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WATER MANAGEMENT, CONSERVATION, & SYSTEM MASTER PLAN

Prepared for:

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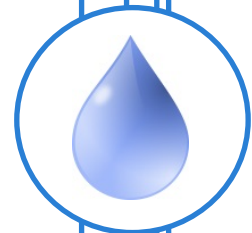


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OAR Chapter 690, Division 86 requirements covered by this plan:

Required Item	OAR Reference	Plan Section
Water Supplier Description		
Description of suppliers sources	690-086-0140(1)	4.1
Delineation of current service area	690-086-0140(2)	2.1
Assessment of adequacy and reliability of existing supplies	690-086-0140(3)	4.1
Quantification of present and historic use	690-086-0140(4)	5.2
Summary of water rights held	690-086-0140(5)	4.1, Appendix E
Description of customers served and water use summary	690-086-0140(6)	4.4
Identification of interconnections with other suppliers	690-086-0140(7)	4.1
System schematic	690-086-0140(8)	4.8
Quantification of system leakage	690-086-0140(9)	4.5
Water Conservation Element		
Full metering of systems	690-086-0150(4)(b)	4.4, 7.1
Meter testing and maintenance program	690-086-0150(4)(c)	7.2
Annual water audit	690-086-0150(4)(a)	7.3
Leak detection program	690-086-0150(4)(e)	7.4
Rate structure based on quantity of water metered	690-086-0150(4)(d)	7.5
Rate structure and billing practices that encourage conservation	690-086-0150(6)(d)	7.5
Public education program	690-086-0150(4)(f)	7.6
Progress report on previous WMCP	690-086-0150(1)	7.8
Documentation of water use measurement and reporting	690-086-0150(2)	7.7
List of measures already implemented or required under contract	690-086-0150(3)	7.8
Water Curtailment Element		
Assessing water supply	690-086-0160(1)	8.2
Stages of alert	690-086-0160(2)	8.3
Triggers for each stage of alert	690-086-0160(3)	8.3
Curtailment actions	690-086-0160(4)	8.3
Water Supply Element		
Delineation of current and future service areas	690-086-0170(1)	2.1, 4.3
Population projections for service area	690-086-0170(1)	2.5
Prepare schedule to fully exercise each permit	690-086-0170(2)	4.6
Prepare demand forecast	690-086-0170(3)	5.1
Comparison of projected need and available sources	690-086-0170(4)	5.1
Other Items		
List of affected governments and their comments	690-086-0125(5)	10.1
Date for submittal of next update	690-086-0125(6)	10.7

SECTION 1 INTRODUCTION

1.1 Background

The City of Scio is located approximately 16 miles southeast of Salem in the Willamette Valley. The City is a small rural community that was incorporated in 1866.

The City of Scio owns the public water system which is currently operated by City personnel. The City relies on two wells located on the north side of town as their drinking water sources and has one 500,000 gallon storage reservoir. Figure 4.1 shows the water system, wells, reservoir, and the extent of the service area within the UGB. The zoning map for the City of Scio, also showing the UGB and City limits, is included as Appendix A of this plan.

CH2M Hill completed the City of Scio's Master Water Plan in October, 1985. That master plan was updated by Fetrow Engineering, Inc. in April 1992. The current master plan used by the City was an update of the previous two plans completed by Erwin Consulting Engineering in 2006.

Until the completion of this plan, the City of Scio did not have a Water Management and Conservation plan (WMCP).

1.2 Authorization

The Oregon Water Resources Department (OWRD) has issued a Final Order (Appendix B) granting the extension for Water Right Permit G-12694 for the total of 1.78 cubic feet per second (CFS). One of the conditions of the Final Order is the completion of an approved WMCP under OAR Chapter 690, Division 86.

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.

The existing Water Master Plan for the City of Scio is approaching 10 years old and due to the above OHA and OWRD requirements as well as service improvements, increases in population and changes to financing options the City of Scio has authorized Erwin Consulting Engineering to complete the combined Water Management and 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 their water resources. Costs given in this plan are in 2014 dollars.

The main goals of this updated 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 in order to complete any necessary upgrades.

SECTION 2 REGULATORY REQUIREMENTS

2.1 Regulating Agencies

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.

- **Well Regulations:**
Through the provisions of the Ground Water Act of 1955, ORS 537.505 to 537.795, the Water Resources Commission has been charged with the administration of the rights of appropriation and

use of ground water resources of the state and the prevention of waste contamination of ground water.

Wells within the State of Oregon shall be constructed and maintained in accordance with the general standards for the construction and maintenance of water wells as prescribed in OAR 333-61-50 and OAR 690, divisions 200 through 220.

- **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. The City was designated as an "Outstanding Performer" following the completion of their 2010 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 completion of the water system survey, the City of Scio has had no violations or been required to issue public notices regarding water quality.

2.3 Future Regulatory Requirements

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

SECTION 3 STUDY AREA AND PLANNING CONSIDERATIONS

3.1 Study Area

The City of Scio is located approximately 16 miles southeast of Salem. The study area is coincident with the Urban Growth Boundary (UGB) established by the City's Comprehensive Plan. The water system serves properties within the City's Urban Growth Boundary which extends beyond the city limits of Scio.

The UGB for Scio encompasses approximately 337 acres with roughly 265 acres of that within the city limits. The land use within the UGB is comprised of approximately 34.5% residential, 18.8% agricultural/forest, 18.1% public (education & government), 15.6% transportation facilities, 3.6% industrial, 2.0% commercial, 1.1% other Non-Residential (Church, organizational), and 6.5% vacant.

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.

It should be noted that the water system does include 22 water services and 7 fire hydrants outside of the UGB service area. The water services outside of the City are found on two sections of HWY 226, one section south of town that also includes Hillside Way and the other to the east of town. A portion of these services were connected to the existing water system prior to the establishment of the UGB in 1980 and the other portion were the water services and fire hydrants that were installed on the waterline that was constructed in 1990, from the storage reservoir on Hillside Way. Residents to the south of the City were allowed to connect to the new water system in trade for easements for the waterline installed on their properties. The 22 water services outside of the UGB are included in the water demand calculations but are not included in the population growth because no property outside of the UGB has been allowed to connect to the system since it was established in 1980.

3.2 Climate and Rainfall Patterns

The study area is located on the lower slopes of the west side of the Cascade mountain range within the Willamette Valley. The weather is characterized by warm, relatively dry summers and cool wet winters.

The climate of the Willamette Valley is relatively mild throughout the year. The climate conditions closely resemble the Mediterranean climates that occur in California, although Oregon's winters are somewhat wetter and cooler. Extreme temperatures in the Valley are rare. Days with maximum temperatures above 90° F occur only 5 to 15 times per year on average, and below zero temperatures occur only about once every 25 years. Mean high temperatures range from the low 80's in the summer to about 40° F in the coldest months. Average low temperatures are generally in the low 50's during the summer and low 30's in the winter. The average annual precipitation is 56".

3.3 Topography

The City of Scio is situated in the Willamette Valley at elevations ranging from 300 to 325 feet. A large portion of the City lies within the 100-year flood plain as Thomas Creek flows year round through the center of the City.

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

The current population within the City of Scio's City Limits is 830 and within the City's Urban Growth Boundary (UGB) it is 885. This population within the UGB is established by adding the population within the UGB but outside of the City limits to the population within the City limits. There are approximately 20 residential units that are within the UGB but outside of the City limits. Per the 2010 U.S. Census, the average household size for Scio is 2.74 residents per household. 20 residential units yield a population of 55 residents living within the UGB but outside of the City limits.

The City of Scio experienced an overall growth rate of approximately 1.3% annually from 1960 to 2010. This fifty year period incorporates times of slow growth, as is seen from 1980 to 1990 (0.75%) and times of more rapid growth as seen from 2006 to 2010 (3.4%). More recently the growth has leveled off and even declined. The certified population in 2011 was 840 but dropped to and stayed at 830 in 2012 and 2013. However, as can be seen in (Figure 3.1), even with this recent leveling off the overall growth appears follow the projected rate of 1.7% established in the 2006 Scio Master Water Plan.

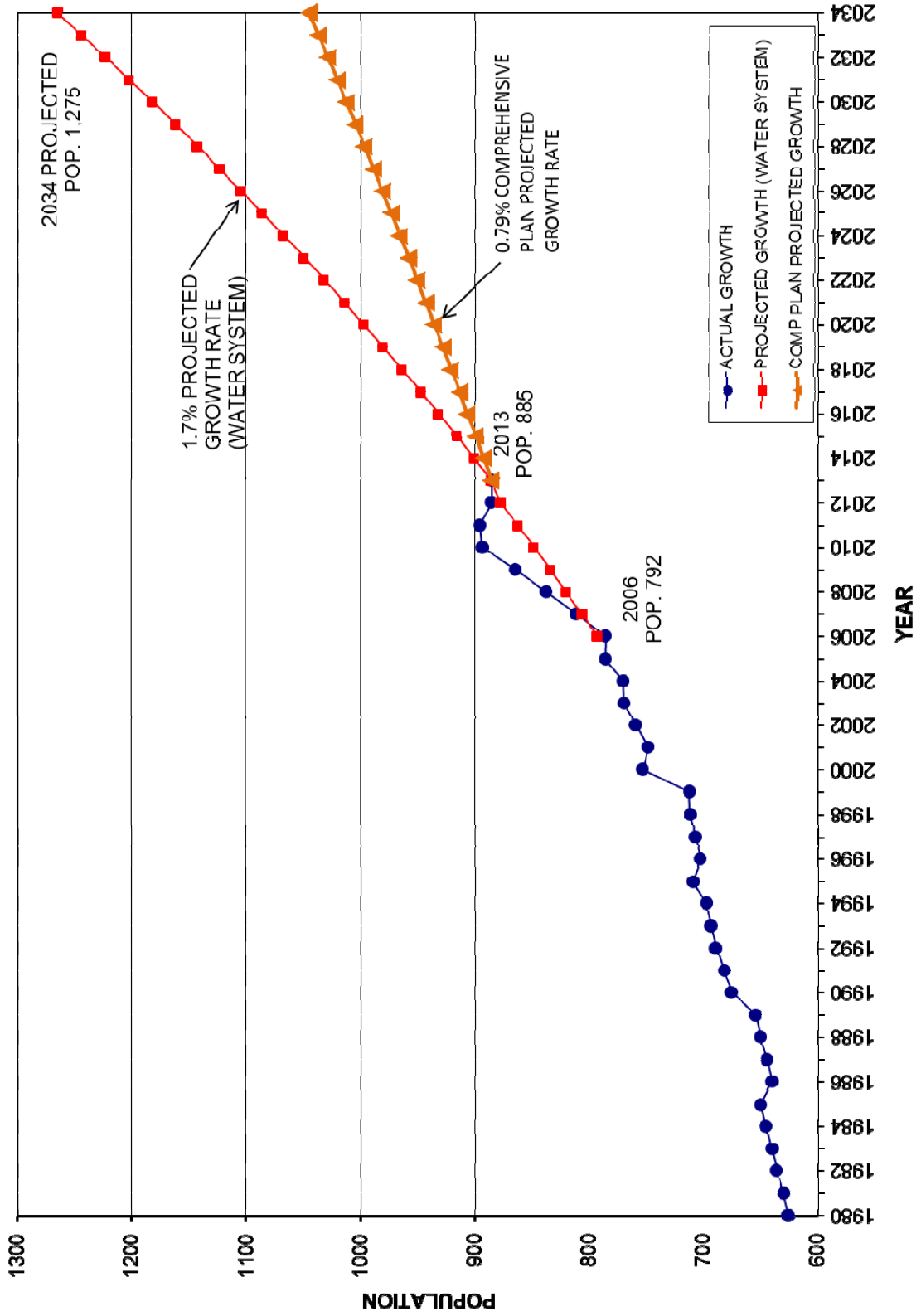
The City of Scio's Comprehensive Plan update anticipates Scio's population will remain at 0.70% of Linn County's total population and will grow at the same rate as Linn County's population over the next 20 years. The State Office of Economic Analysis' update of the Linn County population forecast projects a total county population of 149,286 in 2034. If Scio's population remains at 0.70% of Linn County's population, then the 2034 population for Scio will be 1,045. This growth equates to an annual growth rate of 0.79% for the City.

For the purposes of water system planning, this plan will utilize the 1.7% growth rate established in the 2006 Master Water Plan for planning within the 20 year design period. A 1.7% growth rate is a good representation of growth since 2000, covers growth promoted by the Thomas Creek subdivision discussed below, and is a conservative rate when comparing to the 1.3% overall growth rate and 0.79% projected growth rate discussed in the Scio Comprehensive Plan. Using a conservative number will help account for any large growth that may occur as property is subdivided and developed within the UGB, allowing the City to maintain a sustainable water system. A 1.7% growth rate gives a population in 2034 of 1,265 residents within the UGB.

Thomas Creek Estates, a 77 lot subdivision, was completed in Scio in 2006. As discussed in the 2006 Master Water plan, it was anticipated that the housing within the Thomas Creek Estates would be completed and occupied between 2007 and 2011. However, to date only 36 homes have been constructed within the subdivision. Therefore, the additional residents planned for in the 2006 Master Plan to account for build out within Thomas Creek Estates proved to be too aggressive and did not accurately predict the

current population. We now believe that the straight 1.7% growth rate will account for normal population growth and growth promoted by the “ready to build” lots still available in the subdivision.

**FIGURE 3.1
CITY OF SCIO, OREGON
POPULATION GROWTH PROJECTION**



SECTION 4 DESCRIPTION OF EXISTING SYSTEM

4.1 Source Water Wells

The City relies on groundwater wells as their source of drinking water and is not connected to any other local water system for source water or for the distribution of their water. The City of Scio has four designated well sites but relies on only two of the wells for the City's water supply needs at this time.

- a. Well #1 is located at the east end of N.W. 1st Ave. between N.W. 1st Ave. and Thomas Creek. Well #1 was constructed in 1948 at a depth of 207 feet. Well #1 had its yield reduced by mineral deposits and was valved off in the mid 1980's and sealed in 1999.

Well #1 is covered by Water Right Claim Registration No. GR-2624.

- b. Well #2 is located just south of N.W. 4th Avenue, approximately 150 feet west of the intersection of N. Cherry Street. Well #2 was constructed in 1939 at a depth of 203 feet. In 1985 CH2M Hill conducted pump tests on this well. Based on the results of these tests, the capacity of Well No. 2 was estimated at 150 gpm (0.33 CFS). The water level drawdown following 45 hours of continuous pumping was 62 feet of the available 107 feet. Well No. 2 has not been used in the past 20-55 years but could be reconnected to the system if the needed.

Well #2 is covered by Water Right Claim Registration No. GR-2625.

- c. Well #3 is located on the west side of N. Cherry Street, approximately 185 feet south of the intersection of N.W. 1st Avenue. Well #3 was constructed in 1970 at a depth of 210 feet. In 1985 CH2M Hill conducted pump tests on this well. Based on the results of these tests, the capacity of Well No. 3 is 545 gpm (1.21 CFS) with a drawdown of 62 feet of the available 107 feet after 46 hours of continuous pumping. The current pumping capacity of Well #3 is estimated to be 360 gpm (0.80 CFS) based on pump capacity and there are no physical restrictions that limit this flow. A 6" McCrometer propeller meter is used to record effluent flows at Well #3.

Well #3 is covered by Certificate of Water Right Permit No. G5354 (Certificate No. 50300) for 1.33 CFS (597 gpm). The permit was issued by OWRD on February 21, 1975. The priority date of the permit is February 10, 1971 with the completion of construction

required by October 1, 1976. Complete application of water to the proposed use was required on or before October 1, 1977. The permit was perfected and certified for 1.33 CFS on September 17, 1981.

Oregon Drinking Water Services considers Well #3 to be “inadequately constructed” because it is not sealed into confining layers. This causes Well #3 to allow mixing of water between aquitards and puts the well at a high risk of contamination.

- d. Well #4 is located off of Stayton-Scio road on the northeast corner of the Scio High School property. Well #4 was constructed in 1995 at a depth of 210 feet with an estimated flow rate of 700 gpm (1.56 CFS) and a water right of 1.78 CFS (798 gpm). The current pumping capacity is 430 gpm (0.96 CFS) based on pump capacity and there are no physical restrictions that limit this flow. In 2011 a 100 micron screen was installed on the effluent of Well #4 to help combat particles found in the water system during fire hydrant use. A 6” Water Specialties propeller meter is used to record effluent flows at Well #4.

Well #4 is covered by Certificate of Water Right Permit No. G-12694 for 1.78 CFS (799 gm). The permit was issued by OWRD on August 21, 1996. The permit called for completion of construction by October 1, 1998. The City of Scio submitted an application for extension of time period for Permit G-12694 to OWRD on March 20, 2008. On December 10, 2013 OWRD issued a Proposed Final Order proposing to extend the time to complete construction to October 1, 2049 and to extend the time to fully apply water to beneficial use to October 1, 2049. While the total permitted amount of water under Permit G-12694 is 1.78, the final order (issued June 20, 2014) approving the Extension of Time for Permit G-12694 limits the diversion of water under Permit G-12694 to no more than 0.95 CFS. The diversion of water *beyond* 0.95 CFS under Permit G-12694 is **not allowed** until a WMCP that requests such access and includes the required analysis to justify a greater diversion rate under the permit is submitted to OWRD, **and** a final order approving the WMCP and granting access to a greater diversion rate under Permit G-12694 is issued by OWRD. A copy of the Final Order has been included as Appendix B.

Oregon Department of Fish & Wildlife (ODFW) has determined that 0.21 CFS of the total undeveloped portion (0.62 CFS) of the permit has the Potential for Substantial Interference (PSI) with Thomas Creek. In order to maintain the persistence of listed fish in Thomas Creek, the maximum amount of the 0.21 CFS that can be appropriated must be determined in proportion to the amount by

which the target flows for Thomas Creek (Final Order - Appendix B) are missed based on a daily measurement of the flows in Thomas Creek. When the time comes that the additional 0.21 CFS is needed for use by the City, a system for measuring stream flow and determining the amount that may be appropriated for use must be established. A sample spreadsheet to assist with these calculations is included as Appendix D.

Table 4.1 -City of Scio Source Wells

Well Designation	Registration No.	Application No.	Permit No.	Certificate No.	Priority Date	Maximum Allowable Water Use	Current Production Capacity	2013 Total Reported Production
Well #1	GR-2624	-	-	GR-2489	March 13, 1946	1.30 CFS (585 gpm)	0	0
Well #2	GR-2625	-	-	GR-2490	November 13, 1939	1.34 CFS (600 gpm)	0	0
Well #3	-	G-5427	G-5354	50300	February 10, 1971	1.33 CFS (597 gpm)	0.80 CFS (360 gpm)	0.716 MG
Well #4	-	G-14109	G-12694	N/A	June 26, 1995	1.78 CFS* (799 gpm)	0.96 CFS (430 gpm)	27.545 MG

* While the total permitted amount of water under Permit G-12694 is 1.78, the final order (issued June 20, 2014) approving the Extension of Time for Permit G-12694 limits the diversion of water under Permit G-12694 to no more than 0.95 cfs.

The City of Scio has a total water production capacity of 790 gpm. The total capacity is the Well #3 capacity (360 gpm) plus the Well #4 capacity (430 gpm). Well #4 is designated as the City's primary water source with Well #3 and Well #2 used as backups. Well #3 is currently used periodically to assistance in water production while #2 has been left in place only as an emergency back-up. A more detailed summary table and applicable water right documentation for each well can be found in Appendix E.

4.2 Reservoir

Based on the recommendations of FEI's 1992 Master Water Plan update, a 500,000-gallon glass lined, bolted steel, covered reservoir was constructed in 1996 south of the City on Franklin Butte. The 62-foot diameter reservoir, manufactured by Aquastore Tanks, has a concrete finished floor elevation of 460 feet and a full water surface elevation of 482 feet. The reservoir is accessed via Hillside Way off of Hwy 226.

The City performs interior cleaning and maintenance on the reservoir every three years. The last maintenance was completed in 2012 by an underwater diving contractor and included interior cleaning and the epoxying of a cable connection at the bottom of the tank that had rusted.

4.3 Distribution System

The City of Scio distribution system consists of approximately 37,425 linear feet of waterline which range in size from 2" to 16". The approximate lengths of each size are shown below in Table 4.2. The distribution system is a combination of polyvinylchloride (PVC), ductile iron, and cast iron. 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. The distribution system is broken up into northern and southern sections using Thomas Creek as the dividing line. The north section includes the system wells while the southern section includes the 500,000 gallon reservoir. The two sections are connected by a 12" line attached to the Hwy 226 Thomas Creek Bridge and a second line (8" diameter) that was installed under Thomas Creek from Well #3 to 2nd Place.

TABLE 4.2 - Waterline

Waterline Size & Type	Aprox. L.F.
16"	1,750
12"	4,550
8"	7,650
6"	20,800
4"	900
2"	1,775
TOTAL	37,425

Major improvements were completed on the distribution system in 1996 as recommended by FEI's 1992 Master Water Plan update. The new reservoir on Franklin Butte was connected to the system via a 16" ductile iron waterline which runs from the reservoir site down Hillside Way to Hwy 226. The 16" mainline continues north on Hwy 226 where it is reduced to a 12" ductile iron line approximately 2,400 feet south of Gilkey Road. The 12" mainline then extends approximately 4,550 north along Hwy 226 to the north end of the city. This 12" mainline, which replaced an existing 6" waterline on Hwy 226, was connected to a majority of the City's cross street waterlines.

The 1996 improvements also tied Well #4 to the 12" mainline at the north end of town via approximately 1,640 L.F. of 8" PVC waterline along Stayton Scio Dr. and across Scio High School property.

Another major improvement was the boring of an 8" HDPE waterline under Thomas Creek from Well #3 to the west end of 2nd Place. This creek crossing was an important upgrade as there was only one line that connected the northern and southern sections of the distribution system. Because the wells that feed the system are located on the north side of Thomas Creek, any

damage to the creek crossing found on Main Street could result in a loss of water service to certain areas in town.

The 1996 improvement project also eliminated a majority of the dead end sections of the distribution system by looping waterlines back into the system. Dead-end lines are unfavorable to a water system, as fire flows, waterline breaks, or other large demands in dead-end areas will create a major decrease in water pressure.

4.4 Services and Customers Served

The City of Scio has 389 active water services, as of October 2014. These services for each customer class are broken down as follows:

TABLE 4.3 – Services

Type of Service	Number
Residential	326
Multi-Family (apartments, duplexes, etc.)	12
Small Commercial (3/4" meter)	27
Large Commercial (>3/4" meter)	7
Public	
Small School (3/4" meter)	3
Large School (>3/4" meter)	3
City Meters (parks, city hall, etc.)	11
TOTAL	389

City personnel conduct the water service readings each month. When recorded by the City, the water use is broken down into ten water consumption ranges based on the number of gallons used. Table 4.4 below shows the average meters per month that fall within each meter reading range.

TABLE 4.4 – Meter Reading Ranges

Meter Reading Range (Gallons)	2011 – 2013 Average Monthly Readings Within Each Range
Over 50,000	1
40,001 – 50,000	1
30,001 – 40,000	2
20,001 – 30,000	7
10,001 – 20,000	31
8,001 – 10,000	22
6,001 – 8,000	41
4,001 – 6,000	79
2,001 – 4,000	93
1 – 2,000	72

The typical use and general make up for each of the customer classes, based on 2013 meter readings, is as follows:

- *Residential Services* – Residential use in the City of Scio is typical for use among small rural communities. Residential meter readings usually fall within the first 3 meter reading ranges at 1-6,000 gallons per month. Per the City of Scio Zoning Ordinance, the minimum lot size in residential zones is 8,000 s.f. in the Base Flood area and 10,000 s.f. in the Special Flood Hazard area. Most lots have small yards and shrubbery and don't typically have outdoor water features or swimming pools. Outdoor use is normally attributed to yard and vehicle maintenance.
- *Multi-Family* – The majority of the multi-family units in Scio are duplex units which have the same lot size requirements as single family residential units and see use similar to that of the typical residential units in town. There are two apartment complexes in Scio; one 8 unit apartment complex that is served by a single meter that averages 25,000 gallons of water use monthly and a 16 unit complex served by a single meter that averages 52,000 gallons of water use monthly. With a monthly average use, for each multi-family class residential unit, of 2,944 gallons per month, the total monthly use within the multi-family class is 106,000 gallons.
- *Small Commercial* – The majority of the small commercial class fall within the first two meter reading ranges with average uses of 1-4,000 gallons per month. These small commercial units are offices, small retail, animal clinics, and meeting halls that do not typically require large amounts of water for operation. Their typical use comes from restroom facilities, small kitchens and human consumption. Five of the small commercial users are larger employers and/or units that utilize more water for day to day operations and see average uses of 8,000 – 24,000 gallons. With a monthly average use, for each small commercial unit, of 3,461 gallons per month, the total monthly use within the small commercial class is 90,000 gallons. The largest user is the Covered Bridge Coffee House with an average use of 24,000 gallons per month.
- *Large Commercial* – The water use for the large commercial units is similar to the use of the small commercial class. Six of the units have average use in the 1-8,000 gallon meter reading range. One of these, the Scio Baptist Church, sees as a high summer month use of 10,000 – 20,000 gallons. The one large commercial unit with consistent high use is the Scio Thriftway grocery store with a monthly average use of 31,000 gallons and a summer month average range of 43,000 – 51,000 gallons. With a monthly average use, for each large commercial unit,

of 9,400 gallons per month, the total monthly use within the large commercial class is 47,000 gallons.

- *Public (Schools)* – The Scio Schools are the largest users of water in Scio. Four of the six meters: Scio Middle School, Scio High School, Centennial Elementary, and the Scio High School Stadium, are typically in the upper three meter reading ranges. These four locations record an average monthly use of 38,000 – 46,000 gallons. Summer month use at the schools can be as high as 90,000 gallons per month due to irrigation use. Summer month use at the stadium can reach over 130,000 gallons. However, new artificial turf fields were installed at the high school football and baseball fields so summer irrigation of these facilities is expected to drop in the coming years. The total monthly use within the public schools class is 172,000 gallons per month.
- *Public (City)* – City owned meters are used mainly on parks throughout the City. The average use seen at these meters is 500 – 4,400 gallons per month. As expected, a majority of the use is seen during the summer months for irrigation, where use for Veteran’s, Food Center, Bates, and Museum parks can range from 15,000 - 25,000 gallons per month. Thomas Creek Park is the largest user with a monthly average from May to September of 12,500 gallons and a high of 62,000 gallons per month in late summer. Two other meters included in this class are for City Hall and the sewer lagoon treatment plant. City hall consistently averages a use of 2,800 gallons per month while the sewer lagoon treatment plant averages 1,100 gallons per month. The total monthly use within the public (city) class is 30,000 gallons per month.

4.5 System Leakage

The City has a fully metered system and is able to keep track of monthly water quantities pumped from their source wells as well as the amount of water sold, which is the total of all system water meters. Recent yearly totals are shown below in Table 4.5. The table also takes into account water the City uses for system/fire hydrant flushing and recorded water used by the Fire Department. The City estimates that 1,250,000 gallons are used for these items each year. When these estimates are considered, the City typically sees a yearly water loss of 4-6%. The overall lost water percentages are within a reasonable amount, as values below 15% are typically acceptable. 2011 and 2012 had abnormally high losses which have been attributed to a system leak that the City had trouble locating but was able to find and fix in early 2013.

There is some concern over lost water as some of the monthly percentages range from negative values to as much as 24%, when looking at the years

outside of the 2011/2012. The best explanation for this large range in percentages is record keeping of City water use (hydrant flushing, park watering, etc.) and timing of meter readings. Service meters are typically read and recorded between the 25th and 29th of each month, while the well readings are taken at the end of each month. Therefore, there will be a 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 month. It is important that the City continue to strive to obtain accurate accounts of their water use in order to track the overall water system performance. Consistent high values would raise concern of system leaks or inaccurate metering.

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 Dept Use & Flushing (MG)	Totals (MG)
2007	Pumped	2.324	1.924	2.087	2.064	2.461	2.970	4.113	3.476	3.077	2.139	1.963	2.082		30.681
	Sold	2.155	1.831	1.845	1.725	2.341	2.590	3.721	3.124	2.540	2.215	1.921	1.792	1.250	29.050
	% Water Loss	7.3%	4.8%	11.6%	16.4%	4.9%	12.8%	9.5%	10.1%	17.4%	-3.6%	2.1%	13.9%		5.3%
2008	Pumped	1.993	2.007	1.908	2.057	2.496	2.964	4.171	3.393	2.749	2.018	2.172	1.999		29.925
	Sold	1.919	1.635	1.749	1.828	2.056	2.403	4.245	2.971	2.746	1.796	1.659	2.088	1.250	28.345
	% Water Loss	3.7%	18.5%	8.3%	11.1%	17.6%	18.9%	-1.8%	12.4%	0.1%	11.0%	23.6%	-4.5%		5.3%
2009	Pumped	1.934	1.682	2.063	1.851	2.548	2.872	4.293	3.893	2.722	2.190	1.944	2.664		30.656
	Sold	1.729	1.581	1.702	1.945	2.009	2.779	3.997	3.441	2.787	1.905	1.591	2.659	1.250	29.375
	% Water Loss	10.6%	6.0%	17.5%	-5.1%	21.2%	3.2%	6.9%	11.6%	-2.4%	13.0%	18.2%	0.2%		4.2%
2010	Pumped	2.051	2.126	1.930	2.026	2.079	2.420	3.950	3.645	2.306	2.156	2.222	2.218		29.129
	Sold	1.800	1.726	1.986	1.848	1.819	2.226	3.438	3.698	2.110	1.778	1.959	1.679	1.250	27.317
	% Water Loss	12.2%	18.8%	-2.9%	8.8%	12.5%	8.0%	13.0%	-1.5%	8.5%	17.5%	11.8%	24.3%		6.2%
2011	Pumped	2.537	2.042	2.113	2.114	2.316	2.530	3.422	3.646	3.187	2.254	2.124	2.150		30.435
	Sold	1.687	1.609	1.849	1.597	1.678	2.220	2.440	3.354	2.519	1.609	1.748	1.618	1.250	25.178
	% Water Loss	33.5%	21.2%	12.5%	24.5%	27.6%	12.2%	28.7%	8.0%	21.0%	28.6%	17.7%	24.7%		17.3%
2012	Pumped	2.354	1.980	2.215	2.453	3.628	3.494	4.785	4.314	3.824	3.265	2.671	2.706		37.689
	Sold	1.576	1.708	1.569	1.622	2.055	1.872	2.768	3.605	2.674	2.234	1.690	1.573	1.250	26.196
	% Water Loss	33.0%	13.7%	29.2%	33.9%	43.4%	46.4%	42.1%	16.4%	30.1%	31.6%	36.7%	41.9%		30.5%
2013	Pumped	1.883	1.657	1.795	1.708	2.676	2.595	4.163	3.347	2.273	1.867	1.766	2.530		28.261
	Sold	1.778	1.493	1.612	1.757	2.155	2.174	3.725	2.977	2.099	1.856	1.489	2.132	1.250	26.497
	% Water Loss	5.6%	9.9%	10.2%	-2.8%	19.5%	16.2%	10.5%	11.0%	7.7%	0.6%	15.7%	15.7%		6.2%
2014	Pumped	1.852	1.698	1.781	1.813	2.122	2.724	3.478	3.563	2.704	2.124	1.812	2.043		27.714
	Sold	1.798	1.493	1.509	1.780	1.798	2.441	3.285	3.005	2.459	2.045	1.445	1.768	1.250	26.076
	% Water Loss	2.9%	12.1%	15.3%	1.8%	15.3%	10.4%	5.5%	15.7%	9.1%	3.7%	20.3%	13.5%		5.9%

4.6 Water Rights Schedule

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.

Of the four groundwater water rights held by the City of Scio, only the water right for Well #4 (G-12964) remains unperfected. The recent Final Order for

the Extension of Time for Permit Number G-12694 issued by OWRD sets the deadline for applying water to full beneficial use at October 1, 2049.

Projected water use at the end of the 20 year study period in this plan will not put the Well #4 permit to its full beneficial use. Therefore, the City will use the October 1, 2049 date as their target date for applying water to full beneficial use. This schedule will need to be reviewed and revised based on updated projected water demands revised in the completed 10 year update of this plan.

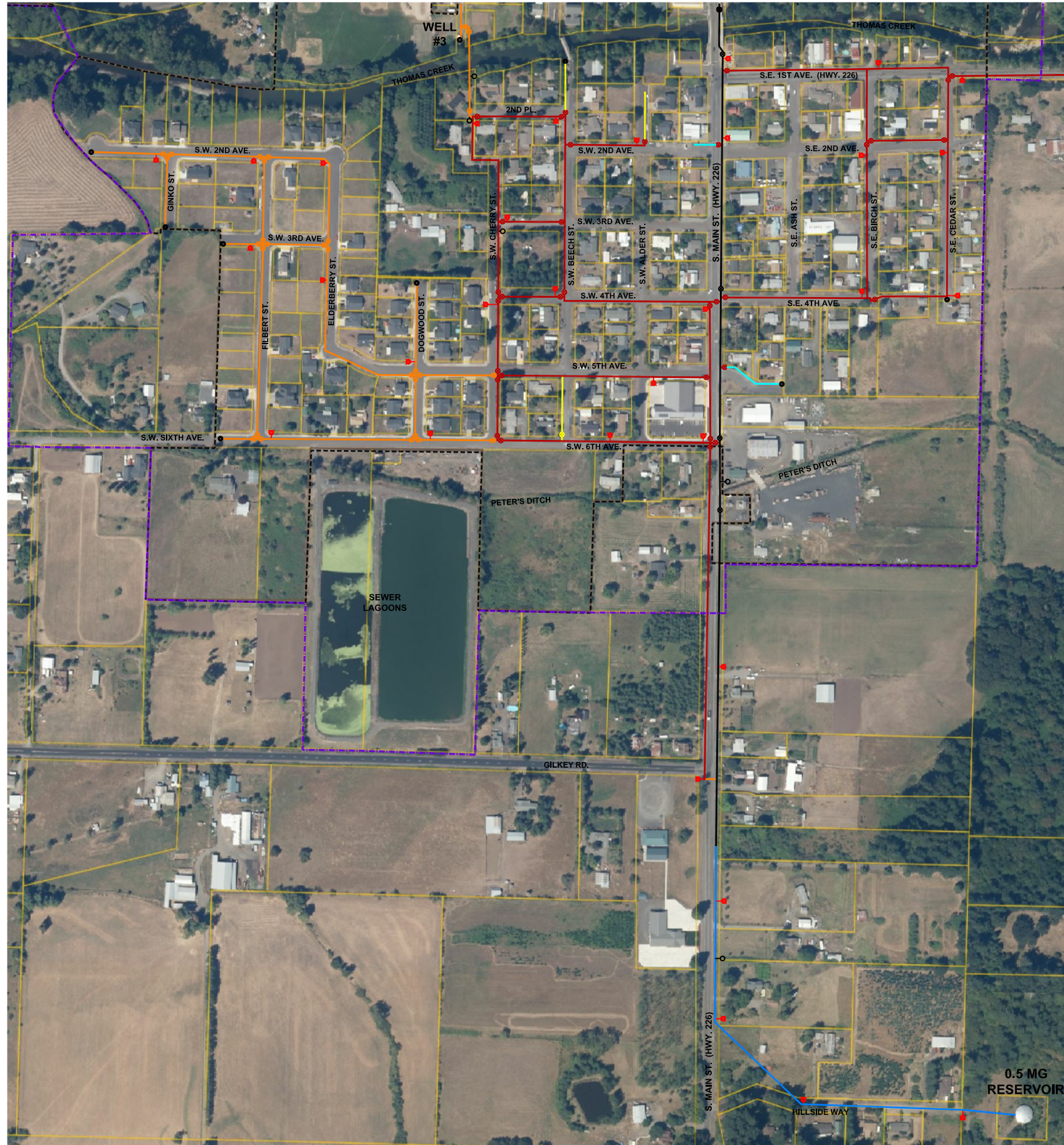
4.7 Water Quality

The City has exceptionally high water quality and has had a strong record in complying with drinking water requirements and standards. The City was designated as an “Outstanding Performer” following the completion of their 2010 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 completion of the water system survey, the City of Scio 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.

4.8 Water System Map

Figure 4.1, an updated water system map can be found on the following two sheets. The system map is broken into two sections, the area north of Thomas Creek and the area south of Thomas Creek.



LEGEND

	2" WATERLINE
	4" WATERLINE
	6" WATERLINE
	8" WATERLINE
	12" WATERLINE
	16" WATERLINE
	2" VALVE
	4" VALVE
	6" VALVE
	8" VALVE
	12" VALVE
	FIRE HYDRANT
	BLOW-OFF ASSEMBLY
	AIR RELEASE VALVE
	WELL
	PROPERTY LINE
	URBAN GROWTH BOUNDARY
	CITY LIMITS

FIGURE 4.1
DISTRIBUTION SYSTEM - SOUTHERN SECTION

APPROXIMATE SCALE: 1" = 400'

VERIFY SCALE
 BAR IS ONE (1) INCH
 ON ORIGINAL DRAWING
 IF NOT ONE INCH ON THIS SHEET
 ADJUST THE SCALE ACCORDINGLY

No.	REVISIONS	BY
1		
2		
3		
4		
5		
6		
7		

30023 Broad Rd.
 LEBANON, OREGON 97355
 (541) 255-2190

ERWIN CONSULTING ENGINEERING

CITY OF SCIO, OREGON
 MASTER WATER PLAN
 WATER SYSTEM MAP

Date: DEC 2014
 Scale:
 Drawn: RHQ
 Job: P-1216
 Sheet: 1
 of 2 Sheets

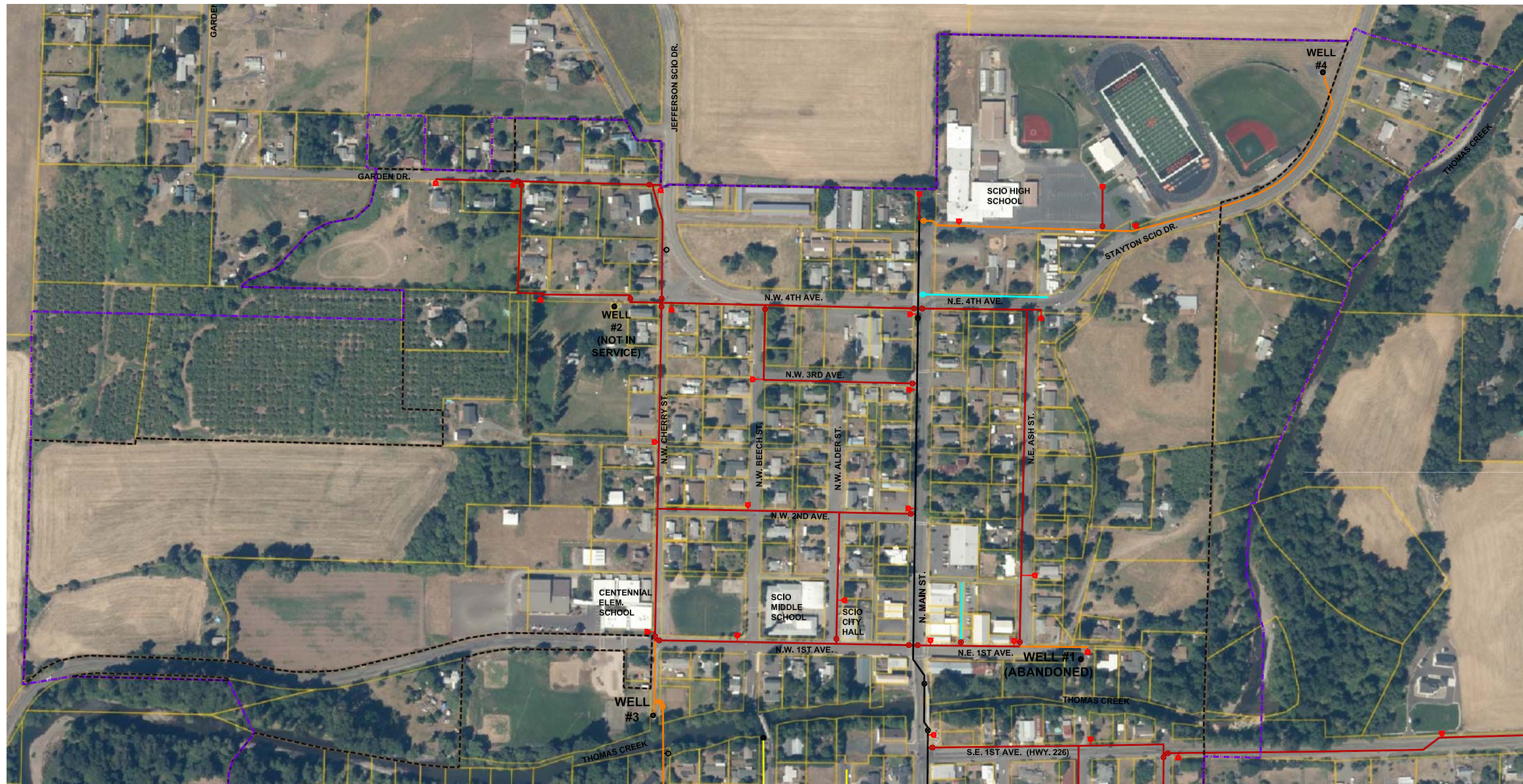


FIGURE 4.1
DISTRIBUTION SYSTEM - NORTHERN SECTION

APPROXIMATE SCALE: 1" = 400'

LEGEND

	2" WATERLINE
	4" WATERLINE
	6" WATERLINE
	8" WATERLINE
	12" WATERLINE
	16" WATERLINE
	2" VALVE
	4" VALVE
	6" VALVE
	8" VALVE
	12" VALVE
	FIRE HYDRANT
	BLOW-OFF ASSEMBLY
	AIR RELEASE VALVE
	WELL
	PROPERTY LINE
	URBAN GROWTH BOUNDARY
	CITY LIMITS



VERIFY SCALE
BAR IS ONE (1) INCH
ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET
ADJUST THE SCALE ACCORDINGLY

No.	REVISIONS	BY
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39023 Brent Rd.
LEBANON, OREGON 97035
(541) 255-2190

ERWIN CONSULTING ENGINEERING

CITY OF SCIO, OREGON
MASTER WATER PLAN
WATER SYSTEM MAP

Date: DEC 2014
Scale:
Drawn: RHQ
Job: P-1216
Sheet: 2
of 2 Sheets

SECTION 5 PRESENT AND FUTURE WATER DEMANDS

5.1 General

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 pumped from Wells #3 and #4 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

Total water production for the City of Scio from 2006 to 2013 is shown in Table 5.1 below. The City averages a monthly production of 2,500,000 gallons, with July as the month of the most production with an average of 4,048,000 gallons and March as the lowest month with an average production of 1,975,000 gallons. During this period the average total annual production was 29,860,000 gallons.

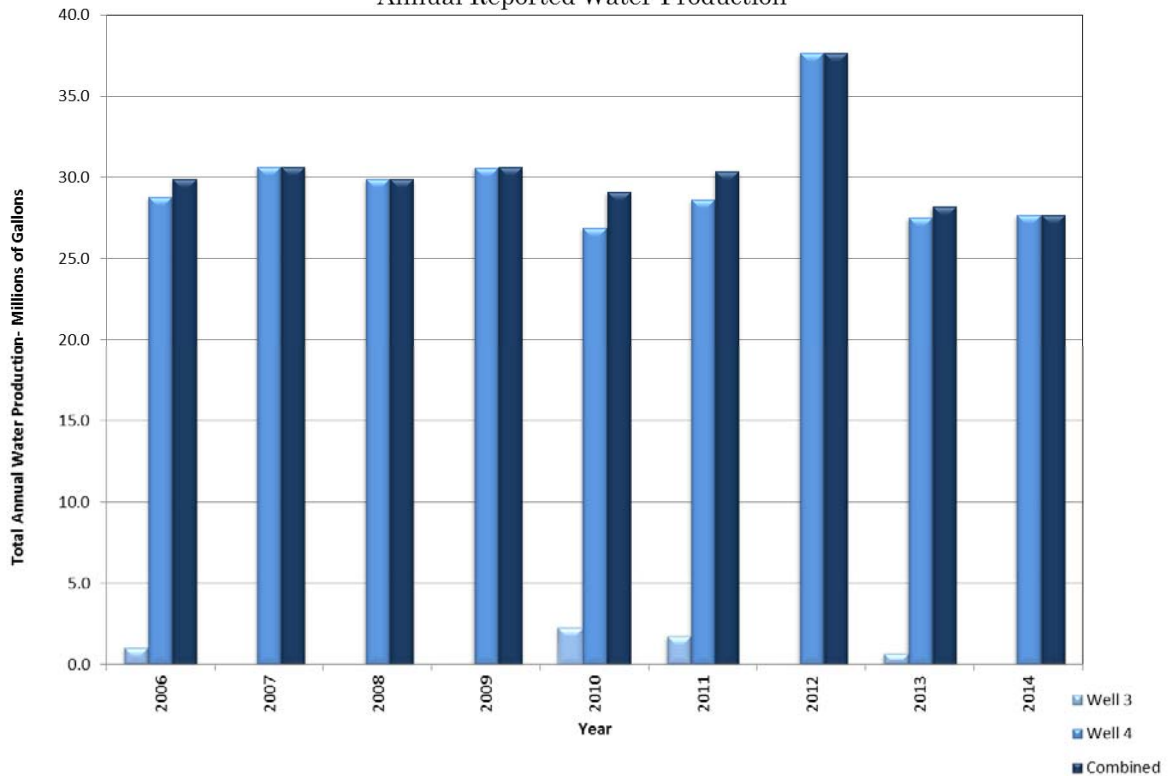
Please note production for 2012 was excluded from the calculation of average annual production, as the amount of water produced was abnormally high. The high figures in 2012 are attributed to excess loss, as seen in Table 4.5, from a system leak that has been corrected.

Table 5.1 - Reported Water Production
Wells #3 & #4

Year	Jan (MG)	Feb (MG)	Mar (MG)	Apr (MG)	May (MG)	June (MG)	July (MG)	Aug (MG)	Sept (MG)	Oct (MG)	Nov (MG)	Dec (MG)	Annual Water Production (MG)
2006	2.151	1.781	1.932	2.103	2.429	2.545	4.223	3.829	2.807	2.208	1.933	1.996	29.935
2007	2.324	1.924	2.087	2.064	2.461	2.970	4.113	3.476	3.077	2.139	1.963	2.082	30.681
2008	1.993	2.007	1.908	2.056	2.496	2.964	4.170	3.393	2.749	2.017	2.172	1.999	29.923
2009	1.934	1.682	2.063	1.851	2.548	2.872	4.293	3.893	2.722	2.190	1.944	2.664	30.656
2010	2.051	2.126	1.930	2.026	2.079	2.420	3.950	3.645	2.306	2.157	2.222	2.218	29.130
2011	2.537	2.042	2.113	2.114	2.316	2.530	3.422	3.646	3.187	2.253	2.124	2.150	30.434
2012	2.354	1.980	2.215	2.453	3.628	3.494	4.785	4.314	3.824	3.265	2.671	2.706	37.689
2013	1.883	1.657	1.795	1.708	2.676	2.595	4.163	3.347	2.273	1.867	1.766	2.530	28.261
2014	1.852	1.698	1.780	1.813	2.122	2.724	3.478	3.562	2.704	2.124	1.811	2.043	27.711

The majority of the water produced during the 2006-2013 period was from Well #4. Well #3 was used only periodically and had annual productions ranging from zero use (2007 & 2008) to 2,212,000 gallons (2010). During this period the maximum instantaneous rate produced was 360 gpm (0.80 CFS) from Well #3 and 427 gpm (0.95 CFS) from Well #4. Figure 5.1 shows the production from each well and total combined production.

Figure 5.1
City of Scio, Oregon
Annual Reported Water Production



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 2006-2013 are shown in Table 5.2. In 2013 ADD for Scio was 82,013 gallons per day (gpd), which equates to an instantaneous production of 57 gallons per minute (gpm.). Applying the peaking factor gives a 2013 PDD of 209,051 gpd or 145 gpm. With a current production capacity of 790 gpm, the City’s current PDD is easily met.

Table 5.2 - Average & Peak Demand

Year	UGB Population	Annual Water Production (MG)	Average Daily Demand				Peak Daily Demand (2.7 Peaking Factor)			
			gpd	gph	gpm	gpcpd	gpd	gph	gpm	gpcpd
2006	792	29.935	82,013	3,417	57	104	221,435	9,226	154	280
2007	811	30.681	84,057	3,502	58	104	226,954	9,456	158	280
2008	837	29.923	81,982	3,416	57	98	221,351	9,223	154	264
2009	865	30.656	83,989	3,500	58	97	226,770	9,449	157	262
2010	893	29.130	79,808	3,325	55	89	215,480	8,978	150	241
2011	895	30.434	83,382	3,474	58	93	225,131	9,380	156	252
2012	885	37.689	103,257	4,302	72	117	278,793	11,616	194	315
2013	885	28.261	77,426	3,226	54	87	209,051	8,710	145	236
Average (excluding 2012)		29.860	81,808	3,409	57	96	220,882	9,203	153	259

Note: **gpd** – gallons per day, **gph** – gallons per hour, **gpm** – gallons per minute, **gpcpd** – gallons per capita per day, **MG** – million gallons

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 2006 to 2013 the average per capita production was 96 gpcpd (Table 5.2). As discussed in Section 5.2, 2012 has been excluded from the calculation of this average.

Table 5.3 shows the estimated population and consumption growth for the City of Scio 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 2034 the City will need the capability to produce approximately 327,809 gpd or 228 gpm to satisfy the peak daily demand. If the wells continue to produce at their current rates, meeting the future demand will not be a problem. The values in Table 5.3 should be re-evaluated within the next 10 years to make certain peak demands are being met by City wells.

Table 5.3 - Projected Water Use

Year	Est. Pop.	Average Daily Demand - 96 gpcpd						
		Estimated Average Demand				Estimated Peak Demand (2.7 Peaking Factor)		
		(MG/yr)	(gpd)	(gph)	(gpm)	(gpd)	(gph)	(gpm)
2013	885	28.261	77,427	3,226	54	209,054	8,711	145
2014	900	31.542	86,417	3,601	60	233,325	9,722	162
2015	916	32.083	87,898	3,662	61	237,325	9,889	165
2016	931	32.633	89,405	3,725	62	241,394	10,058	168
2017	947	33.192	90,938	3,789	63	245,533	10,231	171
2018	964	33.762	92,497	3,854	64	249,743	10,406	173
2019	980	34.340	94,083	3,920	65	254,025	10,584	176
2020	997	34.929	95,696	3,987	66	258,380	10,766	179
2021	1,014	35.528	97,337	4,056	68	262,810	10,950	183
2022	1,031	36.137	99,006	4,125	69	267,316	11,138	186
2023	1,049	36.757	100,704	4,196	70	271,899	11,329	189
2024	1,067	37.387	102,430	4,268	71	276,561	11,523	192
2025	1,085	38.028	104,186	4,341	72	281,303	11,721	195
2026	1,104	38.680	105,973	4,416	74	286,126	11,922	199
2027	1,123	39.343	107,790	4,491	75	291,032	12,126	202
2028	1,142	40.018	109,638	4,568	76	296,022	12,334	206
2029	1,162	40.704	111,517	4,647	77	301,097	12,546	209
2030	1,182	41.402	113,429	4,726	79	306,259	12,761	213
2031	1,202	42.112	115,374	4,807	80	311,510	12,980	216
2032	1,222	42.834	117,352	4,890	81	316,851	13,202	220
2033	1,243	43.568	119,364	4,974	83	322,284	13,428	224
2034	1,265	44.315	121,411	5,059	84	327,809	13,659	228

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 UGB 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 used 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 2012 ISO completed an update evaluation of the fire insurance classification for the Scio Rural Fire Protection District. The evaluation resulted in a PPC of Class 4 within the city, a class of 4/9 in rural areas, 4/8 for dwelling class. 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 2012 Public Protection Classification summary report for the Scio Fire District determined the Needed Fire Flows for five locations within the District as follows:

Table 5.4 – Needed Fire Flows

Flow (gpm)	Facility	Address
4,000	Scio High School	38880 North Main St.
3,500	Centennial Elementary	38875 NW 1 st Ave.
3,500	Scio Middle School	38875 NW 1 st Ave.
3,000	Scio Feed & Country Store	38986 NE 1 st Ave.
2,250	Mennonite Church	38757 Highway 226

The **Basic Fire Flow** for the community is determined by the review of the Needed Fire Flows for selected buildings in the community. The fifth largest Needed Fire Flow is determined to be the Basic Fire Flow. 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 addresses above the **Basic Fire Flow for Scio has been determined to be 2,250 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 2014 storage requirement of 863,325 gallons (233,325 gallons + 630,000 gallons) and a 2034 storage requirement of 957,809 gallons (327,809 gallons + 630,000 gallons).

To meet the Basic Fire Flow of 2,250 gpm, the City needs to provide storage of 270,000 gallons (2,250 gpm for 2 hours) for fire flows plus the volume to meet peak daily demand. This equates to a 2014 storage requirement of 503,325

gallons (233,325 gallons + 270,000 gallons) and a 2034 storage requirement of 597,809 gallons (327,809 gallons + 270,000 gallons).

With a current storage capacity of 500,000 gallons, the City’s reservoir is just below the required volume to satisfy fire flow for two hours plus peak daily demands for the Basic Fire Flows. However, as population and demand increase, as discussed in this plan, the City will need to add additional storage, with approximately 100,000 gallons of storage needed by 2034. In order for the Fire District to achieve maximum credit for storage for the Needed Fire Flow, approximately 460,000 (957,809 gallons – 500,000 gallons) of additional storage would need to be added to the water system by 2034.

It should be noted that it is most likely not possible to obtain the maximum “Needed Fire Flow” of 3,500 in most areas of the City and it would not be economically feasible to upsize the lines throughout the system to obtain these flows. Therefore, the recommended storage improvements in this plan are based on meeting storage to meet the Basic Fire Flow of 2,250 gpm. Table 5.5 below shows the storage required, as discussed above, to meet the requirements of both flow categories.

Table 5.5 - Storage Needed to Maintain Fire Flows

ISO Fire Flow Category	Fire Flow (gpm)	Required Flow Duration (hrs.)	Stored Water Required to Meet Fire Flow (gal.)	2014			2034		
				Peak Daily Demand (gal.)	Total Required Storage (gal.)	Additional Storage Needed (gal.)	Peak Daily Demand (gal.)	Total Required Storage (gal.)	Additional Storage Needed (gal.)
Needed Fire Flow	3,500	3	630,000	233,325	863,325	363,325	327,809	957,809	457,809
Basic Fire Flow	2,250	2	270,000	233,325	503,325	3,325	327,809	597,809	97,809

Current Storage Capacity:	500,000 gal.
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SECTION 6 WATER SYSTEM IMPROVEMENT OPTIONS

6.1 General

The City of Scio currently uses two ground water wells to obtain its water for distribution and a supply capacity of 500,000 gallons by way of one steel reservoir. The storage, supply and distribution system does not currently have any major deficiencies that need to be addressed. However, below, are recommended and optional improvements that will improve the system and keep it operating at a satisfactory level.

6.2 Storage

The City currently has the reservoir inspected and cleaned every 3 years. It is important to continue this practice in order to maintain the longevity of the reservoir's life. It is recommended that the City consult with the tank manufacturer representative, Engineering America (503-682-7600), for the next scheduled tank maintenance. The manufacturer is familiar with the maintenance requirements of the reservoir and can review and recommend cleaning, resealing of joints, fillet replacement and fastener up keep.

Based on the necessity to maintain 270,000 gallons of storage for fire protection and the need for storage to meet the peak daily demand of 233,325 gallons, the City of Scio's 500,000-gallon reservoir is undersized to adequately meet the current 503,325 gallon storage requirement and, therefore, does not provide any reserve volume to allow for growth. The projected storage requirement in 2034 is 597,809 gallons.

Because the estimated required storage is not much larger than the current storage capacity of the system, is recommended that the City re-evaluate storage within the next 10 years. If growth and water use continue as estimated in this plan, the City will need to begin looking into additional storage options.

1. Existing Reservoir Expansion - The first option would be the expansion of the existing glass lined, bolted steel reservoir. Per the glass lined tank representative, Engineering America (formerly Aquastore NW, Inc.), adding additional wall height to the reservoir will provide a maximum tank capacity of 720,000 gallons. The addition of one wall ring would expand the reservoir capacity to 605,000 gallons at an estimated construction cost of \$110,000.00. The addition of two wall rings would expand the reservoir capacity to 720,000 gallons at an estimated cost of \$150,000.00. There are two major concerns with completing this option:

- a. The existing reservoir was designed for expansion upward, however, current and/or future building codes may not allow for this as seismic codes for construction have changed since the construction of the reservoir. The existing reservoir and the proposed expansion would have to be reviewed by a structural engineer to make certain the expanded tank meets all applicable building codes.
 - b. The reservoir would have to be taken out of service for 4 – 5 weeks to allow for construction. This would require the wells to run full time to meet service demand and would leave the City without adequate storage for fire protection.
2. New Reservoir Construction – The second option would be for the City to construct a new reservoir at the same elevation as the existing reservoir. A second reservoir will give the City additional storage as well as allow the City to always have one reservoir in service. It would also be advantageous for the City to construct a reservoir on the north side of Thomas Creek. This would provide the area north of the city with service and fire protection should the creek crossings ever become compromised. While the demand projections call for the need of an extra 100,000 gallons by 2034, it would be advantageous to build a larger reservoir so that storage needs beyond the 20 year planning period can be met. We would recommend the City plan for a 220,000 gallon reservoir, the capacity of adding two rings to the existing reservoir. Estimated budget costs are as follows:

<u>ITEM</u>	<u>COST</u>
1. Reservoir & Base	\$ 240,000.00
2. Reservoir Piping	\$ 150,000.00
3. Instrumentation & Controls	\$ 75,000.00
4. Land Purchase	\$ 100,000.00
5. Site Access Construction	\$ 30,000.00
4. Engineering Design	<u>\$ 125,000.00</u>
TOTAL	\$ 720,000.00

There are several variables that will influence the estimated construction cost including, type of tank selected, distance from existing water system, site access restrictions and the need to purchase land. Transmission main construction, from the new reservoir to the existing distribution system, has not been included in this estimate and will need to be considered when selecting a site for the new reservoir.

6.3 Wells

At this time, with a water production capacity of 790 gpm, the City has adequate flow from its two main wells to meet the 2014 peak daily demand of 162 gpm. There is also adequate flow to meet the future peak daily demand of 228 gpm in 2034. However, the City has expressed some concern over the long term reliability of Well #3. It is recommended the City budget for the re-drilling and upgrade of components at Well #3 toward the end of the 20 year design period. Should production begin to diminish sooner, the City may need to move this to a higher priority and complete the work sooner.

Estimated costs for the work at Well #3 are as follows:

	<u>ITEM</u>	<u>COST</u>
1.	Well Re-drilling	\$ 15,000.00
2.	Building Modifications	\$ 50,000.00
3.	New Pump & Effluent Piping	\$ 75,000.00
4.	Electrical & Controls	\$ 50,000.00
5.	Engineering Design	\$ 50,000.00
	TOTAL	\$ 240,000.00

The second options to improving available source water would be to explore the options of adding a back-up well to the system over the next 20 years. This will allow the city to provide the growing peak daily demand flows in the event one of the existing wells becomes inoperable or no longer produces at its current volume.

Estimated costs for the installation of a new well are as follows:

	<u>ITEM</u>	<u>COST</u>
1.	Well Drilling	\$ 50,000.00
2.	Well & Pump Building	\$ 100,000.00
3.	Pump & Effluent Piping	\$ 75,000.00
4.	Electrical & Controls	\$ 50,000.00
5.	Engineering Design	\$ 70,000.00
	TOTAL	\$ 345,000.00

6.4 Distribution System

The majority of the recommended projects in FEI's 1992 Master Water Plan update have been completed. These projects include the installation of the 12-inch distribution main on Main Street, a second creek crossing, the elimination of dead-end lines throughout the system, and the replacement of 2" waterlines on Garden Drive and S. First Ave. These upgrades in addition to a new well and a 500,000 gallon storage reservoir have created a water system with very few deficiencies. In discussions with City personnel and per

the distribution modeling completed for the system, there appears to be no areas in the water system with inadequate flows or pressures.

The computer modeling software used for the City of Scio's distribution system analysis was EPANET Version 2.0 produced by the Water Supply and Water Resources Division of the U.S. Environmental Protection Agency.

90 pipes with 68 nodes were utilized to model the City of Scio's storage and distribution system. The existing distribution system is shown on the Node Map found in Appendix F. The Node Map was used to format the computer modeling data for the distribution system. Samples of the resulting data for one of the modeled runs is also presented in Appendix F.

By simulating a heavy use, as would be seen in under fire flow conditions, major deficiencies in the system can be identified. The model evaluated for this plan was set up to review fire flow conditions during peak daily demands. Each of the 86 nodes was assigned a demand of 4 gpm, producing an overall system demand of 272 gpm, which exceeds the future peak daily demand of 228 gpm. Maximum flows were then determined at various points in the system to represent fire flow. As can be seen in Table 6.1 below, the recommended basic fire flow of 2,250 gpm is met in the commercial and public school areas. Residential areas do fall below the basic fire flow recommendation, however, per the Oregon Fire Code; flows of 1,000 gpm are acceptable for residential dwellings under 3,600 sq. ft.

Table 6.1 - Maximum Available Fire Flows

Location (Zone)	Maximum Modeled Flow at 20 PSI (gpm)
Scio High School (Public)	2,600
Centennial Elementary School (Public)	2,400
Scio Middle School (public)	2,450
Scio Feed & Country Store (Commercial)	3,000
N.W. 2nd & Main St. (Commercial)	2,900
Mennonite Church (Outside UGB)	4,350
S.W. Sixth & Filbert (Residential)	2,000
S.W. 2nd & Ginko (Residential)	1,725
S.W. 3rd & Beech (Residential)	2,250
S.W. 2 nd & Alder (Residential)	1,350
S.E. 4th & Cedar (Residential)	1,650
N.W. 3rd & Beech (Residential)	2,000
Garden Dr. (Residential)	1,000
N.E. 1st & Ash (Residential)	1,850
N.E. 4th & Ash (Residential)	1,800
N.E. 1 st Ave. Alley (Commercial)	750

Because of the sufficiency of the current system, only two low priority waterline improvements are recommenced at this time. The improvements are recommended to improve fire flows in the area of S.W. 2nd Ave and N.E. 1st. Ave. These proposed improvements and projected fire flow improvements are as follows:

- 1) Complete the connection of the waterline on S.W. 2nd Ave. between Alder St. and the 12" mainline on Highway 226. During the 1995 Water System Upgrade project a 12"X6" tee was installed on the new Hwy 226 12" watermain at the S.W. 2nd Ave intersection. A 6"X4" reducer was installed on this tee and a 4" waterline was bored under the Highway and capped for future extension by the City. It is recommended that the 4"X6" reducer be removed from the existing tee, the 4" waterline be removed from the casing. A 6" C900 PVC line should then be connected to the existing tee, run through the existing bore casing, and connected to the 6" waterline that runs on S.W. 2nd Ave from Beech St. to Alder St. The completion of this project would increase the available fire flow of 1,350 gpm, as shown in Table 6.1 for S.W. 2nd & Alder, to approximately 2,300 gpm.
- 2) Upgrade the old 4" waterline running north/south in the alley way off of N.E. 1st Ave. Because this line services several commercial buildings, it would be beneficial to replace the line with an 8" waterline and install a fire hydrant in order to supply adequate fire flow to these businesses. The completion of this project would increase the available fire flow of 750 gpm, as shown in Table 6.1 for the end of the Alley, to approximately 2,100 gpm.

Budgetary estimates for the engineering and construction of these upgrades are as follows:

<u>Location</u>	<u>Length</u>	<u>Cost/Ft.</u>	<u>Est. Cost</u>
1) SW 2 nd Ave.	300'	\$110.00	\$33,000.00
2) NE 1 st Ave. Alley	200'	\$120.00	\$24,000.00

Please note that costs are basic estimates and detailed cost estimates should be completed prior to any construction planning.

6.5 Treatment

Although not mandated at this time, it would be beneficial to implement a disinfection treatment scheme to the City's well water. The most cost effective method of treating well water would be to introduce chlorinated water to the effluent well water at the well sites. The goal of adding chlorination to the system should be considered in order to maintain chlorine residual in the distribution system to inhibit the growth of bacteria.

There has been no State requirement for the City of Scio to treat the well water and treatment would be voluntary. Voluntary treatment of well water requires no specific contact time of chlorinated water. The City would only need to show that periodic samples of the water within the system show measurable chlorine residual throughout the distribution system per OHA.

At the 2014 peak demand of 162 gpm, one pound of chlorine would be required each day to chlorinate at 0.5 mg/L. A dosing pump and mixing tank would need to be installed in Well #3 and #4 well buildings. Adequate ventilation would also be required in each of the buildings. Each day that Well #4 is in operation, a National Sanitation Foundation (NSF) approved, commercial grade liquid chlorine will need to be added to the mixing tank. The same would be required in the Well #3 mixing tank prior to the start up of that well.

Estimated costs for the installation of the above chlorination system are as follows:

	<u>ITEM</u>	<u>COST</u>
1.	Pumps	\$ 7,000.00
2.	Mixing Tanks	\$ 1,500.00
3.	Ventilation/Bldg Modification	\$ 4,200.00
4.	Engineering	\$ 4,200.00
	TOTAL	\$ 16,900.00

Estimated cost for annual operation of the system is as follows:

	<u>ITEM</u>	<u>ANNUAL COST</u>
1.	Chlorine	\$ 1,000.00
2.	Labor	\$ 5,000.00
3.	Service	\$ 1,500.00
	TOTAL	\$ 7,500.00

6.6 Sample Stations

The City currently takes water samples from existing water users on the water system. Taking samples from the customer side of the meter have been shown to give false positive tests for bacteria as the City does not have control of the system on the customer side of the meter. Designated sampling stations provide a site to retrieve samples at any time versus coordinating sampling from homes and businesses. Sampling stations have been shown to lower false positives, speed collection times, and reduce liability concerns. Sampling stations have been approved for use in the EPA's Total Coliform Rule. Erwin Consulting recommends that the City install 3-4 sampling stations at various points in the distribution system. Installation by a

contractor is estimated at \$3,000.00 per location, as follows:

	<u>ITEM</u>	<u>COST</u>
1.	Sampling Station	\$ 1,050.00
2.	Installation Materials	\$ 750.00
3.	Installation	<u>\$ 1,200.00</u>
	TOTAL	\$ 3,000.00

6.7 SCADA System Upgrade

Vast improvements have been made to water system supervisory control and data acquisition (SCADA) systems over the last 10 years. There are many options and prices for installing and/or upgrading systems. The first step in looking at changes to the City's water system control system would be to have a review of the system and a pre-design report completed by an electrical engineer. This will allow the City to detail what they want in the way of control and process monitoring. It also gives the design engineer a chance to review the existing system to see what components need upgrading or replacing. A typical pre-design report to cover a system the size of Scio's is \$5,000. The completed report will provide recommendations and pricing options for the City to review. For budget purposes, a new SCADA system with new hardware at the City's remote sites would be as follows:

	<u>ITEM</u>	<u>COST</u>
1.	Pre-design Study & Report	\$ 5,000.00
2.	Remote Site Hardware	\$ 25,000.00
3.	SCADA Software	\$ 12,000.00
4.	Software Development	\$ 20,000.00
5.	Computer Hardware	\$ 2,500.00
6.	Design Engineering	<u>\$ 15,000.00</u>
	TOTAL	\$ 79,500.00

As discussed above, the pricing can vary greatly and depends on the quality of existing telemetry hardware, control desires of the City, software preferences, the number of required input and outputs, and communication needs. A thorough review and pre-design report with a more detailed cost estimate completed by an electrical engineer is recommended as the first step to implementing a new SCADA system.

6.8 Backup Power Generator

The City's storage capacity of 500,000 gallons provides two days of stored water to meet two days of peak water demand and one day of peak demand and basic fire flow requirements. The City doesn't typically have power outages longer than a day, in which case the reservoir has enough storage to meet peak demands and fire storage. However, in a disaster situation with power outages longer than 2 days, the City might see stored water depleted.

To ensure continued supply water it is recommended that the City look to add a manually operated back-up generator to Well #4. Budget pricing for installing a manually operated back-up generator is as follows:

	<u>ITEM</u>	<u>COST</u>
1.	60 kW Generator	\$ 25,000.00
2.	Installation	\$ 15,000.00
5.	Design Engineering	<u>\$ 10,000.00</u>
	TOTAL	\$ 50,000.00

6.9 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 starting a leak detection program. The recommended way to complete a leak detection survey is to contract with a leak detection contractor. Erwin Consulting Engineering consulted with American Leak Detection and was quoted a price of \$2,500.00 to complete a survey on the City of Scio's water system. It is estimated that the survey will take two (2) days at \$1,250/day to complete.

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 be then be submitted upon completion, which will identify leak locations, aid in prioritizing repairs and provide a record for future maintenance. The City will need to review the completed leak detection survey and develop a repair schedule by prioritizing fixes based on 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.

The City also has the option of purchasing their own leak detection equipment. While leak detection equipment is an important tool for the City to have on hand, it would be more commonly used to find suspected leaks. City Staff may not have the time, training and resources to complete a full system survey. The acoustic leak sounding survey tool used by American Leak Detection has a list price of \$4,495.00.

SECTION 7 WATER CONSERVATION

7.1 System Meters

The City of Scio's water system is fully metered. All individual water services are metered and are read and recorded on a monthly basis. Per the City's Standards for Public Improvements, meters manufactured by Sensus are to be installed as the standard water service meter. The two source wells, Well #3 and Well #4 are also metered and usage readings are recorded monthly. Well #3 has a 6" McCrometer propeller meter and Well #4 has a 6" Water Specialties propeller meter.

In 2012 a new Scio Fire District fire station was constructed. As part of this project a new fire hydrant equipped with an effluent water meter was installed. This hydrant has been designated as the fill point for the fire district. This was done to allow the City better track the water used to fill fire district trucks.

7.2 Meter Testing & Maintenance

The City does not have a specific meter testing plan in place for water service meters. However, City personal is diligent in checking meters that show abnormal use. If the meter is giving inaccurate readings it is replaced by the City.

Erwin Consulting Engineering has reviewed the operation of the well meters with City Personnel and has recommended the meters be tested and calibrated to ensure they are maintaining their 2% accuracy of true flow as specified. With the two separate well sites utilized, the City also has the option of using one well site while the other is taken off line for servicing and testing. If necessary, both well meters are designed with a removable propeller so that flow to the system can be maintained during this calibration work.

As part of the completion of this plan, the City of Scio will establish a 5-year benchmark to implement a meter testing and maintenance program for the City's customer water service meters and source well meters. The testing interval and replacement schedule will be established based on the specific meter manufacturer's recommendations.

7.3 Annual Water Audit

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

- 1) The City utilizes RSV Utility Billing Software (RSV) to calculate lost water. A monthly System Totals Report is generated by RSV showing water production, water use and lost water.
- 2) Well meters are read and recorded by the City on a monthly basis. This amount is entered into RSV and shown on the System Totals Report as **Water Pumped This Month**.
- 3) Water usage totals for all of the metered services on the water system are recorded on a monthly basis and automatically input into RSV's System Totals Report for billing purposes. The monthly usage totals for the metered services transfer to the System Totals Report as **Water Sold This Month**.
- 4) Authorized water use that is metered and unmetered (system flushing, fire department use, City use) is estimated by the City and/or read from meters where applicable (city facilities, parks, etc.). The total amount is then entered into RSV as Fire/Flush Water and shows on the System Totals Report as **Water Used for Fire and Flushing Line**.
- 5) Lost water is calculated within RSV, by subtracting the **Water Sold** total and **Total Used for Fire/Flush** from the **Water Pumped** total. This total is shown on the System Totals Report as **Water Loss**. The percentage of lost water is then calculated within RSV by dividing the **Total Water Loss** by **Water Pumped**. **Total Water Lost** accounts for all unauthorized use (water theft, etc.) and system losses (leaks, etc.).
- 6) The monthly System Totals Report data is then transferred by RSV into the Usage and Loss Report which can be printed for a period of time, and shows the same figures in a columnar report.

The City utilizes the Usage and Loss Report discussed above to complete water audits by keeping a running comparison of water production, use and loss each month. The City is able to print and review at the end of each year. Recent audit quantities are shown in Table 4.3.

7.4 Leak Detection Program

After reviewing the City's annual water audits, Erwin Consulting Engineering is recommending the implementation of a leak detection program as part of the completion of this plan. Overall, the City has water loss within the acceptable range (15% loss as discussed in Section 4.5 of this Plan) but has individual months of loss outside of the acceptable threshold.

Conducting regular leak testing will help to eliminate leaks as the cause of these numbers or help the City to correct leaks if they are found. We recommend an initial leak detection survey be completed by a leak detection contractor after the approval of this plan and then every 5 years thereafter.

7.5 Rate Structure & Billing

The City utilizes rate structure that attempts to create awareness that usage costs will increase as more water is used. A flat fee of \$31.98 for in town residential meters, \$41.75 for out of town residential meters, \$32.00 for small commercial meters, and \$35.17 for large commercial meters is charged for water use up to the base amount of 3,000 gallons. After the base amount is reached an increasing price per gallon is charged per the amount of water used in three increasing usage blocks. The first block is usage of 3,001 – 5,000 gallons, the second block 5,001 – 8,000 gallons, and the third and final block is usage over 8,000 gallons. The price increase for these usage blocks for each user class is shown on the City of Scio Water Rate Fee Schedule (July 2014) included as Appendix G. An annual 3% increase in the base fee and price per gallon for the use over the base amount is calculated prior to and effective with the July 1st bill each year.

To assist the City with long term project planning and review the effectiveness of the current structure, it would be beneficial for the City to complete a comprehensive water rate study in the next five years. Rate studies typically review revenue requirements, funding options, analysis of alternate rate structures, and rates and fees by customer class.

Meter readings are conducted monthly and bills showing quantity of water used are sent out at the first of each month. Therefore, customers receive bills relatively close to the time water was used, providing a time price signal to the customer.

7.6 Public Education Program

The City does not currently have a public education program for water consumption in place and, as a small community, has limited funds and resources to maintain an extensive public education program. However, with the approval of this plan the City will implement the distribution of flyers showing water savings tips and methods. The City will include this flyer in their Consumer Confidence Report (CCR), which is mailed out annually in May, just prior to the heavy consumption summer months. The flyer will be displayed and available to citizens at the Scio City Hall and on the City's website year round. A sample flyer is included as Appendix H.

7.7 Water Use Measurement and Reporting

The City of Scio complies with OAR Chapter 690, Division 85 by recording monthly water production at their source wells and submitting this information to Oregon Water Resources Department. The City submits the data via the department's online form the first week of October each year for the previous water year (October 1 – September 30).

7.8 Conservation Summary

This plan is the first water conservation and management plan for the City of Scio and the City does not currently have any conservation actions or plans in place, other than those discussed above. The City intends to use this plan as a 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 well 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 Scio relies on groundwater wells for their source water. The primary concerns for the City that may lead to the loss of water production at these wells are mechanical or structural failures or contamination. The City has built in curtailment tools that are covered below in 8.2 – *Assessing Water Supply* and a City Ordinance that covers water user curtailment actions.

City of Scio Ordinance No. 457 addresses the possibility that source water may become limited by reason of natural or unnatural occurrences and gives the city council the authority to limit water use. While the ordinance falls short of meeting the requirements of OAR Chapter 690 Division 86 because it does not give specific triggers for action or detailed actions, it does provide the council power to restrict the use of water for lawns, gardens, ornamental display, irrigation, sprinkling, car washing or unattended open hose use.

As part of this plan the City is working to update the ordinance to include the triggers and actions discussed below. Copies of the current and updated ordinances have been included as Appendix I.

8.2 Assessing Water Supply and Storage

No major emergencies have affected the City's ability to supply water over the last 10 years.

The capacity of the system is limited to the production of Wells #3 and #4. As discussed in Section 4, Well #4 has a current pumping capacity of 360 gpm, while Well #3 has a capacity of 430 gpm. These wells are in different locations in town and are not used simultaneously. This provides a built-in tool in the case of an emergency, as the City can rely solely on one of these locations should the production at one diminish or the well become unusable. Furthermore, a third well site is available as an emergency back-up should the two main locations have issues at the same time.

The City also has a storage reservoir on the system, which they can rely on for short term outages. The wells are set to run on level demand in the reservoir so the full storage capacity of 500,000 gallons is maintained. This gives the City two days of peak daily demand available for water supply should all well production go down.

8.3 Curtailment Strategy

As mentioned above, City Ordinance No. 457 does not provide specific stages for alert in order to implement water use restrictions. The following are the proposed stages and curtailment actions that will be included in the revised ordinance (Appendix I):

Stage 1 – Conservation Stage Alert

The trigger for the Conservation Stage Alert occurs when water use reaches 80% of the current well 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.

Stage 2 – Moderate Stage of Alert

The trigger for the Moderate Stage Alert occurs when water use reaches 90% of the current well production for two consecutive days or a State-declared drought in the Scio area is acknowledged by 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:

1. Prohibit lawn watering between 7:00 a.m. and 7:00 pm.
2. 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. Thomas Creek shall be used as the dividing line between north and south.
3. Prohibit the hosing down of driveways, sidewalks, and parking lots with City supplied water.
4. Prohibit the watering of all City parks and open areas.
5. Prohibit any unnecessary flushing of fire hydrants and water mains.

Stage 3 – Emergency Stage of Alert

The trigger for the Emergency Stage Alert occurs when water use reaches 95% of the current well production, when total well production capability is lost, or when deemed necessary by the City Manager. The City Manager shall declare an Emergency Stage of Alert and call for a continuation of the prohibited items under the Moderate Stage Alert and prohibit the following uses:

1. 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.
2. 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.
 3. The filling of private swimming pools with City supplied water.

8.4 Staff Responsibilities

The following staff member will have the tasks listed in a water curtailment event:

City Manager - Asses emergency situation and declare stage of alert. Distribute user notification of alert and curtailment actions to be taken.

Public Works Superintendent – Review usage data versus production capacity and recommend stage of alert. Coordinate with users, specifically major water users, to reduce consumption. Monitor system use for flushing and City park watering.

Linn County Sheriff – Enforce water curtailment measures.

8.5 Summary

OAR 690, Division 86 rules require that all public water suppliers have an emergency water curtailment plan. While the water supply for the City has been historically reliable and the system has built in emergency response tools, the City recognizes the need to be prepared for a decrease in available supply. To address this, the City will update City Ordinance No. 457 to include the curtailment triggers and actions covered in this section.

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 needs 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 \$51,600. Therefore, the City of Scio 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 Scio, per U.S. Census data, of \$45,000, Scio 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.

Approximately \$11 million per year is available for Public Works, Technical Assistance, Economic Development, and Community Crisis grants. Public Works and most Technical Assistance grants are awarded through annual competition. Applications for these grants can be submitted at any time during the project year described in Part 4 – Application Procedures of the CDBG program guidelines.

Public Work Grants are up to \$2 million for acquisition of property, including rights-of-way, construction, improvements, or expansions of water systems. Projects can also include costs related to site improvements, final engineering, and grant administration cost. All projects must be in accordance with an approved water or wastewater plan. Grants up to \$150,000 are available for preliminary engineering and planning.

Community Crisis Grants are up to \$500,000 for projects needed to address problems which pose a serious and immediate threat to public health and welfare which were unforeseen and which the community cannot solve with local funds. These grants are not available to solve seasonal or longstanding problems with water supply, treatment, distribution, or storage.

Competitive applications are accepted year-round and reviewed quarterly. All awards are subject to funding availability. Contact the Oregon Business Development (OBDD) at 503-986-0123 or review program details at www.orinfrastructure.org.

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.org.

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 regulator 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 are 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 \$50,000 in additional loan funds may be awarded to eligible applicants of under 15,000 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 \$100,00 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.

The application process for the SDWRLF loan program begins with the submittal of a letter of interest, which can be submitted any time of the year. All letters of interest will be ranked and included on a Project Priority List (PPL) for a two-year period. According to the quantity of funds available to Oregon for that federal fiscal year, this priority project list determines which projects are permitted to make final application to the department under SDWRLF. If a project is not approved for final application the letter of interest must be updated every two years or the project will be removed from the priority list.

The format for this letter can be and additional information can be obtained from the Oregon Infrastructure Finance Authority, 503-986-0130, 775 Summer St. NE, Suite 200, Salem, Oregon 97301 or on their website, www.orinfrastructure.org.

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 (WDLF) 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.
- Multipurpose 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 which are 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 conduces 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 \$1000 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 economical 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 is 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 EDA'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.

EDA 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. RCAC 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 Griff, 720-898-9463 or jgriff@rcac.org. 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 1 bill 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 they 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 institutions 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 than 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

The goals of this plan were to determine the amount of water required to meet the City of Scio'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.

It should be noted that Linn County, Oregon is local government that is affected by this plan, as they evaluate consistency of the City's Water Management, Conservation, & System Master Plan with the County's comprehensive land use plan. Notice of this plan was provided to Linn County and Linn County did not provide any comments on the plan.

10.2 Summary of Findings

- **Growth** – The projected population growth for water system planning was determined to be 1.7% annually in this Plan. This results in a projected population for the City of 1,275 residents in 2034, the end of the 20 year planning period. Based on this growth, the resulting peak daily water demand in 2034 was found to be 228 gallons per minute (gpm) or 327,809 gallons per day (gpd).
- **Supply** – The combined available supply flow of 790 gpm from City wells #3 (360 gpm) and #4 (430 gpm) is sufficient to meet the 2014 peak daily demands of 162 gpm in 2014 and 228 gpm in 2034. Therefore, supply is adequate for the planning period and additional sources are not required at this time.
- **Storage** – The City's current storage capacity of 500,000 gallons is below the amount the City needs to provide to meet the 503,325 gallons for fire flow and peak daily demands. There is no storage room available for growth and the City should begin planning for additional storage.
- **Distribution** – The distribution system has few deficiencies and provides adequate flows and pressures throughout. Minor improvements to maintain the system are noted in Section 10.3.

- **Water Conservation** – Water conservation awareness in the City can be improved. The City should begin conservation efforts highlighted in this plan, which include:
 - A public education program
 - Well and 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 10.2 will assist the City in maintaining a viable water system throughout the 20-year planning period and beyond.

10.3 System Improvements

The City of Scio has a 2014 peak daily water demand of 162 gpm (233,325). By the year 2034 the population of Scio is expected to reach 1,265 residents. This increase in population will increase the peak daily demand for water to 228 gpm (327,809 gpd).

Source Water Supply and Quality

At the 2014 (162 gpm) and 2034 (228 gpm) peak daily water demands it is clear that the present production of 790 gpm by Wells #3 & #4 is sufficient to cover the demand (Table 10.1). However, since well production can diminish over time it has been recommended that the City review options for adding a backup well to the system in the next 20 years.

TABLE 10.1 - Well Production

Well	Current Water Production (gpm)
No. 3	360
No. 4	430
Total	790

The City has exceptionally high water quality and has had a strong record in complying with drinking water requirements and standards. The City was designated as an “Outstanding Performer” following the completion of their 2010 water system survey. The City’s goal is to maintain this high level of water quality.

Although it is not a required improvement at this time, adding a chlorination treatment system to Wells #3 and #4 would be a safeguard against well contamination and help achieve the goal of maintain chlorine residual in the distribution system to inhibit bacteria growth. OHA does not require the disinfection of well water that has no contamination history. The chlorination system described in Section 6.5 would provide chlorination to meet the requirements of voluntary chlorination which, per OHA, requires only a measurable amount of chlorine residual be present at any point in the system. If ever there was a requirement to disinfect the City's well water there would be additional cost to the City to bring the chlorination system up to the requirements as mandated by OHA.

Additional optional improvements that have been recommended include installing sample stations to provide more reliable testing points in the system, an upgraded SCADA system for better data recording and control of system operation, and a backup power generator at Well #4.

Distribution

The existing distribution system provides adequate flows and pressures to the majority of the city. The City should work to maintain the existing system by completing regular maintenance on the system and consider completing the two recommended waterline improvements. The City should also implement a leak detection program to help find and correct leaks throughout the system.

Storage

Based on the necessity to maintain 270,000 gallons of storage for fire protection and the need for storage to meet the peak daily demand of 233,325 gallons, the City of Scio's 500,000-gallon reservoir is undersized to adequately meet the current 503,325 gallon storage requirement and does not provide any reserve volume to allow for growth. Therefore, it is recommended that the City begin planning for the construction of a new reservoir in the next 10-years. The City has two options for increasing storage capacity; increasing the size of the existing reservoir or constructing a new reservoir. It is recommended that the City construct a new reservoir north of Thomas Creek. This option will give the City the benefit of a two reservoir water system. The benefits to having more than one reservoir are the ability to take one reservoir off line for maintenance while still providing water storage and increased emergency preparedness.

Recommended Projects

The recommended projects discussed above and in this plan are provided in Table 10.2 at the end of this section. The table gives the estimated cost for each project and the priority phase for which the project should be completed.

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 Scio has had a historically reliable system. With source wells in different areas of town they have the ability to use one or the other should one of them become inoperable. A 500,000 gallon storage reservoir provides additional protection in the case of short term outages at either well site.

City Ordinance No. 457 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 update Ordinance No. 457 with the three stages of alert and the associated conservation actions to be taken as outlined in this plan.

10.7 Plan Update

The City of Scio proposes to submit an updated plan in December 2024, 10 years from the submittal of this plan. 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 wells are anticipated prior to the end of this 10 year period.

10.8 Rate Study

In considering the recommended projects, it would be beneficial for the City to complete a comprehensive water rate study. 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 10.2 for each project phase. The rates are based on 389 service meters and 20 year project loan repayment.

10.9 Recommendations

In conclusion, it is recommended the City of Scio:

1. Approve and adopt the Water Management, Conservation, & 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 10.2 below.
4. Consider the completion of the optional improvements; well water chlorination, sample stations, and SCADA system pre-design report and upgrade shown in table 10.2 below.
5. Adopt and implement Conservation elements and 5 year benchmarks set forth in this plan including; the Public Education Program, source and customer meter testing and calibration, and a leak detection program.
6. Adopt Curtailment Plan by updating City Ordinance No. 457 to include the triggers and curtailment actions detailed in this plan.
7. Develop a policy in which the City's Water Management, Conservation, & System Master Plan is evaluated every ten (10) years in order to update the contents of the plan and review growth, water demand, well production, storage capacity, and project priority. Make arrangements to have the updated plan submitted to and reviewed by Oregon Water Resources by the end of 2024.
8. Complete Rate Study based on the recommended projects shown in Table 10.2.

By adopting the above list of improvements, the City of Scio will continue to provide adequate water supply, storage, and distribution for many years to come, work to conserve water, and be better prepared for a water supply emergency.

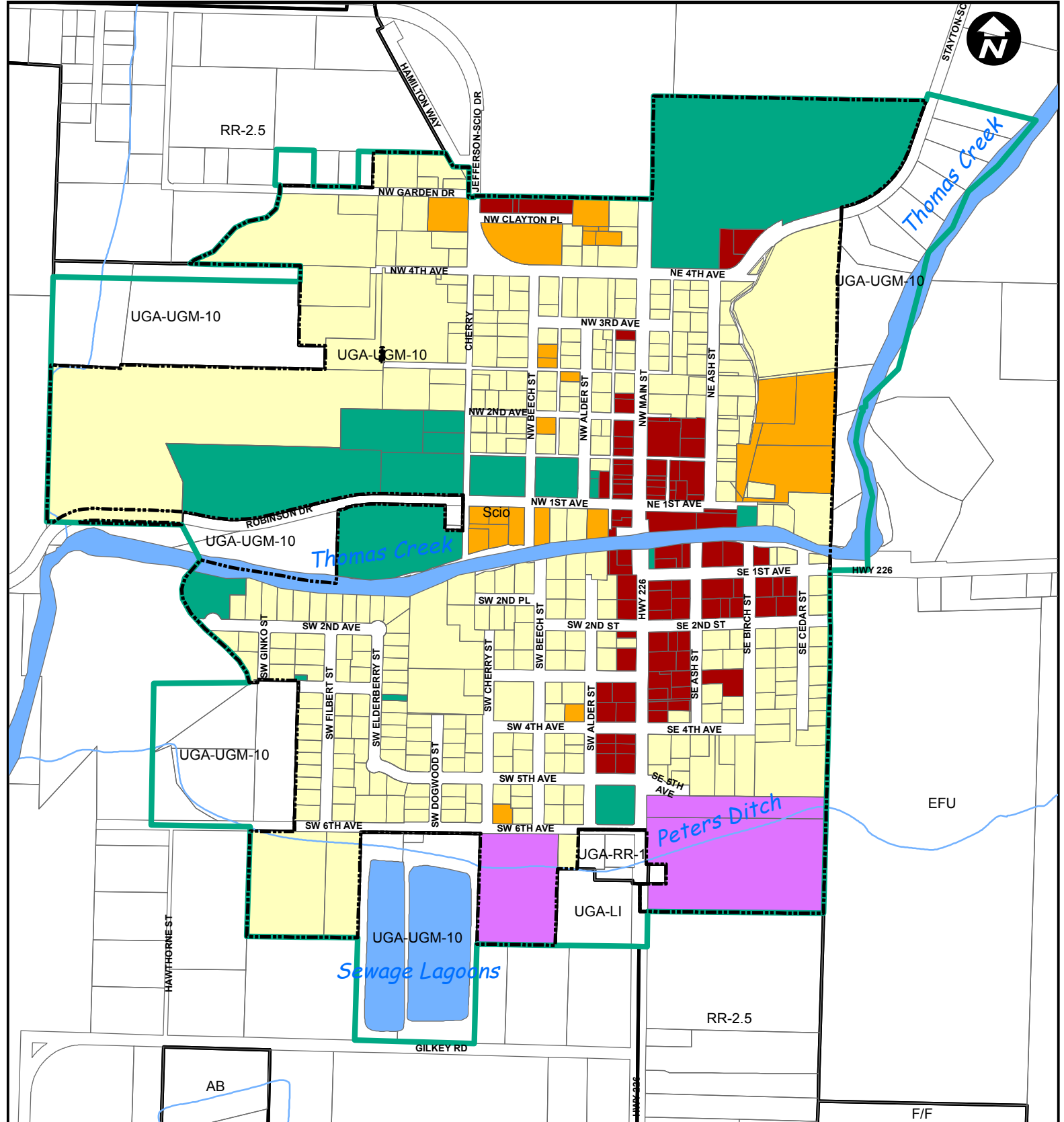
Table 10.2 - Recommended Projects

	Phase 1 0-5 years	Phase 2 5-10 years	Phase 3 10-20 years
Water Supply & Operation			
Chlorination System	-	\$ 16,900.00	-
Chlorination System Operation (\$7,500/year)	-	\$ 37,500.00	\$ 75,000.00
SCADA System Upgrade	\$ 74,500.00	-	-
Well #3 Re-drilling & Upgrades	-	-	\$ 240,000.00
Back-up Power Generator at Well #4		\$ 50,000.00	-
New City Well	-	-	\$ 345,000.00
Water Distribution			
S.W. 2nd Ave Waterline Improvement	\$ 33,000.00	-	-
N.E. 1st Ave. Alley Waterline Improvement	\$ 24,000.00	-	-
Water Sampling Stations (3 locations)	\$ 9,000.00	-	-
Water Storage			
New 220,000 gal. Storage Reservoir	-	\$ 720,000.00	
Existing Reservoir Interior/Exterior Cleaning, Sealing, & Maintenance (every 20 years)	\$ 65,000.00		\$ 65,000.00
Water Conservation			
Source Meter Testing and Calibration (every 5 years)	\$ 1,500.00	\$ 1,500.00	\$ 3,000.00
Leak Detection Program (every 5 years)	\$ 2,500.00	\$ 2,500.00	\$ 5,000.00
Public Education Program (\$300/year)	\$ 1,500.00	\$ 1,500.00	\$ 3,000.00
Planning			
SCADA System Pre-design Study & Report	\$ 5,000.00	-	-
Water Rate Study	\$ 20,000.00	-	-
Update Water Management, Conservation & System Master Plan and review demand and storage and pumping capacities every 10 years	-	\$ 25,000.00	\$ 25,000.00
Totals	\$ 236,000.00	\$ 854,900.00	\$ 761,000.00
\$/month/service meter			
Estimated Water Rate Impact - Based on 389 meters and 20 year loan payback	\$ 2.53	\$ 9.16	\$ 8.15

**SECTION 11
APPENDIX**

- A. City of Scio Zoning Map**
- B. Oregon Water Resources – Final Order for Extension of Time for Permit Number G-12694**
- C. Oregon Administrative Rules**
- D. ODFW Fish Passage Spreadsheet**
- E. Water Rights Summary and Documentation**
- F. Water System Computer Modeling**
- G. City of Scio Water Rate Fee Schedule**
- H. Public Education Program Flyer**
- I. City of Scio Ordinance No. 457**

Appendix A
City of Scio Zoning Map



Zoning

As Amended October 10, 2012



City of Scio
 Map Created 6/19/2014.
 Data Provided by the City
 of Scio and Linn County.

This product is for informational purposes only and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the suitability of the information.

Legend			
	Commercial		City Limits
	Light Industrial		UGB
	Public		Rivers and Streams
	R-1 Single Family Residential		Taxlots
	Multi-Family Residential		County Zoning

Appendix B
Oregon Water Resources – Final Order for Extension of Time for
Permit Number G-12694

Oregon Water Resources Department
Water Right Services Division

Water Rights Application
Number G-14109

Final Order
Extension of Time for Permit Number G-12694
Permit Holder: City of Scio

Permit Information

Application File G-14109/ Permit G-12694

Basin 2 – Willamette Basin / Watermaster District 19

Date of Priority: June 26, 1995

Authorized Use of Water

Source of Water:	Well 4 within the Willamette Basin
Purpose or Use:	Municipal
Maximum Rate:	1.78 Cubic Feet per Second (CFS)

This Extension of Time request is being processed in accordance with Oregon Revised Statute 537.630 and 539.010(5), and Oregon Administrative Rule Chapter 690, Division 315

Appeal Rights

This is a final order in other than a contested case. This order is subject to judicial review under ORS 183.484. A request for judicial review must be filed within the 60 day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080 you may either file 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.

Application History

Permit G-12694 was issued by the Department on August 21, 1996. The permit called for completion of construction by October 1, 1998, and complete application of water to beneficial use by October 1, 1999. On March 20, 2008, the City of Scio submitted an application to the Department for an extension of time for Permit G-12694. In accordance with OAR 690-315-0050(2), on December 10, 2013, the Department issued a Proposed Final Order proposing to extend the time to complete construction to October 1, 2049 and to extend the time to fully apply water to beneficial use to October 1, 2049. The protest period closed January 24, 2013, in accordance with OAR 690-315-0060(1). No protest was filed.

Findings of Fact

Except as expressly stated herein, the Department adopts and incorporates by reference the findings of fact in the Proposed Final Order dated December 10, 2013.

Footnote 7, as shown in the Proposed Final Order is corrected as follows (additions are shown in “underline” text, deletions are shown in “~~strikethrough~~” text):

⁷ The ~~undeveloped~~ portion (0.95) + the undeveloped portion not having PSI (0.62) = 1.57

At time of issuance of the Proposed Final Order the Department concluded that, based on the factors demonstrated by the applicant, the permit may be extended subject to the following conditions:

CONDITIONS

1. **Development Limitations**

Appropriation of any water beyond 0.95 cfs under Permit G-12694 shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86 that authorizes access to a greater rate of appropriation of water under the permit consistent with OAR 690-086-0130(7). The required WMCP shall be submitted to the Department within 3 years of this Final Order. The amount of water used under Permit G-12694 must be consistent with this and subsequent WMCP’s approved under OAR Chapter 690, Division 86 on file with the Department.

The deadline established in this Extension Final Order for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the requirements of this final order may also meet the WMCP submittal requirements of other Department orders.

2. **Conditions to Maintain the Persistence of Listed Fish**

A total of 1.57 cfs, being 0.95 cfs (developed portion of the permit) and 0.62 cfs (the undeveloped portion of the permit not having PSI) is *not* subject to these fish persistence conditions.

A. **Fish Persistence Target Flows**

- a. Fish persistence needs in Thomas Creek as recommended by ODFW are in Table 1, below; flows are to be measured at the mouth of Thomas Creek near Scio, Oregon, USGS GAGE No. 14188800, or its equivalent.

Table 1

FISH PERSISTENCE TARGET FLOWS NEEDS AT THE MOUTH OF THOMAS CREEK MEASURED AT USGS GAGE 14188800, NEAR SCIO, OREGON	
Month	Cubic Feet per Second
Jan 1 – May 31	100
June 1 – June 15	50
June 16 – June 30	40
July 1 – July 15	35
July 16 – July 31	30
Aug 1 – Aug 15	25
Aug 16 – Sept 15	20
Sept 16 – Sept 30	44
Oct 1 – Dec 31	100

- b. Alternate Streamflow Measurement Point(s)
 The location of a streamflow measurement point as established in these Conditions to Maintain the Persistence of Listed Fish may be revised if the City provides evidence in writing that ODFW has determined that persistence flows may be measured at an alternate streamflow measurement point and the City provides an adequate description of the location of the alternate streamflow measurement point, and the Water Resources Director concurs in writing.

B. Determining Water Use Reductions - Generally

The undeveloped portion of Permit G-12694 having PSI with Thomas Creek is 0.21 cfs. The maximum amount of the undeveloped portion of Permit G-12694 having PSI with Thomas Creek that can be appropriated as a result of this fish persistence condition is determined in proportion to the amount by which the flows shown in Table 1 are missed based on a seven day rolling average of mean daily flows measured at the mouth of Thomas Creek. The percent of missed target flows is defined as:

$$(1 - [(Q_A - E_{PSI}) / Q_T]) \times 100\%,$$

where Q_A is the actual flow measured at the designated location based on the seven day rolling average¹, E_{PSI} is the undeveloped portion of the permit having PSI with Thomas Creek as of this extension, and Q_T is the target flow (from

¹ Alternatively, the City may use a single daily measurement.

Table 1).

The percent missed target flows applied to the undeveloped portion of this permit having PSI with Thomas Creek provides the maximum amount of undeveloped water that can be appropriated as a result of this fish persistence condition, and is defined as:

$$E_{PSI} - (E_{PSI} \times \% \text{ missed target flows}),$$

where E_{PSI} is undeveloped portion of the permit as of this extension having PSI with Thomas Creek, being 0.21 cfs.

The maximum amount of undeveloped water that can be appropriated as a result of this fish persistence condition may be adjusted by a Consumptive Use Percentage, when applicable, as per Item 2.C., below.

When $Q_A - E_{PSI} \geq Q_T$, the target flow is considered met and therefore the amount of the undeveloped portion of the permit having PSI with Thomas Creek that can be appropriated would not need to be reduced as a result of this fish persistence condition.

C. Consumptive Use Percentages

a. Initial Consumptive Use Percentages

The City of Scio has not identified any Consumptive Use Percentages based on the return of flows to Thomas Creek through effluent discharge. Thus, at this time the permit holder may not utilize Consumptive Use Percentages for the purpose of calculating the maximum amount of the undeveloped portion of Permit G-12694 that can be appropriated as a result of this fish persistence condition.

b. First Time Utilization of Consumptive Use Percentages

Utilization of Consumptive Use Percentages for the purpose of calculating the maximum amount of the undeveloped portion of Permit G-12694 that can be appropriated as a result of this fish persistence condition may begin after the issuance of the Final Order for this extension of time.

First time utilization of Consumptive Use Percentages is contingent upon the permit holder (1) providing evidence in writing that ODFW has determined that withdrawal points and effluent discharges are within reasonable proximity to each other, such that fish habitat between the two points is not impacted significantly, and (2) submitting monthly Consumptive Use Percentages and receiving the Water Resources Director's concurrence with the proposed Consumptive Use Percentages. Utilization of Consumptive Use Percentages is subject to an approval period described in 2.C.f., below.

Consumptive Use Percentages submitted to the Department for review must

(1) be specified as a percentage (may be to the nearest 1/10 percent) for each month of the year and (2) include a description and justification of the methods utilized to determine the percentages. The proposed Consumptive Use Percentages should be submitted on the *Consumptive Use Percentages Update Form* provided with the Final Order for this extension of time.

c. Consumptive Use Percentages Updates

Continuing the utilization of Consumptive Use Percentages for the purpose of calculating the maximum amount of the undeveloped portion of Permit G-12694 that can be appropriated as a result of this fish persistence condition beyond an approval period (as described in 2.C.f., below) is contingent upon the permit holder submitting updated Consumptive Use Percentages and receiving the Water Resources Director's concurrence with the proposed Consumptive Use Percentages Updates. Utilization of Consumptive Use Percentages Updates is subject to an approval period described in 2.C.f., below.

The updates to the Consumptive Use Percentages must (1) be specified as a percentage (may be to the nearest 1/10 percent) for each month of the year and (2) include a description and justification of the methods utilized to determine the percentages. The updates should be submitted on the *Consumptive Use Percentages Update Form* provided with the Final Order for this extension of time.

d. Changes to Wastewater Technology and/or Wastewater Treatment Plant Practices

If there are changes to either wastewater technology or the practices at the permit holder's wastewater treatment facility resulting in 25% or more reductions in average monthly return flows to Thomas Creek, then the Consumptive Use Percentages in effect at that time may no longer be utilized for the purposes of calculating the maximum amount of the undeveloped portion of Permit G-12694 that can be appropriated as a result of this fish persistence condition. The 25% reduction is based on a 10-year rolling average of monthly wastewater return flows to Thomas Creek as compared to the average monthly wastewater return flows from the 10 year period just prior to date of the first approval period described in 2.C.f., below.

If such changes to either wastewater technology or the practices at the permit holder's wastewater treatment facility occur resulting in 25% reductions, further utilization of Consumptive Use Percentages is contingent upon the permit holder submitting Consumptive Use Percentages Updates as per 2.C.c., above, and receiving the Water Resources Director's concurrence with the proposed Consumptive Use Percentages.

e. Relocation of the Point(s) of Diversion(s) and/or Return Flows

If the point(s) of diversion(s) and/or return flows are relocated, Consumptive Use Percentages in effect at that time may no longer be utilized for the

purposes of calculating the maximum amount of the undeveloped portion of Permit G-12694 that can be appropriated as a result of this fish persistence condition.

After relocation of the point(s) of diversion(s) and/or return flows, further utilization of Consumptive Use Percentages is contingent upon the permit holder (1) providing evidence in writing that ODFW has determined that any relocated withdrawal points and effluent discharge points are within reasonable proximity to each other, such that fish habitat between the two points is not impacted significantly, and (2) submitting Consumptive Use Percentages Updates as per 2.C.c., above, and receiving the Water Resources Director's concurrence with the proposed Consumptive Use Percentages.

f. Approval Periods for Utilization of Consumptive Use Percentages

The utilization of Consumptive Use Percentages for the purpose of calculating the maximum amount of the undeveloped portion of Permit G-12694 that can be appropriated as a result of this fish persistence condition may continue for a 10 year approval period that ends 10 years from the Water Resources Director's most recent date of concurrence with Consumptive Use Percentages Updates as evidenced by the record, unless sections 2.C.d., or 2.C.e. (above) are applicable.

Consumptive Use Percentages (first time utilization or updates) which are submitted and receive the Director's concurrence will begin a new 10 year approval period. The approval period begins on the date of the Water Resources Director's concurrence with Consumptive Use Percentages Updates, as evidenced by the record. The permit holder at its discretion may submit updates prior to the end of an approval period.

D. Examples

Example 1: Target flow met.

On August 10, the last seven mean daily flows were 26.4, 26.3, 26.0, 25.9, 25.5, 25.3 and 25.4 cfs. The seven day rolling average (Q_A) is 25.8 cfs. Given that the undeveloped portion of this permit having PSI with Thomas Creek (E_{PSI}) is 0.21 cfs, then the 7 day average of mean daily flows minus the undeveloped portion is greater than the 25.0 cfs target flow (Q_T) for August 10. In this example, $Q_A - E_{PSI} \geq Q_T$.

$$25.8 - 0.21 \geq 25.6$$

The amount of the undeveloped portion of the permit having PSI with Thomas Creek that can be appropriated would not be reduced because the target flow is considered met.

Example 2: Target flow missed.

Step 1: Given that the undeveloped portion of this permit having PSI with Thomas Creek (E_{PSI}) is 0.21 cfs, if on August 25, the average of the last seven mean daily flows (Q_A) was 8.0 cfs, and the target flow (Q_T) is 20.0, then the target flow would be missed by 61.0%.

$$(1 - [(8.0 - 0.21) / 20]) \times 100\% = 61.0\%$$

Step 2: Assuming the Consumptive Use Percentage is 78.7%² during late August and the utilization of this percentage is authorized, and the target flow is missed by 61.0% (from Step 1), then the amount of the undeveloped portion of the permit having PSI with Thomas Creek that could be appropriated would be reduced by 48.0%.

$$(78.7\% \times 61.0\%) / 100 = 48.0\%$$

(If adjustments are not to be made by a Consumptive Use Percentage, then the undeveloped portion of the permit having PSI with Thomas Creek would only be reduced by the % by which the target flow is missed – 61.0% in this example).

Step 3: Given that the undeveloped portion of this permit having PSI with Thomas Creek (E_{PSI}) is 0.21 cfs, which needs to be reduced by 48 % (from Step 2), or 0.10 cfs, then the maximum amount of the undeveloped portion of Permit G-12694 having PSI with Thomas Creek that can be appropriated as a result of this fish persistence condition is 0.11 cfs. (This maximum amount may be limited as illustrated in Step 4, below.)

$$(0.21 \times 48.0\%) / 100 = 0.10$$

$$0.21 - 0.10 = 0.11$$

Step 4: The calculated maximum amount of water that could be appropriated due to the fish persistence condition may not exceed the amount of water to which the City is legally entitled to divert. In this example, if the amount of water legally authorized for diversion under this permit is 1.6 cfs (for example, authorization provided through a WMCP), then 1.6 cfs would be the maximum amount of diversion allowed under this permit including the developed portion of the permit, being 0.95 cfs, plus the

² Currently, the City of Scio may not utilize Consumptive Use Percentages for the purpose of calculating the amount of the undeveloped portion of Permit G-12694 that can be appropriated as a result of this fish persistence condition. The utilization of the Consumptive Use Percentage 78.7%^{is} only for illustrative purposes in this example.

undeveloped portion of the permit not having PSI, being 0.62 cfs.

(Conversely, if the amount of water legally authorized for diversion under this permit is 1.78 cfs, then 1.68 cfs (.11 from Step 3 + the 0.95 developed portion + the 0.62 cfs not having PSI) would be the maximum amount of diversion allowed under this permit.)

E. Relocation of the Point(s) of Appropriation (s) and New Quantification of PSI.

Any relocation of the point(s) of appropriation(s) through a permit amendment or transfer process will require a new OWRD ground water review pursuant to OAR Chapter 690 Division 9 to determine if use of water at the relocated point(s) of appropriation(s) has the potential for substantial interference (PSI) with surface water. This review will be used to quantify a new value for E_{PSI} , being the undeveloped portion of the permit as of this extension having PSI with the surface water based on the new locations of the point(s) of appropriation(s). The new value for E_{PSI} will be then utilized in the calculations for determining the maximum amount of water that could be appropriated under this permit as a result of this fish persistence condition.

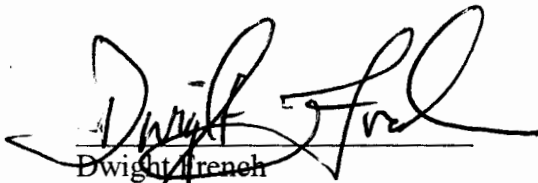
CONCLUSION OF LAW

The applicant has demonstrated good cause for the permit extension pursuant to ORS 537.630, 539.010(5) and OAR 690-315-0080(3).

Order

The extension of time for Application G-14109, Permit G-12694, therefore, is approved subject to conditions contained herein. The deadline for completing construction is extended from October 1, 1998 to October 1, 2049. The deadline for applying water to full beneficial use within the terms and conditions of the permit is extended from October 1, 1999 to October 1, 2049.

DATED: June 20, 2014



Dwight French
Water Right Services Division Administrator, for
Director
Oregon Water Resources Department

If you have any questions about statements contained in this document, please contact Ann Reece at (503) 986-0834.

If you have other questions about the Department or any of its programs, please contact our Water Resources Customer Service Group at (503) 986-0900.

Appendix C
Oregon Administrative Rules

OAR CHAPTER 333
DIVISION 061
PUBLIC WATER SYSTEMS
Effective 10-21-04

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

(1) General requirements:

- (a) The requirements of this rule apply to all public water systems supplied by a surface water source or a groundwater source under the direct influence of surface water beginning January 1, 1992 or 18 months following determination by the Department of the source to be under the direct influence of surface water, whichever is later, for systems which do not provide filtration treatment, and June 29, 1993 or when filtration is installed, whichever is later, for systems which do provide filtration treatment. Systems which do not provide filtration treatment and fail to meet the requirements of sections (2) and (3) of this rule must install filtration and meet the requirements of sections (4) and (5) of this rule within 18 months of the failure. However, any water system serving at least 10,000 people using surface water without filtration treatment or groundwater source under the direct influence of surface water without filtration treatment and cannot meet the requirements of this rule to remain unfiltered must install filtration treatment as specified by these rules and meet the disinfection requirements in Section (5) of this rule by December 31, 2001. 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) For any public water system serving at least 10,000 people using surface water or ground water under the direct influence of surface water and beginning January 1, 2005 for any public water system serving less than 10,000 people using surface water or ground water under the direct influence of surface water:
- (i) 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;
 - (ii) Compliance with any applicable disinfection profiling and benchmark requirements as directed by the Department.
- (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 system 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 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.
 - (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 Department monthly as prescribed in 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).
- (d) In addition to complying with the requirements of this rule, systems serving at least 10,000 people must also comply with additional requirements specified in OAR 333-061-0030, 0036, and 0040 regarding disinfection by-products.
- (2) Requirements for systems 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(4)(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 Department 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 Department, a certified drinking water protection plan (OAR 340-040-0160 to 340-040-00180) 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 Department 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 Department. The on-site inspection must indicate to the Department'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 Department 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 Department, 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 Department 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 trihalomethanes as prescribed in OAR 333-061-0030(2)(b) and 333-061-0036(3)(b) until December 31, 2001. After December 31, 2001, the system must comply with the requirements for total trihalomethanes, haloacetic acids (five), bromate, chlorite, chlorine, chloramines, and chlorine dioxide as specified in OAR 333-061-0036 (3)(b).
- (d) 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 Department can require filtration to be installed where it determines necessary.
- (3) Disinfection requirements for systems 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(4)(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 than chlorine, the system must demonstrate to the Department through the use of an approved protocol for on-site disinfection demonstration studies or other information satisfactory to the Department that the system is achieving the required inactivation rates on a daily basis instead of meeting the "CT" values in this rule.
 - (b) The disinfection system 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. If the Department determines that 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(4)(a)(E), cannot be less than 0.2 mg/l for more than 4 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(4)(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.
- (4) Requirements for systems 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.
 - (A) Until December 31, 2004 systems serving less than 10,000 people using conventional filtration treatment or direct filtration treatment shall meet the turbidity requirements prescribed in OAR 333-061-0030(3)(b)(A)(i) and (ii).
 - (B) Systems serving at least 10,000 people using conventional filtration treatment or direct filtration treatment and beginning January 1, 2005 for systems serving less than 10,000 people using conventional filtration treatment or direct filtration treatment shall meet the turbidity requirements as specified in OAR 333-061-0030 (3)(b)(A)(iii) and (iv). Prior to this date, those systems serving less than 10,000 people shall meet the turbidity requirements as specified in OAR 333-061-0030 (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).
- (5) Disinfection requirements for systems 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 Department.
 - (b) The residual disinfectant concentration in the water entering the distribution system, measured as specified in OAR 333-061-0036(4)(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 in OAR 333-061-0036(4)(b)(C) 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) Disinfection requirements for systems using ground water:
- (a) Systems using ground water sources shall provide continuous disinfection as prescribed in OAR 333-061-0050(5) under the following conditions:
 - (A) Then there are consistent violations of the total coliform rule attributed to source water quality;
 - (B) When a potential health hazard exists as determined by the Department.
 - (b) When continuous disinfection is required, in addition to the requirements prescribed in OAR 333-061-0050(5)(c)(A) through (C), the facilities shall be designed so that:
 - (A) The disinfection treatment must be sufficient to ensure that the system achieve at least 99.99 percent (4-log) inactivation and/or removal of viruses as determined by the Department, 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 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 3 hours contact time under all flow conditions before first water use.

- (7) Determination of groundwater under the direct influence of surface water (GWUDI).
- (a) All Public Water Systems using groundwater as a source of drinking water must evaluate their source(s) for the potential of direct influence of surface water if the source(s) is within 500 feet of perennial or intermittent surface water, or greater distances if water quality trends or geologic conditions indicate additional risk, as determined by the Department; and
 - (A) Have a confirmed or suspected history of coliform bacteria in the source; or
 - (B) The source has been determined by the Department to be unconfined or the source construction has been determined by the Department to be inadequate with respect to providing protection from surface- or near surface water gaining access to the groundwater source(s);
 - (C) Sources may be re-evaluated if geologic conditions or water quality trends change over time, as determined by the Department.
 - (b) Public water systems that are required to evaluate their source(s) for direct influence of surface water must determine if their source(s) is in hydraulic connection with surface water by completing one of the following procedures within a time frame specified by the Department:
 - (A) Hydrogeologic assessment, including, but not limited to, the following:
 - (i) Well characteristics: well depth, screened or perforated interval, casing seal placement;
 - (ii) 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;
 - (iii) Hydraulic gradient: gradient between the aquifer and surface water source during pumping conditions, variation of static water level and surface water level with time;
 - (iv) 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 to the well(s), spring(s), etc.;

- (v) The hydrogeologic assessment must be 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.
- (B) Water Quality Assessment, including, but not limited to:
- (i) Weekly measurements for a period of 12 months, unless otherwise determined by the Department, of precipitation in the source area;
 - (ii) Weekly measurements for a period of 12 months, unless otherwise determined by the Department, of temperature and either specific conductance or pH of water from the groundwater source(s) and surface water source(s). Other parameters may be substituted with Department approval;
 - (iii) Measurements of the groundwater source(s) must be conducted on samples collected from the source as opposed to within the distribution system. If the source is a well, it should be pumped for a minimum of 15 minutes, or until the temperature has stabilized, before the measurements are taken;
 - (iv) To the extent practical, samples of the surface water source(s) should be collected within 0.5 miles of the point nearest to the groundwater source, and at the same place and same time for each sampling event;
 - (v) Monitoring equipment must be able to provide data as follows: temperature to the nearest degree centigrade, temperature-compensated specific conductance to the nearest micro-siemens per centimeter and pH to the nearest 0.1 pH unit. Instruments shall be tested for accuracy at least monthly;
 - (vi) At least quarterly, the water system shall evaluate the precision of their analysis procedure by collecting, during one sampling event, a minimum of six separate and consecutive samples, recording the parameters separately;
 - (vii) At the end of 12 months, or earlier at the Department's discretion, water systems must submit the water quality data as either a paper copy or as an electronic ASCII file (space delimited). The table must include the source sampled, the date and time of sampling, and the parameter values. The water system must also submit the map showing the location of the surface water sampling point (subsection (7)(b)(B)(iv) of this rule) and the

determination of the analytical precision (subsection (7)(b)(B)(vi) of this rule).

- (C) Emergency groundwater sources that meet the criteria of subsection (a) can either be pumped continuously and evaluated as prescribed in subsection (b) of this section, or the evaluation can be waived if the a public notice as prescribed in 333-061-0042(2)(a)(H) 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*.

- (c) The water quality data submitted by the water system will be analyzed by the Department. The Department will determine if the water system's groundwater source(s) is(are) in hydraulic connection with surface water. Water system sources that are determined as not in hydraulic connection with surface water will be classified as groundwater by the Department. Water system sources will be considered groundwater unless:
 - (A) The hydrogeologic assessment performed under subsection (7)(b)(A) of this rule indicates that the water system source(s) is(are) in hydraulic connection with surface water;
 - (B) The statistical analysis of the water quality data performed by the Department indicates:
 - (i) At least one of the measured parameters exhibits a variation that exceeds either the analytical precision determined under subsection (7)(b)(B)(vi) of this rule, or 10 percent of the mean of the parameter values, which ever is greatest; and
 - (ii) At least one median monthly value of that parameter is statistically different from the others at a 90% confidence level; and
 - (iii) A correlation coefficient of at least 0.5 exists for that parameter between the surface water source(s) and the groundwater source that is significant at the 90% confidence level.

- (d) Water systems that have been determined to be in hydraulic connection and whose source construction has been determined to be inadequate under subsection (7)(a)(B) of this rule may choose to reconstruct their source according to construction standards as dictated by OAR 333-061-0050. A post-reconstruction water quality assessment (subsection (7)(b)(B) of this rule) must be completed for this source to re-evaluate whether the source is in hydraulic connection with surface water.

- (e) Water system sources that have been determined to be in hydraulic connection with surface water must conduct a minimum of two Microscopic Particulate Analyses (MPAs) according to the “Consensus Method for Determining Groundwaters under the Direct Influence of Surface Water Using Microscopic Particulate Analysis (MPA).” One sample is to be taken during a period of high runoff or streamflow, and the other during a period of high demand, with lag time taken into account as determined by the Department.
- (f) Scoring of MPAs shall be partially modified from the “Consensus Method” according to Table 8. Scoring for giardia, coccidia, rotifers, and plant debris remains unchanged.
- (g) Determinations of water system source classification based on MPAs are made as follows:
 - (A) If all MPAs have a risk score of less than 10, the water system source is classified as groundwater;
 - (B) 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;
 - (C) If at least one MPA risk score is between 10 and 19 or both are between 10 and 15, an additional set of two MPAs must be taken. Determinations are made as follows:
 - (i) If four or all MPA risk scores are less than 15, the water system source is classified as groundwater;
 - (ii) If two or more MPA risk scores are greater than 14, or one or more is greater than 19, the water system source is classified as under the direct influence of surface water;
 - (iii) Two additional MPAs must be taken if only one of four MPA risk scores is greater than 14. Scores will be evaluated according to (g)(C) of this section, or by further evaluation by the Department.
- (h) If an infiltration gallery, Ranney well, or dug well has been determined to be 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 taken at that time. Re-evaluation may be required by the Department.
- (i) The Department can determine a groundwater source to be under the direct influence of surface water if the criteria in (7)(a) are true 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.
- (j) If geologic conditions, water quality trends, or other indicators change, the Department can require re-evaluation, as detailed in this

section, of a source despite any data previously collected or any determination previously made.

- (k) The Department 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 determinations shall be based on the criteria indicating that the water source has a very low susceptibility to contamination by parasites, including *Giardia* and *Cryptosporidium*. The Department may impose additional monitoring or disinfection treatment requirements to ensure that the risk remains low.

Table 8: Modified Scoring of Microscopic Particulate Analyses					
Indicators of Surface Water (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		

- (8) Requirements for groundwater sources under the direct influence of surface water with a natural filtration credit:
- (a) Groundwater sources under the direct influence of surface water are granted the option to evaluate the natural filtration credit only if all MPA risk scores are less than 20. Credit shall be established by a site-specific study that would include an assessment of the ability of the local hydrogeologic setting to provide adequate log reduction in the number of particles in the *Giardia* and *Cryptosporidium* size range

- between the surface water and the groundwater source, using protocol established or approved by the Department;
- (b) In order to be used to meet treatment requirements, natural filtration must be proven to achieve at least 2.0-log removal for *Giardia* and *Cryptosporidium*. 2.0 log removal credit is the maximum given for natural filtration;
 - (c) Disinfection requirements must be met according to section (5) of this rule. Monitoring must be completed according to OAR 333-061-0036(4)(b).
- (9) 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. This rule establishes criteria under which transient NCWSs 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 Noncommunity 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) Treatment technique for control of disinfection by-product precursors. 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 (e) of this section unless the system meets at least one of the alternative compliance criteria listed in paragraph (d)(A) or (d)(B) of this section.
 - (A) Alternative compliance criteria for enhanced coagulation and enhanced softening systems. Water systems may use the alternative compliance criteria in paragraphs (d)(A)(i) through (vi) of this section 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(3)(b)(I).
 - (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 either the TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively; or prior to the effective date for compliance, the system has made a clear and irrevocable financial commitment not later than the effective date for compliance in this rule to use of technologies that will limit the levels of TTHMs and HAA5 to no more than 0.040 mg/L and 0.030 mg/L, respectively. Systems must submit evidence of a clear and irrevocable financial commitment, in addition to a schedule containing milestones and periodic progress reports for installation and operation of appropriate technologies, to the Department for approval not later than the effective date

for compliance in this rule. These technologies must be installed and operating not later than June 30, 2005. Failure to install and operate these technologies by the date in the approved schedule will constitute a violation of National Primary Drinking Water Regulations.

- (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 (e)(B) of this section may use the alternative compliance criteria in paragraphs (d)(B)(i) and (ii) of this section in lieu of complying with paragraph (e) of this section. Systems must still comply with monitoring requirements in specified in OAR 333-061-0036(3)(b)(I).
- (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 an annual running average.
- (e) Enhanced coagulation and enhanced softening performance requirements.
- (A) Systems must achieve the percent reduction of TOC specified in paragraph (e)(B) of this section between the source water and the combined filter effluent, unless the Department approves a system's request for alternate minimum TOC removal (Step 2) requirements under paragraph (e)(C) of this rule.
 - (B) Required Step 1 TOC reductions, specified in Table 9, 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 9

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 paragraphs (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 (e)(B) of this rule due to water quality parameters or operational constraints must apply to the Department, within three months of failure to achieve the TOC removals required by paragraph (e)(B) of this rule, for approval of alternative minimum TOC (Step 2) removal requirements submitted by the water system. If the Department approves the alternative minimum TOC removal (Step 2) requirements, the Department may make those requirements retroactive for the purposes of determining compliance. Until the Department approves the alternate minimum TOC removal (Step 2) requirements, the water system must meet the Step 1 TOC removals contained in paragraph (e)(B) of this rule.

(D) Alternate minimum TOC removal (Step 2) requirements. Applications made to the Department by enhanced coagulation systems for approval of alternative minimum TOC removal (Step 2) requirements under paragraph (e)(C) of this rule must include, as a minimum, results of bench-scale or pilot-scale testing conducted under paragraph (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 paragraphs (e)(D)(i) through (v) of this section 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 Department, this minimum requirement supersedes the minimum TOC removal required by the Table 9 in paragraph (e)(B) of this section. This requirement will be effective until such time as the Department approves a new value based on the results of a new bench-scale and pilot-scale test. Failure to achieve Department-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 10:

Table 10

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 (e)(C) of this section.
- (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 Department for a waiver of enhanced coagulation requirements.

- (f) Compliance calculations.
- (A) Water systems other than those identified in paragraphs (d)(A) or (d)(B) of this section must comply with requirements contained in paragraph (e)(B) or (e)(C) of this section. 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:
$$\{1 - (\text{treated water TOC} / \text{source water TOC})\} \times 100$$
 - (ii) Determine the required monthly TOC percent removal (from either Table 9 in paragraph (e)(B) of this section or from paragraph (e)(C) of this section).
 - (iii) Divide the value in paragraph (f)(A)(i) of this section by the value in paragraph (f)(A)(ii) of this section.
 - (iv) Add together the results of paragraph (f)(A)(iii) of this section for the last 12 months and divide by 12.
 - (v) If the value calculated in paragraph (f)(A)(iv) of this section 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 paragraphs (f)(B)(i) through (v) of this section in lieu of the calculations in paragraph (f)(A)(i) through (v) of this section 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 paragraph (f)(A)(iii) of this section) when calculating compliance under the provisions of paragraph (f)(A) of this section.
 - (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 paragraph (f)(A)(iii) of this section) when calculating compliance under the provisions of paragraph (f)(A) of this section.
 - (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 paragraph (f)(A)(iii) of this section) when calculating compliance under the provisions of paragraph (f)(A) of this section.

- (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 paragraph (f)(A)(iii) of this section) when calculating compliance under the provisions of paragraph (f)(A) of this section.
 - (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 paragraph (f)(A)(iii) of this section) when calculating compliance under the provisions of paragraph (f)(A) of this section.
 - (C) Water systems using conventional treatment may also comply with the requirements of this section by meeting the criteria in paragraph (d)(A) or (B) of this section.
 - (g) Treatment technique requirements for DBP precursors. Treatment techniques to control the level of disinfection byproduct precursors in drinking water treatment and distribution systems are recognized by the Department for water systems using surface water or groundwater under the direct influence of surface water using conventional treatment as enhanced coagulation or enhanced softening.
- (10) 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 paragraphs (b) and (c) of this rule and OAR 333-061-0040 (2)(i).
 - (b) A water system must notify the Department 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 (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 Department where the Department 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 Department 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.

OAR CHAPTER 333
DIVISION 061
PUBLIC WATER SYSTEMS
Effective 10-21-04

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) Public water systems which may not comply fully with these construction standards, shall be allowed to continue in operation and 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(3) or maximum contaminant levels are being exceeded. Existing facilities are:
 - (A) Facilities at public water systems constructed or installed prior to August 21, 1981; and
 - (B) Facilities at public water systems which have been in continual use in or as a public water system and not inoperative for more than 1 year.
- (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 National Sanitation Foundation 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 Department 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 Department 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 Department, 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 Department;
 - (C) Notwithstanding 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) Notwithstanding paragraph (2)(a)(A) of this rule, in those areas served by community gravity sanitary sewers, the area of ownership or control may be reduced to 50 feet;
 - (E) 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;

- (F) The following sanitary hazards are not allowed within 100 feet of a well which serves a public water system unless waived by the Department: 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 Department 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 Department provided that a secondary containment system is in place that will accommodate 125% of the fuel tank storage;
- (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 2 feet above the anticipated 100-year (1%) 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, Departments 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 rule 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 Department at confined wells which serve as the source of supply for Transient NonCommunity 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 Department;

- (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 paragraphs (L)(iii), (viii) and (xii) of this subsection.
 - (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 Department.
 - (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 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 Department.
 - (b) A determination shall be made as to the status of water rights, and this information shall be submitted to the Department 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 Department 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.
- (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 Department. 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 Department 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 Department 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 Department 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 a Department-approved wellhead protection program.
- (E) The Department 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 Department 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 $\geq 10\mu\text{g/L}$), 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 10,000 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 $\geq 10\mu\text{g/L}$), 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 $\geq 10\mu\text{g/L}$), 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 ($\text{pH} \geq 8.5$) 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 Department 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) Enhanced coagulation or enhanced softening or GAC10, with chlorine as the primary and residual disinfectant for total trihalomethanes.
 - (ii) Enhanced coagulation or enhanced softening or GAC10, with chlorine as the primary and residual disinfectant for HAA5s.
 - (iii) Control of ozone treatment process to reduce production of bromate for bromate concentrations.
 - (iv) Control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels for chlorite.
- (H) The Department 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 Department 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 electro dialysis 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**. For membrane filtration, removal credits shall be 2.5 log for *Giardia* and 2.0 for *Cryptosporidium*, as long as removal has been verified by a third party. 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 Department.
 - (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 Department. Results of the pilot study shall be submitted to the Department 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 Department 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 Department upon request.

- (F) 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.
 - (G) Additional requirements for membrane filtration. Each membrane filter system must have a particle counter or laser turbidimeter installed after filtration for continuous integrity monitoring. Once operating, physical integrity testing must be done on each filter canister at least weekly, using pressure hold, diffusive air flow, bubble point, or sonic sensing testing. The operation and maintenance manual must include a diagnosis and repair plan such that the ability to remove pathogens is not compromised.
- (d) Criteria and procedures for public water systems using point-of-entry devices.
- (A) Public water systems may use point-of-entry devices to comply with maximum contaminant levels only if they meet the requirements of this section.
 - (B) It is the responsibility of the public water system to operate and maintain the point-of-entry treatment system.
 - (C) The public water system must develop and obtain Department approval for a monitoring plan before point-of-entry devices are installed for compliance. Under the plan approved by the Department, point-of-entry 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 Department 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 point-of-entry devices.

- (ii) The design and application of the point-of-entry 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 point-of-entry 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 point-of-entry device installed, maintained, and adequately monitored. The Department 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:
- (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 or springs shall be considered groundwater unless determined otherwise by the Department. 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 and shows a history of microbiological contamination shall first be upgraded to meet current construction standards, and if microbiological contamination still persists, then continuous disinfection shall be provided prior to use in public water systems.
 - (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; and

- (B) The disinfectant is applied in proportion to flow; and
 - (C) Disinfectants, other than ultraviolet light 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 inactivations required by OAR 333-061-0032(1) For ultraviolet light disinfection treatment, sufficient irradiance expressed in milliWatts per square centimeter (mW/cm^2) and exposure time expressed in seconds (s) shall be provided to achieve UV dose levels expressed as (mW/cm^2) or milli-Joules per square centimeter (mJ/cm^2) capable of the inactivations 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 Department, 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 3 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.
- (f) 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) 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.)
- (j) When continuous disinfection treatment is provided through ultraviolet light disinfection, the facilities shall be designed to meet the requirements of this subsection:
- (A) Ultraviolet light may be used as the sole disinfectant for non-community systems serving groundwater with minimal distribution systems, as determined by the Department;
 - (B) Ultraviolet systems must meet the specifications of a Class A UV system under the National Sanitation Foundation (NSF) Standard 55;
 - (C) The ultraviolet light failsafe dosage set point shall be equivalent to 38 mWs/cm^2 (38 mJ/cm^2) with a wavelength between 200 and 300 nanometers;
 - (D) Ultraviolet lamps are insulated from direct contact with the influent water and are removable from the lamp housing;
 - (E) The treatment unit must have a fixed flow rate control that prevents flows 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 with an

- automatic water flow shut-off if the ultraviolet light intensity drops below the failsafe set point;
 - (F) There must be a visual means to verify operation of all ultraviolet lamps;
 - (G) The lamps, lamp sleeves, housings and other equipment must be able to withstand a working pressure of at least 100 psig (689 kPa);
 - (H) 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;
 - (I) The lamps must be changed as per the manufacturer's recommendation, or at least annually; and
 - (J) The treatment unit must be connected into the main water line at the source with the 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.
- (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 continuously disinfected so as to result in a residual in the water leaving the reservoir in accordance with paragraph (5)(c)(D)(i) of this rule;
 - (F) Start-up procedures for new redwood tanks shall consist of filling the tank with a solution of water containing a minimum

- of 2 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 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 paragraph (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 **National Sanitation Foundation Standard 61, Section 9 - Drinking Water System Components - Health Effects (Revised September 1994)** or equivalent.
 - (R) Reservoirs and clearwells that are to be used as disinfection contact time shall use a tracer study to determine the actual contact time. The Department must approve procedures and protocols for the tracer study prior to the initiation of the study;

The Department 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 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 and shall be designed for pressure at least 50% 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%) 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, National Sanitation Foundation or other equivalent standards acceptable to the Department;
 - (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

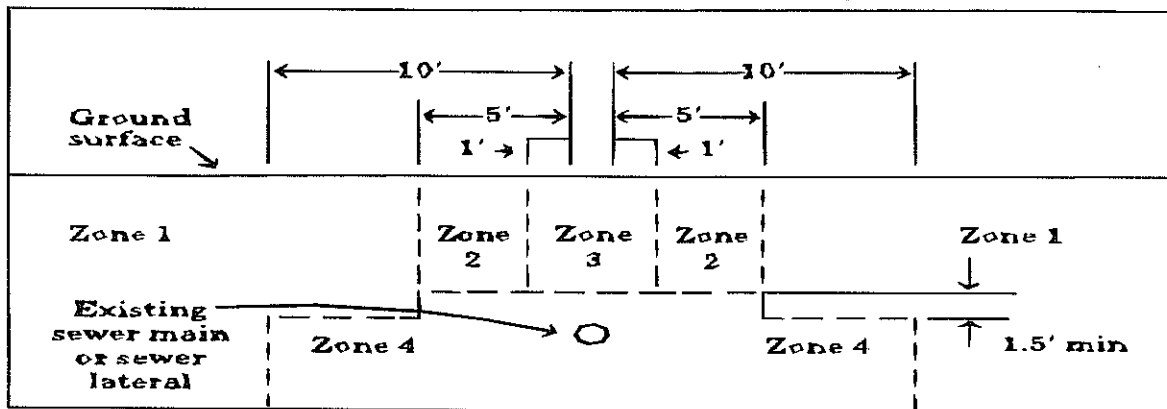
shall be accessible in water meter boxes, valve boxes or casings, or outside the foundation of buildings where the pipeline enters the building. The distance between tracer lead access locations shall not be more than 1,000 feet. Joints or splices in wire shall be waterproof.

- (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 must be supported with a steel or reinforced concrete beam or other means of preventing settlement when it spans the water line trench, and 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 wells, valves, pumps, water mains and service connections, disinfection by chlorination shall be accomplished according to **AWWA standards C651 through C654** which includes, but is not limited to, 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. 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, the facility flushed with potable water and a minimum of one sample shall be collected from the facility 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 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. 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 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 6 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.
- (e) When the procedures described in paragraphs (10)(d)(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;
- (f) When the procedure described in paragraph (10)(d)(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;
- (g) 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.
- (h) 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.

- (i) 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. The trench shall be liberally treated with hypochlorites, the interior of all pipes and fittings shall be swabbed or sprayed with a 1% hypochlorite solution, and the line shall be thoroughly flushed. Where practical, the repaired line shall be disinfected with a 100 mg/l chlorine solution for 3 hours or a 300 mg/l chlorine solution for 15 minutes then the line shall be flushed thoroughly.

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
ODFW Fish Passage Spreadsheet

Thomas Creek Fish Persistence Flow Calculation
City of Scio, Oregon

Date Range	Thomas Creek Target Flow (Q _T)	Percent of Missed Target Flow	Max amount of Undeveloped flow that can be appropriated	Q _A - E _{PSI}	(Q _A - E _{PSI}) Compared to Q _T
Jan 1 - May 31	100	0%	0.21	-0.21	The value for the maximum amount of undeveloped flow that can be appropriated must be used.
June 1 - June 15	50	0%	0.21	-0.21	The value for the maximum amount of undeveloped flow that can be appropriated must be used.
June 16 - June 30	40	-1%	0.21	-0.21	The value for the maximum amount of undeveloped flow that can be appropriated must be used.
July 1 - July 15	35	-1%	0.21	-0.21	The value for the maximum amount of undeveloped flow that can be appropriated must be used.
July 16 - July 31	30	-1%	0.21	-0.21	The value for the maximum amount of undeveloped flow that can be appropriated must be used.
Aug 1 - Aug 15	25	-1%	0.21	-0.21	The value for the maximum amount of undeveloped flow that can be appropriated must be used.
Aug 16 - Sept 15	20	-1%	0.21	-0.21	The value for the maximum amount of undeveloped flow that can be appropriated must be used.
Sept 16 - Sept 30	44	0%	0.21	-0.21	The value for the maximum amount of undeveloped flow that can be appropriated must be used.
Oct 1 - Dec 31	100	0%	0.21	-0.21	The value for the maximum amount of undeveloped flow that can be appropriated must be used.

G-12694 PSI (E_{PSI}) 0.21

Measured Flow (Q_A) 0



Oregon Water Resources Department
 725 Summer Street NE, Suite A
 Salem Oregon 97301-1266
 (503) 986-0900
 www.wrd.state.or.us

"Consumptive Use Percentages" Update Form

TO THE WATER RIGHTS ADMINISTRATOR OF THE OREGON WATER RESOURCES DEPARTMENT

Re: Fish Persistence Condition Applicable to:
 G-14109 / Permit G-12694
 Permit Holder: City of Scio

"Consumptive Use Percentages" Updates

- For each month listed below, provide the consumptive use percentage for the purpose of calculating the maximum total amount of the undeveloped portion of Permit G-12694 that can be diverted as a result of the fish persistence condition on the extension Final Order Dated June 20, 2014.

Month	Consumptive Use Percentage	Month	Consumptive Use Percentage
January	%	July	%
February	%	August	%
March	%	September	%
April	%	October	%
May	%	November	%
June	%	December	%

- Provide a description and justification of the methods utilized to determine the percentages. Please attach additional pages as necessary.
- The use of these "Consumptive Use Percentages" for the purposes stated above may continue for a 10 year approval period unless further utilization of Consumptive Use Percentages is contingent upon the City submitting Consumptive Use Percentages Updates due to changes in wastewater technology and/or the wastewater treatment plant or due to relocation of the point(s) of diversion(s) and/or return flows.

Signature _____ Date _____

For OWRD use only

WRD Concurs with these "Consumptive Use Percentages" Updates Yes No

Approved by: _____
 for the Water Resources Director

Date: _____

Appendix E
Water Rights Summary and Documentation

City of Scio
Water Rights Summary Table

Well Designation	Registration No.	Application No.	Permit No.	Certificate No.	Priority Date	Water Source	Type of Beneficial Use	Maximum Allowable Water Use		Reported Average Use		Authorized Completion Date (Perfection Schedule)	Species	Critical Ground Water Area	Water Quality Limited ²	Comments
								Instantaneous	Annual	Monthly	Daily					
Well #1	GR-2624	-	-	GR-2489	March 13, 1946	Ground Water	Municipal	1.30 CFS (585 gpm)	N/A	N/A	N/A	-	N/A	None	No	Well has been valved off and not used since the 1980's.
Well #2	GR-2625	-	-	GR-2490	November 13, 1939	Ground Water	Municipal	1.34 CFS (600 gpm)	N/A	N/A	N/A	-	N/A	None	No	Well is connected to system as a backup source but has not been used in 15-20 years.
Well #3	-	G-5427	G-5354	50300	February 10, 1971	Ground Water	Municipal	1.33 CFS (597 gpm)	N/A	See Attached	See Attached	October 1, 1977	N/A	None	No	The current pumping capacity at Well #3 is 360 gpm (0.8 CFS).
Well #4	-	G-14109	G-12694	N/A	June 26, 1995	Ground Water	Municipal	1.78 CFS ¹ (799 gpm)	N/A	See Attached	See Attached	October 1, 2049	N/A	None	No	Authorized completion date extended per Final Order - Extension of Time for Permit G-12694 dated June 20, 2014.

¹ While the total permitted amount of water under Permit G-12694 is 1.78, the final order (issued June 20, 2014) approving the Extension of Time for Permit G-12694 limits the diversion of water under Permit G-12694 to no more than 0.95 cfs.

² The City's wells are not located within the Southern Willamette Valley Groundwater Management Area (DEQ) and because all of the City's sources are from ground water, any listing of surface water(s) by DEQ as being water quality limited do not apply.

City of Scio
Reported Water Use - Well No. 3
Total Use per Month

Water Year	Report ID	Facility Name	October (MG)	November (MG)	December (MG)	January (MG)	February (MG)	March (MG)	April (MG)	May (MG)	June (MG)	July (MG)	August (MG)	September (MG)	Total Water Used (MG)
2014	12144	WELL 3 (LINN 3822)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2013	12144	WELL 3 (LINN 3822)	0.000	0.000	0.000	0.000	0.655	0.054	0.000	0.000	0.000	0.006	0.000	0.000	0.716
2012	12144	WELL 3 (LINN 3822)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.011
2011	12144	WELL 3 (LINN 3822)	0.001	0.000	2.212	1.775	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.987
2010	12144	WELL 3 (LINN 3822)	0.017	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.017
2008	12144	WELL 3 (LINN 3822)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2007	12144	WELL 3 (LINN 3822)	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
2006	12144	WELL 3 (LINN 3822)	0.152	0.040	0.000	0.000	0.045	0.000	0.061	0.476	0.000	0.260	0.247	0.000	1.281
2005	12144	WELL 3 (LINN 3822)	0.000	0.570	0.000	0.000	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.584
2004	12144	WELL 3 (LINN 3822)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.004
2003	12144	WELL 3 (LINN 3822)	0.000	0.000	0.000	0.221	0.000	0.000	0.000	0.000	0.000	0.046	0.000	0.000	0.268

City of Scio
Reported Water Use - Well No. 3
Average Daily Use per Month

Water Year	Report ID	Facility Name	October (MG)	November (MG)	December (MG)	January (MG)	February (MG)	March (MG)	April (MG)	May (MG)	June (MG)	July (MG)	August (MG)	September (MG)	Average Daily Water
2014	12144	WELL 3 (LINN 3822)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2013	12144	WELL 3 (LINN 3822)	0.000	0.000	0.000	0.000	0.023	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002
2012	12144	WELL 3 (LINN 3822)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2011	12144	WELL 3 (LINN 3822)	0.000	0.000	0.071	0.057	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011
2010	12144	WELL 3 (LINN 3822)	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2008	12144	WELL 3 (LINN 3822)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2007	12144	WELL 3 (LINN 3822)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2006	12144	WELL 3 (LINN 3822)	0.005	0.001	0.000	0.000	0.002	0.000	0.002	0.015	0.000	0.008	0.008	0.000	0.004
2005	12144	WELL 3 (LINN 3822)	0.000	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
2004	12144	WELL 3 (LINN 3822)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2003	12144	WELL 3 (LINN 3822)	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001

City of Scio
Reported Water Use - Well No. 4
Total Use per Month

Water Year	Report ID	Facility Name	October (MG)	November (MG)	December (MG)	January (MG)	February (MG)	March (MG)	April (MG)	May (MG)	June (MG)	July (MG)	August (MG)	September (MG)	Total Water Used (MG)
2014	33259	WELL 4 (LINN 6579)	1.867	1.766	2.529	1.851	1.698	1.779	1.812	2.121	2.724	3.477	3.562	2.705	27.890
2013	33259	WELL 4 (LINN 6579)	3.265	2.671	2.706	1.883	3.259	1.741	1.708	2.676	2.595	4.157	3.347	2.273	32.281
2012	33259	WELL 4 (LINN 6579)	2.254	2.124	2.150	2.354	1.980	2.215	2.453	3.628	3.494	4.773	4.314	3.824	35.563
2011	33259	WELL 4 (LINN 6579)	2.156	2.222	0.006	0.762	2.042	2.113	2.114	2.316	2.530	3.422	3.646	3.187	26.517
2010	33259	WELL 4 (LINN 6579)	2.173	1.944	2.664	2.051	2.126	1.930	2.026	2.079	2.420	3.950	3.645	2.306	29.314
2008	33259	WELL 4 (LINN 6579)	2.220	1.963	2.082	1.993	2.007	1.908	2.057	2.496	2.964	4.171	3.393	2.749	30.000
2007	33259	WELL 4 (LINN 6579)	2.206	1.933	1.996	2.324	1.924	2.087	2.064	2.461	2.970	4.113	3.476	3.077	30.633
2006	33259	WELL 4 (LINN 6579)	1.903	2.408	2.571	2.151	1.735	1.932	2.042	1.953	2.545	3.964	3.582	2.807	29.590
2005	33259	WELL 4 (LINN 6579)	2.091	1.348	1.966	1.789	1.777	1.988	1.785	1.987	2.116	3.195	4.165	2.682	26.888
2004	33259	WELL 4 (LINN 6579)	2.192	1.876	1.827	2.274	1.876	2.061	2.109	2.309	2.850	3.791	3.372	2.227	28.765
2003	33259	WELL 4 (LINN 6579)	2.072	1.722	1.670	1.672	1.763	1.733	1.769	2.216	2.938	4.025	3.780	2.718	28.077

City of Scio
Reported Water Use - Well No. 4
Average Daily Use per Month

Water Year	Report ID	Facility Name	October (MG)	November (MG)	December (MG)	January (MG)	February (MG)	March (MG)	April (MG)	May (MG)	June (MG)	July (MG)	August (MG)	September (MG)	Average Daily Water
2014	33259	WELL 4 (LINN 6579)	0.060	0.059	0.082	0.060	0.061	0.057	0.060	0.068	0.908	0.112	0.115	0.902	0.076
2013	33259	WELL 4 (LINN 6579)	0.105	0.089	0.087	0.061	0.116	0.056	0.057	0.086	0.865	0.134	0.108	0.758	0.088
2012	33259	WELL 4 (LINN 6579)	0.073	0.071	0.069	0.076	0.071	0.071	0.082	0.117	1.165	0.154	0.139	1.275	0.097
2011	33259	WELL 4 (LINN 6579)	0.070	0.074	0.000	0.025	0.073	0.068	0.070	0.075	0.843	0.110	0.118	1.062	0.073
2010	33259	WELL 4 (LINN 6579)	0.070	0.065	0.086	0.066	0.076	0.062	0.068	0.067	0.807	0.127	0.118	0.769	0.080
2008	33259	WELL 4 (LINN 6579)	0.072	0.065	0.067	0.064	0.072	0.062	0.069	0.081	0.988	0.135	0.109	0.916	0.082
2007	33259	WELL 4 (LINN 6579)	0.071	0.064	0.064	0.075	0.069	0.067	0.069	0.079	0.990	0.133	0.112	1.026	0.084
2006	33259	WELL 4 (LINN 6579)	0.061	0.080	0.083	0.069	0.062	0.062	0.068	0.063	0.848	0.128	0.116	0.936	0.081
2005	33259	WELL 4 (LINN 6579)	0.067	0.045	0.063	0.058	0.063	0.064	0.060	0.064	0.705	0.103	0.134	0.894	0.074
2004	33259	WELL 4 (LINN 6579)	0.071	0.063	0.059	0.073	0.067	0.066	0.070	0.074	0.950	0.122	0.109	0.742	0.079
2003	33259	WELL 4 (LINN 6579)	0.067	0.057	0.054	0.054	0.063	0.056	0.059	0.071	0.979	0.130	0.122	0.906	0.077

STATE OF OREGON

COUNTY OF - LINN

CERTIFICATE OF WATER RIGHT

This Is to Certify, That CITY OF SCIO

of PO Box 37, Scio, State of Oregon 97374, has made proof to the satisfaction of the Water Resources Director, of a right to the use of the waters of a well

a tributary of Thomas Creek for the purpose of municipal

under Permit No. G-5354 and that said right to the use of said waters has been perfected in accordance with the laws of Oregon; that the priority of the right hereby confirmed dates from February 10, 1971 that the amount of water to which such right is entitled and hereby confirmed, for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed 1.33 cubic feet per second

or its equivalent in case of rotation, measured at the point of diversion from the well. The well is located in the SW $\frac{1}{4}$ NE $\frac{1}{4}$, as projected within McKinney DLC, Section 18, T10S, R1W, WM; 1,540 feet South and 770 feet East from N $\frac{1}{4}$ Corner, Section 18.

The amount of water used for irrigation, together with the amount secured under any other right existing for the same lands, shall be limited to -----of one cubic foot per second per acre, appropriation of water only to the extent that it does not impair or substantially interfere with existing surface water rights of others,

and shall conform to such reasonable rotation system as may be ordered by the proper state officer.

A description of the place of use under the right hereby confirmed, and to which such right is appurtenant, is as follows:

SE $\frac{1}{4}$ SW $\frac{1}{4}$
SW $\frac{1}{4}$ SE $\frac{1}{4}$
Section 7

NW $\frac{1}{4}$
Section 17

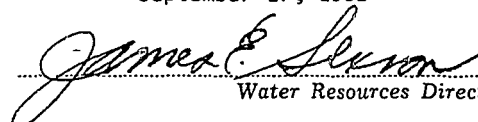
NE $\frac{1}{4}$
NE $\frac{1}{4}$ SE $\frac{1}{4}$
NW $\frac{1}{4}$ SE $\frac{1}{4}$
SE $\frac{1}{4}$ SE $\frac{1}{4}$
Section 18

Township 10 South, Range 1 West, WM

The right to the use of the water for the purposes aforesaid is restricted to the lands or place of use herein described.

WITNESS the signature of the Water Resources Director, affixed

this date. September 17, 1981


Water Resources Director

RECEIVED
STATE ENGINEER
SALMON

Registration No. GR-2624
Certificate No. GR-2489

Registration Statement

OF CLAIMANT OF RIGHT TO APPROPRIATE GROUND WATER

TO THE STATE ENGINEER OF OREGON:

I, City of Scio

of Scio, Oregon County of Linn

State of Oregon, do hereby make application for a certificate of registration as evidence of a right to appropriate ground water.

1. Source from which water is withdrawn is pump well #1
(Flowing well, pump well, infiltration trench, or tunnel)

2. Location is: in Scio, Oregon
(Approximate distance and direction from nearest city or town)

and is more particularly described as follows: 1900 feet West & 200 feet South from NE Corner Section 18

(a) Southwest corner of North & West Streets
(Give distance and bearing to corner of section or other legal subdivision)

being within Scio NW 1/4 of NE 1/4 of Sec. 18, Twp. 10 S, Rge. 1 W
(Smallest legal subdivision) (N or S) (E or W)

or (b) within limits of recorded platted property, town or city: _____

in Lot _____, Block _____ of Eckinney
(Name of plat or addition)

Scio County of Linn
(If within city or town, give name)

3. Construction Work was begun on March 13, 1946; was completed on April 10, 1946
(Date) (Date)

and the ground water claimed was first used for the purposes set out below on May 1, 1946
(Date)

since which time the water has been used continuously
(Continuously or intermittently)

from 5/1/46 to 7/8/58
(Date) (Date)

4. Quantity of water claimed and used is 585 gallons per minute; _____ acre feet per year.

5. Purpose or Purposes for which water is used Municipal

(Domestic, irrigation, municipal, manufacturing, industrial, etc.)

6. Description of Well: Depth 205 feet. Type _____
(Dug or drilled)

diameter 12" inches. Elevation of ground at well site 400 feet, mean sea level.
(As near as known)

Depth to water table 19 feet.

7. Capacity of Well: 585 g.p.m. with 90 feet drawdown.

_____ g.p.m. with _____ feet drawdown.

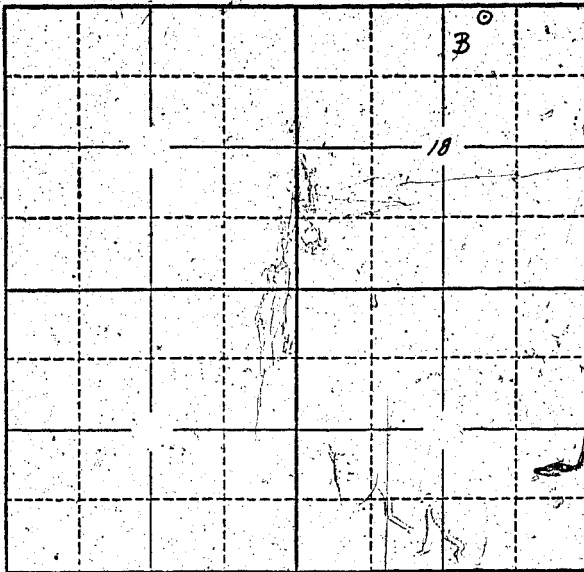
Date of test 4/15/58

If Flowing Well: Measured discharge _____ g.p.m. on _____
(Date)

Shut-in pressure at ground surface _____ lbs. per sq. in. on _____
(Date)

Water is controlled by _____
(Cap, valve, etc.)

Township 10S Range 1W, W.M.
North



Locate well and acreage of irrigated land on plat.
Scale: 2" = 1 Mile

STATE OF OREGON }
County of Linn } ss.

I, K. J. Purdy, Mayor of Scio, being first duly sworn, do hereby certify that I have read the foregoing Registration Statement and that all of the items therein contained are true to the best of my knowledge and belief.

K. J. Purdy
(Signature of Registrant)

Subscribed and sworn to before me this 9 day of July, 1958

My commission expires Jan 3 - 1961
W. B. Jones
(Notary Public)

(SEAL)

CERTIFICATE OF REGISTRATION

STATE OF OREGON }
County of Marion } ss.

This is to certify that the foregoing Registration Statement was received in the office of the State Engineer on the 24th day of July, 1958, at 8⁰⁰ o'clock A. M. and has been duly recorded in said office in Book No. 11 of Registration Statements on page OR-2489

Witness my hand this 6th day of April, 1959

Leuro A. Stanley
(State Engineer)

\$ 22.00

By _____
(Deputy)

Registration Statement

OF CLAIMANT OF RIGHT TO APPROPRIATE GROUND WATER



TO THE STATE ENGINEER OF OREGON:

I, City Of Scio
of Scio, Oregon County of Linn
(Mailing address)

State of Oregon, do hereby make application for a certificate of registration as evidence of a right to appropriate ground water.

1. Source from which water is withdrawn is pump well #2
(Flowing well, pump well, infiltration trench, or tunnel)

2. Location is: in the City of Scio
(Approximate distance and direction from nearest city or town)

and is more particularly described as follows: 500 feet west & 1300 feet South from NE Corner Section 18.

(a) on the SE corner of Mill St. & Pentland Ave.
(Give distance and bearing to corner of section or other legal subdivision)

being within City of Scio of Sec. 18, Twp. 10S, Rge. 1W
(Smallest legal subdivision) (N or S.) (E. or W.)

or (b) within limits of recorded platted property, town or city: Scio

in Lot _____, Block _____ of _____
(Name of plat or addition)

Scio County of Linn
(If within city or town, give name)

3. Construction Work was begun on 11/13/39; was completed on 12/10/39
(Date) (Date)

and the ground water claimed was first used for the purposes set out below on 1/10/40
(Date)

since which time the water has been used continuously
(Continuously or intermittently)

from 1/10/40 to 7/8/58
(Date) (Date)

4. Quantity of water claimed and used is 600 gallons per minute; _____ acre feet per year.

5. Purpose or Purposes for which water is used Municipal

(Domestic, irrigation, municipal, manufacturing, industrial, etc.)

6. Description of Well: Depth 203 feet. Type drilled
(Dug or drilled)

diameter 12" inches. Elevation of ground at well site 400 feet, mean sea level.
(As near as known)

Depth to water table 11 feet.

7. Capacity of Well: 600 g.p.m. with 140 feet drawdown.
_____ g.p.m. with _____ feet drawdown.

Date of test 12/12/40

If Flowing Well: Measured discharge _____ g.p.m. on _____
(Date)

Shut-in pressure at ground surface _____ lbs. per sq. in. on _____
(Date)

Water is controlled by _____
(Cap, valve, etc.)

REGISTERED
ENGINEER
OREGON

CERTIFICATE NO. 50300

Permit No. G- 5354

APPLICATION FOR A PERMIT

To Appropriate the Ground Waters of the State of Oregon

I, City of Scio (Name of applicant) of P. O. Box 37, Scio, Oregon 97374 (Postoffice Address), county of Linn state of Oregon, do hereby make application for a permit to appropriate the following described ground waters of the state of Oregon, SUBJECT TO EXISTING RIGHTS:

If the applicant is a corporation, give date and place of incorporation 1866 - Oregon

1. Give name of nearest stream to which the well, tunnel or other source of water development is situated Thomas Creek (Name of stream) tributary of South Santiam River

2. The amount of water which the applicant intends to apply to beneficial use is 600 cubic feet per second or 600 gallons per minute.

3. The use to which the water is to be applied is municipal

4. The well or other source is located 1410 ft. S (N. or S.) and 755 ft. E (E. or W.) from the NW corner of NW 1/4, NE 1/4, Section 18, Township 10 South, Range 1 West, Willamette Meridian (Section or subdivision) (If preferable, give distance and bearing to section corner)

(If there is more than one well, each must be described. Use separate sheet if necessary) being within the SW 1/4, NE 1/4 of Sec. 18, Twp. 10 S, R. 1 W, W. M., in the county of Linn

5. The transmission line (Canal or pipe line) to be 600 feet in length, terminating in the NW 1/4 of NE 1/4 (Smallest legal subdivision) of Sec. 18, Twp. 10 S, R. 1 W, W. M., the proposed location being shown throughout on the accompanying map.

6. The name of the well or other works is Well No. 3

DESCRIPTION OF WORKS

7. If the flow to be utilized is artesian, the works to be used for the control and conservation of the supply when not in use must be described.

8. The development will consist of one well (Give number of wells, tunnels, etc.) having a diameter of 8 inches and an estimated depth of 210 feet. It is estimated that 210 feet of the well will require steel (Kind) casing. Depth to water table is estimated 26 (Feet) (see attached copy of well log)

CANAL SYSTEM OR PIPE LINE—

9. (a) Give dimensions at each point of canal where materially changed in size, stating miles from headgate. At headgate: width on top (at water line) feet; width on bottom feet; depth of water feet; grade feet fall per one thousand feet.

(b) At miles from headgate: width on top (at water line) feet; width on bottom feet; depth of water feet; grade feet fall per one thousand feet.

(c) Length of pipe, 600 ft.; size at intake 8 in.; in size at 600 ft. from intake 8 in.; size at place of use city distribution system difference in elevation between intake and place of use, + 10 ft. Is grade uniform? No Estimated capacity, 1.33 sec. ft.

10. If pumps are to be used, give size and type 600 gpm vertical turbine

Give horsepower and type of motor or engine to be used 50 HP Electric

11. If the location of the well, tunnel, or other development work is less than one-fourth mile from a natural stream or stream channel, give the distance to the nearest point on each of such channels and the difference in elevation between the stream bed and the ground surface at the source of development

Well is 50 feet North of the north bank of Thomas Creek. Stream bed is about 20 feet lower than ground at well site.

12. Location of area to be irrigated, or place of use City of Scio

Township N. or S.	Range E. or W. of Willamette Meridian	Section	Forty-acre Tract	Number Acres To Be Irrigated
T 10 S	R 1 W	7	SE $\frac{1}{4}$ of SE $\frac{1}{4}$	
"	"	7	SW $\frac{1}{4}$ of SE $\frac{1}{4}$	
"	"	18	NE $\frac{1}{4}$ of NE $\frac{1}{4}$	
"	"	18	NW $\frac{1}{4}$ of NE $\frac{1}{4}$	
"	"	18	SW $\frac{1}{4}$ of NE $\frac{1}{4}$	
"	"	18	SE $\frac{1}{4}$ of NE $\frac{1}{4}$	
"	"	18	NE $\frac{1}{4}$ of SE $\frac{1}{4}$	
"	"	18	NW $\frac{1}{4}$ of SE $\frac{1}{4}$	

(If more space required, attach separate sheet)

Character of soil

Kind of crops raised

MUNICIPAL SUPPLY—

13. To supply the city of Scio
in Linn county, having a present population of 447
and an estimated population of 540 in 1990...

ANSWER QUESTIONS 14, 15, 16, 17 AND 18 IN ALL CASES

- 14. Estimated cost of proposed works, \$ 18,000
- 15. Construction work will begin on or before September 1971
- 16. Construction work will be completed on or before January 1972
- 17. The water will be completely applied to the proposed use on or before January 1972
- 18. If the ground water supply is supplemental to an existing water supply, identify any application for permit, permit, certificate or adjudicated right to appropriate water, made or held by the applicant. Permit GR 2625

Permit GR 2489

City of Scio
Robert E. [Signature]
(Signature of applicant)

Remarks: Well No. 3 is needed to supplement two older wells (GR 2625 and GR 2489) which currently supply the city but which yields have receded over the years.

STATE OF OREGON, }
County of Marion, } ss.

This is to certify that I have examined the foregoing application, together with the accompanying maps and data, and return the same for

In order to retain its priority, this application must be returned to the State Engineer, with corrections on or before, 19.....

WITNESS my hand this day of, 19.....

STATE ENGINEER

By ASSISTANT

County of Marion,

} ss.

This is to certify that I have examined the foregoing application and do hereby grant the same, SUBJECT TO EXISTING RIGHTS and the following limitations and conditions:

The right herein granted is limited to the amount of water which can be applied to beneficial use and shall not exceed 1.33 cubic feet per second measured at the point of diversion from the well or source of appropriation, or its equivalent in case of rotation with other water users, from a well

The use to which this water is to be applied is municipal

If for irrigation, this appropriation shall be limited to of one cubic foot per second or its equivalent for each acre irrigated and shall be further limited to a diversion of not to exceed acre feet per acre for each acre irrigated during the irrigation season of each year; and shall be further limited to appropriation of water only to the extent that it does not impair or substantially interfere with existing surface water rights of others,

and shall be subject to such reasonable rotation system as may be ordered by the proper state officer.

The well shall be cased as necessary in accordance with good practice and if the flow is artesian the works shall include proper capping and control valve to prevent the waste of ground water.

The works constructed shall include an air line and pressure gauge or an access port for measuring line, adequate to determine water level elevation in the well at all times.

The permittee shall install and maintain a weir, meter, or other suitable measuring device, and shall keep a complete record of the amount of ground water withdrawn.

The priority date of this permit is February 10, 1971

Actual construction work shall begin on or before February 21, 1976 and shall thereafter be prosecuted with reasonable diligence and be completed on or before October 1, 1976

Complete application of the water to the proposed use shall be made on or before October 1, 1977

WITNESS my hand this 21st day of February, 1975

[Signature]

STATE ENGINEER

Application No. G-5427
Permit No. G-5354

PERMIT

TO APPROPRIATE THE GROUND
WATERS OF THE STATE
OF OREGON

This instrument was first received in the office of the State Engineer at Salem, Oregon, on the 10th day of February 1975, at 8:00 o'clock A. M.

Returned to applicant:

Approved:

February 21, 1975

Recorded in book No. G 5354 of Ground Water Permits on page

CHRIS L. WHEELER
STATE ENGINEER

Drainage Basin No. 2 page 121

2700

NOTICE TO WATER WELL CONTRACTOR

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

WATER WELL REPORT

STATE OF OREGON

(Please type or print)

(Do not write above this line)

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

RECEIVED
DATE OF OREGON
JAN - 8 1971
STATE ENGINEER
SALEM, OREGON

Linn
3822
G 5427

State Well No. 10/1W-18ac
State Permit No. Well #3

(1) OWNER:

Name City of Scio #3
Address Scio, Ore.

(2) TYPE OF WORK (check):

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

(3) TYPE OF WELL:

Rotary Driven
Cable Jetted
Dug Bored

(4) PROPOSED USE (check):

Domestic Industrial Municipal
Irrigation Test Well Other

CASING INSTALLED:

Threaded Welded
8" Diam. from 0 ft. to 210 ft. Gage 250
" Diam. from ft. to ft. Gage
" Diam. from ft. to ft. Gage

PERFORATIONS:

Perforated? Yes No.

Type of perforator used Mills
Size of perforations 3/8 in. by 2 1/2 in.
710 perforations from 208 ft. to 144 ft.
185 perforations from 123 ft. to 95 ft.
408 perforations from 68 ft. to 50 ft.

(7) SCREENS:

Well screen installed? Yes No

Manufacturer's Name
Type Model No.
Diam. Slot size Set from ft. to ft.
Diam. Slot size Set from ft. to ft.

(8) WELL TESTS:

Drawdown is amount water level is lowered below static level

Was a pump test made? Yes No. If yes, by whom? Stettler
Yield: 900 gal./min. with 49 ft. drawdown after 1/2 hrs.
720 " 17 " 3 1/2 "
480 " 20 " 5 1/2 "
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m.
Temperature of water Depth artesian flow encountered ft.

(9) CONSTRUCTION:

Well seal—Material used Cement
Well sealed from land surface to 21 ft.
Diameter of well bore to bottom of seal 16 in.
Diameter of well bore below seal 8 in.
Number of sacks of cement used in well seal 1 1/4 yd. sacks
Number of sacks of bentonite used in well seal --- sacks
Brand name of bentonite ---
Number of pounds of bentonite per 100 gallons
of water --- lbs./100 gals.
Was a drive shoe used? Yes No Plugs --- Size: location ft.
Did any strata contain unusable water? Yes No
Type of water? depth of strata
Method of sealing strata off
Was well gravel packed? Yes No Size of gravel:
Gravel placed from ft. to ft.

(10) LOCATION OF WELL:

County Linn Driller's well number 47D
SW 1/4 NE 1/4 Section 18 T. 10S R. 1W W.M.
Bearing and distance from section or subdivision corner

(11) WATER LEVEL: Completed well.

Depth at which water was first found 50 ft.
Static level 26 ft. below land surface. Date 12/21/70
Artesian pressure lbs. per square inch. Date

(12) WELL LOG:

Diameter of well below casing ---

Depth drilled 210 ft. Depth of completed well 210 ft.

Formation: Describe color, texture, grain size and structure of materials; and show thickness and nature of each stratum and aquifer penetrated, with at least one entry for each change of formation. Report each change in position of Static Water Level and indicate principal water-bearing strata.

MATERIAL	From	To	SWL
Top soil (sandy-brown)	0'	3'	
Cobbles & clay (packed)	3'	10'	
Cobbles & gravel (cemented)	10'	22'	
Clay (firm-blue & brown)	22'	30'	
Shale (firm-blue-black)	30'	50'	
Sand & small pebbles w.b.	50'	68'	26'
Clay (soft-blue)	68'	95'	
Sand & small gravel w.b.	95'	102'	33'
Clay (blue-some pebbles)	102'	122'	
Gravel & sand w.b.	122'	123'	40'
Clay (blue-some pebbles)	123'	144'	
Gravel & sand (loose) w.b.	144'	145'	37'
Gravel (packed) w.b.	145'	175'	37'
Clay (soft-blue)	175'	180'	
Sand (fine-some pebbles)	180'	182'	37'
Gravel (packed) w.b.	182'	198'	42'
Gravel & sand (loose) w.b.	198'	201'	42'
Gravel (packed) w.b.	201'	208'	42'
Shale (firm-blue)	208'	210'	

Work started 12/7/70 19-- Completed 12/21/70 19
Date well drilling machine moved off of well 12/21/70 19

Drilling Machine Operator's Certification:

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

[Signed] [Signature] Date 12/21/70
(Drilling Machine Operator) License No. 320

Water Well Contractor's Certification:

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

Name Pete Tolmasoff Well Drilling
(Person, firm or corporation) (Type or print)
Address Turner, Ore.
[Signed] [Signature]
(Water Well Contractor)
Contractor's License No. 410 Date 12/21/70 19

STATE OF OREGON

COUNTY OF LINN

PERMIT TO APPROPRIATE THE PUBLIC WATERS

THIS PERMIT IS HEREBY ISSUED TO

CITY OF SCIO
PO BOX 37
SCIO, OREGON 97374

The specific limits for the use are listed below along with conditions of use.

APPLICATION FILE NUMBER: G-14109

SOURCE OF WATER: WELL 4 WITHIN THE WILLAMETTE BASIN

PURPOSE OR USE: MUNICIPAL USE

MAXIMUM RATE: 1.78 CUBIC FEET PER SECOND

PERIOD OF USE: YEAR ROUND

DATE OF PRIORITY: JUNE 26, 1995

POINT OF DIVERSION LOCATION: SW 1/4 SW 1/4, SECTION 8, T10S, R1W, W.M.;
820 FEET NORTH AND 320 FEET EAST FROM SW CORNER OF SECTION 8

THE PLACE OF USE IS LOCATED AS FOLLOWS:

WITHIN THE CITY OF SCIO SERVICE AREA

Measurement, recording and reporting conditions:

- A. Before water use may begin under this permit, the permittee shall install a meter or other suitable measuring device as approved by the Director. The permittee shall maintain the meter or measuring device in good working order, shall keep a complete record of the amount of water used each month and shall submit a report which includes the recorded water use measurements to the Department annually or more frequently as may be required by the Director. Further, the Director may require the permittee to report general water use information, including the place and nature of use of water under the permit.
- B. The permittee shall allow the watermaster access to the meter or measuring device; provided however, where the meter or measuring device is located within a private structure, the watermaster shall request access upon reasonable notice.

If substantial interference with a senior water right occurs due to withdrawal of water from any well listed on this permit, then use of water from the well(s) shall be discontinued or reduced and/or the schedule of withdrawal shall be regulated until or unless the Department approves or implements an alternative administrative action to mitigate the interference. The Department encourages junior and senior appropriators to jointly develop plans to mitigate interferences.

The water user shall develop a plan to monitor and report the impact of water use under this permit on water levels within the aquifer that provides water to the permitted well(s). The plan shall be submitted to the Department within one year of the date the permit is issued and shall be subject to the approval of the Department. At a minimum, the plan shall include a program to periodically measure static water levels within the permitted well(s) or an adequate substitute such as water levels in nearby wells. The plan shall also stipulate a reference water level against which any water-level declines will be compared. If a well listed on this permit (or replacement well) displays a total static water-level decline of 25 or more feet over any period of years, as compared to the reference level, then the water user shall discontinue use of, or reduce the rate or volume of withdrawal from, the well(s). Such action shall be taken until the water level recovers to above the 25-foot decline level or until the Department determines, based on the water user's and/or the Department's data and analysis, that no action is necessary because the aquifer in question can sustain the observed declines without adversely impacting the resource or senior water rights. The water user shall in no instance allow excessive decline, as defined in Commission rules, to occur within the aquifer as a result of use under this permit.

Within one year of permit issuance, the permittee shall submit a water management and conservation plan consistent with OAR Chapter 690, Division 86.

STANDARD CONDITIONS

The wells shall be constructed in accordance with the General Standards for the Construction and Maintenance of Water Wells in Oregon. The works shall be equipped with a usable access port, and may also include an air line and pressure gauge adequate to determine water level elevation in the well at all times.

The use shall conform to such reasonable rotation system as may be ordered by the proper state officer.

Prior to receiving a certificate of water right, the permit holder shall submit the results of a pump test meeting the department's standards, to the Water Resources Department. The Director may require water level or pump test results every ten years thereafter.

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

RECEIVED

JUN - 2 1995

(START CARD) #

77017

2
LINN
6579

10s/ tw/ 8cc
Page 1

Instructions for completing this report are on the last page of this form.

WATER RESOURCES DEPT.

(1) OWNER: Well Number 2817
Name City of Scio
Address 38957 NW 1st Ave
City Scio State OR Zip 97374

(2) TYPE OF WORK
 New Well Deepening Alteration (repair/recondition) Abandonment

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

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

(5) BORE HOLE CONSTRUCTION:
Special Construction approval Yes No Depth of Completed Well 200 ft.
Explosives used Yes No Type _____ Amount _____

HOLE			SEAL			
Diameter	From	To	Material	From	To	Sacks or pounds
14	0	90	Cement	0	90	66 sacks
10	0	210	Bore			

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

Backfill placed from _____ ft. to _____ ft. Material _____
Gravel placed from 90 ft. to 160 ft. Size of gravel 1/4" Grit

(6) CASING/LINER:

Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing: 10	2	202	250	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Liner: NONE				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Final location of shoe(s) NONE

(7) PERFORATIONS/SCREENS:

Perforations Method Holtz
 Screens Type _____ Material _____

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
95	195	1/4x1	5600		10"	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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

Yield gal/min	Drawdown	Drill stem at	Time
700	150		1 hr.

Temperature of water 56 Depth Artesian Flow Found _____
Was a water analysis done? Yes By whom _____
Did any strata contain water not suitable for intended use? Too little
 Salty Muddy Odor Colored Other _____
Depth of strata: _____

(9) LOCATION OF WELL by legal description:
County LINN Latitude _____ Longitude _____
Township 10 N or S 1 E or W WM
Section 8 SW 1/4 SW 1/4
Tax Lot 608 Lot _____ Block _____ Subdivision _____
Street Address of Well (or nearest address) 38875 NW 1st Ave Scio, OR 97374

(10) STATIC WATER LEVEL:
20'2" ft. below land surface. Date 5-16-95
Artesian pressure _____ lb. per square inch. Date _____

(11) WATER BEARING ZONES:

Depth at which water was first found 92

From	To	Estimated Flow Rate	SWL
92	195	700 gpm	202"

(12) WELL LOG:
Ground Elevation _____

Material	From	To	SWL
Sandy Loam, Clay	0	9	
Blue Clay & Gravel	9	27	
Blue Clay	27	35	
Fine Blue Sand	35	38	
Sand & Gravel	38	54	
Gray Clay	54	70	
Blue Sandy Clay	70	80	
Blue Clay	80	92	
Fine Gravel & Sand	92	104	
Gray Clay	104	118	
Sand & Gravel	118	122	
Gray Clay	122	130	
Sand & Gravel	130	139	
Gravels	139	147	
Gravels	147	149	
Gray Clay	149	157	
Gravel	157	158 1/2	
Gray Clay	158 1/2	165	
Brown Clay	165	166 1/2	
Clay Sand Gravel w/ sticks & bark	166 1/2	183	

Date started 5-10-95 Completed 5-16-95

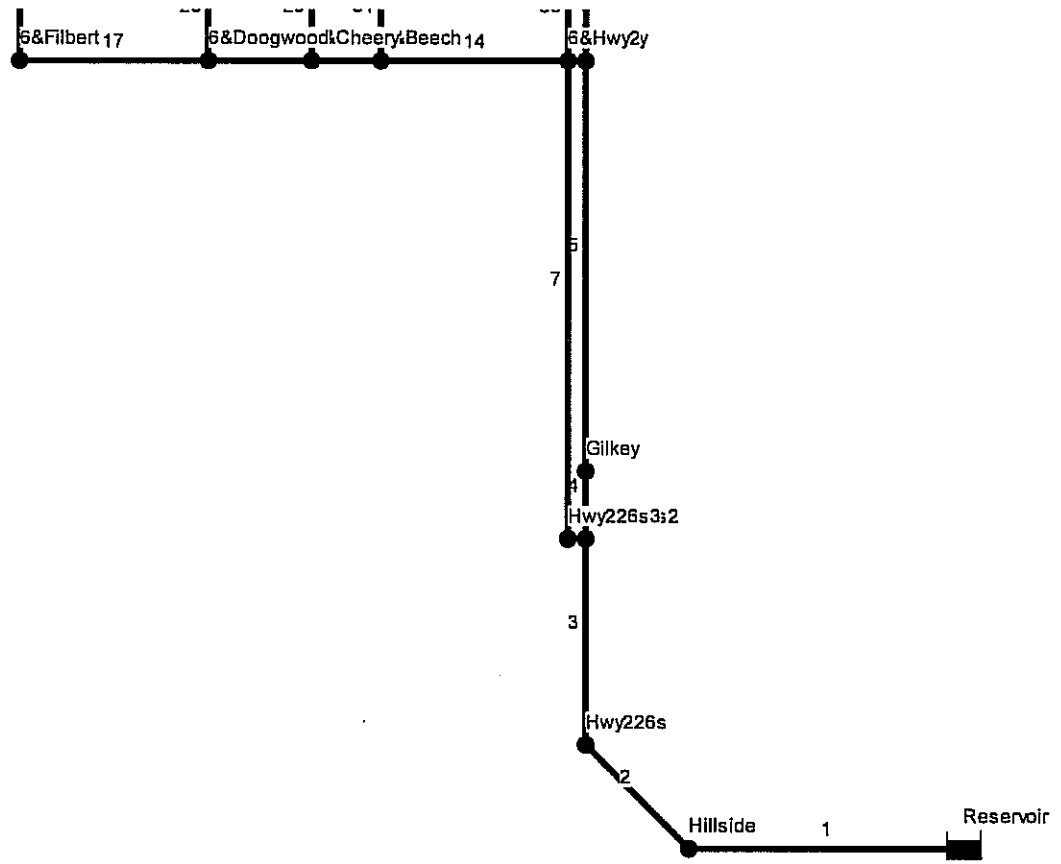
(unbonded) Water Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.
Signed David J. [Signature] WWC Number 1279 Date 5/31/95

(bonded) Water Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.
Signed [Signature] WWC Number 514 Date 5/31/95

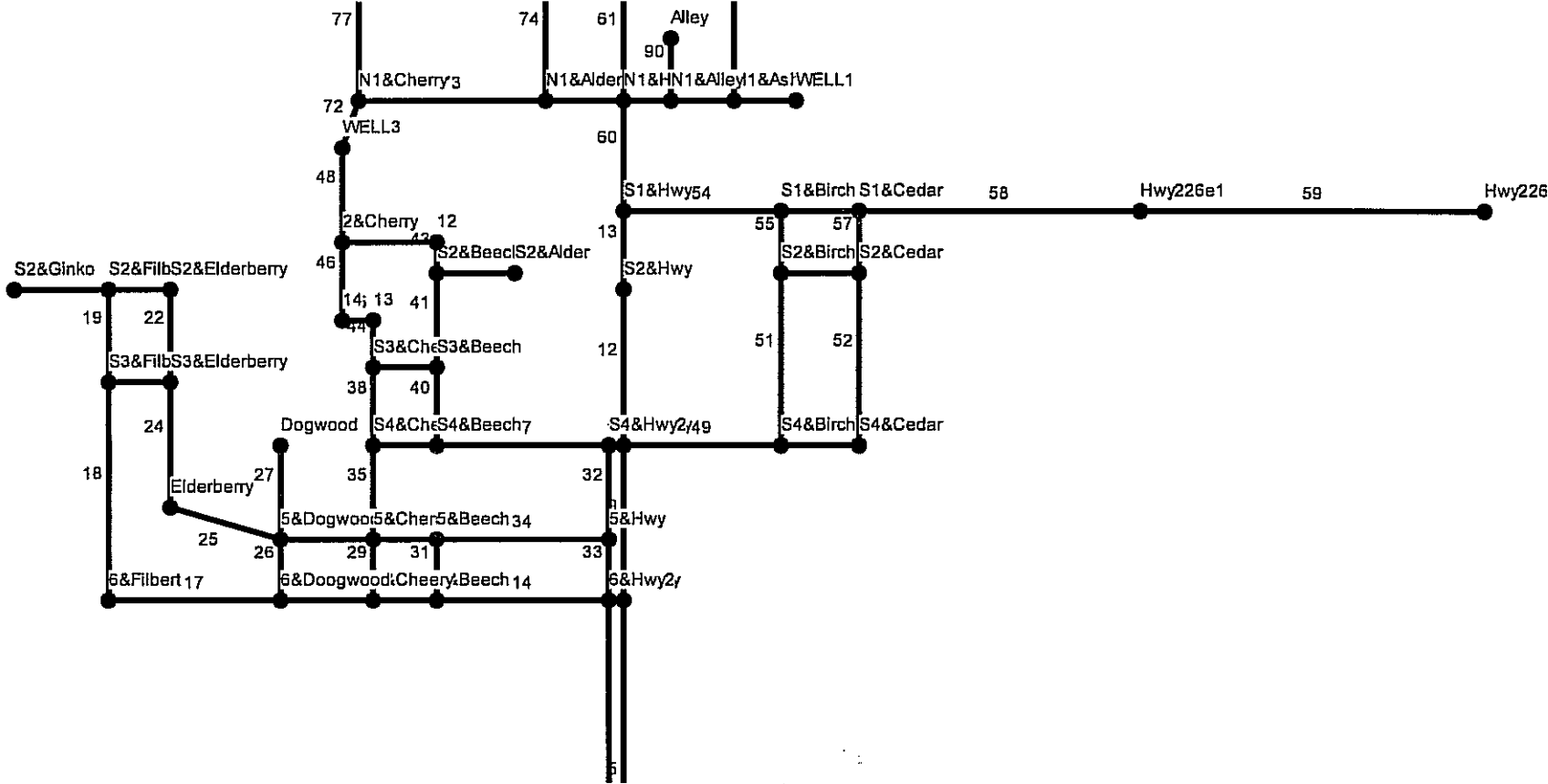
Appendix F

Water System Computer Modeling

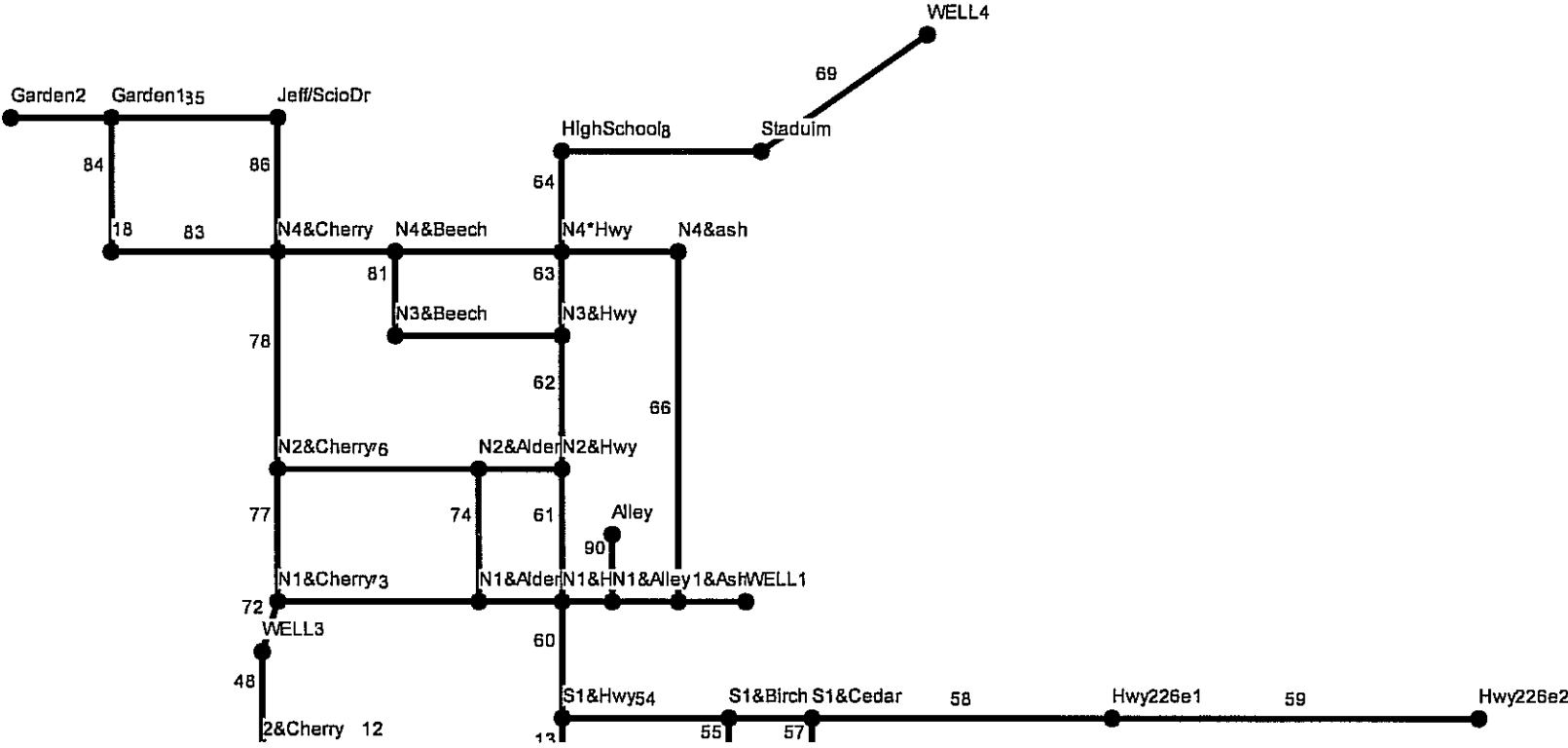
City of Scio – Water System
Node/Pipe Map
Reservoir



City of Scio – Water System
 Node/Pipe Map
 South Section



City of Scio – Water System
 Node/Pipe Map
 North Section



Network Table - Links

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 1	2868.00	8.14	29.00	0.028
Pipe 2	2864.00	4.57	7.12	0.029
Pipe 3	2860.00	4.56	7.10	0.029
Pipe 4	2454.25	6.96	21.73	0.029
Pipe 5	2450.25	6.95	21.66	0.029
Pipe 6	401.75	2.56	5.49	0.036
Pipe 7	397.75	4.51	21.86	0.035
Pipe 8	-279.21	3.17	11.35	0.036
Pipe 9	2167.04	6.15	17.26	0.029
Pipe 11	-82.18	0.93	1.18	0.044
Pipe 12	1988.16	5.64	14.71	0.030
Pipe 13	1984.16	5.63	14.66	0.030
Pipe 14	266.43	3.02	10.41	0.037
Pipe 15	258.61	0.73	0.34	0.040
Pipe 16	120.82	0.77	0.59	0.043
Pipe 17	32.68	0.21	0.05	0.052
Pipe 18	28.68	0.18	0.04	0.053

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 19	10.93	0.07	0.01	0.060
Pipe 20	4.00	0.03	0.00	0.074
Pipe 21	2.93	0.02	0.00	0.056
Pipe 22	-1.07	0.01	0.00	0.093
Pipe 23	13.75	0.09	0.01	0.059
Pipe 24	8.68	0.02	0.00	0.065
Pipe 25	4.68	0.03	0.00	0.068
Pipe 26	84.14	0.54	0.30	0.045
Pipe 27	4.00	0.03	0.00	0.074
Pipe 28	80.82	0.92	1.14	0.044
Pipe 29	-133.79	1.52	2.91	0.041
Pipe 30	-121.26	1.38	2.42	0.041
Pipe 31	-3.82	0.39	0.82	0.058
Pipe 32	-281.09	3.19	11.50	0.036
Pipe 33	-406.53	4.61	22.77	0.034
Pipe 34	-121.44	1.38	2.43	0.041
Pipe 35	331.87	3.77	15.63	0.035
Pipe 36	63.64	0.72	0.73	0.045

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 37	-194.91	2.21	5.83	0.038
Pipe 38	264.23	3.00	10.25	0.037
Pipe 39	-24.03	0.27	0.12	0.052
Pipe 40	254.56	2.89	9.57	0.037
Pipe 41	226.52	2.57	7.71	0.038
Pipe 42	4.00	0.05	0.00	0.069
Pipe 43	218.52	2.48	7.21	0.038
Pipe 44	284.26	3.23	11.74	0.036
Pipe 45	280.26	3.18	11.43	0.036
Pipe 46	276.26	3.13	11.13	0.036
Pipe 47	214.52	2.43	6.97	0.038
Pipe 48	486.78	3.11	7.83	0.035
Pipe 49	257.05	2.92	9.74	0.037
Pipe 50	115.19	1.31	2.20	0.042
Pipe 51	137.86	1.56	3.07	0.040
Pipe 52	111.19	1.26	2.06	0.042
Pipe 53	-8.48	0.10	0.02	0.061
Pipe 54	-225.05	2.55	7.62	0.038

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 55	142.35	1.62	3.26	0.040
Pipe 56	-86.71	0.98	1.30	0.043
Pipe 57	98.71	1.12	1.65	0.042
Pipe 58	8.00	0.09	0.02	0.062
Pipe 59	4.00	0.41	0.92	0.059
Pipe 60	2205.22	6.26	17.82	0.029
Pipe 61	1878.95	5.33	13.25	0.030
Pipe 62	2130.05	6.04	16.72	0.029
Pipe 63	2120.38	6.02	16.57	0.030
Pipe 64	2608.00	7.40	24.32	0.029
Pipe 66	260.18	2.95	9.96	0.037
Pipe 67	-256.18	2.91	9.68	0.037
Pipe 68	8.00	0.05	0.00	0.064
Pipe 69	4.00	0.03	0.00	0.072
Pipe 70	4.00	0.03	0.00	0.070
Pipe 71	46.08	0.52	0.40	0.048
Pipe 72	482.78	3.08	7.71	0.035
Pipe 73	-172.88	1.96	4.67	0.039

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 74	-214.96	2.44	7.00	0.038
Pipe 75	255.10	2.89	9.60	0.037
Pipe 76	-44.14	0.50	0.37	0.048
Pipe 77	305.90	3.47	13.44	0.036
Pipe 78	257.77	2.92	9.79	0.037
Pipe 79	237.77	2.70	8.43	0.037
Pipe 80	235.44	2.67	8.28	0.037
Pipe 81	-1.67	0.02	0.00	0.077
Pipe 82	-5.67	0.06	0.01	0.065
Pipe 83	7.78	0.09	0.01	0.062
Pipe 84	-3.78	0.04	0.00	0.070
Pipe 85	-4.22	0.05	0.00	0.068
Pipe 86	-8.22	0.09	0.02	0.062
Pipe 87	4.00	0.05	0.00	0.068
Pipe 88	276.18	3.13	11.13	0.036
Pipe 89	268.18	3.04	10.54	0.037
Pipe 90	4.00	0.10	0.03	0.065

Example Modeling Results (Nodes)
 2,600 gpm Fire Demand
 Scio High School
 (4 Pages)

Network Table - Nodes

Node ID	Demand GPM	Head ft	Pressure psi
Junc Hillside	4.00	458.80	25.48
Junc Hwy226s	4.00	455.95	43.74
Junc Hwy226s2	4.00	451.69	50.56
Junc Gilkey	4.00	443.00	46.80
Junc 6&Hwy	4.00	417.00	43.76
Junc Hwy226s3	4.00	451.42	50.44
Junc 6&Hwy2	4.00	416.43	43.52
Junc S4&Hwy	4.00	408.37	39.59
Junc S4&Hwy2	4.00	408.43	39.62
Junc S2&Hwy	4.00	401.02	35.54
Junc S1&Hwy	4.00	397.35	34.38
Junc 6&Beech	4.00	410.71	41.47
Junc 6&Cheery	4.00	410.64	41.44
Junc 6&Doogwood	4.00	410.46	41.80
Junc 6&Filbert	4.00	410.43	42.22
Junc S3&Filbert	4.00	410.40	43.07
Junc S2&Filbert	4.00	410.40	43.50

Node ID	Demand GPM	Head ft	Pressure psi
Junc S2&Ginko	4.00	410.40	43.94
Junc S2&Elderberry	4.00	410.40	43.50
Junc S3&Elderberry	4.00	410.40	42.64
Junc Elderberry	4.00	410.40	42.64
Junc 5&Dogwood	4.00	410.40	42.64
Junc Dogwood	4.00	410.40	41.77
Junc 5&Cherry	4.00	410.06	41.19
Junc 5&Beech	4.00	410.54	40.53
Junc 5&Hwy	4.00	411.88	41.54
Junc S4&Cherry	4.00	405.37	39.59
Junc S4&Beech	4.00	405.22	39.53
Junc S3&Cherry	4.00	402.81	38.05
Junc S3&Beech	4.00	402.83	38.06
Junc S2&Beech	4.00	400.52	37.06
Junc S2&Alder	4.00	400.52	37.05
Junc 12	4.00	399.80	37.18
Junc 13	4.00	401.63	37.54
Junc 14	4.00	400.49	37.91

Node ID	Demand GPM	Head ft	Pressure psi
Junc 2&Cherry	4.00	397.71	38.00
Junc WELL3	4.00	395.36	35.69
Junc S4&Birch	4.00	403.50	36.18
Junc S4&Cedar	4.00	402.95	35.94
Junc S2&Birch	4.00	401.81	35.45
Junc S2&Cedar	4.00	401.82	35.45
Junc S1&Birch	4.00	401.16	35.17
Junc S1&Cedar	4.00	401.49	35.31
Junc Hwy226e1	4.00	401.47	32.70
Junc Hwy226e2	4.00	400.46	31.40
Junc N1&Hwy	4.00	391.11	31.68
Junc N2&Hwy	4.00	385.81	29.38
Junc N3&Hwy	4.00	379.13	26.49
Junc N4*Hwy	4.00	374.98	24.26
Junc HighSchool	2600.00	367.69	21.10
Junc N1&Ash	4.00	387.34	29.61
Junc N4&ash	4.00	378.37	24.86
Junc Stadiim	4.00	367.69	18.93

Node ID	Demand GPM	Head ft	Pressure psi
Junc WELL4	4.00	367.69	22.83
Junc WELL1	4.00	387.34	29.61
Junc N1&Alder	4.00	391.01	32.50
Junc N1&Cherry	4.00	393.82	34.15
Junc N2&Alder	4.00	388.22	30.42
Junc N2&Cherry	4.00	388.44	30.52
Junc N4&Cherry	4.00	382.07	29.06
Junc N4&Beech	4.00	379.12	27.78
Junc N3&Beech	4.00	379.12	27.78
Junc 18	4.00	382.07	30.36
Junc Jeff/ScioDr	4.00	382.07	30.36
Junc Garden1	4.00	382.07	30.36
Junc Garden2	4.00	382.06	30.36
Junc N1&Alley	4.00	389.45	32.26
Junc Alley	4.00	389.44	32.25
Resvr Reservoir	-2868.00	482.00	0.00

Appendix G
City of Scio Water Rate Fee Schedule



Covered Bridge Capital of the West

City of Scio

P. O. Box 37

Scio, OR 97374

Phone: 503-394-3342

Fax: 503-394-2340

TTY Access: 711

Water Rate Fee Schedule

July 2014

Fees for Utility Services		
A.	Water Services	<u>Fee or Charge</u>
1.	<p><u>Connection to service (per housing unit)</u> – this includes a ¾” meter, line tap, bore, etc.</p> <p>Upgrade to a 1” & Larger Meter – must pay the increased cost of meter, tap, bore, etc, in addition to the base fee.</p>	\$3,500.00
2.	<p><u>Water Service Deposit.</u></p> <p>a. Property Owner – the deposit will be applied to the account after 12 months continuous paid-on-time service.</p> <p>b. Tenant – the deposit shall be applied to the final bill once the customer vacates the property, any balance left over will be refunded to the customer.</p> <p>c. The Utility deposit shall not bear interest.</p>	\$100.00
3.	<p><u>Monthly Water Service Charges (per Unit)</u></p> <p>a. In Town Residential Base (3,000 gal.)</p> <p style="padding-left: 20px;">Next 2,000 gal</p> <p style="padding-left: 20px;">Next 3,000 gal</p> <p style="padding-left: 20px;">Over 8,000 gal</p> <p>b. Out of Town Residential Base (3,000 gal.)</p> <p style="padding-left: 20px;">Next 2,000 gal</p> <p style="padding-left: 20px;">Next 3,000 gal</p> <p style="padding-left: 20px;">Over 8,000 gal</p>	<p>\$31.98</p> <p>.00293 per gallon</p> <p>.00319 per gallon</p> <p>.00345 per gallon</p> <p>\$41.75</p> <p>.00441 per gallon</p> <p>.00478 per gallon</p> <p>.00515 per gallon</p>
	<p>c. Commercial Base (3,000 gal.)</p> <p style="padding-left: 20px;">Next 2,000 gal</p> <p style="padding-left: 20px;">Next 3,000 gal</p> <p style="padding-left: 20px;">Over 8,000 gal</p> <p>d. Large Commercial Base (3,000 gal.)</p> <p style="padding-left: 20px;">Next 2,000 gal</p> <p style="padding-left: 20px;">Next 3,000 gal</p> <p style="padding-left: 20px;">Over 8,000 gal</p>	<p>\$32.00</p> <p>.00399 per gallon</p> <p>.00425 per gallon</p> <p>.00452 per gallon</p> <p>\$35.17</p> <p>.00399 per gallon</p> <p>.00425 per gallon</p> <p>.00452 per gallon</p>

Incorporated October 24, 1866

The City of Scio is an Equal Opportunity Employer and Provider

4.	<u>Late Charge.</u> Accounts not paid in full by the 15 th of the month will be charged a \$2.00 late fee.	
5.	<u>24-Hour Shut-off Notice.</u> A \$15.00 charge will be assessed on all accounts requiring a 24-Hour Shut-off Notice, at the time the work order is prepared for the notice.	
6.	<u>Shut-off Fee.</u> All accounts which have not been paid in full by 12:00 p.m. (noon) on the day designated on the late notice will be charged a \$50.00 shut-off fee, at the time the work order is processed for the shut-off.	
7.	<u>After-Hours Turn-on Fee.</u>	\$100.00
8.	<u>Meter Test Fee.</u>	\$20.00
9.	<u>Criteria to Credit Excessive Water Bills Due to Leaks.</u> Where residential water bills are excessive due to a leak in the water service between the meter and the building the following policy shall apply: <ul style="list-style-type: none"> a. The water bill shall be adjusted to the average bill over the past 12 months plus ½ of the amount above the average, providing that no adjustment will be made for water loss more than ten (10) days beyond notification of a possible leak. b. Proof of a leak and repair must accompany the request for adjustment. 	
10.	<u>Automatic Annual Increase.</u> An annual 3% increase in the base and overages will be calculated prior to and effective with the July 1 bill each year.	

Appendix H
Public Education Program Flyer

Water Conservation Tips & Information

The City of Scio encourages the efficient use of water within the community. Our community drinking water is available whenever you need it but we all must do our part to conserve! A little effort can make a big difference. Following the tips included here can help save thousands of gallons of water every year in every household. For additional conservation resources and more tips to save water, visit Oregon Water Resources Department at oregon.gov/owrd



City of Scio
P.O. Box 37
38957 NW 1st Avenue
Scio, OR 97374
Phone: 503.394.3342
Fax: 503.394.2340
E-mail: scio@smt-net.com

Indoor Water Savings –

- Use your automatic dishwasher only for full loads.
- Don't leave water running while washing dishes or brushing your teeth.
- Take shorter showers or take a bath. A partially filled tub uses far less water than a long shower.
- Install water-saving showerheads or flow restrictors.
- Put a water displacement device in the tank of every toilet and don't use your toilet as a garbage can.
- Use your washing machine for full loads only.
- Keep a bottle filled with tap water in your refrigerator for drinking. Running the tap until cold is wasteful.

Outdoor Water Savings –

- Water your lawn only when it needs it and do it during the cool part of the day.
- Plant plants that are low water users and place mulch around their bases.
- Remove weeds so they don't compete for water with landscape plants and trees.
- Sweep sidewalks, driveways and patios instead of hosing them down.
- Clean gutters manually, without the use of a hose.
- Don't run the hose constantly while washing your car.

Check for Leaks!

Regularly check exposed pipes, faucets, hose bibs, toilets, and other fixtures. A slow drip can waste 15-20 gallons of water a day. A simple leak fix can save up to 6,000 gallons of water each year!



Appendix I
City of Scio Ordinance No. 457

A BILL FOR AN ORDINANCE ON) ORDINANCE BILL NO. _____
RESIDENTIAL AND COMMERCIAL) for 1978
WATER USE AND CONTROL) ORDINANCE NO. 457

THE PEOPLE OF THE CITY OF SCIO DO ORDAIN AS FOLLOWS:

Section 1. The City of Scio provides residential, commercial and industrial water to consumers in the City at a charge listed in its Ordinances and ammended from time to time to reflect increases in costs of operation, engineering and construction. The sources from which the water is obtained may become limited by reason of natural or unnatural occurrences and in the event that water supplies are limited and as a result in the sole opinion of City Council it is necessary to conserve water, it may, upon a 48 hour prior notice to water users of the City, limit such use as follows:

(a) Beginning April 1 of each year and extending to November 1 of each year, the City may, upon 48 hours prior notice restrict the use of water for lawns, gardens, ornamental display, irrigation, sprinkling, car washes, washing cars, or an untended open hose, by declaring that such use is permitted only on odd days in the south one-half of the City and on even days in the north one-half of the City, using the river as the dividing line between north and south.

(b) No special hours are hereby set by the City for such controlled use, but it may declare the hours in which the watering permitted on odd/even watering days may be allowed.

(c) It shall be unlawful for any person, firm or corporation to use water in a manner or time prohibited if the provisions of the Ordinance are declared to be in effect by the City Council and 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. Each day in which any such violation shall continue shall be deemed a separate offense.

Exceptions to such use may be granted by the City upon application therefore, at the City's sole discretion.

Section 2. Emergency Clause. Inasmuch as the provisions of this Ordinance are necessary for the immediate preservation of the peace, health and safety of the people of the City of Scio, an emergency is hereby declared to exist, and this Ordinance shall be in full force and effect immediately upon its passage by the Council and approval by the Mayor.

Passed by the Council by vote of 5 for and 0 against, and approved by the Mayor this 8 day of Aug; 1978.

Robert E. Zimmerman
Mayor

ATTEST:

George M. ...



City Of Scio, Oregon



ORDINANCE NO.

AN ORDINANCE ON RESIDENTIAL AND COMMERCIAL WATER USE AND CONTROL

THE CITY OF SCIO DOES ORDAIN AS FOLLOWS:

SECTION 1. Title. This ordinance shall be known as the “Water Conservation Ordinance” of the City of Scio, Oregon

SECTION 2. Purpose. The City of Scio provides residential, commercial and industrial water to consumers in the City at a charge listed in its Ordinances and amended from time to time to reflect increases in costs of operation, engineering and construction. The sources from which the water is obtained may become limited by reason of natural or unnatural occurrences. In the event that water supplies are limited and the City Manager determines that a critical water supply shortage threatens the ability of the City to deliver essential water to its customers, the City Manager may activate emergency measures as follows:

SECTION 3. Provisions.

(1) Stage 1 – Conservation Stage Alert

The trigger for the Conservation Stage Alert occurs when water use reaches 80% of the current well 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 of Alert

The trigger for the Moderate Stage Alert occurs when water use reaches 90% of the current well production for two consecutive days or a State-declared drought in the Scio area is acknowledged by 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) Prohibit lawn watering between 7:00 a.m. and 7:00 pm.
- 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. Thomas Creek 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 flushing of fire hydrants and water mains.

(3) Stage 3 – Emergency Stage of Alert

The trigger for the Emergency Stage Alert occurs when water use reaches 95% of the current well production, when total well production capability is lost, or when deemed necessary by the City Manager. The City Manager shall declare an Emergency Stage of 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 in the provisions of Section 3 of this Ordinance as declared to be in effect by the City Administrator. 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 Administrator 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) Install a flow restrictor on the street side of the water meter; or
- b) Terminate water service.

This Ordinance was read for the first time in full on this _____ day of _____, 2014.

This Ordinance was read by title only for the second time on this _____ day of _____, 2014.

This Ordinance was passed on the _____ day of _____, 2014 by the City Council and executed by the Mayor this _____ day of _____, 2014.

Date: _____ By: _____
EARL D. WILSON, Mayor

Date: _____ Attest: _____
VIRGINIA GRIFFITH, City Manager

APPROVED AS TO FORM

Date: _____ By: _____
JOHN E. KENNEDY, City Attorney