



WATER MANAGEMENT AND CONSERVATION PLAN

FOR

Coburg, OR

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Branch Engineering, Inc.

310 5th Street

Springfield, OR 97477

Phone (541) 746-0637

Fax (541) 746-0389



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LIST OF ACRONYMS

ADD	=	Average Day Demand
EWEB	=	Eugene Water and Electric Board
GPCD	=	Gallons per Capita per Day
GPD	=	Gallons per Day
GPM	=	Gallons per Minute
SWVGMAAP	=	Southern Willamette Valley Groundwater Management Area Action Plan
LCOG	=	Lane Council of Governments
MDD	=	Maximum Daily Demand
MG	=	Million Gallons
MGD	=	Million Gallons per Day
OAR	=	Oregon Administrative Rule
PHD	=	Peak Hourly Demand
PSI	=	Pounds per Square Inch
PVE	=	Pioneer Valley Estates
UGB	=	Urban Growth Boundary
WCMP	=	Water Conservation and Management Plan
WSMP	=	Water System Master Plan

Executive Summary

INTRODUCTION

The city of Coburg is submitting this Water Conservation and Management Plan (WCMP) as an update to the City's original 1997 WCMP. This plan was also a condition of the City's recent water right permit extension. There is an immediate need to add an additional well to provide redundancy to its existing wells. The city also needs to transfer and amend its existing water rights to properly cover its existing use and future use. In addition, population is expected to triple during the next twenty years. To supply this new demand, additional sources will be needed just beyond the 20 year planning period. Unless population grows faster than expected, no new water rights will be requested in the next 20 years.

This plan intends to satisfy Oregon Administrative Rules 690-315 and 690-086. A checklist is provided at the beginning of each chapter highlighting the required information and which section to find it in.

REPORT SUMMARY

The city of Coburg currently serves approximately 1050 residents, a substantial industrial district, and a subdivision one mile north of the city limits. The population of Coburg is expected to triple over the next 20 years requiring a reconstruction of much of its water infrastructure and some expansion of current facilities. The City's current source of water is two wells southwest of town. The city has sufficient water rights for the 20 year planning period but an additional well is necessary to fully perfect existing water rights. Water rights from the city's abandoned wells need to be transferred to the existing wellfield to cover current and future use. With successful transfer of these water rights a small increase in instantaneous withdrawals could occur under the existing permit through mechanical upgrades or additional wells as city growth is realized.

As part of the City's attempt to meet increased demand, this WCMP was developed to identify strategies to reduce water use. System upgrades, consumer awareness, increased water rates, system auditing, leak detection, non-potable water reuse, and meter replacement are expected to reduce average daily demand approximately 4% over 5 years. This will reduce daily water usage by roughly 11,000 gallons of water per day.

A curtailment plan was developed in case of a water shortage. The foreseeable causes of shortage in Coburg are mechanical failure, groundwater contamination, and a supply main break. Three alert stages were developed and ordinances developed for the City Council to pass should a water shortage occur.

Due to operational constraints, the city currently cannot fully utilize its existing water rights. Planned upgrades, including the addition of another well, will help the city to meet demand for the planning period under existing water rights.

The City will eventually require a new water right permit for additional groundwater to serve future development. However, this will not be necessary until demand increases substantially. It is predicted that the new water source will be not be necessary until just after the 20 year planning period but it depends on the actual growth rate Coburg experiences. There remains a possibility that a regional connection to the Eugene Water and Electric Board (EWEB) will become possible. The city will also be requesting transfer of its existing water rights to the current wellfield to cover present operations. Table 1 shows a summary of planned water rights actions.

Table 1: Proposed Actions on City’s Water Rights (20 year plan)

Application/ permit number	Certificate Number	Source ¹	Use	Priority date	Rate (CFS)	Proposed Action/ Completion Year
G1726/ G1580	37211	Well No. 3	Municipal- Abandoned	4/19/1960	0.31	Transfer/ 2009
G4283/G4032	44837	Well No. 4	Municipal- Abandoned	3/18/1968	0.1	Transfer/ 2009
G4284/G4033	44838	Well No. 5	Municipal	3/18/1968	0.3	Amend/ 2009
G13877/G13183	none	(2)	Municipal	11/16/1994	2	Amend/2009 Perfect/2025

- 1.) *Note: well numbering history obscure. Some wells have been renumbered. Well numbers shown are the best understanding of the current nomenclature in water rights documentation*
- 2.) *Permit doesn't state well number. Historically it's been assumed to cover City Well 2. Should be clarified to cover discharges of both wells*

DIVISION 86 COMPLIANCE

In Oregon, major water suppliers are required to complete Water Management and Conservation Plans (WMCP). Historically municipal water suppliers were issued water right permits for the amount of water that could reasonably be needed for the next 50 years or more. These permits were reviewed every 5 years and municipalities had to demonstrate that efforts were being made to perfect these rights. New rules now require that

municipalities permit water rights only for demand expected in 20 years. Consequently, the five year renewal process has been abolished.

The rules regarding WMCPs were revised in 2002 and are covered under Oregon Administrative Rule (OAR) 690-086. This is directly related to the rules regarding water permit extensions contained in OAR 690-315. The rules contain requirements for the contents of a WMCP. The report is structured to address these requirements. Below is an overview of the structure of this WMCP.

- ✓ ***Overview –***
 - An introduction to the city of Coburg, location, and intent of plan
- ✓ ***Description of Coburg’s Water System –***
 - A description of Coburg’s water system, operation, service area, and demand characteristics
- ✓ ***Water Conservation –***
 - Coburg’s plan to reduce demand through conservation measures. See Table 2 below.
- ✓ ***Water Curtailment Plan –***
 - Details the three stages of alert during water shortages, triggers, and curtailment actions that will be taken.
- ✓ ***Water Supply –***
 - Outlines projected future water demand with conservation measures in place. It also details necessary future water rights actions

PROPOSED CONSERVATION PROGRAM

A number of conservation measures will be accomplished with the currently planned water system upgrades. The most recent water system plan update included numerous upgrades to the existing infrastructure that will reduce leakage, stabilize pressure, improve water records, and reduce pipe breakage. In addition, efforts will be made to add new programs but will be limited by the city’s limited staff and financial resources. Existing programs will be improved and updated. Table 2 below summarizes the expected timeline for these conservation measures to be implemented.

Table 2: Coburg's Conservation Program

BENCHMARK	START YEAR	FREQUENCY
Upgrade Booster Pump Station	2008	n/a
Install Elevated Reservoir	2009	n/a
Customer Meter Testing and Replacement	2009	Annually
New Source Meters	2008	n/a
Source Meter Testing and Calibration	2013	5 yrs
Water System Audit	2009	Annually
Leakage Assessment	2009	Initial Assessment when Audit >10% Leakage
Public Education	2009	Annually
Non-potable water Reuse	2010	Distribute information Annually

1.1 INTRODUCTION

The city of Coburg is located approximately 2 miles from the northern edge of the Eugene-Springfield Metropolitan area. Similar satellite communities have grown rapidly in recent years but Coburg has not. Coburg's lack of a wastewater collection and treatment system has restricted growth. The first phase of the wastewater system is currently nearing construction. Assuming a sewer system is completed, Coburg's population is expected to triple over the next 20 years.

The updated population forecast and a need to re-evaluate water system improvement priorities prompted an update to Coburg's Water System Master Plan (WSMP) in October 2005. A number of system upgrades and expansions were outlined in this plan including development of additional water sources for increased supply and redundancy.

Two wells southwest of town are Coburg's sole water source with a production capacity of 550 GPM for City Well No.1 and 525 GPM for City Well No. 2. The WSMP indicates plans to further develop this wellfield and possibly construct another wellfield south of town. The City has a total .71 cfs of certificated water rights and another 2 cfs in permitted water rights. This permit has recently received a 20 year extension

A number of improvements outlined in the WSMP update will reduce wasted water and improve system efficiency. This WCMP will identify further opportunities and strategies to conserve valuable water resources.

1.2 PLANNING AREA

The city of Coburg, Oregon is located in Lane County approximately five miles north of the city of Eugene. The city has a rich history showcased by a National Historic District and a number of annual festivals. The first settlers arrived in 1847 and the city was incorporated in 1906. It is surrounded by flat, arable land and the city extends primarily to the west of the Interstate 5 corridor. The Coburg Hills rise over 1,000 feet in elevation immediately to the east. A location map of Coburg is provided in Figure 1.1 below.



Figure 1.1: Location Map of Coburg, Oregon

1.3 STUDY OBJECTIVES

Municipal water suppliers are allowed to apply for a water right permit for more than can be used immediately. In the past, a condition of this permit was that it must be periodically extended and documentation provided regarding how the water right is being developed. In this process, extensions were filed every 5 years for as long as necessary to develop permits. However, in 2002 new rules were enacted that enabled municipalities to apply for a long term permit extension of 50 years or more. In 2005, HB 3038 reduced this time period to a maximum of 20 years.

The rules governing municipal water rights are covered by Oregon Administrative Rules (OAR) Chapter 390, Divisions 86 and 315. In 2002, the rules were revised to include the longer permit extension period, under the condition that municipalities produce a WCMP. All water suppliers serving over 1,000 people and seeking water permit extensions must produce a WCMP.

Coburg is anticipating rapid growth and expansion of its existing water supply will be necessary just beyond the 20 year planning horizon. To serve this new development an additional water right permit will need to be obtained. This plan is intended to proactively address the WCMP requirements of Division 86 prior to application for additional water rights. This study develops a practical and organized strategy for Coburg to maximize efficient use of their water resources.

1.4 FUTURE SUBMITTALS

The city of Coburg plans to update this WCMP in 10 years, in 2018. This is the requirement under OAR 690-86. In addition, a progress report will be submitted in 5 years, in 2013, to detail progress in conservation efforts.

1.5 DATA SOURCES

Most data in this report was obtained through City records or the City's Water System Master Plan. Additional data and information was obtained through the Lane Council of Governments (LCOG). The City's water system has outdated data collection technology so much of the usage and production data is imprecise or estimated.

1.6 NOTIFICATION OF AFFECTED GOVERNMENTS

A draft plan was sent to Lane County on June 19, 2006. No comments were received.

1.7 DOCUMENT ORGANIZATION AND CHECKLIST

Table 1.1 provides a summary of the required elements of this plan and the locations of the information in this document. This Water Management and Conservation Plan is organized as follows:

- Chapter 1: *Overview*
- Chapter 2: *Description of Coburg's Water System*
- Chapter 3: *Water Conservation*

- Chapter 4: *Water Curtailment Plan*
- Chapter 5: *Water Supply*

Table 1.1 Checklist of Report Requirements and Reference Sections

	ITEM	OAR	REFERENCE SECTION
<i>Water Supplier Description</i>			
✓	Description of supplier's source(s)	690-086-0140 (1)	2.3
✓	Delineation of current service area	690-086-0140 (2)	2.2
✓	Assessment of adequacy and reliability of existing supplies	690-086-0140 (3)	2.4
✓	Quantification of present and historic use	690-086-0140 (4)	2.6
✓	Summary of water rights held	690-086-0140 (5)	2.5
✓	Description of customers served and water use summary	690-086-0140 (6)	2.7
✓	Identification of interconnections with other suppliers	690-086-0140 (7)	2.2
✓	System schematic	690-086-0140 (8)	Figure 2.1
✓	Quantification of system leakage	690-086-0140 (9)	2.9
<i>Water Conservation Element</i>			
✓	Full metering of systems	690-86-0150 (4)(b)	3.2
✓	Meter testing and maintenance program	690-86-0150 (4)(c)	3.3.1
✓	Annual water audit	690-86-0150 (4)(a)	3.3.2
✓	Leak detection program	690-86-0150 (4)(e)	3.3.3
✓	Leak repair or line replacement program	690-86-0150 (6)(a)	2.9
✓	Rate structure based on quantity of water metered	690-86-0150 (4)(d)	3.2.3
✓	Rate structure and billing practices that encourage conservation	690-86-0150 (6)(d)	3.2.3
✓	Public education program	690-86-0150 (4)(f)	3.3.4
✓	Technical and financial assistance programs	690-86-0150 (6)(b)	3.3.5
✓	Retrofit/replacement of inefficient fixtures	690-86-0150 (6)(c)	3.3.6
✓	Reuse, recycling, non-potable opportunities	690-86-0150 (6)(e)	3.3.7
✓	Other measures, if identified by supplier	690-86-0150 (6)(f)	3.3.8
✓	Progress report on previous WMCP	690-86-0150 (1)	3.3.8
✓	Documentation of water use measurement and reporting	690-86-0150 (2)	3.2
✓	List of measures already implemented or required under contract	690-86-0150 (3)	3.2.4
<i>Water Curtailment Element</i>			
✓	Assessing your water supply	690-086-0160(1)	4.2
✓	Stages of alert	690-086-0160(2)	4.3
✓	Triggers for each stage of alert	690-086-0160(3)	4.3

✓	Curtailment actions	690-086-0160(4)	4.3
Water Supply Element			
✓	Delineation of current and future service areas	690-086-0170 (1)	5.2
✓	Population projections for service area	690-086-0170 (1)	5.2.1
✓	Prepare schedule to fully exercise each permit	690-086-0170 (2)	5.5
✓	Prepare demand forecast	690-086-0170 (3)	5.3
✓	Comparison of projected need and available sources	690-086-0170 (4)	5.4
✓	Analysis of alternative sources	690-086-0170 (5) and (8)	5.4
✓	Quantification of maximum rate and monthly volume	690-086-0170 (6)	5.3
✓	Mitigation actions under state and federal laws	690-086-0170 (7)	5.4
✓	List of affected local governments and their comments	690-086-0125 (5)	1.6
✓	Date for submittal of next update	690-086-0125 (6)	1.4
N/A	Documentation, where additional time is requested to meet previous benchmarks or metering	690-086-0125 (7)	N/A

1.7 AUTHORIZATION & ACKNOWLEDGEMENTS

The city of Coburg authorized this Water Management and Conservation Plan in February 2006. This study was funded by the city of Coburg through the Special Public Works Fund and Water and Wastewater Program loans administered by the Oregon Economic and Community Development Department.

Branch Engineering, Inc. would like to extend thanks to city staff for their efforts compiling the necessary data required to complete this study.

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DESCRIPTION OF COBURG'S WATER SYSTEM

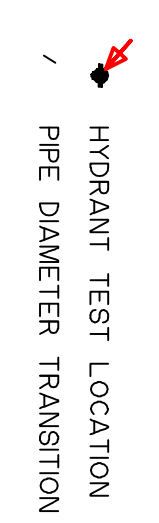
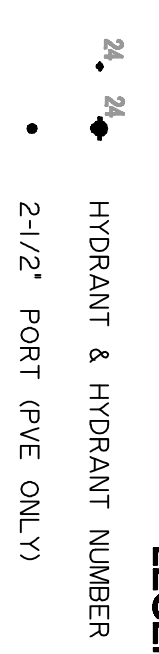
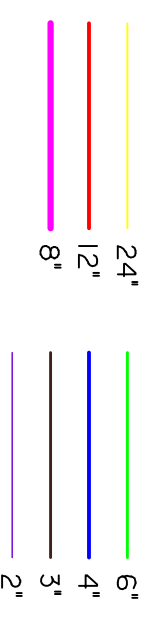
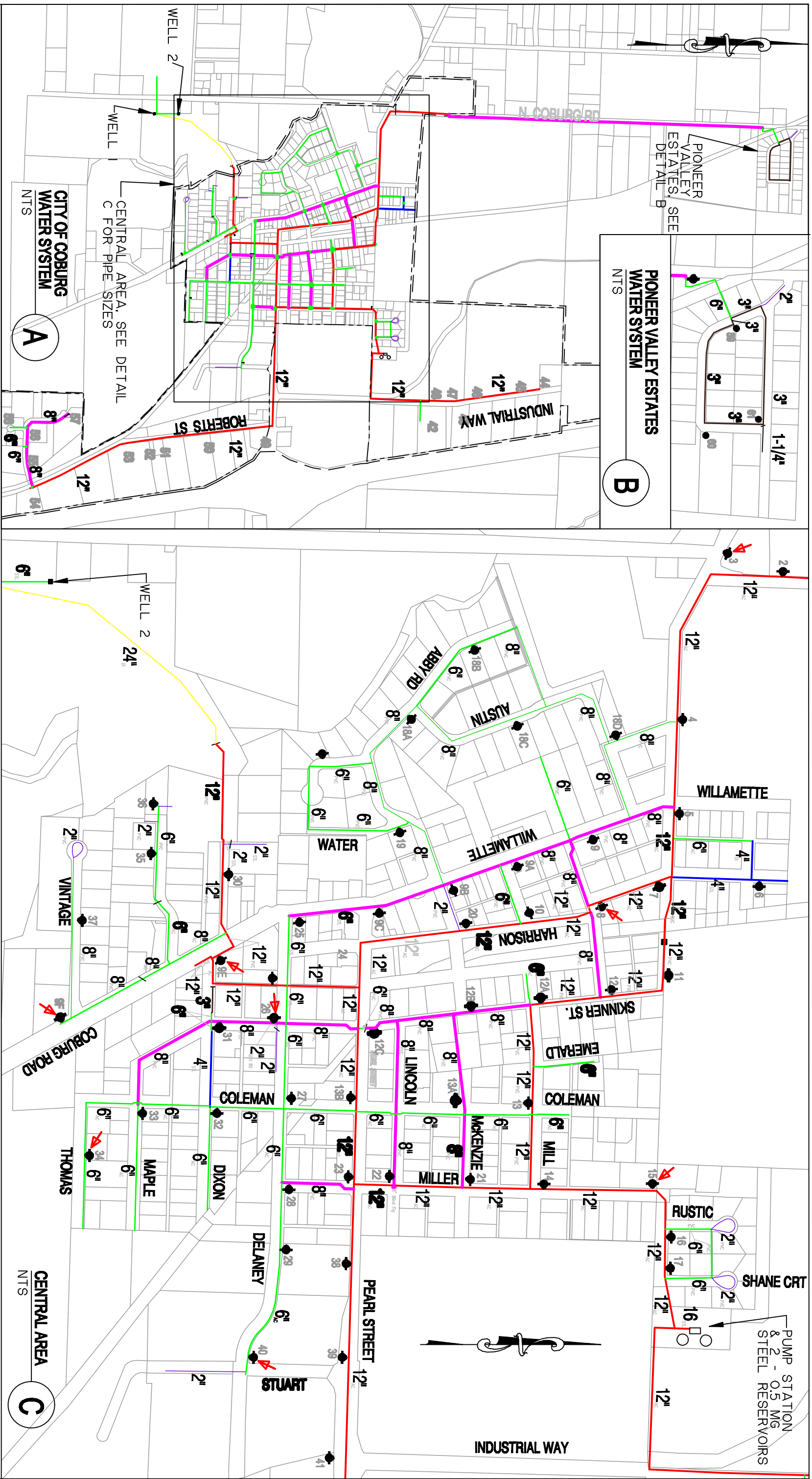
2.1 INTRODUCTION/CHECKLIST

The city of Coburg distributes water to residents and businesses within the city limits and also to the Pioneer Valley Estates (PVE). PVE is a 16.4 acre subdivision approximately one mile north of the Coburg city limits. The city owns and operates the PVE water system; PVE is part of Coburg's "municipal water system" as defined by the water resources department. The two systems were previously independent and separate, but were connected in 2004. The PVE well was contaminated with nitrates and fecal bacteria and is no longer in service.

Two wells located southwest of the city supply all of the system's water. There are no elevated reservoirs to pressurize the system, thus the city relies on the well pumps and booster pumps to pressurize the system. An overview map is shown in Figure 2.1 detailing the current water system. Table 2.1 shows the requirements under Division 86 rules for this chapter and the section where the information is located.

Table 2.1: Checklist of Chapter Requirements and Reference Sections

DESCRIPTION OF COBURG'S WATER SYSTEM			
	ITEM	OAR	REFERENCE SECTION
✓	Description of supplier's source(s)	690-086-0140 (1)	2.3
✓	Delineation of current service area	690-086-0140 (2)	2.2
✓	Assessment of adequacy and reliability of existing supplies	690-086-0140 (3)	2.4
✓	Quantification of present and historic use	690-086-0140 (4)	2.6
✓	Summary of water rights held	690-086-0140 (5)	2.5
✓	Description of customers served and water use summary	690-086-0140 (6)	2.7
✓	Identification of interconnections with other suppliers	690-086-0140 (7)	2.2
✓	System schematic	690-086-0140 (8)	Fig 2.1
✓	Quantification of system leakage	690-086-0140 (9)	2.9



LEGEND

FIGURE 2.1
CITY OF COBURG
DISTRIBUTION SYSTEM MAP

2.2 SERVICE AREA

Coburg's water service area is shown in Figure 2.2. It includes the area within the city's urban growth boundary (UGB) and PVE which is outside the UGB. The city owns and operates the PVE water system. PVE is not an interconnected "municipal water supply provider" but part of the city of Coburg's water supply system. The city limits and UGB encompass approximately 483-acres and 607-acres, respectively. The city acquired PVE's water system in 1963 and operated the two independently until 2004 when the two systems were connected with an 8" PVC Waterline. PVE's well and hydropneumatic tank have since been disconnected. PVE is permanently part of the city's water system.

2.3 WATER SOURCE AND TREATMENT

The sole source of Coburg's water supply is two wells located southwest of the city off Funke Road. These wells are designated Well No. 1 and Well No. 2. Well No. 2 was constructed in early 1977. Well No. 1 was first dug in 1940 and deepened in the 1950's or 60's. Each is located in a separate building, approximately 300-feet apart. Well 1 has a production capacity of approximately 525 gpm and Well 2 has a production capacity of approximately 550 gpm; capacity of the wellfield with both wells running cannot easily be determined until flow monitoring is installed with ongoing facility upgrades.

Well Building No.1 contains Well No. 1 and also the mechanical, electrical, and chlorination facilities for both wells. A pipeline connects Well 2 to Well Building 1. The master meter, generator, and chlorine dosing equipment are also located in this building. The master meter records the combined flow of the two wells. Disinfection is accomplished by dosing chlorine prior to entering a 1,360-ft section of 24-inch diameter transmission line. The transmission line doubles as the chlorine contact chamber. The specifications for Well 1 and Well No.2 are summarized in Table 2.2. The well mechanical and control systems are in the process of being upgraded.

Table 2.2: Well and Pump Specifications

WELL	No. 1	No. 2
Depth	200 ft.	200 ft.
Casing diameter	10 in.	10 in.
PUMP		
Type	Vertical Turbine	Submersible
Year installed	1975	2000
Rated Capacity	525 gpm	550 gpm
Rated Power	50 hp	50 hp

2.4 WATER SUPPLY ASSESSMENT

The water surface depth in the wells is recorded daily in order to monitor well performance. The data show that static water levels are relatively constant over time, save for seasonal fluctuations due to wet and dry weather seasons. This indicates that the aquifer water supply is ample. However, drawdown depths show an increasing trend likely caused by a declining performance in the well screen.

Coburg's two wells provide sufficient supply for the current demand. However, both wells must run to meet MDD because of limitations at the reservoir and booster pump station. The system therefore lacks the redundancy necessary to remove one well from service for maintenance or redevelopment. Coburg's WSMP calls for the addition of one or more wells at this wellfield to increase redundancy. In addition, projected future demand cannot be met with existing wells and further sources will need to be developed. However, a new water supply is not expected to be necessary until after the 20 year planning period.

Coburg's water source has been declared water quality limited by the Department of Environmental Quality (DEQ). The southern Willamette Valley aquifer was designated a Groundwater Management Area in 2004 due to excessive levels of Nitrate. A final Groundwater Management Area Action Plan (GMAAP) was developed on November 9, 2006. The action plan has a number of goals for public water agencies; the goals and strategies of the plan have been addressed in this report and are incorporated as relevant to achieve the plan's objectives. Coburg's wells are 200 feet deep and have elevated nitrate levels. However, nitrate levels are below drinking water standards. According to the GWMAP the majority of nitrate contamination is concentrated from the surface down approximately 20 to 40 feet; Coburg's wells generally draw from the deeper levels of the aquifer and are less susceptible to nitrate contamination than shallow wells.

2.5 WATER RIGHTS

Coburg's current water rights are summarized in Table 2.3. There are enough rights to cover current use; however some rights need to be transferred from abandoned wells. The first two water rights listed are for wells that are out of service. The remaining 2 are for the current well field. The existing water rights and permit have no annual quantity limitations. The maximum instantaneous water allowed and diverted to date is also shown in Table 2.3

Table 2.3: Summary of City's Water Rights

Appl. #/ permit number	Cert. Number	Source ¹	Use	Priority date	Authorized Max. Rate (CFS)	Max Rate Diverted to Date (CFS)
G1726/ G1580	37211	Well No. 3	Municipal- Abandoned	4/19/1960	0.31	0.31
G4283/ G4032	44837	Well No. 4 (PVE well)	Municipal- Abandoned	3/18/1968	0.1	0.1
G4284/ G4033	44838	Well No. 5 (City Well No. 1)	Municipal	3/18/1968	0.3	1.17
G13877/ G13183	none	(2)	Municipal	11/16/1994	2	1.22

1.) Note: well numbering history obscure. Some wells have been renumbered. Well numbers shown are the best understanding of the current nomenclature in water rights documentation.

2) Permit doesn't state well number. Historically it's been assumed to cover City Well 2. Should be clarified to cover discharges of both wells.

Table 2.3: Summary of City's Water Rights (Continued)

Source ²	Max Annual Volume Diverted to Date (Mgals) ¹	Previous Year		Previous 5 Years Average	
		Avg Daily Diversions (kgals)	Avg Monthly Diversions (MGALS)	Avg Daily Div. (Kgals)	Avg Monthly Div. (Mgals)
Well No. 3	Unk. ³	0	0	0	0
Well No. 4	4	0	0	3.9	0.06
Well No. 5	57	130	4.1	135	4.1
Well No. 2	57	130	4.1	135	4.1

1.) Estimate

2) Note: well numbering history obscure. Some wells have been renumbered. Well numbers shown are the best understanding of the current nomenclature in water rights documents.

3) Abandoned Well, no records exist.

Well no. 2 has only a permit and not a certified water right. An application for extension of the permit was filed in 2001 and was extended on August 18, 2006 to 2020 with a condition that a revised WMCP be completed. The permit was meant to cover both wells but may only cover Well No. 2. Confusion surrounds the two wells because they are officially described as being in the same location. This described location does not appear to be the actual site of either of the wells but is over a 100 ft northwest of Well No. 1.

2.6 DISTRIBUTION FACILITIES DESCRIPTION

2.6.1 Finished Water Reservoirs

The water storage reservoirs are located on Sarah Street in northeast Coburg adjacent to the booster pump station. Under present operation, water enters the reservoirs through a 4-inch pipe via a 4-inch pressure relief valve when well pumps run. Water exits the reservoirs and re-enters the distribution system via the pumps.

Reservoir specifications are listed below:

- Type: welded steel
- Base elevation: 397.5'
- Max water surface elevation: 429.5'
- Outer Diameter: 52-ft

2.6.2 Booster Pump Station

The pump station building is approximately 1,000-square feet and houses pumps, pump controls, pump control valves, an altitude valve, pressure relief valve and associated piping. There are two 15-hp, one 40-hp, and one 125-hp fire pump. The 125-hp direct-drive diesel motor and pump has two functions. It is intended to provide fire flow automatically when system pressure drops below 20-psi. It can also provide system pressure in the event power service is interrupted.

The pump station controls the filling and drawdown of the two 0.5 Mg reservoirs. When the wells run, water enters the reservoir via the distribution system. The booster pumps provide system pressure when the wells shut down. An 8-inch altitude valve was originally used to control reservoir filling. The use of this valve was abandoned since it allowed the system pressure to drop below 20 psi, erroneously triggering the fire pump.

Currently, a four-inch pressure relief valve fills the reservoirs. Both the booster pumps and the well pumps deliver water in excess of the pressure relief valve setting. This means that water is wastefully recirculated from the pressurized piping system to the reservoir when the booster pumps run. The original design did not intend for the system to be operated this way and likely exceeds the design capabilities of the pressure relief valve.

This pump station is currently being upgraded as of Fall 2008.

2.6.3 PIPING

The piping system is comprised of typical small-diameter interconnected piping that follows the pattern of city blocks. Improvements over time have led to the installation of larger diameter piping intended to improve overall system hydraulics and to meet fire flow requirements. A number of different piping materials have been used to develop the water system over time. No significant piping deficiencies exist at this time. An existing water main summary is provided in Table 2.4 below.

Table 2.4: Existing Water Main Inventory

Pipe Diameter (in)	Length (ft)	Percent of Total
24	1357	2.8%
12	18877	38.8%
8	11986	24.7%
6	12532	25.8%
4	862	1.8%
3	1653	3.4%
2 & smaller	1343	2.8%
Total: 48,610		Total: 100%

2.7 WATER DEMAND BY LAND USE

Coburg has the following 6 land use types:

- Residential
- Central Business
- Highway Commercial
- Light Industrial
- Parks/Recreation
- Public/ Semi Public

The six land use types had varying levels of water demand. Four categories were formed similar in both zoning and water records. The percentages of total demand for each category was determined through water billing records from March 2003 through April 2004. The average daily demand values have been updated for 2007. These results are shown in Table 2.5 below.

Table 2.5: City of Coburg 2007 Water Usage by Land Use Type.

DISTRICT	PERCENT USE ¹	WATER USE (mg/yr)	AVERAGE DAILY DEMAND (ADD)
Residential (includes PVE & outside residential)	50.8%	48.1	131,700
Central Business	4.7%	4.5	12,200
Industrial/Commercial	43.4%	41.1	112,500
City buildings/parks	1.1%	1.0	2,900
TOTAL		94.7	259,000

1) Percentages based on 2003-2004 data analysis

2.8 RECENT WATER USAGE

Master meter records for the city of Coburg and PVE water systems were provided from year 2000 through year 2007. The data show the water

demand over time in Coburg. A significant increase in demand occurred from 2001 to 2002, recorded at 18.5 percent, largely due to the expansion of the Monaco recreational vehicle manufacturing facility and increased water losses. A more modest increase was experienced in 2003. Production data from 2003 and 2005 indicate a sharp decrease in water production. This is likely due to a water main replacement program reducing losses and changes in business water use. Table 2.6 summarizes this data below.

Table 2.6: Annual Coburg and PVE Water Production: 2000-2005

	Coburg Master Meter Record (gallons)	Pioneer Valley Estates Master Meter Record (gallons)	Annual Demand (gallons)
2000	93,508,000	3,956,000	97,464,000
2001	95,471,000	3,845,000	99,316,000
2002	113,122,000	3,701,000	116,823,000
2003	113,526,000	3,907,000	117,433,000
2004	94,995,000	3,246,000 (thru Oct.)	98,241,000
2005	83,747,000	REMOVED FROM SERVICE	83,747,000
2006	98,654,000	-	98,654,000
2007	94,652,000	-	94,652,000

Demand for 2003, 117,433,000 gallons, was the highest recorded annual quantity diverted to date. For planning purposes 2007 data is representative and will be used.

The water production records show a MDD peaking factor ranging from 2.0 to 2.1 for 2000-2003 (Table 2.7). For this study, a conservative peaking factor of 2.1 was used to estimate the remaining years MDD and PHD. This factor falls within the middle of the typical range for public water systems of 1.2 to 3.0. The PHD peaking factor typically ranges from 3.0 to 6.0. A factor of 4.2 was assumed in subsequent analyses. Table 3.3 summarizes MDD, ADD, and PHD along with the corresponding peaking factors from 2001 through 2007.

Table 2.7: City of Coburg Water Demand 2001 – 2007

Year	ADD (1,000 gpd)	MDD (1,000 gpd)	Estimated PHD (1,000 gpd)	MDD/ADD	Estimated PHD/ADD
2001	272	544	1,088	2.0	3.9
2002	320	640	1,280	2.0	4.0
2003	322	676	1,352	2.1	4.2
2004	260	546 ¹	1,092	2.1 ¹	4.2
2005	229	480 ¹	962	2.1 ¹	4.2
2006	270	567 ¹	1,134	2.1 ¹	4.2
2007	259	544 ¹	1,088	2.1 ¹	4.2

1. *Estimated*

2.9 NON-REVENUE WATER

Common reasons for non-revenue producing water are leakage, meter malfunction, unauthorized use, city irrigation, etc. A water main replacement program was completed in 2003 that is likely reduced water leakage. Average percentage of non revenue water for the last three years is 9% which is fairly good for a community the size of Coburg. A leakage assessment is not currently required; it should be delayed until at least one year after completion of current water system upgrades so that more accurate data can be used to determine the extent of the problem

Table 2.8: Non-Revenue Water 2002-2007

Year	Percentage Non-Revenue Water
2002	28%
2003	26%
2004	18%
2005	9%
2006	8%
2007	10% ¹

1. *Slightly less than 10%, rounded.*

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WATER CONSERVATION MEASURES

3.1 INTRODUCTION/ CHECKLIST

This section outlines numerous water conservation measures that will be taken to reduce wasted and inefficient use of water. Because of Coburg’s small size and limited resources, efforts will be focused on easy to implement measures. The most significant opportunity for Coburg to conserve water will be with water reuse; the planned sewer and wastewater treatment plant will produce high quality effluent suitable for all non-potable uses. This WCMP focuses primarily on the city’s efforts to introduce and then expand a water reuse system. This will be Coburg’s second WMCP, so this plan will build upon successful programs already implemented and expansion where feasible. The plan outline described in the following sections will satisfy OAR 690-086-150.

Table 3.1: Checklist of Chapter Requirements and Reference Sections

WATER CONSERVATION			
	ITEM	OAR	REFERENCE SECTION
✓	Full metering of systems	690-86-0150 (4)(b)	3.2
✓	Meter testing and maintenance program	690-86-0150 (4)(c)	3.3.1
✓	Annual water audit	690-86-0150 (4)(a)	3.3.2
✓	Leak detection program	690-86-0150 (4)(e)	3.3.3
✓	Leak repair or line replacement program	690-86-0150 (6)(a)	3.3.3
✓	Rate structure based on quantity of water metered	690-86-0150 (4)(d)	3.2.3
✓	Rate structure and billing practices that encourage conservation	690-86-0150 (6)(d)	3.2.3
✓	Public education program	690-86-0150 (4)(f)	3.3.4
✓	Technical and financial assistance programs	690-86-0150 (6)(b)	3.3.5
✓	Retrofit/replacement of inefficient fixtures	690-86-0150 (6)(c)	3.3.6
✓	Reuse, recycling, non-potable opportunities	690-86-0150 (6)(e)	3.3.7
✓	Other measures, if identified by supplier	690-86-0150 (6)(f)	3.3.8
✓	Progress report on previous WMCP	690-86-0150 (1)	3.1
✓	Documentation of water use measurement and reporting	690-86-0150 (2)	3.2
✓	List of measures already implemented or required under contract	690-86-0150 (3)	3.2.4

3.2 CURRENT METERING, WATER RATES, AND CONSERVATION

3.2.1 Source Metering

Historically, a single master meter recorded flow volumes for the combined output of the city's two wells. The meter was read daily during the work-week so withdrawal volumes could be determined. However, it was not possible to determine pumping flow rates. Chart recorders documented the time and duration each well runs. A report submitted annually to the Water Resources Department provides a year long summary of monthly water withdrawals from city wells. This satisfies conditions under OAR 690-085 using the approved "flow meter method".

The city is currently undertaking a large multiphase water project including replacing the well master meter with two new meters, one for each well and upgrading the city's system controls and records. This project is currently underway as of summer 2008. Any new wells that are constructed in the future will be individually metered. Master meters will be tested and calibrated every 5 years or sooner if data indicates inaccuracy.

3.2.2 Customer Metering

All retail accounts in the city of Coburg and PVE have water meters. Meters are read once a month by city staff for billing purposes. Many of these meters have been in service for decades and are likely to be worn and inaccurate. A limited meter replacement program is currently in place that is primarily based on responding to customer complaints.

3.2.3 Existing Rate Structure

A revised Water System Master Plan in 1999 increased the number of scheduled water system improvements and required larger loan amounts. To satisfy the increased revenue requirements a substantial rate increase occurred in 2001. The rates were recently raised again in January, 2008. Current water rates are shown in Table 3.2 below. These are based on an inverted block rate structure, which encourages conservation. This is a desirable rate structure for promoting wise water use by consumers. Coburg has some of the highest water rates in the area which encourages conservation.

Table 3.2: Current City of Coburg Water Rates

CUSTOMER TYPE	BASIC RATE	First 700 CF	>700 CF	>10,000 CF
<i>RESIDENTIAL</i>	(\$)	(\$)	(\$/100 cf)	(\$/100cf)
Inside City Limits	33.00	0	2.22	2.22
Pioneer Valley Estates	33.00	0	2.22	2.22
Outside City Limits	33.00	0	2.94	2.94
<i>COMMERCIAL</i>	(\$)	(\$)	(\$/100 cf)	(\$/ 100 cf)
¾ Inch Meter	33.00	0	2.22	2.46
1 Inch Meter	59.00	0	2.22	2.46
1 1/2 Inch Meter	103.00	0	2.22	2.46
2 Inch Meter	156.00	0	2.22	2.46
3 Inch Meter	279.00	0	2.22	2.46
4 Inch Meter	455.00	0	2.22	2.46
6 Inch Meter	895.00	0	2.22	2.46

3.2.4 Previous Conservation Plan and Other Conservation Measures

Although the city has a Water Conservation and Management Plan, staffing and funding limitations have hindered the city's ability to fully implement the plan. Below is a summary of Coburg's 1997 WMCP:

- Customer Education
- Youth Education
- Landscaping Workshops
- Water Friendly Appliance Program
- Commercial Appliance Education
- Commercial Outdoor Education
- Commercial Water Practices Workshop

Most of these programs were implemented sporadically or not at all. According to the original plan the public works department was to fund and administer the programs. Unfortunately, with just a handful of employees and a shoestring budget typical of small towns this program proved very difficult for existing staff to implement. However, a few programs have been created from the plan and should be highlighted. The city currently posts water conservation tips on its website and has water conservation flyers available at city hall. Also an annual billing insert provides water conservation tips to customers. In addition, Coburg is within listening range of EWEB public water conservation radio station announcements. There are no other conservation measures currently implemented by the water supplier.

3.3 PLANNED CONSERVATION MEASURES

Coburg's water conservation objectives are more stringent than other city's of similar size due to its presence in the Southern Willamette Valley Groundwater Management Area (SWVGMA). Southern Willamette Valley Groundwater Management Action Plan (SWVGMAP) has an objective for public water supplies to reduce household water consumption by 10%. To achieve this objective the plan has goals of public education, technical and financial assistance programs, and retrofit incentives. An alternate strategy is proposed that is much more cost effective and feasible alternative that will continue to meet the goals and overall objectives of the SWVGMAP; the strategy will be to maximize the benefit produced by the City's existing conservation programs, focus resources on constructing the wastewater treatment plant, construct the non-potable water reuse system, promote the reuse system, and work to expand the reuse system once it is installed.

3.3.1 Meter Testing and Replacement Program

As stated previously, Coburg is in the process of replacing its source meters. All existing and new sources of water will be individually metered. In addition, these meters are proposed to have electronic data collection capabilities to increase accuracy and reduce operator time and error. Calibration and testing will be planned for every 5 years or earlier if a problem is suspected.

A limited customer meter testing and replacement program has been in place in Coburg since 1997. Meters are currently replaced only when obvious malfunctions occur. Approximately 100 meters have been tested since the programs onset. The city will initiate a more comprehensive meter testing and replacement program, focusing on replacing the larger, oldest meters first. City plans to include a line item in budget 2009-2010 for meter replacement. The program's goal will be to replace all meters 20 years or older, possibly with meters with electronic remote read capabilities. The city's eventual goal will be to replace all meters every 12 years according to AWWA recommendations.

3.3.2 Annual Water System Audit

An annual audit of Coburg's water system is now required under Division 86 rules. Water auditing is the process of tracking water produced and where it eventually ends up. It is helpful in detecting leaks and necessary repairs. This is not just a good conservation measure, but it is also fiscally prudent.

Performing effective audits involves staff commitment to collecting accurate data and may take a few years to become fully effective. Improvements are planned for the City's system controls and data acquisition technology that should greatly improve the ease in conducting these audits.

Information presented in this plan will constitute the first such audit. Hereafter, the City will perform an audit annually to be in compliance with state law. Included in this audit will be an estimation and distribution of unmetered water use including: firefighting, hydrant testing, line flushing, street sweeping, city irrigation, and any other non-metered water use. These estimates will be simply based on the time the water was in use and an estimated flowrate. City crews, fire department personnel, and private contractors will be asked to maintain a log of estimated water use.

Audits will be performed in the spring when the previous years billing and estimated uses will be fully available. The audit will include at a minimum: the total water production, total metered volume from billing records, and estimated unmetered uses. If significant discrepancies are discovered in production volumes versus billing and estimated volumes combined, efforts will be made to determine where unaccounted for water losses are occurring. The City will report the results of the annual water audits in its WMCP progress report in 2011 and WMCP update in 2016.

3.3.3 Leak Detection and Repair

The city undertook a water main replacement project that was completed in 2003. Many of the older mains were replaced at this time. However, the replacement program was meant to address capacity issues not leakage. It appears that water leakage was reduced significantly. The city has monitored for water main leaks since 1995 but has yet to implement a comprehensive leak detection program.

Currently un-accounted water is slightly less than 10 percent. If future water audits reveal greater than 10% loss, a leak detection and repair program would be mandated under state law. The Water System Master Plan Update suggested that the city invest in a professional leakage evaluation. It is recommended that the city consider adding leakage evaluation in budget 2010-2011 based on the results from the system upgrades and improved metering. The results of this evaluation combined with improved water auditing will allow the city to develop a prioritized list of water main replacements and repairs. City crews currently fix leaks when they are discovered.

3.3.4 Public Education

Coburg has conducted some limited public education in the past. Due to Coburg's small size and limited resources, new public outreach will be limited by the ability of existing staff to expand existing programs. The easiest strategy will be to update the city's billing inserts. Appendix C includes the revised WRD flyers that will be included in next summer's billing inserts. If adequate staffing becomes available a personalized conservation newsletter could highlight the City's efforts to conserve water, provide additional conservation tips to homeowners, highlight conservation efforts around the community, and disseminate information on the City's water reuse system.

The city will post the brochures from the Water Resources Department Website on the City's website. Staff permitting, additional supplemental information such as links to helpful websites and irrigation calculators will be provided on the City's webpage. EWEB's water conservation public radio announcements will continue to educate Coburg's customers.

3.3.5 Technical and Financial Assistance Programs

Initially efforts should be focused on implementing water reuse instead of starting new technical or financial incentive programs. Coburg's financial and staffing abilities are insufficient to provide this type of program. However, during development of the water reuse distribution system, incentive programs may be considered to entice water users to irrigate with non-potable water. Possibly, if grants or donations become available, technical and financial assistance programs could be implemented

3.3.6 Retrofit and Replacement Assistance

Complicated and expensive programs such as retrofit and replacement assistance are not feasible in a Coburg due to the high overhead, budgetary, and staffing requirements. Focusing limited resources on water reuse and sewer construction will be more effective at achieving water conservation goals and at protecting the Southern Willamette Valley Groundwater Area. Possibly, if grants or donations become available, retrofit and replacement assistance could be implemented

3.3.7 Water Reuse, Recycling, and Non-Potable Water Opportunities

This is Coburg's most promising opportunity. Coburg is currently the largest municipality in Oregon without a wastewater collection and treatment system. Coburg has begun construction of this sewer system and a wastewater treatment plant is scheduled for construction in 2009. The effluent of this plant will be of sufficient quality that it will be used for non-potable water reuse. A "purple pipe" system will initially distribute this

water to large commercial businesses along Roberts Road, parks, schools, and other large facilities. Future development may also include non-potable water systems. The city will be regularly looking for cost effective ways to expand the reuse system to serve more customers. The city considered providing all residents with non-potable water service; however, a feasibility analysis determined expanding potable water sources would be more cost effective. A large mainline “purple pipe” will be built that will allow future expansion of the non-potable system.

Non-potable water reuse over the next 20 years is expected to significantly decrease summer peak demand as many large irrigation demands and new development utilize non-potable water instead of city drinking water. This should have positive effects on the Southern Willamette Valley aquifer and substantially meet the goals of the SWVGMAAP. The city’s new wastewater system and non-potable reuse system should provide enormous benefit to the aquifer by reducing nitrate contamination from septic fields and by limiting city aquifer withdrawals during high demand summer months. There are many exciting future possibilities for the non-potable water including use as industrial process water, vehicle wash water, construction water, toilet flush water, and much more!

3.3.8 Additional Conservation Opportunities

Much of Coburg’s aging water infrastructure is slated for upgrades and replacement in 2008 and 2009 including a major overhaul of Coburg’s booster pump station and wellfield equipment. The valves and piping in the pump station currently leak and will be replaced. The main improvement to the wellfield will be the addition of new master meters that will be more accurate and collect higher quality data.

The WSMP also indicates the addition of water storage on the nearby hillside elevated above the city. During current operation pressure fluctuations and water hammer is a common occurrence. When the new reservoir is online system pressure will stabilize and losses from broken and leaking pipes will be diminished.

3.3.9 Conservation Savings

According to the Southern Willamette Valley Groundwater Action Plan the public water supplies should set goals of reducing household water consumption by 10 percent. The largest overall savings will be from the installation of the non-potable water system and a planned multiphase water rate increase. System upgrades should also reduce leakage somewhat. It is estimated that this plan will result in approximately a 4% reduction in per capita water use over the next 5 years. The 5 year update of this plan can

assess the actual reduction in per-capita consumption and recommend additional actions to move toward the 10% reduction objective.

Table 3.3: Estimated Water Savings from Conservation Measures in 5 years

ITEM	ESTIMATED SAVINGS	ESTIMATED WATER SAVINGS (GPD)
Upgrade Booster Pump Station	0.1%	260
Install Elevated Reservoir	0.1%	260
Customer Meter Testing and Replacement	0.5%	1300
New Source Meters	n/a	n/a
Water System Auditing	n/a	n/a
Leak Detection and Repair	0.5%	1300
Public Education	0.1%	260
Non-potable Reuse	1%	2590
Revised Water Rates	2%	5180
TOTAL	4.3%	11,150

3.3.10 Summary of 5 year Benchmarks

The major new conservation activities will be the following:

- Increased scope of customer meter replacement program
- Increased public education through billing inserts and website
- Installation of a water re-use system
- Increased water rates

Table 3.4 below summarizes the timeline for implementing the proposed conservation measures.

Table 3.4: Five Year Conservation Benchmarks

BENCHMARK	START YEAR	FREQUENCY
Upgrade Booster Pump Station	2008	n/a
Install Elevated Reservoir	2009	n/a
Customer Meter Testing and Replacement	2009	Annually
New Source Meters	2008	n/a
Source Meter Testing and Calibration	2013	5 yrs
Water System Audit	2009	Annually
Leakage Assessment	2010	Initial Assessment When Audit >10% Water loss
Public Education	2008	Annually
Non-Potable Water Reuse	2010	Distribute information Annually

4.1 INTRODUCTION/ CHECKLIST

Coburg’s water source has historically been very reliable. The primary circumstances that would limit the City’s ability to meet demand are mechanical failure, a break in the supply main, or groundwater contamination. The city, to date, does not have a water curtailment ordinance in place. Ordinances have been developed for each curtailment stage to be enacted when a water shortage occurs. Copies of these ordinances are included in Appendix A.

Table 4.1: Checklist of Chapter Requirements and Reference Sections

WATER CURTAILMENT			
	ITEM	OAR	REFERENCE SECTION
✓	Assessing water supply	690-086-0160(1)	4.2
✓	Stages of alert	690-086-0160(2)	4.3
✓	Triggers for each stage of alert	690-086-0160(3)	4.3
✓	Curtailment actions	690-086-0160(4)	4.3

4.2 SUPPLY DEFICIENCY HISTORY

The existing water system was designed to accommodate population growth that never occurred; therefore, a significant amount of capacity remains. Water demand in the city of Coburg has never strained the production capabilities of the City’s two wells. In fact, only rare circumstances require the simultaneous use of the two wells to meet demand.

In the past 10 years, Coburg has never experienced a supply deficiency. Each well penetrates 200 feet into alluvial sediments with very high production capabilities. Aquifer levels in the area are stable and are affected little by drought conditions.

4.3 PROPOSED CURTAILMENT PLAN

The possible situations that could cause a supply deficiency in Coburg are as follows:

- Mechanical Failure
- Supply Main Break
- Groundwater Contamination
- Demand Exceeds Water Right

Table 4.2 below outlines the City's curtailment plan and conditions that trigger each stage of response.

Table 4.2: Outline of Curtailment Plan

STAGE	TRIGGER	INTENT	IMPLEMENTATION ACTION
1 "mild"	Consumption exceeds 80% of production capacity ¹	Public awareness and 5% reduction in consumption	<ul style="list-style-type: none"> • Declare a "Stage 1 Water Shortage" • Ask for voluntary water use curtailment • Disseminate information regarding shortage and suggested voluntary conservation methods in local media. • Distribute brochures or newsletter outlining basic conservation measures. • Post updates and brochures in conspicuous places such as bulletin boards, schools, and local businesses. • Maintain city website with latest news, conservation reference materials, and links to other helpful resources. • Flush water lines for essential needs only • Voluntary irrigation schedule. Odd number addresses irrigate on odd number days, even addresses on even days.
2 "moderate"	Consumption exceeds 90% of production capacity ¹	10% reduction in Water Use	<ul style="list-style-type: none"> • Continue with Stage 1 measures excepted where noted below: • Mandatory irrigation schedule • Eliminate line flushing (except to preserve public health) and city park irrigation. • Non-essential residential water use prohibited: i.e. vehicle washing, washing of outside surfaces, filling pools or ponds. • Non-essential commercial water use prohibited: i.e. scenic water features, construction purposes, dust control. • No new water service connections to be approved
3 "catastrophic"	Catastrophic loss or reduction of Supply	Reserve water for health, sanitation, and emergency use	<ul style="list-style-type: none"> • Continue with stage 1 and 2 measures except where noted below: • All outdoor irrigation banned • Mandatory water use allotment for each user • Declared reservation of water resources for critical human use.

1. Capacity is the effective maximum rate water can be supplied to customers from the wellfield.

5.1 INTRODUCTION/ CHECKLIST

Future water supply assumptions are based on numerous interrelated planning efforts. In the past few years, Coburg has undergone a voluntary Periodic Review of its Comprehensive Plan. As a result Coburg has completed a vision document, an updated Comprehensive Plan, and an Urbanization Study. The resulting plan from these efforts calls for significant development and an expansion of the Urban Growth Boundary. Water demand is expected to increase substantially with this new development.

Table 5.1: Checklist of Chapter Requirements and Reference Sections

WATER SUPPLY			
	ITEM	OAR	REFERENCE SECTION
✓	Delineation of current and future service areas	690-086-0170 (1)	5.2
✓	Population projections for service area	690-086-0170 (1)	5.2.1
✓	Prepare schedule to fully exercise each permit	690-086-0170 (2)	5.5
✓	Prepare demand forecast	690-086-0170 (3)	5.3
✓	Comparison of projected need and available sources	690-086-0170 (4)	5.4
✓	Analysis of alternative sources	690-086-0170 (5) and (8)	5.4
✓	Quantification of maximum rate and monthly volume	690-086-0170 (6)	5.4
✓	Mitigation actions under state and federal laws	690-086-0170 (7)	5.4

5.2 FUTURE SERVICE AREA

5.2.1 Population

The state recently required updated regional population forecasts for Lane County. The Lane Council of Governments (LCOG) published these results as the Lane County Coordinated Population Projection on February 24, 2005.

Coburg also adopted these projections and is expected to have a 2025 population of 3300 and a 2030 population of 4200 (Table 5.2). This represents a threefold increase over the 2008 population of approximately 1050.

Table 5.2: City of Coburg Population Projection

YEAR	POPULATION
2005	1050
2025	3300
2030	4200

Source: LCOG Coordinated Population Projections (2005)

5.2.2 Employment

Coburg currently has a very high employee to resident ratio. There are approximately 3 employees for every full-time inhabitant. Employment forecasts were published in the Coburg Urbanization Study (CUS) compiled by ECONorthwest in 2004. The report projects only a 2.4% increase in employment from 2002 to 2025.

5.2.3 Future Land Use

A buildable land inventory was included in the CUS. The existing supply of land was evaluated and needed additional acreages identified. It was determined that for the period 2002-2025 sufficient vacant land exists in the Central Business and Highway Commercial districts for development. However, additional land was deemed necessary for the remaining zones. Of particular importance is a predicted tripling in the amount of residential land in the city of Coburg. Table 5.3 below summarizes current and predicted land use area.

Table 5.3: Projected Land Use 2025

	Area (acres)				% Increase
	Existing Developed	Vacant Buildable	2002-2025 deficit (surplus)	Total Land 2025	
Central Business	9.5	5.7	0	15.2	60
Highway Commercial	34.7	25.2	0	59.9	73
Light Industrial	173.9	19.6	57.6	251.1	44
Parks and Recreation	24.2	0	30.2	54.4	124
Public/Semi-Public	1.5	0	22.8	24.3	1520
Residential	83.5	59.1	108.8	251.4	201

Source Data: EcoNorthwest *Coburg Urbanization Report*, 2004

5.3 WATER DEMAND FORECAST

Two different methods are common in estimating future water demand. The first approach estimates current per capita daily usage and extrapolates future usage proportional to population growth. The underlying assumption when basing water demand on population is that the entire community's water use is proportional to the number of residents. Coburg is very non-traditional, having a much higher employee to resident ratio than most cities. Consequently, future water usage based solely on the proportion of additional residents would be highly inaccurate. The second method uses a rate of water use per acre by zoning district, relying upon planned land use type and area.

Future water demand was calculated using two different approaches. The first method is based solely on the land use method. The second is a hybrid, which predicts only residential usage based on population, and the remaining on land use. The original analysis was completed in 2005 but development has yet to occur as expected so 2025 land use characteristics are not expected to occur until 2028. However, the most current design ADD was used for the analysis. Table 5.4 and 5.5 show the results of the two analyses.

Table 5.4: Future Water Demand Based on Projected Land Use

	Area (acres)		Growth Rate	Average Daily Demand		
	2002 Developed	2025 developed		AAGR	2008 ADD ¹	2018 ADD
Central Business	9.5	15.2	2.38%	12,200	15,435	19,528
Highway Commercial	34.7	59.9				
Light Industrial	173.9	251.1				
TOTAL	208.6	311	2.05%	112,500	137,811	168,816
Parks and Recreation	24.2	54.4				
Public	1.5	24.3				
TOTAL	25.7	78.7	5.82%	2,900	5,106	8,990
Residential	83.5	251.4	5.65%	131,700	228,182	395,346
PRE-CONSERVATION DEMAND				259,000	386,534	592,680
CONSERVATION SAVINGS				N/A	(-11,150)	(-11,150)
DEMAND WITH CONSERVATION				N/A	375,384	581,183

Source Data: ECONorthwest Coburg Urbanization Study, 2004

Table 5.5: Future Demand Using Hybrid Land Use and Population Method

	Area (acres)		Growth Rate	Average Daily Demand		
	Developed	2025 developed	AAGR	2008 ADD ¹ (gallons)	2018 ADD (gallons)	2028 ADD (gallons)
Central Business	9.5	15.2	2.38%	12,200	15,435	19,528
Highway Commercial	34.7	59.9				
Light Industrial	173.9	251.1				
TOTAL	208.6	311	2.05%	112,500	137,811	168,816
Parks and Recreation	24.2	54.4				
Public	1.5	24.3				
TOTAL	25.7	78.7	5.82%	2,900	5,106	8,990
Non-Residential ADD				127,600	158,352	197,334
	Per Capita Residential Water Demand (gpcd)		130			
Population				1050	1710	3300
Residential ADD				136,500	222,300	429,000
PRE-CONSERVATION DEMAND				264,100	380,652	626,334
CONSERVATION SAVINGS				N/A	(-11,150)	(-11,150)
DEMAND WITH CONSERVATION				N/A	369,502	615,184

Source Data: ECONorthwest *Coburg Urbanization Report, 2004*

The two estimates are close with only a 6% difference. This is within the margin of error of the source data so there is no significant disparity. Therefore, the results were averaged. The 2028 ADD before conservation is assumed to be 610,000 gpd and the 2016 ADD 384,000 gpd. Factoring in conservation the 2028 ADD is expected to be 600,000 gpd and the 2016 ADD 372,000 gpd. The 2028 MDD is 833 gpm (1.9 cfs) so demand can be met with the existing wellfield and water rights. The other resulting design parameters are shown below in Table 5.6.

Table 5.6: Summary of Water System Design Parameters

	YEAR	DESIGN PARAMETERS (1000 gallons per day)			PEAKING FACTORS	
		ADD	MDD	PHD	MDD/ADD	PHD/ADD
Without Conservation	2018	384	806	1613	2.1	4.2
	2028	610	1281	2562	2.1	4.2
With Conservation	2018	372	942	1562	2.1	4.2
	2028	600	1200	2520	2.1	4.2

Table 5.7: Schedule of Water Demand by Water Right

Application / permit number	Certificate Number	Source	2018		2028	
			Max Rate (cfs)	Monthly Volume (MGALS)	Max Rate (cfs)	Monthly Volume (MGALS)
G1726/ G1580	37211	Current Wellfield	0.31	1.5	0.31	2.1
G4283/ G4032	44837	Current Wellfield	0.1	0.5	0.1	0.67
G4284/ G4033	44838	Current Wellfield	0.3	1.4	0.3	2.0
G13877/ G13183	none	Current Wellfield	1.7	8.0	2	13.5

5.4 NEW SOURCE DEVELOPMENT

With the planned conservation, Coburg's existing wells are sufficient to meet demand for the 20 year planning period and no new Water Rights are necessary within the 20 year planning period. However, an additional backup well will be necessary to fully utilize the city's existing water rights and provide system redundancy. However, it is projected that new sources and additional water rights will be necessary just beyond the 20 year horizon to meet the City's projected demand due to very rapid growth projections and are briefly considered here. A number of alternatives were evaluated in the WSMP update. In addition, the water reuse option was explored during the wastewater treatment plant planning process. Each option was rated based on initial cost, operating costs, reliability, water quality, and ease of implementation. Below is a list of the new source options considered:

- Develop additional well(s) at existing wellfield
- Construct new wellfield south of town
- Distribute non potable water city wide to increase potable water conservation
- Connect to nearby Eugene Water and Electric Board (EWEB) system
- Build a Water Treatment plant on McKenzie River

The first four ranked similarly. The McKenzie River treatment plant was determined to be less advantageous due to its higher costs and additional difficulties in implementation. The non-potable water conservation option has more uncertainty, technical barriers, and financial obstacles; a feasibility analysis indicated that water from conservation from an expanded non-potable system could provide water at a similar cost as a new wellfield but the regulatory and implementation uncertainties of an expanded reuse system outweighed the cost benefits. Future demand will already be reduced by conservation efforts outlined in this plan; more extensive conservation does not currently appear to be able to be a cost effective long term supply strategy for the city. Long term water demand will likely be met by

developing a new wellfield; adding another wellfield will also diversify the City's water supply and make it less susceptible to catastrophic problems such as contamination or mechanical failure. An additional well will be added for redundancy only, not to increase rate of groundwater withdrawals.

Since Coburg is located within a groundwater limited area, the long term reliability of the source needs to be considered. Any additional water supply will need to take into consideration the Southern Willamette Valley Groundwater Action Plan. Coburg actively monitors for nitrates in its drinking water to be in compliance with the Safe Drinking Water Act. The average nitrate concentration in Well 1 is 1.5 mg/L and 4.1 mg/L for Well 2. The highest recorded nitrate level is 6.2 mg/L well below current drinking water standards. Well 2, as of summer 2008, is currently being redeveloped and the uppermost well screens sealed. This should reduce the nitrate Levels close to the levels in Well 1. If nitrate levels continue to increase the Wells may need to be re-screened or deepened.

5.5 WATER RIGHTS SCHEDULE

Under existing operation, storage and distribution limitations restrict the amount of water Coburg can utilize under their existing water rights. Planned infrastructure upgrades will allow more efficient use of these water rights without the need to apply for additional rights. However, some transferring and amendment of its existing water rights will be necessary to properly cover existing and future use.

The City recently extended its only permit. This WMCP is a condition of the extension of the city's permit. The two unused certificated water rights will need to be transferred to the existing wellfield. The water right certificate for well No. 1 may need to be amended to cover diversions for the entire wellfield. If water rights are successfully transferred from the existing abandoned wells the city should consider abandoning these wells. One of the water rights is for a well with an obscure history and unknown location; the history of this well should be ascertained and the well abandoned if still in existence. Information concerning abandoning wells is contained in Appendix C.

Development of a third well is planned to occur in 2009. This well will not require new water rights because it is intended only to provide redundancy and will be operated in rotation with the two existing wells to fully perfect existing water rights. However, the water rights may need to be amended to cover the third well. When a new water supply source is developed, additional permits will be necessary, unless the City connects to EWEB.

If the first two certificates are successfully transferred to the existing wellfield then the city will have the opportunity to perform equipment upgrades to utilize the remaining permitted right. However, if the certificates are not successfully transferred the permit should be perfected. In order to expand water use under the existing permit the city will need to work to meet the objectives of the Southern Willamette Valley Groundwater Management Area Action Plan (SWGMAAP) and develop a strategy for Safe Drinking Water Act (SDWA) compliance. Well 2 is currently being rebuilt and redeveloped to minimize nitrate contamination and a sewer system is under construction in Coburg. This will allow for the abandonment of significant number of septic systems and is diligent step in compliance with both the SWVGMAAP and the SDWA. A timetable to perfect and expand the City's water rights is shown in Table 5.8 below.

Table 5.8: Schedule of Water Rights Activities

Application/ permit number	Certificate Number	Source	Use	Priority date	Proposed Rate (CFS)	Proposed Action/ Completion Year
G1726/ G1580	37211	Well No. 3	Municipal- Abandoned	4/19/1960	0.31	Transfer/ 2009
G4283/G4032	44837	Well No. 4	Municipal- Abandoned	3/18/1968	0.1	Transfer/ 2009
G4284/G4033	44838	Well No. 5 ¹	Municipal	3/18/1968	0.3	Amend/ 2009
G13877/G13183	none	Well No. 2	Municipal	11/16/1994	2	Amend/ 2009 Perfect/2028

1.) City Well No. 1

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APPENDIX

A

**Water
Curtailment
Ordinances**



ORDINANCE PROHIBITING NONESSENTIAL USES OF WATER

ORDINANCE NO. _____

An Ordinance of the city of Coburg, Declaring a Water Shortage Emergency, Establishing Rules and Regulations Limiting Nonessential Uses of Water, and Providing Penalties for Violation Thereof.

The City Council of the city of Coburg does enact as follows:

Section 1. Purpose and Intent.

The City Council of the city of Coburg hereby declares that a water shortage emergency condition prevails within the city of Coburg and that the ordinary demands and requirements of water consumers cannot be satisfied without depleting the water supply of the city of Coburg to the extent that there would be insufficient water for human consumption, sanitation, and fire protection.

In order to conserve the water supply for the greatest public benefit with particular regard to domestic use, sanitation, and fire protection, this City Council adopts the following regulations and restrictions on the delivery and consumption of water to take effect immediately and remain in effect until rescinded by ordinance.

The specific uses regulated or prohibited in the Ordinance are nonessential, if allowed would constitute wastage of water, and should be prohibited.

Section 2. Definitions.

For the purpose of the Ordinance, the following terms have the meaning given:

“Customer” any person using water supplied by the city of Coburg.

“Person” any person, firm, entity, partnership, association, corporation, company, or organization of any kind.

“Water” water from the city of Coburg, unless expressly provided otherwise or required by the contract.

Section 3. Application.

The provisions of this Ordinance shall apply to all customers using water provided by the city of Coburg.

Section 4. Regulation of Sprinkling and Watering.

No person or customer shall sprinkle, water, or irrigate any shrubbery, trees, lawns, grass, ground covers, plants, vines, gardens, vegetables, flowers, or any other vegetation, except as follows:

- a. Such irrigation, sprinkling, and watering shall be permitted by even-numbered addressed residences on even-numbered days of the calendar.
- b. Such irrigation, sprinkling, and watering shall be permitted by odd-numbered addressed residences on odd-numbered days of the calendar.

Section 5. Nonessential Residential Water Use.

The following residential water uses are hereby determined to be nonessential and are prohibited:

- a. The use of water to wash any motorbike, motor vehicle, boat, trailer, airplane, or other vehicle, except at a commercial fixed washing facility.
- b. The use of water to wash down any sidewalks, walkways, driveways, parking lots, tennis courts or other hard-surfaced area, or building or structure.
- c. The use of water to fill, refill or add to any indoor or outdoor swimming pools or jacuzzi pools except for neighborhood fire control, where the pools have recycling water systems and evaporative covers, or where the use of the pool is required by a medical doctor's prescription.
- d. The use of water in a fountain or pond for aesthetic or scenic purposes except where necessary to support fish life.

Section 6. Non-essential Commercial or Industrial Use.

The following commercial or industrial water uses are hereby determined to be nonessential and are prohibited:

- a. The use of water to serve a customer in a restaurant unless requested by the customer.
- b. The use of water for scenic and recreational ponds and lakes, except for the minimum amount required to support fish life.
- c. The use of water from hydrants for construction purposes, fire drills, or any purpose other than firefighting.
- d. The use of water by a golf course to irrigate any portion of its grounds except those areas designated as tees and greens.
- e. The use of water for dust control.

Section 7. Gutter Flooding.

No person or customer shall cause or permit water to run to waste in any gutter or drain.

Section 8. Regulation of Applications for New Water Service.

No applications for new, additional, further expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains, or other water service facilities of any kind shall be allowed, approved, or installed.

Section 9. Discontinuance of Service.

The City Administrator may, after one warning by certified mail or in person by staff, disconnect the water service of any person or customer whenever he determines that such person or customer has failed to comply with any provisions of this Ordinance. Service so disconnected shall be restored only upon payment of the turn-on charge, hereby fixed at \$10.00 during office hours or \$20.00 after office hours, or as otherwise specified by law, and any other costs incurred by the city of Coburg in the discontinuance of service and the giving of suitable assurances to the city of Coburg that the action causing the discontinuance will not be repeated.

In addition to the foregoing, the city of Coburg may, prior to restoration of service, install a flow-restrictive device on the customer's service.

Section 10. Variances.

The City Administrator may, in writing, grant temporary variances for prospective uses of water otherwise prohibited after determining that due to unusual circumstances to fail to grant such variance would cause an emergency condition affecting health, sanitation, or fire protection of the applicant or the public. The City Council shall ratify or revoke any such variance or adjustment at its next scheduled meeting. Any such variance or adjustment so ratified, may be revoked by later action of the City Council. No such variance shall be retroactive or otherwise justify any violation of this Ordinance occurring prior to issuance of said temporary variance.

Section 11. Emergency Ordinance.

This Ordinance is hereby declared to be necessary for the immediate preservation of the public peace, health, and safety and shall take effect and be in force upon its adoption by the members of the City Council. Due to severe drought conditions in the area, it is imperative that this Ordinance become effective immediately to protect existing water supplies for human consumption, sanitation, and fire protection.

Section 12. Ordinance Controlling.

The provisions of this Ordinance shall prevail and control in the event of any inconsistency between this Ordinance and any other rules or regulations of the city of Coburg

Section 13. Severability Clause.

If any section, subsection, sentence, clause, or phrase of the Ordinance is for any reason held to be unconstitutional, such decision shall not affect the remaining

portions of this Ordinance. The City Council of the city of Coburg declares that it would have passed each phrase thereof, irrespective of the fact that any one or more such provisions be declared unconstitutional.

Section 14. Publication.

The City Administrator is hereby directed to publish this Ordinance for the period and in the manner required by the _____ (appropriate legal reference).

ORDER PUBLISHED THIS _____ day of _____, 20__.

ADOPTED THIS _____ day of _____, 20__, (by the following vote):

AYES:

NOS:

ABSENT:

Signed: _____

Attest: _____

_____ (Clerk)

CATASTROPHIC WATER SHORTAGE EMERGENCY

ORDINANCE NO. _____

An Ordinance of the city of Coburg, Declaring a Water Shortage Emergency, Establishing Rules and Regulations For Allocating Available Water Resources, and Providing Penalties for Violation Thereof.

The City Council of the city of Coburg does enact as follows:

Section 1. Purpose and Intent.

The City Council of the city of Coburg hereby declares that a water shortage emergency condition prevails within the City of Coburg and that the ordinary demands and requirements of water consumers cannot be satisfied without depleting the water supply of the city of Coburg to the extent that there would be insufficient water for human consumption, sanitation, and fire protection.

In order to conserve the water supply for the greatest public benefit with particular regard to domestic use, sanitation, and fire protection, this City Council adopts the following regulations and restrictions on the delivery and consumption of water to take effect immediately and remain in effect until rescinded by ordinance.

The specific uses regulated or prohibited in the Ordinance are nonessential, if allowed would constitute wastage of water, and should be prohibited.

Section 2. Definitions.

For the purpose of the Ordinance, the following terms have the meaning given:

“Customer” any person using water supplied by the city of Coburg.

“Person” any person, firm, entity, partnership, association, corporation, company, or organization of any kind.

“Water” water from the city of Coburg, unless expressly provided otherwise or required by the contract.

Section 3. Application.

The provisions of this Ordinance shall apply to all customers using water provided by the city of Coburg.

Section 4. Prohibiting Nonessential Water Use.

Uses of water for residential purposes in excess of the following daily usage allotment are determined to be nonessential and are prohibited:

Section 5. Nonessential Residential Uses Defined.

Uses of water for residential purposes in excess of the following daily usage allotment are determined to be nonessential:

- (1) One or two residential units - Daily usage allotment
 - a. One permanent resident _____ gallons
 - b. Two permanent residents _____ gallons
 - c. Three permanent resident _____ gallons
 - d. Each additional permanent resident _____ gallons

- (2) Multi-residential units - Daily usage allotment (Three or more) for each permanent _____ gallons residence. Each customer in whose name water is supplied to a residence, or residences or apartments or other dwelling units, shall upon request of the City Administrator advise the utility under penalty of perjury the number of permanent residents using water supplied to the residence, residences, apartments, or other dwelling units. If the customer fails to advise the City Administrator, each residence, apartment or dwelling unit shall be permitted the water allocation herein provided for one permanent resident.

- (3) All irrigation uses, use of water features, filling of pools or ponds, exterior washing of cars, driveways, buildings or other equipment except for the purposes of safety or fire fighting purposes are prohibited.

Section 6. Nonessential Commercial Uses Defined.

Uses of water for commercial purposes in excess of the following amounts are determined to be nonessential and are prohibited:

1. The use of water for schools, parks, recreation areas, golf courses, community food gardens, residential gardens, cemeteries, and similar recreation or memorial type facilities for purposes other than human consumption and sanitation.

2. The use of water for nursery facilities, restaurants, shopping centers, filling stations, health and swim clubs, and all other commercial uses for purposes other than human consumption and sanitation.

Section 7. Nonessential Industrial Uses Defined.

Uses of water for industrial purposes in excess of the following amounts are determined to be nonessential:

1. The use of water for manufacturing, food processing, cooling or cleaning of equipment for purposes other than for safety, fire protection human consumption and sanitation.

Section 8. Other Nonessential Uses.

All other uses of water not expressly set forth in this Ordinance for purposes other than safety, fire fighting, human consumption, livestock watering and sanitation.

Section 9. Regulation of Applications for New Water Service.

No applications for new, additional, further expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains, or other water service facilities of any kind shall be allowed, approved, or installed during the time this ordinance is in effect..

Section 10. Penalties and Discontinuance of Service.

Violations of any provision of this Ordinance shall be punished as follows:

First violation:	<i>Warning Letter</i>
Second violation:	Fine - \$100
Third violation, and subsequent violations:	Fine - \$250

City Staff may, after written or personal warning, disconnect the water service of any customer that repeatedly violates this ordinance. Water service disconnected shall be restored only upon payment of any turn-on charge and any other costs incurred by the City and suitable assurances that the action causing the discontinuance will not be repeated. In addition to the foregoing, the city of Coburg may, prior to restoration of service, install a flow-restrictive device on the customer's service.

Section 11. Enforcement.

Each deputy of the Coburg Police shall diligently enforce the provisions of this Ordinance. All employees of the city of Coburg, Public Works Department, and Fire Department, have the duty and are hereby authorized to enforce the provisions of this Ordinance.

Section 12. Variances.

The City Administrator may, in writing, adjust any consumer's usage allotment if it is determined that due to unusual circumstances to fail to do so would cause an emergency condition affecting health, sanitation, or fire protection of the applicant or the public; and may grant such adjustment in the case of a mixed residential and nonresidential use if it is found that such adjustment is necessary to place an equivalent allotment burden on consumers.

The City Council shall ratify or revoke any variance or adjustment. Any variance or adjustment so ratified may be revoked by later action of the City Council. No

variance or adjustment shall be retroactive or otherwise justify any violation of this Ordinance occurring prior to issuance of temporary variance or adjustment.

Section 13. Emergency Ordinance.

This Ordinance is hereby declared to be necessary for the immediate preservation of the public peace, health, and safety and shall take effect and be in force upon its adoption by the members of the City Council. Due to impending water shortages in the city of Coburg, it is imperative that this Ordinance become effective immediately to protect existing water supplies for human consumption, sanitation, and fire protection.

Section 14. Ordinance Controlling.

The provisions of this Ordinance shall prevail and control in the event of any inconsistency between this Ordinance and any other rules or regulations of the city of Coburg.

Section 15. Severability Clause.

If any section, subsection, sentence, clause, or phrase of the Ordinance is for any reason held to be unconstitutional, such decision shall not affect the remaining portions of this Ordinance. The City Council of the city of Coburg declares that it would have passed each phrase thereof, irrespective of the fact that any one or more such provisions be declared unconstitutional.

Section 16. Publication.

The City Administrator is hereby directed to publish this Ordinance for the period and in the manner required by the _____ (appropriate legal reference).

ORDER PUBLISHED THIS _____ day of _____, 20__.

ADOPTED THIS _____ day of _____, 20__, (by the following vote):

AYES:

NOS:

ABSENT:

Signed: _____

Attest: _____

(Clerk)

APPENDIX

B

Sample Public Education Materials



Use Water Wisely...

Learn How Much is Enough

Depending on the weather, it's generally better to water about once a week and provide 1 inch to 1 1/2 inches of water. (If it's hot, you might have to water more often.)

Water early in the morning before 10:00 a.m. Watering in the heat of the day allows the water to evaporate and watering late in the day may promote fungus and other lawn diseases.

Time how long it takes to apply one inch of water by placing a flat-bottomed can about 6-ft. away from the sprinkler. Turn the water on and time how long it takes to fill the can with one inch of water. For the next watering, set a timer as a reminder to turn off or move the sprinkler.

Don't over water. Puddles of water and runoff definitely indicate too much water.



Puddles may also indicate your soil isn't able to absorb enough water and needs conditioning. Thatch and aerate the soil. To do any good, the water must be able to penetrate the soil.

You can put off watering another day if there is heavy dew on the grass.

Try Other Ways to Save Water Outdoors

- When you wash your car, use a bucket, sponge, and shut-off nozzle on the hose.
- Sweep sidewalks, driveways and patios instead of hosing.
- Restrict play in the sprinklers to when the lawn needs watering.
- Clean gutters and downspouts manually, without using a hose.

*Water Conservation -
Making the most efficient use
of the state's most precious
natural resource.*

State of Oregon
WATER RESOURCES DEPARTMENT
725 Summer Street NE, Suite A
Salem, OR 97301-1271

Phone: 503-986-0900
Fax: 503-986-0904
Website: www.wrd.state.or.us



Water Conservation

Outdoor Water Use

A GUIDE TO WATER CONSERVATION



Use Water Wisely...

In the summer each of us uses about 250 gallons of water a day—that's more than twice what we use in the winter. And research suggests much of that extra use is simply wasted.

Nobody has enough water to waste. Please use what you need, but don't waste it.

Water conservation is not just for emergencies. Water conservation today saves you money on your next water bill, reduces the cost for developing new supplies, and leaves more water in the rivers for fish and recreation.

Even if you're not connected to public water and sewer services, conservation is a good idea. You'll save money on

water pumping and heating, extend the life of your well and septic system, and avoid depleting groundwater supplies.

This pamphlet provides a few tips on outdoor water use. For more information, please contact your local water utility, Extension agent or the Oregon Water Resources Department.



Choose the Right Plants

When landscaping, buy plants that are low water-users. A good nursery will be able to advise you.

Consider replacing turf with ground covers such as junipers or heathers.

Group high-water use plants and water them together by area.

Use the Right Equipment

A good stationary sprinkler or soil soaker will water a large area evenly. Avoid oscillating sprinklers since they tend to over-water at the ends when they reverse direction.

Check hoses for leaks and replace washers in hose connectors. Leaks will cost you more money and distribute water unevenly.

Use a hand-held sprayer to water shrubs and special plantings so you can control where the water goes.

Take Care of Your Lawn

Keep your lawn in good shape. Keep weeds down. They rob your lawn and plants of nutrients and water.

Mow your lawn regularly to the height recommended for the type of grass you have. Leave the clippings on the lawn as mulch if they aren't thick and matted.

Start a new lawn in early fall to take advantage of autumn rains and moderate temperatures.

Maintain Planted Beds

Cultivate the soil regularly so water can penetrate and develop a good root system.

Use mulch in rows and around plants to retain moisture.

Keep weeds down so they don't compete for water and nutrients.

Consider using a soaker hose or drip irrigation system instead of a sprinkler if your garden is large. These methods also help prevent evaporation of water from leaves and upper parts of plants.



A GUIDE TO WATER CONSERVATION

State of Oregon
WATER RESOURCES
DEPARTMENT
725 Summer Street NE, Suite A

Phone: 503-986-0900
Fax: 503-986-0904

Website: www.wrd.state.or.us

Statewide Watering Guides

		Average Water Depth in Cans (Inches) After 15 Minutes										
		1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2
		COASTAL AREAS										
		Number of Minutes to Water Twice Weekly										
SPRING		41	27	20	16	14	10	8	6	5	4	3
SUMMER		49	33	24	19	16	12	9	8	6	4	4
FALL		26	17	13	10	8	6	5	4	3	2	2
		WILLAMETTE VALLEY										
		Number of Minutes to Water Twice Weekly										
SPRING		49	33	24	19	16	12	9	8	6	4	4
SUMMER		99	66	49	39	33	24	19	16	12	9	8
FALL		41	27	20	16	13	10	8	6	5	4	3
		SOUTHWEST										
		Number of Minutes to Water Twice Weekly										
SPRING		57	38	28	23	19	14	11	9	7	5	4
SUMMER		115	77	57	46	38	28	23	19	14	11	9
FALL		42	28	21	17	14	10	8	7	5	4	3
		CENTRAL AND EASTERN										
		Number of Minutes to Water Twice Weekly										
SPRING		66	44	33	26	22	16	13	11	8	6	5
SUMMER		115	77	57	46	38	28	23	19	14	11	9
FALL		46	30	23	18	15	11	9	7	5	4	3

*Water Conservation -
Making the most efficient use
of the state's most precious
natural resource.*

FOR MORE INFORMATION
For more information on lawn-watering and
other water conservation contact:

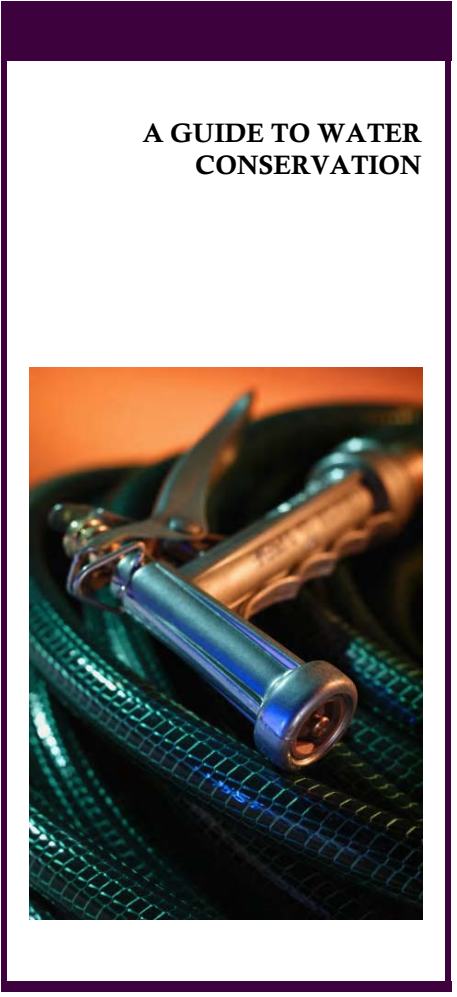
State of Oregon
WATER RESOURCES DEPARTMENT
725 Summer Street NE, Suite A
Salem, OR 97301-1271

Phone: 503-986-0900
Fax: 503-986-0904
Website: www.wrd.state.or.us



Water Conservation

How To Produce A Lawn-Watering Guide



Lawn-Watering Guides Are Necessary

During the summer, nearly half of all residential water in Oregon is used to irrigate landscape areas around homes. A significant reduction in water use can occur by informing residents about more efficient ways to maintain their lawns and gardens.



Many residential landscapes are over-irrigated by as much as 20 to 40 percent. Often, over-irrigation is due to lack of information about how much water the area actually needs. This information can be provided to customers as an easy-to-use lawn-watering guide.

With the basic information provided in this form, you can easily produce a lawn-watering guide, custom-made for your own distinct climate conditions.

The Benefits of a Lawn-Watering Guide

- Enhance customer relations
- Promote press coverage
- Ease peak-demand problems in the community
- Save your customers money on their water bills. Customers will spend less time watering the lawn and correct turf disease and other problems associated with over-watering.



The Lawn-Watering Guide

Evapotranspiration (ET) is the easiest way for your customers to determine if they are over-watering. ET, measured in inches or millimeters, is the amount of water that evaporates from the soil plus the amount of water that transpires through the leaves of a specific plant, in this case grass.

The following instructions will help you use ET information to prepare a lawn-watering guide for your customers.

Keep the instruction guide as simple as possible. If it's too complicated, the homeowner won't use it. The following are sample instructions that can be printed on the guide:

1. Set five flat-bottom cans or coffee mugs at various places on your lawn. Try to place them half way between the sprinklers or in areas that generally receive the least water. More than five cans may be necessary for large lawns.
2. Turn on your sprinkler for exactly 15 minutes.
3. Measure the depth of water in each can and determine the average water depth of the five cans.
4. Check the chart for the water depth in inches according to the season.
5. Read the number of minutes you should water about every third day and record the times for future reference.



NOTE: Use these times as a guide only. Your customers may need to water more when it's extra hot or less when it's cool or rainy.

Additional Water-Saving Tips You May Want to Include

General lawn watering tips you may want to include with the guide:

- Suggest the best watering times.
- Adjust to your guide recommendations gradually to allow the grass root system time to adjust to the change.
- Watch for visual signs of under-watering such as dry spots or wilting.
- If water is flowing off the grass into the gutter, divide the watering time into two blocks to allow the soil to accept the applied water.
- Increase the amount of water over the spring season to reach the summer water needs, and gradually decrease the amount of water in the fall as the winter rains approach.
- Reduce watering times by 20 percent of the time suggested in the guide if you have a Bermuda grass lawn or another type of low water-using grass.
- Water slightly more for small lawns surrounded by concrete or other heat-reflecting urban structures.

NOTE: A supplemental brochure on watering tips is recommended so that the lawn-watering guide will not be too cluttered.



Distribution of the Material

The material should be distributed in either a low-key, simple, mail-out approach, or in a highly visible, public relations manner.

The low-key approach would be to simply include the lawn watering guide in the customer's billing, along with the supplemental brochure.

The highly visible approach would be to promote the lawn watering guide to a greater extent. Getting local gardening clubs, civic organizations, county cooperative extension offices, schools, and the press involved would increase the effectiveness of the program.

The best time to implement either program is in the spring or summer when the public is thinking about lawn watering.



Customizing Your Guide

To customize a lawn-watering guide for your area, choose the appropriate data from the statewide watering guides over-leaf. The sample below shows the data for the Willamette Valley.

Sample

WILLAMETTE VALLEY

Number of Minutes to Water Twice Weekly

SPRING	49	33	24	19	16	12	9	8	6	4	4
SUMMER	99	66	49	39	33	24	19	16	12	9	8
FALL	41	27	20	16	13	10	8	6	5	4	3

Use Water Wisely...

Shaving/Toothbrushing

Leave the water off when brushing your teeth or shaving. Turn it on again to rinse. A faucet left running wide open puts about 3 to 5 gallons a minute down the drain.

Kitchen

Make sure the dishwasher is full before you turn it on. For most dishwashers, you do not need to rinse the dishes first—just scrape them clean.

When you wash dishes by hand, don't leave the water running. Use a sink or dish pan full of wash water and one of rinse water.



Keep a jug of water in the refrigerator for drinking so you don't need to let the faucet run while waiting for the water to get colder.

When waiting for hot water from the faucet, save the cool water for other uses.

When preparing vegetables and foods, put a stopper in the sink instead of letting the faucet run.

Laundry

A washing machine can use 40 gallons of water or more—whether you wash a full load or one sock! Use water more efficiently by washing full loads.

Studies have shown that front-loading machines reduce water use by up to 40% or 16 gallons per load.

Save hot water and energy by using detergents formulated for cold water washing. Cold water is gentler on synthetics and delicate fibers.

Remodeling

If you are remodeling, shop for appliances that are designed to reduce water use. Many manufacturers offer washing machines, dishwashers, toilets and showerheads that can help you save water.

*Water Conservation -
Making the most efficient use
of the state's most precious
natural resource.*

State of Oregon
WATER RESOURCES DEPARTMENT
725 Summer Street NE, Suite A
Salem, OR 97301-1271

Phone: 503-986-0900
Fax: 503-986-0904
Website: www.wrd.state.or.us



Water Conservation

Indoor Water Use

A GUIDE TO WATER CONSERVATION



Use Water Wisely...

Most people use 70 to 90 gallons of water per day indoors. While it may be difficult to imagine how all that water is used, a quick look often shows that much is wasted due to leaks or careless habits.

From the kitchen, to the bathroom, to the laundry room, changing your habits can save money on your water, sewer and energy bill and help conserve a vital resource.

Water conservation is not just for emergencies. Water conservation today saves you money on your next water bill, reduces the cost for developing new supplies, and leaves more water in the rivers for fish and recreation.

This pamphlet provides a few tips on how to conserve water in your home. For further information on water conservation, please contact your local water utility, Extension agent or the Oregon Water Resources Department.



The key to using water efficiently is knowing your water use habits. Do you take long, hot showers? Do you leave the water running while brushing your teeth? Do you flush the toilet needlessly? Do you have plumbing leaks? Water conservation actions involve both changing habits and replacing old, inefficient plumbing fixtures.

Leaks

Check every faucet in your home for leaks. Just a slow drip can waste 15 to 20 gallons a day. Fix it and you will save almost 6,000 gallons a year.

Check for hidden leaks in your water system. Turn off all faucets in and around your house, then locate your water meter and check the reading. Wait 15 minutes without turning any water on, then check the meter again. If the reading has changed, you have a leak.

Showers and Baths

A 5-minute shower uses from 15 to 40 gallons of water. A low volume showerhead, however, uses only 12 to 15 gallons for a 5-minute shower. Low volume showerheads are inexpensive and can pay for themselves in water, sewer and energy savings in less than a year.

Shower or bath? It depends on how long you stand in the shower and how you fill the tub. A partially filled tub uses far less water than a long shower... and a short shower uses less than a full tub.

Toilets

Flush only when needed. Do not use the toilet for discarding tissue, gum wrappers, cigarette butts, spiders and so on.

Put a water displacement device inside the tank of every toilet. You can make one with a plastic bottle of water weighted down with pebbles.



Check your toilets for leaks. Drop a dye tablet or a teaspoon of food coloring in the tank. If the color appears in the bowl after 15 minutes, replace the "flapper" valve.

A GUIDE TO WATER CONSERVATION

State of Oregon
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Fax: 503-986-0904

Website: www.wrd.state.or.us

FOR URBAN AND RURAL OREGONIANS

Saving



Water, Energy & Fish

*During Dry Times
(or anytime) in Oregon*



THE OREGON PLAN
for salmon & watersheds



Natural Resources Conservation Service



OREGON
DEPARTMENT OF
ENERGY

As Oregonians know, it doesn't always rain enough here, and snowpack levels don't always provide the amount of water we normally use over the summer for work and play. In dry times we all need to examine our water and energy use and make some changes.

Saving energy saves water. About half of our electricity comes from hydroelectric dams. **Saving water and energy also means saving salmon,** because fish need water year-round and to make their journey from streams to the ocean and back again. Together, we can get through dry times if we all pitch in – for our communities, for salmon and watersheds, and for our pocketbooks.



Check off the actions below that you will take.

For starters, can you find 5 you will commit to now?

In the Home

1 Repair dripping faucets and leaking toilets, replace washers in hose connectors, and clean gutters and downspouts with a broom or brush, not a hose. A faucet dripping one drop per second wastes 2,700 gallons of water a year!

2 Wash only full loads in clothes washers and dishwashers and avoid using extra cycles. When washing clothes, wash in cold water using a cold water detergent, and consider the next tip below...

3 Buy energy-efficient appliances. Oregon offers a tax credit for qualifying models, including clothes washers that use 60% less energy and up to 40% less water and detergent than standard models, and dishwashers that use 20 to 25% less energy and save up to 800 gallons of water per year. For more information, visit www.oregon.gov/energy or call 1-800-221-8035.



4 Flush toilets only when needed. If your toilets were made before 1995, install a water displacement device in the tank and save about a gallon per flush. Some cities offer the devices free to their water customers. Not all devices work on all toilets. Replacing older toilets saves more – 10,000 gallons a year for the average household. Any model you buy

5 Make a family plan for saving electricity.

■ Raise the thermostat on your air conditioner — each degree cuts your cooling bill 2%.

■ Turn down the thermostat during the heating season — each degree saves you up to 3% on your bill.

■ Set back your heating system to 55° overnight and when you're away from home.

■ Set your water heater temperature to 120° to 130°.

■ Insulate electric water heaters if they are in an unheated area.

■ Turn off lights when they're not needed.

■ Replace standard light bulbs with compact fluorescent bulbs. They use 25% of the energy and last



10 times as long. Use energy-efficient bulbs outdoors too (make sure they are rated

for outdoor use if fixtures are exposed), or use motion sensors that turn on lights only when needed.

■ See if you can get by without that second refrigerator.

today uses only about 1.5 gallons per flush instead of 3.5 to 7 gallons, and some models have 2 flush levels.

6 Call the utility that provides your heat for a free home energy audit. You'll learn which measures make the most sense for your home. You can get cash rebates and low-interest loans for weatherization and other conservation measures. If you heat with oil or wood, call the State Home Oil Weatherization Program at 1-800-452-8660.

7 Seal heating and cooling ducts, test and service heat pumps for peak efficiency, install highly efficient air conditioning systems or make electricity from the sun — and get a state tax credit. Call the Oregon Department of Energy for more information: 1-800-221-8035.

8 Install high-performance shower heads that give a powerful spray using far less water. They cost more, but can pay for themselves quickly in water, sewer and energy savings. Reduce your shower time to five minutes or less.



A five minute shower uses only 12 to 15 gallons with a high performance shower head, but over 40 gallons with a standard model. Each person in your house can save over 10,000 gallons per year.

9 Waiting for hot water? Put a bucket or jug under the faucet or shower-head and save the cooler water for other uses like watering plants. Or install an *on-demand* hot water recirculation system (avoid continuous or timed systems which save water, but use more energy).

10 Turn the faucet off when brushing your teeth, shaving or when you hand-wash dishes. A faucet running wide open puts about 3 to 5 gallons a minute down the drain! Use garbage disposals sparingly.

11 Keep a container of cool water for drinking in the refrigerator instead of running the faucet. And keep the refrigerator door open only as long as needed.

12 Install aerators in bathroom and kitchen faucets. Aerators are easy to install, and they can save up to 5 percent on your indoor water use, enough to reduce your water heating bills.



Around the Home

13 Sweep sidewalks and driveways instead of hosing, and put the sweepings in the garbage. You'll save water and prevent pollutants and debris from entering streams from storm drains.

LAWN TIPS

14 Most lawns are watered about twice as much as needed. Lawns grow best when watered no more than one inch per week. Most lawns can't absorb more than 1/2 inch in an hour. Over-watering washes away nitrogen (turning your lawn brown) and washes fertilizers and weed killers into storm drains (which end up in streams). To find out how long you need to run your sprinklers, set out one or more empty tuna cans where you water and note the average time they take to fill one inch. That's how long to run sprinklers over a week. Split this watering time into two periods. For more terrific info, go to www.healthylawns.org.

15 Timing is everything! Water between 9 p.m. and 10 a.m. (Between 4 a.m. and 10 a.m. is even better to avoid growth of fungus.) Avoiding the hot, windy part of the day reduces evaporation losses and saves up to 30% on water use. If dew is heavy, you can put off watering another day. And, if that's not enough, try the tip below...

16 Let your lawn go brown in the summer. That's what grasses do naturally. When the rains return, your lawn will be as green as ever! Or reduce your lawn area and plant native plants adapted to your local climate.

17 Mulch! Use a mulching mower that leaves the cuttings in the grass. You won't need other fertilizers. Cut your lawn 3-4" high to protect the roots from drying sunlight.

18 Choose the right plants. Use plants that are low-water users, primarily plants native to the area. Replace turf with ground covers such as juniper or heather. Group any high-water use plants together so they can be efficiently watered.

19 In planted beds, cultivate the soil regularly so water can penetrate and encourage a good root system. Use mulch around plants to retain moisture, and consider using a soaker hose or drip irrigation system instead of a sprinkler.

20 Check hoses for leaks, and use a hand-held sprayer to water shrubs so you can control where the water goes.

21 Wash your car at a car wash that recycles the water. If you wash your car at home, use a shut-off nozzle on the hose. Wash the car on the lawn to prevent soap from going directly to storm drains. Bacteria in the soil will cleanse the water before it gets to a stream.

22 Avoid oscillating sprinklers that tend to over-water the ends when they reverse direction. Soakers and stationary sprinklers work better.

23 Rain barrels are a way to catch rainwater from your roof to use in the yard. Find out about rain barrel safety requirements and precautions to avoid breeding mosquitoes – plus other strategies – at www.portlandonline.com/oni/index.cfm?c=29373 or call 503-823-3050.

On the Farm or Ranch

24 Graze properly for a drought-tolerant pasture. Grass needs three inches of leaf or more to support roots below. When grazing removes too much leaf, roots may die, and the pasture will be less drought-tolerant. Use rotational grazing.



25 For hay growers, harvesting one cutting instead of two saves water in a drought year. For pastures, water is important in the spring. If grass develops good root systems during this critical period, it will be more drought-resistant.

26 To minimize evaporation losses, irrigate early in the morning or at night, if possible, when winds are calmer and temperatures are lower. Properly maintain your irrigation system by replacing all leaking gaskets and worn nozzles.

27 Exclude livestock during irrigation and until soil surfaces dry. Wet soils are compacted by livestock, reducing water infiltration and crushing root growth.

28 Control weeds that compete with crops and grasses for moisture.

29 Reduce nitrogen applications during drought by 25 to 50%. Normal amounts of phosphate, potash and sulfur are still needed.

30 Apply water according to crop needs. Annual crops use a net application of 1 to 2 inches per week in the summer. Critical irrigation times are during flowering, seed fill and fruit set. Account for soil moisture and rainfall, as well as crop need, in your watering plan.

31 Consider adjusting livestock numbers to balance with forage supplies. Consider selling calves and lambs early.

32 Grow small grain for use as hay or pasture. Grain requires less water than conventional forage crops.

33 Check springs, stock tanks, float valves and pipelines to ensure they are operating properly. Repair all leaks.

34 Operate tillage tools at shallower depths in dryland conditions.

35 Delay spring tillage until absolutely necessary to help conserve soil moisture.

36 Leave crop residues on the soil surface for improved soil moisture from mulching effects, increased water absorption and reduced surface runoff.

37 Energy-efficient irrigation pumps save both energy and water. State tax credits and loans may be available. Contact Oregon Department of Energy at 1-800-221-8035





38 Not using your computer or computer games? Turn them off to save energy. And don't forget to shut off the monitor.

For more information on reducing water and energy use, contact the following:

- **Natural Resources Conservation Service (NCRS):** www.or.nrcs.usda.gov/water.html
Weekly monitoring reports on snowpack and drought conditions. Also visit www.wcc.nrcs.usda.gov/nrcsirrig/ for additional irrigation recommendations.
- **Oregon Department of Energy:** www.oregon.gov/energy
or (503) 378-4040 or 1-800-221-8035 (in Oregon)
Energy conservation tips and information on tax credits and other programs for residences, business, industry, schools and governments.
- **Oregon State University Extension Service:**
<http://extension.oregonstate.edu/emergency/drought.php>
Publications and information to help Oregonians cope with water shortages at home, in the garden and on the farm. Also includes links to info about livestock management, farm production, monitoring and mitigation during drought.
- **Oregon Water Resources Department:** www.wrd.state.or.us/OWRD/WR_drought.shtml
Updates on drought conditions, Governor's declarations of state drought emergency in various counties, and other government programs addressing drought. Includes steps to save water for residential, municipal, agricultural and commercial/industrial water users.
- **Bonneville Power Administration:** www.bpa.gov
Learn how to make voluntary energy efficiency efforts through "Save A Watt."
- **City of Portland Bureau of Water Works:**
www.portlandonline.com/water/index.cfm?c=30675
Information on water conservation and how to do a water audit of your toilet, sink and shower to determine water usage and where to install water-conserving devices (and save money).
- **Energy Trust of Oregon:** www.energytrust.org/ or 1-866-ENTRUST (368-7878)
Incentives to conserve energy in homes and businesses for Oregon customers of Pacific Power, Portland General Electric, and NW Natural.
- **Portland General Electric:**
www.portlandgeneral.com/EE?aux_html/Tips/tipover.asp
Room-by-room strategies to save energy plus renewable power choices for PGE customers.
- **Pacific Power:** www.pacificpower.net/Article/Article46670.html
Take an online home energy audit and check out Blue Sky renewable energy options.



THE OREGON PLAN
for salmon & watersheds



APPENDIX C

Well Abandonment Information



Protecting Ground Water Through Proper Abandonment of Wells

As development overtakes lands on which wells are located, it is important to protect the ground water resource through proper abandonment of unused water wells. Improperly abandoned wells can serve as a conduit for contamination or can cause loss of artesian pressure. Contamination from improperly abandoned wells can threaten wells over a large geographical area. Domestic uses and even municipal uses can be threatened by even one improperly abandoned well.

For developments on which the future use of existing wells is not anticipated, proper abandonment of wells (permanent or temporary) is very important to protect the ground water resource. Any well that is not going to be used should be abandoned to standards established by the State of Oregon. Also if there is a suspicion that there are contaminants in any well, the Department of Environmental Quality should be contacted before any action is taken.

All too often the land is already graded and the wells damaged before the local jurisdiction is notified of the intent to subdivide. The damage to the resource and the associated liability risks can be avoided. Public information and education is very important. The Department also publishes a brochure, "A Consumer's Guide to Water Well Construction, Maintenance and Abandonment" which provides additional well abandonment information. Anyone interested in a copy of this brochure or for further information may contact the local Watermaster's office or the Enforcement Division in Salem.

The Oregon Water Resources Department encourages agencies to protect the ground water resource, public health and safety by adopting policies and/or procedures to insure proper well abandonment program. Proper well abandonment procedures are outlined in OAR 690 Division 220.

Local jurisdictions should be aware that the Water Resources Department is not asking anyone to adopt any ordinance or procedure that will conflict with ORS 537.769:

"ORS 537.769 Local regulation of wells and water well constructors. The Legislative Assembly finds that ground water protection is a matter of statewide concern. No ordinance, order or regulation shall be adopted by a local government to regulate the inspection of wells, construction of wells or water well constructors subject to regulation by the Water Resources Commission or the Water Resources Department under ORS 537.747 to 537.795 and 537.992. [1989 c.129 s.3]"

If there is any technical question about inspection of wells, construction of wells or water well constructors the Water Resources Department will cooperate with any jurisdiction or individual to ensure the protection of the ground water resource.

Local Jurisdictions may wish to consider the following criteria for determining their policies.

- 1) Unused water wells must be permanently abandoned if the well:
 - Will no longer meet well construction standards.
 - Poses a threat to health and safety (hand dug and shallow wells are of particular concern)
 - Will no longer meet local set-back requirements

2) Unused water wells with the following risk factors are of concern because of the increased risk of contamination:

- Proximity to roads, large parking lots, sewer lines, certain industrial uses, feed lots, quarries, nursery and greenhouse operations, liquid fuel transmission lines and flood plains.
- Any system remnants that may provide the opportunity for cross connections.
- Any unsecured large diameter well (also a public safety concern).

3) Not all unused wells should be abandoned permanently. If there would be an opportunity to put the well to beneficial use within the foreseeable future status quo or temporary abandonment may be an option that local jurisdictions may wish to leave open.

The advantages of maintaining an un-used well include:

- Diversification of sources (such as irrigation or industrial use of raw water rather than finished water).
- Future use by the land owner or a municipality.
- Transfer from surface water source to ground water (specific state standards would apply).
- Often these wells may offer a source for a back-up supply
- Use of the well for monitoring.

Here are some criteria to consider for allowing "status quo" and/or temporary abandonment:

- The well meets all current well construction standards.
- The well location provides minimum risk (see above).
- There is a proposed plan to utilize the well - which includes recognition of federal, state and local regulations.
- The connection to the municipal system is protected by a back-flow protection device.

4) Range of options for local jurisdictions: -

- Adopt ordinances to ensure that state well abandonment requirements are met before development occurs (please see caution above).
- Adopt internal procedures to insure that state well abandonment requirements are met before development occurs.
- Assist in public education efforts including distribution of the Consumer's Guide to Water Well Construction, Maintenance and Abandonment
- Refer all well questions to the local water master's office

Contact Persons:

Michael Mattick, District 2
Central Lane Justice Court
220 N 5th St
Springfield, OR 97477
Ph: 541-682-3620
Kristopher Byrd (503) 986 0851
Bill Fujii (503) 986 0887