

WATER MANAGEMENT AND CONSERVATION PLANS

OAR DIVISION 690, CHAPTER 86

A Guidebook for Oregon Municipal Water Suppliers

March 2015 (2nd Edition)



Alsea Falls, Benton County, Oregon

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Oregon Water Resources Department

May 2003
(1st Edition)

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In Association with

Oregon Water Resources Department

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Web Links to this Document and the Rules

This document can be viewed and downloaded from the Web at:

- League of Oregon Cities –
<http://www.orcities.org/Publications/LibraryArchives/ArchivedPublicationsandResearch/tabid/6519/language/en-US/Default.aspx>
- Oregon Water Resources Department –
http://www.oregon.gov/owrd/Pages/Conservation_Sharehouse.aspx

The Oregon Administrative Rules (OAR) 690-086 and 690-315 are located on the Web at:

- Oregon Water Resources Department –
<http://www.oregon.gov/owrd/Pages/law/index.aspx>

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Acronyms

AWWA	American Water Works Association
DEQ	Oregon Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
LCDC	Oregon Land Conservation and Development Commission
NOAA	National Oceanic and Atmospheric Administration
OAR	Oregon Administrative Rule
ORS	Oregon Revised Statutes
ODFW	Oregon Department of Fish and Wildlife
OWRD	Oregon Water Resources Department
WMCP	Water Management and Conservation Plan



Throughout this document, **hyperlinks** are used to aid the reader by providing the ability to quickly “jump” to other referenced sections or items located throughout this document and on the web.

To return to the spot where you were *before* “jumping” to a hyperlink destination, simply press the “**Alt + left arrow**” keys at the same time.



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INTRODUCTION

MUNICIPAL WATER MANAGEMENT AND CONSERVATION PLANS

OAR DIVISION 690, CHAPTER 86



McKenzie River, photo: Robert Hamilton

Overview

Purpose

WMCP Description

How to Use this Guidebook

Where to Begin When Preparing a WMCP

Quick Summary of OAR 690-086

"Water is the best of all things."

- Pindar (c. 522 BC - c. 438 BC), *Olympian Odes*



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Throughout this document, **hyperlinks** are used to aid the reader by providing the ability to quickly “jump” to other referenced sections or items located throughout this document and on the web.

To return to the spot where you were *before* “jumping” to a hyperlink destination, simply press the “**Alt + left arrow**” keys at the same time.



Overview

This guidebook is designed to assist municipal water suppliers in preparing Water Management and Conservation Plans (WMCPs) that meet state requirements found in Oregon Administrative Rules Chapter 690, Division 86 (OAR 690-086), which are administered by the Oregon Water Resources Department (OWRD). Through the development of WMCPs by Oregon's water suppliers, it is anticipated that management and stewardship of water resources throughout the state will be improved, while serving the present and future supply needs of the state's citizens and communities.

WMCPs provide municipal water suppliers an opportunity to develop a strategy for managing their water supplies in the most efficient manner possible and for meeting their existing and future demands. Two important components of WMCPs are water conservation measures and an evaluation of alternative water supply sources, which can help offset the need to increase the diversion of raw source water for meeting those demands.

Many municipal water suppliers are required to prepare plans under water right permit conditions. In addition, with the revision of the permit extension rules in fall 2002, any community seeking a long-term permit extension(s) is required to prepare a plan that demonstrates the community's need for increased diversions of water as their demand grows.

A municipal WMCP provides a description of the water system, identifies the sources of water used by the community, and explains how the water supplier will manage and conserve supplies to meet future needs. Preparation of a WMCP is intended to represent a pro-active evaluation of the management and conservation measures that suppliers can undertake. The planning program requires municipal water suppliers to consider water that can be saved through conservation practices as a source of supply to meet growing demands if the saved water is less expensive than developing new supplies. As such, a WMCP represents an integrated resource management approach to securing a community's long-term water supply.

Purpose

Many regions of Oregon face periodic and increasingly frequent water shortages during summer periods. Urbanization is resulting in a continually-expanding need for municipal water supplies. In addition, many communities are faced with an obligation to reduce their impacts on the resource in response to state or federal listings of streamflow-dependent species as sensitive, threatened or endangered, water quality problems, and/or other flow issues. It is increasingly important to the state's economy to maintain adequate stream flows and high water quality to support aquatic life and provide recreational opportunities. The continued implementation of conservation measures can help restore streamflows, stabilize water supplies and provide for future needs for economic development and growth.

Effective water management requires an evaluation of the adequacy of water supplies to meet current and future needs, identification of planned modifications in water systems, and development of new water supplies. WMCPs provide information important in water resources planning and management. The plans may also provide support for applications for new water use permits, water right transfers and permit amendments, requests for permit extensions of time, and approvals of water exchanges and reservations of water.

Regional cooperation will improve water management and help facilitate implementation of conservation measures. With this in mind, OAR 690-086 allows multiple water suppliers to jointly submit a single plan that addresses the suppliers' conservation opportunities and water development needs.

WMCP Description

A WMCP is a plan developed by a water supplier such as a city water system, water district, or a private organization that describes the water system and its needs, identifies its sources of water, and explains how the water supplier will manage and conserve those supplies to meet present and future needs. As such, a WMCP is a long-term water management and conservation tool which includes evaluation of different conservation and management actions that suppliers can undertake.

The requirement for preparing WMCPs is directly tied to the criteria for approval of municipal and quasi-municipal permit extension of time applications, as described under OAR Chapter 690, Division 315 (OAR 690-315). These rules require all suppliers serving over 1,000 people to complete a WMCP in association with water right permit extensions. For some water suppliers, submittal of a WMCP may be a condition resulting from the issuance of a new water use permit. OAR 690-086 details the requirements of WMCPs.

Some agricultural water suppliers may also need to prepare WMCPs. However, this guidebook was prepared solely to assist municipal (and quasi-municipal) water suppliers in the preparation of a WMCP and does not address requirements for agricultural water suppliers. There is a separate guidebook to assist agricultural water suppliers in the development and preparation of a WMCP. It can be accessed on OWRD's website at http://www.oregon.gov/owrd/docs/Ag_guideboo_with_append_Sept_2007.pdf.

How to Use this Guidebook

Water suppliers should first review this Introduction and Chapter 1. These sections explain who must prepare a WMCP and provide timelines for WMCP preparation and submittal to OWRD. These sections also provide a brief overview of the kind of information a WMCP should contain.

Any water supplier preparing a WMCP should next review Chapters 2 through 5, which provide detailed guidance for meeting the rule requirements under each element of a WMCP. These chapters go into detail on each specific item required in OAR 690-086, and provide step-by-step guidance on how to develop a WMCP. In some cases, planning activities cannot be fully explained within this guidebook alone. Therefore, these chapters reference published resources that may provide additional information useful in developing a WMCP. Chapter 6 provides an explanation of how OWRD evaluates a WMCP once it is submitted and what happens after WMCP approval.

Appendices G and H contain sample WMCPs for two representative water suppliers. The sample WMCPs are intended to help water suppliers understand the type of information that needs to be contained in a WMCP. They should be viewed only as “examples” of what a WMCP *could* include; not as a comprehensive “template” for preparing a WMCP. Each water supplier preparing a WMCP will need to review its own water supplies, community needs and other individual circumstances in order to prepare a WMCP that reflects the supplier's unique circumstances and meets state requirements.

This guidebook also contains several additional appendices selected to provide valuable information to water suppliers preparing a WMCP. The complete listing of appendices is provided below:

- OAR 690-086 in its entirety ([Appendix A](#))
- WMCP Checklist ([Appendix B](#))
- Water Rights Inventory Table ([Appendix C](#))
- Greenlight Water Worksheet ([Appendix D](#))
- OWRD Internal WMCP Review Worksheet ([Appendix E](#))
- Sample Outline for a WMCP ([Appendix F](#))
- Sample WMCP – Large Community ([Appendix G](#))
- Sample WMCP – Small Community ([Appendix H](#))
- Sample WMCP Five-Year Progress Report ([Appendix I](#))
- Sample Water Curtailment Ordinance and Plan ([Appendix J](#))
- Historical Background on OAR 690-086 ([Appendix K](#))
- Examples of Municipal Conservation Measures ([Appendix L](#))
- U.S. Environmental Protection Agency (EPA) List of Resources for Water Conservation ([Appendix M](#))

Guidance for Preparing a WMCP

The organization of guidebook, as well as “*Exhibit 0.1 – Guidance for Preparing a WMCP*” (pg. 6) below, is based upon and follows the arrangement of OAR 690-086.

OAR 690-086 includes some items relevant to all water suppliers who prepare a WMCP. Other items, however, apply only to water suppliers meeting certain criteria. Throughout this document, the following two icons are used:

- This icon indicates that **all** suppliers preparing a WMCP must address the item under discussion.
- This icon indicates that **not** all suppliers are required to address the item under discussion. Each supplier will need to review the information presented in this guidebook to determine whether a particular item applies to them under OAR 690-086.

“*Exhibit 0.1 – Guidance for Preparing a WMCP*” (pg. 6) below pulls together all items with check box icons and into an easy to read tabular checklist that provides the location within this guidebook where each item is discussed in detail. The column labeled “*Guidebook Pg. No.*” identifies the page number where each discussion item can be found.



A similar blank checklist that suppliers can complete and incorporate into their WMCP is provided in Chapter 1 (see “*Exhibit 1.5 – WMCP Checklist*” on pg. 25). This allows the supplier to clearly indicate the section or page number within the WMCP where they address each item; which, in turn, allows the OWRD reviewer to quickly locate each element within the WMCP.

Exhibit 0.1 – Guidance for Preparing a WMCP

Items and Tasks		OAR Reference	Guidebook Pg. No.
WMCP Plan Elements			
✓	Notice to affected local government(s)	690-086-0125(5)	23
✓	Proposed WMCP update schedule	690-086-0125(6)	23
	Additional time to implement conservation benchmarks	690-086-0125(7)	24
Water Supplier Description			
✓	Supplier's source(s)	690-086-0140(1)	34
✓	Current service area and population served	690-086-0140(2)	34
✓	Assessment of adequacy and reliability of existing water supplies	690-086-0140(3)	35
✓	Present and historic water use	690-086-0140(4)	35
✓	Water rights inventory table and environmental resource issues	690-086-0140(5)	36
✓	Customers served and water use summary	690-086-0140(6)	41
✓	Interconnections with other systems	690-086-0140(7)	42
✓	System schematic	690-086-0140(8)	42
✓	Quantification of system leakage	690-086-0140(9)	42
Water Conservation Element			
	Progress report on implementation of conservation measures scheduled in a previously approved WMCP (<i>N/A if 1st WMCP</i>)	690-086-0150(1)	56
✓	Water use measurement and reporting program	690-086-0150(2)	56
✓	Annual water audit	690-086-0150(4)(a)	57
✓	Full metering of system	690-086-0150(4)(b)	59
✓	Meter testing and maintenance program	690-086-0150(4)(c)	60
✓	Rate structure based on quantity of water metered	690-086-0150(4)(d)	61
	Leak detection program	690-086-0150(4)(e)	63
✓	Public education program	690-086-0150(4)(f)	64
✓	Currently implemented conservation measures	690-086-0150(3)	65
	System leakage reduction program <15%	690-086-0150(5)	67
	System leakage reduction program <10%	690-086-0150(6)(a)	72
	Technical and financial assistance programs	690-086-0150(6)(b)	73
	Retrofit/replacement of inefficient fixtures	690-086-0150(6)(c)	74
	Rate structure and billing practices to encourage conservation	690-086-0150(6)(d)	74
	Reuse, recycling, and non-potable opportunities	690-086-0150(6)(e)	77
	Other proposed conservation measures	690-086-0150(6)(f)	77
Water Curtailment Element			
✓	Water supply assessment and description of past deficiencies	690-086-0160(1)	86
✓	Stages of alert	690-086-0160(2)	87
✓	Triggers for each stage of alert	690-086-0160(3)	88
✓	Curtailment actions	690-086-0160(4)	89
Water Supply Element			
✓	Future service area and population projections	690-086-0170(1)	93
✓	Schedule to fully exercise each permit (<i>i.e., certification</i>)	690-086-0170(2)	94
✓	Demand forecast	690-086-0170(3)	95
✓	Comparison of projected need and available sources	690-086-0170(4)	97
	Analysis of alternative sources	690-086-0170(5) and (8)	97
	Maximum rate and monthly volume quantification	690-086-0170(6)	100
	Mitigation actions under state and federal laws	690-086-0170(7)	100
	Greenlight Water Request – Conservation measure schedule and cost effectiveness	690-086-0130(7)(a)	101
	Greenlight Water Request – Justification that selected source is most feasible and appropriate	690-086-0130(7)(b)	101
	Greenlight Water Request – Mitigation requirements	690-086-0130(7)(c)	101

NOTE: Each item or task listed in this table with a check mark notation beside it must be addressed by all water suppliers. Items or tasks with NO check mark notation apply to some suppliers if certain criteria are triggered. A blank version of this checklist (see “[Exhibit 1.5 – WMCP Checklist](#)” on pg. 25) is available for inclusion in your WMCP.

Where to Begin When Preparing a WMCP

Getting Organized

As with any planning effort, some up-front effort to organize will pay dividends by making the process smoother and more efficient. This section briefly outlines some ideas for organizing the planning process.

Please note that the actions listed under this section titled, “*Where to Begin When Preparing a WMCP*,” are *optional* since the suggestions contained here are not required by OAR 690-086.

Establish Plan Objectives

It may be useful for the water supplier to list some objectives of the planning process right at the outset. This can help guide any staff working on the plan. Examples of potential objectives include:

- Meeting state requirements for submittal of the WMCP;
- Improving water conservation among users;
- Improving management of one or more of the supplier’s water sources;
- Minimizing costs of operations, maintenance and capital investments, while meeting desired levels of service;
- Maintaining or improving water curtailment action plans;
- Maintaining reliability of water supply at some pre-determined level defined by the supplier;
- Reducing reliance on a given source of supply, while increasing use of another source that is more effective in meeting the water supplier’s specific needs in the long term;
- Reduce potential exposure to liability under the Endangered Species Act, for any source(s) of water that contain species listed as sensitive, threatened or endangered (or species that may be listed in the future); and/or
- Maintaining customer satisfaction.

Each of these objectives can be tailored to meet the specific situation of the water supplier, or can be replaced with other objectives, as necessary.

Early Discussion with OWRD Staff

Municipal water suppliers are encouraged to contact OWRD early in the process to lay out a framework for the WMCP, identify any key issues, and discuss the methods that will be used to develop required information. This early contact may save time later in the process. This can also help water suppliers better understand the specific criteria that OWRD will apply in evaluating their individual WMCP. If interested, please contact WMCP staff located at OWRD headquarters (Salem, OR).

Establish a Planning Team

Depending on the size and complexity of a water system, staff assigned to develop the plan may range from one person to a dozen or more. Some water suppliers may choose to hire outside service providers to assist in developing the WMCP. It is important at the outset to identify what types of information and analysis will be needed. Staff can then be identified to meet these needs, and can participate in developing key objectives, methods and timelines.

In some cases, there may be opportunities for cost sharing with other municipalities with whom suppliers can share interconnections or conjunctive uses of a water source. This would be particularly true where outside service providers are needed for services such as leak detection, water audits, alternatives analysis, rate studies, and cost-benefit analysis of water conservation options. In addition, there may be cost-sharing opportunities for carrying out actions in the WMCP, such as developing publications as part of a public outreach effort.

Assembling Information

“[Exhibit 0.1 – Guidance Checklist for WMCP](#)” (pg. 6) above shows the type of information that may be needed to prepare a WMCP. Not every water supplier will need all of the information listed. At the beginning of the planning process, the water supplier may want to take stock of the specific information that will be needed. Sources of that information can then be determined.

Much of the information needed for a WMCP will come from the water supplier’s own records. This includes information such as pumping or diversion records, billed sales, conservation program assessments, extent of the service area, number of connections, and experience with supply interruptions or shortages. Other types of information will be needed from local governments or state sources. This includes, for example, land use plans, estimates of current population, projections of future population, lists of sensitive, threatened and endangered species and water quality impairments. The list of source information at the beginning of each chapter can be used as a starting point for determining what information is needed and where it could be obtained.

Develop an Outline of the WMCP Document

It may be helpful early on to develop a complete outline of the WMCP. [Appendix F](#) contains a suggested outline. Water suppliers may wish to use or modify this outline as they organize to prepare a WMCP.

Provide for Public Involvement, if Desired

OAR 690-086 encourages water suppliers to involve the public as they develop a WMCP. However, public involvement is not required. Therefore, each water supplier should determine the appropriate need and level of public involvement for their specific WMCP. Public involvement techniques may include:

- Distributing information on flyers inserted with customer bills, articles in a water supplier newsletter or posted on a Web site;
- Issuance of a press release to local media to inform the public of planning issues and WMCP development;
- Holding public meetings on the WMCP;
- Formation of a public advisory committee or use of an existing committee to provide input as the WMCP is developed;
- Giving presentations at regular meetings of City Councils or other public boards and commissions, as well as local community, environmental and business groups; and/or
- Making the WMCP available for public comment at water supplier offices, local libraries, posting on a website, or through other means.

Funding for WMCP Preparation

There are no state or federal funding sources specifically earmarked for preparing WMCPs. Water suppliers will need to either use their own staffing and funding resources, or seek funding related to other types of state and federal funding programs. For example, federal money for community and economic development, state loans under the Drinking Water State Revolving Fund and other sources may potentially be available. In many cases, however, to tap these sources of funding, a community may need to link WMCP development to a proposed capital project that would receive funding.

Quick Summary of OAR 690-086

This section summarizes the requirements of OAR 690-086 and how permit extensions approved under OAR 690-315 relate to WMCPs. This summary is provided in a question and answer format so readers can quickly and easily find topics of interest. The complete OAR 690-086 is included in [Appendix A](#) of this guidebook, or see <http://www.oregon.gov/owrd/pages/law/oar.aspx>.

Why is a WMCP required?

In many cases, a WMCP is a condition of approval for a new water use permit or a permit extension of time. The rules in OAR 690-086 and OAR 690-315 provide a process to promote efficient use of the state's water resources and to facilitate water supply planning. A WMCP is provided to the state to document a water supplier's implementation of efficient water use, conservation measures and planning for future demands.

The plans may also provide support for applications for new water use permits, water right transfers and permit amendments, requests for permit extensions of time, and approvals of water exchanges and reservations of water. Due regard shall be given to any relevant approved WMCPs during OWRD consideration of these applications and requests.

Who must submit a WMCP?

Almost all municipal or quasi-municipal water suppliers who request new water use permits or permit extensions must submit WMCPs.

Some exceptions are made for water suppliers who submit a permit extension request if the permit to be extended is issued for Quasi-Municipal use and if:

- Those suppliers have a service population of less than 1,000;

OR

- Those suppliers demonstrate that they will apply water to full beneficial use under the permit in less than 5 years.

OWRD does, however, have the discretion to require even these suppliers seeking a permit extension to submit a WMCP when there are special conditions involved. OWRD will inform water suppliers of the need to submit a WMCP in the final order approving a permit extension. The criteria for requiring submittal of a WMCP as a result of approval of a permit extension request are outlined in OAR 690-315-0090(3)–(5).



To determine if you are required to submit a WMCP, check the conditions either: listed in your permit(s); established in a final order approving a permit extension of time; and/or established in a final order approving a previously submitted WMCP.

When does a WMCP need to be submitted?

In most cases, water suppliers requesting a new water use permit will be required to submit a WMCP within two years from issuance of the water use permit.

For a water right permit extension, a WMCP must be submitted within 3 years of OWRD issuing a final order approving the permit extension. Once a WMCP is approved, a water supplier must submit an updated WMCP within ten years. There are some exceptions. When approved with a Work Plan requirement, an updated WMCP must be submitted within five years. See “[WMCP Approval with a Work Plan Condition](#)” (pg. 114) in Chapter 6.

A water supplier who chooses to submit a new application for water use permit for one or more additional diversions of water before the next scheduled WMCP update is due may be required to submit an updated WMCP sooner if the need for the new diversion is not presented in the existing WMCP.

“[Exhibit 1.7 – Typical Lifecycle of a Water Right from Water Use Permit Application to Certification](#)” (pg. 29) diagrams where a WMCP fits in the typical lifecycle of a water right from application to certification. (NOTE: Due to differing needs of water suppliers, Exhibit 1.7 may not depict the exact same time frames and processes experienced by some water suppliers.)

The table below further delineates the typical timeframes for submittal of a WMCP.

Table 0.1 – Typical Timeframes for Submittal of a WMCP

Category	Submittal Timeline	Trigger for Submittal
New Water Use Permit	2 years	Upon issuance of a permit that includes a condition requiring submittal of a WMCP.
Water Right Permit Extension	3 years	Upon issuance of a final order approving a permit extension of time that includes a condition requiring submittal of a WMCP.
Approved WMCP with Work Plan Requirement	5 years	Upon issuance of a final order conditionally approving a WMCP contingent upon the supplier completing the Work Plan requirements within 5 years. Schedule included for submittal of an updated WMCP in 5 years.
Approved WMCP (No Work Plan Requirement)	10 years	Upon issuance of a final order approving a WMCP. Schedule included for submittal of an updated WMCP in 10 years.

What are the major elements of a Municipal WMCP?

A municipal WMCP submission must include the following elements required under OAR 690-086-0125:

- Documentation of the notice to *affected local government(s)* requesting comments on the draft WMCP relating to consistency with the local government’s comprehensive land use plan, along with a copy of any comments received from those entities;
- A proposed WMCP update schedule;
- Documentation to justify requests for additional time to implement metering or other conservation benchmarks established in a previously approved WMCP in order to avoid unreasonable and excessive costs, if applicable;
- The statutory fee for submittal of a WMCP, as set forth in Oregon Revised Statutes [\(ORS\) 536.050\(1\)\(u\)](#);
- A description of the municipal water supplier;
- The water conservation element;
- The water curtailment element; and
- The water supply element.

What is an “affected local government?”

An “affected local government” is any local government agency that could be affected by the information contained a supplier’s WMCP.

Local governments include any city, county or metropolitan service district (*formed under ORS Chap. 268*), or an association of local governments performing land use planning functions under ORS 197.190.

For example, the county in which the supplier is located would be an affected local government. Other municipalities with whom the supplier neighbors or has inter-governmental agreements or interties, or through whose jurisdiction the supplier’s water diversion/delivery works pass.

See OAR 690-005-0015(9)

Can I submit a Water System Master Plan to satisfy WMCP requirements?

Some water suppliers may determine that it would be effective to include the content of a WMCP within a Water System Master Plan (Master Plan) developed for submittal to the Oregon Health Division. If a Master Plan is also needed, this can streamline the planning process and reduce expenses. However, all elements of a WMCP must be included in the Master Plan in order to be approved by OWRD.

A WMCP generally involves a more comprehensive evaluation of water supply alternatives, including water conservation programs, than a Master Plan. A Master Plan is more oriented to water supply facilities. However, both a WMCP and a Master Plan are tools to help water suppliers plan for the future. In this regard, OAR 690-086-0120(6) allows a Master Plan to substitute for a WMCP if the Master Plan substantially satisfies the requirements of a WMCP. Due to overlap of the plans, water suppliers should consider updating an outdated Master Plan while creating a WMCP and wrapping the WMCP within the Master Plan. Please note that while a WMCP must be updated at least every 10 years, a Master Plan is generally updated on a 20-year cycle.

How does a WMCP relate to a Comprehensive Land Use Plan?

OAR 690-086-0120(7) and (8) require future water use estimates to be consistent with land use and population projections. Therefore, when preparing a WMCP, water suppliers should use the information contained within comprehensive land use plans from each affected local government. A draft WMCP must be submitted to each affected local government with a request for comments about how the pertinent sections in the WMCP match the local government’s comprehensive land use plan.

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CHAPTER 1

WMCP ELEMENTS

OAR 690-086-0125 AND 690-086-0130



Rogue River Rocks, photo: creativespirit

WMCP Elements

Water Supplier Description

Water Conservation Element

Water Curtailment Element

Water Supply Element

Extended Permits and Greenlight Water

Notice to Affected Local Government(s)

Proposed WMCP Update Schedule

Additional Time to Implement Conservation
Benchmarks

Statutory Fee for Submittal of a WMCP

"Water is H₂O, hydrogen two parts, oxygen one, but there is also a third thing, that makes it water and nobody knows what that is."

- D.H. Lawrence, (1885-1930), Pansies, 1929.



Hyperlinks

Throughout this document, **hyperlinks** are used to aid the reader by providing the ability to quickly “jump” to other referenced sections or items located throughout this document and on the web.

To return to the spot where you were *before* “jumping” to a hyperlink destination, simply press the “**Alt + left arrow**” keys at the same time.



WMCP Elements

Chapter 1 provides a brief overview of the required elements that must be included in a WMCP. In addition, a more detailed discussion of how to comply with OAR 690-086 and OAR 690-315 is provided in Chapters 2 through 6 of this guidebook. The complete OAR 690-086 is included in [Appendix A](#) of this guidebook. Oregon Administrative Rules related to water can be found on the OWRD website under “Water Law” at <http://www.oregon.gov/owrd/Pages/law/index.aspx>.

Water Supplier Description

This element sets the stage for the rest of the elements by providing current information about the water supplier and the water supplier’s water distribution system. Required components of this section include sources of water, service area, water distribution system description, present and anticipated service population, water customers served and associated water use characteristics, and any pertinent system maps and/or schematics. This section must also identify water rights held, interconnections with other water systems, current water system demand and water loss estimates. An assessment of the adequacy and reliability of the supplier’s current water supply must also be provided. More information about this topic is found in [Chapter 2](#) of this guidebook and OAR 690-086-0140.

Water Conservation Element

The water conservation element is to include an account of past and current water conservation measures performed by the supplier. It must also include a description of the water supplier’s scheduled five-year benchmarks for implementation or continuation of conservation activities so progress can be evaluated.

OAR 690-086 lists specific basic conservation measures that all water suppliers must implement. It also requires select water suppliers to consider enhanced conservation measures for implementation. There are several criteria that trigger the requirement for suppliers to address enhanced conservation measures.

Under OAR 690-086-0150(5), if system leakage exceeds 15 percent, a system-wide leak repair or line replacement program must be implemented **if** the water supplier serves a population greater than 1,000 **and** proposes to expand or initiate the diversion of water under an extended permit for which environmental resource issues have been identified under OAR 690-086-0140(5)(i). For additional guidance on determining whether this rule applies to you, refer to “[Enhanced Conservation Measures under OAR 690-086-0150\(5\)](#)” (pg. 67) and “[Exhibit 3.3 – Are Enhanced Conservation Measures under OAR 690-086-0150\(5\) Required?](#)” (pg. 69) in Chapter 3.

Implementation of enhanced conservation measures under OAR 690-086-0150(6) must be evaluated and considered **if** the following criteria apply:

- The water supplier serves a population *greater* than 1,000 **and** proposes to expand or initiate the diversion of water under an extended permit for which environmental resource issues¹ have been identified under OAR 690-086-0140(5)(i)²;

OR

- The water supplier serves a population *greater* than 7,500.

¹ Water resource issues are environmental concerns associated with water source(s) that may include the presence of ST&E listed streamflow-dependent species, surface water quality impairment, and/or a critical ground water area designation.

² Note that, in some cases (*but not all*), expanded or initial diversion of water under an extended permit for which environmental resource issues have been identified under OAR 690-086-0140(5)(i) may involve requests to access Greenlight Water. See “[Extended Permits and Greenlight Water](#)” (pg. 17) in Chapter 1 for more information.

In addressing enhanced conservation measures under OAR 690-086-0150(6), the supplier is generally required to evaluate the feasibility of each of the measures and to implement any measures the supplier concludes are feasible. To determine whether you must consider these enhanced conservation measures, refer to the section titled, “[Enhanced Conservation Measures under OAR 690-086-0150\(6\)](#)” (pg. 71) and “[Exhibit 3.7 – Are Enhanced Conservation Measures under OAR 690-086-0150\(6\) Required?](#)” (pg. 79) in Chapter 3. You may also refer to OAR 690-086-0150.

Table 1.1 – Conservation Measures Required of Suppliers (All or Some)

Basic Measures Required of <u>All</u> Suppliers OAR 690-086-0150(4)	Enhanced Measures Required of <u>Select</u> Suppliers OAR 690-086-0150(5)&(6)
<ul style="list-style-type: none"> ▪ Full metering ▪ Annual water audit ▪ Meter testing and maintenance ▪ Leak detection ▪ Rate structure based on metered quantity ▪ Public education 	<ul style="list-style-type: none"> ▪ Leak repair or line replacement ▪ Technical and financial assistance ▪ Retrofit / replacement of inefficient fixtures ▪ Water reuse / recycling / non-potable opportunities ▪ Rate structures, billing schedules, and other associated programs that support and encourage water conservation

Conservation Benchmarks

A conservation benchmark is a specific action that a water supplier commits to doing, along with a schedule to implement and/or carry out the water conservation activities within the next five years. This definition is specific to OAR 690-086 and can be found under OAR 690-086-0030(2).

For required conservation measures not currently implemented by a water supplier, a conservation benchmark may be established to set a schedule (*within five years*) to implement the conservation measure and allow the water supplier to comply with OAR 690-086 requirements. A more detailed discussion of this topic is found throughout [Chapter 3](#). You may also refer to OAR 690-086-0150(4), (5) & (6).

Recognition of the Benefits of Conservation Actions Implemented Prior to a Permit Extension or WMCP

The purpose of a WMCP is to document a sound and responsible approach to managing water resources. Where a water supplier has already integrated conservation actions into its water supply management strategy, those actions should be described in the WMCP. Depending upon the actions carried out and the particular circumstances facing each supplier, these past actions could potentially serve to meet some or all of the required conservation actions under OAR 690-086. For more information, refer to Chapter 3 and OAR 690-086-0150(3).

Water Curtailment Element

The water curtailment element will help water suppliers react quickly and effectively to meet a community's needs in the event of a water supply emergency, such as supply shortage due to drought, contamination or infrastructure failure.

This element requires a water supplier to prepare a curtailment plan with at least three stages of alert which trigger increasingly restrictive water use curtailment actions. A water supplier must also describe any supply deficiencies within the past 10 years and review its ability to maintain delivery of water during a long-term drought or other water supply shortages. The supplier should consider any past curtailment plans that may have been required under drought declarations that may still be in effect for the supplier's service areas. More information about this subject is located in [Chapter 4](#) and under OAR 690-086-0160.

Water Supply Element

The water supply element must describe and support the supplier's future water supply needs. These needs must be based upon population projections and expected development as found in comprehensive land use plans, where available, or other similar planning documents. Water supply needs must be estimated for 10 and 20 years, though a water supplier may estimate for longer periods.

This portion of the WMCP must also consider alternative supply options and address environmental impacts upon water supply source(s) if a water supplier anticipates needing to initiate diversions or further expand diversions of water associated with existing water use permits or anticipates needing to acquire new water use permits in order to meet its projected 20-year water demands. A more detailed discussion on this topic is found in [Chapter 5](#). You may also refer to OAR 690-086-0170.

Extended Permits and Greenlight Water

Extended Water Use Permits

When a water use permit is issued, it specifies the date by which completion of construction and full beneficial use of the water allowed under the permit is to be accomplished. If a permit holder does not fully develop the permit within the specified completion deadlines, the permittee may submit an application requesting a long-term extension of time under the OAR 690-315 extension rules to complete development of the permit. The period of the extension request will depend on the supplier's projections of how long it will take to beneficially use the full quantity of water specified in the permit.

The term "*extended permit*" refers to a permit for which OWRD has issued a final order to approve the extension of time request and authorize new date(s) for completing construction and accomplishing full beneficial use of water under the permit. In accordance with OAR 690-315-0090(3), most extension of time approvals for municipal and quasi-municipal permits will include conditions that: 1) require submittal of a WMCP within three years; and 2) limit the amount of water that may be legally diverted under the extended permit (*i.e., the Development Limitations condition*). Some extension of time approvals may also impose conditions on the undeveloped portion of the permit to maintain the persistence of listed fish species in the portions of the waterway(s) affected by the use of water under the permit. For additional guidance, refer to "[Why are Development Limitations and Fish Persistence Conditions Placed on Extended Permits?](#)" (pg. 18) and "[Development Limitations on Extended Permits](#)" (pg. 19) below.

Developed and Undeveloped Portions of Extended Permits

The “*developed portion*” of an extended permit refers to the maximum rate (or duty, if applicable) of water diverted for beneficial use *before* the extension. A final order approving an extension of time for a municipal or quasi-municipal permit will identify the developed portion of the permit in the Development Limitations condition. This developed portion will be a quantity that is *less than* the maximum rate (or duty) specified in the permit and represents the maximum amount of water the supplier may legally divert following approval of the extension.

In contrast, the “*undeveloped portion*” of the extended permit means the portion of the permit that is the difference between the maximum rate specified in the permit and the maximum rate diverted for beneficial use *before* the extension. This represents the portion of the extended permit that the supplier is not yet legally authorized to divert (*i.e., the quantity of water beyond the Development Limitations condition*).

$$\text{Maximum Allowed Rate of Permit} - \text{Developed Portion} = \text{Undeveloped Portion}$$

What Are Development Limitations and How Are They Determined?

A “*Development Limitations condition*” freezes the amount of water that a supplier is legally authorized to divert under an extended permit. The quantity specified in a Development Limitations condition will be a quantity that is *less than* the maximum rate (or duty, if applicable) specified in the permit.

These limitation conditions can be imposed on the diversion of water under a permit by:

- The issuance of a final order approving an extension of time request for a municipal or quasi-municipal permit; *or*
- The issuance of a final order approving a WMCP.

The determination of a Development Limitations rate (or duty) resulting from a final order approving a permit extension is based upon the maximum rate of diversion for beneficial use accomplished by the water supplier *before* the permit’s most recently authorized completion date (*i.e., before the most recent extension*).

A Development Limitations rate (or duty) resulting from a final order approving a WMCP is based upon a supplier’s projected 20-year demands for water as demonstrated in its WMCP, compared against its currently available water supply and other alternative water supply sources that could help meet those needs.

IMPORTANT: Diversion of water *beyond* the amount specified in a Development Limitations condition can only be authorized upon OWRD’s issuance of a final order approving a WMCP that includes a request for Greenlight Water. This is also known as OWRD granting a request for Greenlight Water. Refer to “[What is Greenlight Water?](#)” and “[What is Red Light Water?](#)” (pg. 20) for more information.

Why Are Development Limitations and Fish Persistence Conditions Placed on Extended Permits?

OAR 690-315 generally requires that an extended municipal or quasi-municipal permit must be conditioned to limit any diversion of the undeveloped portion of the permit. In other words, diversion of water under an extended permit is limited to the maximum rate (or duty, if applicable) diverted for beneficial use (*i.e., the developed portion*) *before* the extension (*i.e., by the authorized completion date*).

As part of evaluating whether an extension of time for a municipal or quasi-municipal permit may be approved, OWRD consults with the Oregon Department of Fish and Wildlife (ODFW). Once equipped with advice provided by ODFW, OWRD determines if use of the undeveloped portion of the permit would maintain the persistence of listed fish species in the portions of the waterway(s) affected by water use under the permit. If the use would not maintain the persistence of listed fish species, further conditions to maintain the persistence must be placed upon the undeveloped portion of the permit. See OAR 690-315-0080.

OWRD's finding related to fish persistence must be based upon existing data and advice from ODFW, and is limited to impacts related to streamflow as a result of use of the undeveloped portion of the permit. The finding is further limited to where ODFW indicates that streamflow would be a limiting factor for the subject listed fish species due to use of the undeveloped portion of the permit. For more information, refer to "[Mitigation Actions under State and Federal Laws](#)" (pg. 100) and "[Requesting Greenlight Water](#)" (pg. 101) in Chapter 5.

Development Limitations on Extended Permits

Most permit extension approvals for municipal and quasi-municipal permits will include a Development Limitations condition. See "[Exhibit 1.1 – Sample Development Limitations Condition \(Extension\)](#)" below.

Exhibit 1.1 – Sample Development Limitations Condition (Extension)

Permit Extension of Time Final Order

Development Limitations

Diversion of water beyond ___ cfs under Permit _____ shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan under OAR Chapter 690, Division 86 that grants access to a greater rate of diversion of water under the permit consistent with OAR 690-086-0130(7). The required Water Management and Conservation Plan shall be submitted to the Department within 3 years of the Final Order. Use of water under Permit _____ must be consistent with this and subsequent WMCPs approved under OAR Chapter 690, Division 86 on file with the Department.

The deadline established in this order for submittal of a Water Management and Conservation Plan shall not relieve a permittee of any existing or future requirements for submittal of a Plan at an earlier date as established through other orders of the Department. A Plan submitted to meet the requirements of this order may also meet the Plan submittal requirements of other Department orders.

As shown in the sample above, the Development Limitations condition in a Permit Extension of Time Final Order *freezes* the amount of water that may be legally diverted under the extended permit to the amount of water diverted for beneficial use *before* the extension. Typically, this is a quantity that is *less than* the maximum rate (or duty, if applicable) specified in the permit. Development Limitations on extended permits may also be established by conditions included in a Final Order approving a WMCP.

Once a Development Limitation is imposed upon an extended permit, the water supplier *cannot* legally divert water *beyond* the diversion rate (or duty) specified in the Development Limitations condition.

The water supplier *cannot* exceed the diversion rate (or duty) limitation until a WMCP (or updated WMCP) that includes a request for Greenlight Water is submitted *and* OWRD issues a final order that approves the WMCP and approves the Greenlight Water request (*i.e., grants legal authorization to divert water in quantities beyond the rate specified in the Development Limitations condition*). Refer to "[Requests for Greenlight Water](#)" (pg. 22) in this chapter below for an introduction on how to request Greenlight Water. For more detailed information and examples on the subject, refer to Chapter 5 "[Requesting Greenlight Water](#)" (pg. 101).

For existing extended water use permits that are conditioned with Development Limitations, a WMCP provides the basis and justification for OWRD to approve a request for Greenlight Water. OWRD's criteria for approving Greenlight Water requests are outlined in OAR 690-086-0130(7).

What is Greenlight Water?

The term “*Greenlight Water*” refers to the quantity of water *beyond* the “developed portion” of an *extended* permit (as recognized in the final order approving the permit extension) to which the supplier has obtained legal authorization from OWRD to divert.

A supplier's WMCP may need to include an initial request for Greenlight Water (or a subsequent request to increase the Greenlight Water allocation) under an extended permit. If, during the next 20 years, the maximum rate of water diverted under an extended permit is projected to be greater than the maximum rate legally authorized for diversion (*i.e., greater than the quantity specified in the Development Limitations condition*) under an approved permit extension or previously approved WMCP, Greenlight Water will need to be requested in the WMCP.

Greenlight Water authorizations from OWRD are based upon a review of the supplier's projected need for water, as documented in their WMCP. The supplier must demonstrate they have compared their current water supply against their projected 20-year water demands, and considered identified alternative water supply sources that could help meet those needs.

In this way, water suppliers are encouraged to take a thoughtful and balanced approach to their long-term water supply planning and water management. Further information about Greenlight Water can be found in “[Sample Scenario – Development Limitations & Greenlight Water](#)” below and in “[Requests for Greenlight Water](#)” (pg. 22) below. You may also refer to “[Requesting Greenlight Water](#)” (pg. 101) in Chapter 5 for more detailed information and examples of how to request Greenlight Water and to OAR 690-315-0090(3).

What is Red Light Water?

The term “*Red Light Water*” means the portion of water under an extended permit that is *not* currently “Greenlighted” for diversion. In other words, Red Light Water is the amount of water above the quantity specified in the most recent Development Limitations condition for an extended permit to which the supplier is *not* yet legally authorized to divert. Red Light Water is further explained in “[Sample Scenario – Development Limitations & Greenlight Water](#)” below.

Sample Scenario – Development Limitations & Greenlight Water

To illustrate the concept of extended permits, Development Limitations, Greenlight Water, and Red Light Water, a fictional municipal water supplier called the City of Anytown will be used as an example of a water supplier that is requesting Greenlight Water under an extended permit.

In this scenario, Permit S-112345 was issued to the City of Anytown on January 1, 1990. This permit allowed the City of Anytown to divert up to 4.0 cfs of water, and specified that completion of construction and full beneficial use of the water was to be accomplished by January 1, 2010.

The City was unable to fully develop its permit and apply all of the water to beneficial use by January 1, 2010. Therefore, the City applied for and was granted an extension of time for Permit S-112345. As part of the extension of time approval, a Development Limitations condition was imposed upon the permit. See “[Exhibit 1.2 - Sample Scenario Development Limitations Condition](#)” on the following page.

Exhibit 1.2 – Sample Scenario Development Limitations Condition

Permit Extension of Time Final Order: City of Anytown – Permit S-112345

Development Limitations

Diversion of water beyond **1.75 cfs** under **Permit S-112345** shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan under OAR Chapter 690, Division 86 that authorizes access to a greater rate of diversion of water under the permit consistent with OAR 690-086-0130(7). The required Water Management and Conservation Plan shall be submitted to the Department within 3 years of this Final Order. Use of water under Permit S-112345 must be consistent with this and subsequent WMCPs approved under OAR Chapter 690, Division 86 on file with the Department.

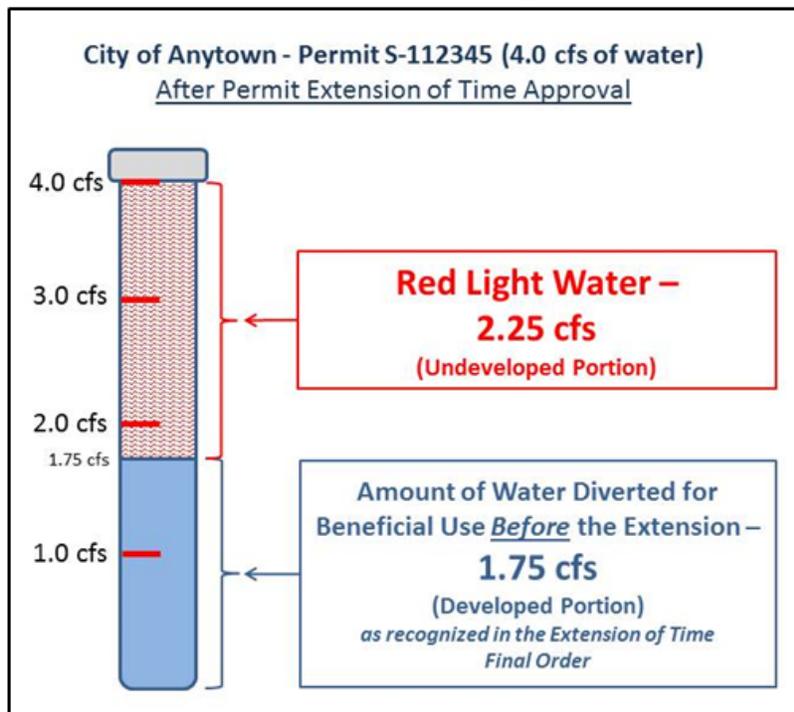
The deadline established in this order for submittal of a Water Management and Conservation Plan shall not relieve a permittee of any existing or future requirements for submittal of a Plan at an earlier date as established through other orders of the Department. A Plan submitted to meet the requirements of this order may also meet the Plan submittal requirements of other Department orders.

As previously mentioned, a Development Limitations condition in a final order approving a permit extension of time limits the diversion of water under the extended permit to the amount of water diverted for beneficial use *before* the extension.

In this sample scenario, the supplier diverted 1.75 cfs of water for beneficial use *prior to* the extension. Therefore, the developed portion of Permit S-112345 (as recognized in the extension final order) is 1.75 cfs, and the undeveloped portion is 2.25 cfs. The Development Limitations condition (shown above) means the City of Anytown may *not* legally divert more than 1.75 cfs out of the 4.0 cfs of water specified in Permit S-112345.

Said differently, there is 2.25 cfs of Red Light Water under Permit S-112345 to which the supplier is *not* yet legally authorized to divert. The concept of Red Light Water is shown in “*Exhibit 1.3 – Extension & Red Light Water*” below.

Exhibit 1.3 – Extension & Red Light Water

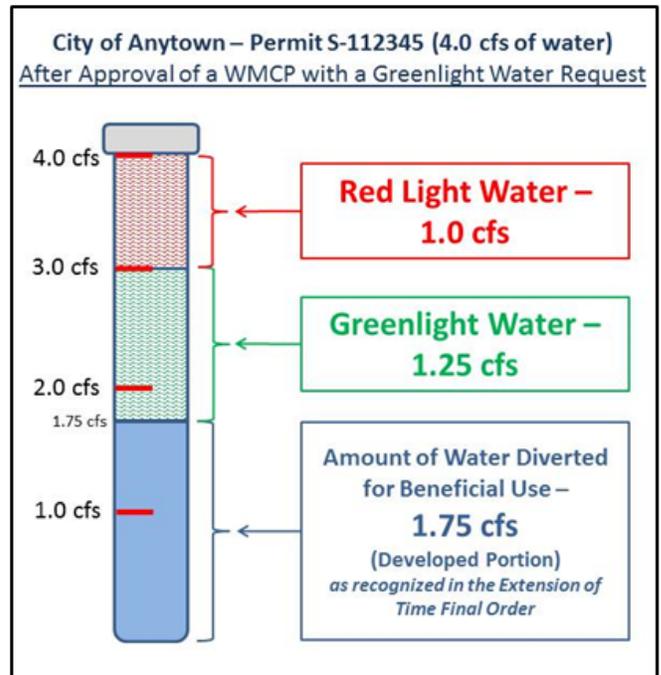


To obtain authorization to increase the amount of water that may be legally diverted under Permit S-112345, the City of Anytown must submit a WMCP that requests and justifies the need to access some portion (*or all*) of the remaining 2.25 cfs of water above the 1.75 cfs of water specified in the Development Limitations condition. In other words, the City needs to request Greenlight Water.

In this example, the City is requesting 1.25 cfs of water be “Greenlighted” under the permit. As illustrated in “*Exhibit 1.4 – WMCP & Greenlight Water*” it is assumed the Greenlight Water request is approved. The City is now legally authorized to divert a total of 3.0 cfs under Permit S-112345. There is still 1.0 cfs of water under the permit that *cannot* yet be legally diverted (*i.e., Red Light Water*).

The following section explains, in further detail, what a water supplier must do in order to obtain authorization for Greenlight Water under an extended permit. It also describes the criteria that must be met for OWRD to grant approval of such a request.

Exhibit 1.4 – WMCP & Greenlight Water



Requests for Greenlight Water

Authorization to divert quantities of water *beyond* the amount specified in the Development Limitations condition may only be granted through the Department’s review and approval of a water supplier’s WMCP (or subsequent WMCP Updates) requesting Greenlight Water. To determine whether you need to request Greenlight Water, refer to “[Exhibit 1.6 – Greenlight Water Worksheet](#)” (pg. 27) in Chapter 1. Another version of the Greenlight Water Worksheet that may be completed and incorporated into a WMCP is found in [Appendix D](#).

The WMCP must also provide the required analysis to support the supplier’s determination that Greenlight Water is the most feasible and appropriate water source alternative available to the supplier for meeting its anticipated 20-year demands.

The documentation and analysis must include:

- 1) A quantification of the amount of water needed under each permit;
- 2) Analysis of alternative water sources, including interconnection or regional water management and water savings resulting from implementation of conservation measures; and
- 3) A description of any mitigation actions the water supplier is taking to comply with state and/or federal legal requirements related to the water source.

If the WMCP provides clear justification that use of the water is necessary and the water supplier is managing and conserving its water in a responsible manner, OWRD may authorize the diversion of Greenlight Water under an extended permit. The amount of Greenlight Water granted is based upon the need demonstrated in the supplier’s WMCP for meeting water demands over the next 20 years. Any final order approving a WMCP and authorizing Greenlight Water will remove the previous Development Limitations condition and grant access to a greater rate of diversion (up to the maximum rate specified in the permit) under the extended permit, consistent with justification provided in the WMCP.

Conversely, a final order approving a WMCP may conclude that the Greenlight Water request is **not** justified and that the Development Limitations condition imposed by the final order approving a permit extension or previous WMCP must remain unchanged (*i.e.*, *Greenlight Water is not granted*).

A more detailed discussion and examples of how to request Greenlight Water are found in Chapter 5. See “[Requesting Greenlight Water](#)” (pg. 101). You may also refer to OAR 690-086-0130(7) and OAR 690-086-0170(3) through (7).

Notice to Affected Local Government(s)

Once the draft WMCP has been prepared, the supplier must share it with all affected local governments before submitting it to OWRD. This helps ensure that future water use estimates in the WMCP are consistent with land use and population projections established within the comprehensive land use plans of each affected local government.

Definition of an Affected Local Government

An “*affected local government*” includes any local government (*i.e.*, *any city, county, metropolitan service district formed under ORS Chapter 268 or an association of local governments performing land use planning functions under ORS 197.190*) within whose jurisdiction the supplier’s diversion, conveyance, and/or use of water is established or proposed within the context of the WMCP. This includes any interconnection (emergency or otherwise) between suppliers. See also “[What is an affected local government?](#)” (pg. 11), OAR 690-086-0020(1), and OAR 690-005-0015.

Sharing the Draft WMCP with Affected Local Government(s)

At least 30 days *prior to* submitting a draft WMCP to OWRD, the supplier must make the draft WMCP available for review by each affected local government, along with a request for comments relating to consistency with the local government’s comprehensive land use plan.

As part of submittal of a WMCP to OWRD, the supplier must include a list of all affected local governments to whom a draft WMCP was made available for review and a copy of any comments on the draft WMCP received from those local governments. These requirements are outlined in OAR 690-086-0120(8) and OAR 690-086-0125(5).

Proposed WMCP Update Schedule

Once a WMCP is submitted to OWRD, it will need to be periodically updated. As required by OAR 690-086-0125(6), the WMCP must document the supplier’s proposed date for submittal of an updated WMCP within no more than 10 years. The proposed date should be based on the timing that works best for the water supplier considering other scheduled community planning activities and the rate of population growth or other changes expected by the water supplier. Additional information about WMCP updates is found in Chapter 6 of this guidebook. If the supplier believes future updated WMCPs are unnecessary, the water supplier must explain why.

Additional Time to Implement Conservation Benchmarks

If a water supplier has requested additional time to implement metering or a conservation benchmark established in a previously approved WMCP, the supplier must document the reason additional time is necessary to avoid unreasonable and excessive costs. For more information, refer to [Chapter 3](#) of this guidebook and OAR 690-086-0125(7).

Statutory Fee for Submittal of a WMCP

The appropriate statutory fee, set forth under ORS 536.050(1)(u), must accompany any WMCP submission. The fee for submittal of a Municipal WMCP is based upon the population served by the water supplier. Suppliers that serve a population of more than 1,000 are required to pay a higher fee than suppliers that serve 1,000 or fewer people. For information on current fees, please refer to the “*Fee Schedule*” located on OWRD’s website at <http://www.oregon.gov/owrd/pages/pubs/forms.aspx#fees>.

Suppliers that have a full-time or seasonal residential population of 1,000 or fewer persons; but serve a population of greater than 1,000 on a *regular basis* will need to pay the higher fee specified for a service population of more than 1,000. Examples of this type of situation include, but are not limited to, the following:

- Coastal cities or towns that serve a population of 1,000 or fewer persons during the week and during the winter, but on weekends and during peak tourism times in the summer serve a population that increases to more than 1,000 persons;
- Destination resorts that serve a full-time residential population of 1,000 or fewer persons, but serve increased populations of greater than 1,000 persons on a seasonal basis for winter and summer recreation;
- Municipal water suppliers that serve a full-time residential population of 1,000 or fewer persons, but also supply water to support a transient population greater than 1,000 persons on a regular basis (*i.e., an employee-based population that goes home to another city at the end of their work day*); and
- Port facilities that have no full-time residential population, but do supply water to support a transient population greater than 1,000 persons on a regular basis (*i.e., a visiting/travel-related population, such as in an airport, and/or an employee-based population that goes home at the end of their work day*).

Exhibit 1.5 – WMCP Checklist

This optional checklist is designed for inclusion in your WMCP. If you choose to include this checklist, please place a check (✓) in the first box for all the tasks that apply to you. (**NOTE:** Boxes pre-checked represent tasks required to be performed by all water suppliers.) Enter “N/A” for sections that do not apply. Check the second box once the task is completed. Please also provide the section or page number in which each item may be found in your WMCP.

Items and Tasks		OAR Reference	Section No.
WMCP Plan Elements			
<input checked="" type="checkbox"/>	Notice to affected local government(s)	690-086-0125(5)	
<input checked="" type="checkbox"/>	Proposed WMCP update schedule	690-086-0125(6)	
	Additional time to implement conservation benchmarks	690-086-0125(7)	
Water Supplier Description			
<input checked="" type="checkbox"/>	Supplier’s source(s)	690-086-0140(1)	
<input checked="" type="checkbox"/>	Current service area and population served	690-086-0140(2)	
<input checked="" type="checkbox"/>	Assessment of adequacy and reliability of existing water supplies	690-086-0140(3)	
<input checked="" type="checkbox"/>	Present and historic water use	690-086-0140(4)	
<input checked="" type="checkbox"/>	Water rights inventory table and environmental resource issues	690-086-0140(5)	
<input checked="" type="checkbox"/>	Customers served and water use summary	690-086-0140(6)	
<input checked="" type="checkbox"/>	Interconnections with other systems	690-086-0140(7)	
<input checked="" type="checkbox"/>	System schematic	690-086-0140(8)	
<input checked="" type="checkbox"/>	Quantification of system leakage	690-086-0140(9)	
Water Conservation Element			
	Progress report on implementation of conservation measures scheduled in a previously approved WMCP (<i>N/A if 1st WMCP</i>)	690-086-0150(1)	
<input checked="" type="checkbox"/>	Water use measurement and reporting program	690-086-0150(2)	
<input checked="" type="checkbox"/>	Currently implemented conservation measures	690-086-0150(3)	
<input checked="" type="checkbox"/>	Annual water audit	690-086-0150(4)(a)	
<input checked="" type="checkbox"/>	Full metering of system	690-086-0150(4)(b)	
<input checked="" type="checkbox"/>	Meter testing and maintenance program	690-086-0150(4)(c)	
<input checked="" type="checkbox"/>	Rate structure based on quantity of water metered	690-086-0150(4)(d)	
	Leak detection program	690-086-0150(4)(e)	
<input checked="" type="checkbox"/>	Public education program	690-086-0150(4)(f)	
	System leakage reduction program <15%	690-086-0150(5)	
	System leakage reduction program <10%	690-086-0150(6)(a)	
	Technical and financial assistance programs	690-086-0150(6)(b)	
	Retrofit/replacement of inefficient fixtures	690-086-0150(6)(c)	
	Rate structure and billing practices to encourage conservation	690-086-0150(6)(d)	
	Reuse, recycling, and non-potable opportunities	690-086-0150(6)(e)	
	Other proposed conservation measures	690-086-0150(6)(f)	
Water Curtailment Element			
<input checked="" type="checkbox"/>	Water supply assessment and description of past deficiencies	690-086-0160(1)	
<input checked="" type="checkbox"/>	Stages of alert	690-086-0160(2)	
<input checked="" type="checkbox"/>	Triggers for each stage of alert	690-086-0160(3)	
<input checked="" type="checkbox"/>	Curtailment actions	690-086-0160(4)	
Water Supply Element			
<input checked="" type="checkbox"/>	Future service area and population projections	690-086-0170(1)	
<input checked="" type="checkbox"/>	Schedule to fully exercise each permit (<i>i.e., certification</i>)	690-086-0170(2)	
<input checked="" type="checkbox"/>	Demand forecast	690-086-0170(3)	
<input checked="" type="checkbox"/>	Comparison of projected need and available sources	690-086-0170(4)	
	Analysis of alternative sources	690-086-0170(5) and (8)	
	Maximum rate and monthly volume quantification	690-086-0170(6)	
	Mitigation actions under state and federal laws	690-086-0170(7)	
	Greenlight Water Request – Conservation measure schedule and cost effectiveness	690-086-0130(7)(a)	
	Greenlight Water Request – Justification that selected source is most feasible and appropriate	690-086-0130(7)(b)	
	Greenlight Water Request – Mitigation requirements	690-086-0130(7)(c)	

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Exhibit 1.6 – Greenlight Water Worksheet

This optional worksheet is designed for inclusion in your WMCP. It is meant to aid water suppliers in determining whether they must provide information in the WMCP to comply with OAR 690-086-0170(5), (6), (7) and/or (8) and OAR 690-086-0130(7).

Greenlight Water Worksheet

(NOTE: Water suppliers are encouraged to include this worksheet as part of their WMCP. Use additional sheets as necessary.)

1. Does the water supplier hold any extended water use permits?

Yes No

If **NO**, stop. A Greenlight Water request does not apply.

If **YES**, list the extended permit number(s) and indicate the maximum instantaneous rate of water allowed by the permit:

Permit Number	Instantaneous Rate of Water <u>Allowed</u> by Permit (in cfs or gpm)

2. Do the extended permit(s) have a Development Limitations condition imposed by a final order approving the Permit Extension or a previously submitted WMCP that freeze the quantity of water that can be diverted under the extended permit?

Yes No

If **NO**, stop. A Greenlight Water request does not apply.

If **YES**, list the extended permit number(s) and indicate the maximum instantaneous rate of water allowed under the Development Limitations condition established by the Permit Extension or previously approved WMCP:

Permit Number	<u>Development Limitations</u> Instantaneous Rate of Water Allowed by Final Order approving a Permit Extension or previous WMCP (in cfs or gpm)

3. Does the water supplier anticipate needing to divert water under an extended permit(s) at an instantaneous rate that is **greater than** the amount specified in the Development Limitations condition (established by the Permit Extension or previously approved WMCP) in order to meet its projected 20-year water demands?

Yes No

If **NO**, stop. A Greenlight Water request does not apply.

If **YES**, Items **A** and **B** below must be addressed in the water supplier’s WMCP being prepared for submittal:

A. Identify the maximum instantaneous rate and the maximum monthly volume of water that will be needed under the extended permit(s) for the next 20 years to meet the water supplier’s projected demands:

Permit Number	<u>Greenlight Water Request</u>	
	Maximum Instantaneous Rate of Water (in cfs or gpm) Anticipated to be Diverted to meet 20-year Demands	Maximum Monthly Volume of Water (in million gallons) Anticipated to be Diverted to meet 20-year Demands

Greenlight Water Worksheet (...continued)

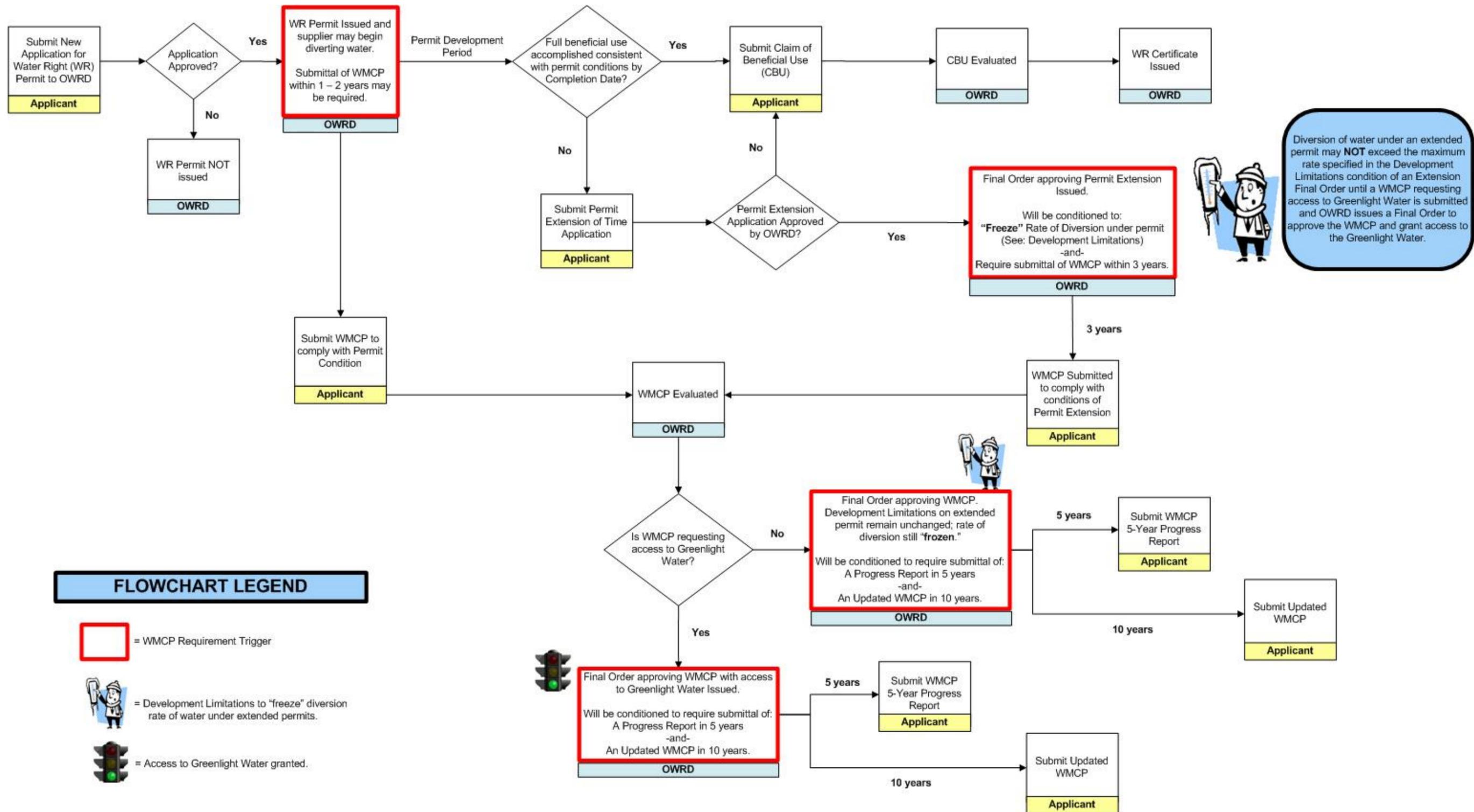
B. In the spaces provided below, describe how the water supplier has satisfied each of the following criteria:

- **OAR 690-086-0130(7)(a)** The plan includes a schedule for development of any conservation measures that would provide water at a cost that is equal to or lower than the cost of other identified sources, **unless**:
 - the supplier has provided sufficient justification for the factors used in selecting other sources for development; **or**
 - the supplier serves a population of less than 1,000.

- **OAR 690-086-0130(7)(b)** Increased use from the source is the most feasible and appropriate water supply alternative available to the supplier.

- **OAR 690-086-0130(7)(c)** If mitigation is legally required to address limitations or restrictions on the development of permits for which resource issues are identified under OAR 690-086-0140(5)(i), the plan contains documentation that the supplier is complying with the mitigation requirements. The Department may consult with federal and state agencies in making this determination.

Exhibit 1.7 – Typical Lifecycle of a Water Right from Water Use Permit Application to Certification



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CHAPTER 2

WATER SUPPLIER DESCRIPTION

OAR 690-086-0140



Willamette River/Portland, Oregon, photo: Stu Seeger

Supplier's Source(s)

Current Service Area/Population Served

Assessment of Existing Water Supplies

Present and Historic Use

Water Rights Inventory Table

Environmental Resource Issues of
Concern

Customers Served and Water Use
Summary

Interconnections with Other Systems

System Schematic

Quantification of System Leakage

"The river itself has no beginning or end. In its beginning, it is not yet the river; in the end it is no longer the river. What we call the headwaters is only a selection from among the innumerable sources which flow together to compose it. At what point in its course does the Mississippi become what the Mississippi means?"

- (T.S. Eliot, Introduction to *The Adventures of Huckleberry Finn*)



Hyperlinks

Throughout this document, **hyperlinks** are used to aid the reader by providing the ability to quickly “jump” to other referenced sections or items located throughout this document and on the web.

To return to the spot where you were *before* “jumping” to a hyperlink destination, simply press the “**Alt + left arrow**” keys at the same time.



Water Supplier Description

This section of a supplier's WMCP will describe in detail the water supply system, its current service territory, and a summary of available water rights. The steps here are intended to create an inventory of the supplier's source(s) of water and the water diversion, treatment and distribution facilities. This section will also assess the adequacy and reliability of water supplies subject to potential future restrictions related to regulation of water rights based on priority date and/or environmental resource issues. The required elements for this section of a WMCP are outlined under OAR 690-086-0140 and detailed throughout Chapter 2.

The information needed to prepare this section of a WMCP may often be found in previous WMCPs, water system master plans, or facilities plans. In addition, the supplier will have to collect data on current and historic water use, for at least the last five years. The supplier will provide a summary of their current water rights, intergovernmental or exchange agreements for water, and/or water supply or delivery contracts. The supplier will also need to provide a description of the facilities used to divert, treat, store and deliver water to its customers, along with a description of those customers. This section of the WMCP must also include a map delineating the current service area, and urban and public service boundaries, if applicable.

Sources of Information

Potential sources for gathering this information for the water supplier description include:

- Prior WMCP, water system master plan, or facilities plan;
- Internal documentation of agreements or contracts for water delivery or purchase;
- Water sales billing records and production data;
- Drawings of the water supplier's system, system plans, CAD drawings, GIS files, or "as-builts;"
- City or County land use plans;
- Interview(s) with system operators;
- Water right documents;
- Summaries of sensitive, threatened and endangered species from the Oregon Department of Fish and Wildlife (ODFW), NOAA Fisheries, and U.S. Fish and Wildlife Service;
- List of Water Quality Limited waters and their impairing parameters from Oregon Department of Environment Quality (DEQ);
- Maps of designated Critical Ground Water Areas from Oregon Water Resources Department (OWRD);
- Service boundary agreements and maps; and
- Capital improvement plans or infrastructure plans.

☑ Supplier's Source(s)**OAR 690-086-0140(1)**

This rule calls for a description of each source of water for the municipal entity, including related diversion(s) and storage facilities. In addition, the rule requires a description of each exchange or intergovernmental cooperation agreement for the sale or purchase of water, and any other contracts for the supply or delivery of water.

The description of each source of water needs to include a general discussion of the type and location of the point of diversion for each right. In the case of a ground or surface water right, also identify the source of water, such as the stream or aquifer name, and the township, range, section and quarter-quarter location of the point(s) of diversion, as specified under the existing water right permit, certificate or transfer. This information can be found on the actual water right permit, certificate or transfer documentation which the water supplier should have on file.

- OWRD's Water Right Information System (WRIS) database can also be consulted at: <http://apps.wrd.state.or.us/aps/wr/wrinfo/default.aspx>.
- You may also contact your local watermaster through the Department or online at: http://www.oregon.gov/owrd/pages/offices.aspx#region_watermaster_map.

The description of the diversion must also include a summary of the physical structure or equipment used to divert or withdraw water. Examples include brief descriptions of the pipe or screen used at a river intake, including any fish screens that may be in place to limit injury to protected aquatic species, as well as any pumps and their capacity used for raw water diversion. Similar descriptions would apply for a ground water right, including a summary of the well depth, screened interval(s), diameter, and installed pumping capacity.

For storage rights, the source description needs to include summaries of the name of the river or stream from which water is diverted and/or stored, as well as brief descriptions of the size of the reservoir, height and crest (width) of the dam, and normal operating pool level.

In addition, the rule requires the supplier to provide a brief description of any additional sources of water, including exchange or intergovernmental agreements for water or supply or delivery contracts with other suppliers. The description of these agreements must identify the entity with which the agreement is made, its general terms and conditions, the quantities of water agreed upon for exchange, sale or purchase, and the period for which the agreement is in effect.

☑ Current Service Area/Population Served**OAR 690-086-0140(2)**

The intent of this part of the water supplier description is to provide a brief summary of the current area which the supplier serves, along with an estimate of the population served within that area. The delineation is commonly created by providing a map of the current service area boundaries for the supply agency. Since a depiction of the supplier's existing and planned future service area must be included on its system schematic, as required under OAR 690-086-0140(8), the supplier may wish to make reference in this section of the WMCP to their system schematic. See "[*Exhibit 2.1 – Sample Current Service Area and Urban Growth Boundary Map*](#)" (pg. 45) for an example of a current service area map.

The map must depict the legal boundaries of the service area for the supply agency. It is also helpful to include reference to municipal boundaries. Often times, the service area boundaries coincide with municipal boundaries, while others are comprised of a portion of existing city limits or unincorporated portions of a county. Supplementing the map with a general description of the size of the service area in acres (or square miles) and location with regard to other prominent features, such as municipal or county entities and adjacent water suppliers, is recommended.

This portion of the water supplier description must also include an estimate of the population served within the supplier's boundaries and service areas and public facilities boundaries. A description of the methodology used to calculate the population estimate must also be included.

Assessment of Existing Water Supplies

OAR 690-086-0140(3)

The supplier must also examine its water rights and evaluate the adequacy and reliability of each source. Often, physical restrictions exist that limit the capacity of a source, such as natural limits on the diversion from a well or surface water intake. Moreover, there are often seasonal limits on the quantity of available water, especially during late summer and early fall. Examples include periodic reduced flow from a spring or well or reduced flow in a river or stream that limit access to the full amount designated in a water right permit or certificate. Interties, even those reserved for emergency purposes only, are also considered sources of supply and the adequacy and reliability of these sources need to be addressed.

(NOTE: A review of the supplier's historic production records may provide information about the adequacy and the reliability of each water source.)

In addition, the supplier must assess the reliability of those source(s) with regard to existing or future restrictions. Examples include restrictions that may be imposed through priority date, protection of threatened or endangered species, instream flow requirements, statewide stream clean-up plans (e.g., *DEQ Total Maximum Daily Load (TMDL) and Water Quality Management Plans*), threats of future contamination and loss of access from nearby pollution sources, or ground water limitations established by the state (e.g., *OWRD groundwater limited or critical areas and DEQ groundwater management areas*).

Using this information, an assessment can be made to quantify the actual amount of potential water available under each water right permit, certificate, or other source. It is recommended that the supplier provide a summary of the actual water available and note any conditions of reliability with regard to continued or expanded use under each right. The supplier must then consider the adequacy of those water sources for meeting its current supply needs, including system redundancy, emergency backup, etc.



The American Water Works, Pacific Northwest Section (AWWA-PNWS) wrote a handbook titled, *"So You Think You Need More Water? (1995)"* to help small water systems plan for additional supply. The handbook discusses supply reliability and methods to determine reliability. Water suppliers may find it a useful tool to complete this rule requirement.

Present and Historic Water Use

OAR 690-086-0140(4)

This rule requires the supplier to provide a description of present and historic water use that quantifies annual and peak seasonal use in terms of volume, as well as average day and peak day use in terms of rate. The information for these numbers should conform to the annual water use reporting required under OAR Chapter 690, Division 85 (OAR 690-085). Moreover, it is suggested that information on the source of the water use data be included as part of the discussion for this element of the WMCP.

The numbers for annual and peak season use can come directly from the supplier's annual water use reports. Graphs or plots of historic annual and monthly water use for the past five years are also useful.

Average day use can be determined by dividing the annual volume of use by 365. Peak day use may be determined from meter records or power consumption data, given the existence of either meters or a relationship between power use and flow. Otherwise, peak day use can be estimated. Typically, numbers for peak day use are between 2.2 to 2.7 times the average day demand (ADD). If estimates are used, the supplier needs to provide a discussion of the assumptions used in making those calculations. In addition, it is recommended that the supplier initiate a program to more accurately monitor water diversions and pumping, if not already doing so.

Water Rights Inventory Table

OAR 690-086-0140(5)

This rule requires that a table be provided listing all water rights held by the supplier. There are a variety of water right types a water supplier may hold. These include permits, certificates, claims, decrees, transfers, limited licenses, etc., all of which are to be included in the tabular listing. In this same table, it is also helpful to include any pending application requests for a water use permit filed with OWRD.

There are also many different uses of water that a water right may authorize. In addition to water rights allowing municipal, quasi-municipal and/or domestic uses of water, water suppliers often hold water rights for non-potable or non-municipal uses and/or water rights that are not directly connected to the municipal/domestic water supply system. While all of its water rights must be listed in a tabular format, a supplier may choose to list their non-potable, non-municipal or non-connected water rights separately from their municipal, quasi-municipal and/or domestic use rights.

Elements that must be provided in the tabular listing for each of the supplier's water rights include:

- Application, Permit, Transfer, Certificate, Claim or Decree numbers (as applicable);
- Priority date(s);
- Source(s) of water;
- Type(s) of beneficial use specified in the right;
- Quantity of water allowed (maximum instantaneous rate and maximum annual volume);
- Quantity of water diverted to date (maximum instantaneous rate and maximum annual volume);
- Average monthly diversion for the previous year, and if available the previous five years;
- Average daily diversion for the previous year, and if available the previous five years;
- Currently authorized date(s) for completion of construction and full beneficial use of water; and
- Environmental resources issues of concern (*i.e., streamflow-dependent species listed as Sensitive, Threatened or Endangered; any listing of the source as Water Quality Limited and the Parameters impairing the source; and/or any Critical Groundwater Area designation*).

Examples of a water right inventory table are provided in “[Exhibit 2.3 – Sample Water Rights Inventory Table](#)” (pg. 49) and “[Exhibit 2.4 – Sample Water Rights Inventory Table \(Alternate Format\)](#)” (pg. 51). Additionally, a template of a water right inventory table is available for download from OWRD’s website at http://www.oregon.gov/owrd/Pages/Conservation_Sharehouse.aspx.

For some water suppliers, such as suppliers who share permitted rights with other utilities, sufficient description of the arrangements with these other water suppliers should be included in addition to the water right inventory table.

Environmental Resource Issues of Concern *OAR 690-086-0140(5)(i)*

As part of the tabular inventory of water rights described above, the water supplier must identify and describe environmental resource issues associated with the water sources allowed under their water rights. It should be noted that it is acceptable to describe these environmental issues in a section of the WMCP that is separate from the tabular water rights inventory.

Specifically, the supplier must identify whether any of their authorized water sources are affected by the following environmental resource issues:

- Any streamflow-dependent species listed by a state or federal agency as sensitive, threatened, or endangered that are present in their source(s);
- Any listing of their source(s) as being water quality limited and the water quality parameters for which the source was listed; and
- Any designation of their source(s) as being located in a critical ground water area.

Each of these environmental resource issues are discussed in greater detail below.

Sources with Sensitive, Threatened or Endangered Species

As part of its WMCP, a water supplier must identify the presence of any streamflow-dependent species that have been listed by a state or federal agency as being sensitive, threatened, or endangered (ST&E) in each of its water sources. For clarity, if no listed species are present in the supplier’s water sources, it is recommended that a statement to that effect is included in the WMCP.

Several sources are available to assess if listed streamflow-dependent species are present in a given water source. Details concerning these listings can be found online through Oregon Department of Fish and Wildlife (ODFW) at <http://www.dfw.state.or.us/>; National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service at <http://www.westcoast.fisheries.noaa.gov/>; and United States Fish and Wildlife Service (USFW) at <http://www.fws.gov/oregonfwo/Species/Data/Default.asp#Fish>.

The focus area of the assessment needs to extend from the supplier’s point of diversion on the subject water source downstream to the mouth of that source. Some water sources, such as the Columbia and Willamette Rivers, cover such large areas that the water source travels through multiple hydrologic units, or involves multiple evolutionary significant units or distinct population segments.



Waterways throughout the United States are broken down into hydrologic units, which are divided and sub-divided into successively smaller hydrologic units. Each hydrologic unit is arranged or nested within each other, from the largest geographic area to the smallest geographic area, and is identified by a unique hydrologic unit code (HUC). More information about hydrologic units may be obtained from the United States Geological Survey (USGS) website at <http://water.usgs.gov/GIS/huc.html>.

“Evolutionary significant units” (ESU) are defined by NOAA Fisheries as a Pacific salmon population or group of populations that is substantially reproductively isolated from other populations of the same species and that represents an important component of the evolutionary legacy of the species. It also defines “distinct population segment” (DPS) as a vertebrate population or group of populations that is discrete from other populations of the species and significant in relation to the entire species. More information about these terms can be accessed from the NOAA Fisheries website at <http://www.westcoast.fisheries.noaa.gov/>.

Take, for example, a diversion point that draws water from the Willamette River at river mile 125.0 between the cities of Albany and Corvallis. For federal listings, not only would you need to review the Upper Willamette River designation, but also the Lower Columbia River designation. This is because the portion of the Willamette River located below Willamette Falls at Oregon City downstream to its confluence with the Columbia River is contained within the Lower Columbia River designation. For state listings, this same diversion point on the Willamette River, at river mile 125.0, would require a review of the Upper Willamette, Middle Willamette and the Lower Willamette hydrologic units. Therefore, it is important to note that the federal ESU and DPS designations do not necessarily line up with the state’s subbasins or hydrologic units.

If you need additional assistance identifying streamflow-dependent species listed as ST&E, you may inquire with ODFW or contact OWRD staff directly.

Water Quality Limited Sources

In addition, the supplier must identify any listing of their source(s) as being water quality limited, as determined by DEQ. Under section 303(d) of the Clean Water Act, DEQ is required to keep a list of stream segments that do not meet water quality standards.

DEQ maintains a database listing 303(d) and other quality impaired waters, the parameters impairing those waters, and the affected stream reach. The current “*Oregon’s Integrated Report Assessment Database and 303(d) List*” can be accessed on DEQ’s website at <http://www.deq.state.or.us/wq/assessment/assessment.htm>.

DEQ Listing Statuses defined as being “*water quality limited*” include all Category 4 and Category 5 designations. These categories are further defined below.

- **Category 4:** Water is water quality limited but a TMDL is not needed. This includes:
 - **4A:** TMDL approved. TMDLs needed to attain applicable water quality standards have been approved;
 - **4B:** Other pollution control requirements are expected to address all pollutants and will attain water quality standards; and
 - **4C:** Impairment is not caused by a pollutant (e.g., *flow or lack of flow is not considered a pollutant*).
- **Category 5:** Water is water quality limited and a TMDL is needed; Section 303(d) list.

It is important to note that, in some cases when a TMDL is approved, the DEQ database may indicate the parameter or pollutant has been “delisted.” However, as described under Categories 4 and 4A above, even when a TMDL has been approved to address a pollutant, the water source is still considered to be water quality limited.

The WMCP must specify all Category 4 and Category 5 listed pollutants identified in the designated stream segment that encompasses the supplier’s diversion point(s) from the water source.

To best illustrate how to find this information in DEQ’s database, we are using a hypothetical scenario. In this example, we assume the water supplier holds a water right authorizing the diversion of water from the South Yamhill River, tributary to the Yamhill River, at river mile 21.5.

At the database’s main query page (shown in “Figure 2.1 – Water Quality Limited Query” below), the following information is entered into the appropriate query fields:

- **Subbasin (USGS 4th Field HUC):**
Yamhill
- **Pollutant:**
All Pollutants
- **Water body (Stream/Lake):**
South Yamhill River
- **Listing Status:**
Water Quality Limited – All (Categories 4 and 5)

Figure 2.1 – Water Quality Limited Query

Review the 2010 Integrated Report Database

Select search criteria and then click the Search button to begin searching the database.

Search Reset Form

Subbasin (USGS 4th Field HUC): Williamson
Williamson; Upper Klamath Lake
Willow
Wilson-Trask-Nestucca
Yamhill

Water body (Stream/Lake): South Stage L.F.
South Trail Creek
South Umpqua River
South Willow Creek
South Yamhill River

Stream or Lake LLID value: Enter LLID numeric value

Pollutant: **All Pollutants**
(Hold down the Ctrl key to select multiple parameters)
Acenaphthene
Acrolein
Alachlor
Aldrin
Alkalinity
Alpha-BNC
Aluminum
Ametryn
Ammonia

Listing Status: All Statuses
Attaining (Category 2)
Insufficient Data (Category 3)
Potential Concern (Category 3b)
Impairing pollutant unknown (Category 3c)
Water Quality Limited - All (Categories 4 and 5)
Water Quality Limited TMDL needed - 303(d) (Category 5)
Water Quality Limited TMDL not needed (Category 4)
Water Quality Limited TMDL not needed - TMDL Approved (Category 4a)
Criteria Change or Use Clarification
Inactive

Water bodies de-listed in 2010: (Other listing status selections will be disregarded)

Create a Spreadsheet (.csv) Select this option if you want to create a .csv (Comma Separated Values) file. Microsoft Excel can be used to view this file.

Search Reset Form

After clicking the “Search” button, the results of your query will appear (see “Figure 2.2 – Water Quality Limited Query Results”).

As illustrated by the yellow highlighted areas, there are several pollutants with a stream reach that encompasses the supplier’s diversion point at river mile 21.5 of the South Yamhill River. Stream reaches that don’t include river mile 21.5 are marked as “N/A.”

Note that only a portion of the results from the database query on the South Yamhill River are shown in Figure 2.2. The actual results at the time of this writing reveal that the South Yamhill River at river mile 21.5 is listed as being water quality limited for the following pollutants: *dissolved oxygen, fecal coliform, flow modification, phosphorous, and temperature.*

In the case of our example scenario, therefore, the supplier’s WMCP must identify each of these pollutants for which the South Yamhill River at river mile 21.5 is listed as being water quality limited.

Figure 2.2 – Water Quality Limited Query Results

Basin Name	Water Body LID	Pollutant	Season	Criteria	Beneficial Uses	Status
Willamette Yamhill 17090008	South Yamhill River 1231445452258 0 to 41	Dissolved Oxygen	January 1 - May 15	Spawning: Not less than 11.0 mg/L or 95% of saturation	Resident trout spawning	Cat 5: Water quality limited, 303(d) list, TMDL needed
Willamette Yamhill 17090008	South Yamhill River 1231445452258 18.1 to 42.6	Fecal Coliform	FallWinterSpring	Fecal coliform log mean of 200 organisms per 100 ml; no more than 10% > 400 per 100 ml	Water contact recreation	303(d)
Willamette Yamhill 17090008	South Yamhill River 1231445452258 18.1 to 42.6	Fecal Coliform	Summer	Fecal coliform log mean of 200 organisms per 100 ml; no more than 10% > 400 per 100 ml	Water contact recreation	303(d)
Willamette Yamhill 17090008	South Yamhill River 1231445452258 42.6 to 61.7	Fecal Coliform	Summer	Fecal coliform log mean of 200 organisms per 100 ml; no more than 10% > 400 per 100 ml	Water contact recreation	303(d)

N/A. Supplier's diversion point is at river mile 21.5 of South Yamhill River.

As stated above, a WMCP must specify all Category 4 and Category 5 listed pollutants identified in the designated stream segment that encompasses the supplier’s diversion point(s) from the water source. If you require additional assistance identifying water quality limited sources and listed pollutants, you may inquire with DEQ or contact OWRD staff directly.

Sources within a Designated Critical Ground Water Area

Those suppliers holding ground water rights must identify any ground water source that is located within the boundaries of a designated “critical ground water area.” To date, OWRD has declared six critical groundwater areas: Cow Valley near Vale; The Dalles in Wasco County; Cooper Mountain-Bull Mountain southwest of Beaverton and Tigard; and the Butter Creek, Ordnance and Stage Gulch in Morrow and Umatilla Counties. The Commission also started critical area proceedings in the Christmas Valley/Fort Rock Basin in 1984. In 1986, however, the Commission opted to withdraw the area from further appropriation, except for certain small uses, as specified in the Goose and Summer Lakes Basin Program under OAR 690-513-0060.

In addition to the critical ground water areas, OWRD has designated several “ground water limited areas.” For the purposes of meeting this rule requirement, however, a WMCP is only required to address critical ground water areas.

To review the boundaries of these critical ground water areas, access the “Map Library” on OWRD’s website at http://apps.wrd.state.or.us/apps/gis/gis_map_library/. You may also contact OWRD staff directly for assistance.

Customers Served and Water Use Summary **OAR 690-086-0140(6)**

The supplier is to develop a description of the customer classes served and general water use characteristics for each customer class (*i.e. residential, commercial, industrial, etc.*). The intent is to identify characteristics of water consumption among the different customer classes.

Examples of helpful information to include in this description are:

- Identification of the supplier’s customer classes (*i.e., residential, commercial, industrial, public/municipal, wholesale, etc.*);
- The number of service connections in each customer class;
- A general overview of water consumption for the different customer classes – *Including various water consumption analyses for each customer class (such as average and peak daily, monthly, seasonal, and annual water usage) is an effective way to demonstrate typical water use patterns across different water use classes;*
- Identification of any prominent industrial facilities, such as a mill, food processing plant, or manufacturing facility;
- A listing of the supplier’s top water users and the volume of water used;
- Identification of any special demands for water; and
- Identification of current or planned water recycling or reuse.

The rules also require the supplier to include a comparison of the quantities of water used in each customer class with the quantities reported in the water supplier’s previously submitted WMCP or associated progress reports (if applicable). Obviously, if this is the supplier’s first WMCP, no comparison is necessary.

Possible sources of information that may be useful in this regard include:

- Oregon Community Profiles: <http://www.oinfrastructure.org/Community-links/index.php?d=4>
- Oregon Blue Book: <http://bluebook.state.or.us/default.htm>
- Population Research Center: <http://www.pdx.edu/prc/>
- U.S. Census Bureau: <https://www.census.gov/#>
- U.S. Census Bureau – Oregon Data: <http://quickfacts.census.gov/qfd/states/41000.html>
- Local Comprehensive Land Use Plans (City or County Planning staff, or Council of Governments)
- Water System Master Plan

☑ Interconnections with Other Systems

OAR 690-086-0140(7)

The WMCP must include a description of all existing or planned interconnections with other suppliers. Include interconnections for full-time water supply agreements or contracts, as well as any emergency water supply arrangements.

Describe the nature of the interconnection (*i.e., water is being purchased or it is being sold, full-time supply or emergency backup supply only*), and include details of the capacity of the service, length of the contract, and the contractual arrangement for water (*i.e., minimum purchase quantities, maximum limits, and delivery restrictions, if any*). Also include any other details that describe the availability or reliability of that service. Copies of any such intergovernmental agreements or contracts may be included in the Appendix of the WMCP.

☑ System Schematic

OAR 690-086-0140(8)

This rule calls for the supplier to provide a schematic or map of the water supply system. See “[Exhibit 2.2 – Sample System Schematic \(Major Facilities\)](#)” (pg. 47) for an example of a water system schematic.

At the very least, the schematic must identify the locations of:

- The supplier’s water source(s);
- Points of diversion/appropriation from the water sources;
- Storage facilities;
- Treatment facilities (if any);
- Major transmission and distribution pipelines;
- Pump stations;
- Pressure reducing valves or other control facilities;
- Interconnections or interties with other supply systems (full-time or emergency);
- Existing service area; and
- Planned future service area (such as an urban growth boundary).

This water system schematic may be taken directly from your Water System Master Plan or other similar plans and must include all of the items listed above. Additionally, it may be beneficial to include any major planned system improvements.

☑ Quantification of System Leakage

OAR 690-086-0140(9)

The final element that must be addressed in the water supplier section is a quantification and description of system leakage or loss. OAR 690-086-0030(8) defines system leakage as, “...*all water that is lost from a municipal water supply system (not including major breaks that are expeditiously repaired) and unmetered authorized or unauthorized uses.*”

Generally, the quantification is provided as a percentage of loss for at least the previous year. In some instances, a supplier may wish to provide a percentage of loss for each of the previous five years along with a 5-year average.

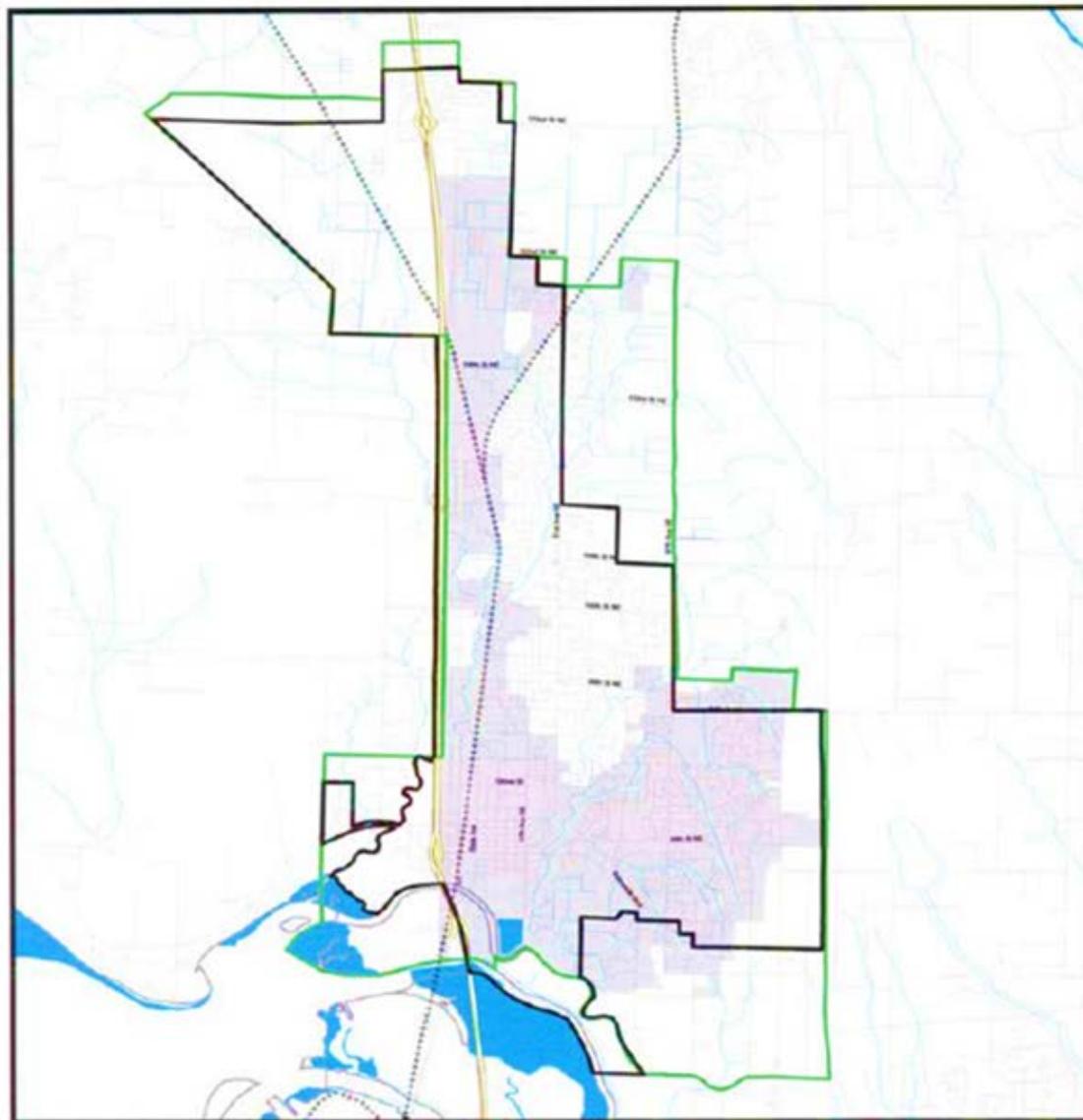
In addition to the quantification, the water supplier must provide any available information regarding the location(s) and details of significant water loss. An estimate of the volume or rate of leakage at these locations is also helpful.

The typical means for quantifying an estimate of system leakage is to take the difference between metered diversions at the source(s) and metered customer use. This figure is then corrected for any unmetered, authorized uses such as park irrigation, main flushing, firefighting, treatment plant operations, street cleaning, and other known uses.

Details of performing a water audit and estimating system leakage or loss are discussed further in Chapter 3 of this guidebook. Additional assistance may be obtained through the American Water Works Association's (AWWA) Manual M36 *Water Audits and Loss Control Programs (2009)*.

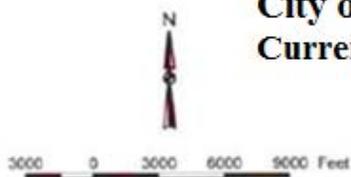
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Exhibit 2.1 – Sample Current Service Area and Urban Growth Boundary Map



LEGEND
Service Area Boundary
Urban Growth Boundary
City Limits

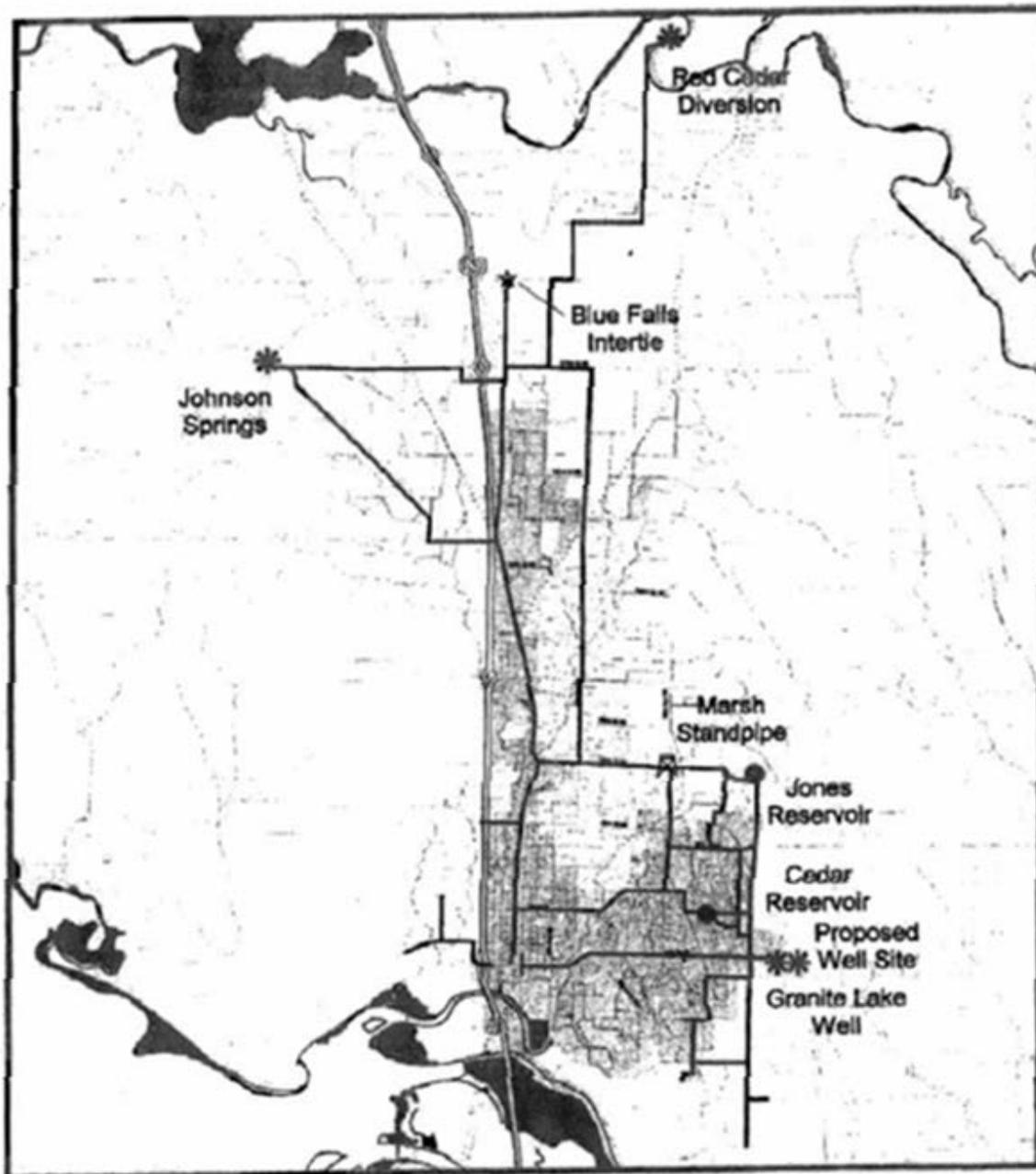
**City of Anywhere, Oregon
Current Service Area & UGB**



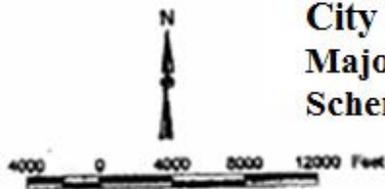
May 2013

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Exhibit 2.2 – Sample System Schematic (Major Facilities)



- LEGEND**
- ✱ Existing Source of Supply
 - Reservoir
 - ⚙ Standpipe
 - ✱ Proposed Source of Supply
 - ☆ Interties
 - Water Transmission Lines
 - City Limits



**City of Anywhere, Oregon
Major Facilities System
Schematic
May 2013**

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Exhibit 2.3 – Sample Water Rights Inventory Table

City Municipal System

Appl. No.	Permit No.	Priority Date	Cert. No.	Transfer No.	Source	Use	Maximum Allowed Rate under Original Permit (cfs)	Current Allowed Rate under "Development Limitations" and/or Perfected Rate of Certificate (cfs)	Actual Diversion				Authorized Completion Date	Source Issues <i>Identification of:</i> • ST&E species present in the source; • Water quality limited parameters listed for the source; and/or • Source well(s) located within a Critical Ground Water Area
									Maximum Instantaneous Rate Diverted to Date (cfs)	Maximum Annual Quantity Diverted to Date (MG)	Average Monthly Diversion (MG)	Average Daily Diversion (MG)		
S-209134	S-199853	5/12/1926	101783 (Cancelled by order approving T-8473)	T-8473 (Additional point of diversion approved under Transfer.)	Red Cedar River	Municipal	9.0	8.1	8.1	900	75	2.5	10/1/2020 (Transfer T-8473)	ST&E Species present in this source: • Chinook, Chum and Steelhead (federally-listed as Threatened); and • Chinook, Steelhead, Western Brook lamprey and Pacific Lamprey (state-listed as Sensitive). The source is water quality listed for the following parameters: temperature, pH, flow modification, mercury, iron and DDT Metabolite (DDE).
S-241778	S-220845	1/22/1930	109445	n/a	Red Cedar River	Irrigation of 9.8 acres (city park)	0.123	0.123	0.123	9.7	1.2	0.04	n/a - certificated	Non-potable. Irrigation use only. Used only during the irrigation season (March through October) of each year.
S-297465	S-285213	3/3/1935	115389	n/a	Johnson Springs	Municipal	0.55	0.55 (certificated)	0.55	120	10	0.33	n/a - certificated	None
S-356659	S-295687	11/16/1963	n/a	n/a	Johnson Springs	Municipal	2.8	1.25	1.25	240	19.4	0.65	10/1/2020 (Permit S-295687)	None
G-415685	G-356689	5/25/1985	n/a	n/a	Granite Lake Wells No. 1, 2, 3 and 4	Municipal	3.5	1.24	1.24	300	28	0.93	10/1/2042 (Permit G-356689)	Wells 1, 2, 3 and 4 are located within the Cow Valley Critical Ground Water Area
CITY MUNICIPAL SYSTEM TOTAL SUPPLY:							15.97385 cfs (10.23 mgd)	11.14 cfs (7.19 mgd)						
No Municipal System Connection														
G-452319	G-397234	4/12/1997	129890	n/a	Shade Well #1	Municipal	1.0	1.0	1.0	40.0	3.3	0.11	n/a - certificated	Serves visitor center/tourist facility located outside the city limits. Water Right is in the name of the County, but the City operates the water infrastructure for the County. This water right is NOT connected to the City's municipal system.

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Exhibit 2.4 – Sample Water Rights Inventory Table (Alternate Format)

City Municipal System

Appl. No.	Permit No.	Priority Date	Cert. No.	Transfer No.	Source	Use	Maximum Allowed Rate under Original Permit (cfs)	Current Allowed Rate under "Development Limitations" conditions and/or Perfected Rate of Certificate (cfs)	Actual Diversion				Authorized Completion Date	Source Issues <i>Identification of:</i> • ST&E species present in the source; • Water quality limited parameters listed for the source; and/or • Source well(s) located within a Critical Ground Water Area	
									Maximum Instantaneous Rate Diverted to Date (cfs)	Maximum Annual Quantity Diverted to Date (MG)	Average Monthly Diversion (MG)	Average Daily Diversion (MG)			
Municipal Water Rights Held by the City															
S-209134	S-199853	5/12/1926	101783 (Cancelled by order approving T-8473)	T-8473 (Additional point of diversion approved under Transfer.)	Red Cedar River	Municipal	9.0	8.1	8.1	900	75	2.5	10/1/2020 (Transfer T-8473)	ST&E Species present in this source: • Chinook, Chum and Steelhead (federally-listed as Threatened); and • Chinook, Steelhead, Western Brook lamprey and Pacific Lamprey (state-listed as Sensitive). The source is water quality listed for the following parameters: temperature, pH, flow modification, mercury, iron and DDT Metabolite (DDE).	
S-297465	S-285213	3/3/1935	115389	n/a	Johnson Springs	Municipal	0.55	0.55 (certificated)	0.55	120	10	0.33	n/a - certificated	None	
S-356659	S-295687	11/16/1963	n/a	n/a	Johnson Springs	Municipal	2.8	1.25	1.25	240	19.4	0.65	10/1/2020 (Permit S-295687)	None	
G-415685	G-356689	5/25/1985	n/a	n/a	Granite Lake Wells No. 1, 2, 3 and 4	Municipal	3.5	1.24	1.24	300	28	0.93	10/1/2042 (Permit G-356689)	Wells 1, 2, 3 and 4 are located within the Cow Valley Critical Ground Water Area	
Non-Municipal Water Rights Held by the City															
S-241778	S-220845	1/22/1930	109445	n/a	Red Cedar River	Irrigation of 9.8 acres (city park)	0.123	0.123	0.123	9.7	1.2	0.04	n/a - certificated	Only used during the irrigation season (March through October) of each year.	
CITY MUNICIPAL SYSTEM TOTAL SUPPLY:							15.97385 cfs (10.23 mgd)	11.14 cfs (7.19 mgd)							
No Municipal System Connection															
G-452319	G-397234	4/12/1997	129890	n/a	Shade Well #1	Municipal	1.0	1.0	1.0	40.0	3.3	0.11	n/a - certificated	Serves visitor center/tourist facility located outside the city limits. Water Right is in the name of the County, but the City operates the water infrastructure for the County. This water right is NOT connected to the City's municipal system.	

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CHAPTER 3

WATER CONSERVATION ELEMENT

OAR 690-86-0150



Photo: OSU Extension Service/Central Oregon Cities Organization's

Basic conservation Measures Required of All
Suppliers

Enhanced Conservation Measures under
OAR 690-086-0150(5)

Enhanced Conservation Measures under
OAR 690-086-0150(6)

Resources for the Water Conservation
Element

“All the water that will ever be is, right now.”

- National Geographic, October 1993



Hyperlinks

Throughout this document, **hyperlinks** are used to aid the reader by providing the ability to quickly “jump” to other referenced sections or items located throughout this document and on the web.

To return to the spot where you were *before* “jumping” to a hyperlink destination, simply press the “**Alt + left arrow**” keys at the same time.



Water Conservation Element

This chapter explains in detail the water conservation requirements of OAR 690-086 and the suppliers to whom the requirements apply. It also provides guidance to water suppliers on how to develop this part of a WMCP.

Water conservation provides an important tool in meeting the water supply needs of communities. OAR 690-86 identifies certain *basic* conservation activities that must be implemented by **all** water suppliers submitting a WMCP. OAR 690-086 also includes several *enhanced* conservation measures that must be evaluated by only **some** suppliers. If a water supplier determines that a specific enhanced conservation activity is not suitable for its service area, the supplier must document the reason(s) why in the WMCP.

The Water Conservation Element in OAR 690-086 includes the term “benchmark.” A benchmark is both an action which a water supplier commits to doing and a schedule for carrying out the water conservation activities between the time a WMCP is submitted to OWRD and the next WMCP progress report or WMCP update (as may be applicable). Each water supplier can propose benchmarks that are appropriate for its specific circumstances. In reviewing a WMCP, OWRD will evaluate the suitability of these benchmarks. Example conservation benchmarks can be found throughout Chapter 3 and within the Sample WMCPs provided in [Appendix G](#) (large community) and [Appendix H](#) (small community).

***Example Five-Year Benchmark:** The City will continue testing source production meters every five years. Additionally, beginning in June 2017, the City will initiate a revolving meter replacement program to replace all meters that are 2-inches and smaller every 20 years. The City will also initiate a program to test all meters larger than 2-inches every five years, and replace meters as needed.*

Water conservation should not be confused with water curtailment. As used in OAR 690-86, water conservation is the elimination of waste or the implementation of other measures to more efficiently meet the needs of the community. Curtailment represents measures taken in response to a short term water supply emergency when not all water needs can be met. Water curtailment is discussed in [Chapter 4](#) of this guidebook.

Basic Conservation Measures Required of All Suppliers

OAR 690-86 requires **all** water suppliers to implement the following basic conservation measures:

- An annual water audit;
- Full metering of the system;
- A meter testing and maintenance program;
- A rate structure based, at least in part, on the quantity of water metered;
- A leak detection program (if system leakage *exceeds* 10 percent); and
- A public education program on efficient water use and low water use landscaping.

Suppliers must describe the specific activities, along with a schedule that establishes five-year benchmarks, for implementation of each of the basic conservation measures listed above.

Also as part of the Water Conservation Element, water suppliers must provide a progress report on the conservation measures scheduled for implementation in a previously approved WMCP (if applicable); a description of the water supplier's water use and measurement and reporting program consistent with Chapter 690, Division 85 (OAR 690-85); and a description of any other conservation measures currently implemented by the water supplier, including any measures required under water supply contracts.

Each of these required basic conservation-related measures and activities are described in further detail below.

Progress Report

OAR 690-086-0150(1)

If the water supplier has a previously approved WMCP, a progress report must be provided detailing conservation measures identified in the previous WMCP and scheduled for implementation. Conversely, if this is the water supplier's first WMCP to be submitted to OWRD, a progress report is not required. In this case, the WMCP should clearly state that no WMCP has previously been submitted to OWRD and therefore a progress report is not applicable.

An effective progress report includes identification of:

- Conservation measures listed in the previous WMCP, along with the benchmark schedule for implementation of those measures within five years;
- Whether the established five-year benchmarks were achieved; and
- If benchmarks were **not** met, include an explanation detailing why implementation was prevented or delayed.

Water Use Measurement / Reporting Program **OAR 690-086-0150(2)**

OAR 690-85 requires that all governmental entities holding water rights must submit an annual report of water use for each water right. The report is due by December 31 of each year. As defined in OAR 690-085-0005(9), "governmental entities" required to report water use include cities, towns, counties, and water districts, among others. Private water suppliers are exempt from this requirement, unless their water right permit(s) specifically indicate they must provide this information.

Water use reports must indicate the amount of water diverted or pumped in each month of the previous water year (October 1 – September 30). There are specific requirements for reporting use of impounded water and release of stored water as well. The OAR 690-85 rules identify specific methods that can be used for measurement, as well as standards for accuracy. For further details on these requirements, see "[OAR 690-85: Annual Reports and Serious Water Management Problem Areas.](#)"

OAR 690-86 requires a WMCP to include a description of the water supplier's water use measurement and reporting program. The WMCP must also include a statement of whether the program complies with the measurement standards required under OAR 690-085. If a time extension or waiver for compliance with OAR 690-85 has been granted by OWRD, or the standards are not applicable, the supplier needs to clearly indicate this in the WMCP.

For water suppliers who are in full compliance with OAR 690-085, providing this information in the WMCP will be relatively straightforward. The supplier can simply indicate that the measurement program complies with this rule, and that reports are submitted by December 31 of each year.

Any water suppliers not in full compliance need to indicate the steps they will take to meet OAR 690-85 requirements in the future. A schedule for achieving compliance must also be included. In this case, progress reports on the WMCP that are submitted in the future will be used to document achievement of this requirement. See OAR 690-086-0150(1).

As mentioned above, some water suppliers may have been granted a time extension or waiver. OWRD is authorized to grant waivers under circumstances described in OAR 690-085-0010(6) for reasons such as economic hardship or for very small diversions that have a minimal effect on the water source. In these cases, the water supplier must clearly document this and provide a brief explanation in the WMCP.

Annual Water Audit

OAR 690-086-0150(4)(a)

Water audits enable suppliers to document all uses of water. OAR 690-86 requires that all water suppliers submitting a WMCP carry out a system-wide water audit every year. The process and results must be described in the WMCP.

A system-wide water audit is a process of comparing the total amount of water withdrawn or diverted with the amount of water sold, delivered, used or lost. In essence, a water audit provides a “water balance” to determine where in the system the water produced goes. One outcome of a water audit is a quantitative estimate of total water loss from leaking water mains. Together with other information, this can assist a water supplier in developing an effective program of leak detection, leak repair, and rehabilitation and/or replacement of water mains. Where audits lead a water supplier to control losses or improve billing practices, this practice can contribute to a utility’s financial performance.

At its simplest, a water audit may involve merely comparing the annual quantity of water produced with the annual quantity of water metered and sold to all customers. For small water systems with limited data collection and management capabilities, this may be adequate. However, for more advanced systems, or for small systems where this approach indicates a large difference between production and sales, more information will be needed.

It is recognized that some systems may need time to develop and carry out an auditing process. Auditing will require a commitment of staff time to extract and review data, perform calculations, and report results. Not all water systems currently have a method or system in place to routinely gather and store data needed for a water audit. If necessary, the water supplier may propose benchmarks for phasing in an annual auditing process.

The American Water Works Association (AWWA) has a complete manual titled “*Water Audits and Loss Control Programs*” (Manual M-36, AWWA, 2009). The manual provides step-by-step procedures and includes worksheets, tables, conversion factors, and other helpful tools for completing a water audit. AWWA also offers free Water Audit Software to help suppliers compile their water audit data. The software includes a data-grading capability that allows the auditor to rate the overall degree of validity of their data, and provides the capability to create charts showing audit components and basic histograms of grading values. For more information and to download the software, visit AWWA’s website at <http://www.awwa.org/resources-tools/water-knowledge/water-loss-control.aspx>.

The basic steps used to conduct an annual system-wide water audit are provided in “*Exhibit 3.1 – Basic Steps in Conducting a Water Audit*” below:

Exhibit 3.1 – Basic Steps in Conducting a Water Audit*

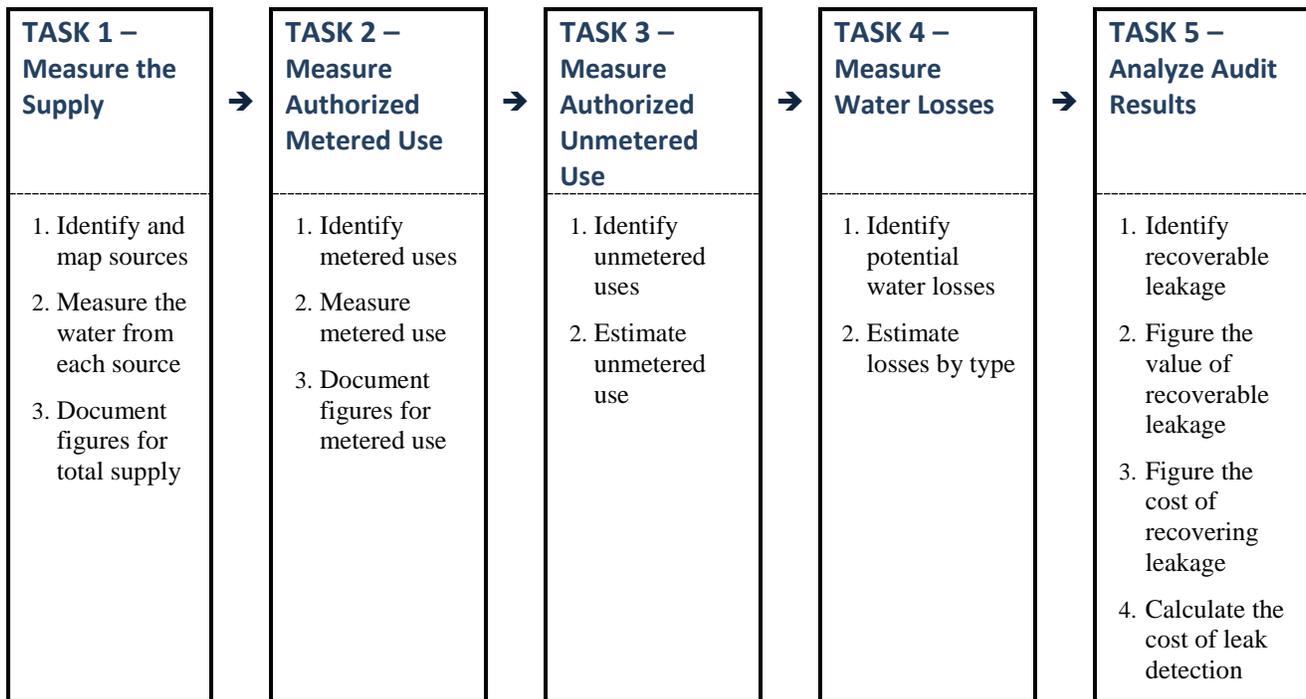
Before the Audit

- A. Establish a worksheet
- B. Set a study period
- C. Choose an official unit of measure

After the Audit

- A. Analyze the value of losses and corrective measures
- B. Evaluate potential corrective measures
- C. Update the audit
- D. Update the master plan

The Audit:



**Adapted from AWWA Manual M36*

A water audit generally involves gathering information from the water supplier’s own records of production and account billings. Some of this information does “double-duty” in meeting other requirements of a WMCP. For example, production data is required to meet state requirements on water use measurement and reporting under OAR 690-85 (see “[Water Use Measurement / Reporting Program](#)” on pg. 56). Billing data on customer usage is needed to prepare the water supplier description for a WMCP (see “[Customers Served and Water Use Summary](#)” on pg. 41). Documentation on the supplier’s program for testing source meters is required. Usually, some additional information will also be needed for a comprehensive audit.

In any water system, there will be a difference between water produced and water sold to customers. Almost universally, more water is produced than sold. Reasons for or causes of this difference may include:

- Meter inaccuracy, both source and customer meters;
- Authorized uses that are not metered or billed (e.g., *flushing mains to maintain water quality, fire-fighting, using hydrants for street cleaning and construction sites, policies allowing certain uses associated with the supplier or local government to go unbilled, etc.*);
- Evaporation from open reservoirs;
- Water loss from storage tank overflow events;
- Unauthorized uses of water;
- Leakage from transmission lines;
- Leakage from water mains and other components of the distribution system; and/or
- Other conditions.

An audit provides a technique for the water supplier to fully itemize the reasons causing the difference, and either measure or estimate the amount of water for each item. “[Exhibit 3.1 – Basic Steps in Conducting a Water Audit](#)” (pg. 58) summarizes this process. Units of measurement must be consistent and must be applied to the same time period for all components of water use or loss. Typically, this period of time is an entire year. One result of the water audit will be the estimated amount of leakage experienced by the water supplier. This information should be reported in the WMCP. Where the audit indicates leakage is greater than 10 percent, OAR 690-086-150(4)(e) requires that the water supplier develop and carry out a leak detection program. The audit results will also be used in regards to the leak repair and line replacement program required of some water suppliers under OAR 690-086-0150(5) and OAR 690-086-0150(6)(a).



OAR 690-086 does not specify the calculation for determining the percent of leakage in a system. It is suggested that the leakage be calculated as a percentage of total source production, on an annual basis. Total source production is the sum of all water produced from all water sources, including any water purchased.

Five-Year Benchmark/Implementation Schedule: Water suppliers that do not currently perform an annual water audit must propose a schedule for implementing and carrying out this item, with benchmarks to indicate a date (*within the next five years*) by which the supplier will begin auditing water use.

Full Metering of System

OAR 690-086-0150(4)(b)

OAR 690-86 requires that all water suppliers with a system that is not fully metered must propose a program to fully meter their system within five years after approval of the WMCP. The program must start immediately after approval of the WMCP and must state the number of meters to be installed each year. Full metering means that all sources of water are metered and all customer connections are metered.

Source meters may include meters on a well, a surface water diversion, or an interconnection that delivers water from an adjacent water supplier’s system. Customer meters or “service meters” are meters that measure water delivered to a single customer, such as a home, apartment complex, office building, commercial business such as a supermarket, an industrial facility, or any other water customer. Deliveries of water to wholesale customers, such as another community that purchases water, must also be metered.

Many water suppliers in the state of Oregon already have a fully metered system. For these suppliers, the WMCP needs to simply indicate that all sources of supply are metered and that all customers are metered.

Other suppliers have not yet accomplished full metering of their water sources and/or customers. These suppliers must include a strategy in their WMCP for full metering of their water system within five years. In developing this strategy, the supplier will likely want to consider issues such as:

- The number of meters that need to be installed;
- The available technologies for metering;
- Appropriate sizing of meters to optimize accuracy, including consideration of accuracy at variable flow rates;
- The operational aspects of metering, including any necessary changes to billing practices;
- Capital cost of meters and any upgrades needed for the billing system;
- Operational costs of reading meters and entering data, including effects on the billing system; and
- Any issues and timing considerations involved in changing from an unmetered system to a metered system.

Five-Year Benchmark/Implementation Schedule: Water suppliers that do not currently have a fully metered system are required to propose a schedule for implementing and carrying out this item, with benchmarks to indicate a date (*within the next five years*) by which the supplier’s system will be fully metered.

As discussed above, OAR 690-086-0150(4)(b) requires the supplier to achieve full metering within five years of WMCP approval. However, it should be noted that under OAR 690-086-0900(2), the rules allow OWRD some discretion to allow extra time. In order to obtain extra time, the water supplier must show it is necessary “to avoid unreasonable and excessive costs.”

AWWA publishes Manual M6 titled, “*Water Meters – Selection, Installation, Testing and Maintenance (2012)*.” This manual can be helpful in determining how best to comply with the requirement under OAR 690-086 for a fully metered system.

Meter Testing and Maintenance Program *OAR 690-086-0150(4)(c)*

Under OAR 690-86, water suppliers are required to review and consider the adequacy of their program for testing and maintaining water meters. The specifics of such a program will depend upon the size, capabilities and need of the supplier.

In the context of the water supply industry, meter calibration and maintenance generally focuses on source meters that measure production from a well, diversions from a surface water source, production flows from a treatment plant, flows from a wholesale supplier, or similar data. At a minimum, water suppliers should document their approach to maintaining and calibrating meters to ensure they provide data within reasonable limits of accuracy. If the supplier plans to upgrade or replace meters in the future, this should be discussed.

Customer meters are another source of data for purposes of documenting demand, assessing effects of water conservation actions, and performing water audits at the system level. If a water supplier has already developed a program to strategically test and calibrate meters for large customers, this should be documented. It is also suggested that water suppliers provide information on the ages of their customer meters (e.g., *in five year blocks*) and available information on failure rates based on customer complaints or meter reading data. The supplier should also describe any programs or schedules to systematically replace or upgrade customer meters, if applicable. Suppliers who anticipate a complete replacement of customer meters to incorporate new technology or to improve overall performance should provide information on their plans and anticipated schedule (i.e., *meter technology selected, number of meters to be replaced annually, etc.*).

Five-Year Benchmark/Implementation Schedule: Water suppliers that do not currently have a meter testing and maintenance program in place are required to propose a schedule for implementing and carrying out this item, with benchmarks to indicate a date (*within the next five years*) by which such a program will be put into effect.

Rate Structure

OAR 690-086-0150(4)(d)

OAR 690-86 requires any water supplier submitting a WMCP to put in place a rate structure in which customer bills are based, at least in part, on the quantity of water metered at the service connection.

The price of water is becoming more important not only because it generates the funds needed to pay utility bills, but also because it can shape the way water is used by customers. Prices that do not fully reflect the cost of treating and delivering water can lead to excess levels of water use. Prices that more fully reflect the cost of water will lead to more efficient use and provide a proper price signal.

Commodity rates: In general, the requirement under OAR 690-086-0150(4)(d) means that water suppliers may *not* use a “*flat rate*” in which the customer receives the same bill no matter how much water they use. Instead, a supplier must put in place a rate structure with at least part of the consumption billed using a “*commodity rate*.” A commodity rate involves charging the customer based on the number of units of water consumed (e.g., *gallons or cubic feet*).

Base rates (fixed charges): A contemporary rate structure is typically composed of both a commodity rate, as described above and a fixed charge. A base rate fee or fixed charge is the same for each bill regardless of the amount of water use. A water supplier or water utility has costs on the system that do not relate to the amount of water used. The base rate or fixed charge is in place to cover these costs, such as meter reading, billing, and other costs incurred per customer or per account. The base rate fee is usually expressed as either a fixed service/customer charge or a fixed meter charge.

- The service/customer charge is typically the same for all customers and expressed as **\$/customer/month**.
- The meter charge is a fixed fee that increases with the meter size. This charge is generally expressed in **\$/size meter/month**.

Some typical rate structures that meet this rule requirement include: a uniform charge, a declining block charge and an inclining block charge. Each of these water use charge rate structures is discussed in greater detail below and is illustrated in “[Exhibit 3.2 – Variable Charge Rate Structures](#)” (pg. 62).

Under a **uniform rate structure**, the cost per unit does not change with consumption, though the more water used, the higher the total bill. From the perspective of customer understanding and rate administration/ billing, this is a simple and straightforward approach.

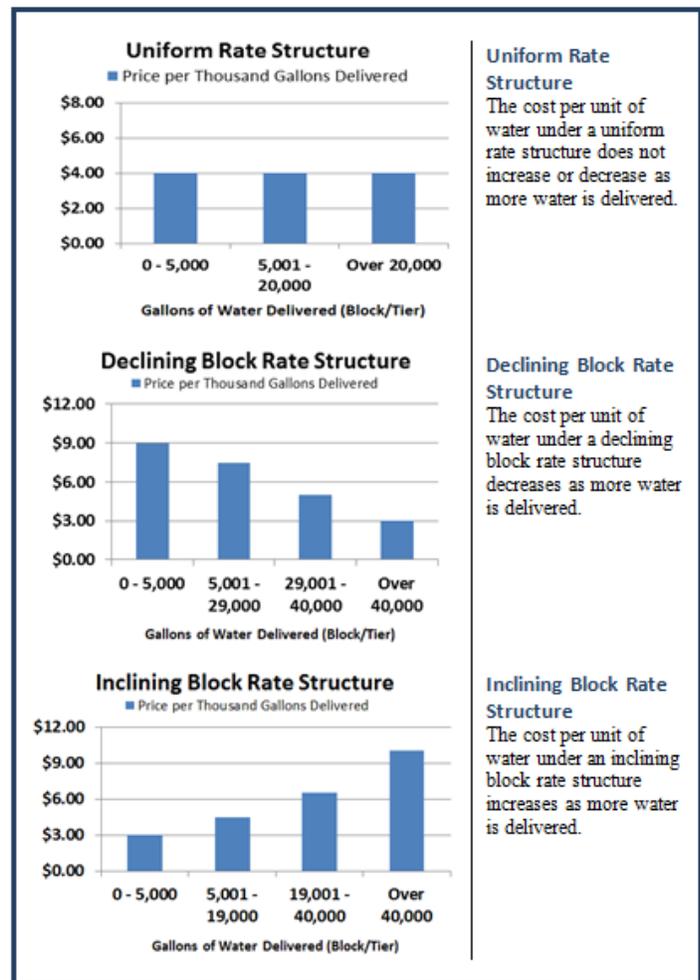
The **declining block rate structure** is a bit more complex since the size of the rate blocks may vary. However, the number of blocks should be practical (*i.e.*, 2 to 4 blocks) for reasons of simplicity of administration. For some water utilities, declining block rates may imply there are economies of scale with additional consumption, such as reduced distribution system costs, but not necessarily a “volume discount” for customers using large volumes of water. Depending upon the utility, this may or may not be a true statement. Adequate rationale for the use of a declining block rate structure needs to be given in the WMCP.

An **inclining block rate structure** attempts to send a price signal to consumers that their consumption costs more, as more water is consumed. This may or may not be the proper price signal regarding the utility’s water resource costs. As with the declining block rate structure, the number and size of each block may vary, but should be reasonable for purposes of customer understanding and rate administration.

The overall goal of a rate structure would be to collect the amount of revenue needed to cover utility costs, in addition to having a commodity charge that allows the customer the ability to control at least a portion of their bill through changing their water use.

For purposes of conservation, it should be noted that the inclining block rate structure is the most desirable. However, all three rate structures listed above meet the basic requirement in OAR 690-86-0150(4)(d). There are other rate structures (*i.e.*, *seasonally-adjusted or summer rates and drought rates*) that meet this basic requirement, as well as the enhanced requirements under OAR 690-086-0150(6)(d). These other rate structures are discussed in further detail under “[Rate Structure/Billing Practices for Conservation](#)” (pg. 74).

Exhibit 3.2 – Variable Charge Rate Structures



AWWA Manual M1 titled, “*Principles of Water Rates, Fees and Charges (2012)*,” offers guidance on many aspects of rates for water utilities, including the rate structures listed above. In many cases, considerable expertise may be needed to put in place an effective rate structure that meets all the financial needs of the water system while sending an appropriate price signal to customers regarding their water use.

Five-Year Benchmark/Implementation Schedule: As with the other conservation actions discussed in this chapter, water suppliers that do not currently have a variable charge rate structure (*i.e., a rate structure in which customer bills are based, at least in part, on the quantity of water metered at the service connection*) are required to propose a schedule for implementing and carrying out this item, with benchmarks to indicate a date (*within the next five years*) by which the appropriate rate structure will be put into effect.

Setting rates is a critical decision in water system management because revenues must be adequate to meet costs, including operations and maintenance costs and debt service on capital facilities. At the same time, rates are sometimes used to achieve important policy goals, such as allowing low-income or fixed-income customers to have access to water to meet basic needs at a relatively low cost. In changing from one rate structure to a new rate structure, water suppliers must take many factors into account, such as revenue stability, customer financial impact, effect on customer water use, and the management policy of the utility, to name a few. Sound analysis is needed to ensure a new rate structure strikes the appropriate balance between the fixed charge/base fee and commodity rates, as well as among different “blocks” of a block rate structure.

□ Leak Detection Program

OAR 690-086-0150(4)(e)

OAR 690-86 requires any water supplier with leakage greater than 10 percent to put in place a leak detection program.

The rules indicate that this program:

- Must be “regularly scheduled and systematic;”
- Must address the distribution system as well as the water transmission system (*e.g., conduits, pipelines, and/or canals that convey water from the point of diversion at the supplier’s source to its distribution system*); and
- May utilize methods and technology appropriate to the supplier’s size and capabilities.

The leak detection program discussed here applies solely to the water supplier’s own facilities. Leakage in an individual customer’s water pipes or equipment is a different issue. Since customer leakage is recorded as water sold to the customer, it will show up as metered demand. Fixing leaks on the customer side of the meter is not a requirement but a supplier may wish to address this issue through public information and technical assistance programs.

AWWA Manual M36, titled “*Water Audits and Loss Control (2009)*,” provides guidance on leak detection. Detecting and repairing leaks can save significant volumes of water, thereby reducing pumping and/or treatment costs to the water supplier. Visible leaks can be identified through diligent attention by meter readers and work crews. Fire hydrants can be a source of leaks and should be periodically checked to see if repairs or adjustments are needed.

Water mains, and associated fittings and valves may also leak. Service lines leading from the water main to the customer meter can also leak. Sometimes these leaks become visually apparent at the surface. However, many leaks can continue for months or years without being noticed. Specialized equipment and techniques are needed to identify hidden leaks, and many vendors perform this service. Some larger utilities purchase leak detection equipment and train their own staff in leak detection techniques.

What if leakage exceeds 10 percent?

Those suppliers *exceeding* the 10 percent threshold must describe their leak detection program in the WMCP. Suggested elements to include in this description are:

- A list of leaks identified and repaired in the past several years, and/or estimate the number of leaks reported per year. Provide any available information on the cause of those leaks;
- A description of other potential causes of leakage, either known or suspected;
- Considerations such as age or piping materials that may help target parts of the water system most susceptible to deterioration;
- A brief listing of pipe ages by decade, if this information is available and useful for describing the leak detection program;
- A description of any leak detection activities performed in the past 10 years, (or longer if this information is useful) the findings, and actions taken to repair leaks or replace deteriorating lines;
- Information on the supplier's planned approach to perform leak detection on a regular and systematic basis. The supplier may wish to indicate the number of linear feet to be tested in each year, broken down by pipe size, material, or location. Leak detection methods need to be briefly described; and
- Steps to be taken in the event significant leakage is detected.

Five-Year Benchmark/Implementation Schedule: As with the other conservation actions discussed in this chapter, water suppliers that exceed the 10 percent leakage threshold but do not currently have a systematic and regularly scheduled program to detect leaks in the transmission and distribution system must propose a schedule for implementing and carrying out this item. The implementation schedule must include benchmarks to indicate a date (*within the next five years*) by which such a program will be put into effect.

Examples of benchmarks for this activity could include the dates by which certain milestones will be met, such as a number of linear feet of main or transmission line to be surveyed for leaks; or a percentage of the piping in the distribution system to be surveyed.

Public Education Program

OAR 690-086-01509(4)(f)

OAR 690-86 requires all water suppliers submitting a WMCP to have a public education program to encourage efficient water use, including low water use landscaping. The program must include regular communication with customers, to provide information on the supplier's water conservation activities and schedule.

Many utilities across the country have gained experience with public education programs promoting water conservation over the past 20 years. These programs can be coupled with similar programs involving solid waste and recycling, storm water management, and other municipal programs where appropriate. A range of activities can be considered, including:

- Distribution of simple brochures and information that provide tips for water savings. These can either be included in customer bills, sent in separate mailings, included on the supplier's website, or made available at locations such as the water supplier's headquarters, City Hall or other local government centers, public libraries or other distribution points;
- Development of a portable or fixed display to be set up at community events, county fairs, public library, schools, or other public buildings;

- Provision of standardized water conservation educational materials and/or water saving products, in partnership with private sector partners such as restaurants, hotels, lawn and garden centers, or home improvement stores;
- Establishing a “Speakers Bureau” providing speakers to give presentations at civic organizations, chambers of commerce, or other venues;
- Use of newsletters or press releases to publicize key programs, unique customer achievements, or other information that promotes awareness of water conservation;
- Presentations or use of standard curriculum in local schools, to promote awareness among school children and by extension, their families;
- Distribution of certain devices that have a public awareness value in addition to a direct impact on water use (e.g., *rain gauges, rain barrels, yard signs for dormant lawns, decals/bumper stickers, etc.*); and/or
- Advertising campaigns using billboards, buses, radio, or television.



Many public outreach activities lend themselves to collaborative approaches with other water suppliers that can greatly reduce the cost and staff time needed for carrying out a public education program.

Many water conservation brochures, educational curriculum materials, and other information items have been developed in standard formats that can be used by any water system. The Pacific Northwest Section of the AWWA has a standing Water Conservation Committee that can provide information on accessing these types of products.

Water suppliers in different regions of the state may find it beneficial to pool resources to purchase materials, share staff, or collaborate in other ways to meet this requirement at an affordable cost. Further, many suppliers find it beneficial to “pilot” conservation measures and evaluate their effectiveness and efficiency before a full measure is implemented.

Few, if any, water suppliers would carry out all of these activities. The public education program may be very different from one supplier to another. The “right” program will depend on the size and staff resources of the water supplier, the impact on its annual budget, the region of the state, limitations on the water source, and characteristics of the customer base in that community. In the WMCP, it is recommended that the water supplier describe their existing and proposed public information program, and explain why this program is appropriate given their community’s particular needs and circumstances.

Five-Year Benchmark/Implementation Schedule: As with the other conservation actions discussed in this chapter, water suppliers that do not currently have a public education program for conserving water must propose a schedule for implementing and carrying out this item, with benchmarks to indicate a date (*within the next five years*) by which the public education program will be implemented.

Other Implemented Conservation Measures **OAR 690-086-0150(3)**

The water supplier must describe any other currently implemented conservation actions, as well as a description of any conservation actions required under the terms of any contract to purchase water from another supplier, if applicable. Providing this information will help OWRD evaluate the water supplier’s overall water conservation program, including areas where the supplier is doing more than is required under law.

If no other conservation measures are currently implemented by the supplier, this fact needs to be clearly stated in the WMCP.

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Enhanced Conservation Measures under OAR 690-086-0150(5)

Which Suppliers are Required to Address OAR 690-086-0150(5)?

Under OAR 690-086-0150(5), water suppliers with system leakage exceeding 15 percent and proposing to expand or initiate the diversion of water under an extended permit for which environmental resource issues have been identified under OAR 690-086-0140(5)(i)³, are required to describe the specific activities, along with a schedule that establishes five-year benchmarks, for implementation of a system-wide leak repair or line replacement program to reduce system leakage to no more than 15 percent.⁴

Suppliers that currently do **not** exceed the 15 percent water loss threshold are **not** subject to this rule requirement. These suppliers must provide sufficient information in the WMCP to demonstrate that their system leakage does not exceed 15 percent.

NOTE: This section **does not** apply if no initial diversion or expanded diversion of water is being proposed under an extended permit for which environmental resource issues have been identified under OAR 690-086-0140(5)(i).

For additional guidance on determining whether this rule applies to you, see “[Exhibit 3.3 - Are Enhanced Conservation Measures under OAR 690-086-0150\(5\) Required?](#)” (pg. 69).

A more detailed discussion of enhanced conservation measures required under OAR 690-086-0150(5) is provided below.

Program to Reduce System Leakage to 15% OAR 690-086-0150(5)

OAR 690-086 requires a system-wide leak repair or line replacement program for water suppliers who are proposing to expand or initiate the diversion of water under an extended permit for which environmental resource issues (*i.e.*, sensitive, threatened or endangered species, water quality limited waters, or critical ground water areas) have been identified under OAR 690-086-0140(5)(i).

The amount of system leakage or water loss can be determined through the water audit process described previously in this guidebook (see “[Annual Water Audit](#)” on pg. 57). Suppliers subject to this rule requirement must implement measures to reduce system leakage to *no more than* 15 percent.

Leak Repair Program: Once leaks have been detected the water supplier will need to determine when they should be repaired. Obviously, many leaks should be repaired as soon as possible to reduce losses from the system and avoid damage to property and facilities. However, in some cases, cost-benefit considerations may indicate that repairs should be deferred. This is particularly true where damage to other facilities such as fiber-optic lines could occur, where lines underlie roadways causing higher restoration costs, or where line repair could divert staff time and financial resources that would be better spent on other conservation activities. A water supplier can also indicate the schedule of upcoming activities to replace water mains throughout the system, if they have plans for this type of replacement.

³ Water resource issues are environmental concerns associated with water source(s) that may include the presence of ST&E listed streamflow-dependent species, surface water quality impairment, and/or a critical ground water area designation.

⁴ Note that, in some cases (*but not all*), expanded or initial diversion of water under an extended permit for which environmental resource issues have been identified under OAR 690-086-0140(5)(i) may involve requests to access Greenlight Water. See “[Extended Permits and Greenlight Water](#)” (pg. 17) in Chapter 1 for more information.

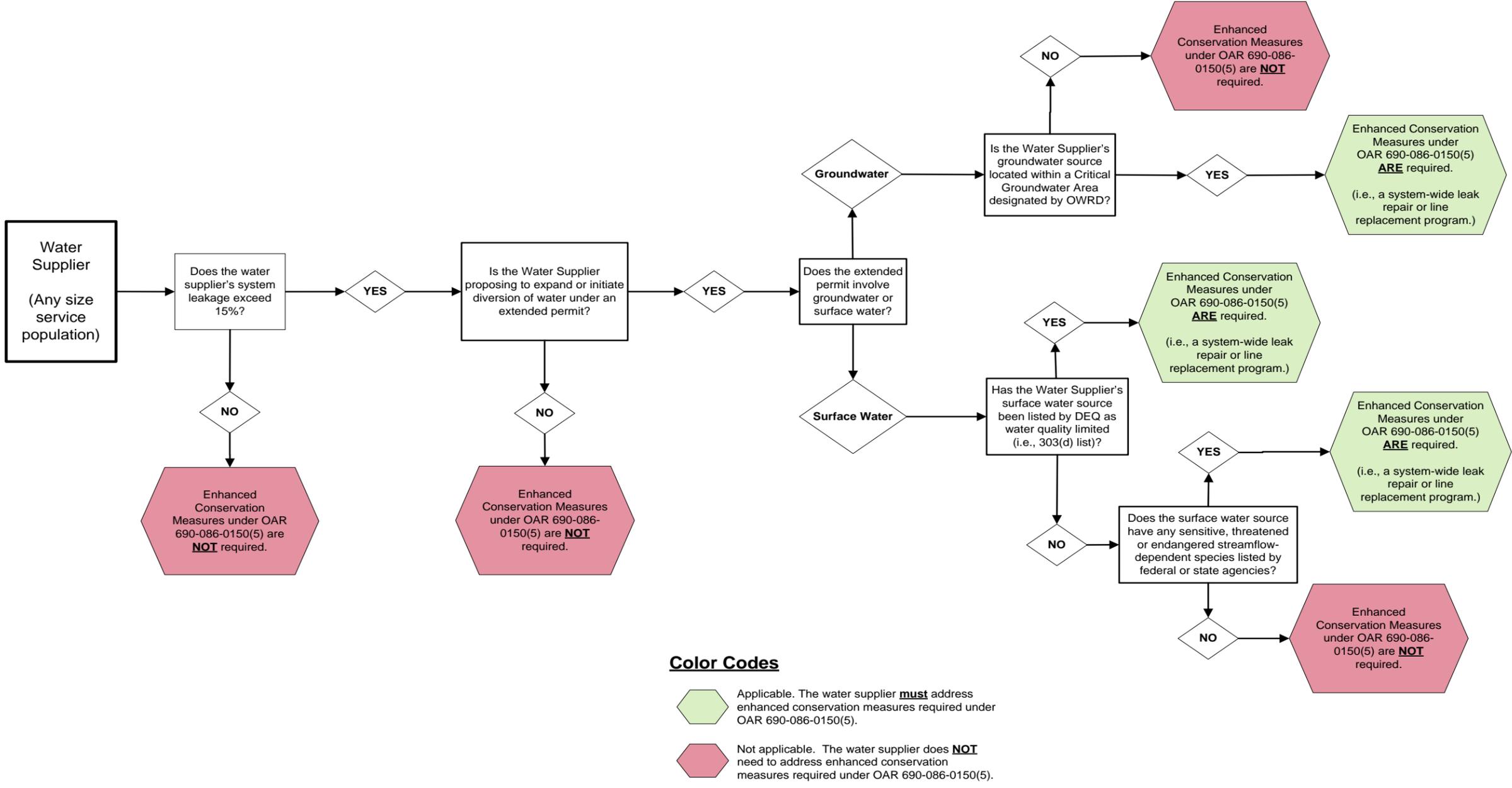
In the WMCP, the water supplier should explain how decisions will be made to repair leaks and how costs and other factors will be considered. For example, a supplier could identify a certain magnitude of leakage in gallons per minute that would dictate an immediate response, compared with smaller leaks where discretion would be applied.

Line Replacement Program: Line replacement can be most effective if it is planned and budgeted well in advance. Age, materials, history of leakage, etc. should be given careful consideration to determine which lines should be replaced and when. Line replacement includes not only water mains, but also service lines and fittings leading to customer meters which can be a significant source of leakage.

In the WMCP, water suppliers should explain what portions of their system will be replaced and when. The supplier should also explain what factors were used to select lines for replacement and develop a schedule of program implementation. If cost is a significant factor that will limit the supplier's ability to replace water lines, the WMCP should clearly document the estimated cost for different amounts of line replacement. The WMCP should clearly explain why this cost indicates that a more extensive line replacement program would not be feasible or appropriate. The supplier may wish to provide comparisons with the costs of other types of conservation activities, the supplier's annual operations budget, and/or important capital projects needed to meet other key objectives, such as water quality or compliance with regulatory requirements. Where the cost of line replacement is compared with the cost of alternative conservation actions, it may be helpful to state the cost per unit of water saved.

Five-Year Benchmark/Implementation Schedule: As with the other conservation actions discussed in this chapter, water suppliers that exceed the 15 percent leakage threshold but do not currently have a system-wide leak repair or line replacement program to reduce system leakage to 15 percent are required to propose a schedule for implementing and carrying out this item. The proposed schedule must include benchmarks to indicate a date (*within the next five years*) by which such a program will be put into effect.

EXHIBIT 3.3 – Are Enhanced Conservation Measures under OAR 690-086-0150(5) Required?



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Enhanced Conservation Measures under OAR 690-086-0150(6)

Which Suppliers are Required to Address OAR 690-086-0150(6)?

Implementation of enhanced conservation measures under OAR 690-086-0150(6) must be evaluated and considered if the following criteria apply:

- The water supplier serves a population greater than 1,000 **and** proposes to expand or initiate the diversion of water under an extended permit for which environmental resource issues⁵ have been identified under OAR 690-086-0140(5)(i)⁶;

OR

- The water supplier serves a population greater than 7,500.

NOTE: If the above criteria are *not* applicable to you, then OAR 690-086-0150(6) does *not* apply and you may skip ahead to “[Resources for the Water Conservation Element](#)” (pg. 81).

For additional guidance on determining whether this rule applies to you, see “[Exhibit 3.7 - Are Enhanced Conservation Measures under OAR 690-086-0150\(6\) Required?](#)” (pg. 79).

Evaluating Enhanced Conservation Measures under OAR 690-086-0150(6)

For those select water suppliers that must evaluate and consider implementation of these enhanced conservation measures, OAR 690-86 does not require implementation if the water supplier demonstrates the measure(s) are neither feasible nor appropriate to ensure efficient use of water and the prevention of waste.⁷ See OAR 690-86-0130(4)(b) and OAR 690-86-0150(6).

For any enhanced conservation measures found to be infeasible or inappropriate, the supplier must provide documentation of this finding, and must show they used a suitable methodology to evaluate these activities.

There are many different approaches to evaluating water conservation measures. The key for a WMCP is that a water supplier must show they have systematically analyzed any activities they do not plan to implement. For example, considerations in this review may include:

- Type of customers in the supplier’s service area and the applicability of a water conservation activity to those customers;
- Cost of the measure, in comparison with costs of other water conservation activities, costs of other source alternatives, and overall costs of the water supplier (*e.g. annual operations and maintenance budget, per unit cost of other capital projects, etc.*);
- Effectiveness of a given conservation action to meet a community’s needs, in comparison with the other conservation actions and water supply sources considered in the WMCP. The WMCP can compare measures and may demonstrate that some measures perform better than others;

⁵ Water resource issues are environmental concerns associated with water source(s) that may include the presence of ST&E listed streamflow-dependent species, surface water quality impairment, and/or a critical ground water area designation.

⁶ Note that, in some cases (*but not all*), expanded or initial diversion of water under an extended permit for which environmental resource issues have been identified under OAR 690-086-0140(5)(i) may involve requests to access Greenlight Water. See “[Extended Permits and Greenlight Water](#)” (pg. 17) in Chapter 1 for more information.

⁷ “Waste” is defined in OAR 690-400-0010(16). Water need is based on efficient water use considering: economic feasibility; environmental impacts of making modifications; available technology; and other considerations. See OAR 690-086-0020(6).

- Impact on revenues. If a water supplier believes that a given measure will reduce revenues and cause significant financial problems, this needs to be explained. However, it is important to note that conservation activities and water rates can be managed jointly to overcome this issue and there are many examples of water suppliers implementing water conservation without undermining financial performance;
- Staff resources and operational capacity to provide the activity. For example, if a water system’s billing system cannot generate bills that compare current water use to past water use for each customer, then the water supplier may find this type of measure is not feasible, at least for the present time;
- Amount of water savings that could be expected from a specific activity. If the water supplier finds that an activity will not produce significant water savings, it needs to be documented and explained. However, it is recognized that water savings may be difficult or impossible to estimate for some types of conservation activities (*e.g., public education*);
- Community acceptance. In some communities, customers may be reluctant or unwilling to undertake some types of conservation activities. Where this is the case, the water supplier must document and explain the situation; and/or
- Results of studies measuring the effectiveness and/or efficiency of a conservation measure, including comparison of effectiveness compared with other conservation measures to be implemented.

For any of the items listed above, or other obstacles that water suppliers identify and document, the water supplier must look ahead and indicate whether these obstacles can be addressed and eliminated over time. This is where the benchmark concept can be especially useful. A water supplier needs to explain how progress could be made on these issues between submittal of the WMCP, submittal of the next progress report (*generally five years*) and submittal of the next WMCP update (*generally within ten years*).

Further information on evaluation techniques is provided in reference sources identified throughout the remainder of Chapter 3 and in [Appendix M](#).

For those water suppliers required to evaluate and consider implementation of enhanced conservation measures under OAR 690-086-0150(6)(a)-(f), each of the conservation measures are described in more detail below.

Program to Reduce System Leakage to 10% OAR 690-086-0150(6)(a)

Based on the criteria outlined under “[Which Suppliers are Required to Address OAR 690-086-0150\(6\)?](#)” (pg. 71), OAR 690-86 requires select water suppliers to evaluate and consider implementing a system-wide leak repair or line replacement program to reduce system leakage to 15 percent and, if the reduction of system leakage to 15 percent is found to be feasible and appropriate, to reduce system leakage to 10 percent.

Please refer to the previous discussion under “[Program to Reduce System Leakage to 15%](#)” (pg. 67) related to OAR 690-086-0150(5) for descriptions of different Leak Repair and Line Replacement Programs.

Five-Year Benchmark/Implementation Schedule:

For those that must evaluate this conservation measure and find it to be feasible and appropriate, the water supplier must describe the specific activities, along with a schedule that establishes five-year benchmarks, for implementation of a system-wide leak repair or line replacement program (*if not already implemented*).

Conversely, if the evaluation reveals implementation is *neither feasible nor appropriate*, the water supplier must provide documentation in the WMCP to justify their decision not to implement the measure.

□ Technical and Financial Assistance Programs *OAR 690-086-0150(6)(b)*

Based on the criteria outlined under “[Which Suppliers are Required to Address OAR 690-086-0150\(6\)?](#)” (pg. 71), OAR 690-086 requires select water suppliers to evaluate and consider implementing programs to offer technical and financial assistance to encourage and aid its residential, commercial and industrial customers in implementation of conservation measures.

Technical and financial assistance programs include activities such as:

- Rebate programs, where the cost of purchasing water-efficient fixtures or equipment can be partially offset;
- Cost-share programs where the cost of a customer’s water conservation measures will be paid, in whole or in part, by the water supplier;
- Water audits offered to some individual customers to assess their water uses and opportunities for water savings;
- Providing training opportunities for customers to learn about specific types of water saving equipment or actions. These may be targeted towards specific groups such as homeowners, apartment managers, building maintenance staff, or grounds maintenance staff;
- Providing training opportunities to businesses that provide goods or services to a water supplier’s customers. This could include landscaping businesses, construction contractors, air conditioning contractors, building centers, and lawn and garden centers;
- Technical and financial assistance to local parks and golf courses to improve control systems; and/or
- Public information items that provide technical information to assist customers in saving water. See also the discussion under “[Public Education Program](#)” (pg. 64).

The number and type of activities to be carried out will naturally vary from one water supplier to another. Some water suppliers serving a smaller population or having limited resources are likely to propose only limited activity in this category. Other water suppliers, with large and diverse service areas, may identify a wide range of technical and financial assistance programs for different groups of customers.

[Appendix L](#) lists a wide range of water conservation measures that may be addressed through technical and financial assistance programs. In general, only a small number of these measures may apply to the smallest water systems; while many of the measures listed in the Appendix L could apply to systems in a large metropolitan setting.

Five-Year Benchmark/Implementation Schedule:

For those water suppliers that must evaluate this conservation measure and find that it is feasible and appropriate, the water supplier must describe the specific activities, along with a schedule that establishes five-year benchmarks, for implementation of technical and financial assistance programs (*if not already implemented*).

Conversely, if the evaluation reveals implementation is *neither feasible nor appropriate*, the water supplier must provide documentation in the WMCP to justify its decision not to implement the measure.

□ Retrofit/Replacement of Inefficient Fixtures *OAR 690-086-510(6)(c)*

In the past 20 years, there have been many improvements in the efficiency of plumbing fixtures and water using equipment. Water suppliers can reduce demand by either providing some type(s) of efficient water using equipment to customers, or providing financial incentives for customers to invest in water-efficient products.

Based on the criteria outlined under “[Which Suppliers are Required to Address OAR 690-086-0150\(6\)?](#)” (pg. 71), OAR 690-086 requires select water suppliers to evaluate and consider implementing programs for the retrofit or replacement of inefficient water using fixtures.

This activity may include:

- Distribution of water conservation kits containing items such as low-flow showerheads, toilet leak detection and repair materials, toilet tank displacement bags, and faucet aerators;
- Rebates for purchase of water efficient toilets and washing machines; and/or
- Rebates for purchase of more specialized equipment such as air-cooled ice machines in hotels and restaurants; single-pass cooling equipment in buildings; and various types of water-using equipment in industrial facilities.

As with other activities listed in this section, the extent of retrofits and replacements will vary from one water supplier to another. In some areas, these retrofits and replacements may have already been accomplished. Some types of water conservation devices (*e.g. showerheads*), may have been distributed by power companies to improve energy efficiency associated with hot water. In communities that have seen rapid growth in recent years, many modern homes and businesses may already have water-efficient toilets and other fixtures. The need and applicability of retrofits should be assessed by the water supplier, and selection of activities should be documented in the WMCP.

Five-Year Benchmark/Implementation Schedule:

For those that must evaluate this conservation measure and find that it is feasible and appropriate, the water supplier must describe the specific activities, along with a schedule that establishes five-year benchmarks, for implementation of a fixture retrofit/replacement program (*if not already implemented*).

Conversely, if the evaluation reveals implementation is *neither feasible nor appropriate*, the water supplier must provide documentation in the WMCP to justify their decision not to implement the measure.

□ Rate Structure/Billing Practices for Conservation *OAR 690-086-0150(6)(d)*

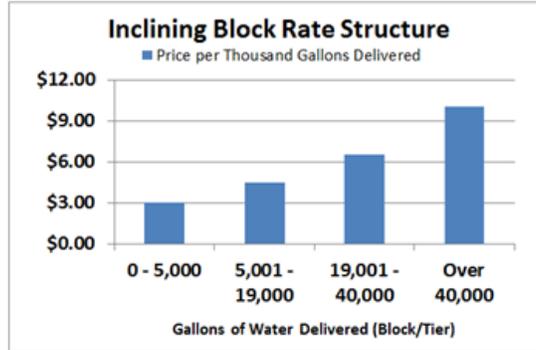
Based on the criteria outlined under “[Which Suppliers are Required to Address OAR 690-086-0150\(6\)?](#)” (pg. 71), OAR 690-086 requires select water suppliers to evaluate and consider adopting rate structures, billing schedules and other associated programs that support and encourage water conservation.

In general, discussion of the following types of activities can be used to demonstrate compliance with this requirement:

Rate structures that support and encourage water conservation –

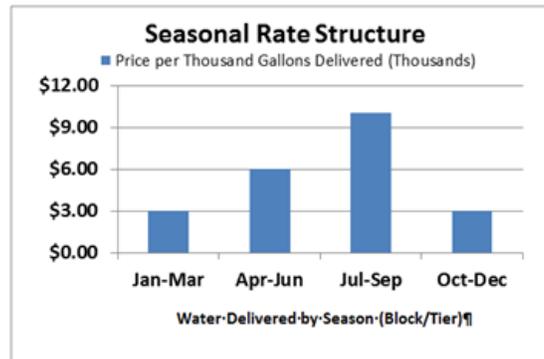
- **Inclining Block Rate Structure:** Base fee and commodity charge using increasing block-rate (the per-unit charge increases as metered consumption passes one or more thresholds – also known as “inverted block” rates);

Exhibit 3.4



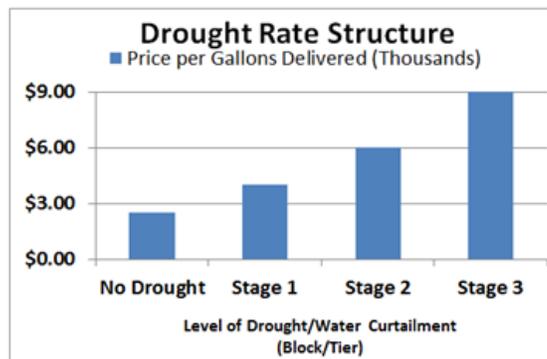
- **Seasonal Rate Structure:** Base fee and commodity charge using a seasonal differential that charges more per unit of water consumed in the dry season (on-peak), compared with the wet season (off-peak), to encourage conservation during peak use periods;

Exhibit 3.5



- **Drought Rate Structure:** Base fee and commodity charge similar to seasonal rates, but instead of applying higher rates during an entire season, the supplier will adjust rates based on the local area’s level of drought. Higher levels of drought result in higher prices for water in order to encourage conservation;

Exhibit 3.6



- **Uniform rate structure:** A uniform rate that utilizes a commodity charge, **only if** this represents a change for the supplier from a flat rate that did not utilize a commodity charge; or
- **Other rate structures,** if the water supplier can demonstrate they meet the requirement for encouraging water conservation.

As noted previously in the “[Helpful Tip](#)” on page 62, AWWA Manual M1, “*Principles of Water Rates, Fees and Charges (2012)*” provides general guidance on these types of rate structures, as well as information on other aspects of setting rates for water utilities. Additionally, the U.S. EPA’s WaterSense program has a web page that describes a wide variety of rate structures that may be used by water utilities. The web page outlining these different billing structures can be accessed at http://www.epa.gov/watersense/our_water/understanding_your_bill.html#seasonal.

Billing Practices –

- Meter reading and billing of customers on a monthly or bi-monthly basis, so that customers receive bills relatively close to the time the water was used; thereby providing a prompt price signal.

Other Programs –

- Information included with each bill to show the customer how their current bill compares with their previous bills or with other customers served by the same water system (*e.g., a graph showing the customer’s previous monthly water usage*);
- Information included with each bill to show the customer how water savings could decrease the amount billed (including reduced sewer charges, if sewer charges are based on water consumption);
- Information included with each bill to show the customer techniques for reducing water use; or
- Other activities that inform customers of the financial benefits of reducing water use. For example, these activities could be part of a supplier’s public education and outreach program (see “[Public Education Program](#)” on pg. 64) as long as there is a clear link between the information provided and the customer’s understanding of financial benefits to them from reduced water use.

It should be noted that the first three items listed above require a fairly sophisticated computerized billing system. A basic billing system would not be able to handle these comparisons. A small utility may benefit more from customer education (*e.g., mailings, newsletters, and workshops*), instead of purchasing a new billing system.

It is also important to point out that in cases in which a utility needs to increase its rates regularly to pay for infrastructure improvements, customers may find that even though they are trying to reduce their bill through conservation, they are not saving any money. While the customer is using less water, the cost of that water is more expensive. Suppliers with this situation occurring should carefully consider the wording of any claims included in water bills related to conservation and financial benefit or savings to the consumer. It may be more appropriate to describe how conservation is a way for customers to control the extent of water bill increases.

Further, a water supplier may propose alternative rate structures, billing practices, and other programs different than those listed above. If alternative approaches are proposed, the water supplier should demonstrate in the WMCP that their approach meets the requirement to support and encourage conservation.

Five-Year Benchmark/Implementation Schedule:

For those that must evaluate this conservation measure, if the evaluation reveals an enhanced rate structure and billing practice program is feasible and appropriate for ensuring efficient use of water and prevention of waste, the water supplier must describe the specific activities, along with a schedule that establishes five-year benchmarks, for implementation of the conservation measure (*if not already implemented*).

Conversely, if the evaluation reveals implementation is *neither feasible nor appropriate*, the water supplier must provide documentation in the WMCP to justify their decision not to implement the measure.

Reuse, Recycling, Non-Potable Opportunities **OAR 690-086-0150(6)(e)**

Based on the criteria outlined under “[Which Suppliers are Required to Address OAR 690-086-0150\(6\)?](#)” (pg. 71), OAR 690-086 requires select water suppliers to evaluate and consider implementing programs to make use of water reuse, water recycling and non-potable water opportunities. Water suppliers must document they have considered whether and how reuse, recycling, and use of non-potable water could reduce the need for withdrawals or diversions of raw water.

Categories that may be included in this discussion include:

- Enhanced treatment of municipal wastewater to allow reuse for non-potable purposes. This may involve consideration of treatment plant upgrades, a separate piping system to deliver reclaimed water, pumping plants if needed, and a market for the reclaimed water. Reclaimed water is typically used for irrigation or industrial purposes. Careful coordination with municipal wastewater treatment authorities is needed to develop an effective project of this nature;
- Recycling of process water within a single industrial facility (or group of facilities); and/or
- Use of domestic “graywater” for onsite irrigation, flushing of toilets, or other non-potable uses, where laws permit such use.

These techniques may have less widespread applicability, compared with some of the other water conservation measures discussed in this guidebook. In discussing application of these techniques, the water supplier may wish to discuss factors such as the relative cost in comparison with other sources of supply, legal restrictions, environmental needs, the applicability of these measures to the specific customer base served by that supplier, and the likely acceptance of these approaches by customers and consumers.

Five-Year Benchmark/Implementation Schedule:

For those that must evaluate this conservation measure and find that it is feasible and appropriate, the water supplier must describe the specific activities, along with a schedule that establishes five-year benchmarks, for implementation of a reuse, recycling, and non-potable water program (*if not already implemented*).

Conversely, if the evaluation reveals implementation is *neither feasible nor appropriate*, the water supplier must provide documentation in the WMCP to justify their decision not to implement the measure.

Other Proposed Conservation Measures **OAR 690-086-0150(6)(f)**

In addition to the measures discussed above, OAR 690-086 requires select water suppliers (based on the criteria outlined under “[Which Suppliers are Required to Address OAR 690-086-0150\(6\)?](#)” on pg. 71) to evaluate and consider implementing any other conservation measures that would improve water use efficiency. Water suppliers must explain any additional water conservation activities they plan to carry out.

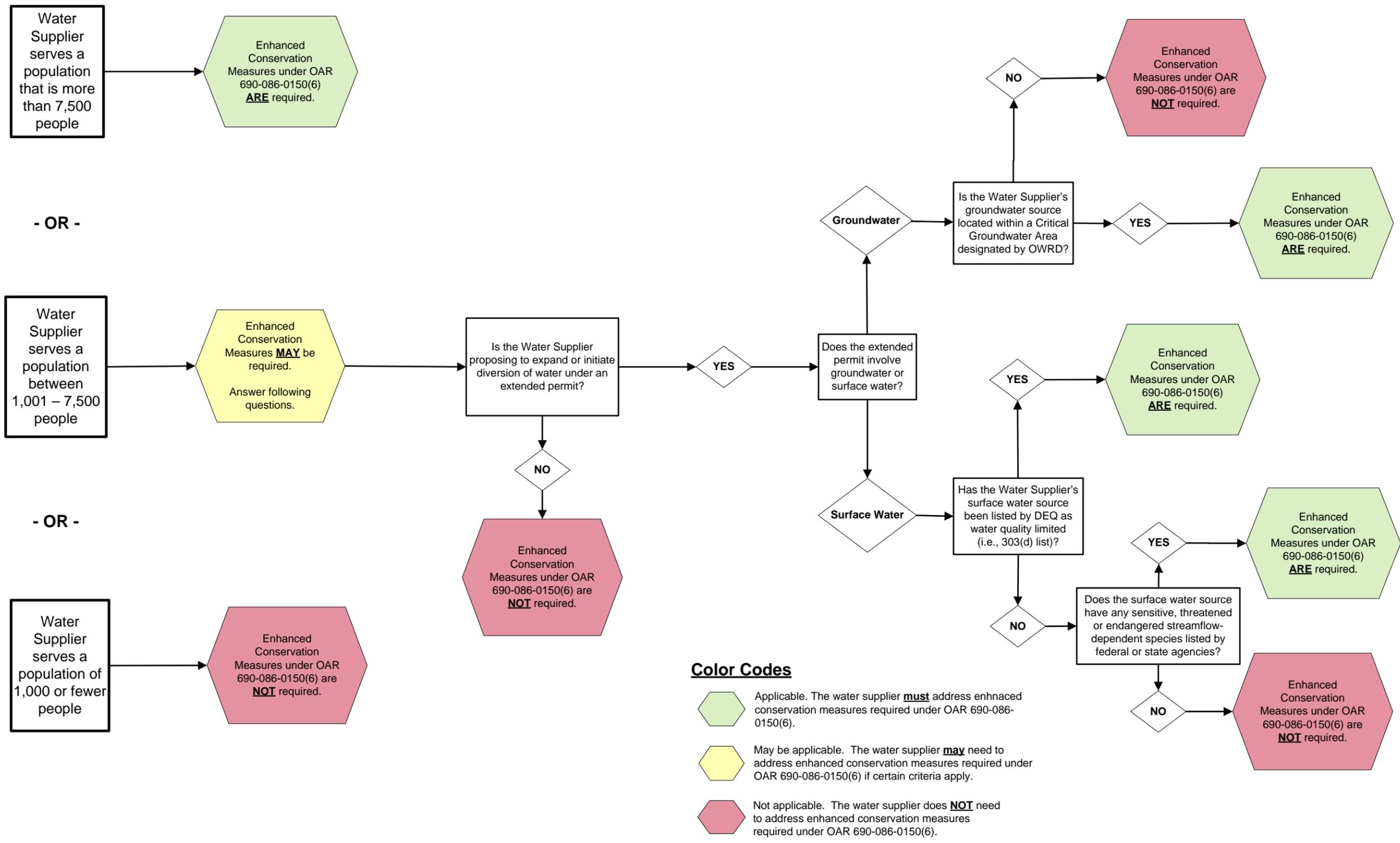
This item will be especially important if a water supplier finds that other conservation activities provide greater benefits or are more cost-effective than the conservation measures that must be evaluated and considered under OAR 690-086-0150(6). In this case, the water supplier must provide information showing these other proposed activities are an appropriate substitute.

Five-Year Benchmark/Implementation Schedule:

For those that find any other conservation measure to be feasible and appropriate, the water supplier must describe the specific activities, along with a schedule that establishes five-year benchmarks, for implementation of the measure (*if not already implemented*).

Conversely, if the evaluation does not reveal any other conservation measures that would be feasible or appropriate, the water supplier must clearly indicate so in the WMCP.

EXHIBIT 3.7 – Are Enhanced Conservation Measures under OAR 690-086-0150(6) Required?



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Resources for the Water Conservation Element

Many resources are available to support development of a water conservation program. These include books and other publications such as the following, as well as conferences and events sponsored by organizations like the AWWA.

- *Water Conservation Plan Guidelines* (EPA 1998)
- AWWA Water Conservation Resource Community web site: <http://www.awwa.org/resources-tools/water-knowledge/water-conservation.aspx>
- *Manual M50 Water Resources Planning*, Second Ed. (AWWA, 2007)
- AWWA Pacific Northwest Section Conservation Committee: <http://www.pnws-awwa.org/>
- *Handbook of Water Use and Conservation* (Vickers, 2001)
- *Manual M6, Water Meters – Selection, Installation, Testing and Maintenance*, Fifth Ed., (AWWA 2012)
- *Manual M60 Drought Preparedness and Response* (AWWA 2011)
- Regional Water Providers Consortium: <http://www.conserveh2o.org>

Further resources related to water conservation programs are provided in [Appendix M](#) of this guidebook. In addition to the sources listed above and in Appendix M, many water conservation plans have been developed by water suppliers in Oregon and other western states, and can serve as useful examples. Contact with other water suppliers to exchange ideas and information can be one of the best ways to get started in building an effective water conservation program that meets the needs of a particular water supplier. The Pacific Northwest Section of the AWWA has a Water Conservation Committee that meets several times each year to exchange information and develop programs.

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CHAPTER 4

WATER CURTAILMENT ELEMENT

OAR 690-086-0160

Drought, photo: Bert Kaufmann



Water Supply Assessment

Stages of Alert

Triggers for Each Stage of Alert

Curtailment Actions

“When the well's dry, we know the worth of water.”

- Benjamin Franklin (1706-1790), Poor Richard's Almanac, 1746



Hyperlinks

Throughout this document, **hyperlinks** are used to aid the reader by providing the ability to quickly “jump” to other referenced sections or items located throughout this document and on the web.

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Water Curtailment Element

Water suppliers with a well-defined water curtailment plan in place are ready to contend with a short-term emergency water shortage. For water suppliers without such a plan or with an outdated plan, this chapter will assist in the development of an effective plan. It also describes water curtailment plans, their role, and how water suppliers can tailor a plan to meet their unique needs. The information provided here is based upon the requirements of OAR 690-086-0160.

Water curtailment plans are designed to minimize the impacts of a short-term emergency water shortage by reducing demand and finding alternative supply. The two most important tools water suppliers can use to immediately reduce and meet demand are conservation measures and interties with an adjacent water supplier. Curtailment plans usually contain voluntary and mandatory water use restrictions. The restrictions become progressively severe as the shortage becomes increasingly dire. In the early stages of a shortage, curtailment plans call for customers to take voluntary curtailment actions. As more severe stages of shortage occur, curtailment plans require more restrictive curtailment actions of its customers.

It is highly recommended that suppliers have ordinances in place allowing them to declare a water supply emergency. Within the ordinances, authority should be given to the supplier to enact the curtailment plan once an emergency has been declared, and to enforce penalties, if needed. When the emergency is over, the supplier should return to normal service conditions. A sample ordinance is provided in [Appendix J](#).

Some of the conservation measures discussed in [Chapter 3](#) of this guidebook will also be used in a curtailment plan. When implemented as part of a curtailment plan, however, these conservation measures in the later stages of an emergency are mandatory and enforceable by the water supplier. Moreover, a curtailment plan may include further actions that are not part of routine conservation activities but are needed to reduce demand to meet unusual circumstances. In addition to voluntary and required conservation measures, curtailment plans should also include methods to ration water amongst users. Methods for rationing water should be based on essential and non-essential uses, and should indicate when alternative sources, such as interties, are to be used.

Short-term emergency water supply shortages can come in the form of sudden interruptions, such as loss of power or mechanical problems resulting in major water treatment and distribution equipment failure, contamination⁸ of water supply, and earthquakes, floods and other natural and man-made disasters. Or, supply shortages may be more gradual, and offer some lead-time to prepare. This would be the case during a drought. In the case of an immediate shortage, more severe restrictions on water usage may be used right from the start. Water shortages that allow time to prepare may provide an opportunity to gradually ramp up restrictions.

If a severe, continuing drought results in a lack of water resources and threatens the availability of essential services, the Governor may declare a drought emergency. In these situations, the Oregon Water Resources Commission (Commission) may order political subdivisions (e.g., *a county, city, town, or district*) within the drought area to develop and submit a water conservation or curtailment plan, or both, for approval and implementation. An approved WMCP curtailment plan will satisfy this requirement ordered by the Commission.

⁸ Water supply contamination can also have a more gradual impact upon supplies. For example, a detected underground plume of known contaminants can take up to a few months to reach a well. Plumes which are estimated to take a longer time reaching a water source probably do not require the use of a water curtailment plan.

The Commission may also issue an order granting a temporary preference to water that is used for human consumption and/or livestock watering (regardless of priority date). The temporary preference of water use only applies to designated drought areas and cannot exceed the term of the Governor’s declared drought. See [ORS 536.700 through 536.780](#) and OAR 690-019-0070 through 690-019-0090.

Water providers subject to these provisions, must have an approved plan with a level of alert that includes conservation and/or curtailment efforts to provide water necessary for essential human consumption uses of water (*e.g., drinking, cooking, sanitation, and firefighting*) and livestock watering. Refer to OAR 690-019-0070 (Drought Mitigation Rules) for further information.

Sources of Information

As water suppliers begin developing the water curtailment portion of their WMCP, it is worthwhile to review any past curtailment plans developed by the supplier to comply with drought declaration requirements. The supplier may wish to incorporate all, or a portion, of its past drought curtailment plan(s) into their WMCP curtailment plan. It should be noted, however, that the past drought curtailment plan may not satisfy all OAR 690-086 requirements. For a list of required items that must be included in a WMCP curtailment plan, refer to “*Developing a Curtailment Plan*” below.

It may also be helpful, as a preliminary step, to gather a few curtailment plans of other water suppliers to use as samples. Many water providers have also used public input to help develop curtailment plans. Public input is most useful for the creation of a list of curtailment actions for each stage of alert (see “*Curtailment Actions*” on pg. 89). Therefore, as a second preliminary step, water providers are encouraged to build additional time into the curtailment plan development process to allow for public input.

Developing a Curtailment Plan

OAR 690-86 requires that water curtailment plans have the following:

- A description of water supply deficiencies experienced within the past 10 years;
- An assessment of current capacity limitation(s) and the ability to maintain water delivery during long-term supply shortages;
- At least three stages of alert;
- Pre-determined situations which trigger each stage of alert; and
- A list of curtailment actions to be enacted under each stage of alert.

Each of these requirements are described below in detail. Water suppliers are encouraged to develop a comprehensive curtailment plan to ensure maximum protection from a short-term emergency water supply shortage.

Water Supply Assessment

OAR 690-086-0160(1)

To assess the likelihood that a water supplier may experience a short-term emergency water supply shortage in the future, suppliers are required to consider the performance of their water system over the last 10 years. Assessing a water system’s past supply shortages or difficulties can help identify future vulnerabilities or weaknesses in the source supply.

To meet this requirement, it is recommended that the WMCP provide answers to such questions as:

- Were any supply deficiencies experienced, such as a drought or mechanical failure, during the past 10 years? If there were *no* supply deficiencies in the past 10 years, clearly indicate so in the WMCP.
- If supply deficiencies were experienced, how frequently did the deficiencies occur?
- What was the magnitude (*e.g., in millions of gallons per day (gpd)*) of each deficiency?
- At present, what is the capacity limitation of the system?

Regarding the last bullet in the list above, capacity limitations may be defined as bottlenecks in the system infrastructure, such as undersized pumps, or small storage capacity compared to maximum day demand. Sources may also have natural limitations, such as maximum regeneration rates for wells or seasonal streamflow limitations in surface water sources. Furthermore, conditions included in a water use permit or permit extension approval order may limit a supplier's ability to divert water under the permit in certain circumstances. The WMCP needs to describe all of these types of limitations related to system capacity.

A water supplier is also required to provide a clear picture of the system's current ability to withstand an emergency water situation.

To meet this requirement, it is recommended that the WMCP include answers to such questions as:

- How did the supplier meet past demands during short-term emergency water supply shortages?
- Will these same techniques be employed to meet demand during future emergencies?
- Are the sources of water vulnerable to contamination?
- Are there additional steps to ensure an adequate source of water during these emergencies?

Include a description of the assessment in the WMCP. Water suppliers that have prepared a security vulnerability assessment as part of an emergency response plan for the U.S. EPA or the Oregon Health Authority; Drinking Water Services (as applicable) may wish to coordinate WMCP curtailment plan development with these assessments.

Stages of Alert

OAR 690-086-0160(2)

The water curtailment plan must have pre-defined stages of alert to respond to a water shortage as it becomes increasingly more severe. This component is interconnected with triggers for each stage of alert and the water use restrictions or curtailment actions associated with each alert stage.

Once enacted, these restrictions represent a measured response to an emergency situation and are intended to progressively reduce demand. The minimum number of stages allowed by OAR 690-086 is three. Some communities may choose to include more stages (*e.g., up to five*). Additional stages would allow less severe restrictions between each stage, but may also be slightly more complex to communicate to the public. Examples of the incremental stages of alert are mild, moderate, severe, critical and/or emergency.

For example, if a water supplier chooses to have four stages of alert, it may be structured as follows:

- Stage 1 – Mild Alert
- Stage 2 – Moderate Alert
- Stage 3 – Serious Alert
- Stage 4 – Critical / Emergency Alert

☑ Triggers for Each Stage of Alert

OAR 690-086-0160(3)

As mentioned previously, a curtailment plan must have pre-defined stages of water use restrictions. These restrictions are triggered by specific emergency conditions. For example, the first stage of alert may be triggered by a percentage drop in available source capacity or a percentage drop in pumping capabilities.

Adding triggers into curtailment plans is important because triggers provide water suppliers an ability to legally impose restrictions once the emergency conditions of the trigger have been met. Also, triggers are set points of reference which can prevent any confusion about when to impose restrictions during an emergency.

It is recommended (but *not* a requirement of OAR 690-086) that triggers for supply, demand, and capacity be developed. These should be used in a combination determined by the water supplier when deciding to ramp up or down the stage of alert. Below are potential triggers for each of these three factors, organized in order from mild to progressively more severe stages of water shortage (adapted from AWWA Manual M50, “*Water Resources Planning*,”).

Example Triggers

- **Mild Stage of Alert:**

- Supply: *If a ground water source* – Water level in well drops 150 feet
If a surface water source – Available streamflow decreases by 50%
- Demand: Use reaches 14 mgd for three consecutive days; *or*
Use reaches ability to refill 70% of elevated storage
- Capacity: Use reaches 60 % of capacity

- **Moderate Stage of Alert:**

- Supply: *If a ground water source* – Water level in well drops 200 feet
If a surface water source – Available streamflow decreases by 70%
- Demand: Use reaches ability to refill only 50 % of elevated storage
- Capacity: Use reaches 85 % of capacity

- **Critical / Emergency Stage of Alert:**

- Supply: *If a ground water source* – Water level in well drops 250 feet
If a surface water source – Available streamflow decreases by 80%
- Demand: Not able to fill elevated storage
- Capacity: Use reaches 90% of capacity

☑ Curtailment Actions

OAR 690-086-0160(4)

If curtailment triggers establish *when* to impose restrictions, curtailment actions establish the *type* of water use restrictions to impose. OAR 690-086 does not specify all types of restrictions to impose at each stage; however, it does provide the inner and outer limits of restrictions: curtailment actions must start with a notice to the public of a potential alert, increasing to limitations on non-essential uses of water, and ending with rationing and/or loss of service at the most critical stage of alert. The specific curtailment actions chosen should be sufficient to respond to any foreseeable situation in which access to supply/supplies is partially or wholly impaired.

Establishing curtailment actions may be a difficult task, especially when going through the process of determining actions for the latter stages of alert. In these latter stages, curtailment actions translate into severe restrictions or complete restrictions for specific non-essential activities, such as lawn watering, that will directly and severely impact your customers. Water providers may wish to consider the use of public input to assist in the process of establishing curtailment actions during plan development. The “public” should include customers from each customer class or sector. These customers can provide valuable insight as to the types of activities they are willing to restrict in the event of an emergency which, in turn, may result in more effective curtailment actions. Customers can also help avoid major omissions to the list of curtailment actions.



Though not required in OAR 690-086, water suppliers may wish to establish goals for each stage of alert. For example, as a result of Stage Two curtailment actions, a supplier could set a goal of 10 percent reduction of off-peak demand. Setting goals in this manner will help a supplier determine which curtailment actions may be the most suitable for achieving the desired reduction in water use under each stage. The exact goals and curtailment actions selected will vary from one supplier to another.

Below are some examples of curtailment actions water suppliers could include in their curtailment plan. The examples progress from mild to severe (adapted from pg. 90 of AWWA’s Manual M50, “*Water Resources Planning*”).

- Public notification
- Voluntary irrigation schedule
- Closing of ornamental fountains
- Five day watering schedule and time-of-day schedule
- Waste of water ordinance enforced
- Hand irrigation only
- Open interconnection with neighboring water supplier
- Industry asked to reduce consumption by 10% (voluntary)
- Public pools closed
- Emergency water rate imposed
- Outdoor use banned
- Residential water use restricted to 75 gallons per day/person
- Industry asked to reduce consumption by 20% (mandatory)
- More stringent emergency rate increase imposed
- Commercial car washes closed
- Shut down industrial operations
- Close public schools and offices
- Eliminate all uses not directly involved with health, sanitation, or safety



Create well-defined procedures that ensure the plan can be carried out properly once it is enacted. It is recommended that a curtailment plan include the following:

- Specific title or position of person who will decide when the plan is to be enacted;
- A list of officials to contact in the event of a short-term water shortage (state and regional authorities, law enforcement, legal authorities, etc.);
- Process and method to communicate restrictions to the public at each stage of alert;
- Process of enforcement of any water use restrictions; and
- Any other actions specific to the curtailment plan.

Recommended Steps

Once a curtailment plan has been developed, water providers are encouraged to consider performing the following tasks:

- ***Encourage affected local governments to adopt the plan.*** The affected local governments may be municipalities (in which case city councils must adopt the plan), water districts (in which case the board or commission must adopt the plan) or some combination of the two. Regardless, it is important to note that curtailment plans are unenforceable unless adopted. Though OWRD does not require adoption, it is highly recommended that a curtailment plan be adopted as soon as possible in order to speed a water supplier's curtailment response to a water emergency. See [Appendix J](#).
- ***Periodic review and revision.*** Since water providers may obtain new water sources, or experience staff changes and/or new potential events leading to a shortage, water suppliers should review and update curtailment plans on a regular basis.
- ***Ensure communication with other suppliers.*** In cases where water shortages are widespread (*e.g., regional*), different water suppliers may have different needs and stages of alert. Water suppliers should work together to coordinate water curtailment messages and avoid confusion among customers and the public.

CHAPTER 5

WATER SUPPLY ELEMENT

OAR 690-86-0170



North Umpqua River in Douglas County, photo: Oregon State Archives

Future Service Area and Population Projections

Schedule to Fully Exercise Each Permit

Demand Forecast

Comparison of Projected Need & Available Sources

Analysis of Alternative Sources

Maximum Rate & Monthly Volume Quantification

Mitigation Actions under State and Federal Laws

Requesting Greenlight Water

“We forget that the water cycle and the life cycle are one.”

- Jacques Cousteau



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Water Supply Element

This chapter looks at the water supply element, which provides a long-range supply plan in which the supplier prepares a demand forecast and compares the projected demand to available supplies. Where additional water is needed, the water supplier is required to explain what sources it plans to use or acquire. For cases in which the supplier's diversion of water under an extended permit will be greater than currently authorized (*i.e., beyond the quantity specified in a Development Limitations condition*), further explanation will be necessary. The water supplier must also show how management of the resource through activities such as water conservation can contribute to meeting customers' demands. It should be noted that many of the items required in this element of the WMCP are closely related to items required in the Water Supplier Description (OAR 690-086-0140) and the Water Conservation Element (OAR 690-086-0150) of the WMCP.

Sources of Information

Various sources of information may be useful in preparing the water supply element. In general, these include information obtained from the water supplier's own records, information related to local land use planning, and more detailed sources of information on methods and techniques related to demand forecasting, source analysis, and related topics. Potential sources include:

- Billing and meter records
- Prior water system master plan, facilities plan, or WMCP
- City or county land use plans
- Local or regional population forecasts and demographic data
- Interviews with local or county planning staff
- Local weather information regarding historic rainfall and temperatures (optional)
- Water right information from OWRD's website
- Local OWRD Watermaster
- Summaries of operational constraints related to the availability of water from each source
- AWWA Manual M-50, *Water Resources Planning*
- *Forecasting Urban Water Demand* (Billings and Jones)

Future Service Area and Population Projections **OAR 690-086-0170(1)**

This rule calls for the supplier to prepare a delineation of current and future service areas consistent with state land use laws. Within the state of Oregon, land use planning is guided by the 19 goals set forth by the Land Conservation and Development Commission (LCDC). Coordination for this planning effort is often done at the city or county level and often sponsored through a local Council of Governments.

The delineation of current and future service areas must be coordinated with existing area land use plans, as adopted under LCDC guidance and approved under regional comprehensive land use plans and urban service agreements. The required submittal here may be done by preparing a map showing the present and future (or anticipated) service area boundaries for the water supply agency in relation to neighboring (or shared) municipal boundaries, unincorporated portions of a county, or other legal boundaries that may be shared or adjoined by the water supplier's present and future service areas.

The water supplier is also required to provide available data on population projections and anticipated development within the service area. These projections must be consistent with comprehensive land use plans, urban service agreements, or other relevant documents that guide land use and utility services. This information will be used in preparing a forecast of future needs for water. See “[Demand Forecast](#)” (pg. 95).

Population projections can often be obtained from sources listed under the discussion of service area, above. If these sources are not available locally, a water supplier may identify and describe other approaches to projecting population suitable for use in water supply planning.

Schedule to Fully Exercise Each Permit

OAR 690-086-0170(2)

The water supplier must prepare a schedule that identifies when they expect to be using the full quantity of water allowed under each water right and water use permit (*i.e., fully exercising each right/permit*) currently held by the supplier. It is expected that this anticipated schedule for fully exercising the permit(s) will be consistent with the supplier’s permit extension request(s), if any. Please note it is helpful to describe the methods and assumptions used in determining the date(s).

When estimating this schedule, it is recommended that the supplier’s projected 20-year water demands be weighed and considered against several factors including, but not limited to, the following:

- The amount of water legally authorized under the supplier’s currently held water rights and permits;
- The reliable diversion or production capacity from the supplier’s authorized sources;
- Any other sources of supply available to the supplier (*i.e., interconnections, delivery contracts, conservation, etc.*);
- The supplier’s primary water supply sources as compared to any rights or permits held only as backup emergency sources or for purposes of redundancy, or those that are simply unavailable; and/or
- Any future difficulties or restrictions that may affect the supplier’s available water supply.

If any of the supplier’s water rights are not considered to be a primary supply or they are unavailable or unreliable for some reason (*i.e., water availability or water quality issues, mechanical issues or equipment failure, inadequate/undersized treatment facilities, etc.*), it is important to include an explanation in the WMCP.

By considering these things, a picture of the supplier’s water budget will begin to develop. Then, the supplier’s strategy for meeting its anticipated water demands can be clearly conveyed in the WMCP.

What is the relationship between fully exercising a permit and the issuance of a water right certificate?

Once a supplier has fully exercised a water use permit, they may be in a position to request certification of the permit, provided they have done so under the terms and conditions of the permit.

The process of “*certification*” involves documenting beneficial use of water allocated under a given permit, as defined by the rules governing beneficial use. Additionally, under present Oregon law, municipal water use permits may be “*perfected*” or certified at increments of at least 25 percent of the original permitted quantity upon the diversion/withdrawal and beneficial use of that water. For example, a permit allowing the use 10.0 cfs of water may be certificated at 2.5, 5.0, 7.5 and 10.0 cfs. Additional information regarding incremental perfection of a municipal use permit can be found in ORS 537.260(4) and OAR 690-320-0040.

It should be noted that a permit extension of time request for the remaining non-certificated portion of the permit may be necessary if the authorized date for completion under the permit is expired. Eventually, full certification of the permit will eliminate the need to seek further permit extension(s) under OAR 690-315 and eliminate the need to request and justify incremental increases in the diversion of water under an extended permit (*i.e.*, *Greenlight Water requests*). However, full certification may not eliminate the requirement for a WMCP and continued WMCP implementation.

It is also important to note that certification of a permit can only be done through submittal of a Claim of Beneficial Use prepared by a Certified Water Rights Examiner (CWRE) to OWRD. A more complete guide to water law and water right certification is available from OWRD in their publication titled, “*An Introduction to Oregon’s Water Laws and Water Rights System.*” To obtain a free copy, simply call OWRD or go online at <http://www.oregon.gov/OWRD/pages/index.aspx>.

Demand Forecast

OAR 690-086-0170(3)

Preparation of a demand forecast for the supplier’s service area is a critical element of a WMCP. The water supplier must provide a forecast for 10- and 20-year time frames. A longer time period may also be included, if the water supplier wants to extend the forecast.

There are a number of ways to develop demand forecasts, ranging from very simple methods to more sophisticated statistical based forecasts. The intent here is to highlight several approaches and provide the reader with additional references regarding the details of each approach.

Several factors can dictate water use, including weather, population change, manufacturing and operational requirements, income, lot sizes, personal habits within the community, social patterns, and other economic and social behaviors. The degree to which these factors are incorporated into the demand forecast is up to the individual supplier. Also, redundancy and backup supply needs will be important when forecasting future water demands. Each supplier must decide on an appropriate means for projecting future demand and be prepared to explain why this approach is appropriate for that supplier. Suppliers should link forecasts in regional planning efforts where applicable.

Three Fundamental Demand Forecast Methods:

- ***Per Capita Forecast.*** – This is the simplest of the methods presented. It requires less expertise, time and data, in comparison with the other methods described below. Here, the supplier simply estimates the rate of annual water demand increase based on the projected increase in total service area population. This produces an aggregate estimate of future need. The technique is more readily applicable to suppliers whose customer base is homogeneous (*e.g.*, *dominated by residential users of a similar lot size and economic standing*).

In order to complete the forecast, a starting point must be determined from which to base the forecast in the present. The simplest approach is to use the water consumption number from the most recent year as the base. However, the supplier needs to make a judgment as to whether that base year is representative or not. If it was unusually hot or dry, or other unusual conditions occurred, a different year may provide a more suitable base. An average of several years could also be used, if the supplier’s customer base has not changed a great deal. Using this method once a base number is determined, projections of future demand are then simply found by increasing projected demand by the rate of increase in population.

- **Simple Disaggregated Forecast.** – A disaggregated forecast looks at several different categories of demand within the service area. Since these categories may grow (or decline) at different rates, this type of forecasting can produce a more accurate picture of future needs. However, this method requires more time, data, and expertise than the per-capita approach.

The different categories used in a disaggregated forecast are typically taken from the water supplier’s billing system. Therefore, this approach requires a billing system that tracks different customer groups or rate classes. Some examples of classes that may be used are shown below:

Table 5.1 – Disaggregated Forecast Categories

Simple Breakdown	Advanced Breakdown
<ul style="list-style-type: none"> ▪ Residential ▪ Non-residential ▪ Non-revenue water⁹ 	<ul style="list-style-type: none"> ▪ Single-family residential ▪ Multi-family residential ▪ Commercial ▪ Industrial ▪ Schools ▪ Parks ▪ Government customers ▪ Irrigation meters ▪ Construction meters ▪ Non-revenue water

For the base (present) year estimate, a similar approach to that described above, or another approach deemed reasonable by the supplier, may be used.

- **Advanced Modeling using Statistical Techniques.** – The most sophisticated of the techniques presented here is based on using formal statistical tools to prepare a more advanced forecasting model. In this approach, water use is related to a variety of driving factors such as population, climate, season, employment, price, or other demographic or economic factors.

This category involves building mathematical models that relate annual water use (Q) to a series of independent variables such as population, climate, and price (represented here by x , y , and z), where the coefficients a , b , c , and d are determined through a standard mathematical calculation known as “least squares.”¹⁰

$$Q = ax + by + cz + d$$

Using known data over a given period of time (say five to ten years), the method of least squares is applied to an equation like the one shown above to arrive at estimates for a , b , c and d . Then by knowing forecasts for x , y , and z (in this case population, climate and price), future estimates of demand (Q) can be made.

This technique allows the forecast to reflect changes associated with a variety of variables. It requires considerable training and experience, and much more extensive data compared with the other methods discussed above. The tools needed to perform regression analysis are often included in standard computerized spreadsheets (e.g., *Microsoft Excel*) or can be found in specialized statistical software packages designed to allow for standard time series analysis of data or multiple regression modeling. This technique is often employed with the assistance of consultants with specified expertise in this area.

⁹ Non-revenue water is not recorded by customer meters. It results from operational uses and unavoidable losses. See “[Annual Water Audits](#)” (pg. 57) in Chapter 3.

¹⁰ “Least squares” is a method of determining the curve that best describes the relationship between expected and observed sets of data by minimizing the sums of the squares of deviation between observed and expected values. See also “regression analysis.”

Regardless of the forecasting method used, it is recommended that the resulting demand projections be compared to similar numbers that may have been developed as part of a Water System Master Plan for the supplier. Several books and manuals that address the subject of demand forecasting are listed in “[Sources of Information](#)” (pg. 93) at the beginning of this chapter and in the bibliography found in [Appendix M](#).

Comparison of Projected Need & Available Sources **OAR 690-086-0170(4)**

Water suppliers must compare their projected demand, including the demands of other suppliers (such as wholesale customers), to their existing water sources identified in the Water Supplier Description element. Will projected demand exceed the current permitted diversions (or *limited* diversions under extended permits with conditions setting Development Limitations) from these water sources? A discussion of the reliability of the sources to meet projected demands must also be included in this section.

One way to compare needs and water sources is to prepare a table or graph that identifies source capacity at 10 and 20 years and the projected demands for those same years.

Analysis of Alternative Sources **OAR 690-086-0170(5) and (8)**

Generally, in order to meet projected demands, a water supplier will need to do one or more of the following:

- Reduce its overall demands for water (either through conservation or other means);
- Expand the rate of diversion under any of its existing permits (up to the maximum permitted rate);
- Acquire water from another supplier;
- Add a new diversion under existing permits or water right certificates (*e.g., adding a new well to a permit or certificate because currently constructed wells do not yield the amount of water necessary to fully exercise the water right*); and/or
- Acquire new water rights within the next 20 years.

Before deciding which water supply option(s) to pursue, OAR 690-086 requires a supplier to objectively consider different water supply options available to them, as well as the impacts their water use may have on other uses of the alternative water source including, instream flows for fish and other aquatic species.

This requirement to perform an analysis of alternative sources, however, only comes into play if a water supplier’s projected 10- and 20-year demands will either exceed current rates of diversion under one or more of its existing permits **or** prompt the need to acquire new water rights. These suppliers must analyze alternative water supplies for meeting its future demands. The analysis of alternative water sources must consider availability, reliability, feasibility and likely environmental impacts. It must also consider the extent to which the projected water demands can be satisfied through:

- Implementation of conservation measures identified under OAR 690-086-0150 (outlined in [Chapter 3](#) of this guidebook);
- Interconnection with other municipal water supply systems and cooperative regional water management; and
- Any other conservation measures that would provide water at a cost that is equal to or lower than the cost of other identified sources.

Examples of different factors that may be considered as part of the alternative water source analysis are outlined below.

Availability Considerations

- How much water is available from the alternative water sources?
- Are the alternative water sources available on a short- or long-term basis?
- Is access to these alternative sources guaranteed, or are there impediments (*e.g., lack of an easement or other permitting requirements*) which may prohibit use?
- Will future development by permit holders of senior water rights on an alternative source impinge upon the water supplier's junior rights on that alternative source?
- Are senior instream water rights present on the alternative source that would, at times, cause regulation of the water supplier's junior water right in order to satisfy the senior right?

Reliability Considerations

- Can the alternative source be secured on a long-term, year-round basis? If not, how long can it be secured?
- Is the alternative water source reliable enough to meet the supplier's projected demands?
- Are there water quality issues that affect the supplier's ability to rely on the alternative source as a primary water supply?
- Do physical limitations (*i.e., excessive distance to access the source*) or operational limitations (*i.e., production or treatment capacity issues*) exist that affect the reliability of the alternative source?
- Do seasonal issues exist that would cause diversion of the alternative water source to be difficult at certain times of the year (*e.g., turbidity issues during high flow events or lack of adequate streamflow during times of peak demand*)?

Feasibility Considerations

- If available and reliable, does the water supplier consider it feasible to divert water from the alternative water source?
- Are there financial, political and/or operational impacts that would make it difficult to utilize the alternative water source(s)?
- Are there public preferences of water sources?

Likely Environmental Impact Considerations

- If a water supplier were to divert water from any of the alternative sources, are there any known environmental impacts or other permitting type impediments upon the sources?
- Are there seasonal restrictions on the source, for example, which are intended to protect fish or Clean Water Act requirements?
- Are there conditions imposed on the permit that limit the diversion of water under certain conditions, such as during periods when established minimum streamflows are not being met?

Implementation of Conservation Measures

Water conservation to reduce demand must also be considered. Specifically, water providers must show how water conservation measures identified in Chapter 3 (*i.e.*, the “*Water Conservation Element*”) can help them meet their demands. Any water savings that can be achieved through implementation of the identified conservation measures need to be quantified and used to adjust the supplier’s future water demands downward.

Additionally, water suppliers must consider other conservation measures that would yield water at a unit cost that is less than or equal to the costs associated with the supplier’s selected sources for meeting its future water demands (*i.e.*, *increasing diversion under an existing permit or acquiring a new water use permit.*) Those conservation measures with a lower unit cost must be identified and assessed in the WMCP.

Considerations related to water conservation measures may include:

- Whether implementation of conservation measures (such as those discussed in [Chapter 3](#)) would yield a significant amount of water savings. If so, it may delay the need to develop a new source and/or to expand diversion of water under an existing permit.
- Further, if implementation of conservation measures can result in considerable water savings, it may be a cheaper “source” option for a supplier than building the infrastructure necessary to develop a new source and/or expand diversion/treatment facilities associated with an existing permit.

Interconnection with Other Municipal Supply Systems and Cooperative Regional Water Management

Water suppliers must also consider how interconnections to other suppliers and/or cooperative regional water management efforts can help meet their projected supply needs. The feasibility of opportunities (or the lack thereof) for interconnection or regional water management need to be discussed in the WMCP.

Examples of considerations related to interconnection include:

- Are there any other water suppliers in close enough proximity that would make an interconnection with them practical?
- Does the other water supplier have excess water supply available to sell? Do they have enough excess supply to meet your needs on a full-time basis, or would it be strictly for emergency use?
- Are there differences between the two water suppliers’ distribution systems that make it difficult to share water?
- Is there an opportunity for multiple water suppliers to develop a water source together? The sharing of costs between multiple partners may make development of a given source more feasible and affordable.

Results of the Alternative Source Analysis

The result of the alternative source analysis will be a proposed mix of source development, water conservation, and/or interconnections to meet forecasted demands. Based on this analysis of alternatives, the water supplier must clearly state in the WMCP what combination of sources and other activities are preferred. The reasons for selecting each activity or source must also be clearly stated in the WMCP.

OWRD will give due consideration to the supplier’s judgment related to the appropriate resource mix as long as the plan documents the basis for the decision and the evaluation that the supplier has performed reflects a good faith effort to understand the economic costs. This illustrates the importance of documentation in the plan of the costs associated with a water source.

☐ Maximum Rate & Monthly Volume Quantification OAR 690-086-0170(6)

Some suppliers may determine that they need to initiate or expand diversion of water under one of their existing permits (*i.e., beyond the current level of authorized diversion, up to the maximum permitted amount*) in order to meet anticipated increased demand for water in the next 20 years. These suppliers must identify the amount of additional water to be diverted under each permit. The quantification of future water need must be presented both in terms of the maximum instantaneous rate of withdrawal (cfs or gpm) and the peak monthly volume (mgd) of water to be diverted during that 20 year period.

☐ Mitigation Actions under State and Federal Laws OAR 690-086-0170(7)

OAR 690-086 requires that, for any expansion or initial diversion of water (*i.e., beyond the current level of diversion, up to the maximum permitted amount*) under any existing permit, the WMCP must describe any mitigation actions being taken by the supplier to comply with associated state and federal law. These include, but are not limited to, the federal Endangered Species Act, Clean Water Act, Safe Drinking Water Act, and permit conditions. If the supplier is not currently required to provide mitigation actions, the WMCP needs to clearly state this fact.

The purpose of this element is to address potential issues that may affect species habitat or resource protection related concerns associated with the operation and maintenance of a diversion or reservoir facility. Some of the more notable elements of concern are outlined below:

Table 5.2 – Potential Issues for Species Habitat/Resource Protection

Direct Diversion of Surface Water	Diversion Dam or Structures	Reservoir Operations
<ul style="list-style-type: none"> ▪ Intakes and screens ▪ Instream flow effects ▪ Hydraulic continuity ▪ Water quality impacts 	<ul style="list-style-type: none"> ▪ Fish passage and bypass ▪ Predator attraction and control ▪ Sediment transport ▪ Spillage effects ▪ Water quality impacts 	<ul style="list-style-type: none"> ▪ Fish passage and bypass ▪ Flow regulation and releases ▪ Pool operation and water levels ▪ Flushing and spillage effects ▪ Water quality impacts

The description of mitigation actions needs to include a report of the actions planned under any other regulatory requirements. The description does not need to include any new, additional mitigation actions above and beyond the requirements of these other regulations.

Additional assistance with these potential issues is available through a separate manual created by the Oregon Association of Clean Water Agencies titled, “*Endangered Species Act Assessment Manual.*” A free copy of the manual can be obtained online at <http://www.oracwa.org>.

□ Requesting Greenlight Water OAR 690-086-0130(7)

Some suppliers may project a need to initiate or expand diversion of water under one of their *extended* permits to meet increased demand for water in the next 20 years (*i.e., initiate or expand diversion of water beyond the rate specified in any Development Limitations condition imposed by a final order approving a permit extension of time or a previous WMCP, up to the maximum permitted rate*). These suppliers must include a written request in their WMCP to access Greenlight Water, and must provide additional documentation to support the Greenlight Water request. To aid OWRD's review process, the Greenlight Water request can be written as a separate section within the WMCP's Water Supply Element chapter.



For a general overview of the relationship between extended permits, Development Limitations, and Greenlight Water, see [Chapter 1](#) of this guidebook.

To determine whether you need to request authorization to access Greenlight Water under an extended permit, refer to "[Exhibit 1.6 – Greenlight Water Worksheet](#)" in Chapter 1 (pg. 27). A similar blank Greenlight Water Worksheet that suppliers can complete and incorporate into their WMCP is provided in Appendix D.

Required Components to include in a Greenlight Water Request

For a supplier requesting access to Greenlight Water, the WMCP is required to document that the use of additional water under the extended permit is the most feasible and appropriate water supply alternative for meeting the supplier's projected 20-year demands. Not only does this documentation explain the supplier's reasoning for selecting a given source to meet its projected demand, but it provides the basis and justification for OWRD to grant access to quantities of water beyond the current diversion rate or volume limit specified in a Development Limitations condition imposed on an extended permit.

Somewhat similar to the "[Analysis of Alternate Sources](#)" (pg. 97) section above, a supplier must examine other sources of supply and provide documentation explaining why increased diversion of water under the extended permit is the most feasible and appropriate option for meeting its projected 20-year demands.

Specifically, this required documentation to support the Greenlight Water request in a WMCP must:

- 1) Explain why access to Greenlight Water under the extended permit is the most feasible and appropriate water supply alternative available to the supplier;
- 2) Document the schedule for development of any conservation measures that would provide water at a cost that is equal to or lower than the cost of developing Greenlight Water under the extended permit;
- 3) Identify the amount of Greenlight Water being requested under the extended permit(s); and
- 4) Document that the supplier is complying with any mitigation actions legally required to address limitations or restrictions on the development of permits for which environmental resource issues have been identified.

1) Most Feasible and Appropriate Water Supply Alternative

As part of a request to access Greenlight Water under an extended permit, the WMCP must provide justification that diversion of water under the extended permit beyond current Development Limitations is the most feasible and appropriate water supply alternative available to the supplier.



Reviewing the results of its alternative water source analysis will help a supplier determine which water supply alternative is the most feasible and appropriate option available for meeting its projected water demands. Refer to "[Analysis of Alternative Sources](#)" (pg. 97) above for more information.

Examples of justification include, but are not limited to, the following:

- **Example 1:**

“The City’s closest neighboring municipal water supplier is located 20 miles away. It is estimated that construction of a 20-mile pipeline to convey the water would cost approximately \$14.2 million. Because the infrastructure to divert and convey water under the City’s extended permit is already in place, accessing Greenlight Water under the extended permit is a far less expensive option for meeting the City’s projected water demands.”

- **Example 2:**

“There are two neighboring water suppliers that are within close proximity to the City. The City does maintain interconnections with these suppliers; however, they are only used for emergency water supply situations. These other two water suppliers do not have enough excess water supply to allow them to sell water to the City on a full time basis. Therefore, accessing Greenlight Water under the City’s extended permit is the most feasible and appropriate water supply alternative available for meeting the City’s projected water demands.”

- **Example 3:**

“In the next five years, the City will be implementing a leak repair/line replacement program. The City’s current annual water loss is estimated at 17%. There is approximately 3 miles of ductile iron pipe in the system, which has been prone to leakage in the past. The City is in the process of obtaining funding to replace this section of pipeline. Based upon the City’s overall water demands, it is estimated that replacing this section of line will reduce water losses by approximately 4%. Considering this, together with its other conservation benchmarks, the City expects to reduce its water losses down to 9%. The City’s projected water demands over the next 20 years, however, are expected to increase by 25% (based on an anticipated 2% annual population growth and three new computer technology based customers that are moving into the service area). Water conservation will help meet the City’s projected demands, but access to a portion of the Greenlight Water under the extended permit will also be necessary to fully meet projected demands.”

- **Example 4:**

“The City holds one surface water right on the North Santiam River (Certificate 246801 for 0.5 cfs) and one ground water right authorizing the use of three wells (Permit G-987654 for 2.5 cfs). The diversion of water under Permit G-987654, however, is currently limited to no more than 0.4 cfs (out of the permitted 2.5 cfs) by the Development Limitations condition in the final order approving the Extension of Time for Permit G-987654. During the winter and spring months, the North Santiam River source is susceptible to high turbidity events which prevent the water treatment plant from effectively treating the water. The City must rely solely on its wells under extended Permit G-987654 to meet its current water demands of 0.4 cfs during this period. The City’s projected water needs are expected to reach 0.9 cfs in the next 20 years. Therefore, in addition to the 0.4 cfs currently authorized under Permit G-987654, the City is requesting access to 0.5 cfs of Greenlight Water under extended Permit G-987654 in order to provide source redundancy and to meet projected demands.”

2) Schedule for Development of Conservation Measures

Also, when requesting access to Greenlight Water under an extended permit, the WMCP needs to provide documentation of the schedule for development of any conservation measures that would provide water at a cost that is equal to or lower than the cost of developing Greenlight Water under the extended permit. This means that the supplier must assess whether implementation of conservation measures can yield water supply (*i.e.*, *water savings*) at a similar or lower cost than the development of Greenlight Water under the extended permit.

If it is determined that conservation measures would provide water at a cost that is equal to or lower than the cost of developing Greenlight Water, OAR 690-086-0130(7)(a) requires the WMCP to include a schedule for development of these conservation measures, unless:

- The supplier has provided sufficient justification for the factors used in selecting development of Greenlight Water under the extended permit to meet projected demands during the next 20 years;

OR

- The supplier serves a population of less than 1,000.

As discussed previously under “[Results of the Alternative Source Analysis](#)” (pg. 99) above, a water supplier will determine what mix of source supply (*i.e.*, *water source development, water conservation, and/or interconnections*) is most appropriate for meeting their forecasted 20-year water demands. The WMCP needs to document the supplier’s basis and provide justification for the source(s) selected to meet those projected demands. To satisfy OAR 690-086-0130(7)(a), the WMCP must convey a good faith effort by the water supplier to understand the economic costs associated with each of the selected source(s).

Examples of documentation and/or justification include, but are not limited to, the following:

- **Example 1:**

“The City serves a population of 735. Therefore, this requirement does not apply.”

- **Example 2:**

“The City projects its 20-year water demands will reach 12.0 cfs. Its currently-available supply is 6.0 cfs. The City estimates that increased investment in a combination of conservation measures over the next 10 years will cost about \$150,000 per 1.0 cfs of supply conserved, while the cost of upgrading its diversion works to pump an additional 6.0 cfs of Greenlight Water under its extended permit will cost \$500,000 (or about \$83,000 per 1.0 cfs of water).

However, closer analysis of conservation opportunities revealed to the City that the first 1.0 cfs of conservation can be achieved at a relatively low cost of \$50,000 and it is the additional conservation results that are more expensive to achieve. So, the City can invest \$50,000 in cost-effective conservation and only need to upgrade the diversion works to provide 5.0 cfs of additional supply from the source stream.

The total cost of the additional supply will end up being \$50,000 for 1.0 cfs of conserved water plus \$415,000 to upgrade the diversion works to pump an additional 5.0 cfs of new water for a combined cost of \$465,000. The City can save \$35,000 through this approach and leave 1.0 cfs in the source stream. The City will, therefore, only request access to 5.0 cfs of Greenlight Water instead of 6.0 cfs.

The City's schedule for development of these similar or lower cost conservation measures is as follows: In year 1 the City will invest \$5,000 in public education and outreach efforts; in years 2 and 3 it will invest \$25,000 to replace a short stretch of 8-inch line along Third Street identified by a previous leak detection survey; and in years 4 and 5 the City will invest \$20,000 to replace approximately 80 older residential meters in the Highland Road neighborhood.

- **Example 3:**

“As shown in the Water Conservation section of its WMCP, the City has implemented an effective program of water conservation activities for the past 20 years. The City's current system-wide water losses are only 6%, so there is a limited amount of additional water savings that may be achieved.

The City also explored the possibility of offering a \$50 rebate to its customers for replacing old, inefficient toilets with modern water-efficient models. Currently the City has about 3,000 older homes that could benefit from this rebate. If half of these homes took advantage of the rebate and installed the water efficient toilets, it would cost the City roughly \$100,000 to implement and administer the program and would yield approximately 0.5 cfs in water supply savings.

The City anticipates needing an additional 3.0 cfs of water to meet its projected 20-year water demands. While the City's extended permit was originally issued for 8.0 cfs, the diversion of water is currently limited to no more than 1.0 cfs by the Development Limitations established in the permit extension approval order. The City's diversion structure and treatment plant associated with this extended permit are currently in place and have the capacity to divert and treat up to 4.0 cfs of water without additional cost to the City.

For these reasons, the City determined that additional investments in conservation would not provide water at a cost that is equal to or lower than the cost of developing Greenlight Water under the extended permit. Therefore, in addition to the 1.0 cfs currently authorized, the City is requesting access to 3.0 cfs of Greenlight Water (for a combined total of 4.0 cfs) under the extended permit to help meet its projected water demands.”

3) Amount of Greenlight Water Being Requested

For Greenlight Water requests, the WMCP must also provide a quantification of the amount of Greenlight Water (in cfs or af) being requested under *each* individual extended permit. In other words, considering its other currently available sources, how much water under the extended permit (*i.e., beyond current Development Limitations*) is expected to be necessary for the supplier to meet its projected 20-year demands?

To answer this question, the supplier first needs to know if there are any Development Limitations imposed upon extended permit(s) they hold. These limitation conditions (if any) are found in final orders approving a supplier's Permit Extension(s) of Time and/or previous WMCP.

Next, it is suggested that the supplier use the “*Greenlight Water Worksheet*” found in [Appendix D](#) (or refer to “[Exhibit 1.6 - Greenlight Water Worksheet](#)” on pg. 27) to help determine whether a request for authorization to access Greenlight Water under an extended permit is necessary. More information about extended permits, Development Limitations and Greenlight Water can be found under “[Extended Permits and Greenlight Water](#)” (pg. 17) in Chapter 1.

An example of a quantification of Greenlight Water being requested in a WMCP is as follows:

- **Example 1 – Greenlight Water Request:**

“The City has determined that, because of its aggressive conservation efforts over the past decade and low leakage estimate of just 6%, additional investments in conservation would not provide water at a cost that is equal to or lower than the cost of developing Greenlight Water under the extended permit.

The City currently holds two water rights. Permit S-112233 for 0.6 cfs out of the Willamette River and extended Permit G-123456 for 3.0 cfs from a well field. The diversion of water under Permit G-123456, however, is currently limited to no more than 0.5 cfs (out of the permitted 3.0 cfs) by the Development Limitations condition in the final order approving the Extension of Time for Permit G-123456. The City’s projected peak water demands are expected to reach 2.6 cfs in the next 20 years. To meet these peak demands, in addition to the 0.6 cfs under Permit S-112233 and the currently authorized 0.5 cfs under extended Permit G-123456, the City will need access to 1.5 cfs of Greenlight Water under extended Permit G-123456.”

Please note that for those suppliers **not** requesting access to Greenlight Water, the WMCP needs to include a clear statement to that effect. For example, the WMCP can simply include a statement, such as:

- **Example 2 –Greenlight Water NOT Requested:**

*“The City is **not** requesting any access to Greenlight Water under extended Permit G-123456.”*

4) Legally Required Mitigation

The final part of a request for Greenlight Water is that the WMCP must identify whether any mitigation is legally required to address limitations or restrictions on the development of the supplier’s permits for which environmental resource issues are identified under OAR 690-086-0140(5)(i). These environmental resource issues include: 1) Any streamflow-dependent species present in the source(s) that are listed by a state or federal agency as sensitive, threatened or endangered; 2) Any listing by DEQ of the source(s) as being water quality limited; and 3) Any designation by OWRD of the source(s) as being located within a critical ground water area.

If the supplier is legally required to provide mitigation to lessen the impact of its use of water from a source with environmental resource issues, the WMCP must include documentation that the supplier is complying with those mitigation requirements. Acceptable documentation may include a written, signed statement by a City official, public works director, water manager, city manager or other similarly knowledgeable person stating the water supplier is in compliance with the specific mitigation obligations. Copies of streamflow gage records, water diversion and productions records, or other similar data tracking records may also be provided to document compliance. A copy of a letter stating the supplier is in compliance with the mitigation requirement received from the regulatory agency imposing the mitigation is also an acceptable form of documentation.

Examples of different types of legally required mitigation and documentation to demonstrate a supplier's compliance with the required mitigation may include, but are not limited to, the following:

- **Example 1:**

“The City holds Permit S-456789 for which a final order approving an Extension of Time was recently issued. As a result of the extension approval, the diversion of water under Permit S-456789 is currently limited to no more than 4.0 cfs (out of the permitted 10.0 cfs). In addition, a specified undeveloped portion of 6.0 cfs under Permit S-456789 is conditioned (based on advice from the Oregon Dept. of Fish & Wildlife) to maintain the persistence of listed fish species in the Willamette River. The attached letter, signed by the water department manager, states the diversion pump has not operated above 4.0 cfs (see attached pump diversion records). The City has not used any of the undeveloped portion of Permit S-456789 (i.e., 6.0 cfs) conditioned by the Extension of Time final order dated February 8, 2010, to maintain the persistence of listed fish.”

- **Example 2:**

“Eight years ago, the City received a final order approving an Extension of Time for Permit S-357914. The extension approval included a condition limiting the diversion under the permit to 5.0 cfs (the developed portion out of the permitted 12.0 cfs) and requiring submittal of a WMCP within 3 years. The extension approval also conditioned (based on advice from the Oregon Dept. of Fish & Wildlife) the specified undeveloped portion of 7.0 cfs under Permit S-357914 to maintain the persistence of listed fish species in South Bend River. As outlined in the Extension final order, the maximum amount of the undeveloped portion that can be diverted may be reduced as a result of the fish persistence condition.

The City submitted the required WMCP within 3 years, which included a request to access 3.0 cfs of Greenlight Water (i.e., undeveloped portion) under the permit. Upon OWRD's approval of the WMCP and Greenlight Water request, the City began diverting the newly authorized amount of 8.0 cfs under Permit S-357914, of which 3.0 cfs is conditioned to maintain the persistence of listed fish species.

Over the last four years since that WMCP approval, the maximum amount of the undeveloped portion (i.e., 3.0 cfs) needed to be reduced 6 times to meet the fish persistence condition. A signed letter from the Public Works Director is attached describing these diversion reductions, as outlined in the Extension final order dated January 5, 2009. Copies of streamflow gage records for that same time period are also attached.

- **Example 3:**

“The City constructed a new water intake and treatment plant on Fern Creek. Most of the year, Fern Creek supplies a reliable amount of streamflow to meet the City's projected 20-year demands. In a typical year, however, the City's peak water demands coincide with the period when the creek is at its lowest stage of flow (generally during the months of August and September). The National Marine Fisheries Service (NMFS) issued a Biological Opinion that sets minimum instream flows on Fern Creek and imposes water withdrawal restrictions to protect fish habitat during periods of low flow when instream requirements are not met. The City's intake has sensors in place to monitor when flow levels in the creek fall below the minimum instream flow requirements (0.9 cfs as determined by NMFS). During these low flow periods, the City switches to using its ground water sources to meet demands. The attached signed letter from the City's Public Works Director, John Q. Wrench, documents the number of times and duration in the past 5 years the City has needed to utilize groundwater to meet its mitigation obligation (17 times for 57 days total). Also included are copies of streamflow monitoring data records, and a letter from NMFS stating the City is in compliance with the instream flow requirement.”

- **Example 4:**

“The City’s ground water Permit G-191919 includes conditions for mitigating impacts to surface water. The permit requires the delivery of 5,000 gallons of water per day to the wetlands adjacent to Hawkeye Creek during the months of September and October. It also requires that, at any time Permit S-191919 is being used, the City is to deliver all clarified backwash water from the water treatment plant to the wetlands adjacent to Hawkeye Creek. The City’s delivery of ground water under Permit G-191919 and the backwash water from the water treatment plant to the wetlands are both metered. Copies of meter records are attached to document the required mitigation deliveries to the wetlands.”

- **Example 5:**

“In order to offset impacts to water quality resulting from the City’s diversion of water from Rock Creek, the Oregon Department of Environmental Quality (DEQ) required riparian tree planting along a 0.25- mile stretch of Rock Creek located immediately downstream of the City’s diversion intake structure. As stated in the city manager’s signed letter, the City has complied with DEQ’s requirement by planting 300 seedlings each on the north and south banks of Rock Creek just downstream of the intake. Copies of receipts for the tree stock and labor are attached. Also attached as photographs of the planted riparian area, as well as the required annual tree survey reports submitted to DEQ for the last 8 years.”

If the supplier is **not** legally required to provide mitigation, the WMCP needs to include a clear statement to that effect. For example, the WMCP can simply include a statement, such as:

- **Example 6:**

*“The City is **not** required at this time to take any mitigation actions under state or federal law in relation to the development of its permits for which environmental resource issues are identified under OAR 690-086-0140(5)(i).”*

How do I know if my request for Greenlight Water was granted?

Upon receipt of a WMCP that includes a request for authorization to access Greenlight Water, OWRD will evaluate the water supplier’s documented need for the additional water under the extended permit(s) (*i.e., the Greenlight Water request*). If the WMCP provides clear justification that use of the water is necessary to meet demands for the next 20 years and that the water supplier is managing and conserving its water in a responsible manner, OWRD may authorize the use of Greenlight Water under the extended permit(s).

Any final order approving a WMCP and authorizing access to Greenlight Water will clearly remove the previous Development Limitations condition and include a new condition granting access to a greater rate of diversion (up to the maximum permitted rate) under the extended permit(s). Inclusion of this condition establishes a new Development Limitation on the extent to which the supplier is allowed to divert water under the extended permit(s).

Conversely, a final order approving a WMCP may conclude that the Greenlight Water request is **not** justified. In this case, the final order approving the WMCP will state that access to Greenlight Water is **not** granted and that the previously imposed Development Limitations condition remains unchanged.

It is important to note that Greenlight Water under an extended permit may **not** be used *until* OWRD issues a final order that both: **1)** approves the WMCP; **and 2)** authorizes access to the Greenlight Water.

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CHAPTER 6

COMPLETING & COMPILING THE WMCP



Snake River near Ontario, Oregon, photo: Curtis Fry

WMCP Submittal to OWRD

OWRD's Review of WMCPs

OWRD's Approval or Denial of a WMCP

Requirements After WMCP Approval

“...if our watersheds are not healthy, then we have truly squandered our heritage and mortgaged our future.”

- John Kitzhaber, Governor of Oregon



Hyperlinks

Throughout this document, **hyperlinks** are used to aid the reader by providing the ability to quickly “jump” to other referenced sections or items located throughout this document and on the web.

To return to the spot where you were *before* “jumping” to a hyperlink destination, simply press the “**Alt + left arrow**” keys at the same time.



WMCP Submittal to OWRD

Finalization and Submittal of the WMCP

OAR 690-086-0125

When a water supplier completes the various elements described in the previous chapters, they are ready to be assembled into a complete WMCP. OAR 690-086 does not prescribe an exact format or organization for the WMCP, apart from the requirement that it contain the four main elements: *Water Supplier Description*, *Water Conservation*, *Water Curtailment*, and *Water Supply*. [Appendix F](#) contains a sample outline of a WMCP document which water suppliers may wish to use or modify.



One thing water suppliers can do to help streamline OWRD's review of a WMCP is to use the optional WMCP Checklist found in Chapter 1 (see "[Exhibit 1.5 – WMCP Checklist](#)" (pg. 25) and include it with their WMCP. Identifying the section or page number associated with each item required by OAR 690-086 allows the OWRD reviewer to quickly locate those items within the WMCP. This also helps to ensure that the supplier and OWRD are "on the same page" when it comes to reviewing your WMCP. It also makes communication during the review process easier. Lastly, including "N/A" for sections the supplier believes are not applicable to their situation assists OWRD in understanding why an item may be missing.

In addition to the required elements listed above, there are three additional items that a complete WMCP must include to comply with OAR 690-086-0125. These items are:

- A list of the [affected local government\(s\)](#) to whom the plan was made available and a copy of any comments received from them. (NOTE: It is helpful, but not required, to indicate how the WMCP has been modified to address any comments received.);
- A [proposed date for submittal of an updated WMCP](#), within no more than 10 years. The date is to be based upon the proposed schedule for implementation of conservation measures, schedules for other community planning activities, and the rate of growth or other anticipated changes. If a water supplier determines that submittal of an updated plan should not be required by OWRD, they must explain the reason(s) why. Please note it is in extremely unusual circumstances that OWRD would not require submittal of an updated WMCP; and
- Some municipal water suppliers may find it necessary to request [additional time to implement full metering, or to complete a conservation benchmark listed in its previous WMCP](#) (if applicable). If this is true, the water supplier must explain why additional time is needed. OWRD will evaluate this request based on whether additional time is needed to avoid unreasonable and excessive costs.

Once the WMCP is assembled and is made available to local governments for review and comment, it is ready to be submitted to OWRD for review. Most suppliers mail a single hard copy, along with an electronic version of the plan on CD, to OWRD. Be sure to provide OWRD with a copy of any comments received from the affected local governments, as well as the [required statutory fee](#) for submittal of the WMCP. See pages 23 and 24 in Chapter 1 for more detailed information about the above-listed items.

Intake and Initial Processing of a WMCP

OAR 690-086-0905 & -0910

Upon receipt of the draft WMCP, OWRD will ensure that all affected local governments were provided at least 30 days to review the draft WMCP and that the required statutory fee for submittal of a WMCP is included. Only then can OWRD begin processing the WMCP submittal.

OWRD will publish notice of receipt of the draft WMCP on its weekly public notice (in accordance with OAR 690-086-0905). Any person may review and submit written comments on the draft WMCP within 30 days of the notification. Written public comments will be considered during OWRD's review of the draft WMCP along with comments received from affected local governments relating to the WMCP's consistency with their comprehensive land use plan(s). In addition, any comments received as a result of OWRD's public notice will be shared with the water supplier as part of OWRD's review comments on the draft WMCP.

OWRD's Review of WMCPs

OWRD Review and Criteria for WMCP Approval OAR 690-086-0130

OWRD's review comments on the draft WMCP are prepared in accordance with the approval criteria, as defined under OAR 690-086-0130. The criteria for approval of a WMCP are:

- The WMCP includes all elements required under OAR 690-086-0125: Water Supplier Description, Water Conservation, Water Curtailment, Water Supply, affected local government notice, proposed WMCP update schedule and, if applicable, a request for more time to implement full metering or other established benchmark;
- Water needs over the next 20 years are demonstrated using information from appropriate planning documents;
- The WMCP includes a reasonable and appropriate schedule with five-year benchmarks for implementation of required conservation measures;
- The manner in which recommended conservation measures were evaluated is suitable;
- Environmental concerns and resource issues identified for the supplier's source(s) are accurate and complete;
- The curtailment plan satisfactorily promotes effective curtailment practices; and
- If Greenlight Water is being requested, the WMCP includes an assessment and a cost comparison of alternative water sources, including conservation and a description of the supplier's compliance with mitigation requirements.

OWRD will complete a review worksheet documenting how each item required under OAR 690-086-0125 through OAR 690-086-0170 either meets the rule requirement or does not meet the rule requirement. OWRD's review worksheet will identify the page or section number where relevant information was found (or *not* found) in the WMCP. If a rule requirement is not met, the review worksheet will indicate what is needed in order to comply with the requirement. For reference, an example copy of the "[OWRD Internal WMCP Review Checklist](#)" is provided in [Appendix E](#).

When review of the draft WMCP is complete, OWRD will send a review package to the water supplier. The package will include the following:

- A cover letter indicating OWRD completed its review of the WMCP and outlining options and next steps for the supplier;
- OWRD's completed internal WMCP review worksheet with comments;
- Copies of any comments received as a result of OWRD's public notice; and
- Any other documentation associated with the WMCP review.

In many cases, a draft WMCP will need some modifications prior to approval by OWRD. The necessary modifications will be identified in OWRD’s review comment worksheet and cover letter. A supplier can choose to either submit these modifications by using red-line edits or track-changes within a draft revised WMCP or by providing written information identifying revisions to address OWRD’s review comments. The revisions will be evaluated in OWRD’s final review of the WMCP.

Final Review of a WMCP

OAR 690-086-0915(1)&(3)

Upon receipt of a proposed final WMCP (revised as needed), OWRD will evaluate the WMCP to determine if it includes the required elements of OARs 690-086-0125 and 690-086-0130. This final evaluation is limited to modifications made in the WMCP to address issues that were identified in OWRD’s written review comments provided under OAR 690-086-0910. If it is determined that the proposed final WMCP (as revised) still does not include all of the required elements, OWRD will: consult with the water supplier; cite the relevant statute or rule that is not satisfied; and may provide additional time for the supplier to correct the deficiencies.

Based upon the results of the final review, there are three determinations OWRD can make on a WMCP, as illustrated in “[Exhibit 6.1 – Water Management & Conservation Plan \(WMCP\) Review Process](#)” (pg. 119). These potential determinations are also summarized in the table below:

Table 6.1 – Potential Outcomes of Final WMCP Review

Approval	Approval with a Work Plan Condition	Denial
<ul style="list-style-type: none"> ▪ Final order issued to approve the WMCP 	<ul style="list-style-type: none"> ▪ Final order issued to approve the WMCP with Work Plan conditions 	<ul style="list-style-type: none"> ▪ Final order issued to deny the WMCP
<ul style="list-style-type: none"> ▪ 10 year update schedule 	<ul style="list-style-type: none"> ▪ 5 year update schedule 	<ul style="list-style-type: none"> ▪ Cannot approve requests for Greenlight Water
<ul style="list-style-type: none"> ▪ 5 year progress report 	<ul style="list-style-type: none"> ▪ Work Plan requirements must be completed within 5 years 	<ul style="list-style-type: none"> ▪ Opportunity for supplier to appeal the OWRD denial <i>OAR 690-086-0915(6)-(10)</i>
<ul style="list-style-type: none"> ▪ Ability to approve Greenlight Water, if requested 	<ul style="list-style-type: none"> ▪ Cannot approve requests for Greenlight Water beyond need quantified for the next 2 years 	

OWRD’s Approval or Denial of a WMCP

Once a WMCP is submitted and evaluated by OWRD, it can be: 1) Approved; 2) Approved with a Work Plan Condition; *or* 3) Denied. Each of these is discussed in further detail below.

WMCP Approval

OAR 690-086-0915(4)

For a WMCP submitted by a municipal water supplier, if OWRD determines the proposed final WMCP (as revised) includes the required elements under OAR 690-086- 0120 to 690-086-0170 and meets the applicable criteria under OAR 690-086-0130, OWRD shall issue a final order approving the WMCP and shall notify the water supplier and any person(s) who submitted comments (*pursuant to OAR 690-086-0905*) of the approval.

OWRD’s final order will include and specify the following:

- **Duration of Plan Approval** – The date through which approval of the WMCP is in effect;
- **Plan Update Schedule** – The date on which an updated WMCP must be submitted to OWRD [*Standard typically 10 years (not less than 5 years); if approved with Work Plan, typically 5 years*];
- **Progress Report Schedule** – A schedule for submittal of a five-year progress report on implementation of water conservation and supply measures described in the WMCP. See “*Five-Year Progress Reports*” below for more information;
- **Development Limitation(s)** – For WMCPs that request access to Greenlight Water under an extended permit, a quantification of the maximum amount of water that may be diverted during the next 20 years under each extended permit (if any), or for a longer period as specified for an extended reservoir permit (if any); and
- **Other Requirement(s) for Plan Submittal** – Notification that the WMCP final order approval does not relieve the water supplier from any existing or future requirement(s) for submittal of an updated WMCP at an earlier date as established through other final orders (if any) issued by OWRD.

A water supplier may submit an updated WMCP at any time prior to the date specified in the final order approving the WMCP, if necessary, to accommodate unanticipated events.

WMCP Approval with a Work Plan Condition **OAR 690-086-0900(3)&(4)**

The Department may approve a WMCP with a Work Plan condition if the plan is generally consistent with the applicable criteria and includes a schedule for completion within five years of any additional work necessary to satisfy the requirements.

After submitting a WMCP and revising it (as needed) to address comments from OWRD, some WMCPs may be generally consistent with OAR 690-086, but still not *fully* meet all of the requirements. In these cases, OWRD may require the water supplier to develop and implement a Work Plan in order to meet all of the requirements. The Work Plan will include a schedule for completion of any additional work necessary to comply with WMCP requirements. Water suppliers who are required to comply with a Work Plan will generally be given five years to accomplish the additional work needed to meet WMCP requirements and to submit an updated WMCP.

It is important to note that a final order approving a WMCP with a Work Plan requirement will restrict the quantity of Greenlight Water (if requested) that may be diverted by the supplier. As required by OAR 690-086-0900(4), for WMCPs approved with a Work Plan, OWRD **cannot** authorize access to Greenlight Water under an extended permit beyond the amount of water needed to meet the supplier’s projected demands for the next **two** years (*i.e., the projected two-year demand for water*).

What is a “Work Plan?”

OAR 690-086 recognizes that in some instances a water supplier may be unable to provide all required elements of a WMCP at the time of review. In this case, a water supplier may negotiate a “Work Plan” with OWRD to complete the missing elements.

Approval of a WMCP with a Work Plan Condition will typically require the water supplier to complete the Work Plan items within the next five years. In general, a Work Plan will outline the steps necessary to fully satisfy the requirements of OAR 690-086.

OAR 690-086-0900(3)

WMCP Denial

OAR 690-086-0915(6)–(10)

The Department shall issue a final order denying approval of the WMCP and notify the water supplier and any person who submitted comments (pursuant to OAR 690-086-0905) of issuance of the final order **if**:

- OWRD determines the proposed final WMCP (as revised) does **not** contain the plan elements required under OAR 690-086-0125;
- The WMCP does **not** meet the criteria under OAR 690-086-0130;
- The supplier has failed to adequately justify a request for additional time to implement water metering under OAR 690-086-0150(4)(b) or a benchmark established in a previously approved WMCP; or
- The Work Plan submitted under OAR 690-086-0900(3) is insufficient for completing the additional work necessary to satisfy the requirements of OAR 690-086.

If OWRD denies a water supplier's WMCP, the water supplier may request that OWRD reconsider the order and that the Director appoint a five-member review board to review the WMCP. After reviewing the WMCP and evaluating any additional information presented by the water supplier and/or OWRD, the review board may recommend that OWRD:

- Reconsider the decision not to approve the WMCP;
- Reconsider the decision not to approve the WMCP contingent on the water supplier agreeing to specified modifications; or
- Reaffirm the original decision not to approve the WMCP.

OWRD will notify the water supplier, members of the review board, and any person who submitted comments (pursuant to OAR 690-086-0905) of any action taken based on the review board's recommendation.

Following the review board's decision, the water supplier or a person who has submitted comments (pursuant to OAR 690-086-0905) may, within 30 days of notification, appeal the decision to approve or deny the WMCP to the Water Resources Commission (Commission). The Commission may:

- Deny the appeal; or
- Accept the appeal and remand the WMCP to OWRD to seek resolution of the issues identified in the appeal and, if the issues are not resolved, to initiate a contested case proceeding.

Requirements After WMCP Approval

After completion and approval of the WMCP, the water supplier must manage water resources for which they were approved in a diligent and efficient manner. This includes following through with the action items (*i.e.*, *5-year benchmarks*) identified in the conservation section of the WMCP and any other action items identified in other sections. Water suppliers must make progress on the benchmarks proposed and approved in their WMCPs and ensure those benchmarks are met. Suppliers must also track when progress reports are due and when the next WMCP update is required to be submitted to OWRD. See "[WMCP Five-Year Progress Reports](#)" and "[WMCP Updates](#)" on the following page for further detail.

WMCP Five-Year Progress Reports

OAR 690-086-0120(3)–(5)

For WMCPs that are approved with a 10-year update schedule, submittal of a 5-year progress report will be required. These progress reports must:

- Include a list of the five-year benchmarks established in the supplier’s approved WMCP;
- Describe the supplier’s progress toward implementing the conservation benchmarks established in the approved WMCP;
- Provide water use data for the last five years (*i.e., average monthly and average daily diversions*) for each water right held by the supplier;
- Describe the results of the supplier’s annual water audit; and
- Provide a comparison of water quantities used in each customer class, as reported in the approved WMCP, with the quantities of water used in each customer class over the last five years.

Upon receiving a progress report, OWRD will publish notice of its receipt of the progress report in its weekly public notice and provide an opportunity for written public comment. OWRD will provide copies of any public comments received to the water supplier.

The progress reports will help OWRD determine whether a water supplier is being diligent in developing its water use permit(s) and implementing its established conservation benchmarks. The progress report will be used by OWRD when considering approval of the supplier’s next WMCP update. A “[Sample WMCP Five-Year Progress Report](#)” is included in [Appendix I](#).

WMCP Updates

OAR 690-086-0915(4)

A water supplier needs to be prepared to periodically update their WMCP. OAR 690-086 requires a WMCP to be updated at least every 10 years. In some cases, however, a water supplier may be required to update a WMCP in 5 years (*e.g., if the system is not yet fully metered, if other OAR 690-086 requirements are not satisfied, and/or a Work Plan was required*).

An updated WMCP will be a full plan (resembling the original WMCP) that addresses all applicable requirements of OAR 690-086, as follows:

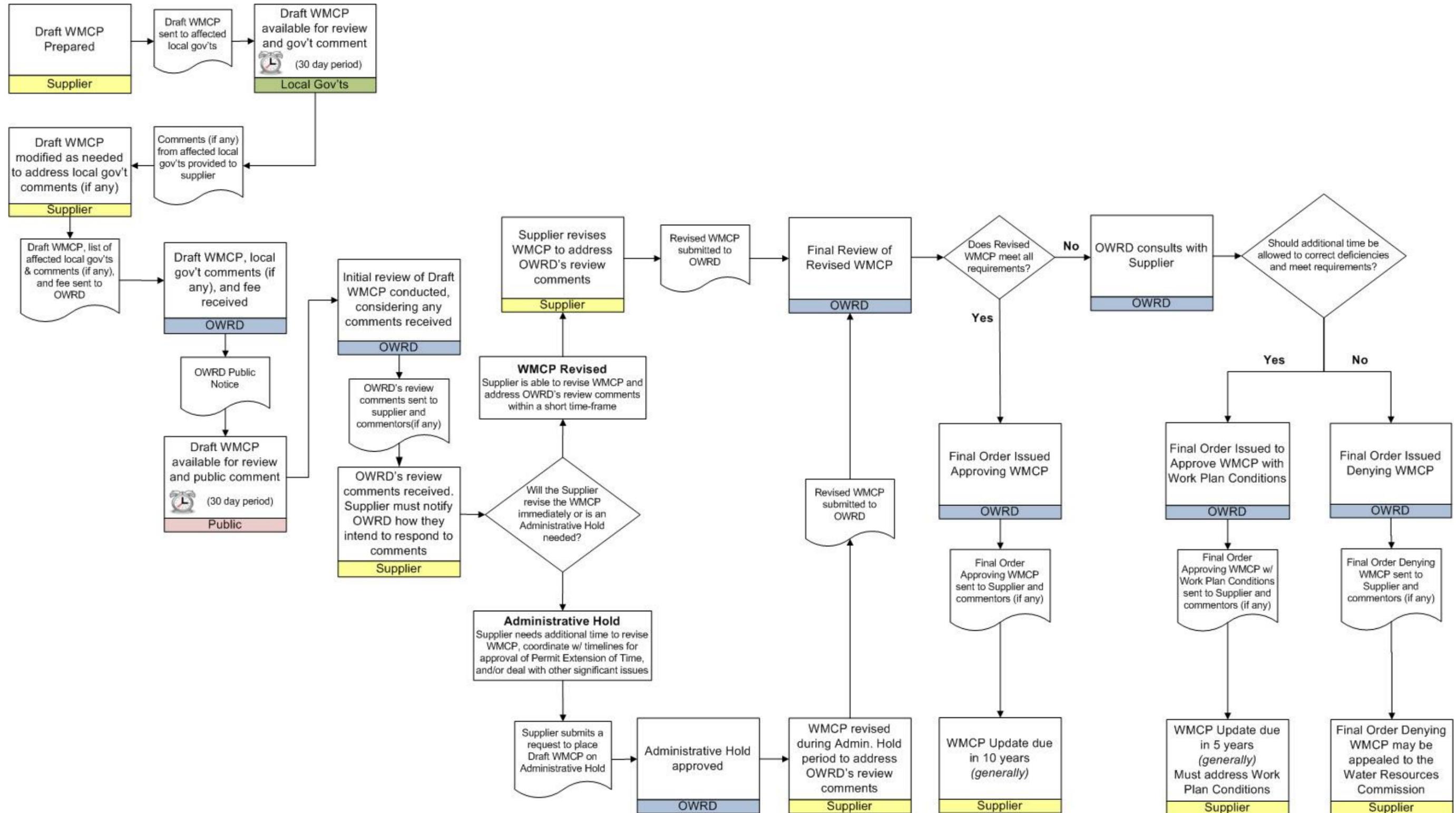
- At least 30 days *prior to* submitting an updated WMCP to OWRD, the water supplier must make the updated WMCP available for review by each affected local government along with a request for comments relating to consistency with the local government’s comprehensive land use plan;
- The updated WMCP must include a list of *all* affected local government(s) to whom the updated WMCP was made available, as well as a copy of any comments on the updated WMCP provided by those local governments;
- The statutory fee for submittal of a WMCP (or updated WMCP) set forth in [ORS 536.050\(1\)\(u\)](#);
- The updated WMCP must include the following elements:
 - a municipal water supplier description as described under OAR 690-086-0140;
 - a municipal water conservation element as described under OAR 690-086-0150 that includes a summary of progress made on implementation of 5-year conservation benchmarks scheduled in the supplier’s most recent previously approved WMCP;
 - a municipal water curtailment element as described under OAR 690-086-0160; and
 - a municipal water supply element as described under OAR 690-086-0170;

- If the supplier's previous WMCP was approved contingent upon the completion of certain Work Plan activities, the updated WMCP must describe and document the status of the supplier's implementation and completion of those required Work Plan actions.
- The updated WMCP must include a proposed date for submittal of the next updated WMCP within no more than 10 years; and
- If the updated WMCP is requesting additional time to implement metering as required under OAR 690-086-0150(4)(b) or a benchmark established in a previously approved WMCP, documentation showing additional time is necessary to avoid unreasonable and excessive costs.

For further detail about these requirements, refer to OAR 690-086-0120(8) and OAR 690-086-0125 (found in [Appendix A](#)) and see [Chapter 1](#) of this guidebook.

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Exhibit 6.1 – Water Management & Conservation Plan (WMCP) Review Process



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APPENDIX



Buena Vista Overlook, Malheur National Wildlife Refuge, photo: Jeff Sorn, ODOT

OWRD Internal WMCP Review Worksheet (Appendix E)

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Appendix A

Oregon Administrative Rule 690-086 (OAR 690-86) Water Management and Conservation Plans

690-086-0010

Purpose

- (1) The Water Resources Commission has adopted a statewide policy on Conservation and Efficient Water Use (OAR 690-410-0060). The policy requires major water users and suppliers to prepare water management and conservation plans. These rules provide a process to ensure the efficient use of the state's water resources and to facilitate water supply planning consistent with water supplier and Department capabilities. The Commission shall evaluate implementation of these rules within three years and every three years thereafter.
- (2) Many regions of Oregon face periodic and increasingly frequent water shortages during summer periods. Urbanization is resulting in a continually expanding need for municipal water supplies. In addition, many communities are faced with the need to reduce their impacts on the resource in response to state or federal listings of streamflow-dependent species as sensitive, threatened or endangered, water quality problem, and other flow issues. It is increasingly important to the state's economy to maintain adequate stream flows to support aquatic life, provide recreational opportunities and maintain water quality. The continued implementation of conservation measures can help restore streamflows, stabilize water supplies and provide for future needs for economic development and growth.
- (3) Pursuant to ORS 540.610(3) the use of water at a rate or duty which is less than the maximum amount allowed under a water right that is achieved through improved water management practices is not a forfeiture under certain circumstances. However, conserved water may only be used on additional acres or for other purposes not included in the original right after allocation of conserved water under ORS 537.455 to 537.500 or under other specific statutory authorizations.
- (4) Effective water management requires an evaluation of the adequacy of water supplies to meet current and future needs, identification of planned modifications in water systems, and development of new water supplies. However, the approval of a water management and conservation plan shall not substitute for compliance with Statewide Planning Goals or any other comprehensive land use planning requirement or constitute approval of applications for water rights, water reservations, water storage facilities, transfers, permit amendments, or extensions of time for permits.
- (5) Water management and conservation plans will provide information important in water resources planning and management. In addition, the plans may provide support for applications for water use permits and water right transfers, permit amendments, and requests for extensions of permits, approvals of exchanges, and reservations of water. Due regard shall be given to any relevant approved water management and conservation plans during Department consideration of these applications and requests.

- (6) Regional cooperation will improve water management and help to facilitate implementation of conservation measures. Water suppliers required under OAR 690-086-0010 to 690-086-0920 to prepare water management and conservation plans, and any other suppliers or users, may jointly submit a single plan that addresses the suppliers' conservation opportunities and water development needs.
- (7) A water management and conservation plan that has been approved under these rules may, at the option of the water supplier, be used to satisfy a condition requiring preparation of a conservation plan in an emergency use permit issued pursuant to OAR 690-019-0040 and a requirement for submittal of a curtailment plan in times of a declared or likely drought under an order issued pursuant to ORS 536.780 and OAR 690-019-0090.
- (8) Many water use permits that have been issued to water suppliers include conditions requiring preparation of water conservation, long-term water supply, and other water management plans. These rules provide standards for the preparation of such plans. Unless other more specific or stringent requirements are included in a permit, water management and conservation plans that have been approved under OAR 690-086-0915 shall be deemed to meet the permit condition.

Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572

Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010

Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02

Definitions

690-086-0020

General Definitions

As used in OAR 690-086-0010 to 690-086-0920:

- (1) "Affected local governments" means any local government as defined in OAR 690-005-0015, within whose jurisdiction the diversion, conveyance, or use of water is established or proposed within the context of the water management and conservation plan.
- (2) "Commission" means the Water Resources Commission.
- (3) "Conservation" has the meaning provided in OAR 690-400-0010.

NOTE: OAR 690-400-0010(5) defines conservation as eliminating waste or otherwise improving efficiency in the use of water while satisfying beneficial uses by modifying the technology or method for diverting, transporting, applying or recovering the water; by changing management of water use; or by implementing other measures.

- (4) "Department" means the Water Resources Department.
- (5) "Director" means the Director of the Water Resources Department or designee.

- (6) "Waste" has the meaning provided in OAR 690-400-0010.

NOTE: OAR 690-400-0010(16) defines waste as the continued use of more water than is needed to satisfy the specific beneficial uses for which a right was granted. The need for water shall be based on using the technology and management practices that provide for the efficient use of water considering:

- (a) The economic feasibility of use of the technology and management practices by the water user;
- (b) The environmental impacts of making modifications;
- (c) The available proven technology;
- (d) The time needed to make modifications;
- (e) Local variations in soil type and weather; and
- (f) Relevant water management plans and subbasin conservation plans.

Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
 Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
 Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0030

Definitions for Municipal Water Suppliers

As used in OAR 690-086-0100 to 690-086-0170 and 690-086-0900 to 690-086-0920:

- (1) "Authorized water uses" means all water uses known and approved by a municipal water supplier. These uses include all metered uses and any other approved uses such as fire-fighting, fire training, system operation needs, reuse, or miscellaneous uses.
- (2) "Benchmark" means the specific incremental activities that a municipal water supplier plans to have completed in implementing conservation measures.
- (3) "Extended permit" means a municipal or quasi-municipal water use permit conditioned by an extension order under OAR chapter 690, division 315 or 320 to provide that diversion of water beyond the maximum rate diverted under the permit or previous extension(s) shall only be authorized upon issuance of a final order approving a water management and conservation plan.
- (4) "Low water use landscaping" means conserving water through designing landscapes for low water use, irrigating efficiently, improving soil and planting low water use plants.
- (5) "Metering" means using water meters or other continuous recording devices to measure and to maintain a record of all water diverted and delivered.
- (6) "Municipal water supplier" means a publicly or privately owned water distribution system that delivers potable water for community needs, either to individual customers or another distribution system, or that delivers water primarily for commercial or industrial uses.

- (7) "System leak detection" means a program to monitor leakage throughout the transmission and distribution systems of a municipal water supplier.
- (8) "System leakage" means all water that is lost from a municipal water supply system, not including major breaks that are expeditiously repaired, and un-metered authorized or unauthorized uses.
- (9) "Water audit" means an analysis of a municipal water supply system that includes a thorough accounting of all water into and out of the system to identify system leakage and metered or estimated use for authorized and unauthorized water uses. The audit also includes an analysis of the water supplier's own water use to identify alternatives to increase efficiency.
- (10) "Water curtailment element" means a program to accomplish a specific reduction in the amount of water used or lost within a specific time in response to an emergency or other short-term shortage.
- (11) "Water service connections" means water supply connections to the water delivery system, including the water supplier's own connections, but does not include connections for uses such as fire hydrants, fire sprinkler systems with flow alarms or detector-checks, water line blow-offs and drains, stand-by emergency interties, valve controlled drinking fountains or other similar intermittently used equipment or facilities.

Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572

Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010

Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02, Renumbered from 690-086-0110

690-086-0040

Definitions for Agricultural Water Suppliers

As used in OAR 690-086-0210 to 690-086-0920:

- (1) "Agricultural water supplier" means any public or private organization, including but not limited to an irrigation district formed under ORS Chapter 545, a drainage district formed under ORS Chapter 547, a water improvement district formed under ORS Chapter 552, a water control district formed under ORS Chapter 553, a corporation organized under ORS Chapter 554, an unincorporated private association or a ditch company, the primary purpose of which is to supply water to others for agricultural uses.
- (2) "Agricultural water measurement" means using measuring devices, including but not limited to weirs, flumes, submerged orifices, gaging stations, and meters, to quantify the rate of flow and the volume of water in a water delivery system.
- (3) "Water allocation/curtailment element" means a program to equitably allocate, under existing priorities, a reduced water supply among the water right holders dependent on the supply in response to an emergency or other short-term shortage.

Stat. Auth.: ORS 536.027, 537.211 and 540.572

Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010

Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02, Renumbered from 690-086-0210

Municipal Water Management and Conservation Plans

690-086-0100

Applicability

- (1) Municipal water suppliers are encouraged to prepare water management and conservation plans, but are not required to do so unless a plan is prescribed by a condition of a water use permit; a permit extension; or another order or rule of the Commission.
- (2) Water management and conservation plans submitted in order to comply with a permit extension order issued after November 1, 2002, are subject to the requirements of these rules.
- (3) Until November 1, 2003, water management and conservation plans submitted for purposes other than to comply with a permit extension order issued after the effective date of these rules shall be reviewed under OAR Chapter 690, Division 86 adopted by the Commission in 1994, unless the water supplier requests the Department to apply the standards in these rules. After November 1, 2003, all new and updated water management and conservation plans are subject to these rules.

Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
 Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
 Hist.: WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0110 [Renumbered to 690-086-0030]

690-086-0120

General Provisions

- (1) Each municipal water supplier required to submit a water management and conservation plan shall exercise diligence in implementing the approved plan and shall update and resubmit a plan consistent with the requirements of these rules as prescribed during plan approval.
- (2) Benchmarks and implementation schedules for conservation measures and other water supply development activities may be modified through the subsequent approval of an updated plan.
- (3) Progress reports submitted by municipal water suppliers will be used in determining whether five-year benchmarks are being met, whether the Department will authorize additional diversion of water under extended permits, and/or if schedule changes proposed in updated plans are reasonable and appropriate.
- (4) Progress reports submitted by municipal water suppliers shall include:
 - (a) A list of the benchmarks established under OAR 690-086-0150 and a description of the progress of the municipal water supplier in implementing the associated conservation or other measure;
 - (b) Average monthly and daily diversions under each right held by the water supplier for the previous five years;

- (c) A description of the results of the annual water audit required under OAR 690-086-0150(4)(a); and
 - (d) A comparison of quantities of water used in each sector as identified and described in OAR 690-086-0140(6) with the quantities of water used in each sector for the previous five years.
- (5) Upon receipt of a progress report the Department shall give public notice in the weekly notice published by the Department and provide an opportunity for written public comment. The Department shall provide copies of any comments received to the municipal water supplier.
 - (6) A master plan prepared under the requirements of the Department of Human Resources Health Division or the water supply element of a public facilities plan prepared under the requirements of the Department of Land Conservation and Development which substantially meets the requirements of OAR 690-086-0125 to 690-086-0170 may be submitted to meet the requirements of these rules.
 - (7) In the development of a water management and conservation plan, each municipal water supplier shall consult with the planning departments or appropriate officials of affected local governments to obtain information related to demand projections in comprehensive land use plans early in the development of the plan.
 - (8) At least 30 days prior to submitting a draft plan to the Department, a municipal water supplier shall make the draft plan available for review by each affected local government along with a request for comments relating to consistency with the local government's comprehensive land use plan.
 - (9) Each municipal water supplier preparing a water management and conservation plan is encouraged to develop and implement a program to involve the supplier's customers in the preparation of the plan. Recommendations include making the plan available for public inspection and conducting public meetings to provide information and gather input on the plan.

Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572

Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010

Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0125

Municipal Water Supplier Plan Elements

A water management and conservation plan submitted by a municipal water supplier shall include:

- (1) A municipal water supplier description as described under OAR 690-086-0140;
- (2) A municipal water conservation element as described under OAR 690-086-0150;
- (3) A municipal water curtailment element as described under OAR 690-086-0160;
- (4) A municipal water supply element as described under OAR 690-086-0170;
- (5) A list of the affected local governments to whom the draft plan was made available pursuant to OAR 690-086-0120(6) and a copy of any comments on the plan provided by the local governments;

- (6) A proposed date for submittal of an updated plan within no more than 10 years based on the proposed schedule for implementation of conservation measures, any relevant schedules for other community planning activities, and the rate of growth or other changes expected by the water supplier; or an explanation of why submittal of an updated plan is unnecessary and should not be required by the Department; and
- (7) If the municipal water supplier is requesting additional time to implement metering as required under OAR 690-086-0150(4)(b) or a benchmark established in a previously approved plan, documentation showing additional time is necessary to avoid unreasonable and excessive costs.

Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
 Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
 Hist.: WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0130

Criteria for Approval of a Plan Submitted by a Municipal Water Supplier

In order to approve a plan by a municipal water supplier under OAR 690-086-0915, the Department must find that:

- (1) The plan includes each of the required elements under OAR 690-086-0125;
- (2) The projections of future water need in the water management and conservation plan are reasonable and consistent with available land use plans and the municipal water supplier has demonstrated a need for the quantity of water to be diverted during the next 20 years under each permit held by the supplier;
- (3) For each of the water conservation measures required under OAR 690-086-0150(4) and, as applicable, 690-086-0150(5), the plan includes a reasonable and appropriate schedule with five year benchmarks for implementation of conservation activities;
- (4) If applicable, for each of the water conservation measures required under OAR 690-086-0150(6), the plan includes:
 - (a) A reasonable and appropriate schedule with five year benchmarks for implementation of conservation activities; or
 - (b) Documentation to demonstrate that implementation of the measure is neither feasible nor appropriate to ensure efficient use of water and the prevention of waste and the supplier has used a suitable methodology in evaluating the measure;
- (5) The identification of resource issues under OAR 690-086-0140(5)(i) is accurate and complete;
- (6) The water curtailment element required under OAR 690-086-0160 satisfactorily promotes water curtailment practices and the coordination of usage regulation, taking into account state water law and local conditions, or is substantially the same as a curtailment plan prepared pursuant to ORS 536.780 and OAR 690-019-0090 and approved by the Department within the previous five years;

- (7) If during the next 20 years the maximum rate of water diverted under an extended permit will be greater than the maximum rate authorized for diversion under the extension or previously approved water management and conservation plan;
 - (a) The plan includes a schedule for development of any conservation measures that would provide water at a cost that is equal to or lower than the cost of other identified sources, unless the supplier has provided sufficient justification for the factors used in selecting other sources for development or the supplier serves a population of less than 1,000;
 - (b) Increased use from the source is the most feasible and appropriate water supply alternative available to the supplier; and
 - (c) If mitigation is legally required to address limitations or restrictions on the development of permits for which resource issues are identified under OAR 690-086-0140(5)(i), the plan contains documentation that the supplier is complying with the mitigation requirements. The Department may consult with federal and state agencies in making this determination; and
- (8) After January 1, 2042, for review of water management and conservation plans that propose to increase the maximum rate of water diverted under an extended permit that the additional diversion of water will not impair or be detrimental to the public interest.

Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0140

Municipal Water Supplier Description

The water supplier description element shall include at least the following information:

- (1) A description of the supplier's source(s) of water; including diversion, storage and regulation facilities; exchange agreements; intergovernmental cooperation agreements; and water supply or delivery contracts;
- (2) A delineation of the current service areas and an estimate of the population served and a description of the methodology(ies) used to make the estimate;
- (3) An assessment of the adequacy and reliability of the existing water supply considering potential limitations on continued or expanded use under existing water rights resulting from existing and potential future restrictions on the community's water supply;
- (4) A quantification of the water delivered by the water supplier that identifies current and available historic average annual water use, peak seasonal use, and average and peak day use;
- (5) A tabular list of water rights held by the municipal water supplier that includes the following information:
 - (a) Application, permit, transfer, and certificate numbers (as applicable);
 - (b) Priority date(s);
 - (c) Source(s) of water;

- (d) Type(s) of beneficial uses specified in the right;
 - (e) Maximum instantaneous and annual quantity of water allowed under each right;
 - (f) Maximum instantaneous and annual quantity of water diverted under each right to date;
 - (g) Average monthly and daily diversions under each right for the previous year, and if available for the previous five years;
 - (h) Currently authorized date for completion of development under each right; and
 - (i) Identification of any streamflow-dependent species listed by a state or federal agency as sensitive, threatened or endangered that are present in the source, any listing of the source as water quality limited and the water quality parameters for which the source was listed, and any designation of the source as being in a critical ground water area.
- (6) A description of customers served including other water suppliers and the estimated numbers; general water use characteristics of residences, commercial and industrial facilities, and any other uses; and a comparison of the quantities of water used in each sector with the quantities reported in the water supplier's previously submitted water management and conservation plan and progress reports;
 - (7) Identification and description of interconnections with other municipal supply systems;
 - (8) A schematic of the system that shows the sources of water, storage facilities, treatment facilities, major transmission and distribution lines, pump stations, interconnections with other municipal supply systems, and the existing and planned future service area; and
 - (9) A quantification and description of system leakage that includes any available information regarding the locations of significant losses.

Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
 Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
 Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0150

Municipal Water Conservation Element

The water conservation element shall include at least the following:

- (1) A progress report on the conservation measures scheduled for implementation in a water management and conservation plan previously approved by the Department, if any;
- (2) A description of the water supplier's water use measurement and reporting program and a statement that the program complies with the measurement standards in OAR chapter 690, division 85, that a time extension or waiver has been granted, or that the standards are not applicable;
- (3) A description of other conservation measures, if any, currently implemented by the water supplier, including any measures required under water supply contracts;

APPENDIX A

- (4) A description of the specific activities, along with a schedule that establishes five-year benchmarks, for implementation of each of the following conservation measures that are required of all municipal water suppliers:
 - (a) An annual water audit that includes a systematic and documented methodology for estimating any un-metered authorized and unauthorized uses;
 - (b) If the system is not fully metered, a program to install meters on all un-metered water service connections. The program shall start immediately after the plan is approved and shall identify the number of meters to be installed each year with full metering completed within five years of approval of the water management and conservation plan;
 - (c) A meter testing and maintenance program;
 - (d) A rate structure under which customers' bills are based, at least in part, on the quantity of water metered at the service connections;
 - (e) If the annual water audit indicates that system leakage exceeds 10 percent, a regularly scheduled and systematic program to detect leaks in the transmission and distribution system using methods and technology appropriate to the size and capabilities of the municipal water supplier; and
 - (f) A public education program to encourage efficient water use and the use of low water use landscaping that includes regular communication of the supplier's water conservation activities and schedule to customers;
- (5) If the municipal water supplier proposes to expand or initiate diversion of water under an extended permit for which resource issues have been identified under OAR 690-086-0140(5)(i), a description of the specific activities, along with a schedule that establishes five-year benchmarks, for implementation of a system-wide leak repair or line replacement program to reduce system leakage to no more than 15 percent or sufficient information to demonstrate that system leakage currently is no more than 15 percent.
- (6) If the municipal water supplier serves a population greater than 1,000 and proposes to expand or initiate diversion of water under an extended permit for which resource issues have been identified under OAR 690-086-0140(5)(i), or if the municipal water supplier serves a population greater than 7,500, a description of the specific activities, along with a schedule that establishes five-year benchmarks, for implementation of each of the following measures; or documentation showing that implementation of the measures is neither feasible nor appropriate for ensuring the efficient use of water and the prevention of waste:
 - (a) A system-wide leak repair program or line replacement to reduce system leakage to 15 percent, and if the reduction of system leakage to 15 percent is found to be feasible and appropriate, to reduce system leakage to 10 percent;
 - (b) Technical and financial assistance programs to encourage and aid residential, commercial and industrial customers in implementation of conservation measures;
 - (c) Supplier financed retrofitting or replacement of existing inefficient water using fixtures, including distribution of residential conservation kits and rebates for customer investments in water conservation;

- (d) Adoption of rate structures, billing schedules, and other associated programs that support and encourage water conservation;
- (e) Water reuse, recycling, and non-potable water opportunities; and
- (f) Any other conservation measures identified by the water supplier that would improve water use efficiency.

Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572

Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010

Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02, Renumbered from 690-086-0140(2)

690-086-0160

Municipal Water Curtailment Element

The water curtailment element shall include at least the following:

- (1) A description of the type, frequency and magnitude of supply deficiencies within the past 10 years and current capacity limitation. The description shall include an assessment of the ability of the water supplier to maintain delivery during long-term drought or other source shortages caused by a natural disaster, source contamination, legal restrictions on water use, or other circumstances;
- (2) A list of three or more stages of alert for potential shortage or water service difficulties. The stages shall range from a potential or mild alert, increasing through a serious situation to a critical emergency;
- (3) A description of pre-determined levels of severity of shortage or water service difficulties that will trigger the curtailment actions under each stage of alert to provide the greatest assurance of maintaining potable supplies for human consumption; and
- (4) A list of specific standby water use curtailment actions for each stage of alert ranging from notice to the public of a potential alert, increasing through limiting nonessential water use, to rationing and/or loss of service at the critical alert stage.

Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572

Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010

Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02, Renumbered from 690-086-0140(3)

690-086-0170

Municipal Water Supply Element

The water supply element shall include at least the following:

- (1) A delineation of the current and future service areas consistent with state land use law that includes available data on population projections and anticipated development consistent with relevant acknowledged comprehensive land use plans and urban service agreements or other relevant growth projections;
- (2) An estimated schedule that identifies when the water supplier expects to fully exercise each of the water rights and water use permits currently held by the supplier;

APPENDIX A

- (3) Based on the information provided in section (1) of this rule, an estimate of the water supplier's water demand projections for 10 and 20 years, and at the option of the municipal water supplier, longer periods;
- (4) A comparison of the projected water needs and the sources of water currently available to the municipal water supplier and to any other suppliers to be served considering the reliability of existing sources;
- (5) If any expansion or initial diversion of water allocated under existing permits is necessary to meet the needs shown in section (3) of this rule, an analysis of alternative sources of water that considers availability, reliability, feasibility and likely environmental impacts. The analysis shall consider the extent to which the projected water needs can be satisfied through:
 - (a) Implementation of conservation measures identified under OAR 690-086-0150;
 - (b) Interconnection with other municipal supply systems and cooperative regional water management; and
 - (c) Any other conservation measures that would provide water at a cost that is equal to or lower than the cost of other identified sources.
- (6) If any expansion or initial diversion of water allocated under existing permits is necessary to meet the needs shown in section (3) of this rule, a quantification of the maximum rate and monthly volume of water to be diverted under each of the permits;
- (7) For any expansion or initial diversion of water under existing permits, a description of mitigation actions the water supplier is taking to comply with legal requirements including but not limited to the Endangered Species Act, Clean Water Act, Safe Drinking Water Act; and
- (8) If acquisition of new water rights will be necessary within the next 20 years to meet the needs shown in section (3) of this rule, an analysis of alternative sources of the additional water that considers availability, reliability, feasibility and likely environmental impacts and a schedule for development of the new sources of water. The analysis shall consider the extent to which the need for new water rights can be eliminated through:
 - (a) Implementation of conservation measures identified under OAR 690-086-0150;
 - (b) Interconnection with other municipal supply systems and cooperative regional water management; and
 - (c) Any other conservation measures that would provide water at a cost that is equal to or lower than the cost of other identified sources.

Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572

Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010

Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02, Renumbered from 690-086-0140(4)

Agricultural Water Supplier Water Management and Conservation Plans

690-086-0210 [Renumbered to 690-086-0040]

690-086-0220

General Provisions

- (1) Certain agricultural water suppliers must have approved conservation plans to transfer water rights within the boundaries of the districts to other land within the districts (ORS 540.572 to 540.578). These rules provide the standards for those conservation plans.
- (2) Each agricultural water supplier required to submit a water management and conservation plan shall exercise diligence in implementing the approved plan and shall update and resubmit a plan consistent with the requirements of OAR 690, division 86 as prescribed during plan approval.
- (3) Any agricultural water supplier participating in the water transfer provisions in ORS 540.572 to 540.578 and OAR 690-021-0070 to 690-021-0700 shall submit an annual report describing progress-to-date in implementing a water management and conservation plan.
- (4) Water management and conservation plans submitted by agricultural water suppliers shall meet the requirements listed in OAR 690-086-0225 to 690-086-0270.
- (5) A water conservation plan prepared in accordance with criteria of the Bureau of Reclamation and substantially meeting the requirements of OAR 690-086-0225 to 690-086-0270 may be submitted to meet the requirements of these rules.
- (6) At least 30 days prior to submitting a draft plan to the Department, an agricultural water supplier shall make the draft plan available for review by each affected local government.
- (7) Each agricultural water supplier preparing a water management and conservation plan is encouraged to develop and implement a program to involve the supplier's patrons in the preparation of the plan. Recommendations include making the plan available for public inspection and conducting public meetings to provide information and gather input on the plan.

Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
 Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
 Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0225

Agricultural Water Supplier Plan Elements

A water management and conservation plan submitted by an agricultural water supplier shall include:

- (1) An agricultural water supplier description as described under OAR 690-086-0240;
- (2) An agricultural water conservation element as described under OAR 690-086-0250;

- (3) An agricultural water allocation/curtailment element as described under OAR 690-086-0260;
- (4) An agricultural water supply element as required under OAR 690-086-0270;
- (5) A list of the affected local governments to whom the draft plan was made available pursuant to OAR 690-086-0220(6) and a copy of any comments on the plan provided by the local governments;
- (6) A proposed date for submittal of an updated plan based on the proposed schedule for implementation of conservation measures, any relevant schedules for other community planning activities, and the rate of growth of or other changes expected by the water supplier; or an explanation of why submittal of an updated plan is unnecessary and should not be required by the Department.

Stat. Auth.: ORS 536.027, 537.211 and 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0240

Agricultural Water System Description

The description of the water system shall include at least the following information:

- (1) General location of water right acreage, numbers of the associated water right certificates and permits and a description of relevant conditions of the water rights including the seasons of use and the uses of any other permitted withdrawals by the supplier;
- (2) Source(s) of water; storage and regulation facilities; and a summary of any transfer, rotation, exchange or intergovernmental cooperation agreements;
- (3) A schematic of the system showing storage and distribution facilities, drainage systems, measurement stations, generalized district boundaries, points of diversion and locations of major operational spills;
- (4) Current water use, including peak and average annual diversions and, when available, water reuse and return flows;
- (5) A summary of major classifications of user accounts showing water right acreages, the number of accounts of each classification, and the beneficial uses for which water is provided (irrigation, frost protection, temperature control, agricultural use, livestock, domestic, etc.);
- (6) Types of on-farm irrigation systems common within the supplier's accounts;
- (7) A general characterization of crops commonly grown and the estimated average and peak consumptive use of the crops; and
- (8) A description of the operation and maintenance program.

Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572
Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010
Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0250**Agricultural Water Conservation Element**

The water conservation element shall include at least the following:

- (1) A progress report on the conservation measures scheduled for implementation in the water management and conservation plan previously approved by the Department, if any;
- (2) A description of the water supplier's agricultural water measurement program and a statement that the program complies with the measurement and reporting standards in OAR chapter 690, division 85, that a time extension or waiver has been granted, or that the standards are not applicable;
- (3) A description of other conservation measures currently implemented by the water supplier;
- (4) Short- and long-term goals of the water supplier to improve water management;
- (5) An evaluation of the opportunities for improving water use efficiency which includes:
 - (a) A description of losses of water from canals, pipelines, and laterals, including any operational spills;
 - (b) An assessment of the extent to which water deliveries are insufficient to meet crop needs;
 - (c) A list of alternative conservation measures to reduce the losses of water identified in subsection (a) of this section and address any insufficiencies of water deliveries identified in subsection (b) of this section; and
 - (d) An assessment of existing and future alternatives to finance conservation measures including an analysis of the possibility of applying for the allocation of conserved water (OAR 690-018-0010 to 690-018-0090).
- (6) For each of the following conservation measures not currently being implemented, and evaluation of whether implementation of the measure is feasible and appropriate for ensuring the efficient use of water and the prevention of waste:
 - (a) Promotion of energy audits offered through local electric utilities for district water users;
 - (b) Conversion to metered, pressurized deliveries to all parcels of one acre or less;
 - (c) Piping or lining earthen canals;
 - (d) Modifying distribution facilities and district policies to increase the flexibility of water deliveries;
 - (e) Provision of on-farm irrigation scheduling assistance;
 - (f) Construction of re-regulating reservoirs;
 - (g) Adoption or rate structures that support and encourage water conservation;
 - (h) Each of the conservation measures listed in OAR 690-086-0250(5)(c); and

- (i) Any other conservation measures identified by the water supplier that would improve water use efficiency.
- (7) A description and estimated schedule for implementation of each of the following conservation measures:
- (a) An information and education program aimed at improving the efficiency of use of water delivered. The program should address all types of uses served and include voluntary water use audits; and
 - (b) Any other conservation measures identified as feasible and appropriate under section (6) of this rule.
- (8) A program to monitor and evaluate the effectiveness of the conservation measures which are implemented.

Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572

Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010

Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02, Renumbered from 690-086-0240(2)

690-086-0260

Agricultural Water Allocation/Curtailment Element

The water allocation/curtailment element shall include at least the following:

- (1) A description of the frequency and magnitude of past supply deficiencies and current capacity limitation. The description shall include an assessment of the ability of the water supplier to maintain delivery during drought or other source shortages.
- (2) A description of the water supply situation(s) that cause the water allocation/curtailment element to be implemented, including identification of the supply situations which trigger warnings to users or public notice of impending shortage;
- (3) A description of the procedure used to allocate water during water shortages.

Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572

Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010

Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02, Renumbered from 690-086-0240(3)

690-086-0270

Agricultural Water Supply Element

The long-range water supply element shall include at least the following:

- (1) An estimate of the water supplier's long-range water demand projections for 20 years;
- (2) A comparison of the projected water needs and the size and reliability of water rights permits or other current water supply contracts held by the water supplier;
- (3) A list of potential sources of water, including conservation and reuse, to supply the long-range needs;

- (4) A comparison among the potential sources of additional water considering costs, availability, reliability, and likely environmental impacts;
- (5) An evaluation of the effects of the following factors on long-range water needs:
 - (a) Regional options for meeting future water needs;
 - (b) Urbanization and other land-use trends;
 - (c) Provisions in affected local governments' comprehensive plans relating to agricultural lands, urbanization, water resources, water supply, public facilities and services, and any other pertinent plan element or ordinance relating to uses or lands served, or proposed to be served, under the long-term water supply plan.

Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572

Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010

Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02, Renumbered from 690-086-0240(4)

Water Management and Conservation Plan Review and Enforcement

690-086-0900

Water Management and Conservation Plan Review, Approval and Enforcement

- (1) The rules in OAR 690-086-0900 to 690-086-0920 set out the process and criteria for the Department's review, approval and enforcement of the water management and conservation plans submitted by agricultural and municipal water suppliers. The rules apply to the submittal and review of draft plans, proposed final plans, and subsequent updates.
- (2) During the plan review and approval process, the Department may allow additional time for a municipal water supplier to implement water metering under OAR 690-086-0150(4)(b) or a benchmark established in a previously approved plan if the water supplier shows that additional time is necessary to avoid unreasonable and excessive costs.
- (3) Notwithstanding any of the requirements of these rules, except OAR 690-086-0150(2) and 690-086-0250(2), the Department may approve a water management and conservation plan if the plan is generally consistent with the applicable criteria and includes a schedule for completion within five years of any additional work necessary to satisfy the requirements.
- (4) Any plan approval that contains a requirement that a municipal water supplier complete additional work under section (3) of this rule shall preclude additional diversion of water under an extended permit beyond the need quantified for the next two years.

Stat. Auth.: ORS 536.025 & ORS 536.027

Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010

Hist.: WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0905

Notice of Submittal of a Draft Plan or Updated Plan

- (1) The Department shall notify affected local governments, affected Indian tribes, and all persons on the Department's weekly mailing list that a draft water management and conservation plan prepared under the requirements of OAR 690-086-0125 or 690-086-0225 has been submitted to the Department and is available for review.
- (2) Any person may review and submit written comments on the draft plan within 30 days of the notification in section (1) of this rule. Written comments submitted under this subsection must cite specific provisions of concern in the draft plan, describe how each of the provisions cited do or do not satisfy the requirements of OAR chapter 690, division 086, suggest any modification in each provision that would be necessary to satisfy the relevant requirement, and include information to support any suggested modifications.

Stat. Auth.:ORS 536.027, ORS 537.211 & ORS 540.572

Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010

Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02, Renumbered from 690-086-0910(1) & (2)

690-086-0910

Preliminary Review of Draft Plans

- (1) The Department shall undertake a preliminary review of the draft plan and the comments received pursuant to OAR 690-086-0905 to determine whether the plan includes the required elements of 690-086-0120 to 690-086-0170 or 690-086-0220 to 690-086-0270.
- (2) For a plan submitted by a municipal water supplier, the Department shall review the plan to determine if the information and analyses in the plan are sufficient for the Department to make the determination required under OAR 690-086-0130.
- (3) For a plan submitted by an agricultural water supplier the Department shall review the plan to determine whether:
 - (a) The plan includes the information required in OAR 690-086-0240;
 - (b) The water supplier has complied with the requirements of OAR 690-086-0250 and has included a description of the actions to be taken in the implementation of water conservation measures that are feasible and appropriate for ensuring the efficient use of water and the prevention of waste; considering:
 - (A) The economic feasibility of the measures for the water supplier;
 - (B) Any likely adverse environmental impacts of implementation of the measures;
 - (C) Whether the measures are available and proven;
 - (D) The time needed to implement the measures;
 - (E) The effects of local variations in soil type and weather on the potential for successful implementation of the measures; and

- (F) Whether the measures are consistent with other relevant water management plans and subbasin conservation plans.
 - (c) The water allocation/curtailment element prepared under OAR 690-086-0260 satisfactorily promotes water curtailment practices and the coordination of usage regulation, taking into account state water law and local conditions, or is substantially the same as a curtailment plan prepared pursuant to ORS 536.780 and OAR 690-019-0090 and approved by the Department within the previous five years; and
 - (d) The water supplier has included the information required in OAR 690-086-0270, and, in the list of potential sources of water to meet projected demands, included the development of any conservation measures which are available at a cost which is lower than the cost of other identified sources or has provided sufficient justification for the factors used in selecting other sources for development.
- (4) Upon completion of the preliminary review and no later than 90 days after receipt of a draft plan, the Department shall:
- (a) After considering public comments, provide the Department's written comments on the plan to the water supplier and any person who submitted comments pursuant to OAR 690-086-0905; or
 - (b) After considering public comments if the Department determines that the draft plan includes the required plan elements under OAR 690-086-0125 or 690-086-0225, and for municipal water supply plans, that the plan meets the criteria under 690-086-0130, issue a final order approving the plan pursuant to 690-0086-0915(4) or (5) and notify any person who submitted comments pursuant to 690-086-0905 of the issuance of the order.
- (5) The Department shall include in its written comments prepared under section (4) of this rule:
- (a) For each deficiency identified in the review, a citation of the relevant statute or rule;
 - (b) To the extent possible, identification of any constraints to implementation of the water management and conservation plan and recommendations on appropriate actions to secure any identified new sources of water;
 - (c) An evaluation of the extent to which a request for additional time under OAR 690-086-0900(2) satisfies the relevant requirements of the rules;
 - (d) A prescribed reasonable period of time of not less than 60 days, identified in consultation with the water supplier, for the water supplier to respond to the Department's review and to submit a proposed final plan; and
 - (e) Copies of any written comments received pursuant to OAR 690-086-0905.
- (6) If the Department does not meet the 90-day deadline in section (4) of this rule:
- (a) For purposes of ORS 540.572, a plan submitted by an agricultural water supplier after November 1, 2002, is deemed approved for the period from the expiration of the 90-day deadline until 120 days after the Department provides written comments under section (5) of this rule; and

- (b) For municipal water suppliers whose additional diversion of water under an extended permit is only authorized upon issuance of a final order approving a water management and conservation plan, notwithstanding OAR chapter 690, division 315, the Director may by order authorize diversion of an additional specified quantity of water as necessary to prevent harm to public welfare, safety and health.

Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572

Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010

Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02

690-086-0915

Final Review of Plans

- (1) Upon receipt of a proposed final plan, the Department shall evaluate the plan to determine if it includes the required elements of OAR 690-086-0125 to 690-086-0170 for municipal water suppliers or 690-086-0225 to 690-086-0270 for agricultural water suppliers. The evaluation shall be limited to a review of modifications in the plan and issues that were identified in the Department's written comments provided under 690-086-0910 and, if any deficiencies are identified, the Department's review shall cite the relevant statute or rule.
- (2) If the Department determines that the final plan does not include the required elements of OAR 690-086-0120 to 690-086-0170 or 690-086-0220 to 690-086-0270, the Department shall consult with the water supplier and may provide additional time to correct any discrepancies.
- (3) For a water management and conservation plan submitted by a municipal water supplier, the Department shall review the plan to determine if the information and analyses in the plan are sufficient for the Department to make the determination required under OAR 690-086-0130.
- (4) For a water management and conservation plan submitted by a municipal water supplier, if the Department determines that the proposed final plan includes the required elements under OAR 690-086-0120 to 690-086-0170 and meets the applicable criteria under 690-086-0130, the Department shall issue a final order approving the plan and notify the water supplier and any person who submitted comments pursuant to 690-086-0905 of the approval. The Department's order shall include the following:
 - (a) A quantification of the maximum amount of water to be diverted during the next 20 years under each extended permit, or for a longer period as specified for an extended reservoir permit;
 - (b) The date on which an updated plan shall be submitted to the Department. A municipal water supplier may submit an updated plan at any time prior to the date specified if necessary to accommodate unanticipated events, but the Department shall not require submittal of an updated plan earlier than five years after issuance of the order approving the plan; and
 - (c) A schedule for submittal of five-year progress reports on implementation of the water conservation and supply measures described in the plan.

- (5) For a water management and conservation plan submitted by an agricultural water supplier, if the Department determines that the proposed final plan satisfies the relevant requirements or if the water supplier satisfactorily corrects any identified discrepancies, the Department shall issue a final order approving the plan and notify the water supplier and any person who submitted comments pursuant to OAR 690-086-0905 of the approval. The Department shall specify in the order approving the plan if an updated plan shall be required and, if so, the date on which the updated plan shall be submitted to the Department. The Department shall not require submittal of an updated plan earlier than five years after issuance of the order approving the plan.
- (6) The Department shall issue a final order denying approval of the plan and notify the water supplier and any person who submitted comments pursuant to OAR 690-086-0905 of the issuance of the order if:
 - (a) The Department determines that the proposed final plan does not contain the plan elements required under OAR 690-086-0125 or 690-086-0225;
 - (b) For municipal water suppliers, the plan does not meet the criteria under OAR 690-086-0130;
 - (c) The municipal water supplier has failed to adequately justify a request for additional time to implement water metering under OAR 690-086-0150(4)(b) or a benchmark established in a previously approved plan; or
 - (d) The work plan submitted under OAR 690-086-0900(3) is insufficient for completing the additional work necessary to satisfy the requirements of these rules.
- (7) The Department may deny approval of a water management and conservation plan if the water supplier fails to submit a final plan to the Department within 120 days after receipt of the Department's preliminary review.
- (8) If the Department issues a final order denying approval of the plan, the water supplier may request that the Department reconsider the order and the Director appoint a five-member review board to review the plan. The board shall include at least two individuals from the basin in which the supplier is located who are engaged in similar uses of water, the local watermaster, and other individuals knowledgeable about water use practices and water conservation. After reviewing the plan and evaluating any additional information presented by the water supplier and the Department, the board may recommend that the Department:
 - (a) Reconsider the decision not to approve the plan;
 - (b) Reconsider the decision not to approve the plan contingent on the water supplier agreeing to specified modifications; or
 - (c) Reaffirm the original decision not to approve the plan.
- (9) The Department shall notify the water supplier, the members of the review board, and any person who submitted comments pursuant to OAR 690-086-0905 of any action taken based on the board's recommendation.

- (10) The water supplier or a person who has submitted comments pursuant to OAR 690-086-0905 may, within 30 days of a notification pursuant to OAR 690-086-0910(5)(b) or section (4), (5), (6), or (9) of this rule, appeal a decision by the Department to approve or to not approve a plan to the Commission. The Commission may deny the appeal or may accept the appeal and remand the plan to the Department to seek resolution of the issues identified in the appeal and, if the issues are not resolved, to initiate a contested case proceeding pursuant to ORS 183.413 and OAR chapter 690, divisions 1 and 2.

Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572

Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010

Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 4 2002, f. & cert. ef. 11-1-02, Renumbered from 690-086-0910(7)

690-086-0920

Enforcement

If the Director determines that a water supplier has failed to submit a water management and conservation plan as required under OAR 690-086-0010 to 690-086-0270 or has failed to satisfactorily implement an approved water management and conservation plan, the Director may proceed with one or more of the following actions:

- (1) Provide an additional, specified amount of time for remedy;
- (2) Initiate an evaluation of the supplier's water management practices and facilities to determine if the use of water is wasteful;
- (3) Initiate regulation of water use under OAR 690-250-0050 to eliminate waste;
- (4) Rescind a previous approval of a water management and conservation plan; and
- (5) If the submittal of the water management and conservation plan is required under a condition of a permit or an extension approved under OAR chapter 690, division 315 or 320, assess a civil penalty under OAR 690-260-0005 to 690-260-0110 or cancel the permit.

Stat. Auth.: ORS 536.027, ORS 537.211 & ORS 540.572

Stats. Implemented: ORS 537.230, ORS 537.630 & ORS 539.010

Hist.: WRD 11-1994, f. & cert. ef. 9-21-94; WRD 11-1994, f. & cert. ef. 9-21-94

Appendix B

WMCP Checklist

✓	Item	OAR Reference	Section No.
WMCP Plan Elements			
	Notice to affected local government(s)	690-086-0125(5)	
	Proposed WMCP update schedule	690-086-0125(6)	
	Additional time to implement conservation benchmarks	690-086-0125(7)	
Water Supplier Description			
	Supplier's source(s)	690-086-0140(1)	
	Current service area & population served	690-086-0140(2)	
	Assessment of adequacy and reliability of existing water supplies	690-086-0140(3)	
	Present and historic water use	690-086-0140(4)	
	Water rights inventory table and environmental resource issues	690-086-0140(5)	
	Customers served and water use summary	690-086-0140(6)	
	Interconnections with other systems	690-086-0140(7)	
	System schematic	690-086-0140(8)	
	Quantification of system leakage	690-086-0140(9)	
Water Conservation Element			
	Progress report on implementation of conservation measures	690-086-0150(1)	
	Water use measurement and reporting program	690-086-0150(2)	
	Currently implemented conservation measures	690-086-0150(3)	
	Annual water audit	690-086-0150(4)(a)	
	Full metering of system	690-086-0150(4)(b)	
	Meter testing and maintenance program	690-086-0150(4)(c)	
	Rate structure	690-086-0150(4)(d)	
	Leak detection program	690-086-0150(4)(e)	
	Public education program	690-086-0150(4)(f)	
	System leakage reduction program <15%	690-086-0150(5)	
	System leakage reduction program <10%	690-086-0150(6)(a)	
	Technical and financial assistance programs	690-086-0150(6)(b)	
	Retrofit/replacement of inefficient fixtures	690-086-0150(6)(c)	
	Rate structure and billing practices to encourage conservation	690-086-0150(6)(d)	
	Reuse, recycling, and non-potable opportunities	690-086-0150(6)(e)	
	Other proposed conservation measures	690-086-0150(6)(f)	
Water Curtailment Element			
	Water supply assessment and description of past deficiencies	690-086-0160(1)	
	Stages of alert	690-086-0160(2)	
	Triggers for each stage of alert	690-086-0160(3)	
	Curtailment actions	690-086-0160(4)	
Water Supply Element			
	Future service area and population projections	690-086-0170(1)	
	Schedule to fully exercise each permit (<i>i.e.</i> , <i>certification</i>)	690-086-0170(2)	
	Demand forecast	690-086-0170(3)	
	Comparison of projected need and available sources	690-086-0170(4)	
	Analysis of alternative sources	690-086-0170(5) and (8)	
	Maximum rate and monthly volume quantification	690-086-0170(6)	
	Mitigation actions under state and federal laws	690-086-0170(7)	
	Greenlight Water Request – Conservation measure schedule and cost effectiveness	690-086-0130(7)(a)	
	Greenlight Water Request – Justification that selected source is most feasible and appropriate	690-086-0130(7)(b)	
	Greenlight Water Request – Mitigation requirements	690-086-0130(7)(c)	

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Appendix D

Greenlight Water Worksheet

Greenlight Water Worksheet

(NOTE: Water suppliers are encouraged to include this worksheet as part of their WMCP. Use additional sheets as necessary.)

1. Does the water supplier hold any extended water use permits?

Yes No

If **NO**, stop. A Greenlight Water request does not apply.

If **YES**, list the extended permit number(s) and indicate the maximum instantaneous rate of water allowed by the permit:

Permit Number	Instantaneous Rate of Water <u>Allowed</u> by Permit (in cfs or gpm)

2. Do the extended permit(s) have a Development Limitations condition imposed by a final order approving the Permit Extension or a previously submitted WMCP that freeze the quantity of water that can be diverted under the extended permit?

Yes No

If **NO**, stop. A Greenlight Water request does not apply.

If **YES**, list the extended permit number(s) and indicate the maximum instantaneous rate of water allowed under the Development Limitations condition established by the Permit Extension or previously approved WMCP:

Permit Number	<u>Development Limitations</u> Instantaneous Rate of Water Allowed by Final Order approving a Permit Extension or previous WMCP (in cfs or gpm)

3. Does the water supplier anticipate needing to divert water under an extended permit(s) at an instantaneous rate that is **greater than** the amount specified in the Development Limitations condition (established by the Permit Extension or previously approved WMCP) in order to meet its projected 20-year water demands?

Yes No

If **NO**, stop. A Greenlight Water request does not apply.

If **YES**, Items **A** and **B** below must be addressed in the water supplier's WMCP being prepared for submittal:

A. Identify the maximum instantaneous rate and the maximum monthly volume of water that will be needed under the extended permit(s) for the next 20 years to meet the water supplier's projected demands:

Permit Number	<u>Greenlight Water Request</u>	
	Maximum Instantaneous Rate of Water (in cfs or gpm) Anticipated to be Diverted to meet 20-year Demands	Maximum Monthly Volume of Water (in million gallons) Anticipated to be Diverted to meet 20-year Demands

Greenlight Water Worksheet (...continued)

B. In the spaces provided below, describe how the water supplier has satisfied each of the following criteria:

- **OAR 690-086-0130(7)(a)** The plan includes a schedule for development of any conservation measures that would provide water at a cost that is equal to or lower than the cost of other identified sources, **unless**:
 - the supplier has provided sufficient justification for the factors used in selecting other sources for development; **or**
 - the supplier serves a population of less than 1,000.

- **OAR 690-086-0130(7)(b)** Increased use from the source is the most feasible and appropriate water supply alternative available to the supplier.

- **OAR 690-086-0130(7)(c)** If mitigation is legally required to address limitations or restrictions on the development of permits for which resource issues are identified under OAR 690-086-0140(5)(i), the plan contains documentation that the supplier is complying with the mitigation requirements. The Department may consult with federal and state agencies in making this determination.

Appendix E

OWRD Internal WMCP Review Worksheet

Oregon Water Resources Department (OWRD) Municipal Water Management and Conservation Plan (WMCP) Review Worksheet (OAR Chapter 690, Division 086)	
Name of Supplier: _____ Date WMCP Received by OWRD: _____	
OWRD Reviewer:	
Date of OWRD Review:	
Reason for submittal of the WMCP:	
If a previous WMCP has been submitted, was it approved contingent upon the completion of certain Work Plan activities? If so, list those Work Plan items here:	
Are there any Development Limitation conditions established by a Final Order approving a previous WMCP or Permit Extension of Time?	
<u>Rule Reference</u>	<u>OWRD Review Comment</u>
ORS 536.050(1)(u) – Fees for Water Management and Conservation Plans	
\$900 – for examination of a Plan submitted by a municipal water supplier serving a population of 1,000 or fewer; or \$1800 – for examination of a Plan submitted by a municipal water supplier serving a population of more than 1,000. <i>Updated fee schedule effective July 1, 2013 (ORS 536.050).</i>	

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OAR 690-086-0125 – Additional Requirements	
(5) A list of the affected local governments to whom the draft plan was made available pursuant to 690-086-0120(8) and a copy of any comments on the plan provided by the local governments;	
(6) A proposed date for submittal of an updated plan within no more than 10 years based on the proposed schedule for implementation of conservation measures, any relevant schedules for other community planning activities, and the rate of growth or other changes expected by the water supplier; or an explanation of why submittal of an updated plan is unnecessary and should not be required by the Department; and	
(7) If the municipal water supplier is requesting additional time to implement metering as required under OAR 690-086-0150(4)(b) or a benchmark established in a previously approved plan, documentation showing additional time is necessary to avoid unreasonable and excessive costs.	
OAR 690-086-0140 – Water Supplier Description	
(1) A description of the supplier's source(s) of water; including diversion, storage and regulation facilities; exchange agreements; intergovernmental cooperation agreements; and water supply or delivery contracts;	
(2) A delineation of the current service areas and an estimate of the population served and a description of the methodology(ies) used to make the estimate;	
(3) An assessment of the adequacy and reliability of the existing water supply considering potential limitations on continued or expanded use under existing water rights resulting from existing and potential future restrictions on the community's water supply;	
(4) A quantification of the water delivered by the water supplier that identifies current and available historic average annual water use, peak seasonal use, and average and peak day use;	
(5) A tabular list of water rights held by the municipal water supplier that includes the following information:	
(a) Application, permit, transfer, and certificate numbers (as applicable);	

(b) Priority date(s);	
(c) Source(s) of water;	
(d) Type(s) of beneficial uses specified in the right;	
(e) Maximum instantaneous and annual quantity of water allowed under each right;	
(f) Maximum instantaneous and annual quantity of water diverted under each right to date;	
(g) Average monthly and daily diversions under each right for the previous year, and if available for the previous five years;	
(h) Currently authorized date for completion of development under each right; and	
Environmental Concerns:	
(i) Identification of any streamflow-dependent species listed by a state or federal agency as sensitive, threatened or endangered that are present in the source, any listing of the source as water quality limited and the water quality parameters for which the source was listed, and any designation of the source as being in a critical ground water area.	
(6) A description of customers served including other water suppliers and the estimated numbers; general water use characteristics of residences, commercial and industrial facilities, and any other uses; and a comparison of the quantities of water used in each sector with the quantities reported in the water supplier's previously submitted water management and conservation plan and progress reports;	
(7) Identification and description of interconnections with other municipal supply systems;	
(8) A schematic of the system that shows the sources of water, storage facilities, treatment facilities, major transmission and distribution lines, pump stations, interconnections with other municipal supply systems, and the existing and planned future service area; and	

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<p>(9) A quantification and description of system leakage that includes any available information regarding the locations of significant losses.</p>	
<p>OAR 690-086-0150 – Water Conservation Element</p>	
<p>(1) A progress report on the conservation measures scheduled for implementation in a water management and conservation plan previously approved by the Department, if any;</p>	
<p>(2) A description of the water supplier's water use measurement and reporting program and a statement that the program complies with the measurement standards in OAR Chapter 690, Division 85, that a time extension or waiver has been granted, or that the standards are not applicable;</p>	
<p>(3) A description of other conservation measures, if any, currently implemented by the water supplier, including any measures required under water supply contracts;</p>	
<p>Basic Conservation Measures Required of <u>All</u> Water Suppliers</p>	
<p>(4) A description of the specific activities, along with a schedule that establishes five-year benchmarks, for implementation of each of the following conservation measures that are required of all municipal water suppliers:</p>	
<p>(a) An annual water audit that includes a systematic and documented methodology for estimating any un-metered authorized and unauthorized uses;</p>	
<p>(b) If the system is not fully metered, a program to install meters on all un-metered water service connections. The program shall start immediately after the plan is approved and shall identify the number of meters to be installed each year with full metering completed within five years of approval of the water management and conservation plan;</p>	
<p>(c) A meter testing and maintenance program;</p>	
<p>(d) A rate structure under which customers' bills are based, at least in part, on the quantity of water metered at the service connections;</p>	

<p>(e) If the annual water audit indicates that system leakage exceeds 10 percent, a regularly scheduled and systematic program to detect leaks in the transmission and distribution system using methods and technology appropriate to the size and capabilities of the municipal water supplier; and</p>	
<p>(f) A public education program to encourage efficient water use and the use of low water use landscaping that includes regular communication of the supplier's water conservation activities and schedule to customers;</p>	
<p>Enhanced Conservation Measures Required of Select Water Suppliers</p>	
<p>(5) If the supplier proposes to expand or initiate diversion of water under an extended permit for which resource issues have been identified under OAR 690-086-0140(5)(i), a description of the specific activities, along with a schedule that establishes five-year benchmarks, for implementation of:</p>	
<p>A system-wide leak repair or line replacement program to reduce system leakage to no more than 15 percent or sufficient information to demonstrate that system leakage currently is no more than 15 percent.</p>	
<p>(6) If the supplier serves a population greater than 1,000 and proposes to expand or initiate diversion of water under an extended permit for which resource issues have been identified under OAR 690-086-0140(5)(i), or if the supplier serves a population greater than 7,500, a description of the specific activities, along with a schedule that establishes five-year benchmarks, for implementation of each of the following measures; or documentation showing that implementation of the measures is neither feasible nor appropriate for ensuring the efficient use of water and the prevention of waste:</p>	
<p>(a) A system-wide leak repair program or line replacement to reduce system leakage to 15 percent, and if the reduction of system leakage to 15 percent is found to be feasible and appropriate, to reduce system leakage to 10 percent;</p>	
<p>(b) Technical and financial assistance programs to encourage and aid residential, commercial and industrial customers in implementation of conservation measures;</p>	
<p>(c) Supplier financed retrofitting or replacement of existing inefficient water using fixtures, including distribution of residential conservation kits and rebates for customer investments in water conservation;</p>	
<p>(d) Adoption of rate structures, billing schedules, and other associated programs that support and encourage water conservation;</p>	

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<p>(e) Water reuse, recycling, and non-potable water opportunities; and</p>	
<p>(f) Any other conservation measures identified by the water supplier that would improve water use efficiency.</p>	
<p>OAR 690-086-0160 – Municipal Water Curtailment Element</p>	
<p>(1) A description of the type, frequency and magnitude of supply deficiencies within the past 10 years and current capacity limitation. The description shall include an assessment of the ability of the water supplier to maintain delivery during long-term drought or other source shortages caused by a natural disaster, source contamination, legal restrictions on water use, or other circumstances;</p>	
<p>(2) A list of three or more stages of alert for potential shortage or water service difficulties. The stages shall range from a potential or mild alert, increasing through a serious situation to a critical emergency;</p>	
<p>(3) A description of pre-determined levels of severity of shortage or water service difficulties that will trigger the curtailment actions under each stage of alert to provide the greatest assurance of maintaining potable supplies for human consumption; and</p>	
<p>(4) A list of specific standby water use curtailment actions for each stage of alert ranging from notice to the public of a potential alert, increasing through limiting nonessential water use, to rationing and/or loss of service at the critical alert stage.</p>	
<p>OAR 690-086-0170 – Municipal Water Supply Element</p>	
<p>(1) A delineation of the current and future service areas consistent with state land use law that includes available data on population projections and anticipated development consistent with relevant acknowledged comprehensive land use plans and urban service agreements or other relevant growth projections;</p>	

<p>(2) An estimated schedule that identifies when the water supplier expects to fully exercise each of the water rights and water use permits currently held by the supplier;</p>	
<p>(3) Based on the information in (1), an estimate of the water supplier's water demand projections for 10 and 20 years, and at the option of the municipal water supplier, longer periods;</p>	
<p>(4) A comparison of the projected water needs and the sources of water currently available to the municipal water supplier and to any other suppliers to be served considering the reliability of existing sources;</p>	
<p>(5) If any expansion or initial diversion of water allocated under existing permits is necessary to meet the needs shown in (3), an analysis of alternative sources of water that considers availability, reliability, feasibility and likely environmental impacts. The analysis shall consider the extent to which the projected water needs can be satisfied through:</p>	
<p>(a) Implementation of conservation measures identified under OAR 690-086-0150;</p>	
<p>(b) Interconnection with other municipal supply systems and cooperative regional water management; and</p>	
<p>(c) Any other conservation measures that would provide water at a cost that is equal to or lower than the cost of other identified sources.</p>	
<p>(6) If any expansion or initial diversion of water allocated under existing permits is necessary to meet the needs shown in (3), a quantification of the maximum rate and monthly volume of water to be diverted under each of the permits;</p>	
<p>(7) For any expansion or initial diversion of water under existing permits, a description of mitigation actions the water supplier is taking to comply with legal requirements including but not limited to the Endangered Species Act, Clean Water Act, Safe Drinking Water Act; and</p>	

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(8) If acquisition of new water rights will be necessary within the next 20 years to meet the needs shown in (3), an analysis of alternative sources of the additional water that considers availability, reliability, feasibility and likely environmental impacts and a schedule for development of the new sources of water. The analysis shall consider the extent to which the need for new water rights can be eliminated through:

(a) Implementation of conservation measures identified under OAR 690-086-0150;	
(b) Interconnection with other municipal supply systems and cooperative regional water management; and	
(c) Any other conservation measures that would provide water at a cost that is equal to or lower than the cost of other identified sources.	

OAR 690-086-0130 – Approval Criteria for Access to Water under an Extended Permit

Greenlight Water Request:

(7) If during the next 20 years the maximum rate of water diverted under an extended permit will be greater than the maximum rate authorized for diversion under the extension or previously approved water management and conservation plan;

(a) The plan includes a schedule for development of any conservation measures that would provide water at a cost that is equal to or lower than the cost of other identified sources, unless the supplier has provided sufficient justification for the factors used in selecting other sources for development or the supplier serves a population of less than 1,000;	
(b) Increased use from the source is the most feasible and appropriate water supply alternative available to the supplier; and	
(c) If mitigation is legally required to address limitations or restrictions on the development of permits for which resource issues are identified under OAR 690-086-0140(5)(i), the plan contains documentation that the supplier is complying with the mitigation requirements. The Department may consult with federal and state agencies in making this determination; and	

Appendix F

Suggested Outline of a Water Management and Conservation Plan

Front Material

- Title Page
- List of participants in developing WMCP
- Table of Contents, list of Tables, Figures, Exhibits, and/or Appendices
- Acronyms and abbreviations

Chapter 1: Introduction

- Brief description of water system and community served
- Reason for submittal of the WMCP
- Relationship to previous WMCP, if any (and Water System Master Plan, if any)
- Documentation of notice of draft WMCP to all affected local governments
- Proposed date of next progress report and next WMCP update
- Major sources of information utilized in developing WMCP (including land use plans, other providers' plans, etc.)
- Organization of this document
- Include summary WMCP Checklist of required content and where it is located within the document

Chapter 2: Water Supplier Description

- Introduction to chapter, including checklist of required plan content and annotation showing where found in this chapter
- Source(s) of supply: wells, springs, surface water diversions, major storage facilities (if applicable – not distribution system tanks), water purchased from other supplier(s)
- Identification and description of any exchange agreements, intergovernmental cooperation agreements, and/or water supply or deliver contracts
- Current service area (include map)
- Current population served (estimate) and a description of the methodology used to make the estimate
- Customer base: number of service connections, distribution among customer classes, wholesale customers, other key customer characteristics
- Current and recent water use: annual use, average day demand, seasonal use, maximum day demand, demand by customer class, trends in demand and comparison with previous WMCP or progress reports (if applicable)
- Tabular list of all water rights, including water used under each water right and identification of any environmental resource issues associated with the authorized water source(s)
- Assessment of adequacy and reliability of sources

- Interconnections with other municipal supply systems
- Map or schematic of major system features: sources, transmission lines, pump stations, treatment facilities, interconnections, existing and planned service area, major distribution system features
- Description and quantification of system leakage, including locations of significant losses

Chapter 3: Water Conservation Element

- Introduction to chapter, including checklist of required plan content and annotation showing where found in this chapter
- Description of water use measurement and reporting program, and documentation of compliance with regulations
- Narrative or table listing previous benchmarks, status and reasons for any deficiencies (if applicable)
- If requesting additional time to implement metering requirement, or to achieve benchmarks, document reason and demonstrate why additional time needed to avoid unreasonable and excessive costs
- Narrative or table listing all water conservation activities required for this particular system and status of implementation to date (activities required of all systems; plus activities required of this individual system based on comparison of system characteristics with regulatory requirements); as well as any additional conservation activities that have been or will be implemented, that are not required under OAR 690-086

Basic Conservation measures required of **all** water suppliers [OAR 690-086-0150(4)]:

- Fully metered system;
- Annual water audit;
- Metering testing and maintenance schedule;
- Rate structure based on the quantity of water metered;
- Leak detection program, if system leakage exceeds 10 percent
- Public education program on water conservation

Enhanced Conservation measures required of select suppliers [OAR 690-086-0150(5) &(6)]:

- Leak repair or line replacement;
- Rate structure that encourages conservation;
- Technical and financial assistance;
- Retrofit/replacement of inefficient water using fixtures;
- Water reuse, recycling, and non-potable opportunities
- Proposed implementation schedule and benchmarks for any required activities not yet implemented
- For any required plan items that are not provided, identify proposed schedule to meet requirements within five years
- For any conservation activities which the supplier believes are neither feasible nor appropriate, documentation demonstrating why this is the case.

Chapter 4: Water Curtailment Element

- Introduction to chapter, including checklist of required plan content and annotation showing where found in this chapter
- Description of past events (at least 10 years) that resulted in supply deficiencies, effects and counter-measures that were implemented, including assessment of supplier's ability to maintain delivery during long-term drought or other source shortages

- Specific objectives of curtailment program
- Overview of curtailment program, defining at least three stages of alert
- Description of each Stage: including conditions or events that will trigger each stage, and actions to be taken in each stage
- Implementation program to enact curtailment program; or documentation of past enactment (not required in OAR 690-086)
- Plans for periodic review and updating, if desired (not required in OAR 690-086)
- For any required plan items that are not provided, identify proposed schedule to meet requirements within five years

Chapter 5: Water Supply Element

- Introduction to chapter, including checklist of required plan content and annotation showing where found in this chapter
- Identification of current and future service areas (map)
- Population projections (and other demographic projections if desired)
- Key issues involving land use and anticipated development that will affect demand in the future
- Projected demand for water for 10 year and 20 year time period (can include longer periods if desired)
- Comparison between projected demand and source capacity, considering any reliability issues (may reference Chapter 2),
- Estimated schedule identifying when the supplier anticipates fully exercising its currently held water rights and water use permits
- If additional supply is needed beyond current authorizations (*i.e.*, *Development Limitations*) or current levels of use under existing permits within the next 20 years, include:
 1. Analysis of the extent those needs can be satisfied through:
 - implementation of conservation measures identified under OAR 690-086-0150 or any other lower cost conservation measures; and
 - interconnection with other municipal supply systems and cooperative regional water management.
 2. A quantification of maximum rate and monthly volume of water needed under each permit; and
 3. Identification of any mitigation actions to comply with legal requirements (*e.g.* *Endangered Species Act*, *Clean Water Act*, *Safe Drinking Water Act*)
- If acquisition of new water rights will be necessary within the next 20 years to meet projected water demands, include:
 1. Analysis of the extent to which the need for new water rights can be eliminated through:
 - implementation of conservation measures identified under OAR 690-086-0150 or any other lower cost conservation measures; and
 - interconnection with other municipal supply systems and cooperative regional water management.
- If additional supply is needed beyond current authorizations (*i.e.*, *maximum rate established by a Development Limitations condition*) under existing extended permits within the next 20 years, include:
 1. Documentation that indicates:
 - the WMCP includes a schedule for development of any conservation measures that would provide water at a cost that is equal to or lower than the cost of other identified sources;
 - increased use from the source is the most feasible and appropriate water supply alternative available to the supplier; and

- if mitigation is legally required to address limitations or restrictions on the development of permits for which resource issues are identified under OAR 690-086-0140(5)(i), the supplier is complying with the mitigation requirements.
- Maps of proposed new sources or expanded sources (if applicable)
- For any required plan items that are not provided, identify proposed schedule to meet requirements within five years

WMCP Appendices (if needed)

- A. Documents providing more detailed analysis, data or documentation regarding any aspect of the WMCP, if the water supplier desires
- B. If applicable, Work Plan to meet all requirements within five years
- C. Contracts or other agreements with adjacent water suppliers
- D. Copies of any written comments received from affected local governments pertaining to the draft WMCP and its consistency with the local government's comprehensive land use plan
- E. Other appendices, as needed

Appendix G

Large Community Sample WMCP

City of Cedar City Water Management and Conservation Plan (WMCP)

May 2014

Note to Readers of this Guidebook:

This sample plan has been developed solely for purposes of the Guidebook on Municipal Water Management and Conservation Plans (WMCPs). It offers an example of a WMCP based on a fictional community. The information presented was assembled from various sources and is intended for illustrative purposes only. Therefore some of the information may not be fully consistent from one section to another.

The overall organization and approach to planning can serve as an example to water suppliers preparing their own plans. However, the specific mix of water supply and conservation actions described in this sample plan will not be applicable to every water supplier. Each community and water supplier is unique and should develop a WMCP to match its own specific needs and circumstances.



For actual examples of municipal WMCPs submitted to and approved by OWRD, please visit: <http://filepickup.wrd.state.or.us/files/Publications/WMCP/Requested%20Files/Municipal%20WMCP%20Guidebook%20Update%202014/>

Cedar City WMCP

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WMCP Checklist

This checklist is provided as a guide to where each required WMCP element is located within the body of the plan. “N/A” is use for sections that do not apply to Cedar City.

✓	Item	OAR Reference	Section No.
WMCP Plan Elements			
	Notice to affected local government(s)	690-086-0125(5)	1.4
	Proposed WMCP update schedule	690-086-0125(6)	1.5
	Additional time to implement conservation benchmarks	690-086-0125(7)	1.6
Water Supplier Description			
	Description of supplier’s source(s)	690-086-0140(1)	2.1
	Map/Delineation of current service area	690-086-0140(2)	2.2 and Exhibit 2-1
	Assessment of adequacy and reliability of existing supplies	690-086-0140(3)	2.3
	Present and historic water use	690-086-0140(4)	2.4
	Water right inventory table	690-086-0140(5)	2.5, 2.5(i), & Exh 2-6
	Customers served and water use summary	690-086-0140(6)	2.6
	Interconnections with other systems	690-086-0140(7)	2.7
	System schematic	690-086-0140(8)	2.8
	Quantification of system leakage	690-086-0140(9)	2.9
Water Conservation Element			
	Progress report on implementation of conservation measures	690-086-0150(1)	3.1
	Water use measurement and reporting program	690-086-0150(2)	3.2
	Currently implemented conservation measures	690-086-0150(3)	3.3
	Annual water audit	690-086-0150(4)(a)	3.4a
	Full metering of system	690-086-0150(4)(b)	3.4bc
	Meter testing and maintenance program	690-086-0150(4)(c)	3.4bc
	Rate structure	690-086-0150(4)(d)	3.4d
	Leak detection program	690-086-0150(4)(e)	3.4e
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	Water supply assessment and description of past deficiencies	690-086-0160(1)	4.1
	Stages of alert	690-086-0160(2)	4.2
	Triggers for each stage of alert	690-086-0160(3)	4.3
	Curtailment actions	690-086-0160(4)	4.4
Water Supply Element			
	Current/future service area and population projections	690-086-0170(1)	5.1
	Schedule to fully exercise each permit (<i>i.e., certification</i>)	690-086-0170(2)	5.2
	Water demand forecast	690-086-0170(3)	5.3
	Comparison of projected need to available sources	690-086-0170(4)	5.4
	Analysis of alternative sources	690-086-0170(5) & (8)	5.5
	Quantification of maximum rate and monthly volume	690-086-0170(6)	5.6
	Mitigation actions under state and federal laws	690-086-0170(7)	5.7
Greenlight Water Request			
	Conservation measure schedule and cost effectiveness	690-086-0130(7)(a)	See Greenlight Water Worksheet
	Justification that selected source is most feasible/appropriate	690-086-0130(7)(b)	
	Mitigation requirements	690-086-0130(7)(c)	

Section 1

Introduction & WMCP Elements

OAR 690-086-0125

1.1 Introduction

Cedar City is submitting this Water Management and Conservation Plan (WMCP) in accordance with Oregon Administrative Rules (OAR) 690-315 and 690-086. This WMCP is related to permit extension applications associated with three of the City's four water rights.

Cedar City provides water to its own citizens, with a population of approximately 18,000 people. Cedar City also serves as the only source of supply for the Town of Blue Falls, which serves an additional 950 people.

Cedar City diverts water from the Red Cedar River, and also has several wells that provide ground water supplies. One of the City's four water rights is fully certificated, and the other three water rights are not fully perfected at this time.

This WMCP documents additional demands projected over the next 20 years. Maximum Day Demand (MDD) is projected to rise from 6.0 million gallons per day (mgd) in 2002 to 7.3 mgd in 2023. Average day demand (ADD) is projected to rise from 3.1 mgd to 3.8 mgd over this time period.

To meet these needs, the City will institute an expanded water conservation program that meets the requirements of the OAR 690-086 rules, and plans to install additional well capacity. The water conservation program is projected to reduce ADD by 0.21 mgd by year 2023. The expanded well capacity will provide an additional 1.1 mgd on an average day basis, and 1.25 mgd on a peak day basis.

To support the expanded pumping, the City is requesting that authorized use for the Granite Lake permit be expanded from the current level of 1.24 cfs to a new level of 3.25 cfs. This is consistent with a permit extension application submitted to WRD by the City. WRD has issued an order approving this expanded use, conditioned on completion of this WMCP. The requested expansion of authorized use is shown in Table 1-1.

Table 1-1 Summary of Expanded Use Requested						
Permit No.	Source	Original Permit*	Current Authorization		Total Authorization Requested**	
		Instantaneous Rate (cfs)	Instantaneous Rate (cfs)	Peak Monthly Volume (MG)	Instantaneous Rate (cfs)	Peak Monthly Volume (MG)
S-199853	Red Cedar River	9.0	8.1	105.0	no change	no change***
S-115389	Johnson Springs	0.55	0.55	10.0	no change	no change***
S-295687	Johnson Springs	2.8	1.25	19.4	no change	no change***
G-356689	Granite Lake Wells No. 1, 2, 3 and 4	3.5	1.24	19.0	3.25	57.0

MG = million gallons
cfs = cubic feet per second

*This is the “face value” of the water use permit, including any unperfected quantity.

**Includes amount previously authorized plus new expansion.

***The City reserves the right to request expanded use in future extension applications.

1.2 Plan Requirement

Cedar City is submitting this Water Management and Conservation Plan (WMCP) in accordance with Oregon Administrative Rules (OAR) 690-315 and 690-086. This WMCP is related to permit extension applications associated with three of the City’s four water rights.

1.3 Plan Organization

The City believes that this Plan fully complies with the requirements of OAR 690-086. Required elements that are included in this plan are listed below:

- **Water Supplier Description:** This WMCP contains all the required content for a water supplier description, including a discussion of supply sources, service area, adequacy of supplies, water usage, water rights and other information.
- **Water Conservation Element:** A water conservation program is described that builds upon the City’s ongoing efforts and meets the OAR 690-086 requirements.
- **Water Curtailment Element:** A curtailment program is provided, that includes four stages of alert, triggers for implementing each stage, and a suite of curtailment actions that will reduce water usage in the event of an emergency water supply shortage.
- **Water Supply Element:** This WMCP projects water demand consistent with the City’s service area and expected population growth as documented in the City’s Comprehensive Land Use Plan. Several alternative means of meeting growth in demand are considered, with documentation provided in appended material. The City’s plan for meeting future needs of its own citizens and those of the Town of Blue Falls is described and provides the documentation associated with the City’s planned expansion of water withdrawals.

1.4 Affected Local Governments

OAR 690-086-0125(5)

Thirty days prior to submitting this WMCP to OWRD, this WMCP was provided in draft form to the Town of Blue Falls Director of Public Works and the Johnson County Planning Director for their review and comment. Comment letters are included in the Appendices. All of the comments have been addressed in this final plan document.

1.5 Plan Update Schedule

OAR 690-086-0125(6)

The city anticipates submitting an update of this WMCP within 10 years of the final order approving this WMCP. As required by OAR Chapter 690, Division 86, a progress report will be submitted within 5 years of the final order.

1.6 Request for Additional Time for Metering or Benchmarks

OAR 690-086-0125(7)

The City is not requesting additional time to implement metering or any conservation benchmarks established in a previously approved WMCP.

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Section 2

Municipal Supplier Description

OAR 690-086-0140

This section is written to satisfy the requirements of OAR 690-086-0140. It describes the City's water sources, service area, population served, and existing water rights and demands for water. It also considers the adequacy and reliability of the City's existing water supply. This section provides a description of the City's customers and their water use patterns, the water system, interconnections with other water suppliers, and quantifies system leakage.

2.1 Water Sources, System Description, and Intergovernmental Agreements

OAR 690-086-0140(1)

Cedar City is located in the southwest region of Johnson County, Oregon in Township 27S, Ranges 5 and 6 W. The City's boundary extends north to the airport and west to Interstate 5. The Town of Blue Falls is located northeast of the City.

Cedar City serves the entire population within its city limits, as well as some customers outside city limits but within the Urban Growth Boundary (UGB). Exhibit 2-1 shows the city limits, water service area and urban growth boundary. The City also delivers water on a wholesale basis to the Town of Blue Falls. Both Cedar City and Blue Falls are located within Johnson County.

Cedar City draws water from three primary sources: Johnson Springs, the Red Cedar River, and the Granite Lake wells. Combined, these sources have the capacity to provide approximately 7.0 mgd. Water rights for these sources are shown in Exhibit 2-6 at the end of Section 2. Exhibit 2-5 also displays the City's sources of supply.

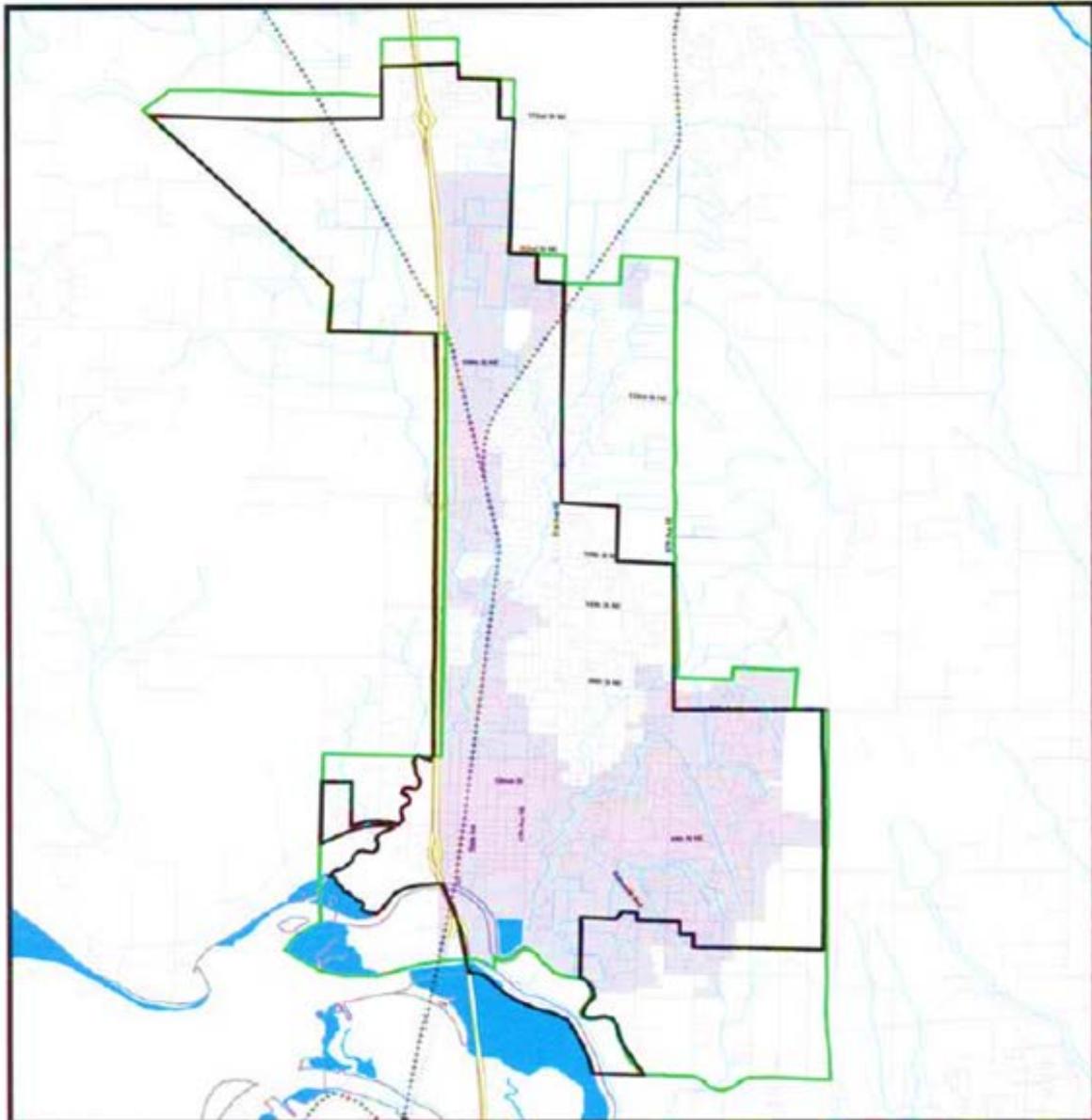
In 1972, Cedar City and the Town of Blue Falls drafted an intergovernmental agreement for the City to deliver water on a wholesale basis to the Town of Blue Falls. An intertie was to be constructed between the two communities with treatment occurring in Cedar City. This long-range water supply plan was approved by the Johnson County Board of Commissioners in 1974. The two communities then split the costs and constructed the Cedar City water treatment plant, the Red Cedar River raw water piping, and the Blue Falls intertie pipeline and pumping station. The point of diversion (POD) for the Red Cedar River is located at river mile 40.

The City also holds a 3.5 cfs groundwater permit (Permit G-356689) at the Granite Lake well field. However, due to a permit extension of time, a development limitation of 1.24 cfs is in place on the groundwater withdraw until approval of this WMCP. The City is requesting access to another 2.01 cfs of "Greenlight water" in addition to the 1.24 cfs currently approved. At that time, the City will have access to 3.25 cfs under this permit in order to meet future supply demands.

2.2 Current Population and Service Area
OAR 690-086-0140(2)

The City presently serves drinking water to about 18,000 customers within its own limits and an additional 950 customers from the Town of Blue Falls. Table 2-1 presents the City’s historical population estimates within City limits and the annual number of single family residential accounts. The City’s historical population estimates are taken from Portland State University Population Research Center. The number of single family residential accounts is taken from the Cedar City Utility Billing System data. Estimates from the Town of Blue Falls are not reflected here.

Table 2-1		
Historical Population and Account Estimates		
Year	In-City Total Population	Number of Single Family Accounts
2005	16,000	4,102
2006	16,320	4,184
2007	16,646	4,268
2008	16,978	4,353
2009	17,317	4,440
2010	17,663	4,528
2011	18,016	4,619
2012	18,376	4,711



- LEGEND
- Service Area Boundary
 - Urban Growth Boundary
 - City Limits

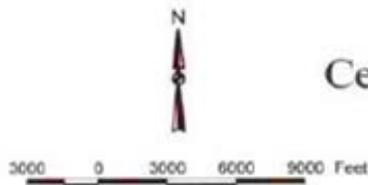


Exhibit 2-1
Cedar City Service Area

May 2013

2.3 Adequacy and Reliability of Water Rights/Supply OAR 690-086-0140(3)

At this time, the City's sources of supply are sufficient to meet its needs and the needs of the adjacent town of Blue Falls. However, as indicated above and in more detail in Section 5 of this WMCP, additional water will be needed to meet future needs as growth occurs.

Reliability of the City's supplies is good, in part due to use of three different sources of supply. If one source is interrupted due to an emergency, the other two sources can be increased. While this may result in reduced supply to some pressure zones, the distribution system can be used to move water throughout the system. During drought conditions in the early 1990's the City's supplies proved adequate to meet community needs.

2.4 Water Use Records OAR 690-086-0140(4)

Average day production (*i.e., water diverted from sources*) in year 2012 was 3.13 mgd; while average day demand (*i.e., water sold*) in 2012 was 2.8 mgd. The average annual demand for the period 2006 – 2012 was 267 mgd. (See also: Exhibit 2-4 below.)

The City's peak season water use in 2012 (July and August) was 1.81 mgd, which was about 30 percent of the City's total water use for the year. Peak day demand in 2012 occurred on August 12 and was 6.02 mgd. This represents a peaking factor of approximately 1.9. The peaking factor is driven by peaking characteristics of the various customer classes served by the City. For example, residential uses exhibit a pronounced peaking pattern in the summer months due to outdoor irrigation of turf and landscape materials. Many commercial customers in Cedar City also have extensive turf that is irrigated. Uses at city parks and schools also increase substantially, with the highest use occurring typically in August. In contrast, the City's large industrial customers have peak uses that may occur at any time of year and do not coincide with irrigation peaks.

2.5 Inventory of Water Rights OAR 690-086-0140(5)

As indicated above, Cedar City draws water from three primary sources: Johnson Springs, the Red Cedar River, and the Granite Lake Well Field. Combined, these sources currently have the capacity to provide approximately 7.0 mgd.

It should be noted that the City's withdrawal of water under its 3.5 cfs groundwater permit (Permit G-356689) at the Granite Lake Well Field is limited due to the approval of an Extension of Time Application for Permit G-356689. As established in the Final Order approving the Extension of Time, a development limitation of 1.24 cfs is in place on the groundwater withdrawal. This limitation is in effect until OWRD approves this WMCP and grants authorization to access groundwater from Permit G-356689 in an amount beyond the 1.24 cfs limitation.

In this WMCP, the City is requesting access to another 2.01 cfs of “Greenlight Water” in addition to the 1.24 cfs currently approved. At that time, the City will have access to 3.25 cfs under this permit in order to meet future supply demands.

The water rights for all of the City’s sources are shown in Exhibit 2-6 at the end of Section 2. Exhibit 2-5 also displays the locations of the City’s sources of supply.

2.5(i) Environmental Resource Issues

OAR 690-086-0140(5)(i)

The City’s diversion on the Red Cedar River has resource issues as identified in OAR 690-086-140(5)(i). Specifically, steelhead are federally-listed as threatened and state-listed as Sensitive-Critical. Steelhead use the Red Cedar River as spawning and rearing habitat. In addition, the river is listed on the 303(d) list, indicating water quality impairment for temperature and fecal coliform. The City anticipates continued access to water supply from the river under its existing water right. However, to the extent that new sources of supply are needed, the City anticipates developing additional ground water from deep wells, rather than increased use of the Red Cedar River (see Sections 5.4 and 5.7).

2.6 Customer Characteristics and Use Patterns

OAR 690-086-0140(6)

Cedar City provides water to residential, commercial and industrial customers, as well as schools, and municipal facilities. Exhibit 2-2 displays the number of service connections from 2003 through 2012. Over that time-period, the number of connections grew by about 16 percent. The breakdown of water uses by customer category is shown in Exhibit 2-3 for year 2012. Total water sold has increased by 11 percent over the past seven years, as shown in Table 2-2 and Exhibit 2-4. Sales to the top five customers by volume are shown in Table 2-3.

Category	2006	2007	2008	2009	2010	2011	2012
Single Family*	1.11	1.14	1.19	1.19	1.24	1.23	1.27
Multi-Family	0.35	0.62	0.62	0.65	0.66	0.64	0.65
Commercial/Industrial	0.59	0.65	0.56	0.58	0.66	0.71	0.67
Schools	0.11	0.11	0.10	0.12	0.14	0.13	0.11
Municipal	0.06	0.07	0.09	0.07	0.09	0.08	0.10
Town of Blue Falls	<u>0.08</u>	<u>0.09</u>	<u>0.09</u>	<u>0.08</u>	<u>0.09</u>	<u>0.10</u>	<u>0.09</u>
Total:	2.52	2.59	2.56	2.61	2.79	2.79	2.80

*45% of single-family customer accounts are currently metered. Sales to unmetered accounts are estimated, based on data from metered accounts.

Exhibit 2-2: Number of Service Connections (2003 - 2012)

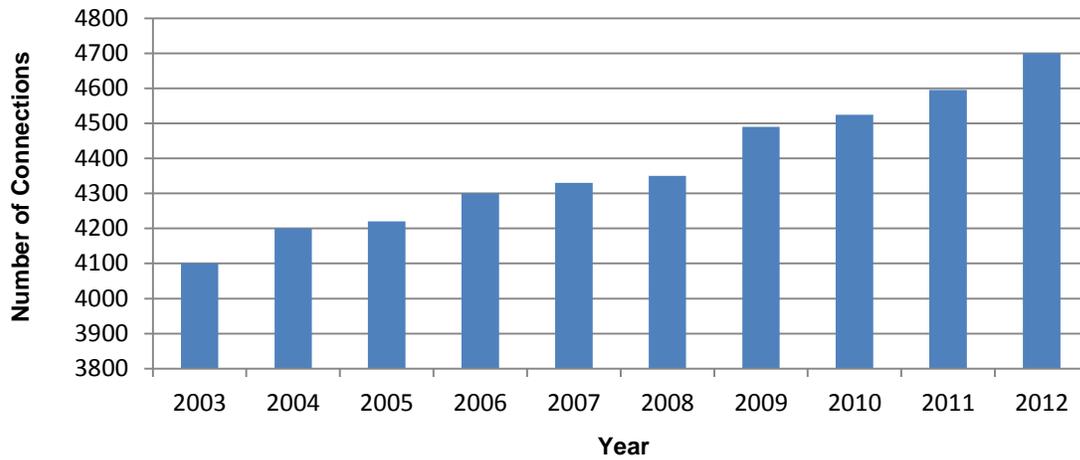
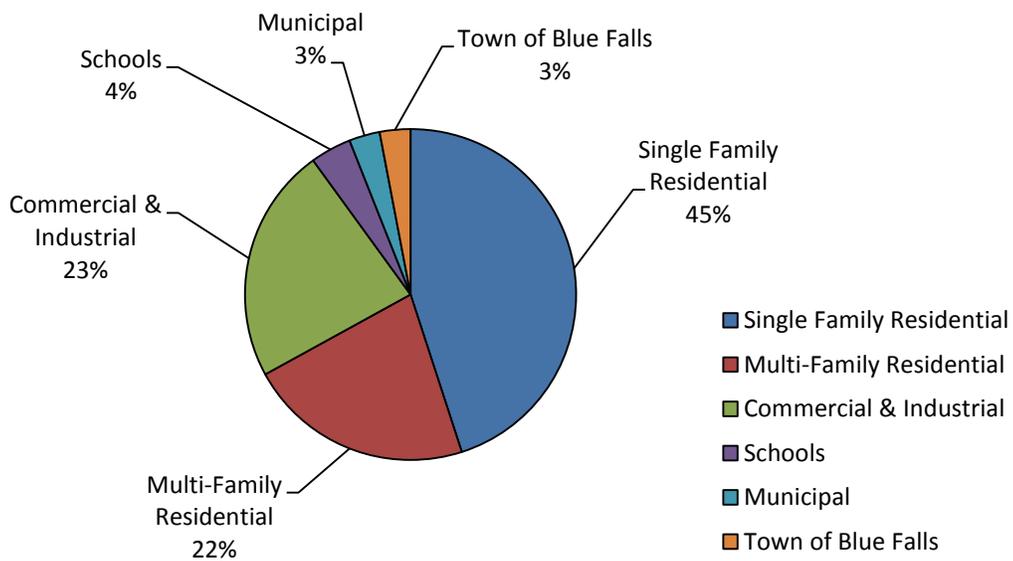
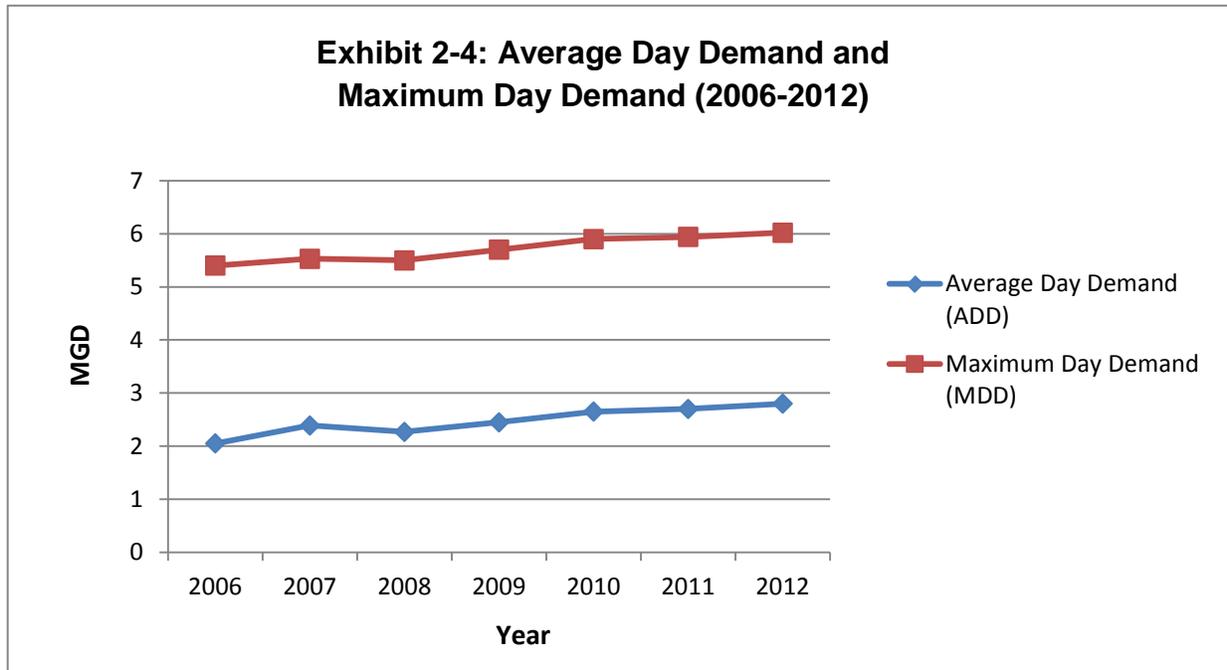


Exhibit 2-3: Demand by Customer Category 2012 (in percent)





**Table 2-3
Top Five Customers in Cedar City**

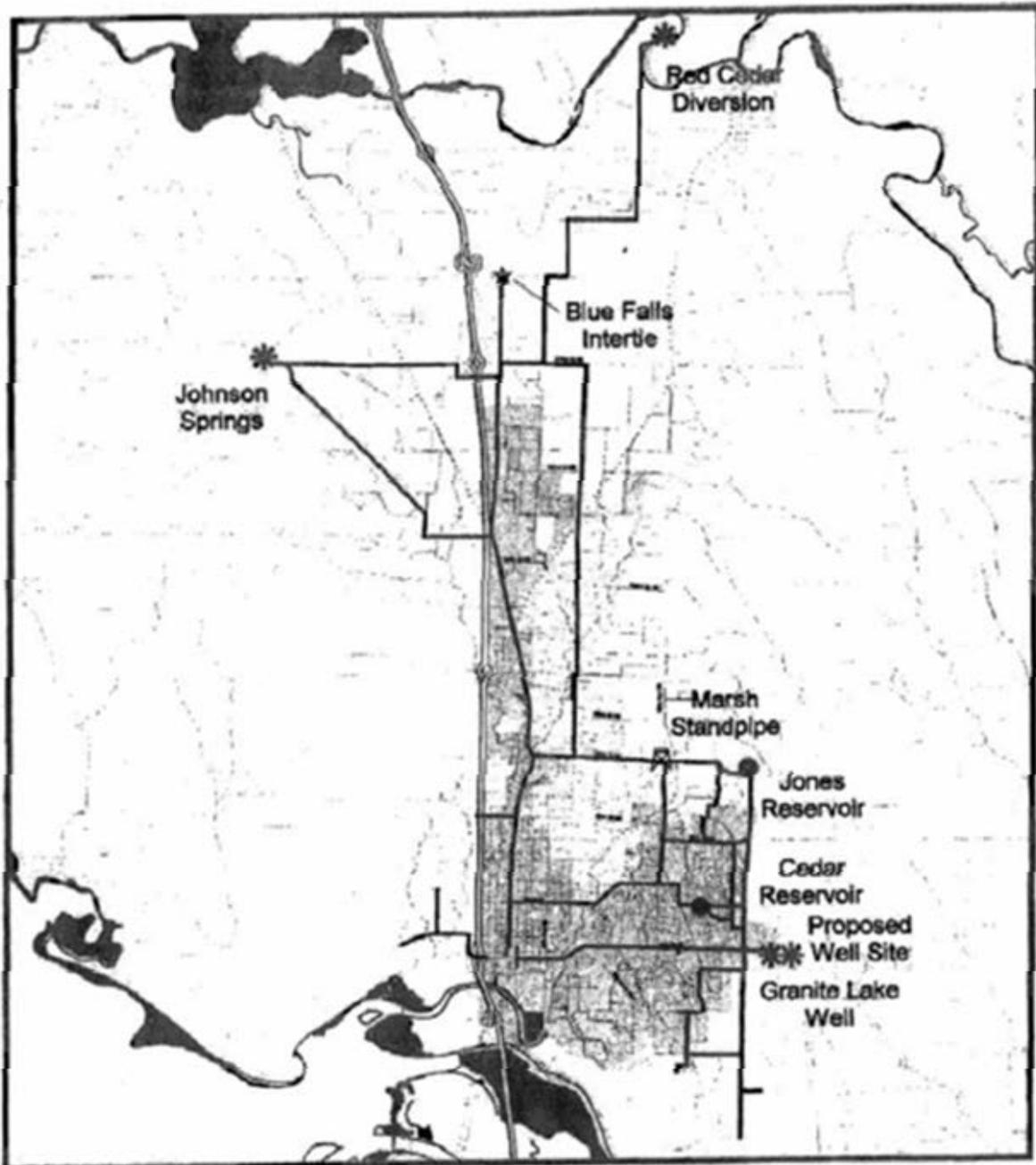
Customer	Average Day Demand (gpd)				
	2008	2009	2010	2011	2012
<i>Pacific Coast Controls, Inc.</i>					
4" meter	138,374	159,038	116,060	147,578	123,087
2" meter	4,932	4,222	6,636	4,658	5,126
sub-total	143,306	163,260	122,696	152,236	128,213
<i>NDSA</i>					
irrigation meter	57,246	43,225	38,822	44,359	46,760
meter	5,921	12,729	12,493	22,063	12,478
sub-total	63,167	55,953	51,315	66,422	59,238
<i>Federated Foods</i>	18,410	14,148	19,784	20,860	23,093
<i>Bluestone Park (irrigation)</i>	4,522	5,134	4,279	5,828	5,128
<i>Johnson Academy</i>	3,948	4,519	4,224	4,768	4,648
Total:	233,352	243,015	202,297	250,113	220,320

Source: Spreadsheet, "Large Users" from Cedar City Public Works

2.7 Interconnections with Other Water Supply Systems OAR 690-086-0140(7)

The City has an intertie with the Town of Blue Falls, to deliver water to Blue Falls. This is a one-way interconnection, as Blue Falls does not have its own source of supply.

2.8 System Schematic
OAR 690-086-0140(8)



- LEGEND**
- Existing Source of Supply
 - Reservoir
 - Standpipe
 - Proposed Source of Supply
 - Interties
 - Water Transmission Lines
 - City Limits

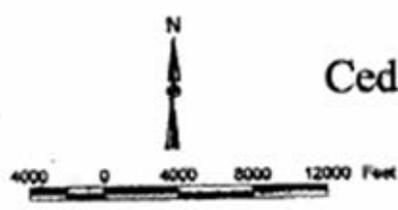


Exhibit 2-5
Cedar City Major Facilities

May 2013

2.9 Water Losses and Non-Revenue Water OAR 690-086-0140(9)

A comparison between production and billed sales indicates that the water system produces approximately 10 to 13 percent more water than is delivered to customers through their meters. Table 2-4 displays this comparison for the past seven years. The difference between production and sales is termed “*non-revenue water*”. It includes water used for beneficial purposes, such as flushing of water mains to meet water quality objectives, uses of water for firefighting, and authorized withdrawals from fire hydrants at construction sites. It may also include some unauthorized uses, leakage and other losses. The city does not have a means to directly measure flushing, firefighting and other authorized un-metered uses. Water main leaks occur occasionally and are repaired. However, there have been no major leaks in the past 10 years that would result in major losses to the system. In the absence of direct measurements of flushing, firefighting, and other authorized un-metered uses, and given the amount of non-revenue water shown below, it is estimated that system leakage must actually be well under ten percent.

	2006	2007	2008	2009	2010	2011	2012
Production	2.88	2.98	2.92	3.03	3.09	3.16	3.13
Billed Sales	2.52	2.59	2.56	2.61	2.79	2.79	2.80
Non-Revenue Water	0.36	0.39	0.36	0.42	0.30	0.37	0.33
Percentage of Total Production	12.43%	13.01%	12.44%	13.90%	9.71%	11.66%	10.51%

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Exhibit 2-6: City of Cedar City – Water Rights Inventory

Appl. No.	Permit No.	Priority Date	Cert. No.	Transfer No.	Source	Use	Maximum Allowed Rate under Original Permit (cfs)	Current Allowed Rate under Development Limitations condition and/or Perfected Rate of Certificate (cfs)	Actual Diversion				Authorized Completion Date	Source Issues <i>Identification of:</i> • ST&E species present in the source; • Water quality limited parameters listed for the source; and/or • Source well(s) located within a Critical Ground Water Area
									Maximum Instantaneous Rate Diverted to Date (cfs)	Maximum Annual Quantity Diverted to Date (MG)	Average Monthly Diversion (MG)	Average Daily Diversion (MG)		
S-209134	S-199853	5/12/1926	n/a	n/a	Red Cedar River	Municipal	9.0	8.1	8.1	900	75	2.5	10/1/2020	Federal listed species and water quality limited waterbody.
S-297465	S-285213	3/3/1905	115389	n/a	Johnson Springs	Municipal	0.55	0.55 (certificated)	0.55	120	10	0.33	n/a - certificated	None
S-356659	S-295687	11/16/1963	n/a	n/a	Johnson Springs	Municipal	2.8	1.25	1.25	240	19.4	0.65	10/1/2020	None
G-415685	G-356689	5/25/1985	n/a	n/a	Granite Lake Wells No. 1, 2, 3 and 4	Municipal	3.5	1.24	1.24	300	28	0.93	10/1/2042	None
TOTAL:							15.85 cfs (10.23 mgd)	11.14 cfs (7.19 mgd)						

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Section 3

Water Conservation Element

3.1 Progress Report - Scheduled Conservation Measures *OAR 690-086-0150(1)*

The City does not have a previously approved Water Management and Conservation Plan. Therefore, this section is not applicable. The City plans to report on the status of the five-year conservation benchmarks identified in this section in the next update of the WMCP.

3.2 Water Use Measurement and Reporting Program *OAR 690-086-0150(2)*

Cedar City's water use reporting is done in compliance with OAR 690-085. The report is submitted annually by December 31st on the form provided by the Water Resources Department using the "*Flow Meter Method*" approved by the Department in OAR 690-085-0015 (5). Source meters are located at each well and the surface water diversion, which record cumulative water volume over the full range of discharge. These meters are read weekly by City personnel. There have been no diversions or withdrawals in the last 10 years that were not recorded and the reported monthly volumes are accurate within plus or minus 15 percent.

3.3 Other Currently Implemented Conservation Measures *OAR 690-086-0150(3)*

Cedar City has been carrying out water conservation activities since 1995. These activities include regular distribution of promotional materials at City Hall and mailing of a brochure on water conservation once per year to all residential customers. In 2001, the City installed a 500 square-foot garden demonstrating low-water using landscape materials at Blakely Park in the city center. In addition, most Cedar City residents have received low flow showerheads from B&E Power, as part of an energy efficiency campaign. The City encourages water efficiency throughout its own facilities, including posting of signs that encourage employees to avoid waste wherever possible. In addition, six high-efficiency toilets were installed at City Hall and four at Blakely Park in year 2000. An additional 10 high-efficiency toilets are planned for installation in other City facilities in 2018.

3.4 Basic Conservation Programs *OAR 690-086-0150(4)*

OAR 690-086-0150(4) requires that all water suppliers establish 5-year benchmarks for implementing the following water management and conservation measures:

Annual Water Audit	<i>OAR 690-086-0150(4)(a)</i>
System-wide Metering	<i>OAR 690-086-0150(4)(b)</i>
Meter Testing and Maintenance	<i>OAR 690-086-0150(4)(c)</i>
Water Rate Structure	<i>OAR 690-086-0150(4)(d)</i>
Leak Detection and Repair	<i>OAR 690-086-0150(4)(e)</i>
Public Education	<i>OAR 690-086-0150(4)(f)</i>

3.4(a) Annual Water Audit *OAR 690-086-0150(4)(a)*

The updated OAR 690-086 Rules require the City to perform a water audit of the system annually. This must include a method to estimate any un-metered uses, both authorized and unauthorized. The data compiled for this WMCP represent the City’s first effort at a system audit. Estimated data indicates that “*non-revenue*” water is currently on the order of 10 to 11 percent of total system production. This estimate is somewhat limited, in that actual data is not available from the 55 percent of single-family residential accounts that are currently unmetered. Therefore, the auditing capability will improve over time, as additional meters are installed (see Section 3.4(b)(c) below).

The City does not currently track unbilled uses of water. These unbilled uses include fire-fighting; flushing mains to maintain water quality; and back-flushing of filters at the Red Cedar River water treatment plant. It also includes authorized uses of water from fire hydrants by construction contractors and a private company contracted to perform street sweeping. These uses cannot be accurately measured, but can be estimated in the future. The City will develop an annual estimate of these uses, by contacting the Cedar City Fire Department and authorized contractors. Beginning in January 2014, City crews responsible for line flushing will be required to maintain a daily log of estimated volumes flushed (minutes multiplied by estimated flushing rate in gpm). City crews that repair line leaks will maintain a similar log to estimate leakage volumes.

As required under OAR 690-086, a water system audit will be performed by public works staff in March of each year, when data on billed sales and estimated uses is fully available for the previous year. The audit will include a comparison of all water produced from the City’s sources of supply; water delivered to all customers; and estimated unbilled uses.

Audit results will be maintained in files of the Director of Public Works. Where audit results indicate an unacceptable level of unaccounted for water, the Director will take appropriate steps to identify the source and carry out corrective measures. The City will report annual audit results in its 5 year WMCP Progress Report and in the next WMCP update scheduled for submittal in 10 years. Table 3-4a shows the benchmarks for the water system audits.

**Table 3-4a
System Audit Benchmarks**

Benchmark	Start Date	Frequency
Perform annual water audit	2013	Annual
Improve audit capabilities through additional metering	See Section 3.4(b)(c)	See Section 3.4(b)(c)
Institute formal tracking of authorized unbilled uses	2014	Annual

3.4(b)(c) System-Wide Metering, Meter Testing & Maintenance OAR 690-086-0150(4)(b) and (4)(c)

Source Meters

Cedar City's three sources of supply are fully metered, and have been since the current facilities were installed. However, the existing meters were installed during the 1970's and 1980's and have not been calibrated in recent years. Cedar City will calibrate the meter associated with the Red Cedar River treatment plant in year 2014; and the meter at Johnson Springs in 2015. Source meters will be re-calibrated every five years thereafter. Depending on the results of the calibration procedure, meters will be adjusted or replaced as necessary. Meters will be judged adequate if calibration indicates they are registering within 5 percent of true flows.

The meters on wells at Granite Lake are the oldest in the system. Rather than calibrating these meters, they will be replaced with new meters in 2016 at the same time the well houses are upgraded in accordance with the City's Capital Improvement Plan.

Under a contract for water supply with the City of Blue Falls, Cedar City owns and maintains a master meter. This meter was upgraded in 2009 and is believed to be accurate. Therefore, the City does not anticipate calibration or replacement in the near future. Calibration will be conducted when the meter reaches an age of 10 years (i.e., in 2019), or sooner if data indicates measurement error.

Customer Meters

OAR 690-086-150(4) requires that a water supplier fully meter all retail accounts within five years of approval of a WMCP. Cedar City's municipal code requires that all multifamily residential, commercial and industrial, and municipal customers have water meters. Single-family residences constructed since 1989 have been required to have meters, but most older houses do not have meters. Unmetered residences represent approximately 55 percent of the housing stock in Cedar City. In accordance with OAR 690-086, the City will amend its municipal code to require all single family residences to have meters by year 2019. Meter installation will be carried out by Public Works crews. This activity will be financed through a rate surcharge applied to unmetered accounts, which will be collected beginning in fiscal year 2014. As part of this process, the City also plans to evaluate upgrading meters on all accounts throughout the City, to utilize new meter-reading technology and reduce operational costs. While the latter measure is not required by the State, it will help the City improve operational efficiencies and customer service.

Customer meters may become less accurate as they age, and occasionally fail altogether. The City currently attempts to calibrate all customer meters 4” and larger at least once every 3 years. Meters are generally replaced when they reach an age of 20 years. There are approximately 190 meters of this size in the system. Smaller meters are replaced when failures occur, as reported by customers or city meter readers. The City will continue these policies in the future as part of its overall approach to metering.

The Town of Blue Falls, which receives water on a wholesale basis from Cedar City, does not currently have customer meters. Cedar City does not have jurisdiction over metering practices in Blue Falls, under the current Water Supply Contract. However, when the current contract is up for renewal in year 2021, Cedar City will require Blue Falls to install customer meters. Advance notice of this requirement will be provided at the time this WMCP receives final approval, to allow for advance planning by the Town Council of Blue Falls. Table 3-4bc below shows the benchmarks for the source and customer metering program.

**Table 3-4bc
Metering Benchmarks**

Benchmark	Start Date	Frequency
Source meter calibration (Red Cedar River)	2014	Every 5 years
Source meter calibration (Johnson Springs)	2015	Every 5 years
Source meter replacement (Granite Lake wells)	2016	Calibrate every 5 years thereafter
Master meter calibration (Town of Blue Falls)	2019	Every 5 years thereafter
Install meters on unmetered customer accounts	2014	Annually through 2018
Customer meter calibration (4” and larger)	Ongoing	3 years
Amend Blue Falls supply contract to require customer meters at time of renewal	2021	N/A
Develop a method to better track authorized un-metered uses (e.g., flushing, firefighting, etc.)	2019	N/A

3.4(d) Water Rate Structure and Billing Schedule *OAR 690-086-0150(4)(d) and OAR 690-086-0150(6)(d)*

The City currently has a rate structure that includes a flat rate for unmetered single-family residential customers, and a base charge/commodity rate for all other customers. The commodity rate includes a uniform-block rate structure in the metered single-family category, the multifamily category, and the municipal category. Commercial and industrial customers have a declining block rate structure that charges less per unit of water as the customer’s use increases.

OAR 690-086 requires all water suppliers to have a rate structure that is based, at least in part, on the quantity of water metered at the service connection. The City’s existing rate structure meets this requirement, for all metered services. As noted in Section 3.4(b)(c) above, all unmetered services will have meters installed by year 2018 and will also meet this requirement.

For water suppliers serving a population over 7,500, OAR 690-086 requires consideration of rate structures that “*support and encourage water conservation.*” Cedar City serves a population of approximately 18,000, and therefore is subject to this requirement. While the City believes that its current rate structure is suitable for the Cedar City community, the City will review its rate structure to assess whether it should be changed. Therefore, a rate study will be commissioned by a qualified analyst specializing in utility finances. The rate study will be carried out by the end of fiscal year 2015. It will include an evaluation of changing to an increasing block rate structure for all customer classes, and will assess the impact on the City’s water customers. The City Council will then determine whether to make alterations in the existing rate structure.

The City currently bills its customers approximately every 60 days. This practice will be continued in the future. The City’s existing computer system and billing software do not permit providing customers with consumption history in each bill. However, the City anticipates upgrading its billing system by year 2017. At the time a new billing system is selected, the City will review available systems to determine whether consumption history can be generated in the new system to be purchased. The final decision on a new billing system will be made by the City Council, and will factor in cost, operational considerations, and customer service needs. Table 3-4d shows benchmarks for the water rates and billing practices.

Benchmark	Start Date	Frequency
Change all flat rate residential customers to commodity rate as meters are installed (see Table 3-4bc)	2014	Annually to 2018 (completion)
Complete rate study to assess change to increasing block rates	2015	N/A
Evaluate incorporating bill history capability in new billing system	2017	N/A

3.4(e) Leak Detection and Repair OAR 690-086-0150(4)(e), OAR 690-086-0150(5), and OAR 690-086-0150(6)(a)

Based on the data provided in Section 2.9 of this WMCP, total non-revenue water is approximately 10 to 11 percent. Since much of this represents water that is used for authorized purposes, but not billed, system leakage is believed to be well below ten percent. Based on this estimate of system leakage, the State Rules do not require a leak detection program. However, the City believes that leak detection activities are part of an overall sound management program. Therefore, the City will contract out leak detection with the objective of testing 25 percent of the water mains by year 2014. The oldest portions of the system, constructed in the 1950’s of asbestos-concrete (AC) pipe, will be tested first. Testing of other areas will be timed to coincide with road and sewer line improvement projects, to reduce the costs of any line replacement that is deemed necessary. As leaks are identified through the testing process, the City will either repair or replace the line, as determined to be most appropriate.

The City is also aware of a 3.5-mile stretch of AC pipe on the City’s west side along Ridge Road that has a long history of significant leaks. The City has scheduled the replacement of this section of pipe with new steel pipe during summer 2015.

The City will fund line repair and replacement needs through its water rates, as part of the City’s overall rehabilitation and replacement program for water system infrastructure. Where possible, the City will also seek funding from state and/or federal sources.

Table 3-4e (below) shows the benchmarks for the leak detection and repair program.

Benchmark	Start Date	Frequency
Test oldest 25% of lines over 10” diameter	2014	Complete by 2020
Test additional lines, as needed coincident with road repairs	2014	Tie to road repair schedule
Repair/replacement of leaking pipes detected through line testing, as needed	2014	On-going
Replacement of 3.5-mile section of AC pipe along Ridge Road	2015	N/A

3.4(f) Public Education OAR 690-086-0150(4)(f)

As described in Section 3.3, Cedar City currently carries out public education activities to encourage wise use of water by customers as well as City employees. The City will expand its public education program as follows:

- Continue free leak detection tests for customers who suspect a leak. City staff will help determine the location of the leak if the leak is outdoors and offer free brochures with conservation information and a free conservation kit when applicable.
- Publish three water conservation articles in the City’s bi-monthly newsletter, *The Cedar City Inquirer*, which all water customers receive by mail. Articles’ topics will include tips to reduce seasonal peak demand (outdoor measures); tips to reduce base demand (indoor measures); information about available water conservation programs, such as incentives for commercial and industrial users; and introductions of other important conservation related measures described herein, such as the conservation web page.
- Create a water conservation web page to be published on the City’s web site. The site will contain information about how to conserve water, programs available to customers, and a link to AWWA’s Waterwiser site.
- Distribute water conservation brochures at community events twice per year and provide brochures at key city office sites frequented by customers. Brochures include tips on water saving irrigation techniques and methods to reduce consumption indoors.

Table 3-4f summarizes the benchmarks for public education.

Benchmark	Start Date	Frequency
Continue free leak detection tests	Current	On-going
Advertise via the conservation web page and the Cedar City Inquirer	April 2014	On-going
Write three conservation articles for the Cedar City Inquirer	June 2014	Annually
Develop a web page for water conservation on the City's web site	December 2013	On-going
Distribute brochures at two community events each year	January 2014	Annually
Distribute brochures in key city offices frequented by customers	January 2014	On-going

The City views these actions as essential to supporting the overall water conservation program. However, estimating water savings from public education is subject to extensive assumptions and was not attempted with the limited budget available for water conservation planning.

3.5 Leak Repair / Line Replacement

OAR 690-086-0150(5)

The City's Leak Detection/Repair and Line Replacement Program, as well as the associated conservation benchmarks, are discussed in Section 3.4(e) and Table 3-4e above.

3.6 Enhanced Conservation Measures

OAR 690-086-0150(6)

OAR 690-086-0150(6) requires municipal water suppliers that serve a population greater than 1,000 and propose to expand or initiate the diversion of water under an extended permit for which resource issues have been identified, or if the population served is greater than 7,500, to provide a description of the specific activities, along with a five-year schedule to implement several additional conservation measures.

Leak repair or line replacement program	<i>OAR 690-086-0150(6)(a)</i>
Technical and financial assistance programs	<i>OAR 690-086-0150(6)(b)</i>
Supplier financed retrofit or replacement of inefficient water-using fixtures	<i>OAR 690-086-0150(6)(c)</i>
Rate structure and billing schedule to support and encourage conservation	<i>OAR 690-086-0150(6)(d)</i>
Water reuse, recycling, or non-potable opportunities	<i>OAR 690-086-0150(6)(e)</i>
Any other conservation measures to improve water use efficiency	<i>OAR 690-086-0150(6)(f)</i>

3.6(a) Leak Repair / Line Replacement

OAR 690-086-0150(6)(a)

The City's Leak Detection/Repair and Line Replacement Program, as well as the associated conservation benchmarks, are discussed in Section 3.4(e) and Table 3-4e above.

3.6(b)(c) Technical / Financial Assistance Programs *OAR 690-086-0150(6)(b) and OAR 690-086-0150(6)(c)*

Cedar City’s conservation program consists of targeted efforts to reduce peak demand by the residential, commercial, and industrial classes. This is appropriate for the Cedar City water system because peak demand is the primary reason that new source development needs to be considered. Reduction in peak demand may help to delay or minimize the need for new source projects, with cost savings to the City’s customers.

Cedar City will initiate a program that offers technical and financial assistance and finances retrofit and replacement of existing fixtures. The program will include distribution of free water conservation kits to residential customers.

Technical and financial assistance will also be extended to the commercial and industrial classes. The City will offer a \$200 subsidy for irrigation audits to commercial and industrial customers with high seasonal peaking. To qualify for the subsidy, participating customers must have the irrigation audits performed by a certified Irrigation Auditor. Ten new customers will be notified of the opportunity by mail annually for the first few years. Because of the small size of Cedar City’s commercial and industrial base and limited number of customers in either of these classes that contribute significantly to peak demand, it is likely that in future years, customers who already received notification of the incentive program will receive additional notifications.

Table 3-6bc shows the benchmarks for the technical and financial assistance program in this category are as follows:

Benchmark	Start Date	Frequency
Distribute free water conservation kits to residential customers who respond to mailed-out information	April 2014	On-going
Offer \$200 rebates for irrigation audits to commercial and industrial customers with high peaking factors	March 2015	Annually

3.6(d) Water Rate Structure and Billing Schedule to Support and Encourage Conservation *OAR 690-086-0150(6)(d)*

A description of the City’s current rate structure and conservation benchmarks to support and encourage water conservation are discussed in Section 3.4(d) and Table 3-4(d) above.

3.6(e) Reuse, Recycling, and Non-Potable Opportunities OAR 690-086-0150(6)(e)

Cedar City has considered opportunities available for water re-use, recycling, and non-potable water. At this time, using water from the City's wastewater treatment plant was deemed infeasible due to the expense compared to the expense of supplying well water. The City's cost effectiveness measure for water conservation actions is \$1.30 per gpd of long-term water savings. The City performed a rough analysis, which showed that the cost to construct reuse infrastructure, coupled with on-going costs, was at least \$13.00 per gpd of water reused. This is several times the cost to supply well water. The construction costs included 4" pipe installation to a nearby customer and modifications to the wastewater treatment plant. These one-time expenses were spread out over a 25-year period. Pumping costs and maintenance were added as on-going costs.

If there were several adjacent customers willing to participate in a reuse program, the costs may be competitive with the cost to provide well water. However, the City does not believe a market exists for reuse wastewater among the users within close proximity to the wastewater treatment plant. In sum, the cost to provide reuse water from the wastewater treatment plant is much more expensive than the cost to provide water from the City's wells. Therefore, the City finds the reuse option inappropriate as well as infeasible.

In an effort to encourage customers to utilize water reuse, recycling, and non-potable water opportunities unassociated with wastewater treatment plant effluent, Cedar City will offer rebates to the ten largest commercial and industrial water users. The rebates will pay for the services of a registered Professional Engineer to study the customer's business operations and determine opportunities for water reuse. Each rebate will be for \$1,000 or half the cost of the study, whichever is less. These ten businesses are the same ones that are being offered a rebate for having an irrigation audit performed. The rebate offer will be repeated once every three years. The letter to this year's selected group was mailed on March 17th.

Table 3-6e (below) shows the benchmarks for the reuse and recycling of water.

Benchmark	Start Date	Frequency
Offer a \$1,000 rebate to the ten largest commercial and industrial water users to study reuse and recycling of water on-site	2014	3 years

3.6(f) Other Conservation Measures OAR 690-086-0150(6)(f)

To serve as an example to its customers in managing water resources efficiently and effectively, the City will install rain sensors at three city parks to avoid irrigation during or immediately after a rain event. This action is not required under the OAR 690-086 Rules but is consistent with the City’s overall program for managing water supplies. Table 3-6f shows the benchmarks for the optional measures.

Benchmark	Start Date	Frequency
Install rain sensors for irrigation systems in city parks	May 2014	One installation annually for 3 years

3.7 Estimated Water Savings OAR 690-086-0150

In conclusion, City staff have estimated the water savings that are anticipated from the entirety of the OAR 690-086-0150 conservation program total 193,000 gpd by the year 2023 and 213,000 gpd by the year 2033. These estimated savings are shown in Table 3-7 below. These savings will reduce the total need for water and allow the City to withdraw less water from its supply sources.

Measure	2023	2033
Metering of all un-metered accounts	51,000	51,000
Replace toilets in city facilities	4,000	4,000
Repair water main leaks	35,000	40,000
Residential conservation kits	40,000	40,000
Rain sensors for city parks	8,000	8,000
Irrigation audits (large customers)*	30,000	35,000
Reuse/recycling (large customers)*	25,000	35,000
Water system audit	support**	support**
Meter testing, maintenance, replacement	support**	support**
Adjust water rates	support**	support**
Public education	support**	support**
Total:	193,000 gpd	213,000 gpd

*Savings depend on interest by private sector. Will be evaluated in next WMCP Progress Report.

**These items are viewed as supporting other conservation measures, and no separate estimate was made for their water savings.

Many of the actions included in the conservation program are identified as supporting water conservation, but are not included in the quantitative estimate of savings. These measures are more difficult to quantify, and overlap with the savings associated with other measures listed. Therefore, they are not quantified independently at this time, but are recognized as contributing to the overall water efficiency of the City and its customers.

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Section 4

Water Curtailment Plan Elements

4.1 History of Supply Deficiencies and Current Capacity Limitations

OAR 690-086-0160(1)

The City Council adopted the City's first water curtailment plan in 1994. The curtailment plan was intended to prepare the City for a scenario where water treatment capacity is reduced and water stored in the system's reservoirs is used to meet the resulting production deficit on a peak day. Such a situation would put the City at risk of being unable to meet crisis water demands.

Within the last decade, the City has not experienced water shortages resulting from a constrained source of supply. The City has needed to implement its curtailment plan only once, in July 1994, when the City put Stage 1 of the curtailment plan into effect as daily water demands exceeded production capacity for 4 consecutive days.

4.2 Stages of Alert for Water Curtailment

OAR 690-086-0160(2)

The City's curtailment plan is comprised of four stages of alert:

- Stage 1 – Awareness of a Potential Water Supply Shortage
- Stage 2 – Water Supply Shortage
- Stage 3 – Severe Water Supply Shortage
- Stage 4 – Critical Water Supply Shortage

Each stage of alert is described in more detail below (in Section 4.3) along with the initiating conditions for each stage.

4.3 Triggers for Water Curtailment

OAR 690-086-0160(3)

Each of the City's three stages of alert is triggered by a pre-determined level of severity of water shortage, which is based upon the amount of water being used as compared to the capacity of the system to meet water demands. The trigger for each stage of alert is described in Table 4-1 (below).

Table 4-1 Water Curtailment Stages and Triggers	
Curtailment Stages	Initiating Conditions
Stage 1: Awareness of Potential Water Supply Shortage	<ul style="list-style-type: none"> • Maximum daily production does not exceed the daily demand • There is expectation of a potential supply deficiency
Stage 2: Water Supply Shortage	<ul style="list-style-type: none"> • Maximum production does not meet daily demand and reservoir storage falls to 90% capacity • Minor damage to the water system because of a natural disaster or vandalism • Failure of a minor part of the water system or a facility
Stage 3: Severe Water Supply Shortage	<ul style="list-style-type: none"> • Maximum production does not meet daily demand and reservoir storage to 80% capacity • Serious damage to the water system because of a natural disaster or vandalism • Failure of a significant part of the water system or a facility • Isolated contamination of the water supply
Stage 4: Critical Water Supply Shortage	<ul style="list-style-type: none"> • Maximum daily production does not meet daily demand and reservoir storage falls to 60% capacity • Extensive damage to the water system because of a natural disaster or vandalism • Failure of a critical water system or a facility • Contamination of the entire water supply

4.4 Water Curtailment Actions *OAR 690-086-0160(4)*

Stage 1: Awareness of Potential Water Supply Shortage

The Stage 1 warning is reached when maximum daily production meets, but does not exceed the daily demand, or when there is expectation of a potential supply deficiency. When such a situation occurs, the Water Operations Supervisor, Water Maintenance Supervisor, Utilities Division Manager, and on-duty water operations staff (i.e., the Water Utilities Management Team) will meet to assess the situation. If the Water Utilities Management Team determines that a potential water shortage exists, the team will consult with the Public Works Director (Director).

Under a Stage 1 warning, the Director has the authority to activate some or all of the voluntary curtailment measures described below.

Actions for which the City has direct control are the easiest to curtail:

1. The City will limit water use for street sweeping, and hydrant and water line flushing.
2. The Parks and Recreation Department will irrigate at maximum efficiency.
3. The Fire Department will limit training exercises to those that do not use water.

4. The City will make conservation information available at the Public Library, Utility Billing and other City offices, Post Offices, to local news media, and to neighborhood associations.
5. The City will remind customers of Cedar City's water waste ordinance (Municipal Code 3.01.250).

Stage 1 curtailment for citizens will be voluntary. The City will request that customers:

1. Reduce or eliminate nonessential water use.
2. Follow odd/even outdoor water schedules based on street address.
3. Limit outdoor watering to the early morning or late evening.

Customers will be notified of the City's voluntary curtailment request through newspaper, radio messages, or in a water bill, depending on the timing.

Stage 2: Water Supply Shortage

A Stage 2 water shortage is reached when maximum production does not meet daily demand and reservoir storage falls to 90% capacity. The Water Utilities Management Team will assess the situation daily, and if the Water Utilities Management Team deems it necessary, the Director may initiate the following restrictions:

1. Activate a conservation hotline with information of the current water supply situation, voluntary curtailment measures, and conservation tips.
2. Limit the Parks and Recreation Department nonessential water use, and irrigate only in off-peak hours.
3. Limit hydrant and water main flushing to emergencies only.
4. Ask customers to voluntarily restrict all irrigation and other nonessential outdoor water use and to limit all outdoor water use to the hours between 8 p.m. and 8 a.m. The following practices are deemed nonessential:
 - a. Watering or irrigating of lawns, grass, or turf except for:
 - New installations after March 1 of the current calendar year.
 - Athletic fields frequently used for organized play.
 - Park and recreation areas of a particular significance and value to the community as approved by the City Manager.
 - b. Use of City-supplied water to wash sidewalks, streets, driveways, walkways, parking lots or other impervious surfaces except where necessary for public health or safety.
5. Use of City-supplied water to wash vehicles (including boats and watercraft) except at facilities equipped with water re-circulation equipment or where necessary for public health or safety (e.g., garbage trucks or food transport) or as required by law.

Customers will be notified of the City's voluntary restrictions request through newspaper, radio messages, or in a water bill, depending on the timing.

Stage 3: Severe Water Supply Shortage

A Stage 3 water shortage is reached when maximum production does not meet daily demand and reservoir storage falls to 80% capacity. The Water Utilities Management Team will assess the situation daily. The Director will notify the City Manager and City Council of the shortage and report on what measures the City has implemented. At Stage 3, the Director may declare a Water Emergency (see Municipal Code 3.01.251). The Public Works Department will keep the media notified regularly about the status of the shortage to keep its customers informed, and the Director may initiate the following restrictions:

All outdoor nonessential water use shall be prohibited except where necessary for public health or safety or as noted in the exceptions below. Violators may be cited and water service may be discontinued for repeat violations per Municipal Code 3.01.252. The following practices are deemed nonessential:

1. Watering or irrigation of lawns, grass, or turf will not occur unless it is:
 - New lawn, grass, or turf that has been seeded or sodded after March 1 of the calendar year in which restrictions are imposed, and in such cases watering may only occur until the vegetation is established. Such watering shall occur only between 8 p.m. and 8 a.m.
 - Park and recreation areas of a particular significance and value to the community, as approved by the City Manager. Such watering will occur only between 8 p.m. and 8 a.m.
2. Use of City-supplied water to clean, fill, or maintain levels in decorative streams, ponds, or fountains unless it has a recirculating water system.
3. Use of City-supplied water to fill swimming, wading, or other pools with a capacity in excess of 100 gallons. Water may be added to swimming pools to replace volume lost because of evaporation and normal loss resulting from usage.
4. Use of City-supplied water to wash down sidewalks, streets, driveways, walkways, parking lots, or other impervious surfaced areas except where necessary for public health or safety.
5. Use of City-supplied water to wash vehicles (including boats and watercraft) except at facilities equipped with water re-circulation equipment. Washing of vehicles for public health and safety purposes (e.g., garbage trucks or food transport) is allowed as required by law.

Customers will be notified of the prohibited practices through newspaper, radio messages, or in a water bill, depending on the timing.

Stage 4: Critical Water Shortage

A Stage 4 water shortage is reached when maximum production does not meet daily demand and reservoir storage falls to 60% capacity. A water shortage of this severity threatens the ability of the City to deliver essential water supplies to its customers and provide adequate water storage and pressure for fire suppression, such that the restrictions are mandatory.

The Director will notify the City Manager and City Council of the shortage and submit a report of what measures are being implemented. At Stage 4, the Director may declare a Water Emergency (see Municipal Code 3.01.251). The Public Works Department will keep the media notified regularly about the status of the shortage to keep its customers informed, and may initiate the following restrictions:

1. All outdoor nonessential water use shall be prohibited except where necessary for public health or safety. Violators may be cited and water service discontinued for repeat violations per Municipal Code 3.01.252. Good Samaritan Hospital will be provided with water as long as possible.
2. All large industrial and institutional accounts will restrict water use to fire protection and other critical functions only.
3. Customers who receive water service from the City, but who reside outside the City limits may have their water service disconnected temporarily.
4. The Fire Department will modify operations as necessary to maintain stored water levels and system water pressure for as long as possible. The Public Works Department will work closely with the Fire Department to alert it of areas where there may be low pressures or supply.
5. In the event that a service level or other area of the City is without water, potable water will be made available at appropriate locations within the City limits. Water will be trucked to these sites and dispensed free of charge to City water customers.

The water emergency will be in effect until the Director notifies the City Manager when, based on the City Manager's direction, the water shortage is deemed over and an emergency situation no longer exists.

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Section 5

Municipal Water Supply Element

OAR 690-086-0170 and OAR 690-086-0130(7)

5.1 Service Areas and Population Projections

OAR 690-086-0170(1)

For purposes of this WMCP, it is assumed that the Urban Growth Boundary (UGB) will not change during the 20-year planning period. It is also assumed that the general character of the community will remain constant, and that the Town of Blue Falls will remain as a wholesale customer to Cedar City. No other wholesale customers are anticipated to be added during the planning period. These assumptions are consistent with the City's Comprehensive Land Use Plan (2006).

Projected growth in population, households and employment was obtained from the Comprehensive Land Use Plan. The City Planning Department and Johnson County planners reviewed the projections and confirmed that they remain valid for use in planning for the water system.

These projections are shown in Table 5-1. They indicate overall average growth of 25 percent from Year 2010 to 2033. Growth in households and employment ranges from 19 percent to 31 percent. The Town of Blue Falls is not included in Table 5-1, and will be treated as a separate demand load in the demand forecast.

Category	2010	2013⁽²⁾	2020	2023	2030	2033⁽³⁾	% Growth 2010 - 2033
Population	18,043	18,328	19,466	19,906	20,934	23,136	28%
Single-Family Households	4,540	4,596	4,819	4,911	5,124	5,582	23%
Multi-Family Households	3,400	3,438	3,831	3,978	4,322	4,469	31%
Employment	3,987	4,009	4,096	4,172	4,348	4,726	19%

Source: Cedar City Comprehensive Plan (2006)

(1) Does not include Town of Blue Falls.

(2) 2013 value interpolated between 2010 and 2020, using straight line interpolation.

(3) 2033 value extrapolated using same growth rate as between 2020 and 2030.

5.2 Schedule for Fully Exercising Water Use Permits OAR 690-086-0170(2)

Based on the information presented in this plan, Table 5-2 below indicates Cedar City’s anticipated schedule for full utilization of its existing water rights and water use permits.

Table 5-2 Schedule for Utilization of Water Rights					
Permit	Certificate	Source	Use	Rate (cfs)	Full Utilization
S-199853	n/a	Red Cedar River	Municipal	9.0	2030
S-285213	115389	Johnson Springs	Municipal	0.55	n/a – certificated
S-295687	n/a	Johnson Springs	Municipal	2.8	2025
G-356689	n/a	Granite Lake Wells No. 1, 2, 3 and 4	Municipal	3.5	2028

5.3 Water Demand Forecast OAR 690-086-0170(3)

Using the demographic forecast shown above, Cedar City developed a forecast of water demand. The major steps in this process included developing a forecast of average day demand (ADD) for the retail customers; developing a forecast of maximum day demand (MDD) for the retail customers, and obtaining a forecast of ADD and MDD from the Town of Blue Falls, which receives water as a wholesale customer. Each of these components of projected demand is described below.

5.3.1 Average Day Demand – Retail Customers

The forecast of ADD to year 2023 is shown in Table 5-3. The following methodology was used to develop the ADD forecast for retail customers:

Customer Type	2012	2023	2033
<i>Single-Family Residential</i>			
Single-Family Households ⁽²⁾	4,596	4,911	5,582
Water use per Single-Family Household (gphd)	276	276	276
Single-Family Demand (mgd)	1.27	1.4	1.5
<i>Multi-Family Residential</i>			
Multi-Family Households ⁽²⁾	3,438	3,978	4,469
Water use per Multi-Family Household (gphd) ⁽³⁾	189	189	189
Multi-Family Demand (mgd)	0.65	0.8	0.8
<i>Non-Residential</i>			
Employment ⁽²⁾	4,009	4,172	4,726
Water use per Employee (gped) ⁽⁴⁾	197	197	197
Base Non-Residential Demand (mgd)	0.79	0.8	0.9
Additional Increment for Large Industrial Development (mgd) ⁽⁵⁾	N/A	0.1	0.2
Total Non-Residential (mgd)	0.8	0.9	1.1
<i>Non-Revenue Water (mgd)⁽⁶⁾</i>	0.3	0.3	0.4
Retail Demand Subtotal (mgd)	3.0	3.4	3.9
<i>Additional Conservation (mgd)⁽⁷⁾</i>	N/A	-0.19	-0.21
Retail Demand with Additional Conservation (mgd)	3.0	3.2	3.7

gphd = gallons per household per day; gped = gallons per employee per day

(1) Does not include Town of Blue Falls.

(2) Demographic projections from Cedar City Comprehensive Plan.

(3) Multifamily water use assumed to be 85% of single-family use per household.

(4) Non-residential water use factor based on year 2010 retail sales to non-residential accounts, divided by estimate of employment in 2010.

(5) Assumes that two large industrial customers, each consuming 0.05 mgd (0.1 mgd total), will be added to the system every ten years.

(6) Non-revenue water in future years estimated as 10 percent of deliveries. This is reduced from Year 2012, when this value averaged 12 percent, as a percent of water delivered (not produced).

(7) Based on projected savings. See Conservation Element of this WMCP.

The forecast of ADD to year 2033 is shown in Table 5-3 above. The following methodology was used to develop the ADD forecast for retail customers:

- Daily water use per single-family household in year 2012 was calculated from available billing data and demographic data (see Tables 2-21 and 5-3). This water use is 276 gallons per household per day (gphd). Similar values were calculated for water use in the multi-family sector and non-residential sector, comprising commercial/industrial, schools, and municipal water uses grouped together. The water use factor calculated for multi-family residential use is 189 gphd. The water use factor calculated for non-residential use is 197 gallons per employee per day (gped). For purposes of these calculations, the water use levels are initially held constant. Conservation savings are then subtracted, below.
- The number of single-family households, multi-family households and employees projected for years 2023 and 2033 were obtained from Table 5-3. These values were then multiplied by water use per household or water use per employee, to obtain projected demand in each of these years.
- An additional increment of demand was identified for new, large industrial customers. This represents water that is available for industrial-oriented economic development, consistent with the City's economic development program. For this purpose, it was assumed that up to two new large customers, consuming 50,000 gpd, would be added to the City every 10 years. This amounts to 100,000 gpd (0.1 mgd) in year 2023, and 200,000 gpd (0.2 mgd) in year 2033. This amount is in addition to the current demand associated with large customers (see Table 2-3).
- A non-revenue water component was added to the projected billed sales. This was calculated as 10 percent of total retail water sold, which is consistent with recent experience.
- It is expected that Cedar City's expanded water conservation program (see Section 3.7) will lead to water savings. It is estimated that the conservation program will achieve savings of 0.19 mgd in year 2023 and 0.21 mgd by 2033 (see Table 3-7). This amount was subtracted from the other demands listed above. The net result will be a reduction in water use levels.

5.3.2 Maximum Day Demand – Retail Customers

Maximum day demand was projected by applying a peaking factor to the projected average day demand (see Table 5-4). Based on the ratio of average day demand to maximum day demand (ADD/MDD) in recent years for retail customers, this peaking factor is approximately 1.9. It should be noted that this is slightly different from the overall system peaking factor, which includes deliveries to Blue Falls. With this peaking factor applied to the demands calculated above, maximum day demand is projected to be 6.1 mgd in year 2023 and 7.0 mgd in year 2033. Conservation savings are anticipated to affect peaking, and this effect will be tracked for future updates of the WMCP.

Table 5-4
Projected Maximum Day Demand (MDD) for Cedar City Retail Customers (mgd)

	2012 (Actual) ⁽¹⁾	2023 ⁽²⁾	2033 ⁽²⁾
Average Day Demand (mgd)	3.0	3.2	3.7
Peaking Factor	1.89	1.9	1.9
Maximum Day Demand (mgd)	5.7	6.1	7.0

(1) 2012 MDD within city limits calculated as system-wide MDD of 6.02 less wholesale MDD of 0.27 delivered to Blue Falls.

(2) Projections use peaking factor of 1.9 (3-year average from 2010-2012), for consistency in projecting maximum day demands.

5.3.3 Projected Demand for Town of Blue Falls

As noted above, Cedar City anticipates that the Town of Blue Falls will continue to be served as a wholesale customer. Projected needs were obtained from the Blue Falls Director of Public Works and are documented in a letter dated January 10, 2013. The Town's ADD and MDD needs are shown in Table 5-5. The peaking factor for Blue Falls is higher than in Cedar City, reflecting a near 100 percent residential character with extensive irrigation. Opportunities to reduce peaking will be explored with Blue Falls prior to renewal of the water supply contract in 2021.

Table 5-5						
Projected Demand for Town of Blue Falls (mgd)						
	2012		2023		2033	
	ADD	MDD	ADD	MDD	ADD	MDD
Town of Blue Falls ⁽¹⁾	0.09	0.27	0.10	0.30	0.11	0.33

Peaking factor for deliveries to Town of Blue Falls (average 2010-2012):3.0

(1) 2012 based on actual data. Projections based on information provided by Blue Falls Director of Public Works.

5.3.4 Summary of Demand Forecast

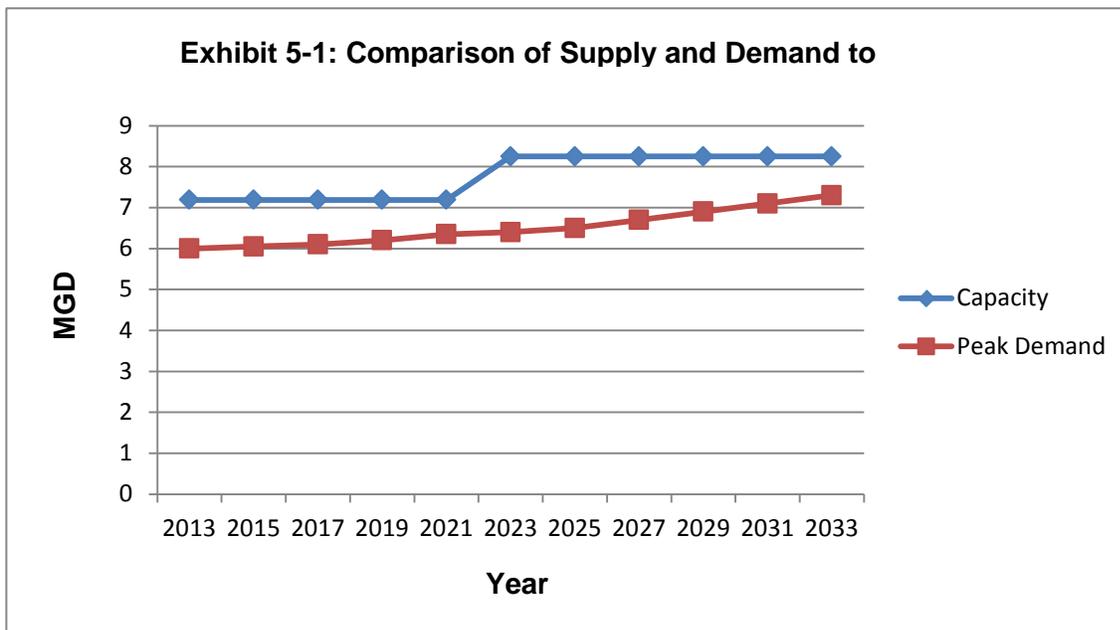
Table 5-6 summarizes total projected system demand, including both retail customers and the Town of Blue Falls. Total ADD for the system is projected to rise to 3.8 mgd by year 2033. Total MDD is projected to rise to 7.3 mgd. This represents an increase of 22 percent over total system demand in year 2012.

Table 5-6						
Summary Forecast of Total System Demand (mgd)						
	2012 - Actual		2023		2033	
	(mgd)	(cfs)	(mgd)	(cfs)	(mgd)	(cfs)
Average Day Demand (ADD)						
Retail System	3.0	4.65	3.2	4.96	3.7	5.74
Blue Falls	<u>0.09</u>	<u>0.14</u>	<u>0.10</u>	<u>0.16</u>	<u>0.11</u>	<u>0.17</u>
Total ADD:	3.1	4.79	3.3	5.12	3.8	5.91
Maximum Day Demand (MDD)						
Retail System	5.8	8.84	6.1	9.46	6.9	10.85
Blue Falls	<u>0.27</u>	<u>0.42</u>	<u>0.30</u>	<u>0.47</u>	<u>0.33</u>	<u>0.51</u>
Total MDD:	6.0	9.26	6.4	9.93	7.3	11.36

5.4 Comparison of Projected Need to Available Sources OAR 690-086-0170(4)

As shown in the demand forecast above, Cedar City’s demand is projected to rise by 22 percent over the next 20 years. Cedar City will need to add capacity to ensure that available supplies are sufficient to meet projected demand. In addition, the City requires some excess capacity to provide adequate supply in case one of its sources must be shut-down in an emergency.

Exhibit 5-1 displays projected maximum day demand, together with a planned expansion of supply capacity from 7.19 mgd (11.14 cfs) to 8.25 mgd (12.79 cfs). The maximum day demand trend incorporates the City’s water conservation program, as discussed in Section 3 of this WMCP. With this capacity added in year 2023, the City will have adequate capacity to meet its customers’ needs through at least 2033 including back-up supply for emergencies.



The City evaluated several alternatives to determine how best to meet future needs. The alternatives were analyzed in detail in a report titled “*Cedar City Supply Alternatives Comparison*,” dated November 15, 2011. These alternatives included:

- Expanded water conservation, above and beyond the program described in Section 3;
- Acquisition of water from other communities through intertie;
- Expansion of diversion facilities and water treatment plant at Red Cedar River;
- Expansion of transmission capacity from Johnson Springs;
- Expansion of well capacity at Granite Lake well field (*i.e., well reconstruction and/or new well installation*); and
- Installation of new wells in the Grand Prairie area near 132nd Street and Maple Way.

5.5 Analysis of Alternative Sources

OAR 690-086-0170(5)

OAR 690-086-0170(5) requires an analysis of alternative sources of water if any expansion or initial diversion of water allocated under existing permits is necessary to meet future water demand.

The following subsections describe the analysis used to determine the extent to which the City's future water needs could be met through other supply alternatives. Based on this analysis, the City determined that increased diversion of water under its extended Permit G-356689 is the most feasible and cost-effective supply alternative available for satisfying its projected demands for water.

(a) Conservation Measures

The report found that expanded water conservation activities cannot fully supply the need at a reasonable cost. A suite of additional water conservation projects was evaluated, with costs ranging from \$3.15 to 20.40 per 1,000 gpd of summer season water savings. The cost of new wells at various locations would range from 1.80 to 4.35 per 1,000 gpd of new peak supply capacity. Based on this comparison, new supply capacity was judged to be more cost effective than additional conservation. For further information, see the report cited above.

It should be noted that the water conservation measures the City is implementing under OAR 690-086 will reduce the size of new capacity needed, and will minimize the effects of growth on water resources utilized by the City. The conservation actions committed to in this WMCP are projected to save over 200,000 gpd by year 2033. This conservation program reduces the amount of new water development needed, by the same quantity. However, as indicated above, implementation of conservation activities above and beyond those established in Section 3 of this WMCP cannot fully supply the projected need.

(b) Interconnections

Purchase of water supply from other water suppliers is not feasible or desirable. The nearest community that could be considered would be the Mountain Home Water District (MHWD). MHWD's nearest water lines are over 12 miles from Cedar City, which would require installation of a costly pipeline. In addition, MHWD does not have excess water rights. Therefore, this solution is not feasible.

(c) Cost-Effectiveness

In considering the applicability of various water conservation actions, it is important to assess their cost-effectiveness, compared with the alternative of developing new ground water supplies. An engineering study completed in 2011 indicated that installation of new ground water supplies would cost \$650,000. Based on the assumptions documented in that report, construction of this project would yield an additional 0.5 mgd on an annual average basis. At a cost of \$650,000 for 0.5 mgd, this equates to approximately \$1.30 per gpd of long-term supply. This value was used as a cost-effectiveness threshold for comparing the cost of water

conservation projects that could achieve long-term reductions in demand. Conservation actions that cost less than this amount are deemed to be cost-effective, while actions costing more are not cost effective for Cedar City. All of the actions listed in Section 3 of this WMCP met the cost-effectiveness target, except where noted.

(NOTE: The cost-effectiveness information presented above is entirely hypothetical, and should not be used in actual WMCPs, your own cost effectiveness analysis should be used.)

5.6 Quantification of Maximum Rate and Monthly Volume OAR 690-086-0170(6)

Based on this WMCP, the City is requesting OWRD authorization to expand the rate of diversion under its extended Permit G-356689 (*i.e., the Granite Lake well field*). This will allow the City to meet its projected 20-year demands through the installation of new wells and pumping at an expanded instantaneous rate of up to 3.25 cfs. This expansion of permitted pumping will allow the City to continue delivering water to its customers and the Town of Blue Falls through at least 2033.

In accordance with OAR 690-086 requirements for a WMCP, Table 5-7 shows anticipated monthly pumping under the Granite Lake water right, to meet projected demand through the end of the 20-year planning period. Pumping authorization from other sources will remain unchanged from current authorizations.

Table 5-7 Estimated Monthly Pumping from Proposed New Wells by End of Planning Period	
Month	Total Gallons Pumped
January	33,500,000
February	33,500,000
March	33,500,000
April	33,500,000
May	40,000,000
June	50,000,000
July	57,000,000
August	57,000,000
September	50,000,000
October	40,000,000
November	33,500,000
December	33,500,000

Table 5-8 below summarizes the City’s request for OWRD authorization to expand the use of water under its extended Permit G-356689 (i.e., a Greenlight water request) from the current authorization of 1.24 cfs to a total of 3.25 cfs. Please also refer to the attached Greenlight Water Worksheet.

Permit No.	Source	Original Water Use Permit ⁽¹⁾	Current Authorization		Total Authorization Requested ⁽²⁾	
		Instantaneous Rate (cfs)	Instantaneous Rate (cfs)	Peak Monthly Volume (MG)	Instantaneous Rate (cfs)	Peak Monthly Volume (MG)
S-199853	Red Cedar River	9.0	8.1	105	no change ⁽³⁾	no change ⁽³⁾
S-285213	Johnson Springs	0.55	0.55	10	n/a - certificated	n/a - certificated
S-295687	Johnson Springs	2.8	1.25	19.4	no change ⁽³⁾	no change ⁽³⁾
G-356689	Granite Lake Wells No. 1, 2, 3 and 4	3.5	1.24	28	3.25	57

MG = million gallons cfs = cubic feet per second

(1) This is the “face value” of the water use permit, including any unperfected quantity.

(2) Includes amount previously authorized under a Permit Extension or WMCP Final Order with a Development Limitations condition.

(3) The City reserves the right to request expanded use in future Permit Extension of Time applications.

5.7 Mitigation Actions under State and Federal Law OAR 690-086-0170(7)

OAR 690-086 requires the water supplier to provide a description of mitigation actions being taken to comply with legal requirements, such as the Federal Endangered Species Act, Clean Water Act, and Safe Drinking Water Act. At the present time, the City is not required to undertake any mitigation actions under state or federal regulations or other requirements.

The expansion of supply indicated above will have the effect of avoiding increased reliance on the Red Cedar River. Since the Red Cedar River is a source that supports a steelhead population, and is also listed as impaired under the Clean Water Act, Section 303(d), the City believes that developing new ground water supplies at the Granite Lake well field site is a responsible action to meet the community’s needs in an environmentally responsible manner.

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Greenlight Water Worksheet

(NOTE: Water suppliers are encouraged to include this worksheet as part of their WMCP. Use additional sheets as necessary.)

1. Does the water supplier hold any extended water use permits?

Yes No

If **NO**, stop. A Greenlight Water request does not apply.

If **YES**, list the extended permit number(s) and indicate the maximum instantaneous rate of water allowed by the permit:

Permit Number	Instantaneous Rate of Water <u>Allowed</u> by Permit
S-199853	9.0 cfs
S-295687	2.8 cfs
G-356689	3.5 cfs

2. Do the extended permit(s) have a Development Limitations condition imposed by a final order approving the Permit Extension or a previously submitted WMCP that freeze the quantity of water that can be diverted under the extended permit?

Yes No

If **NO**, stop. A Greenlight Water request does not apply.

If **YES**, list the extended permit number(s) and indicate the maximum instantaneous rate of water allowed under the Development Limitations condition established by the Permit Extension or previously approved WMCP:

Permit Number	<u>Development Limitations</u>
	Instantaneous Rate of Water Allowed by Final Order approving a Permit Extension or previous WMCP
S-199853	8.1 cfs
S-295687	1.25 cfs
G-356689	1.24 cfs

3. Does the water supplier anticipate needing to divert water under an extended permit(s) at an instantaneous rate that is **greater than** the amount specified in the Development Limitations condition (established by the Permit Extension or previously approved WMCP) in order to meet its projected 20-year water demands?

Yes No

If **NO**, stop. A Greenlight Water request does not apply.

If **YES**, Items A and B below must be addressed in the water supplier’s WMCP being prepared for submittal:

A. Identify the maximum instantaneous rate and the maximum monthly volume of water that will be needed under the extended permit(s) for the next 20 years to meet the water supplier’s projected demands:

Permit Number	<u>“Greenlight Water” Request</u>	
	Maximum Instantaneous Rate of Water Anticipated to be Diverted to meet 20-year Demands	Maximum Monthly Volume of Water Anticipated to be Diverted to meet 20-year Demands
G-356689	3.25 cfs	57 MG

B. Describe how the water supplier has satisfied the following criteria:

- **OAR 690-086-0130(7)(a)** The plan includes a schedule for development of any conservation measures that would provide water at a cost that is equal to or lower than the cost of other identified sources, **unless**:
 - the supplier has provided sufficient justification for the factors used in selecting other sources for development; or
 - the supplier serves a population of less than 1,000.

As established in Section 3 of this WMCP, the City has established conservation benchmarks that will provide water at an equal to or lower cost than increased diversion of water under Permit G-356689. However, these conservation measures alone cannot meet the City’s projected 20-year demands.

As detailed in the November 15, 2011 report titled “Cedar City Supply Alternatives Comparison,” it was found that expanded water conservation activities cannot fully supply the City’s projected water need at a reasonable cost. A suite of additional water conservation projects was evaluated, with costs ranging from \$3.15 to 20.40 per 1,000 gpd of summer season water savings. The cost of new wells at various locations would range from 1.80 to 4.35 per 1,000 gpd of new peak supply capacity. Based on this comparison, the new supply capacity from the new wells was judged to be more cost effective than additional conservation measures.

- **OAR 690-086-0130(7)(b)** Increased use from the source is the most feasible and appropriate water supply alternative available to the supplier.

Purchase of water supply from other water suppliers is not feasible or desirable. The nearest community that could be considered would be the Mountain Home Water District (MHWD). MHWD’s nearest water lines are over 12 miles from Cedar City, which would require installation of a costly pipeline. In addition, MHWD does not have excess water rights. Therefore, this solution is not feasible.

The report also assessed the relative merits of the various capacity additions listed in Section 5.5 above. The City determined that additional diversions from the Red Cedar River are less desirable than new ground water capacity, due to potential issues associated with steelhead populations in the river. Additional diversions could reduce flows below critical levels in some years, creating undesirable effects on steelhead habitat.

Further, adding transmission capacity from Johnson Springs would require an investment of \$15 million. However, retaining the ability to expand the transmission capacity from Johnson Springs could be advantageous in the future, by ensuring that the City continues to have backup supply for the Cedar River in low flow years. This is the case because Johnson Springs and the Red Cedar River treatment plant serve the same pressure zones in the City’s water distribution system.

Installing a new well field at a new location would require new water rights; while expanding capacity at the Granite Lake well field could be done under the existing permit for this location. Moreover, the middle aquifer at this location is very productive. The report cited in Section 5.5 above recommended that Cedar City proceed with expansion of capacity at the Granite Lake well field, under its extended Permit G-3356689 for this site. The City plans to install two new wells adjacent to the existing well, adding pumping capacity of 1.25 mgd.

For these reasons, new ground water capacity appears to be the best option for meeting the City’s needs.

- **OAR 690-086-0130(7)(c)** If mitigation is legally required to address limitations or restrictions on the development of permits for which resource issues are identified under OAR 690-086-0140(5)(i), the plan contains documentation that the supplier is complying with the mitigation requirements. The Department may consult with federal and state agencies in making this determination.

At the present time, the City is not required to undertake any mitigation actions under state or federal regulations or other requirements related to the use of water under its extended permit G-356689.

Further, the expansion of supply under its extended Permit G-356689 indicated above will have the effect of avoiding increased reliance on the Red Cedar River. Since the Red Cedar River is the source that supports a steelhead population, and is also listed as impaired under the Clean Water Act, Section 303 (d), the City believes that developing new ground water supplies at the Granite Lake site is a responsible action to meet the community’s needs in an environmentally responsible manner.

Appendix H

Small Community Sample WMCP

City of Gales Rock

Water Management and Conservation Plan (WMCP)

May 2014

Note to Readers of this Guidebook:

This sample plan has been developed solely for purposes of the Guidebook on Municipal Water Management and Conservation Plans (WMCPs). It offers an example of a WMCP based on a fictional community. The information presented was assembled from various sources and is intended for illustrative purposes only. Therefore some of the information may not be fully consistent from one section to another.

The overall organization and approach to planning can serve as an example to water suppliers preparing their own plans. However, the specific mix of water supply and conservation actions described in this sample plan will not be applicable to every water supplier. Each community and water supplier is unique and should develop a WMCP to match its own specific needs and circumstances.



For actual examples of municipal WMCPs submitted to and approved by OWRD, please visit: <http://filepickup.wrd.state.or.us/files/Publications/W MCP/Requested%20Files/Municipal%20WMCP%20Guidebook%20Update%202014/>

City of Gales Rock WMCP

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-

WMCP Checklist

This checklist is provided as a guide to where each required WMCP element is located within the body of the plan. “N/A” is use for sections that do not apply to Cedar City.

✓	Item	OAR Reference	Section No.
WMCP Plan Elements			
	Notice to affected local government(s)	690-086-0125(5)	1.5
	Proposed WMCP update schedule	690-086-0125(6)	1.6
	Additional time to implement conservation benchmarks	690-086-0125(7)	1.7
Water Supplier Description			
	Description of supplier’s source(s)	690-086-0140(1)	2.1 and 2.2
	Map/Delineation of current service area	690-086-0140(2)	2.3
	Assessment of adequacy and reliability of existing supplies	690-086-0140(3)	2.4
	Present and historic water use	690-086-0140(4)	2.5
	Water right inventory table	690-086-0140(5)	2.6, 2.7, and Table 2-12
	Customers served and water use summary	690-086-0140(6)	2.8
	Interconnections with other systems	690-086-0140(7)	2.9
	System schematic	690-086-0140(8)	2.10 and Exhibit 2-1
	Quantification of system leakage	690-086-0140(9)	2.11
Water Conservation Element			
	Progress report on implementation of conservation measures	690-086-0150(1)	3.1
	Water use measurement and reporting program	690-086-0150(2)	3.2
	Currently implemented conservation measures	690-086-0150(3)	3.3
	Annual water audit	690-086-0150(4)(a)	3.4.1
	Full metering of system	690-086-0150(4)(b)	3.4.2
	Meter testing and maintenance program	690-086-0150(4)(c)	3.4.3
	Rate structure	690-086-0150(4)(d)	3.4.4
	Leak detection program	690-086-0150(4)(e)	3.4.5
	Public education program	690-086-0150(4)(f)	3.4.6
	System leakage reduction program <15%	690-086-0150(5)	3.5
	System leakage reduction program <10%	690-086-0150(6)(a)	3.6.1
	Technical and financial assistance programs	690-086-0150(6)(b)	3.6.2
	Retrofit/replacement of inefficient fixtures	690-086-0150(6)(c)	3.6.3
	Rate structure & billing practices to encourage conservation	690-086-0150(6)(d)	3.6.4
	Reuse, recycling, and non-potable opportunities	690-086-0150(6)(e)	3.6.5
	Other proposed conservation measures	690-086-0150(6)(f)	3.6.6
Water Curtailment Element			
	Water supply assessment and description of past deficiencies	690-086-0160(1)	4.1
	Stages of alert	690-086-0160(2)	4.2
	Triggers for each stage of alert	690-086-0160(3)	4.3
	Curtailment actions	690-086-0160(4)	4.4
Water Supply Element			
	Current/future service area and population projections	690-086-0170(1)	5.1 and 5.2
	Schedule to fully exercise each permit (<i>i.e., certification</i>)	690-086-0170(2)	5.3
	Water demand forecast	690-086-0170(3)	5.4
	Comparison of projected need to available sources	690-086-0170(4)	5.5
	Analysis of alternative sources	690-086-0170(5) & (8)	5.6 and 5.9
	Quantification of maximum rate and monthly volume	690-086-0170(6)	5.7
	Mitigation actions under state and federal laws	690-086-0170(7)	5.8
Greenlight Water Request			
	Conservation measure schedule and cost effectiveness	690-086-0130(7)(a)	5.10.1
	Justification that selected source is most feasible/appropriate	690-086-0130(7)(b)	5.10.2
	Mitigation requirements	690-086-0130(7)(c)	5.10.3

Section 1

Introduction & WMCP Elements

OAR 690-086-0125

1.1 Purpose / Plan Requirement

The City of Gales Rock, located in Blaine County, presents its May 2014 Water Management and Conservation Plan (WMCP) to the Oregon Water Resources Department (OWRD) and interested parties. The City believes this WMCP outlines a plan to effectively manage its present water rights and provide a means for developing a comprehensive strategy for meeting its municipal water supply needs over the next 20 years. Moreover, the plans attempts to enhance management techniques of the state's water resources, including an increased effort to improve the efficiency of the water system, thereby meeting the intent of the regulations defined under Oregon Administrative Rule (OAR) 690-086.

The City is submitting this WMCP in response to the final order approving a permit extension of time request on one of its water rights (Permit G-10400). Approval of the extension application triggered the need to prepare and submit a WMCP as directed under OARs 690-315 and 690-086. The final order approving the permit extension also included a "Development Limitations" condition that limits the amount of water that the City can be diverted under the extended permit to no more than 0.75 cfs (*out of the permitted 2.0 cfs*).

The City last submitted a WMCP in June 2003 in which Oregon Water Resources Department (OWRD) identified specific recommendations to improve local management of water resources. Since that time, the City has made substantial progress in meeting those requests and is looking to coordinate this new plan with on-going efforts to comply with OAR 690-086 rules. The City is also coordinating this latest update of the WMCP with a renewal of its 20-year Water System Master Plan as defined under OAR 333-065.

1.2 Plan Organization

This WMCP is organized in a manner consistent with OAR 690-086.

- Section 2: Describes the water supply system, including key demographic information, water consumption, and the type of infrastructure present in the water system.
- Section 3: Identifies the conservation measures the City has implemented and proposed new measures with associated benchmarks for each new measure.
- Section 4: Describes the tools available to the City in the event of a water emergency, including a water curtailment plan.
- Section 5: Uses the information presented in Section 2 to forecast future demand, compare that demand to present water rights, and assesses the need for additional source water diversions.

1.3 Summary of Data Sources

Throughout this WMCP are references to data, most of which were obtained from City files including records of pumping withdrawal, customer billings, land use planning, operational control, and conservation program implementation. Historical data related to service area, such as connections and demand, were obtained from the City's utility billing system, the City's water demand management software system (SCADA), and the City's previous WMCP and Water System Master Plan. Historic and future demographic data were also obtained in coordination with Blaine County's Council of Governments (BCCOG).

1.4 Input During Plan Development

To develop this WMCP, City staff from all relevant City departments including Water, Parks and Wastewater have worked together to examine a range of water management alternatives. A draft WMCP was also submitted to Blaine County with a request for comments. A final version of this plan was presented to City Council and approved on March 12, 2014.

1.5 Affected Local Governments

OAR 690-086-0125(5)

Thirty days prior to submitting this WMCP to OWRD, the City provided notice of availability of the draft WMCP for review to all affected local governments (listed below), along with a request for comments related to consistency with the local governments' comprehensive land use plan:

- Blaine County Planning Department
- Blaine County Council of Governments
- City of Hardy
- City of Bingham

Comments were received from the City of Hardy. A copy of the notification letter and the comments received are included in the Appendix of this WMCP.

1.6 Plan Update Schedule

OAR 690-086-0125(6)

Following OAR 690-086-0125(6), the City proposes to submit a progress report on or before May 2019 (*five years*) to review noted benchmarking and water use progress, and to submit an updated WMCP at the end of the 10-year period in 2024.

1.7 Request for Additional Time for Metering or Benchmarks

OAR 690-086-0125(7)

The City is not requesting an extension of time to implement metering or a benchmark established in a previously approved WMCP.

Section 2

Municipal Supplier Description

OAR 690-086-0140

This section is written to satisfy the requirements of OAR 690-086-0140. It describes the City's water sources, service area, population served, existing water rights, and demands for water. It also considers the adequacy and reliability of the City's existing water supply. This section also provides a description of the City's customers and their water use patterns, the water system, interconnections with other water suppliers, and a quantification of system leakage.

2.1 Water Sources and System Description

OAR 690-086-0140(1)

2.1.1 Description of Water Sources

There are seven wells connected to the City's water distribution system. The locations of those wells are shown on the system schematic (Exhibit 2-1). The wells are served primarily by withdrawals from the local sand and gravel aquifer that underlies the City. The aquifer is situated within the Central Valley watershed and is thought to be recharged by local rainfall, exchange with the Upper Salmon River and snowmelt from the nearby Bear Mountain range.

The City also has a surface water right for the use of water from Big River. This surface water supply system was originally developed in the 1930s as an unfiltered, gravity-operated system. In 1973, however, the City constructed a surface water treatment facility to disinfect and treat its surface water diversions. The City's current intake on Big River is located approximately 5.5 miles west of the city limits. Water diverted from Big River is conveyed via a 72-inch transmission main to the treatment facility. The treated surface water is then sent into the City's water service area and distribution system.

Additional information pertaining to the City's water rights is found in Section 2.6. A detailed description of all of the City's water rights is provided below in Table 2-12; City of Gales Rock Water Rights Inventory.

2.1.2 Source Treatment

All wells are currently in compliance with state drinking water standards outlined under OAR 333-065. Wells 3 and 6 are slightly impacted by high manganese and hydrogen sulfide and treated for taste and odor related problems with aeration. Wells 1 and 2, however, are highly impacted by hydrogen sulfide. Due to the high level of impact, the City is not currently treating Wells 1 and 2 to remove that compound; and therefore, Wells 1 and 2 are not used at this time. Withdrawals from Wells 3 and 6 are disinfected through the use of sodium hypochlorite, while Wells 4, 5 and 7 are disinfected through the use of gaseous chlorine.

2.1.3 Transmission/Distribution

The City has a system network of pipe sizes ranging from 2-inch to 12-inch pipes. The total linear feet of each nominal pipe size above 2-inch is shown in Table 2-1 below.

**Table 2-1
Summary of System Pipe Sizes**

Pipe Diameter Size (inches)	Total Length (feet)	Percent of Total
2	29,312	46%
4	14,221	22%
6	9,312	14%
8	4,547	7%
12	6,762	11%

Approximately 48% of the pipes are cast iron, 28% ductile iron, and 24% PVC.

2.1.4 Finished Water Storage

The City has four above ground reservoirs totaling 1.67 million gallons. The location of each reservoir is shown on the system schematic (Exhibit 2-1). Summaries of available storage and overflow elevation for each reservoir are provided in Table 2-2.

**Table 2-2
Finished Water Storage Summary**

Reservoir No.	Storage (gallons)	Overflow Elevation (feet)
1	300,000	250
2	300,000	355
3	500,000	433
4	500,000	450

2.1.5 Pump Stations

Each well has a pump house that pumps finished water into the reservoirs and out to the distribution network. The City’s surface water diversion is also equipped with a pump to transmit water to the treatment facility. Table 2-3 provides a summary of the capacities available at each well and the surface water diversion.

**Table 2-3
Summary of Pump Capacities**

Water Source	Pump Capacity (gpm)
Well 1	460
Well 2	441
Well 3	509
Well 4	855
Well 5	513
Well 6	581
Well 7	200
Big River Diversion	450

2.2 Intergovernmental Agreements

OAR 690-086-0140(1)

At this time, the City does not have any intergovernmental agreements with other domestic water supply systems. However, the City does maintain interties with the cities of Hardy and Bingham. Additional discussion related to the City's interconnections is provided in Section 2.9 below.

2.3 Current Population and Service Area

OAR 690-086-0140(2)

The City of Gales Rock, located in Blaine County, is situated on the west side of the Cascade Mountains within the Central Valley. The City sits five miles east of Big River and comprises approximately 1,700 acres.

The City presently serves drinking water to a population of approximately 4,400 within its municipal boundary. The area is roughly divided in land use by about 54% single and multifamily dwellings, 34% industrial and commercial enterprises, 9% agriculture, and 3% other. A map of the City's service area is shown on the system schematic (Exhibit 2-1).

Population estimates used in this report were provided by the City of Gales Rock Community Development Department. These estimates are consistent with the City's Comprehensive Land Use Plan (2010). As of 2013, the City served an estimated population of 4,408. A summary of population data for years 2009 - 2013 is shown in Table 2-4.

**Table 2-4
Population Estimates**

Year	Total Population	Households
2009	3,856	1,665
2010	3,848	1,650
2011	4,012	1,670
2012	4,286	1,725
2013	4,408	1,750

A breakdown of this data reveals an approximate number of 2.4 persons per household, at an annualized growth rate in population of about 2.7 percent over the past 5 years. These numbers are comparable to many of the surrounding communities; however, the City of Gales Rock has a higher number of multifamily units, such as apartments and retirement home condominiums.

2.4 Adequacy and Reliability of Water Rights/Supply

OAR 690-086-0140(3)

Historically, the City has been granted 3.69 mgd (5.73 cfs) of water rights, of which 3.48 mgd (5.4 cfs) is for municipal use and 0.21 mgd (0.33 cfs) is for irrigation. Operational constraints, however, limit total production capacity from all sources to about 1.43 mgd (2.22 cfs), with service into seven pressure zones via withdrawal from seven wells and Big River. The production capacity limitations are due to water quality issues (i.e., taste and odor problems) in Wells 1 and 2, and due to drawdown (hydraulic) restrictions with Wells 4 and 5. Well 5 experienced declining capacity since initially being brought into service; while Well 4 functioned properly for many years before experiencing a similar production decline about ten years ago. It is suspected that the production issues with Well 5 are a result of improper screen placement during construction. Problems with Well 4 seem to also be related screen placement issues.

Because of the above-described issues with Wells 1, 2, 4 and 5, the City relies on Wells 6 and 7, as well as the Big River diversion, as the primary water supply for meeting its municipal demands. The City also utilizes Well 3 as the primary source for agricultural irrigation of 26.4 acres owned by the city. To date, two of the municipal rights have been put to full beneficial use and certificated, while the others remain in permit status. The agricultural irrigation right has also been certificated.

2.5 Water Use Records

OAR 690-086-0140(4)

2.5.1 Average Annual and Average Day Water Use

Table 2-5 summarizes the average annual production from each of the City's seven wells and Big River over the past five years, as well as their relative percentage with regards to the City's total water production. A combination of ground water and surface water (i.e., *mainly Well 6, Well 7, and Big River*) serves as the City's primary source.

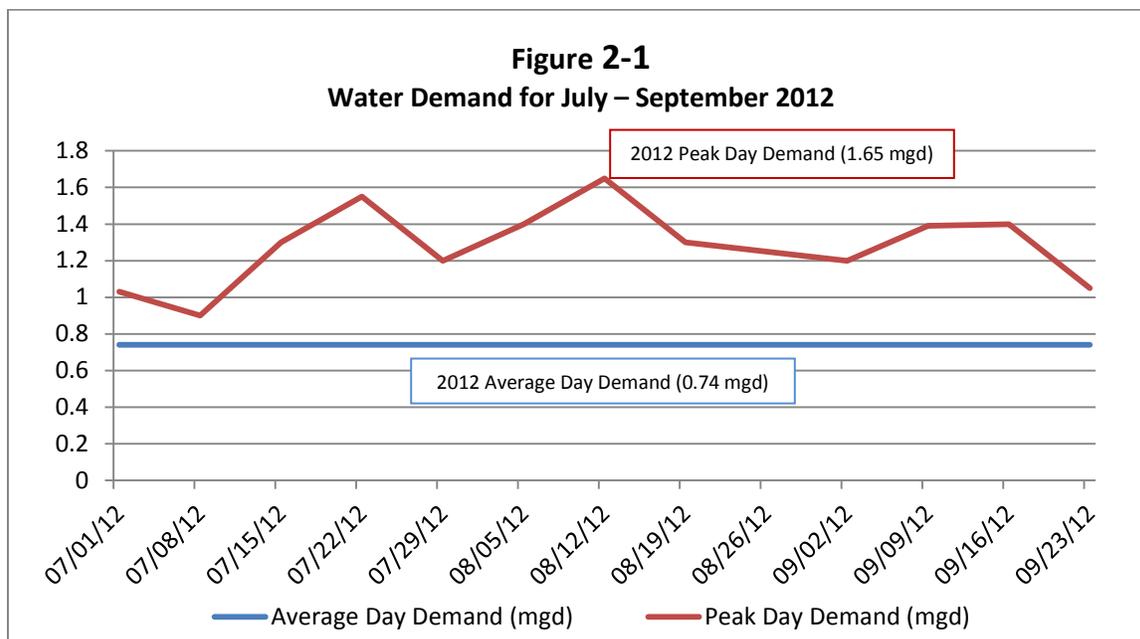
**Table 2-5
Summary of Recent Water Use**

Source	Permit No.	Total Production in Million Gallons (MG)					% of Supply
		2009	2010	2011	2012	2013	
Wells 1 & 2	G-1001	0.0	0.0	0.0	0.0	0.0	0%
Well 3	G-1010	27.5	27.7	28.2	28.5	29.6	11%
Well 4	G-1020	19.9	20.0	20.4	20.7	21.5	8%
Well 5	G-1030	14.9	14.9	15.4	15.4	16.0	6%
Wells 6 & 7	G-10400	94.8	95.0	97.3	98.3	102.1	38%
Big River	S-21001	92.3	92.5	94.8	95.7	99.4	37%
Total (MG):		249.4	250.1	256.1	258.6	268.6	100%
Average Day (mgd):		0.68	0.69	0.70	0.71	0.74	

The numbers shown in Table 2-5 are consistent with the City’s annual water use reporting, as required under OAR 690-085.

2.5.2 Peak Seasonal and Peak Day Water Use

A review of usage between 2009 and 2013 indicates a peak day demand of 1.65 mgd which occurred on August 12, 2012. In general, peak usage occurs each year between late July and early August. Figure 2-1 provides a graphical summary of the total system peak usage between July 1 and September 30, 2012. The resulting data indicate a peak day factor of about 2.3 (i.e. peak day use compared to annual average use). By comparison, this number is comparable to other communities of similar size and composition in the region. However, since the summer of 2012 was not abnormally dry, the peaking factor could trend higher if persistent periods of hot, dry weather were to be experienced in the future.



2.6 Inventory of Water Rights OAR 690-086-0140(5)

The City has access to a total of 3.48 mgd (5.4 cfs) of water for municipal use, with an additional 0.21 mgd (0.33 cfs) related to agricultural irrigation use only. This water is granted through a series of water rights that govern the withdrawals from both ground water and surface water.

There are seven wells connected to the City’s water distribution system. The locations of those wells are shown on the system schematic (Exhibit 2-1). The wells are served primarily by withdrawals from the local sand and gravel aquifer that underlies the City. The aquifer is situated within the Central Valley watershed and is thought to be recharged by local rainfall, exchange with the Upper Salmon River and snowmelt from the nearby Bear Mountain range. In addition to their ground water sources, the City holds one water right for the diversion of water from Big River. A detailed description of all of the City’s water rights is provided below in Table 2-12; City of Gales Rock Water Right Inventory at the end of Section 2.

It is important to note that Wells 1 and 2 suffer from severe taste and odor problems and are not currently used due to water quality concerns. Also, Wells 4 and 5 have experienced declining capacity since being brought into service. Wells 4 and 5 annually produce just under 25% of the City’s water. The problems with Wells 4 and 5 are thought to be associated with fouling or improper screen placement during construction. Recent testing of the wells indicates the City has access to about 1.9 mgd (including the Big River diversion) under limited peak withdrawal and a firm yield of about 1.4 mgd.

Table 2-6 summarizes the City’s water use, broken down by the amount diverted under each of its water rights. The table includes: the maximum instantaneous diversion rate to date for each right; the maximum annual quantity diverted to date for each right; and the average monthly and the average daily diversion under each right for the previous five years.

**Table 2-6
Water Use under Each of the City’s Water Rights**

Source	Permit No.	Maximum Allowed Rate (cfs)	Max. Instantaneous Rate Diverted to Date (cfs)	Max. Annual Quantity Diverted to Date (MG)	Average Monthly Diversion for Previous 5 Years (MG)	Average Daily Diversion for Previous 5 Years (cfs)
Wells 1 & 2	G-1001	1.33	1.33	14.0	0.0	0.0
Well 3	G-1010	0.33	0.33	36.0	3.0	0.23
Well 4	G-1020	0.55	0.49	22.6	2.5	0.18
Well 5	G-1030	0.67	0.62	24.9	2.2	0.16
Wells 6 & 7	G-10400	2.0 <i>(currently limited to 0.75 cfs)</i>	0.75	52.3	4.5	0.59
Big River	S-21001	0.85	0.85	60.4	6.0	0.71

2.7 Environmental Resource Issues

OAR 690-086-0140(5)

The City's ground water sources consist of seven wells. These wells are located within the boundary of a Critical Ground Water Area, as designated by the Oregon Water Resources Department.

The City also has one surface water source, namely Big River. Big River is listed on Oregon Department of Environmental Quality's (DEQ) 303(d) list of impaired water bodies for the following parameters: alkalinity, ammonia, chloride, dissolved oxygen, pH, phosphate phosphorous, flow modification, habitat modification, and temperature.

Additionally, Table 2-7 below identifies the following streamflow-dependent species that are present in Big River and that have been federally and/or state listed as sensitive, threatened or endangered.

Species	Federal Listing	State Listing
Chinook Salmon	Not Listed	Sensitive-Critical
Coho Salmon	Threatened	Sensitive-Critical
Steelhead	Not Listed	Sensitive-Critical
Western Brook Lamprey	Not listed	Sensitive-Vulnerable

2.8 Customer Characteristics and Use Patterns

OAR 690-086-0140(6)

The City has historically tracked its water users under the following classifications:

- Residential
- Commercial/Industrial
- Agricultural
- Public/Institutional
- Fire flow

Customers identified as "Residential" represent at least one dwelling unit. For example, both single family, multi-family, condominiums, and mobile homes are found within this class. The "commercial/industrial" class includes all commercial and industrial customers within the city. The "Agricultural" class includes any type of customer with a service connection dedicated for the raising of livestock or edible or non-edible crops. "Public/Institutional" accounts include the hospital, federal, state, or municipal connections, and the school districts. "Fireflow" accounts are strictly dedicated meters to allow for fire flow in the event of a fire.

As of 2013, the City had a total of 1,828 customer accounts. A summary of account history from 2009 to 2013 is shown in Table 2-8. Approximately 95 percent of the City's total connections serve residential customers (*which includes both single and multi-family accounts*).

The residential class is also the largest class among the City’s users, as measured by consumption, accounting for about 80% of all water produced. By contrast, the commercial and industrial class has significantly fewer customers, accounting for about 15% of all water produced, making it the second largest consumer. The remaining customer classes (i.e., public institutions, fire flow, and agriculture) represent 5% of consumption, combined.

Table 2-8
Accounts per Customer Class

	2009	2010	2011	2012	2013
Residential	1,548	1,593	1,668	1,686	1,728
Fire Meters	4	5	5	6	6
Public/Institutional	18	18	18	17	17
Commercial/Industrial	45	51	59	68	74
Agriculture	4	4	4	3	3
Total:	1,619	1,671	1,754	1,780	1,828

It is typical for a utility to convert its various meter sizes to Equivalent Residential Units (ERUs) to characterize potential water usage throughout a wide range of connection sizes. An alternative way of examining water use is to treat all connections as if they were a typical residential meter size. Such normalization allows the use to be standardized based on meter size.

Table 2-9 provides a summary of the City’s 2013 metered accounts and ERUs for each customer class by meter size. As shown in Table 2-9, as of 2013 the City had a total of 2,699 ERUs. The City’s largest customer class remains residential users representing 58% of the ERUs in the system. 230 ERUs are fire flow connections which do not have a significant impact on overall water usage due to their infrequent use. Calculations within this WMCP do not incorporate “Fire Flow” accounts unless otherwise noted.

Table 2-9
2013 Summary of Connections and ERUs (in parentheses)

Meter Size	ERU Equivalent	Agriculture	Public / Institutional	Residential	Commercial / Industrial	Fire Flow*
¾"	(1)	1 (1)	4 (4)	1,572 (1,572)	14 (14)	0 (0)
1"	(3)	2 (6)	5 (15)	108 (324)	26 (78)	0 (0)
1 ½"	(5)	1 (5)	1 (5)	37 (185)	8 (40)	0 (0)
2"	(8)	6 (48)	6 (48)	11 (88)	18 (144)	0 (0)

* Fire-standby connections will not be used in normalized water usage calculations (gpd/ERU).

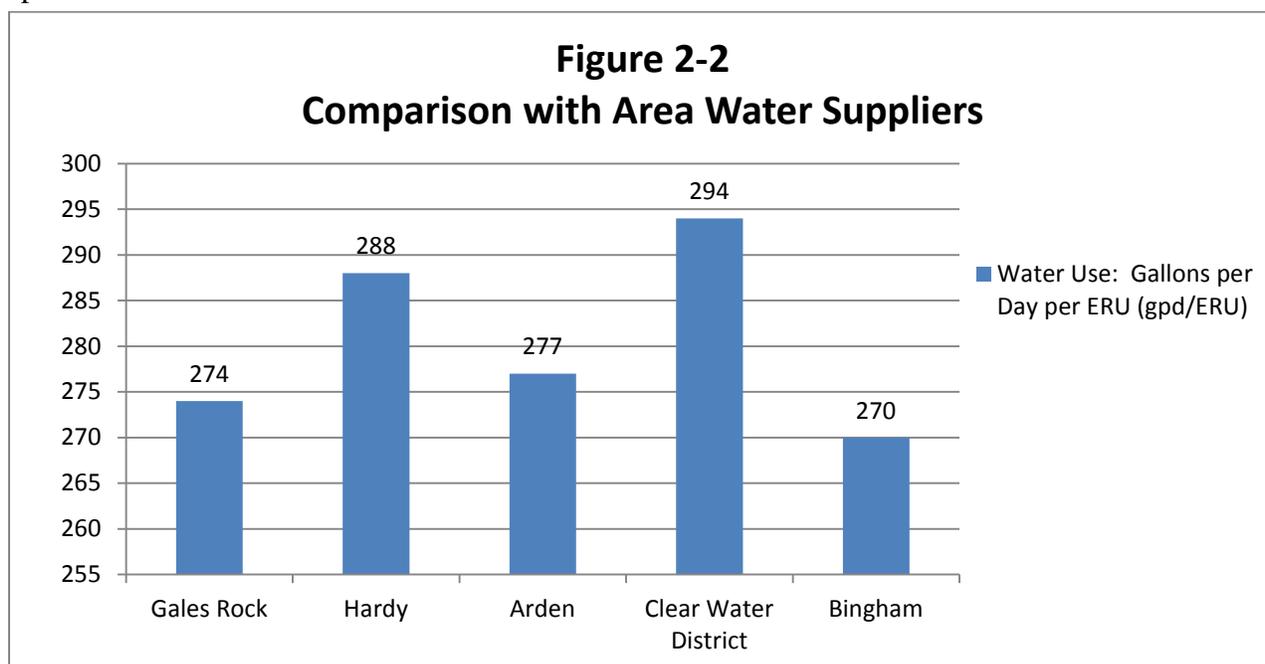
In analyzing water usage by customer class, the total number of connections was divided by class and normalized into ERUs. The average water use can be divided by the appropriate number of ERUs to obtain a history of normalized use, as shown in Table 2-10.

Table 2-10
Historic Average Annual Water Use – Gallons Per Day Per ERU (gpd/ERU)

Year	Annual Water Use (mgd)	ERUs*	Water Use/ERU (gpd/ERU)
2009	0.68	2,493	273
2010	0.69	2,505	275
2011	0.70	2,589	270
2012	0.71	2,628	270
2013	0.74	2,699	274

* Fire-standby connections are not included in the total ERU amount.

The City’s usage per ERU is about average when compared to a majority of water users in the area. Figure 2-2 shows various other area water providers and their average water usage rates per ERU.



2.9 Interconnections with Other Water Supply Systems OAR 690-086-0140(7)

The City currently has interties with the cities of Hardy and Bingham. There are no intergovernmental agreements relating to water supply for the City. Use from these interties has been very limited. Discussions with the Public Works Directors of Hardy and Bingham have indicated that these interties should not be considered as alternative sources of supply, except in cases of emergency. Both Hardy and Bingham have limited access to existing groundwater resources and, as a result, are unable to commit portions of their supply for use by the City of

Gales Rock as part of a wholesale arrangement. The intertie with Bingham, however, has been used three times over the past five years to support peak day demand in the City of Gales Rock. Consideration of this intertie as a reliable long-term source of supply is tied directly to Bingham’s current plans to develop the Trillium reservoir system. The new reservoir, if approved by OWRD, would supply an additional 5,000 acre-feet of water to four regional water providers, including the City of Gales Rock. The City of Gales Rock has currently reserved access to 500 acre-feet in that planned project. If constructed, the Trillium Reservoir project would provide about 1.1 mgd to the City of Gales Rock each year during the 150-day summer time period (May 15-October 15).

Further discussion of the City of Gales Rock’s long term supply plans are outlined in Section 5 of this report.

2.10 System Schematic
OAR 690-086-0140(8)

See the system schematic (Exhibit 2-1) at the end of Section 2.

2.11 Water Losses and Non-Revenue Water
OAR 690-086-0140(9)

Unaccounted for water over the past 5 years has generally been between 16% and 18%. This number is presently computed by simply taking the difference between metered withdrawals at the wells and recorded use from the City’s billing accounts. An unknown portion of the differences is a result of the absence of a methodology to track authorized, unmetered uses. In looking to improve system efficiencies, the City has aggressively pursued leak detection and repair and is presently performing an annual leak detection for pipes 4 inches in diameter and larger. A summary of water audit findings for the City for the period 2009 through 2013 is shown in Table 2-11. Additional details of the City’s water auditing program are presented in Section 3.4.1.

Year	Leakage Volume as a Percent of Production*
2009	16.2%
2010	17.2%
2011	17.4%
2012	17.1%
2013	18.2%

*Rounded to the nearest 0.1%. Measured for twelve months starting on October 1.

The City is currently awaiting the findings of the on-going leak detection work to identify any known major points of loss. The City is also presently undertaking plans to replace its entire cast iron pipe inventory over the next ten years. A priority for that renewal and replacement is expected to come from the findings of next year’s audit. The overall goal is to reduce annual losses to less than 10% of the total water pumped.

Table 2-12: City of Gales Rock Water Rights Inventory

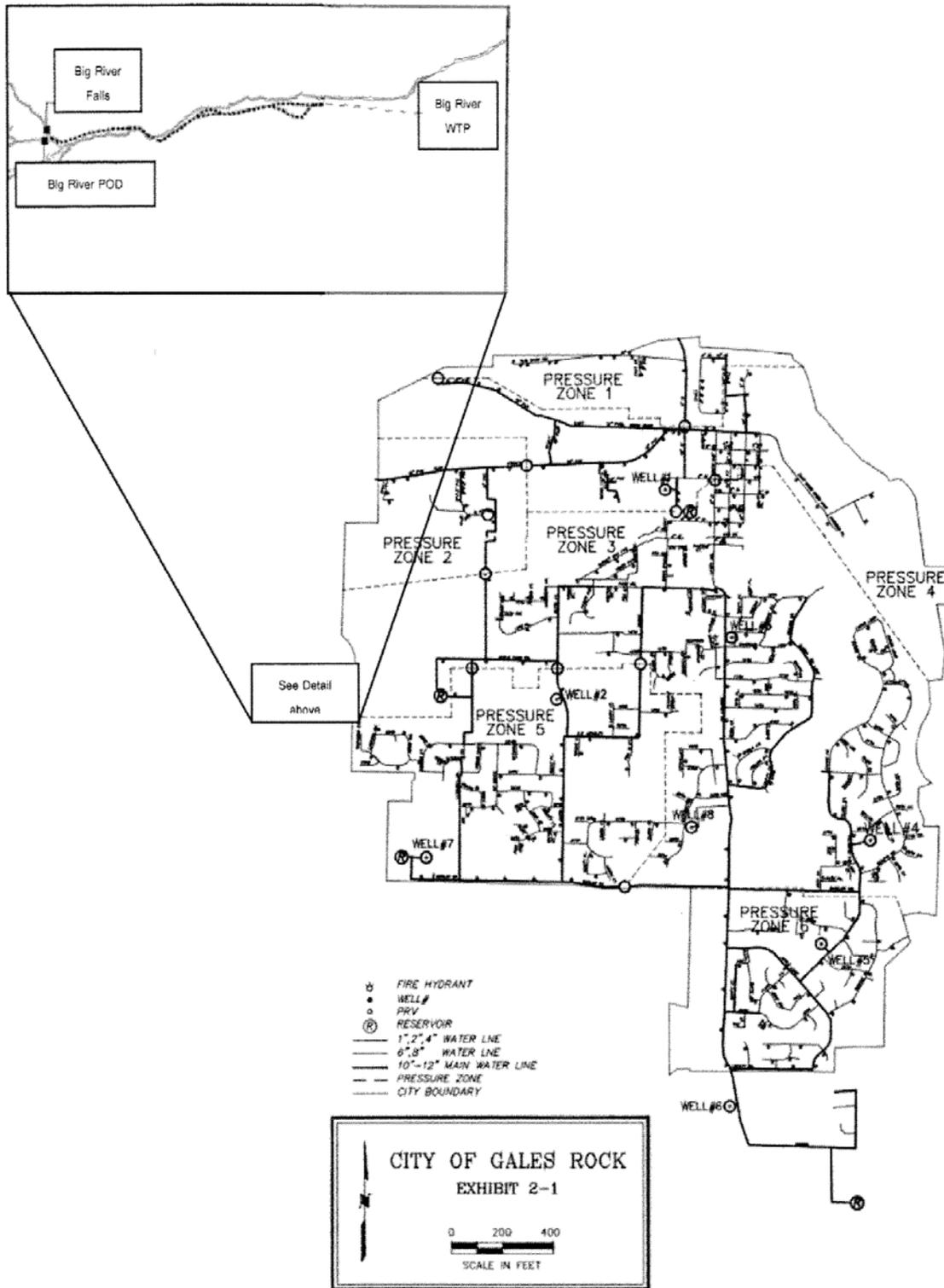
This tabular listing of water rights is provided to comply with the requirements of OAR 690-086-0140(5):

Appl. No. (5)(a)	Permit No. (5)(a)	Priority Date (5)(b)	Cert. No. (5)(a)	Source (5)(c)	Use (5)(d)	Maximum Allowed Rate (cfs) (5)(e)	Allowed Rate under Development Limitations Condition and/or Perfected Rate of Certificate (cfs) (5)(e)	Actual Diversion				Authorized Completion Date (5)(h)	Source Issues <i>Identification of:</i> • ST&E species present in the source; • Water quality limited parameters listed for the source; and/or • Source well(s) located within a Critical Ground Water Area (5)(i)
								Maximum Instantaneous Rate Diverted to Date (cfs) (5)(f)	Maximum Annual Quantity Diverted to Date (MG) (5)(f)	Average Monthly Diversion (MG) (5)(g)	Average Daily Diversion (cfs) (5)(g)		
G-1278	G-1001	8/19/1923	1234	Wells 1 & 2	Municipal	1.33 cfs	N/A	1.33 cfs	14.0	0.0	0.0	N/A - certificated	Within White Ridge Critical GW Area
G-1294	G-1010	6/14/1931	2345	Well 3	Agricultural Irrigation of 26.4 acres	0.33 cfs	N/A	0.33 cfs	36.0	3.0	0.26	N/A - certificated	Within White Ridge Critical GW Area
G-1318	G-1020	4/26/1956	---	Well 4	Municipal	0.55 cfs	N/A	0.55 cfs	22.6	2.5	0.18	10-1-2021	Within White Ridge Critical GW Area
G-1326	G-1030	9/16/1972	---	Well 5	Municipal	0.67 cfs	N/A	0.2 cfs	24.9	2.75	0.16	10-1-2025	Within White Ridge Critical GW Area
G-12551	G-10400	1/09/1981	---	Wells 6 & 7	Municipal	2.0 cfs	0.75 cfs ...as established by the "Development Limitations" condition in the Final Order issued 6-12-2011 approving the Permit Extension of Time	0.75 cfs	52.3	4.5	0.59	10-1-2054	Within White Ridge Critical GW Area
S-23456	S-21001	5/28/1932	8679	Big River	Municipal	0.85 cfs	N/A	0.85 cfs	60.4	6.0	0.71	N/A – certificated	*See below for water quality issues and listed ST&E species.

*Big River is on DEQ's 303(d) list for the following impairments: alkalinity, ammonia, chloride, dissolved oxygen, pH, phosphate phosphorous, flow modification, habitat modification, and temperature. The following species occur in Big River and are state and/or federally listed as Sensitive, Threatened or Endangered: chinook salmon, coho salmon, steelhead, and western brook lamprey.

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Exhibit 2-1 – System Schematic



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Section 3

Water Conservation Element

OAR 690-086-0150

***NOTE:** This sample Conservation Element is designed to describe all potential water conservation measures that a water supplier may need to implement and address. Based upon conditions specific to your own water supply system, the Water Conservation Element in your WMCP may not be as extensive as this example.

This section is written to satisfy the requirements of OAR 690-086-0150. It provides a status report on conservation measures scheduled for implementation in the City's previously approved WMCP, describes the City's current water conservation program, and outlines the City's benchmarks for meeting required conservation measures not currently implemented, if any.

In 2003, Gales Rock submitted a Water Management and Conservation Plan (WMCP) to Water Resource Department (WRD) describing, among other things, conservation measures available to the City. Since then, Gales Rock implemented some of these measures and continues to engage in conservation related activities. However, the breadth and depth of conservation measures required in the OAR 690-086 rules is greater than Gales Rock's existing measures. This section of the WMCP demonstrates the City's commitment to implementing a new program which will improve its water resources management techniques and thereby meet the intent of the new rules.

While limited resources hamper the ability to offer a full scale conservation program as seen at larger cities, Gales Rock's new conservation program represents a targeted approach to encouraging customers to conserve. Specifically, Gales Rock chooses to focus efforts on conservation measures which are intended reduce peak demand by the residential, commercial and industrial classes. Gales Rock's efforts also represent a new level of commitment by the City to take steps necessary to ensure internal practices promote efficient water management.

On the following pages, the City describes the conservation measures implemented since its last WMCP, and then details its new conservation program per OAR 690-086 rules. For easy reference, organization of this section of this WMCP closely matches the organization of the new rules.

3.1 Status Report - Scheduled Conservation Measures

OAR 690-086-0150(1)

As stated earlier, the City of Gales Rock submitted its first WMCP to O WRD in June 2003. This plan identified conservation measures the City could implement to encourage customers to conserve and also reduce the operational uses of water. Since that WMCP was submitted, the City has undertaken several of the activities recommended at that time.

- Water main leak detection program: In early 2006, Gales Rock hired a leak detection company to survey water mains (4 inches and larger) throughout the service area. Problem areas were placed on a prioritized list and subsequently repaired. The City repaired 3 major areas of leakage as a result of this survey, saving an estimated 1.2 million gallons of water per year.
- Reservoirs and tank leak detection program: Gales Rock continues to regularly perform visual inspections of its reservoirs and tanks for leakage.
- Meter testing program: The testing program focused on suspect meters which were identified when the water billing staff recognized an unusual meter reading or pattern or from a call from a customer. The City uses AWWA's accuracy standards when testing and repairing or maintaining meters; if suspect meters are found to measure outside of this standard, the meter is repaired or replaced. Source production meters (*meters measuring production at each well and Big River*) are tested generally once every five years.
- City park irrigation: Park irrigation systems are fully automated and irrigation events are timed to occur during the evening or early morning to minimize evaporation and avoid contributing to peak demand.
- City's operational usage: The City has undertaken the following steps to reduce or encourage the reduction of operational uses of water:
 - Self-closing nozzles have been installed at maintenance facilities to reduce water loss during vehicle washing and other maintenance activities.
 - Hydrant testing protocols have been upgraded to include a "closed cap" procedure.
 - Two public fountains have been rebuilt to recirculate water; new water is added only to offset evaporation.
 - Quarterly water usage reports are distributed to staff at the Parks Department and the wastewater treatment plant. The reports are used to monitor water consumption.
- Available customer program: Free leak detection visits are offered to customers upon request. A visit by City staff consists of a basic analysis of the likelihood of a line leak on the customer's property.

3.2 Water Use Measurement and Reporting Program OAR 690-086-0150(2)

Gales Rock's water use reporting is done in compliance with OAR 690-085. The report is submitted annually by December 31st on the form provided by OWRD using the "Flow Meter Method" approved by the Department in OAR 690-085-0015 (5).

Enders and Hauser brand meters are located at each well and the Big River diversion which record cumulative water volume over the full range of discharge. These meters are read weekly by City personnel. There have been no withdrawals in the last 10 years that were not recorded and the reported monthly volumes are accurate within plus or minus 15%.

3.3 Other Currently Implemented Conservation Measures OAR 690-086-0150(3)

The City has also undertaken several additional projects that were not identified in its June 2003 WMCP, including:

- Annual sponsorship of vendor's booth at the Blaine County Fair to promote "wise use" of water and distribute water conservation pamphlets and free lawn watering gauges.
- Toilets with 3.5 gallons per flush and larger have been replaced at all city parks and other city facilities with high efficiency 1.6 gallons per flush models.

3.4 Basic Conservation Measures Required of All Suppliers OAR 690-086-0150(4)

This rule applies to all municipal water suppliers. It requires the supplier to establish a schedule with five-year benchmarks for implementation of each of the following conservation measures identified under OAR 690-086-0150(4):

- *Annual water audit;*
- *Full metering;*
- *Meter testing and maintenance;*
- *Rate structure, based upon the amount of water metered;*
- *Leak detection if water loss exceeds 10%; and*
- *Public education.*

The conservation program described within the following subsection was developed by the City and based upon careful analyses of the characteristics of historical demand patterns and customer demographics, as described below.

The City's available water rights currently meet annual average and peak period demands. However, capacity limits based on operational elements are approaching the maximum summertime demands. For this reason, the City will focus its conservation measures on peak demand reduction and those elements of the customer base most affected by related activities. Historically, about half the annual consumption in each of the residential, commercial, and industrial customer classes occurs during the months of June, July, August and September. Such peaking is typical in the Northwest, especially for residential customers. Gales Rock, however, also experiences a similar pattern for its commercial and industrial users, whose seasonal demand typically does not vary to such a great degree.

Accordingly, the City's conservation program will be focused on peak demand reduction for these three classes (*i.e., residential, commercial, and industrial*). Further, although the City is already taking steps to reduce its own contribution to peak day, such as irrigating parks during the early mornings, it will also look to further encourage additional "wise use" by City staff.

In year 2013, the estimated per capita consumption for the residential class was approximately 103 gallons per day. This is a low number, considering the fact that one of the City's immediate neighbors, the City of Hardy, measured per capita single family residential demand at 145 gallons per day during that same year. Gales Rock attributes the

low per capita demand on the age of water-using fixtures in single and multi-family residences. Since over 30% of residences have been constructed or remodeled since 1994 (*the year a federal mandate was invoked requiring low water use fixtures in new construction and remodels*), the City estimates that essentially all of these homes have low water use fixtures now in place.

However, the City recognizes the need to continue to build on its present conservation activities. To do so, the City is planning to undertake several new conservation actions over the next ten years. Details of those plans are outlined in the following subsections.

3.4.1 Annual Water Audit

OAR 690-086-0150(4)(a)

A water audit has been performed annually by the City since 1995. Over the past five years, the City's average annual water loss has been about 17% (see Section 2.11 and Table 2-11). Currently, the City's calculation relies on a simple computation between the quantity of water pumped from the sources as compared to the quantity of water measured at customer's meters.

The City, however, has not yet attempted to identify unmetered authorized or unauthorized uses in the past. The City believes that if it starts to track unmetered authorized uses, such as flushing, fire flow through hydrants, and street cleaning activities, then the annual estimate of unaccounted for water may improve, i.e. drop below 15%. The City will begin a program to track non-revenue water usage starting in October 2016 and factor this number into all subsequent auditing reports for year 2016 and beyond. In addition, the City will annually review water usage at city facilities to identify conservation opportunities.

Five-Year Benchmark: *By October 2016, the City will develop and implement a program to track non-revenue water usage. This figure will be factored into all subsequent auditing reports for Year 2016 and beyond. The City will also review water usage at city facilities on an annual basis to identify conservation opportunities.*

3.4.2 System-Wide Metering

OAR 690-086-0150(4)(b)

The City's system is fully metered. All water sources are equipped with a source production meter to measure the amount of water diverted. Additionally, all customer connections are metered.

Five-Year Benchmark: *The City will continue to require the installation of meters at service connections for all new development within its service area.*

3.4.3 Meter Testing and Maintenance

OAR 690-086-0150(4)(c)

Meter testing and maintenance is currently performed on an “as needed” basis except for the source production meters which are tested every five years. The City will continue testing the source production meters every five years, but will also initiate a revolving meter replacement program in which all meters 2-inches and below will be replaced every 20 years. Starting in June 2017, all meters will be scheduled for replacement based on age and size priorities – the older, larger meters being replaced first. Additionally, all meters larger than 2-inches will be tested every five years for possible replacement starting at that same time.

Five-Year Benchmark: *The City will continue testing source production meters every five years. Additionally, beginning in June 2017, the City will initiate a revolving meter replacement program to replace all meters that are 2-inches and smaller every 20 years. The City will also initiate a program to test all meters larger than 2-inches every five years, and replace meters as needed.*

3.4.4 Water Rate Structure

OAR 690-086-0150(4)(d)

The City recently completed an update to its rates in association with the 2010 Water System Master Plan. The City adopted a \$16.00 monthly base (meter) charge and a rate of \$1.35 per 100 cubic feet (ccf) of water used. All customer use in the City is monitored under metered accounts and billed on a monthly basis.

Five-Year Benchmark: *The City will continue to maintain a water rate structure that includes a volumetric charge based on the amount of water metered at the customer’s service connection.*

3.4.5 Leak Detection

OAR 690-086-0150(4)(e)

The City’s system leakage from 2009 through 2013 ranged from approximately 16% to 18%. In accordance with OAR 690-086-0150(4)(e), because the City’s water losses have exceeded 10% over the last five years they have developed a leak detection program to conduct a revolving leak detection survey on at least 20% of the system each year. This way, the entire system is surveyed for leaks every five years.

Additionally, the City is currently awaiting results from an April 2014 leak detection survey conducted on all city pipelines 4-inches and larger. The City plans to use the results to outline a maintenance program to repair all detected leaks.

Five-Year Benchmark: *The City will continue to perform annual leak detection surveys, as described above, to monitor changes in pipeline integrity over time.*

3.4.6 Public Education

OAR 690-086-0150(4)(f)

Public education is an important component of the City's overall water conservation program. The following public education measures are planned:

- The City plans to continue to distribute free outdoor water conservation kits to its residential customers. The kits include an automatic-stop hose nozzle, a hose repair kit, and an irrigation gauge (*to measure volume of water applied*). The kits will be offered at two planned annual public events, including the Blaine County Fair, as well as on the City's website. The kits will also be distributed to customers when warranted during any on-site water leak detection visits.
- The City provides water conservation brochures at key city office sites frequented by customers. The brochures include tips on water saving irrigation techniques and methods to reduce indoor water consumption.
- The City also plans to publish a water conservation article in the City's newsletter and in the local *Gales Observer* newspaper on an annual basis, beginning in May 2015.
- The City's website is currently being overhauled to provide a water conservation page that will focus on ways to conserve water indoors and how to irrigate landscaping with low water use methods. The website upgrade is scheduled to be completed by May 2015, and will include links to other water conservation related sites.

Five-Year Benchmark: *The City will continue to distribute free outdoor water conservation kits to residential customers, and have water conservation brochures available at key city office sites. Additionally, by May 2015, the City will have an upgraded website with a page dedicated specifically to water conservation and will begin publishing an annual water conservation article in the City newsletter and the Gales Observer newspaper.*

3.5 Leak Repair/Line Replacement Program

OAR 690-086-0150(5)

This rule applies to municipal water suppliers that propose to expand or initiate diversion of water under an extended permit for which environmental resource issues have been identified under OAR 690-086-014(5)(i), and that have system leakage exceeding 15%.

It requires the municipal water supplier to establish a schedule with five-year benchmarks for implementation of the following conservation measure:

- *Leak repair or line replacement program.*

The City's system leakage in 2013 was approximately 18%. Additionally, in order to meet projected 20-year demands, the City is proposing to expand the diversion of water under its extended Permit G-10400 beyond the "Development Limitation" of 0.75 cfs (*out of the total permitted 2.0 cfs*) set forth in the Final Order issued on June 6, 2011 approving the Permit Extension of Time. Furthermore, the wells authorized under extended Permit G-10400 are

located within the boundary of a Critical Ground Water Area, as designated by OWRD. For these reasons, OAR 690-086-0150(5) is applicable to the City.

The City conducts an annual leak detection survey on at least 20% of its system and recently conducted a leak detection survey (in April 2014) on all city pipelines 4-inches and larger. The City plans to use the results to outline a maintenance program to repair all detected leaks.

The City also recently completed a 2010 update to its Water System Master Plan. In that plan, the City has scheduled the replacement of all existing old cast iron pipelines by the end of Year 2020. The plan outlines the replacement of approximately 60% of the oldest lines within the first 5 years, with the remaining 40% to be replaced between 2015 and 2020.

Five-Year Benchmark: *By October 2016, the City will repair all leaks identified in the recent leak detection surveys. Additionally, the City will replace 60% of its oldest cast iron pipeline by October 2015. The City also plans to work to replace the remaining 40% of old cast iron pipeline by October 2020.*

3.6 Enhanced Conservation Measures OAR 690-086-0150(6)

This rule applies to municipal water suppliers that serve a population greater than 1,000 and that are proposing to expand or initiate diversion of water under an extended permit for which environmental resource issues have been identified under OAR 690-086-014(5)(i).

This rule requires the municipal water supplier to establish a schedule with five-year benchmarks for implementation of each of the following conservation measures identified under OAR 690-086-0150(6), or to provide documentation showing that implementation of the measures is neither feasible nor appropriate for ensuring the efficient use of water and the prevention of waste:

- *Leak repair or line replacement program;*
- *Technical and financial assistance;*
- *Supplier financed retrofit or replacement of inefficient fixtures;*
- *Rate structures, billing schedules, and other associated programs to encourage water conservation;*
- *Water reuse, recycling, and non-potable water opportunities; and*
- *Any other conservation measures identified by the supplier to improve water use efficiency.*

The City currently serves a population of 4,400. Additionally, in order to meet projected 20-year demands, the City is proposing to expand the diversion of water under its extended Permit G-10400 beyond the “Development Limitation” of 0.75 cfs (*out of the total permitted 2.0 cfs*) set forth in the Final Order issued on June 6, 2011 approving the Permit Extension of Time. Furthermore, the wells authorized under extended Permit G-10400 are located within the boundary of the White Ridge Critical Ground Water Area, as designated by OWRD. For these reasons, OAR 690-086-0150(6) is applicable to the City.

3.6.1 Leak Repair/Line Replacement Program

OAR 690-086-0150(6)(a)

The City's system leakage in 2013 was approximately 18%; therefore the City conducts annual leak detection surveys on at least 20% of its system, and also recently conducted a leak detection survey (in April 2014) on all city pipelines 4-inches and larger. The City plans to use the results to outline a maintenance program to repair all detected leaks.

The City also recently completed a 2010 update to its Water System Master Plan. In that plan, the City has scheduled the replacement of all existing old cast iron pipelines by the end of Year 2020. The plan outlines the replacement of approximately 60% of the oldest lines within the first 5 years, with the remaining 40% to be replaced between 2015 and 2020.

Five-Year Benchmark: *By October 2016, the City will repair all leaks identified in the recent leak detection survey. Additionally, the City will replace 60% of its oldest cast iron pipeline by October 2015. The City also plans to work to replace the remaining 40% of old cast iron pipeline by October 2020.*

3.6.2 Technical /Financial Assistance Programs

OAR 690-086-0150(6)(b)

The City offers free leak detection tests to residential customers who suspect a leak. City staff provide assistance in determining the location of a leak and provide helpful information about how best to repair the leak. If the leak is outdoors, the City also offers free brochures with conservation information and a free landscape irrigation conservation kit that includes an automatic-stop hose nozzle, a hose repair kit, and an irrigation gauge.

The City has also implemented a program to work with its top ten largest water users in the commercial and industrial sectors. After ensuring that these customers' meters are calibrated and functioning properly, City staff provide a free water audit for these users on an annual basis. This program has helped to reduce water use in these sectors by approximately 10%.

Five-Year Benchmark: *The City will continue to offer free leak detection tests and technical assistance to residential customers who suspect a leak, and to offer free annual water audits for the City's top ten largest commercial/industrial water users.*

3.6.3 Retrofit/Replacement of Inefficient Fixtures

OAR 690-086-0150(6)(c)

As discussed previously, approximately 30% of residences within the City have been constructed or remodeled since 1994 (*the year a federal mandate was invoked requiring low water use fixtures in new construction and remodels*), and the City estimates that essentially all of these homes have low water use fixtures now in place.

For the remaining 70% of residences within the service area, however, the City is considering the cost/benefit aspect of developing a rebate program to assist these customers with investing in more efficient water using appliances (i.e., toilets, dishwashers, clothes washers) to replace their existing inefficient models.

Five-Year Benchmark: *By December 2017, the City will complete an evaluation of the feasibility of offering a rebate program for the replacement of inefficient toilets, clothes washers and/or dishwashers. If the analysis indicates this program will be cost-effective and beneficial in conserving water for the City, the program will be implemented by January 2019.*

3.6.4 Rate Structure and Billing Schedule to Encourage Conservation OAR 690-086-0150(6)(d)

As indicated in Section 3.4.4 above, the City recently completed an update to its rates in association with the 2010 Water System Master Plan. The City adopted a \$16.00 monthly base (meter) charge and a rate of \$1.35 per 100 cubic feet (ccf) of water used. All customer use in the City is monitored under metered accounts and billed on a monthly basis.

Additionally, all bills include the history of the customer's water use, the water billing rate structure, and water conservation messages.

Five-Year Benchmark: *The City will continue to maintain a water rate structure that includes a volumetric charge based on the amount of water metered at the customer's service connection. The City will also continue to bill its customers on a monthly basis and include the history of the customer's water use, the water billing rate structure, and water conservation messages on all water bills.*

3.6.5 Reuse, Recycling, and Non-Potable Opportunities OAR 690-086-0150(6)(e)

The City conveys treated wastewater from the wastewater treatment facility to the Green Hills Golf Course (*located within the City's service area*) for non-potable irrigation purposes on 78.0 acres at the golf course.

The City also plans to work with the largest industrial customers within its service area to determine whether there are opportunities within these customers' own production processes to implement water reuse and recycling.

Five-Year Benchmark: *During the next five years, the City will work with industrial users to investigate opportunities for water reuse and recycling in these users' production processes.*

3.6.6 Other Conservation Measures

OAR 690-086-0150(6)(f)

The City is committed to leading the community in the effective and efficient use of water and, by March 2016, will install rain sensors at each of the two city parks to optimize irrigation use at those two facilities.

***Five-Year Benchmark:** By March 2016, the City will install rain sensors at each of the two city parks to optimize irrigation use at those sites.*

3.7 Conservation Savings

Gales Rock anticipates that the savings gained from the conservation measures identified above will reduce peak demand in years 10 and 20 by 5% of total system demand estimated for those years. Table 3-1 identifies the approximate percentage savings for each measure as estimated by Gales Rock staff.

Table 3-1	
Estimated Savings from 5-Year Conservation Benchmarks	
Measure	Estimated Savings
Ongoing Efforts	
Maintain a fully metered system	0.01%
Visual inspection of reservoirs	0.01%
Meter testing program	0.4%
Production meter testing	0.2%
Automated park irrigation	0.1%
Leak detection visits	0.06%
Repair any leaks identified in annual leak detection survey	0.1%
Reduced operational usage at City facilities	0.1%
Maintain a rate structure based on metered use	0.1%
Distribution of conservation brochures and kits	0.02%
Planned Programs	
Improved water auditing (track non-revenue use)	N/A
Initiate revolving meter (2" and lower) replacement	0.3%
Testing of meters greater than 2"	1.0%
Leak repair (all leaks from April 2014 leak survey)	1.5%
Replace 60% of existing cast iron pipe	1.0%
Install rain sensors in city parks	0.5%
Investigate opportunities for water reuse and recycling with industrial users	N/A
Publish conservation article in City newsletter and Gales Observer newspaper	0.1%
City website upgrade to include water conservation education	0.5%
TOTAL:	6.0%

The City anticipates that the greatest conservation savings will come from the meter testing and maintenance program and leak repair program. The meter testing and maintenance program will allow staff to locate and repair or replace malfunctioning meters. Experience indicates that once a faulty meter is repaired or replaced, average and peak demand associated with that meter decreases a substantial amount, depending upon how poorly the meter read before its repair or replacement.

3.8 Summary of 5-Year Benchmarks

A summary of the relevant benchmarks for the City's on-going and planned conservation activities are outlined in the Table 3-2.

Benchmark	Date	Frequency
Ongoing Efforts		
Maintain a fully metered system	---	Ongoing
Visual inspection of reservoirs	---	Annually
Meter testing program	---	On-call
Production meter testing	---	5 years
Automated park irrigation	---	Daily
Leak detection visits	---	On-call
Repair any leaks identified in annual leak detection survey	---	Ongoing
Reduced operational usage at City facilities	---	Daily
Maintain a rate structure based on metered use	---	Monthly
Distribute conservation brochures	---	Ongoing
Distribute conservation kits, including at the Blaine County Fair	---	On-going
Planned Programs		
Improved water auditing (track non-revenue use)	October 2016	Annually
Initiate revolving meter (< 2") replacement	June 2017	20 years
Testing of meters > 2"	June 2017	5 years
Leak repair (all leaks from April 2014 leak survey)	October 2016	N/A
Replace 60% of existing cast iron pipe	October 2015	N/A
Install rain sensors in city parks	March 2016	N/A
Investigate opportunities for water reuse and recycling with industrial customers	April 2019	N/A
Publish conservation article in City newsletter and <i>Gales Observer</i> newspaper	May 2015	Annually
City website upgrade to include water conservation education	May 2015	On-going

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Section 4

Water Curtailment Plan Elements

OAR 690-086-0160

This section is written to satisfy the requirements of OAR 690-086-0160. It provides a description of past supply deficiencies and current capacity limitation. It also outlines the City's water curtailment plan that identifies the different stages of alert along with the associated triggers and water curtailment actions for each alert stage.

The City of Gales Rock's water supply is both surface water and ground water. The ground water supply is less susceptible to seasonal fluctuations in weather patterns than surface water. The City believes that there are three primary scenarios in which the City may not be able to meet demand: in the event of a mechanical or structural failure of the infrastructure (particularly problems associated with a well); contamination in one or more of the sources; and/or peak season streamflow levels in Big River are reduced to the point that the City is unable to divert the full authorized amount of water (i.e., climatic conditions such as drought). The City's response to water supply emergencies such as these is described below.

The City Council has adopted a water curtailment ordinance. This ordinance allows the City Manager authority to promulgate a water supply emergency and enact the water curtailment plan. In the event that a stage three water emergency is determined, the ordinance allows for the policing of customer activities and the issuance of citations (warning and fines) to encourage customers to abide by the curtailment plan measures. A copy of a draft ordinance is included in the Appendix of this WMCP.

4.1 History of Past System Curtailment Events

OAR 690-086-0160(1)

Within the last 10 years, the City experienced one water shortage that was serious enough to require the water curtailment plan to be enacted. During the 2009 drought, summertime streamflow in Big River was 30 percent of normal and the diversion of water from this source had to be reduced. Also at this time, the City experienced a short-term mechanical problem with the pump in Well No. 6 that lasted five days. Well No. 6, along with Well No. 7, produce the highest yield of water from the City's ground water sources. Further, the City's storage tanks only held enough finished water to meet the City's peak season demands for two days.

With implementation of curtailment measures prescribed under the "Moderate" stage of alert, along with obtaining some additional water through its emergency intertie with the City of Bingham, the City of Gales Rock was able to reduce its water consumption enough to help meet demands during this period. Once the pump in Well No. 6 was repaired, the water curtailment was lifted and peak season demands were sufficiently met with water from the City's wells.

As a result of this water shortage, the City determined that more in-line storage was necessary to help alleviate the degree of future water supply shortage situations. The City also instituted a program to perform routine mechanical inspections and maintenance on its pumps to ensure they are functioning properly.

4.2 Stages of Alert for Water Curtailment OAR 690-086-0160(2)

The City’s curtailment plan is comprised of three stages of alert: Mild, Moderate, and Critical. Each stage of alert is outlined in detail in Table 4-1 below.

4.3 Triggers for Water Curtailment OAR 690-086-0160(3)

Each of the City’s three stages of alert is triggered by a pre-determined level of severity of water shortage, which is based upon the amount of water being used as compared to the capacity of the system to meet water demands. The trigger for each stage of alert is described in Table 4-1 below.

4.4 Water Curtailment Actions OAR 690-086-0160(4)

The specific water curtailment measures that will be implemented under each stage of alert upon enactment of the water curtailment plan are outlined in Table 4-1 below.

Stage	Trigger	Goal	Curtailment Measures
Mild	Use reaches 80% of system capacity* -OR- The static water level in Well 6 & Well 7 drops 5 feet	Awareness and 5% reduction in consumption	Active curtailment plan through implementation of the following actions: <ul style="list-style-type: none"> ▪ Disseminate informational brochures on conservation methods ▪ Put up posters and sandwich boards around the City ▪ Coordinate outreach to customers through direct means (web page) and indirect means (media) ▪ Voluntary irrigation schedule based on north and south side customers irrigating every fifth day during the early morning or evening ▪ Flushing lines for essential needs only ▪ Turn off city fountains and post a sign describing why

...Table 4-1 continued below

Table 4-1 (...continued)
Water Curtailment Plan

Stage	Trigger	Goal	Curtailment Measures
Moderate	Use reaches 90% of system capacity* -OR- The static water level in Well 6 & Well 7 drops 15 feet	10% reduction in consumption	Continue with “Mild” stage curtailment measures, except where noted below: <ul style="list-style-type: none"> ▪ The irrigation schedule implemented in the “Mild” stage is now mandatory ▪ Close all public pools ▪ Eliminate city street cleaning, line flushing (unless health of customers at risk), and City park irrigation ▪ Request businesses reduce consumption by 10% ▪ Hosing of pavement not permitted except when necessary for public health or safety
Critical	Use reaches 95% of system capacity* -OR- The static water level in Well 6 & Well 7 drops 25 feet	15% reduction in consumption	Continue with “Moderate” stage curtailment measures, except where noted below: <ul style="list-style-type: none"> ▪ No use of city supplier water to fill private swimming pools ▪ Outdoor irrigation banned ▪ No use of city supplied water to wash vehicles

*Capacity is defined as the total rate of water accessible at any given time through the City’s wells and its diversion from Big River.

4.5 Staff Responsibilities

The following staff will have responsibilities for the following tasks in the event the water curtailment plan is enacted.

Table 4-2	
Staff Responsibilities in the Event the Water Curtailment Plan is Enacted	
Staff Person	Responsibility
John Smith, Media Relations City Manager’s Office	All direct and indirect media outreach efforts
Sally Jones, Law Enforcement Officer Police Department	Enforce curtailment measures
Jack Brown, Water Foreman Water Department	Work with businesses to reduce consumption
Judy Doe, Supervisor Water Department	Coordinate with public pools, street cleaning company, and Water Department to ensure activities are commensurate with curtailment plan

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Section 5

Municipal Water Supply Element OAR 690-086-0170 and OAR 690-086-0130(7)

This section is written to satisfy requirements of OAR 690-086-0170 and OAR 690-086-0130(7). It provides a description of the City's current and future service area and population projections. It details the City's projected 10 and 20 year demands for water, and identifies when the City expects to fully exercise its water rights. This section also compares the City's projected water needs against their existing available sources of supply, analyzes potential alternative water sources, and describes required mitigation actions.

5.1 Delineation of Current/Future Water Service Areas OAR 690-086-0170(1)

Based on existing tax lot data, the six primary land uses within the City's current service area are multi-family residential, single-family residential, agricultural, commercial, industrial, and open space. Table 5-1 summarizes the total area for each land use category. The single-family residential category takes up over 50% of the land within the existing city limits (not including transportation corridors).

**Table 5-1
Land Use Summary**

Code	Land Use Description	Total Area (acres)	% of Total
MFR	Multi-Family Residential	57	3%
SFR	Single-Family Residential	883	51%
AGR	Agricultural	151	9%
COM	Commercial	171	10%
IND	Industrial	424	24%
OPN	Open Space	52	3%
Total:		1,738	100%

It is anticipated that the City's major land use category will continue to be single-family residential. The City's long term growth should not significantly affect the current distribution of land use categories, and as such, each customer class should continue to exhibit the same share of the City's total water consumption.

The City's water service area boundaries coincide with those of its City limits. The City's Comprehensive Land Use Plan notes no growth will occur outside the city limits given the slow rate of growth and available land within the City, and therefore does not anticipate any expansion beyond the existing boundaries. As noted in Section 5.2.2 below, however, there is potential for

expansion of industrial lands located north of the city limits which could be annexed into the City’s service area. Because of this potential, a map showing the City’s current and anticipated service areas (including the potential industrial expansion) has been developed and is included as Exhibit 5-1.

5.2 Population Projections/Anticipated Development *OAR 690-086-0170(1)*

5.2.1 Population

The City’s present (Year 2013) population is estimated at 4,408. Twenty-five year forecasts have been developed by the City’s Planning Department and show a modest population increase through year 2040. At that time, the City is expected to support just under 5,000 people. These forecasts are consistent with the City’s Water System Master Plan (2010) and Comprehensive Land Use Plan (2010). Table 5-2 provides a summary of population data and estimates from 2000 to 2040. These estimates will provide the initial basis for long-term water supply forecasting.

Year	Total Population
2000	3,577
2010	3,848
2013	4,408
2015	4,510
2020	4,620
2025	4,739
2030	4,810
2035	4,900
2040	4,995

The number shown between 2000 and 2013 reflects an annualized growth rate of 1.9%. This growth slows to just around 0.6% per year for the period 2013 to 2040.

5.2.2 Employment

Employment forecasts were also obtained from the State of Oregon Office of Economic Analysis (OEA) and are based on projected growth rates until 2035. These figures were adjusted by the City's Planning Department to account for industrial lands north of the city anticipated to be annexed in the future. Table 5-3 shows employment estimates until 2035. These estimates will also provide the basis for long-term water supply forecasting.

Year	Employment Estimate
2010	2,410
2013	2,575
2015	2,690
2020	2,780
2025	2,990
2035	3,105

By comparison to population, the number of jobs initially grows more quickly, at an annualized rate of 2.1% for the period between 2010 and 2025. It then slows to just under 0.4% per year over the next ten years to 2035.

5.3 Schedule for Fully Exercising Water Use Permits *OAR 690-086-0170(2)*

The City currently operates seven wells and one diversion from Big River under six separate water rights, five of which allow for municipal use and one for irrigation. Of the five municipal rights, two have been certificated: those governing Wells 1 & 2 and Big River. The irrigation right (Well 3) is also certificated.

In order to solidify its present permits, the City has developed a timeline for applying beneficial use and certification of each unperfected right. That schedule is shown in Table 5-4. The City's water needs are based on the demand forecast previously presented with adjustments to reflect conservation savings.

**Table 5-4
Water Rights Perfection**

Source	Permit No.	Priority Date	Certificate	Permitted Rate (cfs)	Maximum Beneficial Use to Date (cfs)	Use	Perfection Schedule
Wells 1 & 2	G-1001	8/19/1923	1234	1.33	1.33	Municipal	Complete
Well 3	G-1010	6/14/1931	2345	0.33	0.33	Agricultural	Complete
Well 4	G-1020	4/26/1956	---	0.55	0.55	Municipal	Complete – Awaiting issuance of certificate
Well 5	G-1030	9/16/1972	---	0.67	0.2	Municipal	Summer 2023
Wells 6 & 7	G-10400	1/9/1981	---	2.0	0.75	Municipal	Summer 2015
Big River	S-21001	5/28/1932	8679	0.85	0.85	Municipal	Complete
Total:				5.73	4.26		

The City plans to certificate all unperfected rights prior to the submittal of the updated WMCP in Year 2024.

5.4 Demand Forecast *OAR 690-086-0170(3)*

5.4.1 Average Annual Demand

The rate of growth in water demand is presumed to be driven by the two largest customer classes, which are residential and commercial/industrial. Under this approach, it is assumed that use by the other customer classes will remain relatively steady and will have little impact on future water consumption. It is also presumed that the general characteristics of the residential and commercial/industrial classes will remain relatively the same.

Future demand was calculated by estimating the future number of ERU’s and applying a standard rate of use per ERU. A figure of 270 gallons per day per ERU was determined from the historical data reported in Section 2. The number of expected ERU’s was then computed using the rates of growth for population and employment for the residential and commercial/industrial classes, respectively. The results of that forecast are shown in Table 5-5.

**Table 5-5
Average Daily Demand Forecast Summary**

Year	Residential Demand (mgd)	Commercial/Industrial Demand (mgd)	Other (mgd)	Total (mgd)
2013	0.60	0.12	0.02	0.74
2015	0.62	0.13	0.02	0.77
2025	0.65	0.13	0.02	0.80
2035	0.67	0.14	0.03	0.84

The average daily demand (ADD) is expected to increase from 0.74 mgd to 0.80 mgd over the period 2013 to 2025, which is an increase of just over 8% during that period. By 2035, the City's projected population and industrial demands are expected to require only an additional 0.04 mgd.

The other customer classes, such as Agriculture, Public/Institutional, and Fire Flow, are expected to remain static over the next twenty years. Specifically, decreases in agriculture consumption as a result of urban development expansion, will offset minor expected increases in the Public/Institutional classes. Fire Flow will not change unless the City experiences fires large enough to warrant the use of huge volumes of water. The next section discusses the results of conservation measures on peak day.

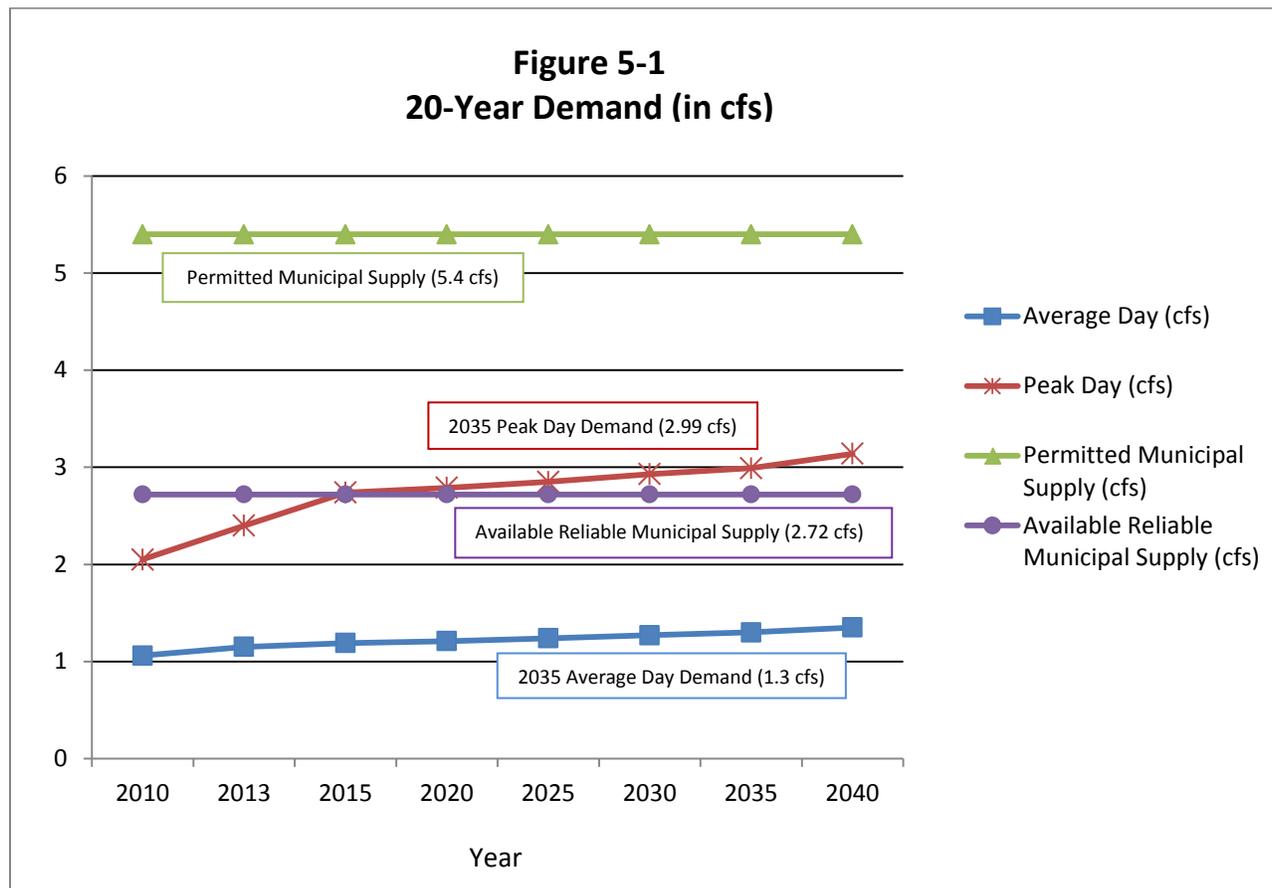
5.4.2 Peak Day and Conservation Measures

As described in Section 2, Gales Rock's peaking factor is 2.3 which brings the peak day estimate to 1.84 mgd in 2025 and 1.93 mgd by 2035. However, the City anticipates that its conservation program activities combined will reduce peak day demand by 6% in year 2025 and 2035. As such, peak day demand may be reduced to 1.73 mgd by 2025 and 1.81 mgd by 2035.

Table 5-6 describes peak and average day demand for the years 2013, 2015, 2025 and 2035.

Year	<u>Average Day Demand</u>		<u>Peak Day Demand – WITHOUT Conservation</u>		<u>Peak Day Demand – WITH Conservation</u>	
	(mgd)	(cfs)	(mgd)	(cfs)	(mgd)	(cfs)
2013	0.74	1.15	1.70	2.64	---	---
2015	0.77	1.19	1.77	2.74	---	---
2025	0.80	1.24	1.84	2.85	1.73	2.68
2035	0.84	1.30	1.93	2.99	1.81	2.81

A graphical summary of the City’s 20-year average and peak day demands are shown in Figure 5-1 below.



5.5 Comparison of Projected Need to Available Sources OAR 690-086-0170(4)

5.5.1 Capacity Analysis

The City’s current water supply inventory will deliver about 1.9 mgd (2.95 cfs) on a peak basis and 1.4 mgd (2.17 cfs) regularly over the year. The 20-year forecast places peak day demands between 1.81 and 1.93 mgd (depending on conservation outcomes). While the City has permitted access to water for municipal use totaling 3.48 mgd (5.4 cfs), operational constraints limit their available reliable (or firm) water supply production capacity for municipal purposes to 1.43 mgd (2.22 cfs).

The production capacity limitations are due to water quality issues (i.e., taste and odor problems) in Wells 1 and 2, and due to drawdown (hydraulic) restrictions with Wells 4 and 5. Well 5 experienced declining capacity since initially being brought into service; while Well 4 functioned properly for many years before experiencing a similar production decline about ten years ago. It is suspected that the production issues with Well 5 are a result of improper screen placement during construction. Problems with Well 4 seem to also be related screen placement issues.

Because of the above-described issues with Wells 1, 2, 4 and 5, the City relies on Wells 6 and 7, as well as the Big River diversion, as the primary water supply for meeting its municipal demands. The City also utilizes Well 3 as the primary source for agricultural irrigation of 26.4 acres owned by the city. To date, two of the municipal rights have been put to full beneficial use and certificated, while the others remain in permit status. The agricultural irrigation right has also been certificated.

Table 5-7 below lists the quantity of water allowed from each of the City’s water sources. It also identifies the current reliable production capacity and limiting factors (if any) for each of those sources.

**Table 5-7
Current Supply Capacity**

Source	Permit No.	Permitted Quantity		Available Reliable Supply Capacity		Limiting Factors
		Max. Rate (mgd)	Max. Rate (cfs)	Max. Rate (mgd)	Max. Rate (cfs)	
Wells 1 & 2	G-1001	0.86	1.33	0.00 (not in use)	0.00 (not in use)	Water quality issues (i.e., severe odor and poor taste) present in both wells
Well 3	G-1010	0.21	0.33	0.17 (irrigation only)	0.26 (irrigation only)	Permitted for Irrigation of 26.4 acres only
Well 4	G-1020	0.36	0.55	0.13	0.20	N/A
Well 5	G-1030	0.43	0.67	0.10	0.16	Diminished yield due to well construction issues
Wells 6 & 7	G-10400	1.29	2.00	0.48	0.75	Limited to 0.75 cfs by Extension “Development Limitations” condition
Big River	S-21001	0.55	0.85	0.55	0.85	N/A
Total Available Supply Capacity for Municipal Use:				1.43 mgd	2.22 cfs	
Total Available Supply Capacity for Irrigation of 26.4 acres (Permit G-1010):				0.17 mgd	0.26 cfs	

Given this information, the City must plan to expand its present capacity for withdrawals under its existing permits to accommodate additional access to water during peak periods of demand and to increase reliability and redundancy throughout the system. Plans to do so include:

- Requesting and gaining access to an additional 0.53 cfs of the undeveloped portion (i.e., Greenlight water) under extended Permit G-10400 (*for authorization to access a total of 1.28 cfs under extended Permit G-10400*). It is important to note that without conservation, the City’s projected demands will exceed the current reliable water supply capacity very soon (i.e., Year 2015). If proposed conservation actions result in water savings, the current reliable water supply capacity may be adequate to meet projected demands through approximately Year 2030.

- Rehabilitating Wells 4 and 5 in order to increase production capacity of the well.
(NOTE: The City was able to accomplish full beneficial use of water under Permit G-1020 from Well #4 in July 2000. The City submitted a Claim of Beneficial Use to OWRD and is awaiting the issuance of a water right certificate. Since that time, however, the production capacity of Well #4 has been greatly diminished.)
- The construction of up to two additional wells in the local aquifer to be operated under the existing permits to achieve greater access to water. To accomplish this, the City would seek to establish the new wells as additional points of appropriation under existing permits through the permit amendment process.

The City of Gales Rock is also a potential partner (along with the cities of Bingham, Hardy and Arden) in the construction of the Trillium Reservoir project. If constructed, the project would give the City access to 500 acre-feet of stored water during the annual period May 1 to October 31. This would allow for up to 1.1 mgd (1.71 cfs) of water over the 150-day annual target period between May 15 and October 15. The City, however, would also have to fund the construction of a new 14-mile pipeline to convey water from the proposed reservoir to their existing surface water treatment plant in order to make that water available. The City is presently conducting a feasibility assessment to investigate this option as part of an approved activity under its City's present Water System Master Plan. No decision has yet been made regarding the City's plan to pursue the development of that project.

5.5.2 Projected 20-Year Withdrawal

The long-range supply plan for the City will include diligent management of its existing water rights inventory to achieve minimal impact, while maintaining a high level of service to customers. Under that plan, the City will look to expand its withdrawals under each of its currently permitted (unperfected) water rights. The projected 20-year withdrawal under each permit is shown in Table 5-8. The numbers shown reflect the permitted (or perfected) capacity under each right and the projected withdrawal for both the maximum instantaneous rate and peak monthly volume. Note that due to taste and odor problems of Wells 1 and 2, the City has chosen not to use full amount of certificated water

Based on the projections of water needed, the impacts of conservation on demand, and available supply, the City will need to increase its diversion of water to meet its projected 20-year water demands of between 1.81 and 1.93 mgd (between 2.81 and 2.99 cfs), as shown in Table 5-6. This increase will require OWRD authorization to access an additional 0.53 cfs of the undeveloped portion (i.e., Greenlight water) under extended Permit G-10400 (*for authorization to access a total of 1.28 cfs under extended Permit G-10400*) and to construct additional wells under existing permit(s) as discussed above in Section 5.5.1. The City expects the 2035 peak month demand for municipal purposes to be 41,298,000 gallons.

**Table 5-8
20-Year Withdrawal Summary (Year 2035)**

Source	Permit No.	<u>Permitted Quantity</u>	<u>Available Reliable Supply Capacity</u>	<u>Projected 20-Year Peak Withdrawal</u>	
		Max. Rate (cfs)	Max. Rate (cfs)	Max. Rate (cfs)	Max. Monthly Volume (MG)
Wells 1 & 2	G-1001	1.33	0.00 (not currently in use)	0.00 (not currently in use)	0.00 (not currently in use)
Well 3	G-1010	0.33 (irrigation only)	0.26 (irrigation only)	0.33 (irrigation only)	12.5 (irrigation only)
Well 4	G-1020	0.55	0.20	0.41	5.7
Well 5	G-1030	0.67	0.16	0.45	6.2
Wells 6 & 7	G-10400	2.0	0.75	1.28	17.8
Big River	S-21001	0.85	0.85	0.85	11.6
Total Available Supply Capacity for Municipal Use:			2.22 cfs	2.99 cfs	41.3 MG
Total Available Supply Capacity for Irrigation of 26.4 acres (Permit G-1010):			0.26 cfs	0.33 cfs	12.5 MG

5.6 Alternative Sources – Initial/Expanded Water Use under Existing Permits OAR 690-086-0170(5)

Under OAR 689-086-0170(5), water suppliers that plan to expand or initiate diversion of water under existing permit(s) to meet projected demands must analyze alternative water sources. The analysis must consider availability, reliability, feasibility and likely environmental impacts, as well as the extent to which the projected water needs can be satisfied through conservation measures and interconnection or regional water management.

As indicated above in Sections 5.5.1 and 5.5.2 above, the City is requesting OWRD authorization to access an additional 0.53 cfs of the undeveloped portion (i.e., Greenlight water) under its extended Permit G-10400. Combined with the City's current authorization to access 0.75 cfs of water under its extended Permit G-10400, this additional authorization will grant the City access to a total of 1.28 cfs under its extended Permit G-10400).

The City also plans to expand the diversion of water under Permit G-1030 (Well 5). As previously discussed, due to issues with the construction of Well 5, the City has never been able to produce adequate water from this well to accomplish full beneficial use of Permit G-1030. The City is planning to rehabilitate this well and, after reconstruction, it is anticipated that Well 5 may be able to reliably produce up to 0.45 cfs. Furthermore, while the City has accomplished full beneficial of water from Well 4 under Permit G-1020, the production capacity of Well 4 has diminished greatly over time. Therefore, the City is also planning to rehabilitate Well 4 in order to increase the reliable production capacity of this well.

5.6.1 Conservation Measures

OAR 690-086-0170(5)(a)

As shown in Section 3, the City has implemented a wide array of water conservation measures to increase water conservation by its customers. Additionally, the City plans to implement several new conservation measures over the next 5 years. It is anticipated that water savings in the amount of 0.12 mgd (0.186 cfs) may be achieved over the next 20 years with the continuation and implementation of these conservation measures.

Considering the City's projected 20-year peak day demands of 1.93 mgd (2.99 cfs) with anticipated conservation savings of 0.12 mgd (0.186 cfs) factored in, the City's current reliable supply capacity of 1.43 mgd (2.22 cfs) will not be sufficient to meet the City's projected demands.

Therefore, in addition to water savings accomplished through the continuation and/or implementation of conservation measures, the City will need to increase diversions of water under its extended Permit G-10400 (Wells 6 & 7) and Permit G-1030 (Well 5) in order to meet its projected peak demands during the next 20 years.

5.6.2 Interconnection / Regional Water Management

OAR 690-086-0170(5)(b)

The City currently has emergency interties with the City of Hardy and the City of Bingham; however, both of these cities have very limited excess supply and are unable to commit portions of their water supply for use by the City of Gales Rock as part of a long-term wholesale arrangement. Nevertheless, the intertie with Bingham has been used three times over the past five years on a short-term basis to support peak day demand in the City of Gales Rock.

As discussed in Section 5.5.1 above, the City of Gales Rock is evaluating the feasibility of being a potential partner (along with the cities of Bingham, Hardy and Arden) in the construction of the Trillium Reservoir project. The new reservoir, if approved by OWRD, would supply an additional 5,000 acre-feet of water to these four regional water providers. Gales Rock has tentatively reserved access to 500 acre-feet of storage in that planned project. If constructed, the Trillium Reservoir project would provide about 1.1 mgd to the City of Gales Rock each year during the 150-day summer time period (May 15 - October 15). However, this project is just in the beginning stages and any water available through this project would not be available within the 20-year planning horizon.

5.6.3 Cost-Effectiveness

OAR 690-086-0170(5)(c)

As described above, while the City's conservation measures are anticipated to provide water savings over the next 20 years, conservation alone cannot meet the City's projected 20-year demands for water. Given this information, therefore, expanding the use of water under the City's existing Permits G-10400 and G-1030 is a cost-effective option for helping the City meet its anticipated future water demands.

5.7 Quantification of Maximum Rate and Monthly Volume OAR 690-086-0170(6)

Under OAR 690-086-0170(6), water suppliers that plan to expand or initiate diversion of water under existing permit(s) to meet projected demands must provide a quantification of the maximum rate and monthly volume of water to be diverted under each of the permits.

Within the next 20 years, the City is planning to expand the use of water under its existing Permits G-10400 and G-1030 to help meet projected water demands in Year 2035. Assuming the water use permits are used at the maximum rate (i.e., 0.45 cfs for Permit G-1030 and 1.28 cfs for Permit G-10400) at 24 hours per day for 31 days during the peak use month (typically July or August), the maximum monthly volume for Permits G-1030 and G-10400 would be 6.2 MG and 17.8 MG, respectively. This information is also provided below in Table 5-9.

Table 5-9
Quantification of Maximum Rate and Monthly Volume

Source	Permit	Projected 20-Year Peak Withdrawal	
		Max. Rate (cfs)	Max. Monthly Volume (MG)
Well 5	G-1030	0.45	6.2
Wells 6 & 7	G-10400	1.28	17.8

5.8 Mitigation Actions under State and Federal Law OAR 690-086-0170(7)

Under OAR 690-086-0170(7), water suppliers that plan to expand or initiate diversion of water under existing permit(s) to meet projected demands must describe mitigation actions the supplier is taking to comply with legal requirements including, but not limited to, the Endangered Species Act, Clean Water Act, Safe Drinking Water Act, or any other state or federal requirements, as may applicable.

The City was granted an extension of time for Permit G-10400. As part of the extension review, OWRD determined the wells were hydraulically connected to surface water. Therefore, in accordance with OAR 690-315, OWRD requested the Oregon Department of Fish and Wildlife (ODFW) to identify the flows necessary to “maintain the persistence” of listed fish species that are present in the surface water source. Based upon ODFW’s recommendation, OWRD included “fish persistence” conditions in the Final Order approving the extension of time for Permit G-10400. This City is monitoring streamflow levels and adjusting its diversion of water under G-10400 as required by the extension condition.

The City is not currently required to take any mitigation actions under state or federal law related to Permit G-1030.

5.9 Acquisition of New Water Rights OAR 690-086-0170(8)

Under OAR 689-086-0170(8), water suppliers that need to acquire new water rights in the next 20 years to meet their projected 20-year water demands must analyze alternative water sources. The analysis must consider availability, reliability, feasibility and likely environmental impacts, as well as the extent to which the projected water needs can be satisfied through conservation measures and interconnection or regional water management.

This rule requirement does not apply. The City does not anticipate needing to acquire new water rights within the next 20 years in order to meet its projected demands for water.

5.9.1 Conservation Measures OAR 690-086-0170(8)(a)

This does not apply. The City does not anticipate needing to acquire new water rights within the next 20 years in order to meet its projected demands for water.

5.9.2 Interconnection / Regional Water Management OAR 690-086-0170(8)(b)

This does not apply. The City does not anticipate needing to acquire new water rights within the next 20 years in order to meet its projected demands for water.

5.9.3 Cost-Effectiveness OAR 690-086-0170(8)(c)

This does not apply. The City does not anticipate needing to acquire new water rights within the next 20 years in order to meet its projected demands for water.

5.10 Increased Diversion of Water under Extended Permits (i.e., Greenlight Water Request) OAR 690-086-0130(7)

Under OAR 690-086-0130(7), if during the next 20 years a water supplier will need to divert water under an extended permit at a maximum rate of diversion that is greater than the maximum rate of diversion authorized under a final order approving the permit extension of time or a previous WMCP, the water supplier must document that the WMCP includes: a schedule for implementation of lower cost conservation measures [except in those circumstances described in OAR 690-086-0130(7)(a)]; justification that the selected source is the most feasible and appropriate supply alternative; and whether the supplier is complying with mitigation requirements to address development of permits with identified environmental resource issues under OAR 690-086-0140(5)(i), if any.

5.10.1 Lower Cost Conservation Measures

OAR 690-086-0130(7)(a)

As described in Sections 3 and 5.6.1 above, the City has implemented a wide array of water conservation measures to increase water conservation by its customers, and has established a schedule to implement several new conservation measures over the next 5 years. It is anticipated that water savings in the amount of 0.12 mgd (0.186 cfs) may be achieved over the next 20 years with the continuation and implementation of these conservation measures.

5.10.2 Feasibility and Appropriateness of Selected Supply

OAR 690-086-0130(7)(b)

While the City has permitted access to water for municipal use totaling 3.48 mgd (5.4 cfs), operational constraints limit their available reliable (or firm) water supply production capacity for municipal purposes to 1.43 mgd (2.22 cfs). The production capacity limitations are due to water quality issues (i.e., taste and odor problems) in Wells 1 and 2 (Certificate 1234), and due to drawdown (hydraulic) restrictions with Wells 4 and 5 (Permit G-1020 and G-1030). Well 5 experienced declining capacity since initially being brought into service; while Well 4 functioned properly for many years before experiencing a similar production decline about ten years ago. It is suspected that the production issues with Well 5 are a result of improper screen placement during construction. Problems with Well 4 seem to also be related screen placement issues. The City's current reliable production capacity is not adequate to meet its projected 20-year water demands.

Additionally as described in Sections 5.4.2 and 5.6.1 above, while the City's conservation measures are anticipated to provide water savings over the next 20 years, the water savings from conservation along with the current reliable production capacity cannot meet the City's projected 20-year demands for water.

Further, as discussed in Section 5.6.2, the City of Gales Rock is evaluating the feasibility of being a potential partner in the construction of the regional Trillium Reservoir project. If approved by OWRD and constructed, the Trillium Reservoir project would provide about 1.1 mgd to the City of Gales Rock each year during the 150-day summer time period (May 15 - October 15). However, this project is just in the beginning stages and any water available through this project would not be available within the 20-year planning horizon.

Given all of this information, therefore, expanding the use of water under the City's existing extended Permit G-10400 beyond the current Development Limitations condition established by the Final Order approving an extension of time for Permit G-10400 (along with expanded diversion of water under Permit G-1030), is the most feasible and appropriate water supply available to the City at this time.

5.10.3 Mitigation Requirements Related to Further Development of Extended Permit *OAR 690-086-0130(7)(c)*

The City was granted an extension of time for Permit G-10400. As part of the extension review, OWRD determined the wells were hydraulically connected to surface water. Therefore, in accordance with OAR 690-315, OWRD requested the Oregon Department of Fish and Wildlife (ODFW) to identify the flows necessary to “maintain the persistence” of listed fish species that are present in the surface water source. Based upon ODFW’s recommendation, OWRD included “fish persistence” conditions in the Final Order approving the extension of time for Permit G-10400. This City is monitoring streamflow levels and adjusting its diversion of water under G-10400 as required by the extension condition. The City is not required to provide any other mitigation actions related to the use of water under Permit G-10400.

The City is not currently required to take any mitigation actions under state or federal law related to Permit G-1030.

Appendix I

Sample WMCP Five-Year Progress Report under OAR 690-086-0120(4)

City of Anywhere, Oregon

May 2014

Five-Year Progress Report on Implementation of the Water Conservation and Supply Measures Described in the Approved WMCP (Year 2009)

OAR 690-086-0120(4)(a): A list of the benchmarks established under OAR 690-086-0150 and a description of the progress of the municipal water supplier in implementing the associated conservation or other measure.

Progress Report for Conservation Benchmarks Listed in the 2009 WMCP

	Item	Status
1.	Water Audit	The City continues to perform an annual, system-wide water audit. The City has also improved its methodology for estimating its unmetered uses of water. Specifically, water used for backwash/flushing at the water treatment plant is now tracked and documented. A program has also been implemented to meter water used by contractors from fire hydrants for construction purposes.
2.	Fully Metered System	The City's system is fully metered. The City also continues to require meters for all development within its service area. The City also requires contractors accessing bulk water from fire hydrants to first check out a calibrated meter that is installed by a City staff person in order to use water from the hydrant.
3.	Meter Testing & Replacement	The system has 804 customer service connections that are all metered. The City aims to test 20 percent (~160) of its meters each year. During the period 2010 through 2013, the City tested 590 meters (slightly under the 20% goal). Of the meters tested, 26 were found to be inaccurate and were replaced. The City tests its source meters annually and repairs or replaces them, as needed.
4.	Water Rates	In April 2011, the City updated its rate structure to a tiered rate structure that provides a cost-incentive to conserve water by high volume residential users. Current rates for single-family residential is a fixed charge of \$21.40 per month, plus a volume charge based upon the amount of water metered at the service connection. The volume charge is: Block 1 = \$1.96 per 100 cubic feet (ccf) for use between 0-7 ccf monthly; Block 2 = \$2.87 per ccf for use between 8-15 ccf monthly; or Block 3 = \$5.59 per ccf for use over 16 ccf monthly.
5.	Leak Detection Program	The City has a leak detection program in place and, between 2010 and 2013, the City surveyed 179 miles of pipeline and found 58 leaks. Two significant leaks were identified in the Hillside neighborhood. It is estimated that 1.5 MG of water was lost from these two leaks. The PVC pipe in this area has had multiple significant leaks over the past 10 years, so the City decided to replace this 10-mile stretch of PVC pipeline with steel pipe.

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6.	Public Education	The City maintains a webpage that conveys helpful tips and information about ways to conserve water. The webpage also provides information and techniques for creating a water efficient landscape. The page highlights low water use and drought tolerant plants and efficient landscape irrigation practices. The City also includes water conservation related messages on its monthly water bills.
7.	Leak Repairs & Line Replacement	The City budgets \$275,000 annually for leak repair and line replacement. Between 2010 and 2013, the City surveyed 179 miles of pipeline and found 58 leaks. Two significant leaks were identified in the Hillside neighborhood. It is estimated that 1.5 MG of water was lost from these two leaks. The PVC pipe in this area has had multiple significant leaks over the past 10 years, so the City decided to replace this 10-mile stretch of PVC pipeline with steel pipe.
8.	Technical & Financial Assistance	From 2010 through 2013, the City has performed 29 interior-based residential audits and 97 exterior-based residential (landscape irrigation) audits. The City has also worked with the 10 highest water using industrial facilities to perform audits and recommend certain water use efficiencies within their facilities. This work has resulted in a 13% reduction in summertime residential use and a 16% reduction in peak industrial demands.
9.	Retrofit/Replacement of Inefficient Fixtures	Since January 2010, the City has distributed 345 water efficient fixture packets. These packets include: a low-flow shower head, shower timer, faucet aerators, rain gauges, and hose timers. The City also offers a rebate of up to \$50 per household for replacement of an old, inefficient toilet with a new ultra low-flow toilet model. A rebate of up to \$75 per household is also available for replacement of an old inefficient washing machine or dishwasher with a new efficient water using model.
10.	Conservation Based Rate Structure	As indicated in Item #4 above, in April 2011, the City moved from a uniform rate structure to a tiered rate structure that provides a cost-incentive to conserve water by high volume residential users. Furthermore, the City is considering an additional seasonal differential charge that charges a higher rate per unit of water consumed during peak use months (i.e., July and August) to further encourage conservation and further reduce peak water uses during this period.
11.	Water Reuse	The City has entered into an agreement with Big Meadow Golf Course to provide reclaimed treatment plant waste water for irrigation within the golf course. This will reduce the amount of treated potable water used by the golf course for irrigation.
12.	Other Measure(s) to Improve Water Use Efficiency	The City has connected all park irrigation systems to the City's new weather stations so that irrigation controllers make climate-based adjustments using evapo-transpiration (ET) calculations. The City also conducts annual assessments of its irrigation systems to ensure distribution uniformity.

***OAR 690-086-0120(4)(b):** Average monthly and daily diversions under each right held by the water supplier for the previous five years.*

Diversion of water under each of City's three water rights for the previous five years is detailed below:

Source	2009		2010		2011		2012		2013	
	Average Monthly Diversion (MG/month)	Average Daily Diversion (mgd)	Average Monthly Diversion (MG/month)	Average Daily Diversion (mgd)	Average Monthly Diversion (MG/month)	Average Daily Diversion (mgd)	Average Monthly Diversion (MG/month)	Average Daily Diversion (mgd)	Average Monthly Diversion (MG/month)	Average Daily Diversion (mgd)
Big River Cert. 54321	215.63	6.84	198.34	6.13	178.92	5.86	184.51	5.97	154.67	5.21
Small Spring Cert. 24111	N/A	N/A								
Well #1 Cert. 59999	89.12	2.97	87.34	2.91	86.54	2.88	91.29	3.04	72.34	2.41

OAR 690-086-0120(4)(c): A description of the results of the annual water audit required under OAR 690-086-0150(4)(a).

Water Audit Data (2009 – 2013)		Revenue Water			Non-Revenue Water		Total Water Loss
Reporting Period	Water Delivered	Authorized Consumption				Water Losses	
Year	Production (MG)	Retail Metered Consumption (MG)	Wholesale Metered Consumption (MG)	Hydrant Meters (MG)	Authorized Non-Revenue Flows (MG)	Apparent & Real Losses (MG)	Percent
2009	2789.43	1879.52	342.00	0.59	*	567.32	20.3
2010	2456.78	1802.61	308.23	0.56	*	345.38	14.1
2011	2328.26	1694.89	265.73	0.52	1.69	365.43	15.7
2012	2043.62	1603.45	97.27	0.61	2.03	340.26	16.6
2013	2104.11	1678.71	142.09	0.31	2.88	280.12	13.3

* Tracking of Authorized Non-Revenue Flows began in January 2011. No data is available for 2009 or 2010.

OAR 690-086-0120(4)(d): A comparison of quantities of water used in each sector as identified and described in OAR 690-086-0140(6) with the quantities of water used in each sector for the previous five years.

Water Use by Customer Category (2009 – 2013)

Year	Single Family Residential	Multi- Family Residential	Commercial/ Industrial	Institutional (Schools & Hospital)	Municipal	Irrigation	Wholesale Water	Authorized Unbilled Use	Total Consumption (including wholesale)
2009	888.84	222.21	311.09	177.79	155.55	266.65	199.98	*	2,222.11
2010	760.10	190.03	277.71	168.91	211.14	274.48	229.03	*	2,111.40
2011	628.11	171.75	264.98	147.21	255.17	292.73	201.19	1.69	1,962.83
2012	515.27	140.53	251.25	123.49	289.57	225.69	155.53	2.03	1,703.36
2013	565.44	145.92	269.04	152.17	255.36	218.87	214.31	2.88	1,823.99

* Tracking of Authorized Non-Revenue Flows began in January 2011. No data is available for 2009 or 2010.

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Appendix J

Sample Water Curtailment Ordinance

I. WATER WASTE PROHIBITED.

- (a) It is unlawful to allow waste of city/district water by knowingly or negligently causing, authorizing or permitting such water to escape from its intended beneficial use into any river, creek, natural watercourse, depression, lake, reservoir, storm sewer, street, highway, road, or ditch.
- (b) For the purpose of this section: (1) “waste” means the use of water in excess of the reasonable volume necessary to meet the beneficial use; and (2) “beneficial use” means the reasonable efficient use of water.

II. WATER CURTAILMENT AUTHORITY.

- (a) When the director determines that a critical water supply shortage threatens the ability of the city to deliver essential water to its customers, the director may activate emergency measures in compliance with the entitled “Water Curtailment Plan” adopted by _____ on _____, and on file with the _____ recorder.
- (b) Upon declaration of a stage three critical water supply shortage by the director:
 - (1) No watering or irrigating of lawns, grass, or turf shall occur unless it is:
 - A. New lawn, grass, or turf that has been seeded or sodded after March 1 of the calendar year in which the restrictions are imposed, and in such cases it may be watered as necessary until established;
 - B. Athletic fields frequently used for organized play;
 - C. Golf course tees and greens; and,
 - D. Park and recreation areas of a particular significance and value to the community as approved by the city manager.
 - (2) No use of city-supplied water shall be allowed to clean, fill, or maintain levels in decorative fountains.
 - (3) No use of city-supplied water shall be allowed to fill swimming pools or other pools with a capacity in excess of 100 gallons, provided, however, that water may be added to swimming pools to replace volume lost due to evaporation and normal loss due to usage.
 - (4) No use of city-supplied water shall be allowed to wash sidewalks, walkways, streets, driveways, parking lots, or other hard surfaced areas except where necessary for public health or safety.
 - (5) No use of City-supplied water shall be allowed to wash vehicles.

III. WITHHOLDING OF SERVICE.

In the event that a citation is issued during the period of activated emergency measures for a violation of I or II, and the director determines that a second violation has occurred after the date of the citation and during the same emergency curtailment period, the director may:

- (a) Install a flow restrictor on the street side of the water meter; or
- (b) Terminate water service.

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Appendix K

Historical Background on Oregon Administrative Rule 690-086

Oregon's municipal water suppliers are permitted to "grow into" their water rights over a period of time. Historically, the Department routinely issued five-year extensions to suppliers to continue developing municipal permits. Once a community grew to a size where the permit was fully used, the community submitted proof of perfection of the right and WRD issued a certificate of water right. In 1989, the statutes were amended to also allow many municipal water suppliers to certificate their water rights in 25 percent increments while continuing to develop the balance of the permit. These approaches are different than the procedures applied to holders of non-municipal permits where the timelines for construction of facilities to divert and use the water authorized under a permit and for the submittal of final proof documenting the beneficial use of water are less flexible.

In 1997, the state Attorney General issued advice to the Department that affected permit extensions in two major ways: **(1)** In considering whether to grant an extension, the Department may evaluate the public interest of continued development under the permit, and **(2)** in granting a permit extension, the Department must authorize the extension for the full period of time that the permittee anticipates needing to complete development under the permit rather than for fixed five-year increments. However, the advice did indicate that subsequent extensions could be granted if development of the permit takes longer than originally expected.

In 1998 while incorporating the advice of the Attorney General into the Department's administrative rules, both Department staff and the municipal stakeholders agreed that municipal permit extension issues were unique, warranting a separate rule development process to focus on their resolution. In order to move forward with the rulemaking, an exemption was created that allowed for continued development of municipal permits despite the expiration of previously granted extensions of time. In addition, the Department agreed to convene the Community Water Supply Work Group to review issues associated with permit extensions and to recommend changes, where appropriate, to current laws and rules. The work group included representatives from municipalities, environmental organizations, and WRD.

In 2001, after several meetings with the Community Water Supply Work Group, the Department proposed an approach which linked long-term permit extensions to the development of a WMCP. Municipalities would be granted extensions allowing development of their permits over a long period of time, consistent with the needs of the community. In turn, municipal suppliers would be required to complete WMCPs showing prudent management and conservation of the resource. This approach was adopted as rule by the Water Resources Commission in October 2002.

Under these rules, a municipal permittee can ask for a long-term extension of time to complete development of the permit. The period of the extension will depend on the municipality's projections of how long it will take to fully use the quantity of water allowed under the permit. However, under the permit extension, the municipality will not be authorized to divert water beyond the quantity specified in the development limitation condition set forth in the final order approving the permit extension. Authorization to quantities of water beyond the development limitation may only be granted through the Department's review and approval of the municipality's WMCP requesting such access. The Department

will authorize the use of water under extended permits in 20-year blocks, as long as the WMCP provides clear justification that the water will be needed and the municipality is managing and conserving water in a responsible manner.

The rules are contained in OAR Chapter 690, Divisions 86 and 315— the former of which is the focus of the material described in this guidebook. The updated rules include several key concepts:

- The historic procedure of renewing permit extensions every five years is eliminated. Municipal permittees can now request extensions based on the period of time that will be needed to fully develop the permit. Depending on the particular circumstances, an extension can be issued for as long as 50 years, or even longer with sufficient documentation.
- Most future municipal and quasi-municipal water right permit extensions will include a requirement that the supplier prepare a new or updated WMCP within three years of approval of the extension and will be conditioned with development limitations to “freeze” the quantity of water that may be diverted or pumped under the extended permit. To access quantities of water beyond the development limitations specified in the permit extension, the water supplier’s WMCP must request such access. OWRD will evaluate the request and, if the criteria outlined in OAR 690-086-0130(7) are satisfied, grant access to water beyond the development limitations imposed by the permit extension.
- The supplier will be required to gain OWRD approval for any expansion of the use of water under an extended permit. This approval will be provided based on a demonstration in the supplier’s WMCP that the water will be needed in the next 20 years. In approving a WMCP, OWRD will grant the authorization to access and use the next increment of water under the extended permit. This “green light” water will represent a limit on the extent to which the community is authorized to pump or divert water under the extended permit until an updated WMCP is submitted and access to “green light” water is approved by OWRD. Suppliers may submit updated plans seeking authorization for additional “green light” water at any time.
- OWRD’s review of any WMCPs that are submitted after January 1, 2042 and that request authorization to increase water diversions will include an evaluation of competing needs, environmental needs and other public interest considerations.
- Water conservation is now viewed as a critical element in the State’s water supply inventory. Water suppliers will need to show in their WMCPs that they have considered a range of water management and conservation actions to minimize their needs and to develop their supplies in an environmentally responsible manner. Conservation actions must be considered as an alternative to increased development of water.
- All water suppliers must implement a core group of water conservation measures. Some water suppliers must also consider the feasibility of a range of additional conservation actions. In general, those water suppliers serving a population greater than 7,500 must consider the additional actions and must document the basis for any decision not to implement the additional conservation measures. Some water suppliers serving smaller communities will also need to consider the wider range of conservation actions if they are expanding their use of sensitive resources.

There are many additional elements to preparing a WMCP, and these are explained in other chapters of this guidebook.

Appendix L

Examples of Municipal Water Conservation Measures

Sample Universe of Water Conservation Measures¹¹

End Use	Conservation Measure	Customer Class
Shower	Low-flow showerheads (2.75 GPM)	SFR, MFR, COM
	Ultra-low flow showerheads (1.9 GPM)	SFR, MFR, COM
	Shower flow restrictors	SFR, MFR, COM
Faucets	Low-flow faucets	SFR, MFR, COM, IND, GVT
	Low-flow faucet aerators	SFR, MFR, COM, IND, GVT
Toilets	Gravity-flow tank-type ULFT	SFR, MFR, COM
	Pressurized tank type ULFT	SFR, MFR, COM
	<1 GPF ULFT	SFR, MFR, COM
Toilet Retrofit	Displacement bags	SFR, MFR, COM
	Displacement bottles	SFR, MFR, COM
	Displacement dams	SFR, MFR, COM
	Dual-flush adapters	SFR, MFR, COM
	Fill cycle regulators	SFR, MFR, COM
	Early closure flappers	SFR, MFR, COM
Leaks – Faucet	Faucet Washers	SFR, MFR, COM
Leaks – Toilet	Flapper valves Fill valves	SFR, MFR, COM
	Leak detection tablets	SFR, MFR, COM
	Flapper valves Fill valves	SFR, MFR, COM
Washers	Lower volume vertical axis	SFR, MFR
	Horizontal axis machines	SFR, MFR
Dishwashers	Lower volume dishwashers	SFR, MFR
Residential – Misc.	Replace self-regenerating water softeners	SFR, MFR
	Point-of-use water heaters	SFR, MFR
	Individual dwelling unit sub-meters	MFR
	Separate irrigation sub-meters	MFR, COM, IND, IRR, GVT
	Metering all accounts	SFR, MFR, COM, IND, IRR, GVT
	Water pressure regulator	SFR, MFR

¹¹ Source: American Water Works Association (AWWA), undated, Integrated Water Resource Planning, A Balanced Approach to Water Resources Decision Making.

APPENDIX L

Residential – Outdoor	Hose control nozzles	SFR, MFR
	Garden hose timers	SFR, MFR
	Drip irrigation system	SFR, MFR
	Bubbler/soaker irrigation system	SFR, MFR
	Automatic sprinkler system	SFR, MFR
	Soil sensors	SFR, MFR
	Rain sensors	SFR, MFR
	Water efficient plant material	SFR, MFR
	Xeriscaping	SFR, MFR
	Turf replacement/reduction	SFR, MFR
	Irrigation scheduling	SFR, MFR
	Soil preparation/mulching	SFR, MFR
	Greywater systems	SFR, MFR
	Rainwater collector/cistern	SFR, MFR
Swimming pool covers	SFR, MFR	
Commercial – Toilets	Commercial ULFT	COM, IND, GVT
	ULFT valve replacement	COM, IND
	Ultra-low flush urinals	COM, IND, GVT
	Ultra-low flush urinal valve replacement	COM, IND, GVT
	Infra-red activated flushing	COM, IND, GVT
Commercial – Faucets	Pressure closing	COM, IND, GVT
	Spring loaded infrared activated	COM, IND, GVT
	Ultrasonic activated	COM, IND, GVT
	Foot operated	COM, IND, GVT
Commercial – Misc.	Point-of-use water heaters	COM, IND, GVT
	Recirculating hot water systems	COM, IND, GVT
	Swimming pool covers	COM, GVT
	Centralized regeneration water softeners	COM, GVT
	Meter-controlled flushing water softeners	COM, GVT
Commercial – Washers	Efficient machines (laundromat capacity)	COM, GVT
	Recycling machines	COM, GVT
	Batch washers	COM, GVT
	Tunnel washers	COM, GVT
	Rinse water reclaim systems	COM, GVT
	Ozonated washing machines	COM, GVT
Car Washes	Low volume car washes	COM, GVT
	Recirculating/counter-current car washes	COM, GVT

Air-Cooled Machinery	Air conditioners (HVAC)	COM, GVT
	Chillers	COM, GVT
	Pumps	COM, GVT
	Compressors	COM, GVT
	Ice-makers	COM, GVT
	Cold-water drinking fountains	COM, GVT
	Medical equipment (<i>sterilizers, X-ray equipment, etc.</i>)	GVT
	Laboratory equipment (<i>pumps, Deionizers, etc.</i>)	GVT
Food Handling	Water-efficient dishwashers	COM, GVT
	Recirculating dishwashers	COM, GVT
	Chemical sanitizer dishwashers	COM, GVT
	Conveyor dishwashers	COM, GVT
	Ultrasound dishwashers	COM, GVT
	Dishwasher water reuse systems	COM, GVT
	Warming tables with dry heat	COM, GVT
	Garbage disposers using recycled water	COM, GVT
	Off-site garbage disposal	COM, GVT
Heat Exchanges/Boilers	Closed loop	COM, GVT
	Steam condensate return systems	COM, IND, GVT
Cooling Tower Modifications	Drift eliminators	COM, IND, GVT
	Connections to alternative make-up sources	
	Conductivity meters for blow-down control	
	Flow meters on make-up and blow-down valves	
	Fixed ppm discharge minimum requirements	
	Eliminate/replace all single-pass cooling systems	
Cooling Towers	Process changes to reach higher cooling tower of concentration (from standard 1-2 to 6 or more)	
	- Ozonation systems	
	- Acid treatment systems	
	- Ion exchange systems	
	- Lime softening systems	
	- Sidestream filtration systems	
	- Magnetic attraction systems	
	- Electrostatic field generator systems	
Evaporative Cooler	Reroute and reuse blow down	COM, IND, GVT
	Thermostat controllers	COM, IND, GVT

APPENDIX L

Solenoid and Other Automatic Valves for Water Flow Control	<ul style="list-style-type: none"> Timer controls/delay switches Mechanical motion-sensors Electronic motion sensors Float valves on make-up reservoirs Conductivity probes Temperature probes Master off-hour control valves 	IND
Industrial Washers and Rinsers (least efficient-continuous running bath rinsers)	<ul style="list-style-type: none"> Quick-dump rinsers with timers or conductivity probes Counter current washers and rinsers Spray rinsing systems Air knives Drag-out elimination stages Return drains 	IND
High Pressure / Low Volume Spray Nozzles	<ul style="list-style-type: none"> Conveyor systems Washers and rinsers Warmers Chillers 	IND
Closed System/Batch Dump Chillers/Warmers		IND
On-Site Water Reclamation / Treatment Systems	<ul style="list-style-type: none"> Ultrafiltration Activated carbon filtration Ion exchange processes Reverse osmosis Vapor compression evaporation Deionized water reclaim loops 	IND
Greywater: use reclaimed / treated process water in a lower quality process or non-process use (includes required dual-plumbing modifications)	<ul style="list-style-type: none"> Cooling tower makeup systems Landscape irrigation systems Dust control systems Cleaning systems Once-through cooling systems Toilet flushing systems Fume/ gas scrubbing systems Quenching systems 	IND
Waste Stream Separation to Facilitate Process Water Reclamation	<ul style="list-style-type: none"> Separation of sanitary water stream and process water stream Segregation of toxic from non-toxic constituent streams Sewer bypass connections between point of discharge and point of reuse Facilities for temporary storage of process water 	IND

Custom Industrial Process Operations (varies by industry)	Lower volume soap and water conveyor belt lubrication systems Lower volume bottle washer and rinser systems Dyebath recirculation systems High-pressure/ low-volume cleaning equipment	IND
Building – Outdoor	Sub-meter for irrigation	COM, IND, GVT
Large Landscape	Drip irrigation systems Bubbler/Soaker irrigation systems High-efficiency sprinkler system Timers Soil sensors Rain sensors Computer stations Weather station hook-ups Water efficient plant material Xeriscaping Turf replacement/reduction Irrigation scheduling Soil preparation/mulching All weather artificial recreation surfaces Recirculating water features Greywater systems Storage reservoir and pumping systems to capture and use stormwater runoff	COM, IRR, IND, GVT COM, IRR, IND, GVT IRR, GVT COM, IRR, IND, GVT COM, IRR, IND, GVT COM, IRR, IND, GVT IRR, GVT COM, IRR, IND, GVT COM, IRR, IND, GVT IRR, GVT
Distribution System	Leak detection and repair service training Periodic valve servicing and adjustment Periodic equipment servicing	UTL UTL UTL
Agricultural	Miscellaneous	

ABBREVIATIONS

SFR: Single Family Residences	GPM: Gallon(s) per minute
MFR: Multi Family Residences	GPF: Gallon(s) per flush
COM: Commercial	HVAC: Heating, ventilation, and air-conditioning systems
IND: Industrial	ULFT: Ultra low flow toilet
GVT: Government and Exempt Institutions	ppm: parts per million
UTL: Utility	
IRR: Irrigators / Large Landscapers	

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Appendix M

U.S. EPA List of Resources for Water Conservation

(see 1998 U.S. EPA Water Conservation Plan Guidelines – Appendix D)

(NOTE: Items in **BOLD** represent resources the Guidebook committee has found particularly useful.)

Guides, Manuals, and Handbooks

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American Water Works Association WaterWiser: The Water Efficiency Clearinghouse: <http://www.waterwiser.org/>

American Water Works Research Foundation: <http://www.awwarf.com/>

American Water Resources Association: <http://awra.org/>

American Society of Plumbing Engineers: <http://www.aspe.org/>

Association of Metropolitan Water Agencies: <http://www.amwa.net/>

Bureau of Reclamation, U.S. Department of the Interior: <http://www.usbr.gov/main/index.html>

Green Seal: <http://www.greenseal.org>

Institute for Water Resources, U.S. Army Corps of Engineers: <http://www.iwr.usace.army.mil/>

National Drinking Water Clearinghouse: http://www.nesc.wvu.edu/ndwc/ndwc_index.htm

National Drought Mitigation Center: <http://enso.unl.edu.ndmc>

National Ground Water Association: <http://www.ngwa.org/>

National Watershed Network: http://www2.ctic.purdue.edu/US_Watersheds_8digit.html

Natural Resource Conservation Service, U.S. Department of Agriculture: <http://www.nrcs.usda.gov/>

Rural Community Assistance Program: <http://www.rcap.org/>

Regional Water Providers Consortium (Portland Metro area): <http://www.conserveh2o.org>

Rural Water Association: <http://www.ruralwater.org>

Universities Council on Water Resources: <http://www.uwin.siu.edu/>

U.S. Environmental Protection Agency: <http://epa.gov/owm/genwave.htm>

U.S. Geological Survey: <http://www.usgs.gov>

U.S. Water News: <http://www.uswaternews.com>

Water Education Foundation: <http://www.water-ed.org>

Water Environment Federation: <http://www.wef.org>

Water Online: <http://www.wateronline.com/>

Water Quality Association: <http://wqa.org/>

Water Share, U.S. Department of the Interior, Bureau of Reclamation: <http://www.watershare.usbr.gov>

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