systems with populations 10,000 or less).

(G) The Authority identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for disinfection byproducts:

(i) For TTHM and HAA5, when monitoring in accordance with OAR 333-061-0036(4)(c): enhanced coagulation, enhanced softening or GAC10, with chlorine as the primary and residual disinfectant.

(ii) For bromate concentrations: control of ozone treatment process to reduce production of bromate.

(iii) For chlorite concentrations: control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels .

(iv) For TTHM and HAA5, for water systems that disinfect their source water and monitor in accordance with OAR 333-061-0036(4)(d): enhanced coagulation or enhanced softening plus GAC10; or nanofiltration with a molecular weight cutoff less than or equal to 1000 Daltons; or GAC20.

(v) For TTHMs and HAA5, for purchasing water systems with populations greater than or equal to 10,000 and that monitor in accordance with OAR 333-061-0036(4)(d) improved distribution system and storage tank management to reduce residence time, plus the use of chloramines for disinfectant residual maintenance. This applies only to the disinfected water that purchasing water systems receive from a wholesale system.

(vi) For TTHMs and HAA5, for purchasing water systems with populations less than 10,000 and that monitor in accordance with OAR 333-061-0036(4)(d): improved distribution system and storage tank management to reduce residence time. This applies only to the disinfected water that purchasing water systems receive from a wholesale system.

(H) The Authority identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum residual disinfectant levels: Control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels.

(I) The Authority identifies the following as the best available technology, treatment techniques, or other means available for achieving compliance with the MCLs for radionuclides.

(i) Central treatment using ion exchange for combined radium-226/228, beta particle/photon activity and uranium.
(ii) Central treatment using reverse osmosis for combined radium-226/228, gross alpha particle activity, beta particle/photon activity, and uranium (for systems with populations 501-10,000).
(iii) Central treatment using lime softening for combined radium-226/228, and uranium (for systems with populations 501-10,000).
(iv) Central treatment using enhanced coagulation/filtration for uranium.
(v) Central treatment using activated alumina for uranium (for systems with populations of 10,000 or less).
(vi) Central treatment using greensand filtration for combined radium-226/228.
(vii) Central treatment using electrodialysis for combined radium-226/228.
(viii) Central treatment using pre-formed hydrous manganese oxide filtration for combined radium-226/228.
(ix) Central treatment using co-precipitation with barium for combined radium-226/228.
(x) Point-of-use treatment using ion exchange for combined radium-226/228, beta particle/photon activity, and uranium.
(xi) Point-of use treatment using reverse osmosis for combined radium-226/228, gross alpha particle activity, beta particle/ photon activity, and uranium (for systems with populations of 10,000 or less).

(c) Filtration of Surface Water Sources and Groundwater Sources Under the Direct Influence of Surface Water

(A) All water systems using surface water or groundwater sources under the direct influence of surface water that fail to meet the criteria for avoiding filtration prescribed in OAR 33-061-0032(2) and (3) must meet all requirements of this subsection for installing filtration treatment.

(B) There are four standard filtration methods: conventional filtration, direct filtration, slow sand, and diatomaceous earth. Other filtration technologies are only acceptable if their efficiency at removing target organisms and contaminants can be demonstrated to be equal to or more efficient than these. The assumed log removals credited to filtration of *Giardia lamblia* and viruses will be based on recommendations in the USEPA SWTR Guidance Manual. In all cases, filtration processes must be designed and operated to achieve at least 2.0 log removal of *Giardia lamblia*. For membrane filtration,

removal credits shall be verified by a challenge study according to paragraphs (4)(c)(H) and (I) of this rule. Bag and Cartridge Filtration must have removal credits demonstrated in a challenge study according to paragraph (4)(c)(J) of this rule. The combination of filtration and disinfection must meet the inactivation levels prescribed in OAR 333-061-0032(1). Any water system wishing to challenge the assumed log removal credits must conduct demonstration studies based on the recommendations in the USEPA SWTR Guidance Manual and have the study protocol approved by the Authority.

(C) Pilot studies shall be conducted by the water supplier to demonstrate the effectiveness of any filtration method other than conventional filtration. Pilot study protocol shall be approved in advance by the Authority. Results of the pilot study shall be submitted to the Authority for review and approval.

(D) Regardless of the filtration method used, the water system must achieve a minimum of 0.5-log reduction of *Giardia lamblia* and a 1.0-log reduction of viruses from disinfection alone after filtration treatment.

(E) All filtration systems shall be designed and operated so as to meet the requirements prescribed in OAR 333-061-0032(4) and (5). Design of the filtration system must be in keeping with accepted standard engineering references acknowledged by the Authority such as the Great Lakes Upper Mississippi River "Recommended Standards for Water Works" technical reports by the International Reference Center for Community Water Supply and Sanitation, or publications from the World Health Organization. A list of additional references is available from the Authority upon request.

(F) Requirements for water systems using conventional or direct filtration

(i) Systems that employ multiple filters shall be designed such that turbidity measurements are monitored for each filter independently of the other filter(s). Each filter shall have a provision to discharge effluent water as waste.

(ii) All water treatment plants shall have an auto-dial call out alarm or an automatic shut-off for high turbidity.

(G) Additional requirements for membrane filtration. Each membrane filter system must have a turbidimeter installed after each filter unit for continuous indirect integrity monitoring. Once operating, direct and indirect integrity testing must be conducted on each unit as described in OAR 333-061-0036(5)(d). The operation and maintenance manual must include a diagnosis and repair plan such that the ability to remove pathogens is not compromised.

(H) Challenge Study criteria for Membrane Filtration. Water systems receive *Cryptosporidium* treatment credit for membrane filtration, as

defined in OAR 333-061-0020(76)(f), that meets the criteria of this paragraph. The level of treatment credit a water system receives is equal to the lower of the values determined in this paragraph.

(i) The removal efficiency demonstrated during challenge testing conducted under the conditions in accordance with paragraph (4)(c)(I) of this rule.

(ii) The maximum removal efficiency that can be verified through direct integrity testing of the membrane filtration process under the conditions prescribed by OAR 333-061-0036(5)(d)(B).

(I) Challenge Testing. The membrane filter used by the water system must undergo challenge testing to evaluate removal efficiency, and results of the challenge testing must be reported to the Authority. Challenge testing must be conducted according to the criteria specified in this paragraph. Water systems may use data from challenge testing conducted prior to June 1, 2009 if the prior testing was consistent with the criteria specified in this paragraph.

(i) Challenge testing must be conducted on a full-scale membrane module, identical in material and construction to the membrane modules used in the water system's treatment facility, or a smaller-scale membrane module, identical in material and similar in construction to the full-scale module. A module is defined as the smallest component of a membrane unit in which a specific membrane surface area is housed in a device with a filtrate outlet structure.

(ii) Challenge testing must be conducted using *Cryptosporidium* oocysts or a surrogate that is removed no more efficiently than *Cryptosporidium* oocysts. *Cryptosporidium* or the surrogate used during challenge testing is referred to as the challenge particulate. The concentration of the challenge particulate, in both the feed and filtrate water, must be determined using a method capable of discretely quantifying the specific challenge particulate used in the test; gross measurements such as turbidity may not be used.

(iii) The maximum feed water concentration that can be used during a challenge test is based on the detection limit of the challenge particulate in the filtrate and must be determined according to the following equation:
Maximum Feed Concentration = 3.16 x 10^6 x (Filtrate Detection Limit)

(iv) Challenge testing must be conducted according to representative hydraulic conditions at the maximum design flux and maximum design process recovery specified by the manufacturer for the membrane module. Flux is defined as the

throughput of a pressure driven membrane process expressed as flow per unit of membrane area. Recovery is defined as the volumetric percent of feed water that is converted to filtrate over the course of an operating cycle uninterrupted by events such as chemical cleaning or a solids removal process (i.e., backwashing).

(v) Removal efficiency of a membrane module must be calculated from the challenge test results and expressed as a log removal value according to the following equation:
$LRV = LOG_{10}(Cf) - LOG_{10}(Cp)$
Where:
LRV = log removal value demonstrated during the challenge test;
Cf = the feed concentration measured during the challenge test; and
Cp = the filtrate concentration measured during the challenge test. Equivalent units must be used for the feed and filtrate concentrations. If the challenge particulate is not detected in the filtrate, the term Cp is set equal to the detection limit for the purpose of calculating the LRV. An LRV must be calculated for each membrane module evaluated during the challenge test.

(vi) The removal efficiency of a membrane filtration process demonstrated during challenge testing must be expressed as a log removal value (LRVC-Test). If fewer than 20 modules are tested, then LRVC-Test is equal to the lowest of the representative LRVs among the modules tested. If 20 or more modules are tested, then LRVC-Test is equal to the 10th percentile of the representative LRVs among the modules tested. The percentile is defined by (i/(n+1))where i is the rank of n individual data points ordered lowest to highest. If necessary, the 10th percentile may be calculated using linear interpolation.

(vii) The challenge test must establish a quality control release value (QCRV) for a non-destructive performance test that demonstrates the *Cryptosporidium* removal capability of the membrane filtration module. This performance test must be applied to each production membrane module used by the system that was not directly challenge tested in order to verify *Cryptosporidium* removal capability. Production modules that do not meet the established QCRV are not eligible for the treatment credit demonstrated during the challenge test.

(viii) If a previously tested membrane is modified in a manner that could change the removal efficiency of the membrane or the

applicability of the non-destructive performance test and associated QCRV, additional challenge testing to demonstrate the removal efficiency of, and determine a new QCRV for, the modified membrane must be conducted and submitted to the Authority.

(J) Challenge Study requirements for Bag and Cartridge Filtration.

(i) The *Cryptosporidium* treatment credit awarded to bag or cartridge filters must be based on the removal efficiency demonstrated during challenge testing that is conducted according to the criteria specified in this paragraph. A factor of safety equal to 1-log for individual bag or cartridge filters and 0.5-log for bag or cartridge filters in series must be applied to challenge testing results to determine removal credit. Water systems may use results from challenge testing conducted prior to June 1, 2009 if the prior testing was consistent with the criteria specified in this paragraph.

(ii) Challenge testing must be performed on full-scale bag or cartridge filters and the associated filter housing or pressure vessel, that are identical in material and construction to the filters and housings the water system will use for removal of *Cryptosporidium*. Bag or cartridge filters must be challenge tested in the same configuration that the system will use, either as individual filters or as a series configuration of filters.

(iii) Challenge testing must be conducted using *Cryptosporidium* or a surrogate that is removed no more efficiently than *Cryptosporidium*. The microorganism or surrogate used during challenge testing is referred to as the challenge particulate. The concentration of the challenge particulate must be determined using a method capable of discreetly quantifying the specific microorganism or surrogate used in the test; gross measurements such as turbidity may not be used.

(iv) The maximum feed water concentration that can be used during a challenge test must be based on the detection limit of the challenge particulate in the filtrate (i.e., filtrate detection limit) and must be calculated using the following equation:
Maximum Feed Concentration = 1 x 10^4 x (Filtrate Detection Limit)

(v) Challenge testing must be conducted at the maximum design flow rate for the filter as specified by the manufacturer.

(vi) Each filter evaluated must be tested for a duration sufficient to reach 100 percent of the terminal pressure drop, which establishes the maximum pressure drop under which the filter may be used to comply with the requirements of this paragraph.

(vii) Removal efficiency of a filter must be determined from the results of the challenge test and expressed in terms of log removal values using the following equation:
LRV = LOG10(Cf)-LOG10(Cp)
Where:
LRV = log removal value demonstrated during challenge testing;
Cf = the feed concentration measured during the challenge test; and
Cp = the filtrate concentration measured during the challenge test. In applying this equation, the same units must be used for the feed and filtrate concentrations. If the challenge particulate is not detected in the filtrate, then the term Cp must be set equal to the detection limit.

(viii) Each filter tested must be challenged with the challenge particulate during three periods over the filtration cycle: within two hours of start-up of a new filter; when the pressure drop is between 45 and 55 percent of the terminal pressure drop; and at the end of the cycle after the pressure drop has reached 100 percent of the terminal pressure drop. An LRV must be calculated for each of these challenge periods for each filter tested. The LRV for the filter (LRVfilter) must be assigned the value of the minimum LRV observed during the three challenge periods for that filter.

(ix) If fewer than 20 filters are tested, the overall removal efficiency for the filter product line must be set equal to the lowest LRVfilter among the filters tested. If 20 or more filters are tested, the overall removal efficiency for the filter product line must be set equal to the 10th percentile of the set of LRVfilter values for the various filters tested. The percentile is defined by (i/(n+1))where i is the rank of n individual data points ordered lowest to highest. If necessary, the 10th percentile may be calculated using linear interpolation.

(x) If a previously tested filter is modified in a manner that could change the removal efficiency of the filter product line, challenge testing to demonstrate the removal efficiency of the modified filter must be conducted and submitted to the Authority.

(K) Water systems using cartridge filtration must have pressure gauges installed before and after each cartridge filter.

(L) Water systems using diatomaceous earth filtration must add the body feed with the influent flow.

(d) Criteria and procedures for public water systems using point-of-entry (POE) or point-of-use (POU) devices.

(A) Public water systems may use POE or POU devices to comply with maximum contaminant levels, where specified in subsection (4)(b) of this rule, only if they meet the requirements of this subsection.

(B) It is the responsibility of the public water system to operate and maintain the POE or POU treatment system.

(C) The public water system must develop and obtain Authority approval for a monitoring plan before POE or POU devices are installed for compliance. Under the plan approved by the Authority, POE or POU devices must provide health protection equivalent to central water treatment. "Equivalent" means that the water would meet all Maximum Contaminant Levels as prescribed in OAR 333-061-0030 and would be of acceptable quality similar to water distributed by a well-operated central treatment plant. Monitoring must include contaminant removal efficacy, physical measurements and observations such as total flow treated and mechanical condition of the treatment equipment.

(D) Effective technology must be properly applied under a plan approved by the Authority and the microbiological safety of the water must be maintained.

(i) The water supplier must submit adequate certification of performance, field testing, and, if not included in the certification process, a rigorous engineering design review of the POE or POU devices to the Authority for approval prior to installation.

(ii) The design and application of the POE or POU devices must consider the tendency for increase in heterotrophic bacteria concentrations in water treated with activated carbon. It may be necessary to use frequent backwashing, post-contractor disinfection, and Heterotrophic Plate Count monitoring to ensure that the microbiological safety of the water is not compromised.

(iii) The POE or POU device must be evaluated to assure that the device will not cause increased corrosion of lead and copper bearing materials located between the device and the tap that could increase contaminant levels of lead and copper at the tap.

(E) All consumers shall be protected. Every building connected to the system must have a POE or POU device installed, maintained, and adequately monitored. The Authority must be assured that every building is subject to treatment and monitoring, and that the rights and responsibilities of the public water system customer convey with title upon sale of property.

(5) Facilities for continuous disinfection and disinfectant residual maintenance:

(a) Water obtained from surface sources or groundwater sources under the direct influence of surface water shall, as a minimum, be provided with continuous disinfection before such water may be used as a source of supply for a public water system. Water obtained from wells constructed in conformance with the requirements of these rules and which is found not to exceed microbiological maximum contaminant levels, may be used without treatment at public water systems;

(b) Water obtained from wells and springs shall be considered groundwater unless determined otherwise by the Authority. Wells and springs may be utilized without continuous disinfection if the construction requirements of section (2) of this rule are met and analyses indicate that the water consistently meets microbiological standards. A well or spring that is inadequately constructed, shows a history of microbiological contamination, and where the Authority determines that reconstruction will add a significant measure of public health protection, must be upgraded to meet current construction standards or disconnected from the water system.

(c) In public water systems where continuous disinfection is required as the sole form of treatment, or as one component of more extensive treatment to meet the requirements prescribed in OAR 333-061-0032(1), the facilities shall be designed so that:

(A) The disinfectant applied shall be capable of effectively destroying pathogenic organisms;

(B) The disinfectant is applied in proportion to water flow; and

(C) Disinfectants, other than ultraviolet light and ozone disinfection treatment, shall be capable of leaving a residual in the water which can be readily measured and which continues to serve as an active disinfectant; and

(D) Sufficient contact time shall be provided to achieve "CT" values capable of the inactivation required by OAR 333-061-0032(1). For ultraviolet light disinfection treatment, sufficient irradiance expressed in milliwatts per square centimeter (mWs/cm2) and exposure time expressed in seconds shall be provided to achieve UV dose levels expressed as (mWs/cm2) or millijoules per square centimeter (mJ/cm2) capable of the inactivation required by OAR 333-061-0032(1).

(d) When continuous disinfection, other than ultraviolet light disinfection, is required for reasons other than the treatment of surface water sources or groundwater sources under the direct influence of surface water, in addition to the requirements of paragraphs (5)(c)(A) through (C) of this rule, the facilities shall be designed so that:

(A) The primary disinfection treatment is sufficient to ensure at least 99.99 percent (4-log) inactivation and/or removal of viruses as determined by the Authority, or;

(B) There is sufficient contact time provided to achieve disinfection under all flow conditions between the point of disinfectant application and the point of first water use:

(i) When chlorine is used as the primary disinfectant, the system shall be constructed to achieve a free chlorine residual of 0.2 mg/l after 30 minutes contact time under all flow conditions before first water use;

(ii) When ammonia is added to the water with the chlorine to form a chloramine as the disinfectant, the system shall be constructed to achieve a combined chlorine residual of at least 2.0 mg/l after three hours contact time under all flow conditions before first water use;

(e) Provisions shall be made to alert the water supplier before the chlorine supply is exhausted. Water systems serving more than 3,300 people shall have an auto-dial call out alarm or an automatic shut-off for low chlorine residual when chlorine is used as a disinfectant.

(f) For continuous disinfection only, provisions shall be made for sampling the water before and after chlorination;

(g) Testing equipment shall be provided to determine the chlorine residual;

(h) Chlorinator piping shall be designed to prevent the contamination of the potable water system by backflow of untreated water or water having excessive concentrations of chlorine;

(i) The disinfectant must be applied in proportion to water flow;

(j) Chlorine gas feeders and chlorine gas storage areas shall:

(A) Be enclosed and separated from other operating areas;

(B) Chlorine cylinders shall be restrained in position to prevent upset by chaining 100 and 150 pound cylinders two-thirds of their height up from the floor and by double chocking one ton cylinders;

(C) The room housing the feeders and cylinders shall be above ground surface, shall have doors which open outward and to the outside and shall be ventilated by mechanical means at floor level and shall have an air intake located higher than the exhaust ventilation;

(D) Be located so that chlorine gas, if released, will not flow into the building ventilation systems;

(E) Have corrosion resistant lighting and ventilation switches located outside the enclosure, adjacent to the door;

(F) Be provided with a platform or hydraulic scale for measuring the weight of the chlorine cylinders;

(G) Be provided with a gas mask or self contained breathing apparatus approved by the National Institute of Occupational Safety and Health (NIOSH) for protection against chlorine gas and kept in good working condition. Storage of such equipment shall be in an area adjoining the chlorine room and shall be readily available. (Also see the Oregon Occupational Health and Safety regulations contained in OAR chapter 437.)

(k) When continuous disinfection treatment is provided through ultraviolet light (UV) disinfection, the facilities shall be designed to meet the requirements of this subsection:

(A) The UV unit must achieve the dosage indicated in Table 38 for the required pathogen inactivation.

(B) Ultraviolet lamps are insulated from direct contact with the influent water and are removable from the lamp housing;

(C) The treatment unit must have an upstream valve or device that prevents flows from exceeding the manufacturer's maximum rated flow rate, an ultraviolet light sensor that monitors light intensity through the water during operation, and a visual and audible alarm;

(D) There must be a visual means to verify operation of all ultraviolet lamps;

(E) The lamps, lamp sleeves, housings and other equipment must be able to withstand the working pressures applied through the unit;

(F) The treatment facility must be sheltered from the weather and accessible for routine maintenance as well as routine cleaning and replacement of the lamp sleeves and cleaning of the sensor windows/lenses;

(G) The lamps must be changed as per the manufacturer's recommendation; and

(H) The treatment unit must have shut-off valves at both the inlet side and the outlet side of the treatment unit. There shall be no bypass piping around the treatment unit.

(I) Reactor validation testing. All water systems, except those specified in paragraph (5)(k)(J) of this rule, must use UV reactors that have undergone validation testing to determine the operating conditions under which the reactor delivers the UV dose required in OAR 333-061-0036(5)(c) (i.e., validated operating conditions). These operating conditions must include flow rate, UV intensity as measured by a UV sensor, UV Transmittance, and UV lamp status.

(i) When determining validated operating conditions, water systems must account for the following factors: UV absorbance by the water; lamp fouling and aging; measurement uncertainty of on-line sensors; UV dose distributions arising from the

velocity profiles through the reactor; failure of UV lamps or other critical system components; and inlet and outlet piping or channel configurations of the UV reactor.

(ii) Validation testing must include the following: full scale testing of a reactor that conforms uniformly to the UV reactors used by the water system and inactivation of a test microorganism whose dose response characteristics have been quantified with a low pressure mercury vapor lamp.

(iii) The Authority may approve an alternative approach to validation testing.

(J) Non-Community water systems using only groundwater sources, and having minimal distribution systems as determined by the Authority, may use ultraviolet light as the only disinfectant when total coliforms but no *E. coli* have been detected in the source water. UV units must meet the specifications of a Class A UV system under the NSF Standard 55. The minimum ultraviolet light failsafe dosage set point shall be equivalent to 40 mW-s/cm^2 (40 mJ/cm^2) with a wavelength between 200 and 300 nanometers. The UV unit must automatically shut-off water flow if dosage drops below this failsafe set point.

(6) Finished water storage:

(a) Distribution reservoirs and treatment plant storage facilities for finished water shall be constructed to meet the following requirements:

(A) They shall be constructed of concrete, steel, wood or other durable material capable of withstanding external and internal forces which may act upon the structure;

(B) Ground-level reservoirs shall be constructed on undisturbed soil, bedrock or other stable foundation material capable of supporting the structure when full;

(C) Steel reservoirs, standpipes and elevated tanks shall be constructed in conformance with the AWWA Standards D100 and D103;

(D) Concrete reservoirs shall be provided with sufficient reinforcing to prevent the formation of cracks, and waterstops and dowels shall be placed at construction joints. Poured-in-place wall castings shall be provided where pipes pass through the concrete;

(E) Wooden reservoirs shall be redwood or other equally durable wood and shall be installed on a reinforced concrete base. Where redwood reservoirs are used, separate inlet and outlet pipes are required and the water entering the reservoir must be have a disinfectant continuously applied so as to result in a detectable residual in the water leaving the reservoir;

(F) Start-up procedures for new redwood tanks shall consist of filling the tank with a solution of water containing a minimum of two pounds of

sodium carbonate per 1,000 gallons of water and retaining this solution in the tank a minimum of seven days before flushing;

(G) Where ground-level reservoirs are located partially below ground, the bottom shall be above the ground water table and footing drains discharging to daylight shall be provided to carry away ground water which may accumulate around the perimeter of the structure;

(H) The finished water storage capacity shall be increased to accommodate fire flows when fire hydrants are provided;

(I) Finished water storage facilities shall have watertight roofs;

(J) An access manhole shall be provided to permit entry to the interior for cleaning and maintenance. When the access manhole is on the roof of the reservoir there shall be a curbing around the opening and a lockable watertight cover that overlaps the curbing;

(K) Internal ladders of durable material, shall be provided where the only access manhole is located on the roof;

(L) Screened vents shall be provided above the highest water level to permit circulation of air above the water in finished water storage facilities;

(M) A drain shall be provided at the lowest point in the bottom, and an overflow of sufficient diameter to handle the maximum flow into the tank shall be provided at or near the top of the sidewall. The outlet ends of the drain and overflow shall be fitted with angle-flap valves or equivalent protection and shall discharge with an airgap to a watercourse or storm drain capable of accommodating the flow;

(N) A silt stop shall be provided at the outlet pipe;

(O) Where a single inlet/outlet pipe is installed and the reservoir floats on the system, provisions shall be made to insure an adequate exchange of water and to prevent degradation of the water quality and to assure the disinfection levels required in subparagraph (5)(c)(D)(i) of this rule;

(P) A fence or other method of vandal deterrence shall be provided around distribution reservoirs;

(Q) When interior surfaces of finished water storage tanks are provided with a protective coating, the coating shall meet the requirements of NSF Standard 61, Section 9 - Drinking Water System Components -- Health Effects (Revised September 1994) or equivalent.

(R) Reservoirs and clearwells that are to be used for disinfection contact time to treat surface water shall use a tracer study to determine the actual contact time. The Authority must approve procedures and protocols for the tracer study prior to the initiation of the study. The Authority recommends the USEPA SWTR Guidance Manual for tracer study procedure and protocol.

(S) Reservoirs and clearwells that are to be used for disinfection contact time to treat surface water shall have a means to adequately determine the flow rate on the effluent line.

(b) Pressure tanks for finished water shall meet the following requirements:

(A) Pressure tanks shall be installed above normal ground surface;

(B) Bypass piping around the pressure tank shall be provided to permit operation of the system while the tank is being maintained or repaired;

(C) Pressure tanks greater than 1,000 gallons shall be provided with an access manhole and a water sight-glass.

(D) All pressure tanks shall be provided with a drain, a pressure gauge, an air blow-off valve, means for adding air and pressure switches for controlling the operation of the pump(s);

(E) Pressure tanks shall be constructed of steel or an alternative material provided the tank is NSF 61 certified and shall be designed for pressure at least 50 percent greater than the maximum system pressure anticipated.

(7) Pumping facilities:

(a) Wherever possible, booster pumps shall take suction from tanks and reservoirs to avoid the potential for negative pressures on the suction line which result when the pump suction is directly connected to a distribution main;

(b) Pumps which take suction from distribution mains for the purpose of serving areas of higher elevation shall be provided with a low pressure cut-off switch on the suction side set at no less than 20 psi;

(c) Suction lift at pumping stations shall be avoided as far as possible, and pumps shall be installed so that the suction line is under a positive head. If suction lift cannot be avoided, provision shall be made for priming with water which does not exceed maximum contaminant levels;

(d) Pumping stations shall be located above maximum anticipated 100-year (1 percent) flood level, and the area around the pumping station shall be graded so that surface drainage is away from the station;

(e) Pumping stations shall be of durable construction so as to protect the equipment from the elements. The door to the pumping station shall be lockable, and facilities for heating and lighting shall be provided. The floor of the pumping station shall be sloped to provide adequate drainage.

(8) Distribution systems:

(a) Wherever possible, distribution pipelines shall be located on public property. Where pipelines are required to pass through private property, easements shall be obtained from the property owner and shall be recorded with the county clerk;

(b) Pipe, pipe fittings, valves and other appurtenances utilized at Community water systems shall be manufactured, installed and tested in conformance

with the latest standards of the American Water Works Association, NSF International or other equivalent standards acceptable to the Authority;

(c) In Community water systems, distribution mains located in public roadways or easements, and the portion of the service connections from the distribution main to the customer's property line or service meter where provided are subject to the requirements of these rules. The piping from the customer's property line, or the meter where provided, to the point of water use (the building supply line) is subject to the requirements of the State Plumbing Code;

(d) In all Public Water Systems where the system facilities and the premises being served are both on the same parcel of property, requirements relating to pipe materials and pipe installation shall comply with the State Plumbing Code;

(e) Distribution piping shall be designed and installed so that the pressure measured at the property line in the case of Community water systems, or at the furthest point of water use, in the case of a Transient Non-Community water system of the type described in subsection (d) of this section, shall not be reduced below 20 psi;

(f) Distribution piping shall be carefully bedded and fully supported in material free from rocks and shall be provided with a cover of at least 30 inches. Select backfill material shall be tamped in layers around and over the pipe to support and protect it. Large rocks or boulders shall not be used as backfill over the pipe;

(g) Provision shall be made at all bends, tees, plugs, and hydrants to prevent movement of the pipe or fitting;

(h) Wherever possible, dead ends shall be minimized by looping. Where dead ends are installed, or low points exist, blow-offs of adequate size shall be provided for flushing;

(i) Air-relief valves shall be installed at high points where air can accumulate. The breather tube on air-relief valves shall be extended above ground surface and provided with a screened, downward facing elbow;

(j) Yarn, oakum, lead or other material which may impair water quality shall not be used where it will be in contact with potable water;

(k) Nonconductive water pipe (plastic or other material) that is not encased in conductive pipe or casing must have an electrically conductive wire or other approved conductor for locating the pipe when the pipeline is underground. The wire shall be No. 18 AWG (minimum) solid copper with blue colored insulation. Ends of wire shall be accessible in water meter boxes, valve boxes or casings, or outside the foundation of buildings where the pipeline enters the building. The distance between tracer lead access locations shall not be more than 1,000 feet. Joints or splices in wire shall be waterproof.

(l) Piping that is to be used for disinfection contact time shall be verified by plug flow calculations under maximum flow conditions.

(9) Crossings-Sanitary sewers and water lines:

(a) All reference to sewers in this section shall mean sanitary sewers;

(b) In situations involving a water line parallel to a sewer main or sewer lateral, the separation between the two shall be as indicated in Figure 1;

(c) In situations where a water line and a sewer main or sewer lateral cross, the separation between the two shall be as follows:

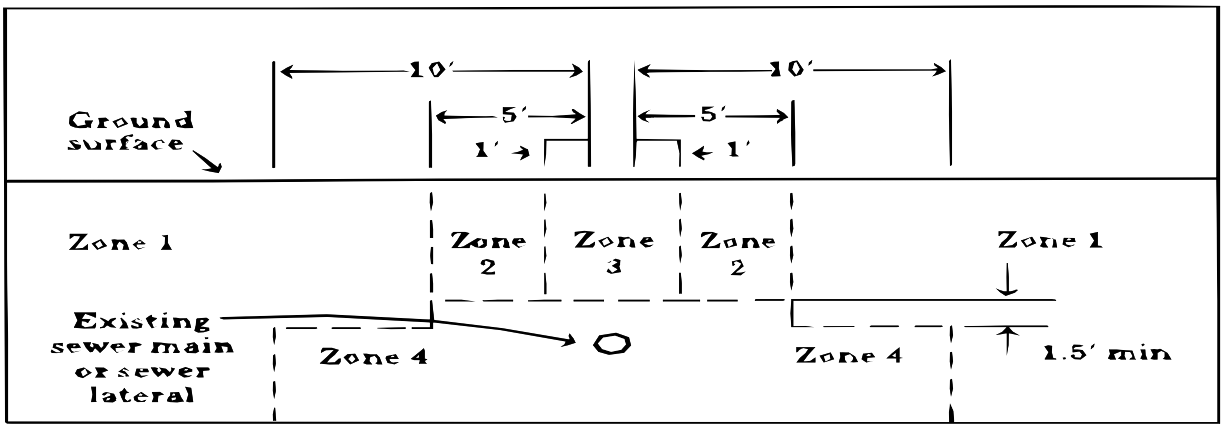
(A) Wherever possible, the bottom of the water line shall be 1.5 feet or more above the top of the sewer line and one full length of the water line shall be centered at the crossing;

(B) Where the water line crosses over the sewer line but with a clearance of less than 1.5 feet, the sewer line shall be exposed to the sewer line joints on both sides of the crossing to permit examination of the sewer pipe. If the sewer pipe is in good condition and there is no evidence of leakage from the sewer line, the 1.5-foot separation may be reduced. However, in this situation, the water supplier must center one length of the water line at the crossing and must prepare a written report of the findings and indicating the reasons for reducing the separation. If the water supplier determines that the conditions are not favorable or finds evidence of leakage from the sewer line, the sewer line shall be replaced with a full length of pipe centered at the crossing point, of PVC pressure pipe (ASTM D-2241, SDR 32.5), high-density PE pipe (Drisco pipe 1000), ductile-iron Class 50 (AWWA C-51), or other acceptable pipe; or the sewer shall be encased in a reinforced concrete jacket for a distance of 10 feet on both sides of the crossing.

(C) Where the water line crosses under the sewer line, the water supplier shall expose the sewer line and examine it as indicated in paragraph (9)(c)(B) of this rule. If conditions are favorable and there is no evidence of leakage from the sewer line, the sewer line may be left in place, but special precautions must be taken to assure that the backfill material over the water line in the vicinity of the crossing is thoroughly tamped in order to prevent settlement which could result in the leakage of sewage. In this situation, the water supplier must center one length of the water line at the crossing and must prepare a written report recording the manner in which the sewer line was supported at the crossing and the material and methods used in backfilling and tamping to prevent settlement of the sewer. If the water supplier determines that conditions are not favorable or finds evidence of leakage from the sewer line, the provisions of paragraph (9)(c)(B) of this rule apply.

(d) When a water main is installed under a stream or other watercourse, a minimum cover of 30 inches shall be provided over the pipe. Where the watercourse is more than 15 feet wide, the pipe shall be of special construction with flexible watertight joints, valves shall be provided on both sides of the crossing so that the section can be isolated for testing or repair, and test cocks shall be provided at the valves.

Figure 1: Water Line-Sewer Line Separation



Zone 1: Only crossing restrictions apply
Zone 2: Case-by-case determination
Zone 3: Parallel water line prohibited
Zone 4: Parallel water line prohibited

(10) Disinfection of facilities:

(a) Following completion of new facilities and repairs to existing facilities, those portions of the facilities which will be in contact with the water delivered to users shall be disinfected with chlorine before they are placed into service. Other disinfectants may be used if it is demonstrated that they can also achieve the same result as chlorine;

(b) Prior to disinfection, the facilities shall be cleaned and flushed with potable water according to AWWA Standards C651 through C654;

(c) For new construction and installation of wells, pumps, and water mains (with any associated service connections and other appurtenances installed at the time of construction), disinfection by chlorination shall be accomplished according to AWWA standards C651 through C654 which includes, but is not limited to the following:

(A) The introduction of a chlorine solution with a free chlorine residual of 25 mg/l into the system in a manner which will result in a thorough wetting of all surfaces and the discharge of all trapped air. The solution shall remain in place for 24 hours.

(B) After the 24-hour period, the free chlorine residual shall be checked, and if it is found to be 10 mg/l or more, the chlorine solution shall be drained and the facility flushed with potable water. If the check

measurement taken after the 24-hour contact period indicates a free chlorine residual of less than 10 mg/l, the facilities shall be flushed, rechlorinated and rechecked until a final residual of 10 mg/l or more is achieved after a 24-hour standing time.

(C) After the final residual is confirmed at 10 mg/l or more, and after the facility is flushed and filled with potable water, bacteriological samples shall be taken to provide a record for determining the procedures' effectiveness. A minimum of two consecutive samples must be collected at least 24 hours apart from the new facilities for microbiological analysis. If the results of both analyses indicate that the water is free of coliform organisms, the facility may be put into service. Likewise, if the microbiological analysis indicates the presence of coliform organisms, the flushing and disinfection must be repeated until a sample free of coliform organisms is obtained.

(d) For repaired wells, pumps, and completely depressurized water mains, disinfection by chlorination shall be accomplished according to AWWA standards C651 through C654. Following thorough flushing, a minimum of one sample must be collected from each direction of flow downstream from the repaired facilities for microbiological analysis. If the direction of flow is unknown, then samples shall be taken on each side of the repaired facility. If the microbiological analysis indicates the presence of coliform organisms, a follow-up sample shall be taken. If the follow-up sample indicates a presence of coliform organisms, then the repaired components shall be flushed and resampled until a sample free of coliform organisms is obtained.

(e) For reservoirs and tanks, disinfection by chlorination shall be accomplished according to AWWA Standard C652 which includes, but is not limited to, the following methods:

(A) Filling the reservoir or tank and maintaining a free chlorine residual of not less than 10 mg/l for the appropriate 6 or 24 hour retention period; or

(B) Filling the reservoir or tank with a 50 mg/l chlorine solution and leaving for six hours; or

(C) Directly applying by spraying or brushing a 200 mg/l solution to all surfaces of the storage facility in contact with water if the facility were full to the overflow elevation.

(f) When the procedures described in paragraphs (10)(e)(A) and (B) of this rule are followed, the reservoir or tank shall be drained after the prescribed contact period and refilled with potable water, and a sample taken for microbiological analysis. If the results of the analysis indicate that the water is free of coliform organisms, the facility may be put into service. If not, the procedure shall be repeated until a sample free of coliform organisms is obtained;

(g) When the procedure described in paragraph (10)(e)(C) of this rule is followed, the reservoir or tank shall be filled with potable water and a sample taken for microbiological analysis. It will not be necessary to flush the reservoir or tank after the chlorine solution is applied by spraying or brushing. Microbiological analysis shall indicate that the water is free of coliform organisms before the facility can be put into service;

(h) When a reservoir is chlorinated following routine maintenance, inspection, or repair, it may be put back into service prior to receiving the report on the microbiological analysis provided the water leaving the reservoir has a free chlorine residual of at least 0.4 mg/l or a combined chlorine residual of at least 2.0 mg/l.

(i) Underwater divers used for routine maintenance, inspection, or repair of reservoirs shall use a full body dry suit with hardhat scuba and an external air supply. The diver shall be disinfected by spraying a 200 mg/l solution of chlorine on all surfaces that will come into contact with drinking water.

(j) A water line may be returned to service, following repairs or routine maintenance, prior to receiving a report on the microbiological analysis if the following procedures have been completed.

  (A) Customer meters were shut off prior to placing the water line out of service;

  (B) The area below the water line to be repaired was excavated and dewatered;

  (C) The exposed pipe was treated with a hypochlorite solution;

  (D) The water line and any other appurtenance or item affected by the repair and/or maintenance was disinfected by chlorination according to AWWA standards C651 through C654;

  (E) The water line was flushed thoroughly, and a concentration of residual chlorine has been re-established that is comparable to the level normally maintained by the water system, if applicable; and

  (F) Microbiological analysis has been conducted as a record of repair effectiveness.

Stat. Auth.: ORS 448.131
Stats. Implemented: ORS 431.110, 431.150, 448.131, 448.150, 448.273, 448.279

333-061-0055 Waivers from Construction Standards

The Authority may grant waivers from the construction standards prescribed by these rules:

(1) When it is demonstrated to the satisfaction of the Authority that strict compliance with the rule would be highly burdensome or impractical due to special conditions or causes; and

(2) When the public or private interest in the granting of the waiver is found by the Authority to clearly outweigh the interest of the application of uniform rules; and

(3) When alternate measures are provided which, in the opinion of the Authority, will provide adequate protection to the health and safety of the public including the ability to produce water which does not exceed the maximum contaminant levels listed in OAR 333-061-0030.

Stat. Auth.: ORS 448.131

Stats. Implemented: ORS 448.131 & 448.135

333-061-0032 Treatment Requirements and Performance Standards for Surface Water, Groundwater Under Direct Influence of Surface Water, and Groundwater

(1) General requirements for all public water systems supplied by a surface water source or a groundwater source under the direct influence of surface water.

(a) These regulations establish criteria under which filtration is required and treatment technique requirements in lieu of maximum contaminant levels for the following contaminants: *Giardia lamblia*, viruses, heterotrophic plate count bacteria, *Legionella*, *Cryptosporidium*, and turbidity. Each public water system with a surface water source or a groundwater source under the direct influence of surface water must provide treatment of that source water that complies with these treatment technique requirements. The treatment technique requirements consist of installing and properly operating water treatment processes which reliably achieve:

(A) At least 99.9 percent (3-log) removal and/or inactivation of *Giardia lamblia* cysts between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer, and

(B) At least 99.99 percent (4-log) removal and/or inactivation of viruses between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer.

(C) At least 99 percent (2-log) removal of *Cryptosporidium* between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer for filtered systems, or *Cryptosporidium* control under the watershed control plan for unfiltered systems; and

(D) Compliance with any applicable disinfection profiling and benchmark requirements as specified in OAR 333-061-0036(4)(g) and OAR 333-061-0060(1)(e).

(E) Sampling and Bin Classification for *Cryptosporidium*:

(i) All systems must conduct an initial and second round of source water monitoring, as prescribed in subsection 333-061-0036(5)(e) of these rules, for each plant that treats a surface water or GWUDI source to determine what level, if any, of additional *Cryptosporidium* treatment they must provide.

(ii) Filtered systems must determine their *Cryptosporidium* treatment bin classification as prescribed in subsection (4)(f) of this rule and provide additional treatment for *Cryptosporidium*, if required, as prescribed in subsection (4)(g) of this rule. All unfiltered systems must provide treatment for *Cryptosporidium* as prescribed in subsections (3)(e) through (g) of this rule. Filtered and unfiltered systems must implement

Cryptosporidium treatment according to the schedule in paragraph (1)(a)(F) of this rule.

(iii) Systems required to provide additional treatment for *Cryptosporidium* must implement microbial toolbox options that are designed and operated as prescribed in sections (13) through (17) of this rule and in OAR 333-061-0036(5)(c), OAR 333-061-0050(4) and OAR 333-061-0050(5)(k).

(F) Schedule for compliance with *Cryptosporidium* treatment requirements.

(i) Following initial bin classification as prescribed in subsection (4)(f) of this rule, filtered water systems must provide the level of treatment for *Cryptosporidium* required under subsection (4)(g) of this rule according to the schedule in subparagraph (1)(a)(F)(iii) of this rule.

(ii) Following initial determination of the mean *Cryptosporidium* level as prescribed by subsection (2)(d) of this rule, unfiltered water systems must provide the level of treatment for Cryptosporidium required under subsection (3)(e) of this rule according to the schedule in subparagraph (1)(a)(F)(iii) of this rule.

(iii) *Cryptosporidium* treatment compliance dates. The Authority may allow up to an additional two years from the date specified below for water systems making capital improvements.

(I) Water systems that serve at least 100,000 people must comply with *Cryptosporidium* treatment by April 1, 2012.

(II) Water systems that serve from 50,000 to 99,999 people must comply with *Cryptosporidium* treatment by October 1, 2012.

(III) Water systems that serve from 10,000 to 49,999 people must comply with *Cryptosporidium* treatment by October 1, 2013.

(IV) Water systems that serve fewer than 10,000 people must comply with *Cryptosporidium* treatment by October 1, 2014.

(V) State-Regulated public water systems must comply with *Cryptosporidium* treatment by October 1, 2015.

(iv) If the bin classification for a filtered water system changes following the second round of source water monitoring as prescribed in subsection (4)(f) of this rule, the water system must provide the level of treatment for *Cryptosporidium* required by subsection (4)(g) of this rule on a schedule approved by the Authority.

(v) If the mean *Cryptosporidium* level for an unfiltered water system changes following the second round of monitoring as prescribed by paragraph (2)(d)(A) of this rule, the water system must provide the level of *Cryptosporidium* treatment required by subsection (3)(e) of this rule, due to the change, following a schedule approved by the Authority.

(b) A public water system using a surface water source or a ground water source under the direct influence of surface water is considered to be in compliance with the requirements of this rule if:

(A) The system meets the requirements for avoiding filtration in section (2) of this rule and the disinfection requirements in section (3) of this rule, and the disinfection benchmarking requirements of OAR 333-061-0060(1)(e); or

(B) The system meets the filtration requirements in section (4) of this rule and the disinfection requirements in section (5) of this rule and the disinfection benchmarking requirements of OAR 333-061-0060(1)(e).

(c) Water systems that utilize sources that have been determined to be under the direct influence of surface water according to section (7) of this rule have 18 months to meet the requirements of sections (2) and (3) of this rule, or the requirements of sections (4) and (5) of this rule. During that time, the system must meet the following Interim Standards:

(A) The turbidity of water entering the distribution system must never exceed 5 NTU. Turbidity measurements must be taken a minimum of once per day. If continuous turbidimeters are in place, measurements should be taken every four hours; and

(B) Disinfection must be sufficient to reliably achieve at least 1.0 log inactivation of *Giardia lamblia* cysts prior to the first user. Daily disinfection "CT" values must be calculated and recorded daily, including pH and temperature measurements, and disinfection residuals at the first customer.

(C) Reports must be submitted to the Authority monthly as prescribed in OAR 333-061-0040.

(D) If these interim standards are not met, the owner or operator of the water system must notify customers of the failure as required in OAR 333-061-0042(2)(b)(A).

(2) Requirements for systems utilizing surface water or GWUDI sources without filtration:

(a) A public water system that uses a surface water source or a groundwater source under the direct influence of surface water must meet all of the conditions of this section.

(b) Source water quality conditions.

(A) The fecal coliform concentration must be equal to or less than 20/100 ml, or the total coliform concentration must be equal to or less than

100/100 ml in representative samples of the source water immediately prior to the first or only point of disinfectant application in at least 90 percent of the measurements made for the 6 previous months that the system served water to the public on an ongoing basis. If a system measures both fecal and total coliform, the fecal coliform criterion, but not the total coliform criterion, in this paragraph must be met. All samples must be collected as prescribed in OAR 333-061-0036(5)(a)(A).

(B) The turbidity level cannot exceed the maximum contaminant level prescribed in OAR 333-061-0030(3)(a)(A).

(c) Site-specific conditions. The public water supply must:

(A) Meet the disinfection requirements as prescribed in section (3) of this rule at least 11 of the 12 previous months that the system served water to the public, on an ongoing basis, unless the system fails to meet the requirements during 2 of the 12 previous months that the system served water to the public, and the Authority determines that at least one of these failures was caused by circumstances that were unusual and unpredictable.

(B) Maintain a comprehensive watershed control program which minimizes the potential for contamination by *Giardia lamblia* cysts, *Cryptosporidium* oocysts, and viruses in the source water. For groundwater systems under the direct influence of surface water, and at the discretion of the Authority, a certified drinking water protection plan (OAR 340-040-0160 to 340-040-0180) that addresses both the groundwater- and surface water components of the drinking water supply may be substituted for a watershed control program. Groundwater systems relying on a drinking water protection plan would still be subject to the requirements of subsection (c) of this rule. The watershed control program shall be developed according to guidelines in OAR 333-061-0075. The public water system must demonstrate through ownership and/or written agreements with landowners within the watershed that it can control all human activities which may have an adverse impact on the microbiological quality of the source water. The system must submit an annual report to the Authority identifying any special concerns about the watershed, the procedures used to resolve the concern, current activities affecting water quality, and projections of future adverse impacts or activities and the means to address them. At a minimum, the watershed control program must:

(i) Characterize the watershed hydrology and land ownership;

(ii) Identify watershed characteristics and activities which have or may have an adverse effect on source water quality; and

(iii) Monitor the occurrence of activities which may have an adverse effect on source water quality.

(C) Be subject to an annual on-site inspection of the watershed control program and the disinfection treatment process by the Authority. The on-site inspection must indicate to the Authority's satisfaction that the watershed control program and disinfection treatment process are adequately designed and maintained including the adequacy limiting the potential contamination by *Cryptosporidium* oocysts. The inspection must include:

(i) A review of the effectiveness of the watershed control program;

(ii) A review of the physical condition of the source intake and how well it is protected;

(iii) A review of the system's equipment maintenance program to ensure there is low probability for failure of the disinfection process;

(iv) An inspection of the disinfection equipment for physical deterioration;

(v) A review of operating procedures;

(vi) A review of data records to ensure that all required tests are being conducted and recorded and disinfection is effectively practiced; and

(vii) Identification of any improvements which are needed in the equipment, system maintenance and operation, or data collection.

(D) Shall not have been identified by the Authority as a source of waterborne disease outbreak under the system's current configuration. If such an outbreak occurs, the system must sufficiently modify the treatment process, as determined by the Authority, to prevent any future such occurrence.

(E) Comply with the maximum contaminant level (MCL) for total coliform bacteria in OAR 333-061-0030(4) at least 11 months of the 12 previous months that the system served water to the public on an ongoing basis, unless the Authority determines that failure to meet this requirement was not caused by a deficiency in treatment of the source water.

(F) Comply with the requirements for total trihalomethanes, haloacetic acids (five), bromate, chlorite, chlorine, chloramines, and chlorine dioxide as specified in OAR 333-061-0036(4).

(d) Determination of mean *Cryptosporidium* level.

(A) Unfiltered water systems must calculate the arithmetic average of all *Cryptosporidium* sample concentrations following completion of the initial and second round of source water monitoring conducted in accordance with OAR 333-061-0036(5)(e). Systems must report this

value to the Authority for approval no later than 6 months after the date the system was required to complete the required monitoring.

(B) If the frequency of monthly *Cryptosporidium* sampling varies, water systems must calculate a monthly average for each month of sampling. Systems must then use these monthly average concentrations, rather than individual sample concentrations, in the calculation of the mean *Cryptosporidium* level prescribed in paragraph (2)(d)(A) of this rule.

(C) The report to the Authority of the mean *Cryptosporidium* levels calculated in accordance with paragraph (2)(d)(A) of this rule must include a summary of the source water monitoring data used for the calculation.

(D) Failure to comply with the conditions of subsection (2)(d) of this rule is a violation of the treatment technique requirement.

(e) A public water system which fails to meet any of the criteria in section (2) of this rule is in violation of a treatment technique requirement. The Authority can require filtration to be installed where it determines necessary.

(3) Disinfection requirements for systems utilizing surface water or GWUDI sources without filtration. Each public water system that does not provide filtration treatment must provide disinfection treatment as follows:

(a) The disinfection treatment must be sufficient to ensure at least 99.9 percent (3-log) inactivation of *Giardia lamblia* cysts and 99.99 percent (4-log) inactivation of viruses, every day the system serves water to the public, except any one day each month. Each day a system serves water to the public, the public water system must calculate the CT value(s) from the system's treatment parameters, using the procedure specified in OAR 333-061-0036(5)(a)(C) and determine whether this value(s) is sufficient to achieve the specified inactivation rates for *Giardia lamblia* cysts and viruses. If a system uses a disinfectant other the chlorine, the system must demonstrate to the Authority through the use of an approved protocol for on-site disinfection demonstration studies or other information satisfactory to the Authority that the system is achieving the required inactivation rates on a daily basis instead of meeting the "CT" values in this rule.

(b) Systems for chemical disinfection must have either:

(A) Redundant components, including an auxiliary power supply with automatic start-up and alarm to ensure that disinfectant application is maintained continuously while water is being delivered to the distribution system; or

(B) Automatic shut-off of delivery of water to the distribution system whenever there is less than 0.2 mg/l of residual disinfectant concentration in the water, or if the ultraviolet light system fails. If the Authority determines than automatic shut-off would cause

unreasonable risk to health or interfere with fire protection, the system must comply with paragraph (3)(b)(A) of this rule.

(c) The residual disinfectant concentration in the water entering the distribution system, measured as specified in OAR 333-061-0036(5)(a)(E), cannot be less than 0.2 mg/l for more than four hours.

(d) Disinfectant residuals in the distribution system. The residual disinfectant concentration in the distribution system, measured as total chlorine, combined chlorine, or chlorine dioxide, as specified in OAR 333-061-0036(5)(a)(F), cannot be undetectable in more than 5 percent of the samples each month, for any two consecutive months that the system serves water to the public.

(e) Unfiltered water systems must provide the level of *Cryptosporidium* inactivation specified in this subsection, based on their mean *Cryptosporidium* levels, and determined in accordance with subsection (2)(d) of this rule and according to the schedule in subsection (1)(a) of this rule.

(A) Unfiltered systems with a mean *Cryptosporidium* level of 0.01 oocysts/L or less must provide at least 2-log *Cryptosporidium* inactivation.

(B) Unfiltered systems with a mean *Cryptosporidium* level of greater than 0.01 oocysts/L must provide at least 3-log *Cryptosporidium* inactivation.

(f) Inactivation treatment technology requirements. Unfiltered systems must use chlorine dioxide, ozone, or UV as prescribed by 333-061-0036(5)(c) of these rules to meet the *Cryptosporidium* inactivation requirements of this section.

(A) Systems that use chlorine dioxide or ozone and fail to achieve the *Cryptosporidium* inactivation required in subsection (3)(e) of this rule on more than one day in the calendar month are in violation of the treatment technique requirement.

(B) Systems that use UV light and fail to achieve the *Cryptosporidium* inactivation required in subsection (3)(e) of this rule because they do not to meet the criteria specified in subsection (18)(c) of this rule are in violation of the treatment technique requirement.

(g) Use of two disinfectants. Unfiltered water systems must meet the combined *Cryptosporidium* inactivation requirements of subsection (3)(e) of this rule, and the *Giardia lamblia* and virus inactivation requirements of subsection (3)(a) of this rule using a minimum of two disinfectants. Each of the two disinfectants must achieve by itself, the total inactivation required for at least one of the following pathogens: *Cryptosporidium*, *Giardia lamblia*, or viruses.

(4) Requirements for systems utilizing surface water or GWUDI sources that provide filtration:

(a) A public water system that uses a surface water source or a groundwater source under the direct influence of surface water, and does not meet all of the criteria in sections (1), (2), and (3) of this rule for avoiding filtration, violates a treatment technique and must provide treatment consisting of both disinfection, as specified in section (5) of this rule, and filtration treatment which complies with the requirements of either subsection (4)(b), (c), (d), or (e) of this rule by June 29, 1993 or within 18 months of the failure to meet the criteria in section (2) of this rule for avoiding filtration, whichever is later. Failure to install a required treatment by the prescribed dates is a violation of the treatment technique requirements.

(b) Conventional filtration treatment or direct filtration. Systems using conventional filtration treatment or direct filtration treatment shall meet the turbidity requirements as specified in OAR 333-0061-0030(3)(b)(A)(i) and (ii).

(c) Slow sand filtration. Systems using slow sand filtration treatment shall meet the turbidity requirements prescribed in OAR 333-061-0030(3)(b)(B).

(d) Diatomaceous earth filtration. Systems using diatomaceous earth filtration treatment shall meet the turbidity requirements prescribed in OAR 333-061-0030(3)(b)(C).

(e) Other filtration technologies. Systems using other filtration technologies shall meet the turbidity requirements prescribed in OAR 333-061-0030(3)(b)(D).

(A) GWUDI systems using bank filtration as an alternate filtration technology must meet the requirements listed in section (9) of this rule.

(B) Systems using membrane filtration must conduct continuous indirect integrity testing and daily direct integrity testing in accordance with OAR 333-061-0036(5)(d)(B) and (C).

(f) *Cryptosporidium* Bin classification for filtered water systems. Following completion of the initial round of source water monitoring required by OAR 333-061-0036(5)(e), filtered water systems must calculate an initial *Cryptosporidium* bin concentration for each plant for which monitoring was required. Calculation of the bin concentration must be based upon the *Cryptosporidium* results reported in accordance with OAR 333-061-0036(5)(e), and must comply with paragraphs (4)(f)(A) through (F) of this rule.

(A) For water systems that collect 48 or more samples, the bin concentration is equal to the arithmetic average of all sample concentrations.

(B) For water systems that collect at least 24 samples, but not more than 47 samples, the bin concentration is equal to the highest arithmetic average of all sample concentrations in any 12 consecutive months during which *Cryptosporidium* samples were collected.

(C) For water systems that serve fewer than 10,000 people and only collect *Cryptosporidium* samples for 12 months, i.e., collect 24 samples in 12 months, the bin concentration is equal to the arithmetic average of all sample concentrations.

(D) For water systems with plants operating only part of the year, and that monitor fewer than 12 months per year as prescribed by OAR 333-061-0036(5)(e)(E), the bin concentration is equal to the highest arithmetic average of all sample concentrations during any year of *Cryptosporidium* monitoring.

(E) If the monthly *Cryptosporidium* sampling frequency varies, water systems must first calculate a monthly average for each month of monitoring. Water systems must then use these monthly average concentrations, rather than individual sample concentrations, in the applicable calculation for bin classification of this subsection.

(F) Bin classification table.

(i) Filtered water systems must determine their initial bin classification from Table 9 as follows and using the *Cryptosporidium* bin concentration calculated under subsection (4)(f) of this rule:

Table 9
Bin Classification Table for Filtered Systems

Mean *Cryptosporidium* concentration[1]	Bin Classification
< 0.075 *Cryptosporidium* oocysts/L, including water systems serving fewer than 10,000 people and not required to monitor for *Cryptosporidium* under OAR 333-061-0036(5)(e)(A).	Bin 1
0.075 oocyst/L to < 1.0 oocysts/L	Bin 2
≥ 1.0 oocysts/L to < 3.0 oocysts/L	Bin 3
≥ 3.0 *Cryptosporidium* oocysts/L	Bin 4

[1]Based on calculations as prescribed by paragraphs (4)(f)(A) through (E) of this rule, as applicable.

(ii) Following completion of the second round of source water monitoring required as prescribed by OAR 333-061-0036(5)(e)(B), filtered water systems must recalculate their *Cryptosporidium* bin concentration based upon the sample results reported in accordance with OAR 333-061-0036(5)(e)(B) and following the procedures specified in

paragraphs (4)(f)(A) through (D) of this rule. Water systems must then re-determine their bin classification using Table 9 in paragraph (4)(f)(F) of this rule.

(G) Filtered water systems must report their bin classification as prescribed by paragraph (4)(f)(F) of this rule to the Authority for approval no later than 6 months after the system is required to complete the initial and second round of source water monitoring based on the schedule in OAR 333-061-0036(5)(e)(C).

(H) The bin classification report to the Authority must include a summary of source water monitoring data and the calculation procedure used to determine bin classification. Failure to comply with the conditions of this paragraph is a violation of treatment technique requirements.

(g) Additional C*ryptosporidium* treatment requirements.

(A) Filtered water systems must provide the level of additional treatment for *Cryptosporidium* specified in Table 10 based on their bin classification as determined under subsection (4)(f) of this rule, and according to the schedule in paragraph (1)(a)(F) of this rule.

Table 10
Additional *Cryptosporidium* Treatment Requirements:

Bin Classification	Type of Filtration Treatment			
	Conventional Filtration (including softening)	Direct Filtration	Slow Sand or Diatomaceous Earth Filtration	Alternative Filtration Technologies
1	No additional Treatment	No additional Treatment	No additional Treatment	No additional Treatment
2	1-log treatment	1.5-log treatment	1-log treatment	[1]
3	2-log treatment	2.5-log treatment	2-log treatment	[2]
4	2.5-log treatment	3-log treatment	2.5-log treatment	[3]

[1] As determined by the Authority such that the total *Cryptosporidium* removal and inactivation is at least 4.0-log.
[2] As determined by the Authority such that the total *Cryptosporidium* removal and inactivation is at least 5.0-log.
[3] As determined by the Authority such that the total *Cryptosporidium* removal and inactivation is at least 5.5-log.

(B) Filtered water systems must use one or more of the treatment and management options listed in section (13) of this rule, termed the

microbial toolbox, to comply with the additional *Cryptosporidium* treatment required by paragraph (4)(g)(A) of this rule.

(C) Systems classified in Bin 3 or Bin 4 must achieve at least 1-log of the additional *Cryptosporidium* treatment, as required by paragraph (4)(g)(A) of this rule, using either one or a combination of the following: bag filters, bank filtration, cartridge filters, chlorine dioxide, membranes, ozone, or UV, as described in sections (14) through (18) of this rule and in OAR 333-061-0036(5)(c).

(i) Failure by a water system, in any month, to achieve the treatment credit required by sections (14) through (18) of this rule and OAR 333-061-0036(5)(c) that is at least equal to the level of treatment required by paragraph (4)(g)(A) of this rule, is a violation of treatment technique requirements.

(ii) If the Authority determines during a sanitary survey or equivalent source water assessment, that after a system completed the monitoring conducted as required by OAR 333-061-0036(5)(e)(A) or (B), significant changes occurred in the system's watershed that could lead to increased contamination of the source water by *Cryptosporidium*, the system must take action as specified by the Authority to address the contamination. These actions may include additional source water monitoring and/or implementing microbial toolbox options specified in section (13) of this rule.

(5) Disinfection requirements for systems utilizing surface water or GWUDI sources with filtration:

(a) The disinfection treatment must be sufficient to ensure that the total treatment processes of that system achieve at least 99.9 percent (3-log) inactivation and/or removal of *Giardia lamblia* cysts and at least 99.99 percent (4-log) inactivation and/or removal of viruses as determined by the Authority.

(b) The residual disinfectant concentration in the water entering the distribution system, measured as specified in OAR 333-061-0036(5)(b)(B), cannot be less than 0.2 mg/l for more than 4 hours.

(c) The residual disinfectant concentration in the distribution system, measured as total chlorine, combined chlorine, or chlorine dioxide, as specified is OAR 333-061-0036(5)(b)(E) cannot be undetectable in more than 5 percent of the samples each month, for any two consecutive months that the system serves water to the public.

(6) Requirements for groundwater systems with significant deficiencies or source water fecal or total coliform contamination.

(a) Groundwater systems must comply with the treatment technique requirements of this section when a significant deficiency is identified.

(b) Groundwater systems must comply with the treatment technique requirements of this section when a groundwater source sample collected in accordance with OAR 333-061-0036(6)(r) through (t) or (w) is *E. coli* positive.

(c) When a significant deficiency is identified at a public water system that uses both groundwater and surface water or groundwater under the direct influence of surface water, the system must comply with provisions of this section except in cases where the Authority determines that the significant deficiency is in a portion of the distribution system that is served solely by surface water or groundwater under the direct influence of surface water.

(d) Groundwater systems must consult with the Authority regarding the appropriate corrective action within 30 days of receiving written notice from the Authority of a significant deficiency, written notice from a laboratory that a groundwater source sample collected in accordance with OAR 333-061-0036(6)(s) was found to be *E. coli* -positive, or direction from the Authority that an *E. coli* -positive collected in accordance with OAR 333-061-0036(6)(r), (u)(A), or (w) requires corrective action.

(e) Within 120 days (or earlier if directed by the Authority) of receiving written notification from the Authority of a significant deficiency, written notice from a laboratory that a groundwater source sample collected in accordance with OAR 333-061-0036(6)(s) was found to be *E. coli* positive, or direction from the Authority that a *E. coli* -positive sample collected in accordance with OAR 333-061-036(6)(r), (t), or (w) requires corrective action, the groundwater system must either:

  (A) Have completed corrective action in accordance with applicable Authority plan review processes or other Authority guidance, including any Authority-specified interim measures; or

  (B) Be in compliance with an Authority approved corrective action plan and schedule subject to the following conditions:

    (i) Any subsequent modifications to an approved corrective action plan and schedule must be approved by the Authority; and

    (ii) If the Authority specifies interim measures for the protection of public health pending Authority approval of the corrective action plan and schedule, or pending completion of the corrective action plan, the system must comply with these interim measures as well as with any schedule specified by the Authority.

(f) Groundwater systems that meet the conditions of subsections (6)(a) or (6)(b) of this rule must, upon approval by the Authority, implement one or more of the following corrective action alternatives:

  (A) Correct all significant deficiencies;

(B) Disconnect the groundwater source from the water system and provide an alternate source of water. If a disconnected well is or will be within 100 feet of a public water supply well, the disconnected well must be abandoned in accordance with 333-061-0050(2)(a)(E);

(C) Eliminate the source of contamination; or

(D) Provide treatment for the groundwater source that reliably achieves at least 4-log inactivation, removal, or a combination of inactivation and removal of viruses before or at the first customer. If the groundwater source does not meet all of the applicable construction standards specified in OAR 333-061-0050(2)(a) or (b), and the Authority determines that reconstruction of the groundwater source will add a significant measure of public health protection, then the groundwater source must be made to meet all of the applicable construction standards specified in OAR 333-061-0050(2)(a) or (b) before treatment is applied as prescribed by OAR 333-061-0050(5)(b).

(g) A groundwater system with a significant deficiency is in violation of treatment technique requirements if, within 120 days (or earlier if directed by the Authority) of receiving written notice from the Authority of the significant deficiency, the water system:

(A) Does not complete corrective action in accordance with applicable Authority plan review processes or other Authority guidance, including Authority specified interim actions and measures; or

(B) Is not in compliance with an Authority approved corrective action plan and schedule.

(h) A groundwater system receiving notification of an *E. coli* -positive groundwater source sample (unless the Authority invalidates the sample in accordance with OAR 333-061-0036(6)(x)) is in violation of treatment technique requirements if, within 120 days (or earlier if directed by the Authority), the system:

(A) Does not complete corrective action in accordance with any applicable Authority plan review processes or other Authority guidance, including Authority specified interim actions and measures; or

(B) Is not in compliance with an Authority approved corrective action plan and schedule.

(i) A groundwater system, subject to the requirements of subsection (7)(b) of this rule, that fails to maintain at least 4-log treatment of viruses (using inactivation, removal, or an Authority approved combination of 4-log virus inactivation and removal) before or at the first customer for a groundwater source is in violation of treatment technique requirements if the failure is not corrected within four hours of determining the system is not maintaining at least 4-log treatment of viruses before or at the first customer.

(j) Water systems using groundwater sources shall provide continuous disinfection as prescribed by OAR 333-061-0050(5) when disinfection is approved by the Authority as a corrective action for a fecally contaminated source.

(7) Compliance monitoring requirements for groundwater systems that provide at least 4-log treatment of viruses. Water systems must comply with the requirements of (7)(a) through (7)(c) of this rule beginning on December 1, 2009.

(a) A groundwater system that is not required to meet the source water monitoring requirements of 333-061-0036(6)(r) through 333-061-0036(6)(u) of these rules, because it provides at least 4-log treatment of viruses (using inactivation, removal, or an Authority-approved combination of 4-log virus inactivation and removal) before or at the first customer for any groundwater source, must comply with the requirements of this subsection by December 1, 2009 or within 30 days of placing the groundwater source in service, whichever is later.

(A) The water system must notify the Authority in writing, that it provides at least 4-log treatment of viruses (using inactivation, removal, or an Authority approved combination of 4-log virus inactivation and removal) before or at the first customer for the groundwater source. Notification to the Authority must include engineering, operational, or other information that the Authority requests to evaluate the submission.

(B) The system must conduct compliance monitoring as required by subsection (7)(b) of this rule.

(C) The system must conduct groundwater source monitoring under OAR 333-061-0036(6) if the system subsequently discontinues 4-log treatment of viruses (using inactivation, removal, or an Authority-approved combination of 4-log virus inactivation and removal) before or at the first customer for the groundwater source.

(b) Monitoring requirements. A groundwater system subject to the requirements of section (6) or subsection (7)(a) of this rule must monitor the effectiveness and reliability of treatment for that groundwater source before or at the first customer as follows:

(A) Chemical Disinfection:

(i) Groundwater systems serving greater than 3,300 people must continuously monitor the residual disinfectant concentration using analytical methods as specified in OAR 333-061-0036(1), at a location approved by the Authority, and must record the lowest residual disinfectant concentration each day that water from the groundwater source is served to the public. The groundwater system must maintain the Authority-determined residual disinfectant concentration every day the groundwater

system serves water from the groundwater source to the public. If there is a failure in the continuous monitoring equipment, the groundwater system must conduct grab sampling every four hours until the continuous monitoring equipment is returned to service. The system must resume continuous residual disinfectant monitoring within 14 days.

(ii) Groundwater systems serving 3,300 or fewer people must monitor the residual disinfectant concentration using analytical methods as specified in OAR 333-061-0036(1), at a location approved by the Authority, and record the residual disinfection concentration each day that water from the groundwater source is served to the public. The groundwater system must maintain the Authority-determined residual disinfectant concentration every day the groundwater system serves water from the groundwater source to the public. The groundwater system must take a daily grab sample during the hour of peak flow or at another time specified by the Authority. If any daily grab sample measurement falls below the Authority-determined residual disinfectant concentration, the groundwater system must take follow-up samples every four hours until the residual disinfectant concentration is restored to the Authority-determined level. Alternately, a groundwater system that serves 3,300 or fewer people may monitor continuously and meet the requirements of subparagraph (7)(b)(A)(i) of this rule.

(B) Membrane filtration. A groundwater system that uses membrane filtration to achieve at least 4-log removal of viruses must monitor and operate the membrane filtration process in accordance with all Authority-specified monitoring and compliance requirements. A groundwater system that uses membrane filtration is in compliance with the requirement to achieve at least 4-log removal of viruses when:

(i) The membrane has an absolute molecular weight cut-off (MWCO), or an alternate parameter describing the exclusion characteristics of the membrane, that can reliably achieve at least 4-log removal of viruses;

(ii) The membrane process is operated in accordance with Authority-specified compliance requirements; and

(iii) The integrity of the membrane is intact as verified per OAR 333-061-0050(4)(c)(J).

(C) Alternative treatment. A groundwater system that uses an Authority-approved alternative treatment to provide at least 4-log treatment of viruses (using inactivation, removal, or an Authority-approved

combination of 4-log virus inactivation and removal) before or at the first customer must:

(i) Monitor the alternative treatment in accordance with all Authority-specified monitoring requirements; and

(ii) Operate the alternative treatment in accordance with all compliance requirements that the Authority determines to be necessary to achieve at least 4-log treatment of viruses.

(c) Discontinuing treatment. A groundwater system may discontinue 4-log treatment of viruses (using inactivation, removal, or an Authority-approved combination of 4-log virus inactivation and removal) before or at the first customer for a groundwater source if the Authority determines, and documents in writing, that 4-log treatment of viruses is no longer necessary for that groundwater source. A system that discontinues 4-log treatment of viruses is subject to the source water monitoring requirements of OAR 333-061-0036(6).

(8) Determination of groundwater under the direct influence of surface water (GWUDI)

(a) Except for wells using only a handpump, all groundwater sources must be evaluated for the potential of surface water influence if the source is in proximity to perennial or intermittent surface water and meets one of the hydrogeologic setting-surface water setback criteria identified in paragraph (A) and either paragraph (B) or (C). Hydrogeologic setting is identified by the Source Water Assessment or some other hydrogeologic study approved by the Authority.

(A) The groundwater source draws water from:

(i) A sand aquifer and is within 75 feet of surface water;

(ii) A sand and gravel aquifer and is within 100 feet of surface water;

(iii) A coarse sand, gravel, and boulder aquifer and is within 200 feet of surface water;

(iv) A fractured bedrock aquifer or layered volcanic aquifer and is within 500 feet of surface water; or

(v) Greater distances if geologic conditions or historical monitoring data indicate additional risk at the source; and

(B) There is a history of microbiological contamination in the source; or

(C) The Source Water Assessment or some other hydrogeologic study approved by the Authority determines the source is highly sensitive as a result of aquifer characteristics, vadose zone characteristics, monitoring history or well construction.

(b) Except as provided by subsection (8)(c) of this rule, water suppliers must conduct sampling for any groundwater source(s) meeting the criteria

specified in subsection (8)(a) of this rule. Sampling must be conducted according to the following criteria:

(A) Collection of twelve consecutive monthly source water samples when the source is used year-round, or every month the source provides water to the public during one operational season for water sources used seasonally;

(B) Samples must be analyzed for *E. coli* in accordance with all the applicable provisions of OAR 333-061-0036(1); and

(C) Samples must be collected at the water source prior to any treatment unless the Authority approves an alternate sampling location that is representative of source water quality.

(c) Public water systems that are required to evaluate their source(s) for direct influence of surface water may submit results of a hydrogeologic assessment completed by an Oregon registered geologist or other licensed professional with demonstrated experience and competence in hydrogeology in accordance with ORS 672.505 through 672.705 to demonstrate that the source is not potentially under the direct influence of surface water. The assessment must be consistent with the Oregon State Board of Geologist Examiners "Hydrology Report Guidelines," must be completed within a timeframe specified by the Authority and must include the following:

(A) Well characteristics: well depth, screened or perforated interval, casing seal placement;

(B) Aquifer characteristics: thickness of the vadose zone, hydraulic conductivity of the vadose zone and the aquifer, presence of low permeability zones in the vadose zone, degree of connection between the aquifer and surface water;

(C) Hydraulic gradient: gradient between the aquifer and surface water source during pumping conditions, variation of static water level and surface water level with time; and

(D) Groundwater flow: flow of water from the surface water source to the groundwater source during pumping conditions, estimated time-of-travel for groundwater from the surface water source(s) to the well(s), spring(s), etc.

(d) If a source water sample collected in accordance with subsection (8)(b) of this rule is reported as *E. coli* positive, then the water supplier must collect five additional source water samples within 24 hours of receiving notification of the positive sample result.

(e) If any of the five additional source water samples specified in subsection (8)(d) of this rule is *E. coli* positive then the original *E. coli* positive sample is considered confirmed, and the water supplier must have the groundwater source analyzed for surface water influence according to subsection (8)(h) of this rule. Further *E. coli* monitoring is not required.

(f) A water supplier may be required to have the groundwater source analyzed for surface water influence according to subsection (8)(h) of this rule at the discretion of the Authority if source water samples are consistently total coliform positive.

(g) Emergency groundwater sources that meet the criteria of subsection (8)(a) of this rule can either be evaluated as prescribed in subsection 8(b) or (8)(c) of this rule, or the evaluation can be waived if a Tier 2 public notice as prescribed in OAR 333-061-0042 is issued each time the source is used. The notice must explain that the source has been identified as potentially under the direct influence of surface water, but has not been fully evaluated, and therefore may not be treated sufficiently to inactivate pathogens such as *Giardia lamblia* and *Cryptosporidium*.

(h) Determination of surface water influence on a groundwater source must be based upon a minimum of two samples conducted according to the "Consensus Method for Determining Groundwaters under the Direct Influence of Surface Water Using Microscopic Particulate Analysis (MPA)." Both water samples must be collected during a period of high runoff or streamflow and separated by a period of at least four weeks, or at other times as determined by the Authority. Scoring for diatoms, other algae, and insects/larvae is partially modified according to Table 11. Scoring for *Giardia lamblia*, coccidia, rotifers, and plant debris remains unchanged.

Table 11
Modified Scoring of Microscopic Particulate Analyses

Indicators of Surface Water, Oregon Modified Scoring (counted per 100 gal. water)					
Diatoms		Other Algae		Insects / Larvae	
Abundance	Risk Score	Abundance	Risk Score	Abundance	Risk Score
1-10	6	1-20	4	1-15	3
11-16	7	21-32	5	16-22	4
17-22	8	33-48	6	23-30	5
23-28	9	49-64	7	31-65	6
29-34	10	65-80	8	66-99	7
35-40	11	81-95	9	100-130	8
41-100	12	96-160	10	>130	9
101-149	13	161-220	11		
150-200	14	221-299	12		
201-250	15	300-360	13		
>251	16	>360	14		

EPA Consensus Method Scoring (counted per 100 gal. water)							
Giardia		Coccidia		Rotifers		Plant Debris	
Abundance	Risk	Abundance	Risk	Abundance	Risk	Abundance	Risk

	Score		Score		Score		Score
1-5	20	1-5	20	1-20	1	1-25	0
6-15	25	6-15	25	21-60	2	26-70	1
16-30	30	16-30	30	61-149	3	71-200	2
>30	40	>30	35	>150	4	>200	3

(i) A water source will be classified as groundwater or GWUDI as follows:

(A) If the two initial microscopic particulate analyses have a risk score of less than 10, the water system source is classified as groundwater;

(B) If any microscopic particulate analysis (MPA) risk score is greater than 19, or each risk score is greater than 14, the water source is classified as GWUDI;

(C) If at least one of the two MPA risk scores is between 10 and 19, two additional microscopic particulate analyses must be conducted, and water source classification will be made as follows:

(i) If all of the MPA risk scores are less than 15, the water system source is classified as groundwater;

(ii) If any MPA risk score is greater than 19, or two or more are greater than 14, the water system source is classified as under the direct influence of surface water; or

(iii) If only one of four MPA risk scores is greater than 14, two additional microscopic particulate analyses must be conducted, and water source classification will be based upon further evaluation by the Authority.

(j) If an infiltration gallery, Ranney well, or dug well has been classified as groundwater under this rule, the turbidity of the source must be monitored and recorded daily and kept by the water system operator. If the turbidity exceeds 5 NTU or if the surface water body changes course such that risk to the groundwater source is increased, an MPA must be conducted at that time. Reevaluation may be required by the Authority at any time.

(k) The Authority may determine a groundwater source to be under the direct influence of surface water if the criteria in subsection (8)(a) of this rule are met and there are significant or relatively rapid shifts in groundwater characteristics, such as turbidity, which closely correlate to changes in weather or surface water conditions.

(l) The Authority may require reevaluation of a groundwater source, as specified in this section, if geologic conditions, water quality trends, or other indicators change despite any data previously collected or any determination previously made.

(m) The Authority may determine that a source is not under direct influence of surface water based on criteria other than MPAs including the Source Water Assessment, source water protection, and other water quality parameters.

The determination shall be based on the criteria indicating that the water source has a very low susceptibility to contamination by parasites, including *Giardia lamblia* and *Cryptosporidium*. The Authority may impose additional monitoring or disinfection treatment requirements to ensure that the risk remains low.

(9) Requirements for groundwater sources under the direct influence of surface water seeking alternative filtration credit through bank filtration:

(a) Water systems with all MPA risk scores less than 30 may choose the option to evaluate for bank filtration credit. The water system must conduct a demonstration of performance study that includes an assessment of the ability of the local hydrogeologic setting to provide a minimum of 2-log reduction in the number of particles and microorganisms in the *Giardia* and *Cryptosporidium* size range between surface water and the groundwater source. The bank filtration study must include the following elements or other Authority approved methods:

(A) The bank filtration study must involve the collection of data on removal of biological surrogates and particles in the *Cryptosporidium* size range of 2–5 microns or other surrogates approved by the Authority, and related hydrogeologic and water quality parameters during the full range of operating conditions. The demonstration study methods shall be reviewed and approved by the Authority prior to implementation. Final assessment of removal credit granted to the well shall be made by the Authority based on the study results.

(b) If a GWUDI system using bank filtration as an alternative filtration technology violates the MCL for turbidity specified in OAR 333-061-0030(3)(b)(D), the water system must investigate the cause of the high turbidity within 24 hours of the exceedance. Pending the results of the investigation by the water system, the Authority may require a new bank filtration study.

(10) Disinfection Byproduct Control Requirements:

(a) This rule establishes criteria under which community water systems and Non-transient, Non-community water systems which add a chemical disinfectant to the water in any part of the drinking water treatment process must modify their practices to meet MCLs and MRDLs in OAR 333-061-0030 and 0031, respectively. This rule also establishes the treatment technique requirements for disinfection byproduct precursors, and the criteria under which transient non-community water systems that use chlorine dioxide as a disinfectant or oxidant must modify their practices to meet the MRDL for chlorine dioxide as specified in OAR 333-061-0031.

(b) Compliance dates.

(A) Community and Non-transient Non-community water systems serving at least 10,000 people using surface water or groundwater under the

direct influence of surface water must comply with the treatment technique requirements of this rule as well as monitoring and maximum contaminants requirements for disinfection byproduct control as specified in OAR 333-061-0030 and 0036, respectively beginning January 1, 2002. Those systems serving fewer than 10,000 people using surface water or groundwater under the direct influence of surface water and those systems using only groundwater not under the direct influence of surface water must comply with the rules identified in this paragraph beginning January 1, 2004.

(B) Transient non-community water systems serving at least 10,000 people using surface water or groundwater under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with the requirements for chlorine dioxide in this rule and OAR 333-061-0030 and 0036 beginning January 1, 2002. Those systems serving fewer than 10,000 persons using surface water or groundwater under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant and systems using only ground water not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with the requirements for chlorine dioxide in this rule and OAR 333-061-0030 and 0036 beginning January 1, 2004.

(c) Water systems may increase residual disinfectant levels in the distribution system of chlorine or chloramines (but not chlorine dioxide) to a level and for a time necessary to protect public health, to address specific microbiological contamination problems caused by circumstances such as, but not limited to, distribution line breaks, storm run-off events, source water contamination events, or cross connection events.

(d) Enhanced coagulation or enhanced softening are authorized treatment techniques to control the level of disinfection byproduct precursors for water systems using surface water or groundwater under the direct influence of surface water and conventional filtration treatment. Community and Non-transient Non-community water systems using conventional filtration treatment must operate with enhanced coagulation or enhanced softening to achieve the total organic carbon (TOC) percent removal levels specified in subsection (10)(e) of this rule unless the system meets at least one of the alternative compliance criteria listed in paragraph (10)(d)(A) or (10)(d)(B) of this rule.

(A) Alternative compliance criteria for enhanced coagulation and enhanced softening systems. Water systems may use the alternative compliance criteria in subparagraphs (10)(d)(A)(i) through (vi) of this rule in lieu of complying with the performance criteria specified in

subsection (e) of this section. Systems must still comply with monitoring requirements specified in OAR 333-061-0036(4)(n).

(i) The system's source water TOC level is less than 2.0 mg/L, calculated quarterly as a running annual average.

(ii) The system's treated water TOC level is less than 2.0 mg/L, calculated quarterly as a running annual average.

(iii) The system's source water TOC is less than 4.0 mg/L, calculated quarterly as a running annual average; the source water alkalinity is greater than 60 mg/L (as CaCO3 calculated quarterly as a running annual average; and the TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively.

(iv) The TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively, and the system uses only chlorine for primary disinfection and maintenance of a residual in the distribution system.

(v) The system's source water SUVA, prior to any treatment and measured monthly is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

(vi) The system's finished water SUVA, measured monthly is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

(B) Additional alternative compliance criteria for softening systems. Systems practicing enhanced softening that cannot achieve the TOC removals required by paragraph (10)(e)(B) of this rule may use the alternative compliance criteria in subparagraphs (10)(d)(B)(i) and (ii) of this rule in lieu of complying with subsection (10)(e) of this rule. Systems must still comply with monitoring requirements in specified in OAR 333-061-0036(4)(n).

(i) Softening that results in lowering the treated water alkalinity to less than 60 mg/L (as CaCO3), measured monthly and calculated quarterly as a running annual average.

(ii) Softening that results in removing at least 10 mg/L of magnesium hardness (as CaCO3), measured monthly and calculated quarterly as a running annual average.

(e) Enhanced coagulation and enhanced softening performance requirements.

(A) Systems must achieve the percent reduction of TOC specified in paragraph (10)(e)(B) in this rule between the source water and the combined filter effluent, unless the Authority approves a system's request for alternate minimum TOC removal (Step 2) requirements under paragraph (10)(e)(C) of this rule.

(B) Required Step 1 TOC reductions, specified in Table 12, are based upon specified source water parameters. Systems practicing softening are required to meet the Step 1 TOC reductions in the far-right column (Source water alkalinity >120 mg/L) for the specified source water TOC:

Table 12
Step 1 Required Removal (in percent) of TOC by Enhanced Coagulation and Enhanced Softening for Systems Using Conventional Treatment[1,2]

Source-water TOC, mg/L	Source-water alkalinity, mg/L as $CaCO_3$		
	0-60	61-120	>120[3]
>2.0-4.0	35.0	25.0	15.0
>4.0-8.0	45.0	35.0	25.0
>8.0	50.0	40.0	30.0

[1] Systems meeting at least one of the conditions in subparagraphs (d)(A)(i)-(vi) of this section are not required to operate with enhanced coagulation.

[2] Softening systems meeting one of the alternative compliance criteria in paragraph (d)(B) of this section are not required to operate with enhanced softening.

[3] Systems practicing softening must meet the TOC removal requirements in this column.

(C) Water systems that cannot achieve the Step 1 TOC removals required by paragraph (10)(e)(B) of this rule due to water quality parameters or operational constraints must apply to the Authority, within three months of failure to achieve the TOC removals required by paragraph (10)(e)(B) of this rule, for approval of alternative minimum TOC (Step 2) removal requirements submitted by the water system. If the Authority approves the alternative minimum TOC removal (Step 2) requirements, the Authority may make those requirements retroactive for the purposes of determining compliance. Until the Authority approves the alternate minimum TOC removal (Step 2) requirements, the water system must meet the Step 1 TOC removals contained in paragraph (10)(e)(B) of this rule.

(D) Alternate minimum TOC removal (Step 2) requirements. Applications made to the Authority by enhanced coagulation systems for approval of alternative minimum TOC removal (Step 2) requirements under paragraph (10)(e)(C) of this rule must include, as a minimum, results of bench-scale or pilot-scale testing conducted under subparagraph (10)(e)(D)(i) of this rule. The submitted bench-scale or pilot scale testing must be used to determine the alternate enhanced coagulation level.

(i) Alternate enhanced coagulation level is defined as coagulation at a coagulant dose and pH as determined by the method described in subparagraphs (10)(e)(D)(i) through (v) of this rule

such that an incremental addition of 10 mg/L of alum (or equivalent amount of ferric salt) results in a TOC removal of less than or equal to 0.3 mg/ L. The percent removal of TOC at this point on the "TOC removal versus coagulant dose" curve is then defined as the minimum TOC removal required for the system. Once approved by the Authority, this minimum requirement supersedes the minimum TOC removal required by the Table 12 in paragraph (10)(e)(B) of this rule. This requirement will be effective until such time as the Authority approves a new value based on the results of a new bench-scale and pilot-scale test. Failure to achieve Authority-set alternative minimum TOC removal levels is a violation.

(ii) Bench-scale or pilot-scale testing of enhanced coagulation must be conducted by using representative water samples and adding 10 mg/L increments of alum (or equivalent amounts of ferric salt) until the pH is reduced to a level less than or equal to the enhanced coagulation Step 2 target pH as specified in Table 13

Table 13
Enhanced Coagulation Step 2 Target pH

Alkalinity (mg/L as $CaCO_3$)	Target pH
0-60	5.5
>60-120	6.3
>120-240	7.0
>240	7.5

(iii) For waters with alkalinities of less than 60 mg/L for which addition of small amounts of alum or equivalent addition of iron coagulant drives the pH below 5.5 before significant TOC removal occurs, the system must add necessary chemicals to maintain the pH between 5.3 and 5.7 in samples until the TOC removal of 0.3 mg/L per 10 mg/L alum added (or equivalent addition of iron coagulant) is reached.

(iv) The system may operate at any coagulant dose or pH necessary, consistent with these rules to achieve the minimum TOC percent removal approved under paragraph (10)(e)(C) of this rule.

(v) If the TOC removal is consistently less than 0.3 mg/L of TOC per 10 mg/L of incremental alum dose at all dosages of alum (or equivalent addition of iron coagulant), the water is deemed to contain TOC not amenable to enhanced coagulation. The water system may then apply to the Authority for a waiver of enhanced coagulation requirements.

(f) Compliance calculations.

(A) Water systems other than those identified in paragraphs (10)(d)(A) or (d)(B) of this rule must comply with requirements contained in paragraph (10)(e)(B) or (C) of this rule. Systems must calculate compliance quarterly, beginning after the system has collected 12 months of data, by determining an annual average using the following method:

(i) Determine actual monthly TOC percent removal, equal to: {1-(treated water TOC/source water TOC)}x100

(ii) Determine the required monthly TOC percent removal (from either Table 9 in paragraph (10)(e)(B) of this rule or from paragraph (10)(e)(C) of this rule).

(iii) Divide the value in subparagraph (10)(f)(A)(i) of this rule by the value in subparagraph (10)(f)(A)(ii) of this rule.

(iv) Add together the results of subparagraph (10)(f)(A)(iii) of this rule for the last 12 months and divide by 12.

(v) If the value calculated in subparagraph (10)(f)(A)(iv) of this rule is less than 1.00, the water system is not in compliance with the TOC percent removal requirements.

(B) Water systems may use the provisions in subparagraphs (10)(f)(B)(i) through (v) of this rule in lieu of the calculations in subparagraph (10)(f)(A)(i) through (v) of this rule to determine compliance with TOC percent removal requirements.

(i) In any month that the water system's treated or source water TOC level is less than 2.0 mg/L, the water system may assign a monthly value of 1.0 (in lieu of the value calculated in subparagraph (10)(f)(A)(iii) of this rule) when calculating compliance under the provisions of paragraph (10)(f)(A) of this rule.

(ii) In any month that a system practicing softening removes at least 10 mg/L of magnesium hardness (as CaCO3), the water system may assign a monthly value of 1.0 (in lieu of the value calculated in subparagraph (10)(f)(A)(iii) of this rule) when calculating compliance under the provisions of paragraph (10)(f)(A) of this rule.

(iii) In any month that the water system's source water SUVA, prior to any treatment is less than or equal to 2.0 L/mg-m, the water system may assign a monthly value of 1.0 (in lieu of the value calculated in subparagraph (10)(f)(A)(iii) of this rule) when calculating compliance under the provisions of paragraph (10)(f)(A) of this rule.

(iv) In any month that the water system's finished water SUVA is less than or equal to 2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in subparagraph (10)(f)(A)(iii) of this rule) when calculating compliance under the provisions of paragraph (10)(f)(A) of this rule.

(v) In any month that a system practicing enhanced softening lowers alkalinity below 60 mg/L (as CaCO3), the water system may assign a monthly value of 1.0 (in lieu of the value calculated in subparagraph (10)(f)(A)(iii) of this rule) when calculating compliance under the provisions of paragraph (10)(f)(A) of this rule.

(C) Water systems using conventional treatment may also comply with the requirements of this section by meeting the criteria in paragraph (10)(d)(A) or (B) of this rule.

(11) Requirements for Water Treatment Plant Recycled Water

(a) Any water system using surface water or groundwater under the direct influence of surface water that uses conventional filtration treatment or direct filtration treatment and that recycles spent filter backwash water, thickener, supernatant, or liquids from dewatering processes must meet the requirements of subsections (10)(b) and (c) of this rule and OAR 333-061-0040(2)(i).

(b) A water system must notify the Authority in writing by December 8, 2003 if that water system recycles spent filter backwash water, thickener supernatant, or liquids from dewatering processes. This notification must include, at a minimum, the information specified in paragraphs (10)(b)(A) and (B) of this rule.

(A) A water treatment plant schematic showing the origin of all flows which are recycled (including, but not limited to, spent filter backwash water, thickener supernatant, and liquids from dewatering processes), the hydraulic conveyance used to transport them, and the location where they are re-introduced back into the water treatment plant.

(B) Typical recycle flow in gallons per minute (gpm), the highest observed water treatment plant flow experienced in the previous year (gpm), the design flow for the water treatment plant (gpm), and the operating capacity of the water treatment plant (gpm) that has been determined by the Authority where the Authority has made such determinations.

(c) Any water system that recycles spent filter backwash water, thickener supernatant, or liquids from dewatering processes must return these flows through the processes of a system's existing conventional filtration treatment

plant or direct filtration treatment plant as defined by these rules or at an alternate location approved by the Authority by June 8, 2004. If capital improvements are required to modify the recycle location to meet this requirement, all capital improvements must be completed no later than June 8, 2006.

(12) Water systems using uncovered finished water storage facilities must comply with the conditions of either subsections (12)(a) or (b) of this rule for each uncovered finished water storage facility, or be in compliance with an Authority approved schedule to meet these conditions no later than April 1, 2009.

(a) Water systems must cover any uncovered finished water storage facility; or

(b) Treat the discharge from the uncovered finished water storage facility into the distribution system to achieve at least 4-log virus, 3-log *Giardia lamblia*, and 2-log *Cryptosporidium* inactivation and/or removal using a protocol approved by the Authority.

(c) Failure to comply with the requirements of this section is a violation of the treatment technique requirement.

(13) Summary and General Requirements of Microbial toolbox options for meeting *Cryptosporidium* treatment requirements. Filtered water systems are eligible for the treatment credits listed in Table 14 of this section by meeting the conditions for microbial toolbox options described in sections (14) through (18) of this rule and in OAR 333-061-0036(5)(c). Unfiltered water systems are eligible only for the treatment credits specified as inactivation toolbox options in Table 14. Water systems apply these treatment credits to meet the requirements of subsections (3)(e) or (4)(g) of this rule, as applicable.

Table 14
Microbial Toolbox Options

Toolbox Option	Crypto treatment credit with design and implementation criteria summary
Source Protection and Management Toolbox Options	
Watershed Control Program	0.5-log credit for Authority approved program including the required elements, an annual program status report to the Authority, and regular watershed surveys. Specific criteria are in subsection (14)(a) of this rule.
Alternative source/intake management	No prescribed credit. Systems must conduct simultaneous monitoring for treatment bin classification at alternative intake locations or using alternative intake management strategies. Specific criteria are in subsection (14)(b) of this rule.
Pre Filtration Toolbox Options	
Presedimentation basin with coagulation	0.5-log credit during any month that presedimentation basins achieve a monthly mean 0.5-log or greater

	reduction of turbidity, or alternative Authority approved performance criteria. To be eligible, basins must be operated continuously with coagulant addition and all plant flow must pass through the basins. Specific criteria are in subsection (15)(a) of this rule.
Two-stage lime softening	0.5-log credit for two-stage softening where chemical addition and hardness precipitation occur in both stages. All plant flow must pass through both stages. Single-stage softening is credited as equivalent to conventional treatment. Specific criteria are in subsection (15)(b) of this rule.
Bank filtration	0.5-log credit for 25-foot setback; 1.0-log credit for 50-foot setback; aquifer must be unconsolidated sand containing at least 10 percent fines; average turbidity in wells must be less than 1 NTU. Water systems using wells followed by filtration must sample at the well to determine bin classification when conducting source water monitoring, and are not eligible for additional credit. Specific criteria are in subsection (15)(c) of this rule.

Treatment Performance Toolbox Options

Combined filter performance	0.5-log credit for combined filter effluent turbidity less than or equal to 0.15 NTU in at least 95 percent of measurements each month. Specific criteria are in subsection (16)(a) of this rule.
Individual filter performance	0.5-log credit if individual filter effluent turbidity is less than or equal to 0.15 NTU in at least 95 percent of samples each month in each filter and is never greater than 0.3 NTU in two consecutive measurements in any filter. This credit is cumulative to the 0.5-log combined filter performance credit. Specific criteria are in subsection (16)(b) of this rule.
Demonstration of performance	Credit awarded to unit process or treatment train based on a demonstration to the Authority with an Authority approved protocol. Specific criteria are in subsection (16)(c) of this rule.

Additional Filtration Toolbox Options

Bag or cartridge filters (individual filters)	Up to 2-log credit based on the removal efficiency demonstrated during challenge testing with a 1.0-log factor of safety. Specific criteria are in subsection (17)(a) of this rule.
Bag or cartridge filters (in series)	Up to 2.5-log credit based on the removal efficiency demonstrated during challenge testing with a 0.5-log factor of safety. Specific criteria are in subsection (17)(a) of this rule.
Membrane filtration	Log credit equivalent to removal efficiency demonstrated in challenge test for device if supported by direct integrity testing. Specific criteria are in subsection (17)(b) of this rule.
Second stage filtration	0.5-log credit for second separate granular media filtration stage if treatment train includes coagulation prior to first filter. Specific criteria are in subsection (17)(c) of this rule.
Slow sand filters	2.5-log credit as a secondary filtration step; 3.0-log credit as a primary filtration process. No prior chlorination for either option. Specific criteria are in subsection (17)(d) of this rule.
Inactivation Toolbox Options	
Chlorine dioxide	Log credit based on measured CT in relation to CT table. Specific criteria in OAR 333-061-0036(5)(c).
Ozone	Log credit based on measured CT in relation to CT table. Specific criteria in OAR 333-061-0036(5)(c).
UV	Log credit based on validated UV dose in relation to UV dose table; reactor validation testing required to establish UV dose and associated operating conditions. Specific criteria in OAR 333-061-0036(5)(c).

(14) Source toolbox components for meeting *Cryptosporidium* treatment requirements.

(a) Watershed control program. Water systems receive 0.5-log *Cryptosporidium* treatment credit for implementing a watershed control program that meets the requirements of this subsection.

(A) Water systems must notify the Authority of the intent to apply for the watershed control program credit no later than two years prior to the treatment compliance date applicable to the system in subsection (1)(a) of this rule.

(B) Water systems must submit a proposed watershed control plan to the Authority no later than one year before the applicable treatment compliance date in subsection (1)(a) of this rule. The Authority must approve the watershed control plan for the water system to receive the applicable treatment credit. The watershed control plan must include the following elements:

(i) Identification of an area of influence, outside of which the likelihood of *Cryptosporidium* or fecal contamination affecting the treatment plant intake is not significant. This is the area to be evaluated in future watershed surveys under subparagraph (14)(a)(E)(ii) of this rule;

(ii) Identification of both potential and actual sources of *Cryptosporidium* contamination, and an assessment of the relative impact of these contamination sources on the water system's source water quality;

(iii) An analysis of the effectiveness and feasibility of control measures that could reduce *Cryptosporidium* loading from sources of contamination to the system's source water; and

(iv) A statement of goals and specific actions the system will undertake to reduce source water *Cryptosporidium* levels. The plan must explain how the actions are expected to contribute to specific goals, identify watershed partners and their roles, identify resource requirements and commitments, and include a schedule for plan implementation with deadlines for completing specific actions identified in the plan.

(C) Water Systems with existing watershed control programs are eligible to seek this credit, but must meet the requirements prescribed in paragraph (14)(a)(B) of this rule, and must specify ongoing and future actions that will reduce source water *Cryptosporidium* levels.

(D) If the Authority does not respond to a water system regarding approval of a watershed control plan submitted in accordance with this section, and the system meets the other requirements of this section, the watershed control program will be considered approved and a 0.5 log *Cryptosporidium* treatment credit will be awarded unless the Authority subsequently withdraws such approval.

(E) Water systems must complete the actions specified in this paragraph to maintain the 0.5-log credit.

(i) Water systems must submit an annual watershed control program status report to the Authority. The status report must describe the water system's implementation of the approved plan, and assess the adequacy of the plan to meet its goals. It must explain how the water system is addressing any

deficiencies in plan implementation, including those previously identified by the Authority, or as the result of the watershed survey conducted in accordance with subparagraph (14)(a)(E)(ii) of this rule. The watershed control program status report must also describe any significant changes that have occurred in the watershed since the last watershed sanitary survey.

(ii) Water systems must undergo a watershed sanitary survey every three years for community water systems and every five years for non-community water systems and submit the survey report to the Authority. The survey must be conducted according to Authority guidelines and by persons the Authority approves.

(I) The watershed sanitary survey must meet the following criteria: encompass the region identified in the Authority approved watershed control plan as the area of influence; assess the implementation of actions to reduce source water *Cryptosporidium* levels; and identify any significant new sources of *Cryptosporidium*.

(II) If the Authority determines that significant changes may have occurred in the watershed since the previous watershed sanitary survey, water systems must undergo another watershed sanitary survey by a date determined by the Authority regardless of the regular date specified in subparagraph (14)(a)(E)(ii) of this rule.

(iii) The water system must make the watershed control plan, annual status reports, and watershed sanitary survey reports available to the public upon request. These documents must be in a plain language style and include criteria by which to evaluate the success of the program in achieving plan goals. The Authority may approve withholding portions of the annual status report, watershed control plan, and watershed sanitary survey from the public based on water supply security considerations.

(F) If the Authority determines that a water system is not implementing the approved watershed control plan, the Authority may withdraw the watershed control program treatment credit.

(G) If a water system determines, during implementation, that making a significant change to its approved watershed control program is necessary, the system must notify the Authority prior to making any such changes. If any change is likely to reduce the level of source water protection, the system must notify the Authority of the actions the water system will take to mitigate this effect.

(b) Alternative source. A water system may conduct source water monitoring that reflects a different intake location (either in the same source or from an alternate source), or a different procedure for the timing or level of withdrawal from the source. If the Authority approves, a system may determine its bin classification under subsection (4)(f) of this rule based on the alternative source monitoring results.

(A) If a water system conducts alternative source monitoring as prescribed by this subsection, the water system must also monitor their current plant intake concurrently as prescribed by OAR 333-061-0036(5)(e).

(B) Alternative source monitoring as prescribed by this subsection must meet the requirements for source monitoring to determine bin classification, as described in OAR 333-061-0036(1), OAR 333-061-0036(5)(e) through (g), and OAR 333-061-0040(1)(l). Water systems must report the alternative source monitoring results to the Authority, including supporting information that documents the operating conditions under which the samples were collected.

(C) If a system determines its bin classification according to subsection (4)(f) of this rule using alternative source monitoring results that reflect a different intake location or a different procedure for managing the timing or level of withdrawal from the source, the system must relocate the intake or permanently adopt the withdrawal procedure, as applicable, no later than the applicable treatment compliance date in subsection (1)(a) of this rule.

(15) Pre-filtration treatment toolbox components for meeting *Cryptosporidium* treatment requirements.

(a) Presedimentation. Systems receive 0.5-log *Cryptosporidium* treatment credit for a presedimentation basin during any month the process meets the criteria specified in this paragraph:

(A) The presedimentation basin must be in continuous operation, and must treat the entire plant flow taken from a surface water or GWUDI source;

(B) The water system must continuously add a coagulant to the presedimentation basin; and

(C) The presedimentation basin must achieve the performance criteria specified in this paragraph.

(i) The basin must demonstrate at least 0.5-log mean reduction of influent turbidity. This reduction must be determined using daily turbidity measurements of the presedimentation process influent and effluent, and must be calculated as follows: $\log_{10}$(monthly mean of daily influent turbidity)-$\log_{10}$(monthly mean of daily effluent turbidity).

(ii) The basin must also comply with Authority-approved performance criteria that demonstrates at least 0.5-log mean removal of micron-sized particulate material through the presedimentation process.

(b) Two-stage lime softening. Systems receive an additional 0.5-log *Cryptosporidium* treatment credit for a two-stage lime softening plant if chemical addition and hardness precipitation occur in two separate and sequential softening stages prior to filtration. Both softening stages must treat the entire plant flow taken from a surface water or GWUDI source.

(c) Bank filtration. Water systems receive *Cryptosporidium* treatment credit for bank filtration that serves as pretreatment to a filtration plant by meeting the criteria specified in this section. Water systems using bank filtration when they begin source water monitoring according to OAR 333-061-0036(5)(e) must collect samples as prescribed by OAR 333-061-0036(5)(g) and are not eligible for this credit.

(A) Wells with a groundwater flow path of at least 25 feet receive 0.5-log treatment credit. Wells with a groundwater flow path of at least 50 feet receive 1.0-log treatment credit. The groundwater flow path must be determined as specified in paragraph (D) of this subsection.

(B) Only wells in granular aquifers are eligible for treatment credit. Granular aquifers are those comprised of sand, clay, silt, rock fragments, pebbles or larger particles, and minor cement. A water system must characterize the aquifer at the well site to determine aquifer properties.

(i) Water systems must extract a core from the aquifer and demonstrate that in at least 90 percent of the core length, grains less than 1.0 mm in diameter constitute at least 10 percent of the core material.

(C) Only horizontal and vertical wells are eligible for treatment credit.

(D) For vertical wells, the groundwater flow path is the measured distance from the edge of the surface water body under high flow conditions (as determined by the 100 year floodplain elevation boundary or by the floodway, as defined in Federal Emergency Management Agency flood hazard maps) to the well screen. For horizontal wells, the groundwater flow path is the measured distance from the bed of the river under normal flow conditions to the closest horizontal well lateral screen.

(E) Water systems must monitor each wellhead for turbidity at least once every four hours while the bank filtration process is in operation. If monthly average turbidity levels, based on daily maximum values in the well, exceed 1 NTU, the system must report this result to the Authority and conduct an assessment within 30 days to determine the

cause of the high turbidity levels in the well. If the Authority determines that microbial removal has been compromised, the Authority may revoke treatment credit until the water system implements Authority-approved corrective actions to remediate the problem.

(F) Springs and infiltration galleries are not eligible for treatment credit under this section, but are eligible for a treatment credit in accordance with subsection (16)(c) of this rule.

(G) Bank filtration demonstration of performance. The Authority may approve *Cryptosporidium* treatment credit for bank filtration based on a demonstration of performance study that meets the criteria in this paragraph. This treatment credit may be greater than 1.0-log and may be awarded to bank filtration that does not meet the criteria in (15)(c)(A) through (E) of this rule.

(i) The study must follow an Authority approved protocol, and must include the collection of data on the removal of *Cryptosporidium* or a surrogate for *Cryptosporidium* and related hydrogeologic and water quality parameters during the full range of operating conditions.

(ii) The study must include sampling from both the production well(s) and monitoring wells that are screened and located along the shortest flow path between the surface water source and the production well(s).

(16) Treatment performance toolbox components for meeting *Cryptosporidium* treatment requirements.

(a) Combined filter performance. Water systems using conventional filtration treatment or direct filtration treatment receive an additional 0.5-log *Cryptosporidium* treatment credit during any month that the water system meets the criteria in this subsection. Combined filter effluent (CFE) turbidity must be less than or equal to 0.15 NTU in at least 95 percent of the measurements. Turbidity must be measured as described in OAR 333-061-0036(5)(a)(B).

(b) Individual filter performance. Water systems using conventional filtration treatment or direct filtration treatment receive 0.5-log *Cryptosporidium* treatment credit, which can be in addition to the 0.5-log credit under subsection (16)(a) of this rule, during any month the system meets the criteria in this subsection. Compliance with this criteria must be based on individual filter turbidity monitoring as described in OAR 333-061-0036(5)(d).

(A) The filtered water turbidity for each individual filter must be less than or equal to 0.15 NTU in at least 95 percent of the measurements recorded each month.

(B) No individual filter may have a measured turbidity greater than 0.3 NTU in two consecutive measurements taken 15 minutes apart.

(C) Any system that has received treatment credit for individual filter performance and fails to meet the requirements of paragraphs (16)(b)(A) or (B) of this rule, during any month, is in violation of treatment technique requirements as prescribed by subsection (4)(g) of this rule unless the Authority determines the following:

(i) The failure was due to unusual and short-term circumstances that could not reasonably be prevented through optimizing treatment plant design, operation, or maintenance; and

(ii) The system has experienced no more than two such failures in any calendar year.

(c) Demonstration of performance. The Authority may approve *Cryptosporidium* treatment credit for water treatment processes based on a demonstration of performance study that meets the criteria in this subsection. This treatment credit may be greater than or less than the prescribed treatment credits in subsection (4)(g) or sections (15) through (18) of this rule and may be awarded to treatment processes that do not meet the criteria for the prescribed credits.

(A) Water systems cannot receive the prescribed treatment credit for any toolbox option in sections (15) through (18) of this rule, if that toolbox option is included in a demonstration of performance study for which treatment credit is awarded under this subsection.

(B) The demonstration of performance study must follow an Authority approved protocol, and must demonstrate the level of *Cryptosporidium* reduction achieved by the treatment process under the full range of expected operating conditions for the water system.

(C) Approval by the Authority must be in writing, and may include monitoring and treatment performance criteria that the system must demonstrate and report on an ongoing basis to remain eligible for the treatment credit. The Authority may require such criteria where necessary to verify that the conditions under which the demonstration of performance credit was approved are maintained during routine operation.

(17) Additional filtration toolbox components for meeting *Cryptosporidium* treatment requirements.

(a) Bag and cartridge filters. Systems receive *Cryptosporidium* treatment credit of up to 2.0-log for individual bag or cartridge filters and up to 2.5-log for bag or cartridge filters operated in series by meeting the requirements in OAR 333-061-0050(4)(c)(J). To be eligible for this credit, water systems must report to the Authority, the results of challenge testing conducted in

accordance with OAR 333-061-0050(4)(c)(J). The filters must treat the entire plant flow.

(b) Membrane filtration. Systems receive *Cryptosporidium* treatment credit for membrane filtration that meets the requirements of this paragraph. Membrane cartridge filters that meet the definition of membrane filtration in OAR 333-061-0020(76)(f) are eligible for this credit. The level of treatment credit a system receives is equal to the lower of the values determined under OAR 333-061-0050(4)(c)(H)(i) and (ii).

(c) Second stage filtration. Water systems receive 0.5-log *Cryptosporidium* treatment credit for a separate second stage of Authority-approved filtration that consists of sand, dual media, GAC, or other fine grain media following granular media filtration. To be eligible for this credit, the first stage of filtration must be preceded by a coagulation step and, both filtration stages must treat the entire plant flow taken from a surface water or GWUDI source. The Authority must assign the treatment credit based on an assessment of the design characteristics of the filtration process. A cap (added layer of filter media), such as GAC, on a single stage of filtration is not eligible for this credit.

(d) Slow sand filtration (as secondary filter). Water systems are eligible to receive 2.5-log *Cryptosporidium* treatment credit for a slow sand filtration process that follows a separate stage of filtration if both filtration stages treat the entire plant flow taken from a surface water or GWUDI source, and no disinfectant residual is present in the influent water to the slow sand filtration process. The Authority must assign the treatment credit based on an assessment of the design characteristics of the filtration process. This subsection does not apply to treatment credit awarded to slow sand filtration used as a primary filtration process.

(18) Inactivation toolbox components for meeting *Cryptosporidium* treatment requirements.

(a) If Chlorine Dioxide is used, CT values in Table 36 must be met.

(b) If Ozone is used, CT values in Table 37 must be met.

(c) To receive treatment credit for UV light, water systems must treat at least 95 percent of the water delivered to the public during each month by UV reactors operating within validated conditions for the required UV dose, as prescribed by OAR 333-061-0036(5)(c)(D) and OAR 333-061-0050(5)(k)(I). Systems must demonstrate compliance with this condition by the monitoring required in OAR 333-061-0036(5)(c)(D)(ii).

Stat. Auth.: ORS 448.131
Stats. Implemented: ORS 431.110, 431.150, 448.175 & 448.273

DIVISION 86
WATER MANAGEMENT AND CONSERVATION PLANS

690-086-0010
Purpose

(1) The Water Resources Commission has adopted a statewide policy on Conservation and Efficient Water Use (OAR 690-410-0060). The policy requires major water users and suppliers to prepare water management and conservation plans. These rules provide a process to ensure the efficient use of the state's water resources and to facilitate water supply planning consistent with water supplier and Department capabilities. The Commission shall evaluate implementation of these rules within three years and every three years thereafter.
(2) Many regions of Oregon face periodic and increasingly frequent water shortages during summer periods. Urbanization is resulting in a continually expanding need for municipal water supplies. In addition, many communities are faced with the need to reduce their impacts on the resource in response to state or federal listings of stream-flow dependant species as sensitive, threatened or endangered, water quality problem, and other flow issues. It is increasingly important to the state's economy to maintain adequate stream flows to support aquatic life, provide recreational opportunities and maintain water quality. The continued implementation of conservation measures can help restore streamflows, stabilize water supplies and provide for future needs for economic development and growth.
(3) Pursuant to ORS 540.610(3) the use of water at a rate or duty which is less than the maximum amount allowed under a water right that is achieved through improved water management practices is not a forfeiture under certain circumstances. However, conserved water may only be used on additional acres or for other purposes not included in the original right after allocation of conserved water under ORS 537.455 to 537.500 or under other specific statutory authorizations.
(4) Effective water management requires an evaluation of the adequacy of water supplies to meet current and future needs, identification of planned modifications in water systems, and development of new water supplies. However, the approval of a water management and conservation plan shall not substitute for compliance with Statewide Planning Goals or any other comprehensive land use planning requirement or constitute approval of applications for water rights, water reservations, water storage facilities, transfers, permit amendments, or extensions of time for permits.
(5) Water management and conservation plans will provide information important in water resources planning and management. In addition, the plans may provide support for applications for water use permits and water right transfers, permit amendments, and requests for extensions of permits, approvals of exchanges, and reservations of water. Due regard shall be given to any relevant approved water management and conservation plans during Department consideration of these applications and requests.
(6) Regional cooperation will improve water management and help to facilitate implementation of conservation measures. Water suppliers required under OAR 690-086-0010 to 690-086-0920 to prepare water management and conservation plans, and any other suppliers or users, may jointly submit a single plan that addresses the suppliers' conservation opportunities and water development needs.
(7) A water management and conservation plan that has been approved under these rules may, at the option of the water supplier, be used to satisfy a condition requiring preparation of a

conservation plan in an emergency use permit issued pursuant to OAR 690-019-0040 and a requirement for submittal of a curtailment plan in times of a declared or likely drought under an order issued pursuant to ORS 536.780 and OAR 690-019-0090.
(8) Many water use permits that have been issued to water suppliers include conditions requiring preparation of water conservation, long-term water supply, and other water management plans. These rules provide standards for the preparation of such plans. Unless other more specific or stringent requirements are included in a permit, water management and conservation plans that have been approved under OAR 690-086-0915 shall be deemed to meet the permit condition.

Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02

Definitions

690-086-0020
General Definitions

As used in OAR 690-086-0010 to 690-086-0920:
(1) "Affected local governments" means any local government as defined in OAR 690-005-0015, within whose jurisdiction the diversion, conveyance, or use of water is established or proposed within the context of the water management and conservation plan.
(2) "Commission" means the Water Resources Commission.
(3) "Conservation" has the meaning provided in OAR 690-400-0010.
NOTE: OAR 690-400-0010(5) defines conservation as eliminating waste or otherwise improving efficiency in the use of water while satisfying beneficial uses by modifying the technology or method for diverting, transporting, applying or recovering the water; by changing management of water use; or by implementing other measures.
(4) "Department" means the Water Resources Department.
(5) "Director" means the Director of the Water Resources Department or designee.
(6) "Waste" has the meaning provided in OAR 690-400-0010.
NOTE: OAR 690-400-0010(16) defines waste as the continued use of more water than is needed to satisfy the specific beneficial uses for which a right was granted. The need for water shall be based on using the technology and management practices that provide for the efficient use of water considering:
(a) The economic feasibility of use of the technology and management practices by the water user;
(b) The environmental impacts of making modifications;
(c) The available proven technology;
(d) The time needed to make modifications;
(e) Local variations in soil type and weather; and
(f) Relevant water management plans and subbasin conservation plans.
Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0030
Definitions for Municipal Water Suppliers

As used in OAR 690-086-0100 to 690-086-0170 and 690-086-0900 to 690-086-0920:
(1) "Authorized water uses" means all water uses known and approved by a municipal water supplier. These uses include all metered uses and any other approved uses such as fire-fighting, fire training, system operation needs, reuse, or miscellaneous uses.
(2) "Benchmark" means the specific incremental activities that a municipal water supplier plans to have completed in implementing conservation measures.
(3) "Extended permit" means a municipal or quasi-municipal water use permit conditioned by an extension order under OAR chapter 690, division 315 or 320 to provide that diversion of water beyond the maximum rate diverted under the permit or previous extension(s) shall only be authorized upon issuance of a final order approving a water management and conservation plan.
(4) "Low water use landscaping" means conserving water through designing landscapes for low water use, irrigating efficiently, improving soil and planting low water use plants.
(5) "Metering" means using water meters or other continuous recording devices to measure and to maintain a record of all water diverted and delivered.
(6) "Municipal water supplier" means a publicly or privately owned water distribution system that delivers potable water for community needs, either to individual customers or another distribution system, or that delivers water primarily for commercial or industrial uses.
(7) "System leak detection" means a program to monitor leakage throughout the transmission and distribution systems of a municipal water supplier.
(8) "System leakage" means all water that is lost from a municipal water supply system, not including major breaks that are expeditiously repaired, and un-metered authorized or unauthorized uses.
(9) "Water audit" means an analysis of a municipal water supply system that includes a thorough accounting of all water into and out of the system to identify system leakage and metered or estimated use for authorized and unauthorized water uses. The audit also includes an analysis of the water supplier's own water use to identify alternatives to increase efficiency.
(10) "Water curtailment element" means a program to accomplish a specific reduction in the amount of water used or lost within a specific time in response to an emergency or other short-term shortage.
(11) "Water service connections" means water supply connections to the water delivery system, including the water supplier's own connections, but does not include connections for uses such as fire hydrants, fire sprinkler systems with flow alarms or detector-checks, water line blow-offs and drains, stand-by emergency interties, valve controlled drinking fountains or other similar intermittently used equipment or facilities.
Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02, Renumbered from 690-086-0110

690-086-0040
Definitions for Agricultural Water Suppliers
As used in OAR 690-086-0210 to 690-086-0920:
(1) "Agricultural water supplier" means any public or private organization, including but not limited to an irrigation district formed under ORS Chapter 545, a drainage district formed under ORS Chapter 547, a water improvement district formed under ORS Chapter 552, a water control district formed under ORS Chapter 553, a corporation organized under ORS Chapter 554, an unincorporated private association or a ditch company, the primary purpose of which is to supply water to others for agricultural uses.
(2) "Agricultural water measurement" means using measuring devices, including but not limited to weirs, flumes, submerged orifices, gaging stations, and meters, to quantify the rate of flow and the volume of water in a water delivery system.
(3) "Water allocation/curtailment element" means a program to equitably allocate, under existing priorities, a reduced water supply among the water right holders dependent on the supply in response to an emergency or other short-term shortage.
Stat. Auth.: ORS 536.027, 537.211 and 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02, Renumbered from 690-086-0210

Municipal Water Management and Conservation Plans

690-086-0100
Applicability

(1) Municipal water suppliers are encouraged to prepare water management and conservation plans, but are not required to do so unless a plan is prescribed by a condition of a water use permit; a permit extension; or another order or rule of the Commission.
(2) Water management and conservation plans submitted in order to comply with a permit extension order issued after November 1, 2002, are subject to the requirements of these rules.
(3) Until November 1, 2003, water management and conservation plans submitted for purposes other than to comply with a permit extension order issued after the effective date of these rules shall be reviewed under OAR chapter 690, division 86 adopted by the Commission in 1994, unless the water supplier requests the Department to apply the standards in these rules. After November 1, 2003, all new and updated water management and conservation plans are subject to these rules.
Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0110 [Renumbered to 690-086-0030]

690-086-0120
General Provisions

(1) Each municipal water supplier required to submit a water management and conservation plan shall exercise diligence in implementing the approved plan and shall update and resubmit a plan consistent with the requirements of these rules as prescribed during plan approval.
(2) Benchmarks and implementation schedules for conservation measures and other water supply development activities may be modified through the subsequent approval of an updated plan.
(3) Progress reports submitted by municipal water suppliers will be used in determining whether five-year benchmarks are being met, whether the Department will authorize additional diversion of water under extended permits, and/or if schedule changes proposed in updated plans are reasonable and appropriate.
(4) Progress reports submitted by municipal water suppliers shall include:
(a) A list of the benchmarks established under OAR 690-086-0150 and a description of the progress of the municipal water supplier in implementing the associated conservation or other measure;
(b) Average monthly and daily diversions under each right held by the water supplier for the previous five years;
(c) A description of the results of the annual water audit required under OAR 690-086-0150(4)(a); and
(d) A comparison of quantities of water used in each sector as identified and described in OAR 690-086-0140(6) with the quantities of water used in each sector for the previous five years.
(5) Upon receipt of a progress report the Department shall give public notice in the weekly notice published by the Department and provide an opportunity for written public comment. The Department shall provide copies of any comments received to the municipal water supplier.
(6) A master plan prepared under the requirements of the Department of Human Resources Health Division or the water supply element of a public facilities plan prepared under the requirements of the Department of Land Conservation and Development which substantially meets the requirements of OAR 690-086-0125 to 690-086-0170 may be submitted to meet the requirements of these rules.
(7) In the development of a water management and conservation plan, each municipal water supplier shall consult with the planning departments or appropriate officials of affected local governments to obtain information related to demand projections in comprehensive land use plans early in the development of the plan.
(8) At least 30 days prior to submitting a draft plan to the Department, a municipal water supplier shall make the draft plan available for review by each affected local government along with a request for comments relating to consistency with the local government's comprehensive land use plan.
(9) Each municipal water supplier preparing a water management and conservation plan is encouraged to develop and implement a program to involve the supplier's customers in the preparation of the plan. Recommendations include making the plan available for public inspection and conducting public meetings to provide information and gather input on the plan.
Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0125
Municipal Water Supplier Plan Elements

A water management and conservation plan submitted by a municipal water supplier shall include:
(1) A municipal water supplier description as described under OAR 690-086-0140;
(2) A municipal water conservation element as described under OAR 690-086-0150;
(3) A municipal water curtailment element as described under OAR 690-086-0160;
(4) A municipal water supply element as described under OAR 690-086-0170;
(5) A list of the affected local governments to whom the draft plan was made available pursuant to OAR 690-086-0120(6) and a copy of any comments on the plan provided by the local governments;
(6) A proposed date for submittal of an updated plan within no more than 10 years based on the proposed schedule for implementation of conservation measures, any relevant schedules for other community planning activities, and the rate of growth or other changes expected by the water supplier; or an explanation of why submittal of an updated plan is unnecessary and should not be required by the Department; and
(7) If the municipal water supplier is requesting additional time to implement metering as required under OAR 690-086-0150(4)(b) or a benchmark established in a previously approved plan, documentation showing additional time is necessary to avoid unreasonable and excessive costs.
Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0130
Criteria for Approval of a Plan Submitted by a Municipal Water Supplier

In order to approve a plan by a municipal water supplier under OAR 690-086-0915, the Department must find that:
(1) The plan includes each of the required elements under OAR 690-086-0125;
(2) The projections of future water need in the water management and conservation plan are reasonable and consistent with available land use plans and the municipal water supplier has demonstrated a need for the quantity of water to be diverted during the next 20 years under each permit held by the supplier;
(3) For each of the water conservation measures required under OAR 690-086-0150(4) and, as applicable, 690-086-0150(5), the plan includes a reasonable and appropriate schedule with five year benchmarks for implementation of conservation activities;
(4) If applicable, for each of the water conservation measures required under OAR 690-086-0150(6), the plan includes:
(a) A reasonable and appropriate schedule with five year benchmarks for implementation of conservation activities; or
(b) Documentation to demonstrate that implementation of the measure is neither feasible nor appropriate to ensure efficient use of water and the prevention of waste and the supplier has used a suitable methodology in evaluating the measure;

(5) The identification of resource issues under OAR 690-086-0140(5)(i) is accurate and complete;
(6) The water curtailment element required under OAR 690-086-0160 satisfactorily promotes water curtailment practices and the coordination of usage regulation, taking into account state water law and local conditions, or is substantially the same as a curtailment plan prepared pursuant to ORS 536.780 and OAR 690-019-0090 and approved by the Department within the previous five years;
(7) If during the next 20 years the maximum rate of water diverted under an extended permit will be greater than the maximum rate authorized for diversion under the extension or previously approved water management and conservation plan;
(a)The plan includes a schedule for development of any conservation measures that would provide water at a cost that is equal to or lower than the cost of other identified sources, unless the supplier has provided sufficient justification for the factors used in selecting other sources for development or the supplier serves a population of less than 1,000;
(b) Increased use from the source is the most feasible and appropriate water supply alternative available to the supplier; and
(c) If mitigation is legally required to address limitations or restrictions on the development of permits for which resource issues are identified under OAR 690-086-0140(5)(i), the plan contains documentation that the supplier is complying with the mitigation requirements. The Department may consult with federal and state agencies in making this determination; and
(8) After January 1, 2042, for review of water management and conservation plans that propose to increase the maximum rate of water diverted under an extended permit that the additional diversion of water will not impair or be detrimental to the public interest.
Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0140
Municipal Water Supplier Description

The water supplier description element shall include at least the following information:
(1) A description of the supplier's source(s) of water; including diversion, storage and regulation facilities; exchange agreements; intergovernmental cooperation agreements; and water supply or delivery contracts;
(2) A delineation of the current service areas and an estimate of the population served and a description of the methodology(ies) used to make the estimate;
(3) An assessment of the adequacy and reliability of the existing water supply considering potential limitations on continued or expanded use under existing water rights resulting from existing and potential future restrictions on the community's water supply;
(4) A quantification of the water delivered by the water supplier that identifies current and available historic average annual water use, peak seasonal use, and average and peak day use;
(5) A tabular list of water rights held by the municipal water supplier that includes the following information:
(a) Application, permit, transfer, and certificate numbers (as applicable);
(b) Priority date(s);
(c) Source(s) of water;

(d) Type(s) of beneficial uses specified in the right;
(e) Maximum instantaneous and annual quantity of water allowed under each right;
(f) Maximum instantaneous and annual quantity of water diverted under each right to date;
(g) Average monthly and daily diversions under each right for the previous year, and if available for the previous five years;
(h) Currently authorized date for completion of development under each right; and
(i) Identification of any streamflow-dependent species listed by a state or federal agency as sensitive, threatened or endangered that are present in the source, any listing of the source as water quality limited and the water quality parameters for which the source was listed, and any designation of the source as being in a critical ground water area.
(6) A description of customers served including other water suppliers and the estimated numbers; general water use characteristics of residences, commercial and industrial facilities, and any other uses; and a comparison of the quantities of water used in each sector with the quantities reported in the water supplier's previously submitted water management and conservation plan and progress reports;
(7) Identification and description of interconnections with other municipal supply systems;
(8) A schematic of the system that shows the sources of water, storage facilities, treatment facilities, major transmission and distribution lines, pump stations, interconnections with other municipal supply systems, and the existing and planned future service area; and
(9) A quantification and description of system leakage that includes any available information regarding the locations of significant losses.
Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0150
Municipal Water Conservation Element

The water conservation element shall include at least the following:
(1) A progress report on the conservation measures scheduled for implementation in a water management and conservation plan previously approved by the Department, if any;
(2) A description of the water supplier's water use measurement and reporting program and a statement that the program complies with the measurement standards in OAR chapter 690, division 85, that a time extension or waiver has been granted, or that the standards are not applicable;
(3) A description of other conservation measures, if any, currently implemented by the water supplier, including any measures required under water supply contracts;
(4) A description of the specific activities, along with a schedule that establishes five-year benchmarks, for implementation of each of the following conservation measures that are required of all municipal water suppliers:
(a) An annual water audit that includes a systematic and documented methodology for estimating any un-metered authorized and unauthorized uses;
(b) If the system is not fully metered, a program to install meters on all un-metered water service connections. The program shall start immediately after the plan is approved and shall identify the number of meters to be installed each year with full metering completed within five years of approval of the water management and conservation plan;

(c) A meter testing and maintenance program;
(d) A rate structure under which customers' bills are based, at least in part, on the quantity of water metered at the service connections;
(e) If the annual water audit indicates that system leakage exceeds 10 percent, a regularly scheduled and systematic program to detect leaks in the transmission and distribution system using methods and technology appropriate to the size and capabilities of the municipal water supplier; and
(f) A public education program to encourage efficient water use and the use of low water use landscaping that includes regular communication of the supplier's water conservation activities and schedule to customers;
(5) If the municipal water supplier proposes to expand or initiate diversion of water under an extended permit for which resource issues have been identified under OAR 690-086-0140(5)(i), a description of the specific activities, along with a schedule that establishes five-year benchmarks, for implementation of a system-wide leak repair or line replacement program to reduce system leakage to no more than 15 percent or sufficient information to demonstrate that system leakage currently is no more than 15 percent.
(6) If the municipal water supplier serves a population greater than 1,000 and proposes to expand or initiate diversion of water under an extended permit for which resource issues have been identified under OAR 690-086-0140(5)(i), or if the municipal water supplier serves a population greater than 7,500, a description of the specific activities, along with a schedule that establishes five-year benchmarks, for implementation of each of the following measures; or documentation showing that implementation of the measures is neither feasible nor appropriate for ensuring the efficient use of water and the prevention of waste:
(a) A system-wide leak repair program or line replacement to reduce system leakage to 15 percent, and if the reduction of system leakage to 15 percent is found to be feasible and appropriate, to reduce system leakage to 10 percent;
(b) Technical and financial assistance programs to encourage and aid residential, commercial and industrial customers in implementation of conservation measures;
(c) Supplier financed retrofitting or replacement of existing inefficient water using fixtures, including distribution of residential conservation kits and rebates for customer investments in water conservation;
(d) Adoption of rate structures, billing schedules, and other associated programs that support and encourage water conservation;
(e) Water reuse, recycling, and non-potable water opportunities; and
(f) Any other conservation measures identified by the water supplier that would improve water use efficiency.
Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02, Renumbered from 690-086-0140(2)

690-086-0160
Municipal Water Curtailment Element

The water curtailment element shall include at least the following:
(1) A description of the type, frequency and magnitude of supply deficiencies within the past 10 years and current capacity limitation. The description shall include an assessment of the ability of the water supplier to maintain delivery during long-term drought or other source shortages caused by a natural disaster, source contamination, legal restrictions on water use, or other circumstances;
(2) A list of three or more stages of alert for potential shortage or water service difficulties. The stages shall range from a potential or mild alert, increasing through a serious situation to a critical emergency;
(3) A description of pre-determined levels of severity of shortage or water service difficulties that will trigger the curtailment actions under each stage of alert to provide the greatest assurance of maintaining potable supplies for human consumption; and
(4) A list of specific standby water use curtailment actions for each stage of alert ranging from notice to the public of a potential alert, increasing through limiting nonessential water use, to rationing and/or loss of service at the critical alert stage.
Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02, Renumbered from 690-086-0140(3)

690-086-0170
Municipal Water Supply Element

The water supply element shall include at least the following:
(1) A delineation of the current and future service areas consistent with state land use law that includes available data on population projections and anticipated development consistent with relevant acknowledged comprehensive land use plans and urban service agreements or other relevant growth projections;
(2) An estimated schedule that identifies when the water supplier expects to fully exercise each of the water rights and water use permits currently held by the supplier;
(3) Based on the information provided in section (1) of this rule, an estimate of the water supplier's water demand projections for 10 and 20 years, and at the option of the municipal water supplier, longer periods;
(4) A comparison of the projected water needs and the sources of water currently available to the municipal water supplier and to any other suppliers to be served considering the reliability of existing sources;
(5) If any expansion or initial diversion of water allocated under existing permits is necessary to meet the needs shown in section (3) of this rule, an analysis of alternative sources of water that considers availability, reliability, feasibility and likely environmental impacts. The analysis shall consider the extent to which the projected water needs can be satisfied through:
(a) Implementation of conservation measures identified under OAR 690-086-0150;
(b) Interconnection with other municipal supply systems and cooperative regional water management; and

(c) Any other conservation measures that would provide water at a cost that is equal to or lower than the cost of other identified sources.
(6) If any expansion or initial diversion of water allocated under existing permits is necessary to meet the needs shown in section (3) of this rule, a quantification of the maximum rate and monthly volume of water to be diverted under each of the permits;
(7) For any expansion or initial diversion of water under existing permits, a description of mitigation actions the water supplier is taking to comply with legal requirements including but not limited to the Endangered Species Act, Clean Water Act, Safe Drinking Water Act; and
(8) If acquisition of new water rights will be necessary within the next 20 years to meet the needs shown in section (3) of this rule, an analysis of alternative sources of the additional water that considers availability, reliability, feasibility and likely environmental impacts and a schedule for development of the new sources of water. The analysis shall consider the extent to which the need for new water rights can be eliminated through:
(a) Implementation of conservation measures identified under OAR 690-086-0150;
(b) Interconnection with other municipal supply systems and cooperative regional water management; and
(c) Any other conservation measures that would provide water at a cost that is equal to or lower than the cost of other identified sources.
Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02, Renumbered from 690-086-0140(4)

Agricultural Water Supplier Water Management and Conservation Plans

690-086-0210 [Renumbered to 690-086-0040]

690-086-0220
General Provisions

(1) Certain agricultural water suppliers must have approved conservation plans to transfer water rights within the boundaries of the districts to other land within the districts (ORS 540.572 to 540.578). These rules provide the standards for those conservation plans.
(2) Each agricultural water supplier required to submit a water management and conservation plan shall exercise diligence in implementing the approved plan and shall update and resubmit a plan consistent with the requirements of OAR 690, division 86 as prescribed during plan approval.
(3) Any agricultural water supplier participating in the water transfer provisions in ORS 540.572 to 540.578 and OAR 690-021-0070 to 690-021-0700 shall submit an annual report describing progress-to-date in implementing a water management and conservation plan.
(4) Water management and conservation plans submitted by agricultural water suppliers shall meet the requirements listed in OAR 690-086-0225 to 690-086-0270.
(5) A water conservation plan prepared in accordance with criteria of the Bureau of Reclamation and substantially meeting the requirements of OAR 690-086-0225 to 690-086-0270 may be submitted to meet the requirements of these rules.

(6) At least 30 days prior to submitting a draft plan to the Department, an agricultural water supplier shall make the draft plan available for review by each affected local government.
(7) Each agricultural water supplier preparing a water management and conservation plan is encouraged to develop and implement a program to involve the supplier's patrons in the preparation of the plan. Recommendations include making the plan available for public inspection and conducting public meetings to provide information and gather input on the plan.
Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0225
Agricultural Water Supplier Plan Elements

A water management and conservation plan submitted by an agricultural water supplier shall include:
(1) An agricultural water supplier description as described under OAR 690-086-0240;
(2) An agricultural water conservation element as described under OAR 690-086-0250;
(3) An agricultural water allocation/curtailment element as described under OAR 690-086-0260;
(4) An agricultural water supply element as required under OAR 690-086-0270;
(5) A list of the affected local governments to whom the draft plan was made available pursuant to OAR 690-086-0220(6) and a copy of any comments on the plan provided by the local governments;
(6) A proposed date for submittal of an updated plan based on the proposed schedule for implementation of conservation measures, any relevant schedules for other community planning activities, and the rate of growth of or other changes expected by the water supplier; or an explanation of why submittal of an updated plan is unnecessary and should not be required by the Department.
Stat. Auth.: ORS 536.027, 537.211 and 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0240
Agricultural Water System Description

The description of the water system shall include at least the following information:
(1) General location of water right acreage, numbers of the associated water right certificates and permits and a description of relevant conditions of the water rights including the seasons of use and the uses of any other permitted withdrawals by the supplier;
(2) Source(s) of water; storage and regulation facilities; and a summary of any transfer, rotation, exchange or intergovernmental cooperation agreements;
(3) A schematic of the system showing storage and distribution facilities, drainage systems, measurement stations, generalized district boundaries, points of diversion and locations of major operational spills;
(4) Current water use, including peak and average annual diversions and, when available, water reuse and return flows;

(5) A summary of major classifications of user accounts showing water right acreages, the number of accounts of each classification, and the beneficial uses for which water is provided (irrigation, frost protection, temperature control, agricultural use, livestock, domestic, etc.);
(6) Types of on-farm irrigation systems common within the supplier's accounts;
(7) A general characterization of crops commonly grown and the estimated average and peak consumptive use of the crops; and
(8) A description of the operation and maintenance program.
Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0250
Agricultural Water Conservation Element

The water conservation element shall include at least the following:
(1) A progress report on the conservation measures scheduled for implementation in the water management and conservation plan previously approved by the Department, if any;
(2) A description of the water supplier's agricultural water measurement program and a statement that the program complies with the measurement and reporting standards in OAR chapter 690, division 85, that a time extension or waiver has been granted, or that the standards are not applicable;
(3) A description of other conservation measures currently implemented by the water supplier;
(4) Short- and long-term goals of the water supplier to improve water management;
(5) An evaluation of the opportunities for improving water use efficiency which includes:
(a) A description of losses of water from canals, pipelines, and laterals, including any operational spills;
(b) An assessment of the extent to which water deliveries are insufficient to meet crop needs;
(c) A list of alternative conservation measures to reduce the losses of water identified in subsection (a) of this section and address any insufficiencies of water deliveries identified in subsection (b) of this section; and
(d) An assessment of existing and future alternatives to finance conservation measures including an analysis of the possibility of applying for the allocation of conserved water (OAR 690-018-0010 to 690-018-0090).
(6) For each of the following conservation measures not currently being implemented, and evaluation of whether implementation of the measure is feasible and appropriate for ensuring the efficient use of water and the prevention of waste:
(a) Promotion of energy audits offered through local electric utilities for district water users;
(b) Conversion to metered, pressurized deliveries to all parcels of one acre or less;
(c) Piping or lining earthen canals;
(d) Modifying distribution facilities and district policies to increase the flexibility of water deliveries;
(e) Provision of on-farm irrigation scheduling assistance;
(f) Construction of re-regulating reservoirs;
(g) Adoption or rate structures that support and encourage water conservation;
(h) Each of the conservation measures listed in OAR 690-086-0250(5)(c); and

(i) Any other conservation measures identified by the water supplier that would improve water use efficiency.
(7) A description and estimated schedule for implementation of each of the following conservation measures:
(a) An information and education program aimed at improving the efficiency of use of water delivered. The program should address all types of uses served and include voluntary water use audits; and
(b) Any other conservation measures identified as feasible and appropriate under section (6) of this rule.
(8) A program to monitor and evaluate the effectiveness of the conservation measures which are implemented.
Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02, Renumbered from 690-086-0240(2)

690-086-0260
Agricultural Water Allocation/Curtailment Element

The water allocation/curtailment element shall include at least the following:
(1) A description of the frequency and magnitude of past supply deficiencies and current capacity limitation. The description shall include an assessment of the ability of the water supplier to maintain delivery during drought or other source shortages.
(2) A description of the water supply situation(s) that cause the water allocation/curtailment element to be implemented, including identification of the supply situations which trigger warnings to users or public notice of impending shortage;
(3) A description of the procedure used to allocate water during water shortages.
Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02, Renumbered from 690-086-0240(3)

690-086-0270
Agricultural Water Supply Element

The long-range water supply element shall include at least the following:
(1) An estimate of the water supplier's long-range water demand projections for 20 years;
(2) A comparison of the projected water needs and the size and reliability of water rights permits or other current water supply contracts held by the water supplier;
(3) A list of potential sources of water, including conservation and reuse, to supply the long-range needs;
(4) A comparison among the potential sources of additional water considering costs, availability, reliability, and likely environmental impacts;
(5) An evaluation of the effects of the following factors on long-range water needs:
(a) Regional options for meeting future water needs;
(b) Urbanization and other land-use trends;

(c) Provisions in affected local governments' comprehensive plans relating to agricultural lands, urbanization, water resources, water supply, public facilities and services, and any other pertinent plan element or ordinance relating to uses or lands served, or proposed to be served, under the long-term water supply plan.
Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02, Renumbered from 690-086-0240(4)

Water Management and Conservation Plan Review and Enforcement

690-086-0900
Water Management and Conservation Plan Review, Approval and Enforcement

(1) The rules in OAR 690-086-0900 to 690-086-0920 set out the process and criteria for the Department's review, approval and enforcement of the water management and conservation plans submitted by agricultural and municipal water suppliers. The rules apply to the submittal and review of draft plans, proposed final plans, and subsequent updates.
(2) During the plan review and approval process, the Department may allow additional time for a municipal water supplier to implement water metering under OAR 690-086-0150(4)(b) or a benchmark established in a previously approved plan if the water supplier shows that additional time is necessary to avoid unreasonable and excessive costs.
(3) Notwithstanding any of the requirements of these rules, except OAR 690-086-0150(2) and 690-086-0250(2), the Department may approve a water management and conservation plan if the plan is generally consistent with the applicable criteria and includes a schedule for completion within five years of any additional work necessary to satisfy the requirements.
(4) Any plan approval that contains a requirement that a municipal water supplier complete additional work under section (3) of this rule shall preclude additional diversion of water under an extended permit beyond the need quantified for the next two years.
Stat. Auth.: ORS 536.025 & ORS 536.027
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0905
Notice of Submittal of a Draft Plan or Updated Plan

(1) The Department shall notify affected local governments, affected Indian tribes, and all persons on the Department's weekly mailing list that a draft water management and conservation plan prepared under the requirements of OAR 690-086-0125 or 690-086-0225 has been submitted to the Department and is available for review.
(2) Any person may review and submit written comments on the draft plan within 30 days of the notification in section (1) of this rule. Written comments submitted under this subsection must cite specific provisions of concern in the draft plan, describe how each of the provisions cited do or do not satisfy the requirements of OAR chapter 690, division 086, suggest any modification in each provision that would be necessary to satisfy the relevant requirement, and include information to support any suggested modifications.

Stat. Auth.:ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02, Renumbered from 690-086-0910(1) & (2)

690-086-0910
Preliminary Review of Draft Plans

(1) The Department shall undertake a preliminary review of the draft plan and the comments received pursuant to OAR 690-086-0905 to determine whether the plan includes the required elements of 690-086-0120 to 690-086-0170 or 690-086-0220 to 690-086-0270.
(2) For a plan submitted by a municipal water supplier, the Department shall review the plan to determine if the information and analyses in the plan are sufficient for the Department to make the determination required under OAR 690-086-0130.
(3) For a plan submitted by an agricultural water supplier the Department shall review the plan to determine whether:
(a) The plan includes the information required in OAR 690-086-0240;
(b) The water supplier has complied with the requirements of OAR 690-086-0250 and has included a description of the actions to be taken in the implementation of water conservation measures that are feasible and appropriate for ensuring the efficient use of water and the prevention of waste; considering:
(A) The economic feasibility of the measures for the water supplier;
(B) Any likely adverse environmental impacts of implementation of the measures;
(C) Whether the measures are available and proven;
(D) The time needed to implement the measures;
(E) The effects of local variations in soil type and weather on the potential for successful implementation of the measures; and
(F) Whether the measures are consistent with other relevant water management plans and subbasin conservation plans.
(c) The water allocation/curtailment element prepared under OAR 690-086-0260 satisfactorily promotes water curtailment practices and the coordination of usage regulation, taking into account state water law and local conditions, or is substantially the same as a curtailment plan prepared pursuant to ORS 536.780 and OAR 690-019-0090 and approved by the Department within the previous five years; and
(d) The water supplier has included the information required in OAR 690-086-0270, and, in the list of potential sources of water to meet projected demands, included the development of any conservation measures which are available at a cost which is lower than the cost of other identified sources or has provided sufficient justification for the factors used in selecting other sources for development.
(4) Upon completion of the preliminary review and no later than 90 days after receipt of a draft plan, the Department shall:
(a) After considering public comments, provide the Department's written comments on the plan to the water supplier and any person who submitted comments pursuant to OAR 690-086-0905; or
(b) After considering public comments if the Department determines that the draft plan includes the required plan elements under OAR 690-086-0125 or 690-086-0225, and for municipal water

supply plans, that the plan meets the criteria under 690-086-0130, issue a final order approving the plan pursuant to 690-0086-0915(4) or (5) and notify any person who submitted comments pursuant to 690-086-0905 of the issuance of the order.
(5) The Department shall include in its written comments prepared under section (4) of this rule:
(a) For each deficiency identified in the review, a citation of the relevant statute or rule;
(b) To the extent possible, identification of any constraints to implementation of the water management and conservation plan and recommendations on appropriate actions to secure any identified new sources of water;
(c) An evaluation of the extent to which a request for additional time under OAR 690-086-0900(2) satisfies the relevant requirements of the rules;
(d) A prescribed reasonable period of time of not less than 60 days, identified in consultation with the water supplier, for the water supplier to respond to the Department's review and to submit a proposed final plan; and
(e) Copies of any written comments received pursuant to OAR 690-086-0905.
(6) If the Department does not meet the 90-day deadline in section (4) of this rule:
(a) For purposes of ORS 540.572, a plan submitted by an agricultural water supplier after November 1, 2002, is deemed approved for the period from the expiration of the 90-day deadline until 120 days after the Department provides written comments under section (5) of this rule; and
(b) For municipal water suppliers whose additional diversion of water under an extended permit is only authorized upon issuance of a final order approving a water management and conservation plan, notwithstanding OAR chapter 690, division 315, the Director may by order authorize diversion of an additional specified quantity of water as necessary to prevent harm to public welfare, safety and health.
Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0915
Final Review of Plans

(1) Upon receipt of a proposed final plan, the Department shall evaluate the plan to determine if it includes the required elements of OAR 690-086-0125 to 690-086-0170 for municipal water suppliers or 690-086-0225 to 690-086-0270 for agricultural water suppliers. The evaluation shall be limited to a review of modifications in the plan and issues that were identified in the Department's written comments provided under 690-086-0910 and, if any deficiencies are identified, the Department's review shall cite the relevant statute or rule.
(2) If the Department determines that the final plan does not include the required elements of OAR 690-086-0120 to 690-086-0170 or 690-086-0220 to 690-086-0270, the Department shall consult with the water supplier and may provide additional time to correct any discrepancies.
(3) For a water management and conservation plan submitted by a municipal water supplier, the Department shall review the plan to determine if the information and analyses in the plan are sufficient for the Department to make the determination required under OAR 690-086-0130.
(4) For a water management and conservation plan submitted by a municipal water supplier, if the Department determines that the proposed final plan includes the required elements under OAR 690-086-0120 to 690-086-0170 and meets the applicable criteria under 690-086-0130, the Department shall issue a final order approving the plan and notify the water supplier and any

person who submitted comments pursuant to 690-086-0905 of the approval. The Department's order shall include the following:
(a) A quantification of the maximum amount of water to be diverted during the next 20 years under each extended permit, or for a longer period as specified for an extended reservoir permit;
(b) The date on which an updated plan shall be submitted to the Department. A municipal water supplier may submit an updated plan at any time prior to the date specified if necessary to accommodate unanticipated events, but the Department shall not require submittal of an updated plan earlier than five years after issuance of the order approving the plan; and
(c) A schedule for submittal of five-year progress reports on implementation of the water conservation and supply measures described in the plan.
(5) For a water management and conservation plan submitted by an agricultural water supplier, if the Department determines that the proposed final plan satisfies the relevant requirements or if the water supplier satisfactorily corrects any identified discrepancies, the Department shall issue a final order approving the plan and notify the water supplier and any person who submitted comments pursuant to OAR 690-086-0905 of the approval. The Department shall specify in the order approving the plan if an updated plan shall be required and, if so, the date on which the updated plan shall be submitted to the Department. The Department shall not require submittal of an updated plan earlier than five years after issuance of the order approving the plan.
(6) The Department shall issue a final order denying approval of the plan and notify the water supplier and any person who submitted comments pursuant to OAR 690-086-0905 of the issuance of the order if:
(a) The Department determines that the proposed final plan does not contain the plan elements required under OAR 690-086-0125 or 690-086-0225;
(b) For municipal water suppliers, the plan does not meet the criteria under OAR 690-086-0130;
(c) The municipal water supplier has failed to adequately justify a request for additional time to implement water metering under OAR 690-086-0150(4)(b) or a benchmark established in a previously approved plan; or
(d) The work plan submitted under OAR 690-086-0900(3) is insufficient for completing the additional work necessary to satisfy the requirements of these rules.
(7) The Department may deny approval of a water management and conservation plan if the water supplier fails to submit a final plan to the Department within 120 days after receipt of the Department's preliminary review.
(8) If the Department issues a final order denying approval of the plan, the water supplier may request that the Department reconsider the order and the Director appoint a five-member review board to review the plan. The board shall include at least two individuals from the basin in which the supplier is located who are engaged in similar uses of water, the local watermaster, and other individuals knowledgeable about water use practices and water conservation. After reviewing the plan and evaluating any additional information presented by the water supplier and the Department, the board may recommend that the Department:
(a) Reconsider the decision not to approve the plan;
(b) Reconsider the decision not to approve the plan contingent on the water supplier agreeing to specified modifications; or
(c) Reaffirm the original decision not to approve the plan.
(9) The Department shall notify the water supplier, the members of the review board, and any person who submitted comments pursuant to OAR 690-086-0905 of any action taken based on the board's recommendation.

(10) The water supplier or a person who has submitted comments pursuant to OAR 690-086-0905 may, within 30 days of a notification pursuant to OAR 690-086-0910(5)(b) or section (4), (5), (6), or (9) of this rule, appeal a decision by the Department to approve or to not approve a plan to the Commission. The Commission may deny the appeal or may accept the appeal and remand the plan to the Department to seek resolution of the issues identified in the appeal and, if the issues are not resolved, to initiate a contested case proceeding pursuant to ORS 183.413 and OAR chapter 690, divisions 1 and 2.
Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02, Renumbered from 690-086-0910(7)

690-086-0920
Enforcement

If the Director determines that a water supplier has failed to submit a water management and conservation plan as required under OAR 690-086-0010 to 690-086-0270 or has failed to satisfactorily implement an approved water management and conservation plan, the Director may proceed with one or more of the following actions:
(1) Provide an additional, specified amount of time for remedy;
(2) Initiate an evaluation of the supplier's water management practices and facilities to determine if the use of water is wasteful;
(3) Initiate regulation of water use under OAR 690-250-0050 to eliminate waste;
(4) Rescind a previous approval of a water management and conservation plan; and
(5) If the submittal of the water management and conservation plan is required under a condition of a permit or an extension approved under OAR chapter 690, division 315 or 320, assess a civil penalty under OAR 690-260-0005 to 690-260-0110 or cancel the permit.
Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 11-1994, f. & cert. ef. 9-21-94

Appendix D
WRD Water Use Report

Entity Water Use Report

2000
start water year

PW DIRECTOR MICHAEL ADAMS
CITY OF SWEET HOME

2015
end water year

Records per page: 20

Acre-feet (AF) of Water Used

Water Year*	Report ID	Facility	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total Water Used	Irrigated Acres
2015	12240	S SANTIAM R	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	
2015	54806	WATER TREATMENT PLANT	107.73	107.25	107.23	112.50	100.09	110.95	108.54	118.63	145.27	157.32	135.74	135.67	1446.90	
2014	12240	S SANTIAM R	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	
2014	54806	WATER TREATMENT PLANT	108.16	109.08	126.00	112.78	109.21	116.62	110.52	115.53	120.79	143.58	175.80	122.80	1470.87	
2013	12240	S SANTIAM R	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	
2013	54806	WATER TREATMENT PLANT	130.83	110.90	116.03	126.52	107.69	122.01	107.68	116.81	114.63	145.34	140.86	113.16	1452.46	
2012	54806	WATER TREATMENT PLANT	72.40	70.89	92.04	106.74	99.16	108.39	108.45	114.04	112.66	128.22	152.43	125.49	1290.90	
2011	54806	WATER TREATMENT PLANT	81.33	75.43	72.43	85.50	69.23	76.91	70.31	97.62	80.80	99.62	129.26	99.98	1038.42	

2010	54806	WATER TREATMENT PLANT	115.24	72.82	71.11	64.29	49.90	60.76	62.39	63.22	66.29	113.55	193.43	69.36	1002.36
2009	54806	WATER TREATMENT PLANT	85.93	81.63	81.02	77.03	66.60	64.94	69.02	70.74	87.59	111.52	88.23	73.01	957.25
2008	12239	OLD DIVERSION POINT	97.16	110.58	118.95	92.56	74.64	83.58	84.82	81.33	106.34	184.24	157.22	124.57	1315.99
2006	12239	OLD DIVERSION POINT	94.43	90.42	97.74	91.20	93.43	107.32	105.04	116.38	113.20	152.89	150.16	111.18	1323.40
2006	12240	S SANTIAM R													
2005	12239	OLD DIVERSION POINT	95.42	92.96	94.90	98.59	90.58	96.06	93.43	101.25	106.47	122.74	147.40	116.48	1256.29
2004	12239	OLD DIVERSION POINT	93.99	81.95	89.28	93.28	91.57	95.98	94.20	99.49	107.19	132.72	136.99	92.05	1208.68
2003	12239	OLD DIVERSION POINT	104.12	101.26	101.70	99.11	91.62	101.72	98.21	96.41	125.20	155.68	149.66	102.47	1327.17
2002	12239	OLD DIVERSION POINT	106.84	96.73	105.33	101.19	92.15	99.26	105.13	117.55	128.82	161.61	158.38	133.57	1406.55
2001	12239	OLD DIVERSION POINT	105.14	94.12	90.71	95.68	85.83	92.21	93.02	104.67	109.96	146.68	140.00	124.81	1282.83
2000	12239	OLD DIVERSION POINT	116.57	97.35	101.50	97.14	89.72	94.16	90.60	99.06	121.59	145.38	166.48	121.18	1340.73

*The water year is named for the calendar year in which it ends. Example: the 2014 water year begins Oct. 1, 2013 and ends Sep. 30, 2014.

- Monthly amounts indicate:
  - For diverted rights, the total amount diverted during the month;
  - For storage rights, the amount generally stored in the reservoir/pond during the month, as represented by the volume of water impounded on approximately the same day each month.
- Water Use amounts have all been converted to "acre-feet" (AF), regardless of the original measurement unit reported. One AF is the volume of water that will cover an acre of ground one foot deep = 325,850 gallons.
- Zeroes indicate that a report was received, stating that no water was used during those months; if a year is not listed, no report of water use was received for that year

Appendix E
Water Rights Summary and Documentation

Oregon
John A. Kitzhaber, MD, Governor

Water Resources Department
North Mall Office Building
725 Summer Street NE, Suite A
Salem, OR 97301-1271
503-986-0900
FAX 503-986-0904

S-13151
0.16 cfs

Date Mailed: May 17, 2013

NOTICE OF CERTIFICATE ISSUANCE

Attached is a certificate that correctly describes the water rights established under the terms of a transfer order issued by this Department.

This certificate is an order in other than a contested case. This order is subject to judicial review under ORS 183.482. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.482. Pursuant to ORS 183.482, ORS 536.075 and OAR 137-003-0675, you may petition for judicial review and petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied

This statement of judicial review rights is required under ORS 536.075; it does not alter or add to existing review rights or create review rights that are not otherwise provided by law.

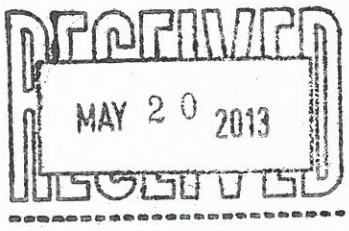
The water must be controlled and not wasted. To change the location of the point of diversion, the character of use, or the location of use requires the advance approval of the Water Resources Director.

If you have any questions please contact Craig Kohanek at 503-986-0823.

STATE OF OREGON

COUNTY OF LINN

CERTIFICATE OF WATER RIGHT



THIS CERTIFICATE ISSUED TO

CITY OF SWEET HOME
PUBLIC WORKS DIRECTOR
1140 12TH AVE
SWEET HOME OR 97386

confirms the right to use the waters of SOUTH SANTIAM RIVER, tributary to SANTIAM RIVER for MUNICIPAL USE.

This right was perfected under permit S-13151. The date of priority is JULY 14, 1938. The amount of water to which this right is entitled is limited to an amount actually used beneficially, and shall not exceed 0.6 CUBIC FOOT PER SECOND, or its equivalent in case of rotation, measured at the point of diversion.

The point of diversion is located as follows:

Twp	Rng	Mer	Sec	GLot	Q-Q	Measured Distances
13 S	1 E	WM	27	2	NW NE	1048 FEET SOUTH & 697 FEET EAST FROM N1/4 CORNER, SECTION 27

The quantity of water diverted at the new point of diversion shall not exceed the quantity of water lawfully available from the original point of diversion described as follows:

Twp	Rng	Mer	Sec	Q-Q	GLot
13 S	1 E	WM	31	NE NW	2

A description of the place of use is as follows:

Twp	Rng	Mer	Sec	Q-Q
13 S	1 E	WM	31	NE NE
13 S	1 E	WM	31	NW NE
13 S	1 E	WM	31	SW NE
13 S	1 E	WM	31	SE NE
13 S	1 E	WM	31	SW NW
13 S	1 E	WM	31	SE NW
13 S	1 E	WM	31	NE SW
13 S	1 E	WM	31	NW SW
13 S	1 E	WM	31	SW SW
13 S	1 E	WM	31	SE SW

NOTICE OF RIGHT TO PETITION FOR RECONSIDERATION OR JUDICIAL REVIEW

This is an order in other than a contested case. This order is subject to judicial review under ORS 183.482. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.482. Pursuant to ORS 183.482, ORS 536.075 and OAR 137-003-0675, you may petition for judicial review and petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

Twp	Rng	Mer	Sec	Q-Q
13 S	1 E	WM	31	NE SE
13 S	1 E	WM	31	NW SE
13 S	1 E	WM	31	SW SE
13 S	1 E	WM	31	SE SE
13 S	1 E	WM	32	NE NW
13 S	1 E	WM	32	NW NW
13 S	1 E	WM	32	SW NW
13 S	1 E	WM	32	SE NW
13 S	1 E	WM	32	NW SW
13 S	1 E	WM	32	SW SW
13 S	1 W	WM	36	NE SE

The water user shall maintain a headgate, an in-line flow meter, weir, or other suitable measuring device for measuring and recording the quantity of water diverted.

Water shall be acquired from the same surface water source as the original point of diversion.

The water user shall maintain and operate fish screening as required by the Oregon Department of Fish and Wildlife to prevent fish from entering the diversion.

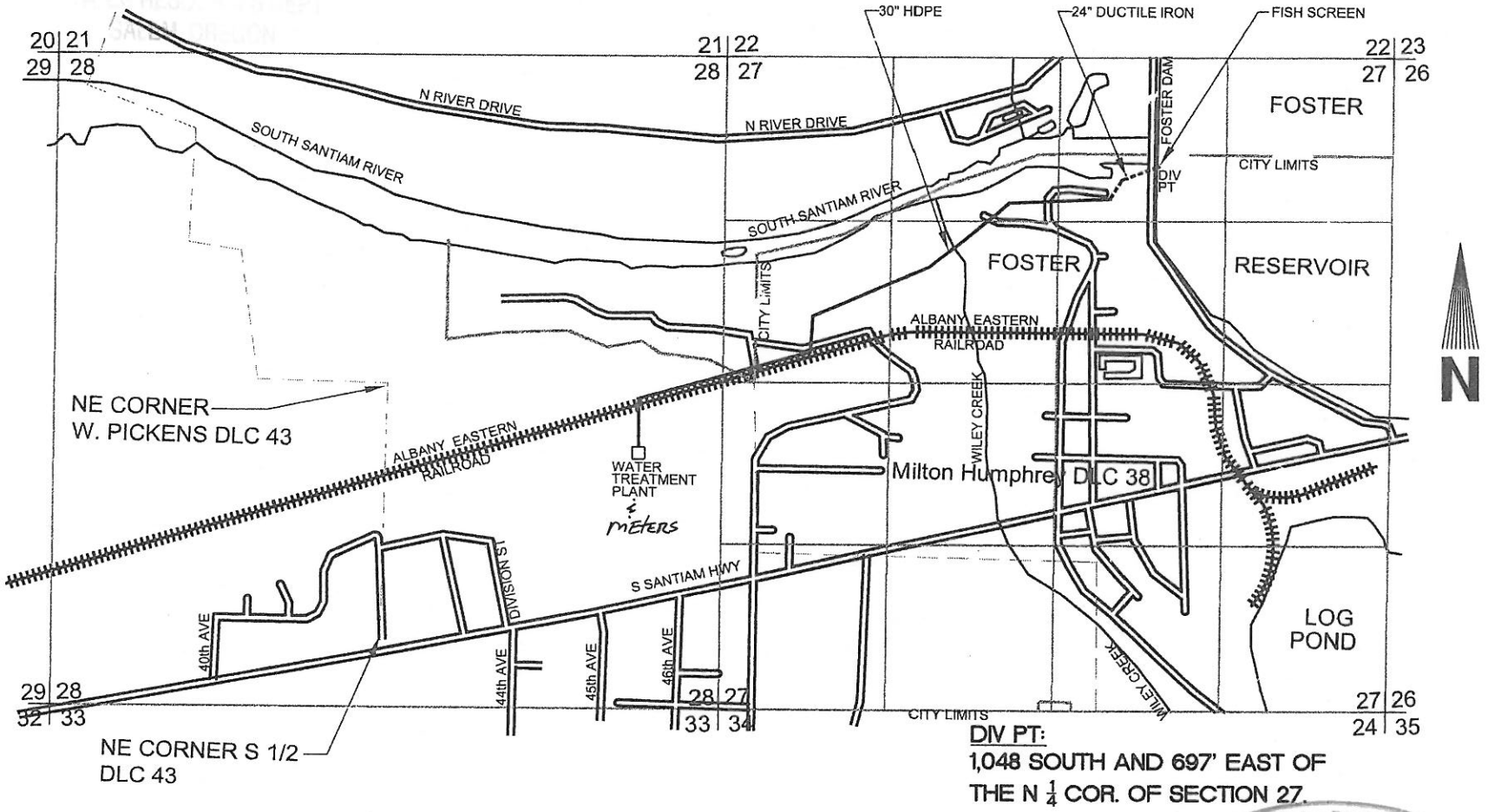
This certificate is issued to confirm a change in POINT OF DIVERSION approved by an order of the Water Resources Director entered July 8, 2003, at Special Order Volume 57, Page 994, approving Transfer Application 8662, and supersedes Certificate 13741, State Record of Water Right Certificates.

The right to the use of the water for the above purpose is restricted to beneficial use on the lands or place of use described; however, water may be applied to lands which are not specifically described above, provided the holder of this right complies with ORS 540.510(3).

Issued MAY 17 2013.

Dwight W. French
Administrator, Water Right Services, for
Phillip C. Ward, Director

CLAIM OF BENEFICIAL USE
T13S, R1E, WM, SECTION 27/28



DIV PT:
1,048 SOUTH AND 697' EAST OF
THE N $\frac{1}{4}$ COR. OF SECTION 27.

TRANSFER NO.	APPLICATION NO.	PERMIT NO.	CERT. NO.
T8662	17422	13151	13741
T8663	S-25810	20525	
T8664	S-57037	S-49959	

NOTE:
MAP IS FOR THE PURPOSE OF IDENTIFYING THE LOCATION OF WATER RIGHTS AND HAS NO INTENT TO DIMENSION OR LOCATE PROPERTY OWNERSHIP LINES.

Certified Water Right Examiner
163
Jon E. Erwin
May 17, 1988
STATE OF OREGON
Exp 12-31-2013

0 1320 2640
SCALE: 1" = 1320'

FOSTER, OREGON
T13S, R1E, Sections 27 + 28.
W.M. LINN COUNTY

Date: 11/9/12
Dwn By: JEE
Scale: 1"=1320'

ERWIN CONSULTING ENGINEERING
33923 BOND RD.
LEBANON, OR 97355
(540) 259-2280

Oregon
John A. Kitzhaber, MD, Governor

Water Resources Department
North Mall Office Building
725 Summer Street NE, Suite A
Salem, OR 97301-1271
503-986-0900
FAX 503-986-0904

S-20525
7.0 CFS

Date Mailed: May 17, 2013

NOTICE OF CERTIFICATE ISSUANCE

Attached are certificates that confirm water rights established under the terms of permits issued by this Department. The water rights are now appurtenant to the specific place where the use was established as described by the certificates. The water rights are limited to a specific amount of water, but not more than can be beneficially used for the purposes stated within the certificates.

These certificates are final orders in other than a contested case. These orders are subject to judicial review under ORS 183.484 and ORS 536.075. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.484(2). Pursuant to ORS 183.484, ORS 536.075 and OAR 137-004-0080, you may petition for judicial review and petition the Director for reconsideration of these orders. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied. In addition, under ORS 537.260 any person with an application, permit or water right certificate subsequent in priority may jointly or severally contest the issuance of these certificates within three months after issuance of the certificates.

Oregon law does not allow the Director to reissue a certificate because of a change in the ownership of the appurtenant place of use. The water must be controlled and not wasted. To change the location of the point of diversion, the character of use, or the location of use requires the advance approval of the Water Resources Director.

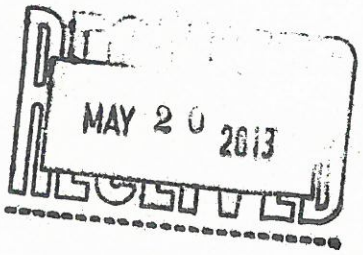
If any portion of this water right is not used for five or more consecutive years, that portion of the right may be subject to forfeiture according to ORS 540.610. Land enrolled in a Federal Reserve Program is not subject to forfeiture during the period of enrollment. Other exceptions to forfeiture are explained in ORS 540.610.

If you have any questions please contact Craig Kohanek at 503-986-0823.

STATE OF OREGON

COUNTY OF LINN

CERTIFICATE OF WATER RIGHT



THIS CERTIFICATE ISSUED TO

CITY OF SWEET HOME
PUBLIC WORKS DIRECTOR
1140 12TH AVE
SWEET HOME OR 97386

confirms the right to use the waters of SOUTH SANTIAM RIVER for MUNICIPAL USE.

This right was perfected under Permit S-20525. The date of priority is APRIL 16, 1951. The amount of water to which this right is entitled is limited to an amount actually used beneficially, and shall not exceed 7.0 CUBIC FEET PER SECOND or its equivalent in case of rotation, measured at the point of diversion.

The point of diversion is located as follows:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
13 S	1 E	WM	27	NW NE	1048 FEET SOUTH & 697 FEET EAST FROM THE NORTH 1/4 CORNER, SECTION 27

The quantity of water diverted at the new point of diversion shall not exceed the quantity of water lawfully available from the original point of diversion described as follows:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
13 S	1 E	WM	31	NE NW	580 FEET SOUTH & 2887 FEET WEST FROM THE NE CORNER, SECTION 31

A description of the place of use is as follows:

Twp	Rng	Mer	Sec	Q-Q
13 S	1 E	WM	29	SW SW
13 S	1 E	WM	29	SE SW
13 S	1 E	WM	30	SW SE
13 S	1 E	WM	30	SE SE
13 S	1 E	WM	31	ALL
13 S	1 E	WM	32	NW 1/4
13 S	1 E	WM	32	SW 1/4
13 S	1 W	WM	36	NE 1/4
13 S	1 W	WM	36	SE 1/4

NOTICE OF RIGHT TO PETITION FOR RECONSIDERATION OR JUDICIAL REVIEW

This is an order in other than a contested case. This order is subject to judicial review under ORS 183.484 and ORS 536.075. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.484(2). Pursuant to ORS 183.484, ORS 536.075 and OAR 137-004-0080, you may petition for judicial review and petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied. In addition, under ORS 537.260 any person with an application, permit or water right certificate subsequent in priority may jointly or severally contest the issuance of the certificate within three months after issuance of the certificate.

Twp	Rng	Mer	Sec	Q-Q
14 S	1 E	WM	5	NE NW
14 S	1 E	WM	5	NW NW
14 S	1 E	WM	6	NE 1/4
14 S	1 E	WM	6	NW 1/4

The water user shall maintain a headgate, in-line flow meter, or other suitable devices for measuring and recording the quantity of water diverted.

Water shall be acquired from the same source as the original point of diversion.

The water user shall maintain and operate fish screening as required by the Oregon Department of Fish and Wildlife to prevent fish from entering the diversion.

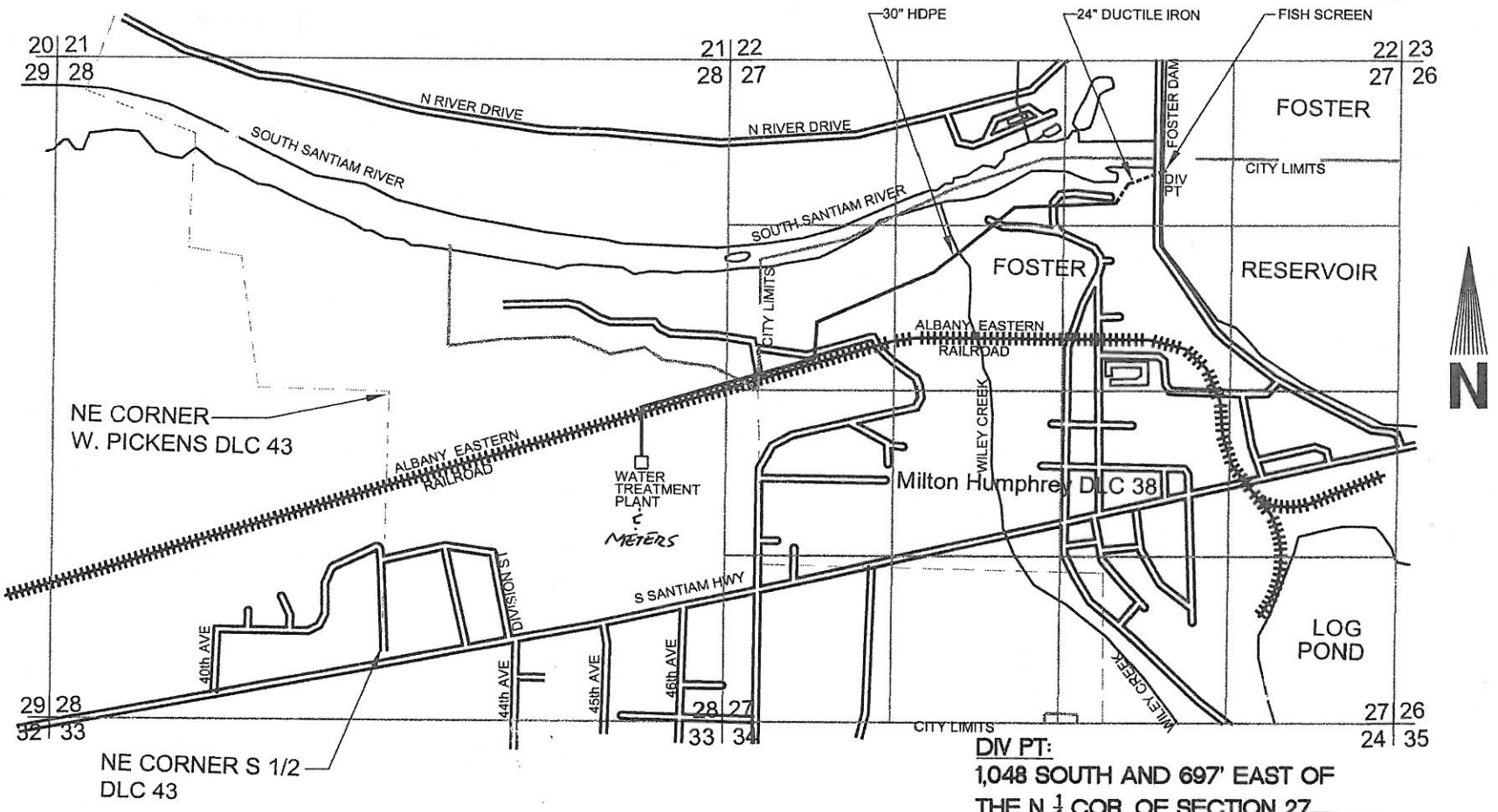
The right to the use of the water for the above purpose is restricted to beneficial use on the lands or place of use described; however, water may be applied to lands which are not specifically described above, provided the holder of this right complies with ORS 540.510(3).

Issued MAY 17 2013.

Dwight W. French
Administrator, Water Right Services, for
Phillip C. Ward, Director

 Recorded in State Record of Water Right Certificates numbered 88301.

CLAIM OF BENEFICIAL USE
T13S, R1E, WM, SECTION 27/28



DIV PT:
1,048 SOUTH AND 697' EAST OF
THE N $\frac{1}{4}$ COR. OF SECTION 27.

TRANSFER NO.	APPLICATION NO.	PERMIT NO.	CERT. NO.
T8662	17422	13151	13741
T8663	S-25810	20525	
T8664	S-57037	S-49959	

NOTE:
MAP IS FOR THE PURPOSE OF IDENTIFYING THE LOCATION OF WATER RIGHTS AND HAS NO INTENT TO DIMENSION OR LOCATE PROPERTY OWNERSHIP LINES.

Certified Water Right Examiner
163
Jon E. Erwin
May 17, 1988
STATE OF OREGON

Exp 12-31-2013

0 1320 2640

SCALE: 1" = 1320'

FOSTER, OREGON
T13S, R1E, Sections 27 + 28.
W.M. LINN COUNTY

Date: 11/9/12
Dwn By: JEE
Scale: 1"=1320'

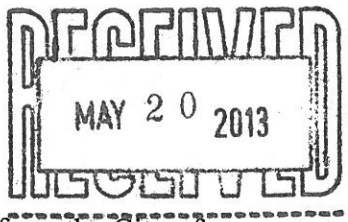
ERWIN CONSULTING ENGINEERING
33923 BOND RD.
LEBANON, OR 97355
(541) 259-2190

BEFORE THE WATER RESOURCES DIRECTOR OF OREGON

LINN COUNTY

IN THE MATTER OF PARTIAL PERFECTION OF)
WATER RIGHT PERMIT S-49959 IN THE NAME)
OF THE CITY OF SWEET HOME)

ORDER



STATEMENT

On December 3, 2012, The Water Resources Department received a request from the City of Sweet Home to partially perfect the use of water under water right permit S-49959.

FINDINGS OF FACT

Permit S-49959 allows for the use of 5.5 cubic foot per second (CFS) from the South Santiam River, a tributary of the Willamette River for municipal use.

The City has requested partial perfection of permit S-49959 and issuance of a water right certificate. The request was accompanied by the survey required under ORS 537.230(4). The survey shows, to the satisfaction of the Director, that the appropriation has been partially perfected in accordance with the provision of the Water Rights Act.

ORS 537.260 allows, without loss of priority or cancellation to the permit, the incremental perfection of the water right permit in an amount of not less than 25 percent, pursuant to ORS 537.260 and OAR 690-320-0040.

The Department finds that the City has perfected 3.51 cfs. The quantity of water is equal or greater than the 25 percent of the original quantity of water allowed under permit S-49959.

OAR 690-320-0040(5) allows municipal suppliers that incrementally perfect less than the full quantity of water to request further extension of time to complete construction and apply water to beneficial use for the remaining, unperfected quantity of water.

NOTICE OF RIGHT TO PETITION FOR JUDICIAL REVIEW OR RECONSIDERATION

This is a final order in other than contested case. This order is subject to judicial review under ORS 183.482. Any petition for judicial review must be filed within the 60 day time period specified by ORS 183.482 and ORS 536.075. Pursuant to ORS 183.482, ORS 536.075 and OAR 137-003-0675, you may petition for judicial review and petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

STATE OF OREGON

COUNTY OF LINN

CERTIFICATE OF WATER RIGHT

THIS CERTIFICATE ISSUED TO

CITY OF SWEET HOME
PUBLIC WORKS DEPARTMENT
1140 12TH AVE
SWEET HOME OR 97386

confirms the right to use the waters of SOUTH SANTIAM RIVER, a tributary of the WILLAMETTE RIVER for MUNICIPAL USE.

This right was partially perfected under Permit S-49959. The date of priority is APRIL 8, 1986. The amount of water to which this right is entitled is limited to an amount actually used beneficially, and shall not exceed 3.51 CUBIC FEET PER SECOND or its equivalent in case of rotation, measured at the point of diversion.

The point of diversion is located as follows:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
13 S	1 E	WM	27	NW NE	1048 FEET SOUTH AND 697 FEET EAST FROM THE N1/4 CORNER, SECTION 27

The quantity of water diverted at the new point of diversion shall not exceed the quantity of water lawfully available from the original point of diversion described as follows:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
13 S	1 E	WM	31	NE NW	550 FEET SOUTH AND 2950 FEET WEST FROM THE SE CORNER, SECTION 31

A description of the place of use is as follows:

Twp	Rng	Mer	Sec	Q-Q
13 S	1 E	WM	26	NW 1/4
13 S	1 E	WM	26	NE SW
13 S	1 E	WM	26	NW SW
13 S	1 E	WM	26	SW SW
13 S	1 E	WM	27	NE 1/4
13 S	1 E	WM	27	SW NW
13 S	1 E	WM	27	SE NW
13 S	1 E	WM	27	SW 1/4

NOTICE OF RIGHT TO PETITION FOR RECONSIDERATION OR JUDICIAL REVIEW

This is an order in other than a contested case. This order is subject to judicial review under ORS 183.484 and ORS 536.075. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.484(2). Pursuant to ORS 183.484, ORS 536.075 and OAR 137-004-0080, you may petition for judicial review and petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied. In addition, under ORS 537.260 any person with an application, permit or water right certificate subsequent in priority may jointly or severally contest the issuance of the certificate within three months after issuance of the certificate.

Twp	Rng	Mer	Sec	Q-Q
13 S	1 E	WM	27	SE 1/4
13 S	1 E	WM	28	SW NW
13 S	1 E	WM	28	SE NW
13 S	1 E	WM	28	SW 1/4
13 S	1 E	WM	28	SE 1/4
13 S	1 E	WM	29	NE 1/4
13 S	1 E	WM	29	NE NW
13 S	1 E	WM	29	SE NW
13 S	1 E	WM	29	NE SW
13 S	1 E	WM	29	NW SW
13 S	1 E	WM	29	SE 1/4
13 S	1 E	WM	31	NE NW
13 S	1 E	WM	31	NW NW
13 S	1 E	WM	32	NE 1/4
13 S	1 E	WM	32	NE SE
13 S	1 E	WM	32	NW SE
13 S	1 E	WM	33	NE 1/4
13 S	1 E	WM	33	NW 1/4
13 S	1 E	WM	33	NE SW
13 S	1 E	WM	33	NW SW
13 S	1 E	WM	33	NE SE
13 S	1 E	WM	33	NW SE
13 S	1 E	WM	34	NW 1/4
13 S	1 W	WM	36	NW NE
13 S	1 W	WM	36	SW NE
14 S	1 E	WM	6	SW NE

The water user shall maintain a headgate, an in-line flow meter, weir, or other suitable measuring device for measuring and recording the quantity of water diverted.

Water shall be acquired from the same surface water source as the original point of diversion.

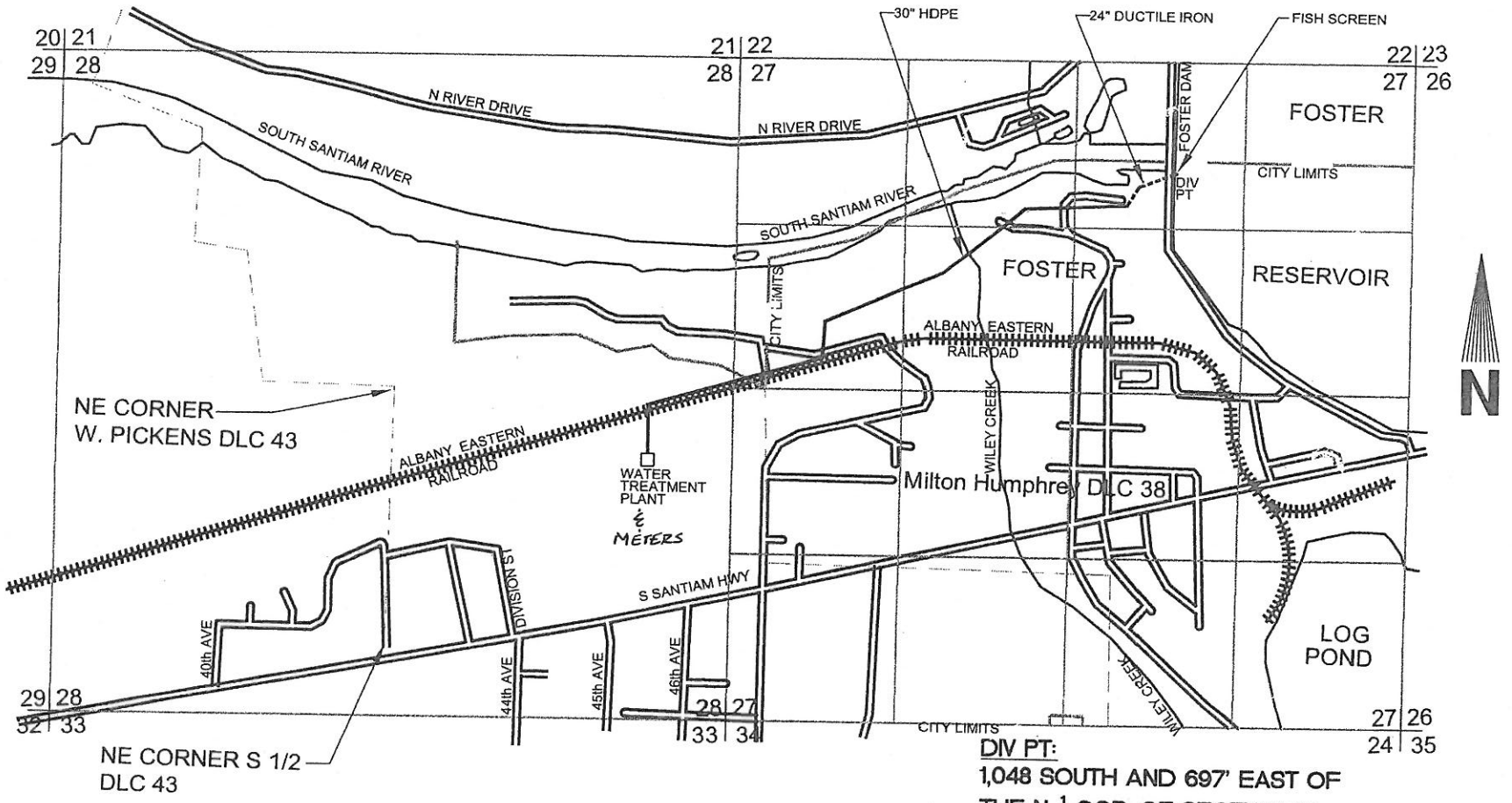
The water user shall maintain and operate fish screening as required by the Oregon Department of Fish and Wildlife to prevent fish from entering the diversion.

The right to the use of the water for the above purpose is restricted to beneficial use on the lands or place of use described; however, water may be applied to lands which are not specifically described above, provided the holder of this right complies with ORS 540.510(3).

Issued MAY 17 2013.

Dwight W. French
Administrator, Water Right Services, for
Phillip C. Ward, Director

CLAIM OF BENEFICIAL USE
T13S, R1E, WM, SECTION 27/28



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FOSTER, OREGON
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Date: 11/9/12
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Appendix F
Water System Computer Modeling

APPENDIX

CITY OF SWEET HOME

WATER MODELING SOFTWARE: BENTLEY SYSTEMS WATERCAD V8I

Model Description.

The WaterCAD Network Model is comprised of the major pipelines being 6" and larger, up the largest diameter of 16". The Model has the capacity of 500 pipes, of which 288 have been added to the system. Only a very few 4" are modeled, since the emphasis has been to remove the smaller lines (2" and 3") as part of the modernization and leak repair programs. None of the 2" lines in the city are in the model, though there is significant length remaining in use. At some point in the future the smaller lines may be added, but only for consistency with the network. The remaining pipe number capacity in the model is being "saved" for future expansion of the city network with new growth.

Node points are located at each junction, with a default demand load gallons per minute. These nodes need individual calibration (see below) to determine more accurate usage. The pipelines modeled are primarily Ductile Iron and C900 PVC, which are the majority of the pipe segments in town. There are a few Steel pipelines, and some remaining Tar Wrapped Cast Iron. Most pipe segments in the model have the default capacity factor "C" value from a "new" pipeline outlook, and this too needs to be adjusted on a pipe to pipe consideration.

The five reservoirs in the city are modeled at their true elevation and size and shape. The tanks and connecting pipes, and pipes throughout the city are located at their actual locations by the City GIS and CAD Asset Management System. Pipe lengths closely reflect the actual distance of segments. The pipe segments themselves do not have specific valve controls at this time, all valves are assumed to be fully opened.

A Flow Control Valve is placed in the system on 49th Avenue to reflect a field operations control to attenuate the flow to the 49th Avenue Reservoir. This is done in the field by throttling a valve at Long Street and 49th Avenue, diverting more water to the network and helping to force water to the 10th Avenue Reservoirs to fill at "near" the same pace as 49th. There is still a lag time/flow level between the two locations, but the difference is minor. The FCV is modeled to restrict roughly 50% flow, based on a limited flow rate value. At a later time, a Throttle Control Valve will be placed in the system to evaluate which valve type would perform closer to actual field measurements. At this time the FCV is place.

The Source Reservoir is modeled as a very large pipe segment, close-coupled to the new Water Treatment Plant pumps. It acts as nearly unlimited source water availability for the system hydraulics, as recommended in the manuals for the WaterCAD software. At some point later in 2016, the City will try – as time permits – formulating model characteristics for the actual inlet in Foster Dam, the Raw Water Pipeline configuration, and the Intake Pump Station and its piping to the main treatment facility. In the model, the pipe segments to and from the WTP pumps are actually have user defined lengths much shorter than the graphical distance as shown on the System Map. The pumps at the WTP are modeled as two pumps rather than the three that there actually are. In discussions with plant

managers, the plant only runs two of the three at any given time, and only for short times with the high output flow. With pumps rotated during use, the effect of three and operation controls will be added.

Modeling effects of throttling flow, usage at nodes, the WTP and PS Strawberry pumps, the reservoirs, and other locations is continuing. The emphasis has been to get various network elements placed in the model and functioning correctly, with refinements to be added as time progresses. The next most important element is the demand usage at nodes. The grid of city is laid out such that various areas have different demand usages, i.e. a mix of commercial and residential, and some industrial mixed with residential, that all need to factor together for a relatively close approximation of the actual demand.

There will be two additional Pump Stations and pressure zones added to the City in the near future. In early 2016, PS Lake Pointe will be operational serving a new subdivision off Riggs Hill Road, and likely in 2018 to 2020, another PS and pressure zone will be added to the Canyon Creek Subdivision off 10th Avenue.

The Scenario Management function of the program allows for development of options for new capacity line replacement, Transmission Main routing, Water Quality, fire flows and contingency planning for system breaks that may draw down storage quickly and significantly, new reservoir planning and location siting, and other functions.

Model scenario runs have been performed working towards a closer Model-Predicted vs Field-Measured relationship. Early runs have been close, with pressures and flow similar to actual, but there is still significant refining of parameters yet to do.

Figures and Tables.

The following tables are the data that WC uses for its analysis. Both the Node and Pipeline tables have more internal hydraulic data associated with each element for processing of the program, but for the purposes of this report, these tables are a general overview.

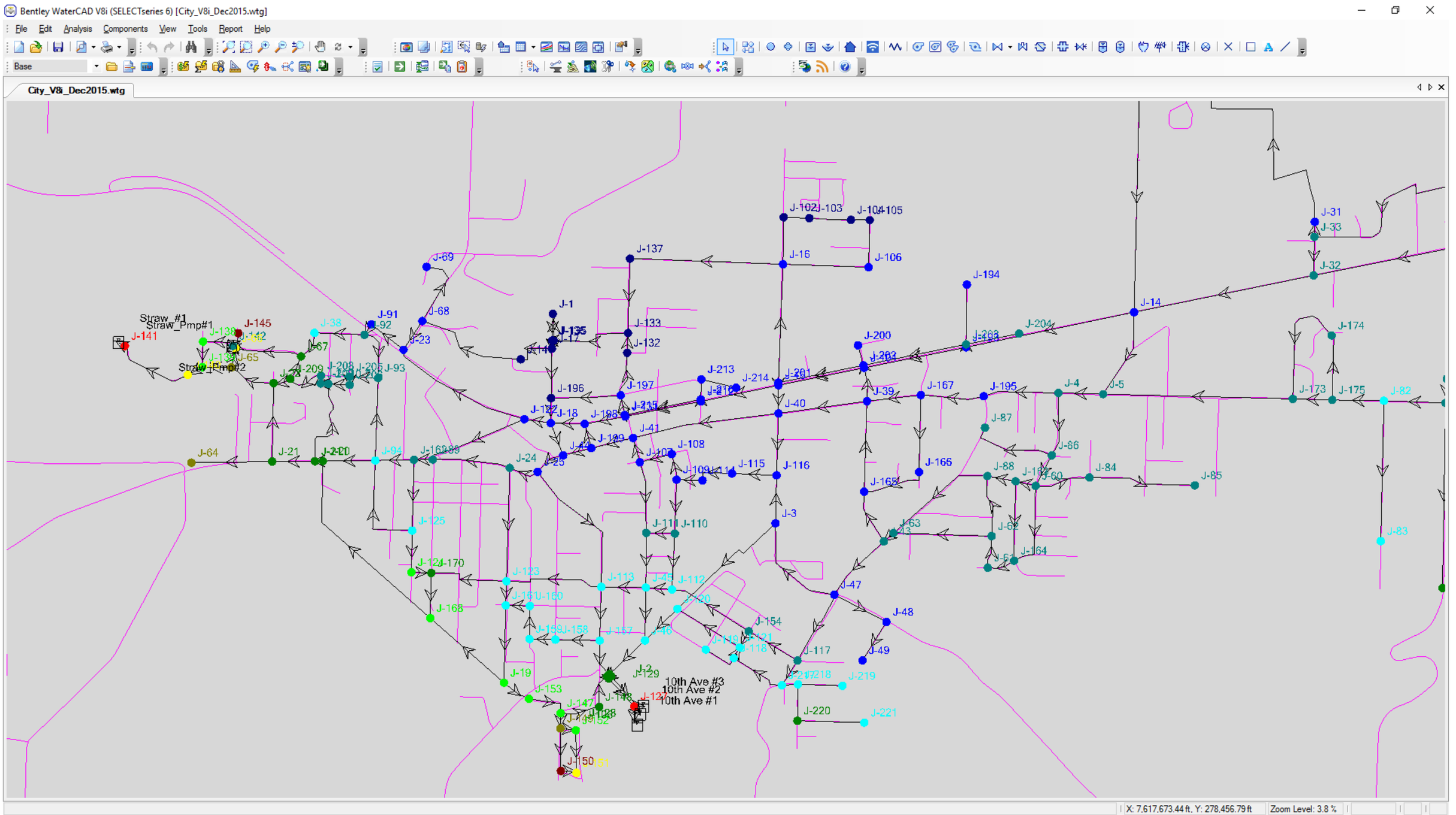
Figure 1: Node Location Map. This picture is a screen grab of the WaterCAD program showing the nodes locations in a pressure rated color code. Due to the small image size, there is no Legend displayed on the map.

Table 1: Node Features. The table on Nodes describes the Feature ID, the descriptive Label, elevation in feet, which pressure zone of the city it is in, and the roadway junction locations by street intersection or mid-block and property location.

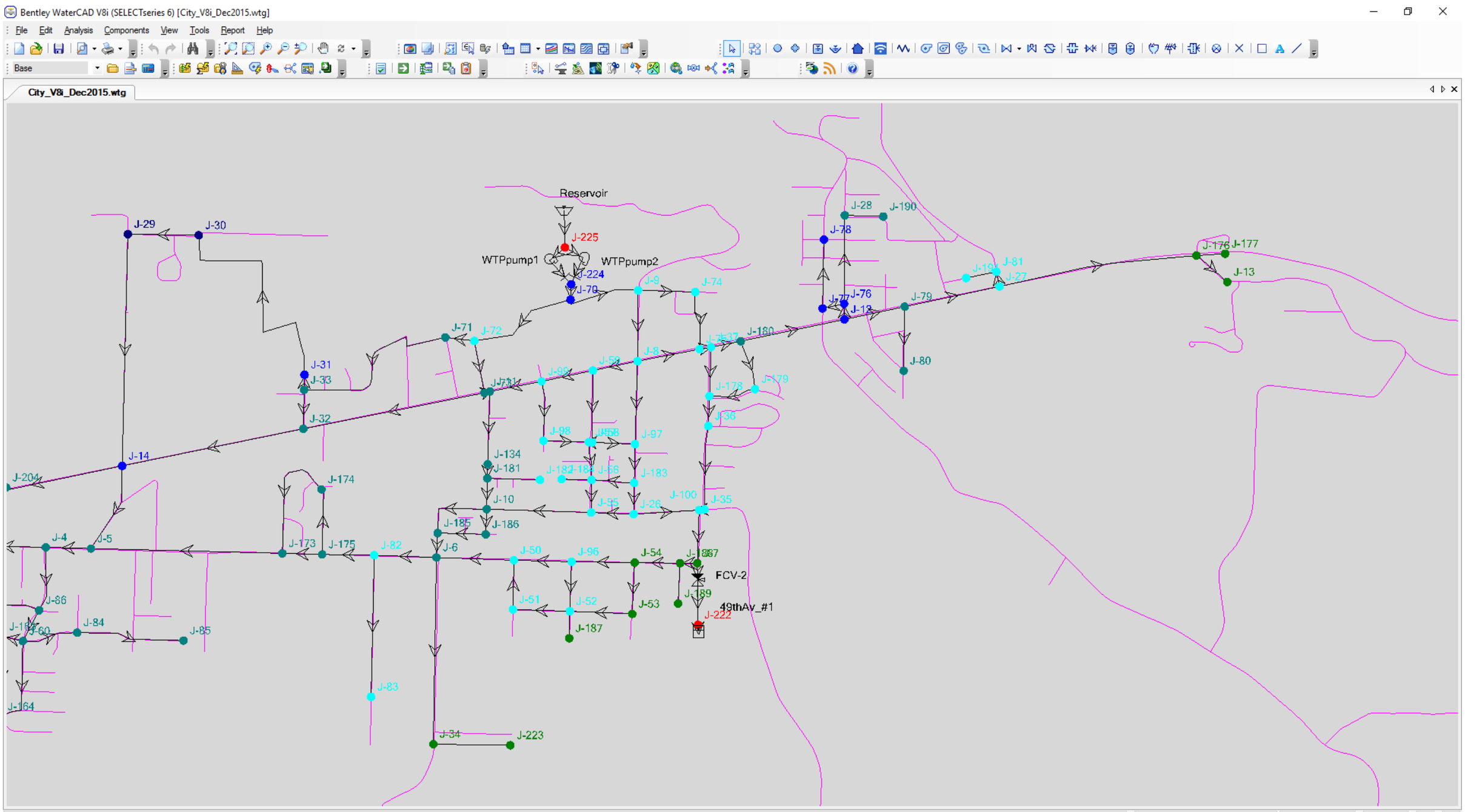
Table 2: Pipe Features. The table on Pipelines describes the Feature ID, the descriptive Label, length in feet, the Start Node and End Node, the pipe diameter in inches, and the pipe material.

Table 3: System Features. The Table on System Features describes those other items necessary in a model, from source water to reservoirs. These features are the Source Reservoir, the Pressure Pumps, one network Flow Control Valve, and the Storage Reservoirs. The table describes the Feature ID, the descriptive label, the elevation in feet, the pressure zone it is located in, the roadway location, and a short description of the element.

System Map: West half of Sweet Home.



System Map: East half of Sweet Home.



City of Sweet Home
1140 12th Ave
Sweet Home, OR 97386

Sweet Home Water System
System Features Location Table

12/28/2015

ID	Label	Elevation (ft)	Zone	Roadway	Description
Source Water					
182	Reservoir	590	89: Zone - 1_City	WTP	Source Reservoir
Pressure Pump Systems					
720	WTPpump1	590	89: Zone - 1_City	WTP	PS WTP : Pump #1
721	WTPpump2	590	89: Zone - 1_City	WTP	PS WTP : Pump #2
452	Straw_Pmp#1	656	90: Zone - 2_Straw	Strawberry Loop Dr	PS Strawberry : Pump #1
469	Straw_Pmp#2	656	90: Zone - 2_Straw	Strawberry Loop Dr	PS Strawberry : Pump #2
Network Flow Control					
747	FCV-2	68.7	89: Zone - 1_City	49th Ave	Flow Control Feature : 49th Ave Res.
Water Storage Reservoirs					
183	10th Ave #1	742	89: Zone - 1_City	10th Ave	10th Avenue Res. : Tank #1
420	10th Ave #2	751	89: Zone - 1_City	10th Ave	10th Avenue Res. : Tank #2
421	10th Ave #3	745	89: Zone - 1_City	10th Ave	10th Avenue Res. : Tank #3
463	Straw_#1	795	90: Zone - 2_Straw	Nandina St	Strawberry Res. : Tank #1
184	49thAv_#1	742	89: Zone - 1_City	48th Ave	49th Avenue Res. : Tank #1

City of Sweet Home
1140 12th Ave
Sweet Home OR 97386

Sweet Home Water System
Pipe Analysis Locations Table

ID	Label	Length (ft)	Start Node: (ID : Num)	Stop Node (ID : Num)	Diameter (in)	Material
188	P-5	565	97: J-4	98: J-5	12	PVC
190	P-10	885	101: J-8	102: J-9	12	PVC
193	P-16	1151	98: J-5	107: J-14	12	PVC
204	P-31	989	114: J-21	115: J-22	8	Ductile Iron
207	P-37	390	117: J-24	118: J-25	10	PVC
212	P-45	2896	107: J-14	122: J-29	8	PVC
213	P-46	886	122: J-29	123: J-30	8	PVC
214	P-47	3063	123: J-30	124: J-31	10	PVC
215	P-48	2310	107: J-14	125: J-32	12	PVC
216	P-50	189	124: J-31	126: J-33	8	PVC
217	P-51	486	126: J-33	125: J-32	10	PVC
218	P-52	2334	99: J-6	127: J-34	16	PVC
219	P-53	1046	128: J-35	129: J-36	8	Ductile Iron
225	P-60	354	108: J-15	133: J-40	8	Ductile Iron
227	P-62	1126	132: J-39	133: J-40	4	Ductile Iron
228	P-63	1863	133: J-40	134: J-41	6	Ductile Iron
230	P-68	435	111: J-18	136: J-44	10	Steel
231	P-69	398	136: J-44	118: J-25	10	Steel
234	P-72	618	95: J-2	138: J-46	10	Ductile Iron
236	P-74	666	137: J-45	138: J-46	8	Ductile Iron
237	P-75	1365	96: J-3	139: J-47	10	Ductile Iron
238	P-76	922	139: J-47	135: J-43	10	Ductile Iron
239	P-77	741	139: J-47	140: J-48	10	Ductile Iron
240	P-78	572	140: J-48	141: J-49	6	PVC
241	P-79	968	99: J-6	142: J-50	10	PVC
242	P-81	615	142: J-50	143: J-51	8	PVC
243	P-82	713	143: J-51	144: J-52	6	PVC
244	P-83	780	144: J-52	145: J-53	6	PVC
247	P-86	641	145: J-53	146: J-54	8	PVC
248	P-87	1307	103: J-10	147: J-55	16	PVC
249	P-88	530	147: J-55	119: J-26	16	PVC
250	P-89	408	147: J-55	148: J-56	8	PVC
251	P-90	476	148: J-56	149: J-57	8	PVC
252	P-91	41	149: J-57	150: J-58	8	PVC
254	P-93	568	151: J-59	101: J-8	12	Ductile Iron
255	P-94	898	150: J-58	151: J-59	8	PVC
257	P-98	411	153: J-61	154: J-62	8	PVC
258	P-99	160	135: J-43	155: J-63	10	Ductile Iron
259	P-101	1239	154: J-62	155: J-63	6	Ductile Iron
260	P-102	1019	114: J-21	156: J-64	6	Ductile Iron
261	P-103	594	115: J-22	157: J-65	6	Ductile Iron
262	P-104	247	157: J-65	158: J-66	6	Ductile Iron
264	P-106	367	159: J-67	131: J-38	8	Ductile Iron
265	P-107	840	159: J-67	158: J-66	6	Ductile Iron
266	P-108	433	116: J-23	160: J-68	10	PVC
268	P-110	965	160: J-68	161: J-69	10	PVC
269	P-111	925	162: J-70	102: J-9	16	Ductile Iron
272	P-114	2320	126: J-33	163: J-71	8	PVC
273	P-115	365	163: J-71	164: J-72	8	PVC
274	P-116	2307	125: J-32	165: J-73	12	PVC
275	P-117	71	165: J-73	104: J-11	12	PVC
276	P-118	662	164: J-72	165: J-73	16	PVC
277	P-119	714	102: J-9	166: J-74	8	PVC
278	P-120	790	101: J-8	167: J-75	16	Ductile Iron
279	P-121	147	167: J-75	130: J-37	16	Ductile Iron
280	P-122	758	166: J-74	167: J-75	8	PVC
281	P-123	196	105: J-12	168: J-76	16	PVC
282	P-124	1105	168: J-76	121: J-28	16	PVC
283	P-125	277	168: J-76	169: J-77	8	Ductile Iron
284	P-126	861	169: J-77	170: J-78	8	Ductile Iron
285	P-127	770	105: J-12	171: J-79	10	PVC
286	P-128	1211	171: J-79	120: J-27	10	PVC
287	P-129	802	171: J-79	172: J-80	8	PVC
288	P-130	188	120: J-27	173: J-81	8	PVC
290	P-132	778	174: J-82	99: J-6	12	PVC
291	P-133	1769	174: J-82	175: J-83	8	Ductile Iron
292	P-134	700	152: J-60	176: J-84	8	Ductile Iron
293	P-135	1346	176: J-84	177: J-85	6	Ductile Iron
294	P-136	438	152: J-60	178: J-86	10	Ductile Iron

Sweet Home Water System
Pipe Analysis Locations Table

295	P-137	809	178: J-86	97: J-4	10	Ductile Iron
296	P-138	1082	178: J-86	179: J-87	6	Ductile Iron
297	P-139	1457	155: J-63	180: J-88	10	Ductile Iron
299	P-141	782	154: J-62	180: J-88	8	PVC
300	P-142	1377	162: J-70	164: J-72	16	Ductile Iron
305	P-145	982	117: J-24	302: J-89	10	PVC
308	P-146	516	116: J-23	307: J-91	10	PVC
310	P-147	632	131: J-38	309: J-92	6	Ductile Iron
312	P-149	159	307: J-91	309: J-92	10	PVC
314	P-150	665	309: J-92	313: J-93	6	Ductile Iron
317	P-152	660	315: J-94	113: J-20	6	Ductile Iron
318	P-153	1040	313: J-93	315: J-94	8	Ductile Iron
321	P-154	721	142: J-50	320: J-96	10	PVC
322	P-155	788	320: J-96	146: J-54	10	PVC
323	P-156	620	144: J-52	320: J-96	8	PVC
326	P-158	1038	324: J-97	101: J-8	10	PVC
327	P-159	538	324: J-97	150: J-58	8	PVC
329	P-160	566	149: J-57	328: J-98	8	PVC
331	P-161	658	104: J-11	330: J-99	12	Ductile Iron
332	P-162	656	330: J-99	151: J-59	12	Ductile Iron
333	P-163	746	328: J-98	330: J-99	6	Ductile Iron
336	P-165	821	334: J-100	119: J-26	10	PVC
337	P-166	66	128: J-35	334: J-100	10	PVC
340	P-168	1103	338: J-101	108: J-15	8	Ductile Iron
341	P-169	425	132: J-39	338: J-101	6	Ductile Iron
343	P-170	592	109: J-16	342: J-102	10	Ductile Iron
345	P-171	324	342: J-102	344: J-103	6	Ductile Iron
347	P-172	525	344: J-103	346: J-104	4	Ductile Iron
349	P-173	237	346: J-104	348: J-105	6	Ductile Iron
351	P-174	594	348: J-105	350: J-106	6	Ductile Iron
352	P-175	1080	350: J-106	109: J-16	6	Ductile Iron
354	P-176	318	134: J-41	353: J-107	8	Ductile Iron
357	P-178	415	353: J-107	356: J-108	6	Ductile Iron
359	P-179	331	356: J-108	358: J-109	8	Ductile Iron
361	P-180	678	358: J-109	360: J-110	6	Ductile Iron
363	P-181	900	353: J-107	362: J-111	8	Ductile Iron
364	P-182	690	362: J-111	137: J-45	8	Ductile Iron
365	P-183	360	360: J-110	362: J-111	6	Ductile Iron
367	P-184	707	360: J-110	366: J-112	6	Ductile Iron
368	P-185	328	366: J-112	137: J-45	6	Ductile Iron
370	P-186	1816	118: J-25	369: J-113	10	Ductile Iron
372	P-188	563	137: J-45	369: J-113	6	Ductile Iron
374	P-189	327	358: J-109	373: J-114	10	Ductile Iron
376	P-190	469	373: J-114	375: J-115	8	Ductile Iron
378	P-191	780	133: J-40	377: J-116	8	Ductile Iron
379	P-192	605	377: J-116	96: J-3	8	Ductile Iron
380	P-193	564	375: J-115	377: J-116	8	Ductile Iron
386	P-196	459	383: J-118	385: J-119	6	Ductile Iron
388	P-197	571	138: J-46	387: J-120	10	Ductile Iron
389	P-198	1704	387: J-120	96: J-3	10	Ductile Iron
391	P-199	922	387: J-120	390: J-121	6	Ductile Iron
393	P-200	336	111: J-18	392: J-122	6	Ductile Iron
394	P-201	1810	392: J-122	116: J-23	6	Ductile Iron
395	P-202	1293	392: J-122	302: J-89	4	Ductile Iron
398	P-204	1429	396: J-123	117: J-24	10	Ductile Iron
399	P-205	1266	369: J-113	396: J-123	6	Ductile Iron
403	P-207	527	400: J-124	402: J-125	8	Ductile Iron
404	P-208	1366	402: J-125	315: J-94	8	Ductile Iron
406	P-209	42	95: J-2	405: J-126	10	Ductile Iron
410	P-212	250	408: J-127	183: 10th Ave #1	12	Steel
413	P-214	33	405: J-126	412: J-128	10	Ductile Iron
414	P-215	479	412: J-128	408: J-127	10	Ductile Iron
416	P-216	34	95: J-2	415: J-129	12	Steel
417	P-217	506	415: J-129	408: J-127	12	Steel
418	P-218	42	412: J-128	415: J-129	12	Ductile Iron
422	P-219	123	420: 10th Ave #2	408: J-127	10	Ductile Iron
423	P-220	116	421: 10th Ave #3	408: J-127	10	Ductile Iron
432	P-226	250	427: J-132	429: J-133	10	PVC
435	P-228	909	433: J-134	104: J-11	10	PVC
437	P-229	1034	429: J-133	436: J-135	10	Ductile Iron
438	P-230	122	436: J-135	110: J-17	16	PVC
439	P-231	362	94: J-1	436: J-135	16	PVC
441	P-232	336	94: J-1	440: J-136	12	PVC

Sweet Home Water System
Pipe Analysis Locations Table

442	P-233	103	440: J-136	110: J-17	12	PVC
443	P-234	18	436: J-135	440: J-136	16	PVC
448	P-237	1931	109: J-16	447: J-137	10	Ductile Iron
449	P-238	938	447: J-137	429: J-133	10	Ductile Iron
453	P-239	31	158: J-66	452: Straw_Pmp#1	2	Ductile Iron
457	P-241	324	454: J-138	456: J-139	6	Ductile Iron
458	P-242	367	157: J-65	456: J-139	4	Ductile Iron
460	P-243	206	456: J-139	459: J-140	10	PVC
462	P-244	1024	459: J-140	461: J-141	10	PVC
464	P-245	88	461: J-141	463: Straw_#1	10	PVC
467	P-246	16	452: Straw_Pmp#1	466: J-142	2	Ductile Iron
468	P-247	411	466: J-142	454: J-138	6	Ductile Iron
470	P-248	35	158: J-66	469: Straw_Pmp#2	2	Ductile Iron
471	P-249	22	469: Straw_Pmp#2	466: J-142	2	Ductile Iron
475	P-250	196	158: J-66	474: J-145	6	Ductile Iron
477	P-251	1428	160: J-68	476: J-146	10	PVC
478	P-252	543	476: J-146	110: J-17	10	PVC
483	P-255	431	405: J-126	482: J-148	10	Ductile Iron
484	P-256	500	482: J-148	479: J-147	10	Ductile Iron
486	P-257	194	479: J-147	485: J-149	8	Ductile Iron
488	P-258	535	485: J-149	487: J-150	8	Ductile Iron
490	P-259	200	487: J-150	489: J-151	8	Ductile Iron
492	P-260	538	489: J-151	491: J-152	8	Ductile Iron
493	P-261	196	491: J-152	485: J-149	8	Ductile Iron
495	P-262	521	479: J-147	494: J-153	10	Ductile Iron
496	P-263	378	494: J-153	112: J-19	10	Ductile Iron
514	P-264	1117	366: J-112	513: J-154	6	Ductile Iron
515	P-265	716	513: J-154	381: J-117	6	Ductile Iron
516	P-266	232	513: J-154	390: J-121	6	Ductile Iron
517	P-267	154	390: J-121	383: J-118	6	Ductile Iron
522	P-270	969	139: J-47	381: J-117	10	PVC
524	P-271	677	369: J-113	523: J-157	10	Ductile Iron
525	P-272	471	523: J-157	95: J-2	10	Ductile Iron
527	P-273	560	523: J-157	526: J-158	8	PVC
529	P-274	327	526: J-158	528: J-159	8	PVC
531	P-275	417	528: J-159	530: J-160	4	Cast iron
533	P-276	976	112: J-19	532: J-161	10	Ductile Iron
534	P-277	304	532: J-161	396: J-123	10	Ductile Iron
535	P-278	305	530: J-160	532: J-161	4	Cast iron
537	P-279	238	302: J-89	536: J-162	6	Ductile Iron
538	P-280	488	536: J-162	315: J-94	6	Ductile Iron
539	P-281	893	402: J-125	536: J-162	8	Ductile Iron
541	P-282	364	180: J-88	540: J-163	10	Ductile Iron
542	P-283	257	540: J-163	152: J-60	10	Ductile Iron
544	P-284	1130	152: J-60	543: J-164	8	Ductile Iron
545	P-285	373	543: J-164	153: J-61	8	Ductile Iron
546	P-286	1000	540: J-163	543: J-164	6	Ductile Iron
548	P-287	1141	132: J-39	547: J-165	6	Ductile Iron
549	P-288	702	547: J-165	135: J-43	6	Ductile Iron
551	P-289	817	547: J-165	550: J-166	6	Ductile Iron
554	P-291	683	552: J-167	132: J-39	6	Ductile Iron
555	P-292	970	550: J-166	552: J-167	2	Ductile Iron
557	P-293	1236	112: J-19	556: J-168	10	Ductile Iron
558	P-294	2597	556: J-168	113: J-20	10	Ductile Iron
562	P-296	1026	396: J-123	561: J-170	4	Ductile Iron
563	P-297	251	561: J-170	400: J-124	4	Ductile Iron
564	P-298	569	556: J-168	561: J-170	6	Ductile Iron
569	P-300	2391	98: J-5	568: J-173	12	Ductile Iron
572	P-302	1547	568: J-173	571: J-174	8	Ductile Iron
574	P-303	497	568: J-173	573: J-175	12	Ductile Iron
575	P-304	652	573: J-175	174: J-82	12	Ductile Iron
576	P-305	821	571: J-174	573: J-175	8	Ductile Iron
578	P-306	2495	120: J-27	577: J-176	10	Ductile Iron
579	P-307	512	577: J-176	106: J-13	10	Ductile Iron
581	P-308	359	577: J-176	580: J-177	10	Ductile Iron
583	P-309	374	129: J-36	582: J-178	8	Ductile Iron
584	P-310	612	582: J-178	130: J-37	8	Ductile Iron
586	P-311	590	582: J-178	585: J-179	10	Ductile Iron
588	P-312	377	130: J-37	587: J-180	16	Ductile Iron
589	P-313	1324	587: J-180	105: J-12	16	Ductile Iron
590	P-314	628	585: J-179	587: J-180	10	Ductile Iron
592	P-315	385	103: J-10	591: J-181	16	Ductile Iron
593	P-316	178	591: J-181	433: J-134	16	Ductile Iron

Sweet Home Water System
Pipe Analysis Locations Table

595	P-317	658	591: J-181	594: J-182	8	Ductile Iron
597	P-318	389	119: J-26	596: J-183	10	Ductile Iron
598	P-319	486	596: J-183	324: J-97	10	Ductile Iron
599	P-320	534	596: J-183	148: J-56	8	Ductile Iron
601	P-321	376	148: J-56	600: J-184	8	Ductile Iron
603	P-322	306	99: J-6	602: J-185	16	Ductile Iron
604	P-323	904	602: J-185	103: J-10	16	Ductile Iron
606	P-324	601	602: J-185	605: J-186	8	Ductile Iron
607	P-325	314	605: J-186	103: J-10	8	Ductile Iron
609	P-326	337	144: J-52	608: J-187	8	Ductile Iron
611	P-327	567	146: J-54	610: J-188	10	Ductile Iron
612	P-328	216	610: J-188	100: J-7	10	Ductile Iron
614	P-329	506	610: J-188	613: J-189	8	Ductile Iron
616	P-330	481	121: J-28	615: J-190	8	Ductile Iron
618	P-331	384	173: J-81	617: J-191	8	Ductile Iron
621	P-332	2164	107: J-14	620: J-193	8	Ductile Iron
622	P-333	1311	620: J-193	338: J-101	8	Ductile Iron
626	P-335	952	97: J-4	625: J-195	10	Ductile Iron
627	P-336	802	625: J-195	552: J-167	6	Ductile Iron
629	P-337	624	110: J-17	628: J-196	10	Ductile Iron
630	P-338	314	628: J-196	111: J-18	10	Ductile Iron
633	P-340	575	631: J-197	427: J-132	10	Ductile Iron
634	P-341	878	628: J-196	631: J-197	6	Ductile Iron
636	P-342	520	424: J-131	635: J-198	8	Ductile Iron
637	P-343	428	635: J-198	111: J-18	8	Ductile Iron
639	P-344	542	134: J-41	638: J-199	6	Ductile Iron
640	P-345	366	638: J-199	136: J-44	6	Ductile Iron
641	P-346	317	635: J-198	638: J-199	8	Ductile Iron
645	P-348	33	108: J-15	644: J-201	6	Ductile Iron
646	P-349	1495	644: J-201	109: J-16	6	Ductile Iron
648	P-350	33	338: J-101	647: J-202	8	Ductile Iron
649	P-351	261	647: J-202	642: J-200	8	Ductile Iron
650	P-352	1095	644: J-201	647: J-202	12	Ductile Iron
652	P-353	38	620: J-193	651: J-203	6	Ductile Iron
653	P-354	753	651: J-203	623: J-194	6	Ductile Iron
654	P-355	1320	647: J-202	651: J-203	12	Ductile Iron
656	P-356	681	651: J-203	655: J-204	12	Ductile Iron
658	P-357	357	313: J-93	657: J-205	6	Ductile Iron
660	P-358	101	657: J-205	659: J-206	6	Ductile Iron
664	P-360	99	661: J-207	663: J-208	6	Ductile Iron
666	P-361	223	115: J-22	665: J-209	8	Ductile Iron
667	P-362	316	665: J-209	159: J-67	8	Ductile Iron
668	P-363	457	663: J-208	665: J-209	6	Ductile Iron
670	P-364	270	659: J-206	669: J-210	6	Ductile Iron
671	P-365	96	669: J-210	661: J-207	6	Ductile Iron
673	P-366	101	113: J-20	672: J-211	8	Ductile Iron
674	P-367	539	672: J-211	114: J-21	8	Ductile Iron
675	P-368	1189	669: J-210	672: J-211	8	Ductile Iron
677	P-369	998	108: J-15	676: J-212	8	Ductile Iron
678	P-370	972	676: J-212	424: J-131	8	Ductile Iron
682	P-372	451	679: J-213	681: J-214	8	Ductile Iron
684	P-373	20	424: J-131	683: J-215	10	Ductile Iron
685	P-374	254	683: J-215	631: J-197	10	Ductile Iron
687	P-375	26	676: J-212	686: J-216	8	Ductile Iron
688	P-376	254	686: J-216	679: J-213	8	Ductile Iron
689	P-377	978	683: J-215	686: J-216	12	Ductile Iron
691	P-378	369	381: J-117	690: J-217	6	Ductile Iron
692	P-379	732	690: J-217	383: J-118	6	Ductile Iron
694	P-380	205	690: J-217	693: J-218	6	Ductile Iron
696	P-381	559	693: J-218	695: J-219	6	Ductile Iron
698	P-382	460	693: J-218	697: J-220	6	Ductile Iron
700	P-383	844	697: J-220	699: J-221	6	Ductile Iron
703	P-385	89	701: J-222	184: 49thAv_#2	16	Ductile Iron
705	P-386	962	127: J-34	704: J-223	6	Ductile Iron
719	P-390	193	717: J-224	162: J-70	24	Ductile Iron
722	P-391	402	720: WTPpump1	717: J-224	24	Ductile Iron
723	P-392	363	721: WTPpump2	717: J-224	24	Ductile Iron
728	P-395	460	182: Reservoir	727: J-225	120	Ductile Iron
729	P-396	252	727: J-225	720: WTPpump1	120	Ductile Iron
730	P-397	259	727: J-225	721: WTPpump2	120	Ductile Iron
746	P-404	664	334: J-100	100: J-7	10	Ductile Iron
748	P-405	207	100: J-7	747: FCV-2	16	Ductile Iron
749	P-406	563	747: FCV-2	701: J-222	16	Ductile Iron

City of Sweet Home
1140 12th Ave
Sweet Home, OR 97386

Sweet Home Water System
Node Analysis Locations Table

ID	Label	Elevation (ft)	Zone	Roadway E-W	Roadway N-S
94	J-1	518	89: Zone - 1_City	Old WTP	9th Ave
95	J-2	600	89: Zone - 1_City	South Hills Trail Park	10th Ave
96	J-3	555	89: Zone - 1_City	JRCC	18th Ave
97	J-4	602	89: Zone - 1_City	Long St	29th Ave
98	J-5	603	89: Zone - 1_City	Long St	Clark Mill Road
99	J-6	625	89: Zone - 1_City	Long St	43rd Ave
100	J-7	665	89: Zone - 1_City	Long St	49th Ave
101	J-8	635	89: Zone - 1_City	Main St	47th Ave
102	J-9	633	89: Zone - 1_City	Kalmia St	47th Ave
103	J-10	625	89: Zone - 1_City	Airport Rd	44th Ave
104	J-11	628	89: Zone - 1_City	Main St	44th Ave
105	J-12	600	89: Zone - 1_City	Main St	54th Ave
106	J-13	670	89: Zone - 1_City	Riggs Hill Road	Lake Pointe Way
107	J-14	593	89: Zone - 1_City	Main St	Clark Mill Road
108	J-15	541	89: Zone - 1_City	Main St	18th Ave
109	J-16	541	89: Zone - 1_City	Tamarack St	18th Ave
110	J-17	513	89: Zone - 1_City	Poplar St	9th Ave
111	J-18	529	89: Zone - 1_City	Main St	9th Ave
112	J-19	640	89: Zone - 1_City	South Hills Trail Park	7th Ave
113	J-20	604	89: Zone - 1_City	Holley Rd	Vista Ln
114	J-21	602	89: Zone - 1_City	Holley Rd	Evergreen Ln
115	J-22	604	89: Zone - 1_City	Nandina St	Evergreen Ln
116	J-23	550	89: Zone - 1_City	Main St	Pleasant Valley Road
117	J-24	569	89: Zone - 1_City	Oak Terrace	7th Ave
118	J-25	544	89: Zone - 1_City	Oak Terrace	Terrace Ln
119	J-26	645	89: Zone - 1_City	Airport Rd	46th Ave
120	J-27	650	89: Zone - 1_City	Main St	60th Ave
121	J-28	620	89: Zone - 1_City	Osage St	54th Ave
122	J-29	560	89: Zone - 1_City	Green River Road	Clark Mill Road
123	J-30	563	89: Zone - 1_City	Green River Road	37th Circle
124	J-31	600	89: Zone - 1_City	RR Tracks	40th Ave
125	J-32	615	89: Zone - 1_City	Main St	40th Ave
126	J-33	614	89: Zone - 1_City	Osage St	40th Ave
127	J-34	664	89: Zone - 1_City	Coulter Ln	43rd Ave
128	J-35	645	89: Zone - 1_City	Airport Rd	49th Ave - E
129	J-36	641	89: Zone - 1_City	Mimosa Cr	49th Ave
130	J-37	635	89: Zone - 1_City	Main St	49th Ave
131	J-38	587	89: Zone - 1_City	Osage St	Meadowlark Ln
132	J-39	550	89: Zone - 1_City	Long St	22nd Ave
133	J-40	542	89: Zone - 1_City	Long St	18th Ave
134	J-41	544	89: Zone - 1_City	Long St	12th Ave
135	J-43	580	89: Zone - 1_City	22nd Ave	Mountain View Road
136	J-44	535	89: Zone - 1_City	Long St	Ames Creek
137	J-45	580	89: Zone - 1_City	Elm St	12th Ave
138	J-46	585	89: Zone - 1_City	Cedar St	12th Ave
139	J-47	555	89: Zone - 1_City	Ames Creek Road	Mountain View Road
140	J-48	555	89: Zone - 1_City	Ames Creek Road	Surrey Ln
141	J-49	545	89: Zone - 1_City	South End	Surrey Ln
142	J-50	640	89: Zone - 1_City	Long St	45th Ave
143	J-51	640	89: Zone - 1_City	Kalmia St	45th Ave
144	J-52	642	89: Zone - 1_City	Kalmia St	46th Ave
145	J-53	655	89: Zone - 1_City	Kalmia St	47th Ave
146	J-54	650	89: Zone - 1_City	Long St	47th Ave
147	J-55	645	89: Zone - 1_City	Airport Rd	46th Ave
148	J-56	645	89: Zone - 1_City	Live Oak St	46th Ave
149	J-57	640	89: Zone - 1_City	Airport Ln	46th Ave - W
150	J-58	640	89: Zone - 1_City	Airport Ln	46th Ave - E
151	J-59	633	89: Zone - 1_City	Main St	46th Ave
152	J-60	595	89: Zone - 1_City	Juniper St	29th Ave
153	J-61	590	89: Zone - 1_City	Foothills Dr	27th Ave
154	J-62	590	89: Zone - 1_City	Harding St	27th Ave
155	J-63	580	89: Zone - 1_City	Harding St	Mountain View Road
156	J-64	640	89: Zone - 1_City	Holley Rd	WCL - Fern Ridge Rd
157	J-65	650	89: Zone - 1_City	Nandina St	Meadow-StrawRidge MB
158	J-66	655	89: Zone - 1_City	Strawberry Loop Dr	Fern Ln
159	J-67	590	89: Zone - 1_City	Strawberry Loop Dr	Meadowlark Ln
160	J-68	530	89: Zone - 1_City	WWTP Driveway	Pleasant Valley Bridge
161	J-69	550	89: Zone - 1_City	Whites Electronic	Pleasant Valley Road
162	J-70	590	89: Zone - 1_City	WTP	WTP Split

Sweet Home Water System
Node Analysis Locations Table

163	J-71	620	89: Zone - 1_City	Osage St	43rd Ave
164	J-72	630	89: Zone - 1_City	Osage St	44th Ave
165	J-73	628	89: Zone - 1_City	Main St	44th Ave
166	J-74	630	89: Zone - 1_City	Nandina St	48th Loop
167	J-75	635	89: Zone - 1_City	Main St	49th Ave - W
168	J-76	600	89: Zone - 1_City	Nandina St	54th Ave
169	J-77	600	89: Zone - 1_City	Nandina St	53rd Ave
170	J-78	605	89: Zone - 1_City	Poplar St	53rd Ave
171	J-79	619	89: Zone - 1_City	Main St	57th Ave
172	J-80	629	89: Zone - 1_City	55th Ave	57th Ave
173	J-81	650	89: Zone - 1_City	Nandina St	60th Ave
174	J-82	625	89: Zone - 1_City	Long St	42nd Ave
175	J-83	645	89: Zone - 1_City	Long St	42nd Ave - South End
176	J-84	598	89: Zone - 1_City	Juniper St	32nd Ct
177	J-85	595	89: Zone - 1_City	Juniper St	35th Ave - East End
178	J-86	595	89: Zone - 1_City	Kalmia St	29th Ave
179	J-87	600	89: Zone - 1_City	Kalmia St	Mountain View Road
180	J-88	590	89: Zone - 1_City	Juniper St	27th Ave
302	J-89	564	89: Zone - 1_City	Holley Rd	4th Ave
307	J-91	544	89: Zone - 1_City	Main St	Clover Mem. Park
309	J-92	555	89: Zone - 1_City	Osage St	Clover Mem. Park
313	J-93	558	89: Zone - 1_City	Nandina St	1st Ave
315	J-94	572	89: Zone - 1_City	Holley Rd	1st Ave
320	J-96	645	89: Zone - 1_City	Long St	46th Ave
324	J-97	642	89: Zone - 1_City	Airport Ln	47th Ave
328	J-98	640	89: Zone - 1_City	Airport Ln	45th Ave
330	J-99	630	89: Zone - 1_City	Main St	45th Ave
334	J-100	645	89: Zone - 1_City	Airport Rd	49th Ave - W
338	J-101	550	89: Zone - 1_City	Main St	22nd Ave
342	J-102	530	89: Zone - 1_City	Vine St	18th Ave
344	J-103	530	89: Zone - 1_City	Vine St	18th-20th MB
346	J-104	530	89: Zone - 1_City	Vine St	18th-20th MB
348	J-105	527	89: Zone - 1_City	Vine St	18th-20th MB
350	J-106	535	89: Zone - 1_City	Tamarack St	20th Ave
353	J-107	548	89: Zone - 1_City	Kalmia St	12th Ave
356	J-108	548	89: Zone - 1_City	Kalmia St	14th Ave
358	J-109	550	89: Zone - 1_City	Kalmia-Hawthorne MB	14th Ave
360	J-110	555	89: Zone - 1_City	Hawthorne St	14th Ave
362	J-111	555	89: Zone - 1_City	Hawthorne St	12th Ave
366	J-112	580	89: Zone - 1_City	Elm St	14th Ave
369	J-113	575	89: Zone - 1_City	Elm St	10th Ave
373	J-114	550	89: Zone - 1_City	SHHS South Fields	14th-18th MB
375	J-115	550	89: Zone - 1_City	SHHS South Fields	14th-18th MB
377	J-116	550	89: Zone - 1_City	SHHS South Fields	18th Ave
381	J-117	580	89: Zone - 1_City	Elm St	Mountain View Road
383	J-118	592	89: Zone - 1_City	Cedar St	18th Ave
385	J-119	591	89: Zone - 1_City	Cedar St	17th Ave
387	J-120	585	89: Zone - 1_City	Dogwood St	16th Ave
390	J-121	590	89: Zone - 1_City	Dogwood St	18th Ave
392	J-122	530	89: Zone - 1_City	Main St	Holley Rd
396	J-123	580	89: Zone - 1_City	Elm St	7th Ave
400	J-124	625	89: Zone - 1_City	Elm St	3rd Ave
402	J-125	590	89: Zone - 1_City	Hawthorne St	3rd Ave
405	J-126	600	89: Zone - 1_City	South Hills Trail Park	10th Ave
408	J-127	740	89: Zone - 1_City	South Hills Trail Park	10th Ave Res Complex
412	J-128	600	89: Zone - 1_City	South Hills Trail Park	10th Ave
415	J-129	600	89: Zone - 1_City	South Hills Trail Park	10th Ave
424	J-131	544	89: Zone - 1_City	Main St	12th Ave
427	J-132	518	89: Zone - 1_City	Osage St	12th Ave
429	J-133	519	89: Zone - 1_City	Poplar St	12th Ave
433	J-134	625	89: Zone - 1_City	Live Oak St - N	44th Ave
436	J-135	515	89: Zone - 1_City	Poplar St	9th Ave
440	J-136	515	89: Zone - 1_City	Poplar St	9th Ave
447	J-137	518	89: Zone - 1_City	Tamarack St	12th Ave
454	J-138	708	90: Zone - 2_Straw	Strawberry Loop Dr	Strawberry Ridge Dr
456	J-139	694	90: Zone - 2_Straw	Nandina St	Strawberry Ridge Dr
459	J-140	726	90: Zone - 2_Straw	Nandina St	Strawberry Tower Driveway
461	J-141	795	90: Zone - 2_Straw	Strawberry Tower Driveway	Strawberry Res Complex
466	J-142	656	90: Zone - 2_Straw	Strawberry Loop Dr	Strawberry Pump Station
474	J-145	671	89: Zone - 1_City	Strawberry Loop Dr	Fern Ln - N
476	J-146	513	89: Zone - 1_City	WWTP Grounds	Ames Creek
479	J-147	628	89: Zone - 1_City	Pinetop St	Boulder Ridge Dr
482	J-148	600	89: Zone - 1_City	Pinetop St	10th Ave

City of Sweet Home
1140 12th Ave
Sweet Home, OR 97386

Sweet Home Water System
Node Analysis Locations Table

485	J-149	650	89: Zone - 1_City	Park St	Boulder Ridge Dr
487	J-150	709	89: Zone - 1_City	Timber St	Boulder Ridge Dr
489	J-151	668	89: Zone - 1_City	Timber St	Taylor Creek Dr
491	J-152	622	89: Zone - 1_City	Park St	Taylor Creek Dr
494	J-153	626	89: Zone - 1_City	Elkhorn St	Old Holly Road
513	J-154	580	89: Zone - 1_City	Elm St	18th Ave
523	J-157	590.2	89: Zone - 1_City	Cedar St	10th Ave
526	J-158	595	89: Zone - 1_City	Cedar St	9th Ave
528	J-159	595	89: Zone - 1_City	Cedar St	8th Ave
530	J-160	593	89: Zone - 1_City	Dogwood St	8th Ave
532	J-161	594.2	89: Zone - 1_City	Dogwood St	7th Ave
536	J-162	566.6	89: Zone - 1_City	Holley Rd	3rd Ave
540	J-163	595	89: Zone - 1_City	Juniper St	28th Ave
543	J-164	591.3	89: Zone - 1_City	Foothills Dr	28th Ave
547	J-165	568.6	89: Zone - 1_City	Ironwood St	22nd Ave
550	J-166	569	89: Zone - 1_City	Ironwood St	23rd Ave
552	J-167	564.6	89: Zone - 1_City	Long St	23rd Ave
556	J-168	632.7	89: Zone - 1_City	South Hills Trail Park	4th Ave
561	J-170	616.2	89: Zone - 1_City	Elm St	4th Ave
568	J-173	617.9	89: Zone - 1_City	Long St	40th Ave
571	J-174	620	89: Zone - 1_City	Lily St	41st Ave
573	J-175	621	89: Zone - 1_City	Long St	41st Ave
577	J-176	666.6	89: Zone - 1_City	Main St	USCOE Shea Point
580	J-177	668	89: Zone - 1_City	Main St	East City Limit
582	J-178	638.6	89: Zone - 1_City	Mountain Fir St	49th Ave
585	J-179	639	89: Zone - 1_City	Mountain Fir St	Sam. ALF
587	J-180	627.2	89: Zone - 1_City	Main St	Sam. ALF
591	J-181	625	89: Zone - 1_City	Live Oak St	44th Ave
594	J-182	635	89: Zone - 1_City	Live Oak St	Live Oak St - East End
596	J-183	643.7	89: Zone - 1_City	Live Oak St	47th Ave
600	J-184	640	89: Zone - 1_City	Live Oak St	Live Oak St - West End
602	J-185	625	89: Zone - 1_City	Citabria St	43rd Ave
605	J-186	625	89: Zone - 1_City	Citabria St	44th Ave
608	J-187	650	89: Zone - 1_City	Kalmia St - South	46th Ave
610	J-188	660.9	89: Zone - 1_City	Long St	48th Ave
613	J-189	664	89: Zone - 1_City	48th Ave - South End	48th Ave
615	J-190	620	89: Zone - 1_City	Osage St	55th Ave
617	J-191	650	89: Zone - 1_City	Nandina St	59th-60th MB
620	J-193	566.2	89: Zone - 1_City	Main St	24th Ave
623	J-194	560	89: Zone - 1_City	RR Tracks	24th Ave
625	J-195	581.7	89: Zone - 1_City	Long St	Mountain View Road
628	J-196	523.6	89: Zone - 1_City	Nandina St	9th Ave
631	J-197	535.5	89: Zone - 1_City	Nandina St	12th Ave
635	J-198	535.7	89: Zone - 1_City	Main St	10th Ave
638	J-199	538.6	89: Zone - 1_City	Long St	10th Ave
642	J-200	550	89: Zone - 1_City	Nandina St	22nd Ave
644	J-201	541	89: Zone - 1_City	Main St	18th Ave
647	J-202	550	89: Zone - 1_City	Main St	22nd Ave
651	J-203	566	89: Zone - 1_City	Main St	24th Ave
655	J-204	570	89: Zone - 1_City	Main St	24th Ave - E
657	J-205	558	89: Zone - 1_City	Nandina St	Westwood Ln
659	J-206	558	89: Zone - 1_City	Nandina St - S	Westwood Ln
661	J-207	565	89: Zone - 1_City	Nandina St - S	Sunset Ln - W
663	J-208	565	89: Zone - 1_City	Nandina St	Sunset Ln - W
665	J-209	598.2	89: Zone - 1_City	Nandina St	Meadowlark Ln
669	J-210	560	89: Zone - 1_City	Nandina St - S	Sunset Ln
672	J-211	603.7	89: Zone - 1_City	Holley Rd	Vista Ln - W
676	J-212	542.5	89: Zone - 1_City	Main St	15th Ave
679	J-213	540	89: Zone - 1_City	Nandina St	15th Ave
681	J-214	540	89: Zone - 1_City	Nandina St	15th Ave - E
683	J-215	543.4	89: Zone - 1_City	Main St	12th Ave
686	J-216	542.5	89: Zone - 1_City	Main St	15th Ave
690	J-217	598	89: Zone - 1_City	Cedar St	Mountain View Road
693	J-218	598	89: Zone - 1_City	Cedar St	23rd Ave
695	J-219	595	89: Zone - 1_City	Cedar St	East End
697	J-220	610	89: Zone - 1_City	Birch St	23rd Ave
699	J-221	600	89: Zone - 1_City	Birch St	East End
701	J-222	742	89: Zone - 1_City	48th Ave Driveway	49th Res Complex
704	J-223	668	89: Zone - 1_City	Coulter Ln	Coulter Ln - East End
717	J-224	590	89: Zone - 1_City	WTP	WTP Out Header
727	J-225	590	89: Zone - 1_City	WTP	WTP Clear Well

Appendix G
City of Sweet Home Water Rate Fee Schedule

RESOLUTION NO. 26 FOR 2016

A RESOLUTION SETTING RATES AND FEES FOR WATER SERVICES.

WHEREAS, the Sweet Home City Council has provided that Water Use Rates should be established by resolution, in accordance with Ordinance No. 1174; and,

WHEREAS, the Water User Rates were last adjusted July 2014 and need to be adjusted herein to ensure adequate funds are received to cover the annual cost of operation and maintenance, replacement, and other administrative costs of the Water Utility.

NOW, THEREFORE, BE IT RESOLVED BY THE SWEET HOME CITY COUNCIL that effective July 21, 2016, the water use fees shall be as follows:

For purposes of this resolution, the City Council shall annually review Water Rates before May of each year and set the new monthly rate for bills sent out each July.

Section 1 The rates for water use to be charged for each billing period are as follows:

A minimum charge for each water service inside the city limits will be made according to the meter sizes as follows.

Meter Size	Monthly Base Charge
3/4 inch	$ 26.58
1 inch	33.32
1-1/2 inch	42.30
2 inch	67.00
3 inch	248.88
4 inch	316.24
6 inch	473.43
8 inch	653.06

Residential Users (Inside the City Limits): The monthly base charge is to include the first 400 cubic feet of water consumed for all residential customers only. A consumption charge of $6.50 per 100 cubic feet for water used, over 400 cubic feet, shall be made in addition to the Monthly Base Charge for all meter sizes for all residential customers only.

Commercial Users (Inside the City Limits): A consumption charge of $ 5.95 per 100 cubic feet for all water used shall be made in addition to the Monthly Base Charge for all commercial customers per meter size.

Bulk Users (Inside the City Limits): A consumption charge of $ 5.21 per 100 cubic feet for all water used shall be made.

Water Users Outside the City Limits: Monthly charges will be computed at 1.5 times the inside city rate as stated above for residential, commercial and bulk users.

The Monthly Base Charge for a meter on water line installed solely for the purpose of providing fire protection shall be the ¾-inch rate charged for a residence. If the monthly reading of the meter indicates any usage, the Monthly Base Charge will be the normal charge for the meter size installed as shown above in addition to the charge for consumption.

Section 2 Miscellaneous water service fees to be established as follows:

a) Reinstating water service to any property deprived of such service; a fee of $32.

b) Turning water service on that has been turned off without permit by persons other than City employees; a fee of $32.

c) Turning off and turning on water service after hours; a fee of $32. During regular hours $16 (after hours at users' request only).

d) Re-reading the water meter at the request of the user, if the previous reading was correct; a fee of $16.

e) Calibration or reinstallation of water meters at the request of the user if the previous meter was registering correctly; a fee of $125.00.

f) Vacationers' water on/off; a fee of $16 each visit.

g) Tampering with a water meter affecting register; a fee of $250.

h) Fees for special portable metered or estimated water usage; i.e., swimming pool fills, tanker fills, and street sweeper fills, and other usage as required shall be charged at a $5.21 per 100 cubic feet, or $0.0070 / gallon. Such usage must be with permit as approved by the Public Works Director (see Bulk users).

i) Water Deposit: $50.00 (An additional $50.00 will be collected from water residents for each new sewer account and shall be administered in conjunction with the Wastewater Ordinance/Resolution).

j) Temporary Water Service Fee: $32

k) Plan review fee for required backflow devices as established in Ordinance No. 948 – Basic Right-of-way Fee.

l) Notification by Door Hanging for Delinquent Bill: $16.00

m) Service Charge: $2.00 per month on delinquent accounts

n) Interest Rate: 1 ½% outstanding delinquent account balance including all interest, service charge, or other relevant fee/charges.

o) Refunds <u>will not</u> be made for amounts less than $10.00

Section 3 Other associated fees, practices and charges for water and sewer installation and hookup are described in Ordinance Numbers 1029, 1127 and 1175 or other current superseding ordinances.

It has been determined that these rates and fees are classified as not being subject to Oregon Constitution, Article XI, Section 11b limitations.

This resolution supersedes all prior resolutions on water rates.

PASSED by the Council and approved by the Mayor this 23th day of August, 2016.

Mayor

ATTEST:

City Manager Pro-Tem - Ex Officio City Recorder

RESOLUTION NO. 18 FOR 2014

A RESOLUTION SETTING RATES AND FEES FOR WATER SERVICES.

WHEREAS, the Sweet Home City Council has provided that Water Use Rates should be established by resolution, in accordance with Ordinance No. 1174; and,

WHEREAS, the Water User Rates were last adjusted July 2010 and need to be adjusted herein to ensure adequate funds are received to cover the annual cost of operation and maintenance, replacement, and other administrative costs of the Water Utility.

NOW, THEREFORE, BE IT RESOLVED BY THE SWEET HOME CITY COUNCIL that effective July 21, 2014, the water use fees shall be as follows:

For purposes of this resolution, the City Council shall annually review Water Rates before May of each year and set the new monthly rate for bills sent out each July.

Section 1 The rates for water use to be charged for each billing period are as follows:

A minimum charge for each water service inside the city limits will be made according to the meter sizes as follows.

Meter Size	Monthly Base Charge
3/4 inch	$ 17.90
1 inch	22.38
1-1/2 inch	28.35
2 inch	44.77
3 inch	165.68
4 inch	210.46
6 inch	314.95
8 inch	434.37

Residential Users (Inside the City Limits): The monthly base charge is to include the first 400 cubic feet of water consumed for all residential customers only. A consumption charge of $ 7.48 per 100 cubic feet for water used, over 400 cubic feet, shall be made in addition to the Monthly Base Charge for all meter sizes for all residential customers only.

Commercial Users (Inside the City Limits): A consumption charge of $ 6.85 per 100 cubic feet for all water used shall be made in addition to the Monthly Base Charge for all commercial customers per meter size.

Bulk Users (Inside the City Limits): A consumption charge of $ 6.01 per 100 cubic feet for all water used shall be made.

Water Users Outside the City Limits: Monthly charges will be computed at 1.5 times the inside city rate as stated above for residential, commercial and bulk users.

The Monthly Base Charge for a meter on water line installed solely for the purpose of providing fire protection shall be the ¾-inch rate charged for a residence. If the monthly reading of the meter indicates any usage, the Monthly Base Charge will be the normal charge for the meter size installed as shown above in addition to the charge for consumption.

Section 2 Miscellaneous water service fees to be established as follows:

a) Reinstating water service to any property deprived of such service; a fee of $32.

b) Turning water service on that has been turned off without permit by persons other than City employees; a fee of $32.

c) Turning off and turning on water service after hours; a fee of $32. During regular hours $16 (after hours at users' request only).

d) Re-reading the water meter at the request of the user, if the previous reading was correct; a fee of $16.

e) Calibration or reinstallation of water meters at the request of the user if the previous meter was registering correctly; a fee of $125.00.

f) Vacationers' water on/off; a fee of $16 each visit.

g) Tampering with a water meter affecting register; a fee of $250.

h) Fees for special portable metered or estimated water usage; i.e., swimming pool fills, tanker fills, and street sweeper fills, and other usage as required shall be charged at a $4.79 per 100 cubic feet, or $0.0064 / gallon. Such usage must be with permit as approved by the Public Works Director (see Bulk users).

i) Water Deposit: $50.00 (An additional $50.00 will be collected from water residents for each new sewer account and shall be administered in conjunction with the Wastewater Ordinance/Resolution).

j) Temporary Water Service Fee: $32

k) Plan review fee for required backflow devices as established in Ordinance No. 948 – Basic Right-of-way Fee.

l) Notification by Door Hanging for Delinquent Bill: $16.00

m) Service Charge: $2.00 per month on delinquent accounts

n) Interest Rate: 1 ½% outstanding delinquent account balance including all interest, service charge, or other relevant fee/charges.

o) Refunds <u>will not</u> be made for amounts less than $10.00

Section 3 Other associated fees, practices and charges for water and sewer installation and hookup are described in Ordinance Numbers 1029, 1127 and 1175 or other current superseding ordinances.

It has been determined that these rates and fees are classified as not being subject to Oregon Constitution, Article XI, Section 11b limitations.

This resolution supersedes all prior resolutions on water rates.

PASSED by the Council and approved by the Mayor this 24th day of June 2014.

Mayor

ATTEST:

City Manager - Ex Officio City Recorder

C:\Documents and Settings\wendy.SWEET-HOME\Local Settings\Temporary Internet Files\Content.Outlook\NIFGC95V\Water Resolution 2014.docx

Appendix H
Public Education Program Flyer

City of Sweet Home
Public Works Water Dept.

2014/2015

Special points of interest:

- Learn 25 things you can do to prevent water waste!
- Installing water-saving shower heads or flow restrictors can save 500—800 gallons water per month!
- Recycle coffee grounds—it makes excellent mulch yard mulch!
- Water conservation saves money and helps the environment!

Inside this issue:
Conservation tips for—

Water Conservation Tips & Information

City Encourages Efficient Use of Water in Community!

The City of Sweet Home continues to implement several steps and/or programs to encourage efficient use of water within the community. The programs mainly include regulatory and operation and maintenance alternatives which help reduce water consumption. These programs include but are not necessarily limited to:

- Use of constant water rates
- Create water rates based on meter size and amount of water used
- System wide "leak detection" surveys within the public right-of-way.

Another way the City is promoting conservation is through this newsletter. Throughout this newsletter you will find useful information and tips on how you can conserve our most important natural resource at home.

For other useful tips and information including a helpful and free home water use audit visit the *"Water—Use It Wisely"* website at www.wateruseitwisely.com

Conservation efforts can save customers $$ in Sweet Home!

If a Residential customer with a 3/4" service meter in the City of Sweet Home typically using 1,000 cubic feet of water each month were able to implement conservation measures that helped them reduce their monthly usage to 900 cubic feet, that customer could expect to save $7.48 on their monthly water bill alone.

A $89.76 ANNUAL SAVINGS.

(*Illustration only. Actual dollar amounts saved via conservation measures will vary amongst customer meter size, classification, and methods incorporated*)

Don't use your toilet as an ashtray or wastebasket.

Fresh, clean drinking water is yours to use whenever you need it—but not to waste!

Wash full loads only—can save 800 gallons water per month

9 things you can do to save water in the bathroom

1. Check your toilets for leaks. Put a little food coloring in your toilet tank. If, without flushing, the color begins to appear in the bowl, you have a leak that should be repaired immediately.
2. Stop using the toilet as an ashtray or wastebasket. Every time you flush a cigarette butt, facial tissue, or other small bits of trash, you waste 5—7 gallons of water.
3. Put plastic bottles in your toilet tank. To cut down on water waste, put an inch or two of sand or pebbles inside each of two plastic bottles to weigh them down. Fill them with water and put them in your toilet tank, safely away from operating mechanisms. In an average home, the bottles may displace and save ten or more gallons of water a day.
4. Take shorter showers. Limit your showers to the time it takes to soap up, wash down, and rinse off. This can save 5-10 gallons every unneeded minute.
5. Install water-saving showerheads or flow restrictors. Your local hardware stores stock inexpensive and easy to install fixtures.
6. Take baths. A bath in a partially filled tub uses less water than all but the shortest showers.
7. Turn off the water after you wet your toothbrush. There is no need to keep water pouring down the drain. Just rinse your brush and fill a glass for mouth rinsing.
8. Rinse your razor in the sink. Fill the bottom of the sink with a few inches of warm water. This rinses your blade just as well as running water—and is far less wasteful.
9. Check faucets and pipes for leaks. Even the smallest drip from a worn washer can waste 20 or more gallons a day. Large leaks waste hundreds.

6 things you can do to save water in the kitchen or laundry

1. Use your automatic dishwasher only for full loads.
2. Use your automatic washing machine only for full loads.
3. If you wash dishes by hand, don't leave the water running for rinsing. If you have two sinks, fill one with soapy water and one with rinse water. If you have only one sink, gather washed dishes in a dish rack and rinse them with a spray device or a pan full of hot water.
4. Don't let the faucet run while you clean vegetables. Just rinse them in a stoppered sink or a pan of clean water.
5. Keep a bottle of drinking water in the refrigerator. Running tap water to cool it off for drinking water is wasteful.
6. Check the faucets and pipes for leaks. Leaks waste water 24 hours a day, seven days a week and often can be repaired with just an inexpensive washer.

10 things you can do to save water outside

1. Water your lawn only when it needs it. A good way to see if your lawn needs watering is to step o the grass. If it springs back up when you move, it doesn't need water. If it stays flat, fetch the sprinkler.
2. Deep-soak your lawn. When you do water, do it long enough for the moisture to soak down to the roots where it does the most good. A light sprinkling can evaporate quickly and tends to encourage shallow root systems.
3. Water during the cool parts of the day. Early morning generally is better than dusk because it helps prevent growth of fungus.
4. Don't water the gutter. Position your sprinkler so water lands on the lawn, not on paved areas. Also avoid watering on windy days.
5. Plant drought-resistant trees and plants. Many beautiful trees and plants thrive with far less watering than other species.
6. Put a layer of mulch around trees and plants. Mulch slows evaporation of moisture and discourages weed growth.
7. Use a broom, not a hose, to clean driveways and sidewalks.
8. Don't run the hose while washing your car. Clean the car with a pail of soapy water. Use the hose just for rinsing.
9. Tell your children not to play with the hose and sprinklers.
10. Check for leaks in pipes, hoses, faucets, and couplings. Leaks outside the house may not seem as bad because they're not as visible. But, they can be just as wasteful as leaks inside. Check frequently and keep them drip-free.

Leaking water hoses can be as wasteful as leaks inside the building.

A little effort and a little common sense make a BIG difference!

Leaks can be expensive!

City of Sweet Home
Public Works Water Dept.

City Hall
1140 12th Avenue
Sweet Home, OR 97386

Phone: 541-367-6243
Fax: 541-367-5113

We're on the Web!
www.ci.sweet-home.or.us

The City of Sweet Home, as operators of a Municipal Water System, is required to publish information that informs and promotes water conservation within the community. This newsletter is intended to help complete this mission and provide general tips on how consumers can be active participants in our local conservation measures.

We encourage individuals to share their comments on how this information has helped them conserve our important and vital natural resource of water. We also ask that ideas, tips, and/or other conservation information not listed here be shared with us so we can provide to the entire community.

Please feel free to contact our offices at 541-367-6243 with helpful suggestions on making this newsletter better and as informative as possible.

Use water...but use it wisely!

Fresh, clean drinking water is yours to use whenever you need it—but not to waste. It's too valuable. Remember that a little effort and a little common sense make a big difference.

Following the tips in this newsletter can help save thousands of gallons of water every year in every household. That's right, thousands! So be alert. If you see water being wasted in your home, tighten up. If you see it being wasted anywhere else, speak up.

City of Sweet Home
WMCP Five-Year Conservation Benchmarks

Benchmarks	Start Date	Frequency		Progress
Ongoing Efforts				
Leak Detection and repair	Ongoing	Annually		
Pipe replacement	Ongoing	Annually	✓	On task
Planned programs				
Free customer water audits	July 2006	On-call	✓	Still available – no requests yet
Customer Service meter testing	July 2006	On-call	✓	On task
Provide U.S. EPA "Water Saver" software to large water users	July 2006	As needed	✓	Still available – no requests yet
Conservation training for large water users	December 2006	As needed	✓	Still available – no requests yet
Annual review of unaccounted for water	January 2006	Annually	✓	On task
Test Larger service meters, city property meters and production meters	January 2016	5 years		
Test major piping, valves, and fire hydrants	July 2006	Annually	✓	On task
Make conservation presentations to local school children	2016	2 times / year		
Distribute water conservation brochures in water bills	July 2011	2 times / year	✓	Posted as link to official City website www.ci.sweet-home.or.us
Test new touch-read meters	August 2006	Minimum 20% annually	✓	New meters have +-98% accuracy out of box when installed. When usage is questioned, meter is automatically replaced over 10 years old.

✓ Frequency being met – On task
❖ Partial progress on frequency – improved focus suggested!
o Frequency not met – Improvement required!

Appendix I
DRAFT City Ordinance

ORDINANCE BILL NO ___ FOR 2016

ORDINANCE NO _____

AN ORDINANCE REGARDING RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL WATER USE AND CONTROL.

THE CITY OF SWEET HOME DOES ORDAIN AS FOLLOWS:

SECTION 1, Title
This ordinance shall be known as the "Water Conservation Ordinance" of the City of Sweet Home, Oregon

SECTION 2, Purpose
The City of Sweet Home provides municipal water to residential, commercial, and industrial consumers within the City at a charge as allowed by its Ordinances and amended from time to time to reflect increases in costs or operation, engineering and construction. The source from which the water is obtained consumers may become limited by reason of natural and/or unnatural occurrences. In the event that municipal water supplies become limited and the City Manager, or designee, determine that a critical water supply shortage threatens the ability of the City to deliver essential treated water to its customers, the City Manager or appropriate designee may activate emergency curtailment measures as follows:

SECTION 3, Provisions

1) Stage 1 – Conservation Stage Alert
   The trigger for the "*Conservation Stage Alert*" occurs when water use/demand reaches 80% of the current water treatment plant production for three consecutive days. The City Manager shall declare a Conservation Stage Alert and request voluntary conservation by users and distribute their Water Conservation Tips & Information flyer to all users.

2) Stage 2 – Moderate Stage Alert
   The trigger for the "*Moderate Stage Alert*" occurs when water use/demand reaches 90% of the current water treatment plant production for two consecutive days or a State-declared drought in the Sweet Home area is acknowledged by appropriate State Officials. The City Manager shall declare a Moderate Stage Alert and call for the continued voluntary conservation efforts and declare the requirement of the following conservation methods:
   a) Prohibition of lawn watering between 7:00 a.m. and 7:00 p.m.
   b) Mandatory adherence to odd watering days for users in the South one-half of the City and even watering days for users in the North one-half of the City. Long Street, from Holley Road from West City Limits to 49th Avenue, shall be used as the dividing line between North and South.
   c) Prohibit the hosing down of driveways, sidewalks, and parking lots with City supplied water.
   d) Prohibit the watering of all City parks and open areas.
   e) Prohibit any unnecessary use or flushing of fire hydrants and water mains.

3) Stage 3 – Emergency Stage Alert
   The trigger for the "*Emergency Stage Alert*" occurs when water use/demand reaches 95% of the current water treatment plant production, when total production capability is lost, or when deemed necessary by the City Manager. In this stage, the City Manager shall declare an Emergency Stage Alert and call for a continuation of the prohibited items under the Moderate Stage Alert and prohibit the following uses:
   a) Lawn watering without explicit City approval in writing. The City may approve watering for new lawns, turf and grasses that were seeded before issuance of the Emergency Stage Alert and are less than 12 months past first planting.

b) Washing of boats and vehicles except where public health, safety and welfare depend on frequent vehicle cleaning, such as food transport vehicles or where required by law.
c) The filling of private swimming pools with City supplied water.

SECTION 4, Penalty

It shall be unlawful for any person, firm, or corporation to use water in a manner or time prohibited as outlined above in Section 3 – Provisions of this Ordinance and as declared in effect by the City Manager. In the event any person, firm, or corporation does so violate the terms of this Ordinance by use of water as prohibited, shall, upon conviction thereof be punished by a fine of not less than $50.00. In the event that a citation is issued during the period of activated stages of alert, and the City Manager determines that a second violation has occurred after the date of the initial citation and during the same emergency curtailment period, the City Manager may;

a) Initiate the installation of a flow restrictor on the public side of the water service meter; and/or
b) Terminate the water service.

SECTION 5, Severability

The provisions of this ordinance are severable, and it is the intention to confer the whole or any part of the powers herein provided for. If any clause, section or provision of this ordinance shall be declared unconstitutional or invalid for any reason or cause, the remaining portion of this ordinance shall be in full force and effect and be valid as if such invalid portion thereof had not been incorporated herein. It is hereby declared to be the council's intent that this ordinance would have been adopted had such an unconstitutional provision not been included herein.

SECTION 6, Classification

The city council determines that any fee, rates or charges imposed by this ordinance are not a tax subject to the property tax limitations of Article XI, section 11(b) of the Oregon Constitution.

SECTION 7, Repeal/Savings

Ordinance No.XXXX is hereby repealed. The repeal of an ordinance, or part thereof, shall not preclude action against a person or property that is in violation of said ordinance before the effective date of the repeal. The invalidity of any section, clause, sentence, or provision of this ordinance shall not affect the validity of any other part of this ordinance, which can be given effect without such invalid part or parts.

Passed by the Council and approved by the Mayor this ___ day of _____, 2016.

_____

Mayor

ATTEST:

_____

City Manager – Ex Officio City Recorder

Appendix J
WMCP Amendment 2016