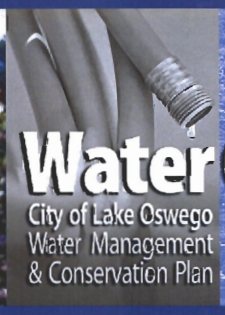
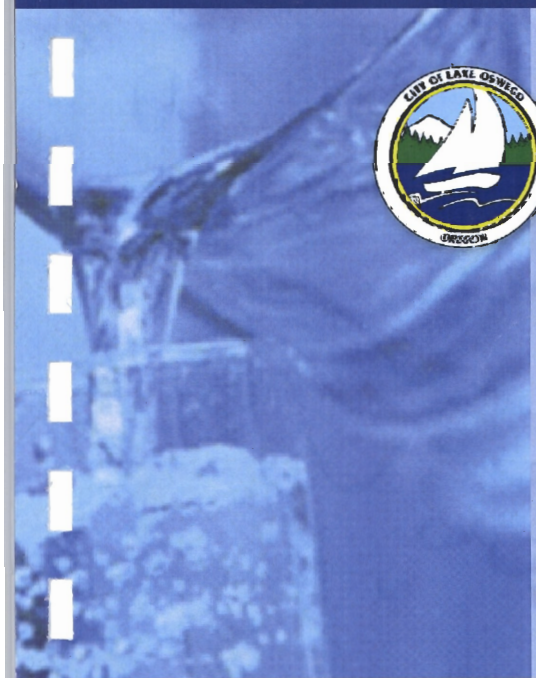
final draft

Water Management and Conservation Plan





PREPARED FOR

City of Lake Oswego, Oregon

PREPARED BY

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JUNE 2007

Final Draft

Water Management and Conservation Plan

Prepared for

City of Lake Oswego, Oregon

June 2007

CH2MHILL

Contents

Appendixes

Exhibits

Executive Summary

The City of Lake Oswego submits this Water Management and Conservation Plan (WMCP) for review and approval by the Oregon Water Resources Department (OWRD). The City operates a public community water system that supplies drinking water to approximately 33,000 City residents and approximately 61,000 additional wholesale customers pursuant to intergovernmental agreements for surplus water supply.

This WMCP satisfies the requirements of OAR Chapter 690, Division 86 adopted by the Water Resources Commission in November 2002. It includes each of the required elements under OAR 690-086-0125.

This WMCP also presents planned water conservation programs for the City. These are a combination of existing programs that will be continued and new programs that the City plans to initiate.

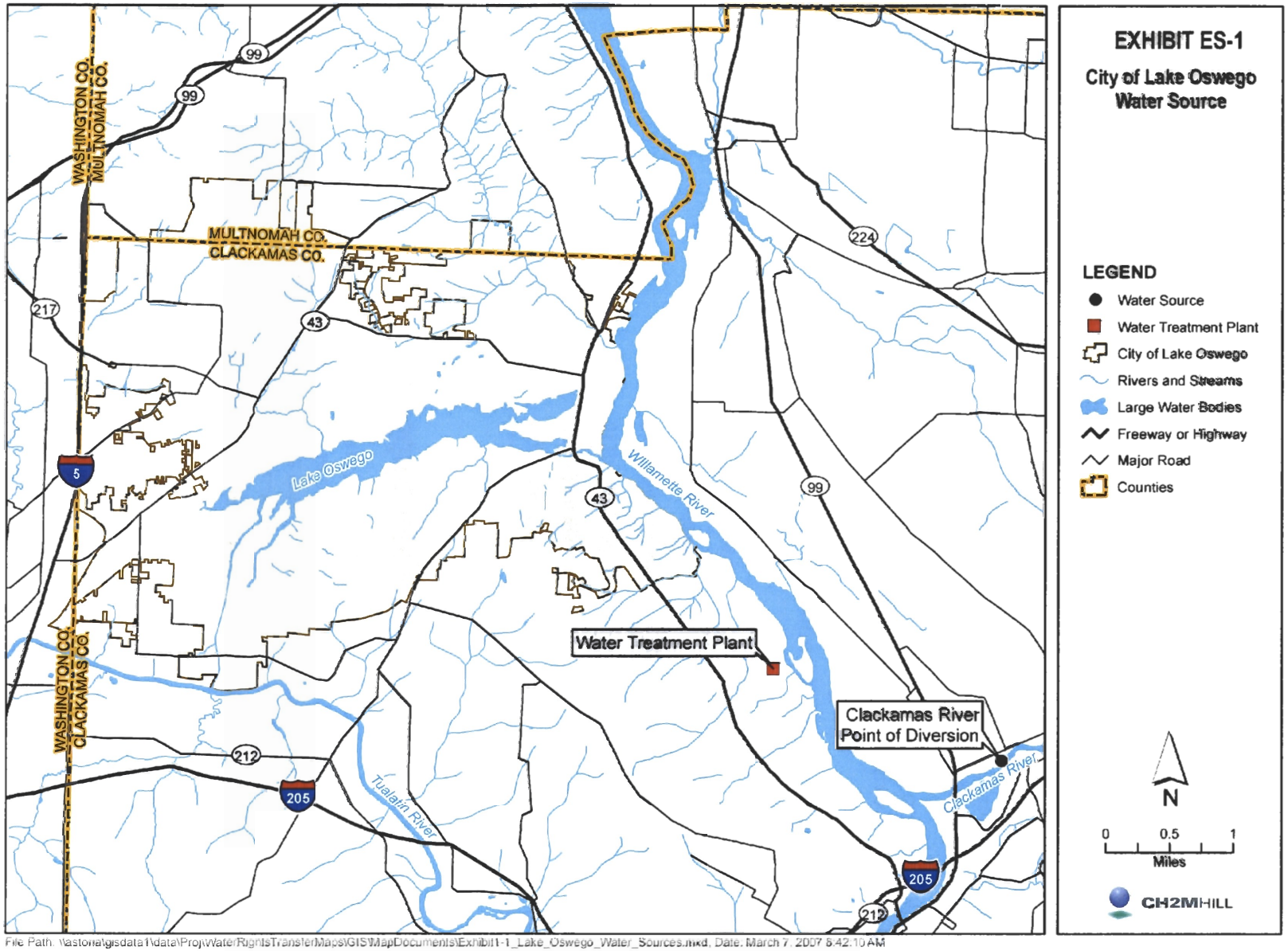
The plan is organized into the following sections, each addressing specific sections of OAR Chapter 690, Division 86:

Section	*Requirement*
Section 1 – Introduction	*OAR 690-086-0125*
Section 2 - Water Supplier Description	*OAR 690-086-0140*
Section 3 - Water Conservation	*OAR 690-086-0150*
Section 4 – Curtailment	*OAR 690-086-0160*
Section 5 - Water Supply	*OAR 690-086-0170*

Description of Municipal Water Supplier

The City of Lake Oswego operates a public community water system (Public Water System Identification No. 4100457), supplying water to approximately 33,000 City residents. Within its Urban Services Boundary (USB) the City has agreements to provide water to the Lake Grove Water District, Skylands Water Company, Glenmorrie Water Company, and the cities of Tigard and Portland. The City also maintains emergency interties with the cities of West Linn, Tualatin, and the Rivergrove Water District.

Lake Oswego's water source is the Clackamas River (Exhibit ES-1). Raw water is pumped from an intake at River Mile (RM) 0.8 on the Clackamas River to the City's water treatment plant located in the City of West Linn. After coagulation, filtration, and disinfection the finished water is pumped to the distribution system. The City also holds an undeveloped water right permit on the Willamette River, a Ground Water Registration for municipal water use, and two groundwater permits for irrigation water use.



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Water Conservation Element

Current Conservation Measures

The City does not currently have an approved WMCP; however, the City has implemented a number of conservation measures in recent years:

1. **Public Information**. The City financially supports and is an active member of the Regional Water Providers Consortium (RWPC), and has been since its inception. Approximately 60 percent of the consortium's $640,233 budget is devoted to water conservation efforts. The efforts of the consortium focus on education and outreach throughout the Portland Metro area. RWPC programs include a variety of public outreach efforts including the following:

   - A Web site, www.conserveh2o.org, has indoor and outdoor water conservation information and suggestions.
   - A summer media campaign that includes television and radio advertisements and news interviews on local stations. The consortium budgets $130,000 annually for this effort, and gains an additional $100,000 of added value through media partnerships.
   - Workshops for developers and landscapers that focus on water-efficient landscape design and installation, and on using water-efficient irrigation equipment. A public lecture on water conserving landscape design was presented at a local Lake Oswego garden shop.
   - Conservation displays available to consortium members for use at local events.
   - Brochures containing conservation information.
   - Presentations at large regional events such as the Portland Yard, Garden and Patio Show and the Portland Salmon Festival.

   The City of Lake Oswego engages in the following additional public education efforts:

   - The City's website contains a section on water conservation located at http://www.ci.oswego.or.us/wtp/.
   - The Public Affairs Office provides an assortment of water-wise fliers and brochures, and children's activity/coloring books (titled *Where's Rosie*). Materials are available at brochure racks and, during the summer, at the weekly "concert at the park" series hosted by the Lake Oswego Parks Department.
   - The City hosts and funds a *Where's Rosie* play at two local elementary schools, Bryant and Waluga. The play is part of the conservation activities developed in collaboration with the RWPC. Performed by a troupe of actors from Ladybug Theatre, the play's message is the need for water conservation.
   - In 2005, the City's annual Earth Day event featured a water conservation theme and was advertised with posters, print advertisements, and flyers.

- In August 2002 and July 2004, the City distributed press releases with a water conservation message.
- The City sponsors gardening classes that feature native plants and xeriscape landscaping; plantings around City Hall incorporate these ideas.
- Water conservation is a frequent topic in the monthly City newsletter *Hello LO*. There have been at least 14 articles on water conservation, water-efficient gardening, and related topics in this newsletter since April 2003.
- The 2005 and 2006 Consumer Confidence Report includes a cut-out flier with indoor and outdoor water conservation tips.
- City staff participates in an annual water conservation event held at Portland Community College.

2. **Rates.** The City has a uniform rate structure. Water customers pay $0.83 per hundred cubic feet (748 gallons) of water used regardless of customer class or volume used.
3. **Indoor conservation kits.** The City receives fifty indoor conservation kits including low-flow shower heads and toilet diverters every year from RWPC, and distributes them to customers on request.
4. **Irrigation on City land.** The City incorporates water-efficient sprinkler heads in City-owned landscape projects. These sprinkler heads are low-volume devices that promote more efficient use of water by reducing runoff. In addition wetting agents, turf aeration, and irrigation head retrofits on existing installations have been used to improve irrigation efficiency. A City employee is certified to conduct indoor and outdoor water audits.
5. **System-wide meter testing.** All water customers are metered. Approximately 400-500 meters (¾-in to 1.5-in) are replaced annually. Approximately 50 percent of meters 2 inches and larger are tested annually and repaired or replaced as necessary.
6. **Pipe replacement.** Since 1994, the City has annually budgeted and expended an average of $600,000 for pipeline replacement. Most of the areas of the City with known pipeline problems have been addressed through this program.
7. **Leak detection and repair**. The City historically has conducted leak detection on 30 miles of its 200 mile pipe network, resulting in a 7-year leak detection cycle. In April 2007, a leak was found in an old 2-inch diameter galvanized service line. Estimated water savings from repair of this leak were from 3 to 6 million gallons per year for at least five years. The need for leak detection will diminish with time because of the annual pipeline replacement program.
8. **Community conservation survey.** In June 2006, the City commissioned a telephone survey to explore community attitudes toward and awareness of water supply and water conservation issues. (See below.)
9. **Water Conservation Committee.** A citizen-based committee including representatives from the School District, the Parks and Recreation Advisory Board, the Home Builders

Association, Lake Oswego Country Club, and the private development community was assembled to provide guidance in the development of this WMCP.

5-Year Benchmarks for Existing or Expanded Conservation Programs

Over the next 5 years, the City intends to continue or expand the following existing conservation measures:

1. **Public education.** Continue involvement with the RWPC, and increase local messaging to disseminate information about water conservation opportunities and programs. Develop simple targeted messages that emphasize the Clackamas River as the source of the City's water.
2. **Annual water audits.** Continue to conduct annual water audits and evaluate production and consumption data to observe trends in unaccounted for water. Work with the Utility Billing Department to streamline the retrieval of water consumption data by date, volume, and customer class to assist in tracking water use trends.
3. **System metering.** All customers served by the City of Lake Oswego are metered. Continue to require meters for all development within the City.
4. **Meter testing and maintenance**. Continue annual testing and repair or replacement of 50 percent of 2-inch and larger meters. Increase the number of ¾-inch to 1.5-inch meters replaced annually to achieve a 25-year replacement cycle. Establish a design standard to ensure all meters 2 inches and larger are installed with test ports and by-pass to facilitate testing and repair.
5. **Leak detection and repair.** Continue annual water main replacement as necessary based on the age of system components, field observations, leak reports, maintenance history and other data sources. Periodically audit the City's construction standards to ensure that they remain current relative to industry best practices. Continue to respond to all calls related to possible system leaks in a timely manner, and repair any leaks detected.

5-Year Benchmarks for New Conservation Programs

Over the next 5 years, the City intends to evaluate or implement the following new conservation measures:

1. **Public education.** Explore the feasibility of developing an outdoor water use/water conservation demonstration project.
2. **Annual water audits**. Develop and implement Administrative Policies and Procedures to document consumption of authorized un-metered water. This could consist of developing report forms and reporting requirements for such uses. The City should consider developing a permit system for construction uses.
3. **System metering.** Audit meter reading and accounting practices to identify inaccuracies. Adjust such practices as necessary to reduce reporting errors and increase billing and measurement accuracy.

4. **Meter reading/billing cycle.** Evaluate the costs and benefits of changing meter reading and billing cycles from the current bi-monthly cycle to a monthly cycle to improve utility understanding and analysis of customer demand patterns and provide more frequent feedback opportunities to the utility's customers regarding water usage.

5. **Water rate structure.** Within the fiscal year (FY) 2007 to 2009 biennium, fund an analysis of alternate rate structures that encourage conservation. An effort such as this may cost approximately $50,000. Undertake steps to gain acceptance from the community and adoption by the City Council.

6. **Technical assistance.** Identify the top 20 residential and top 20 commercial water users and provide free water audits for two customers from each category (4 audits) each year so that all 40 customers will have an audit within 10 years. Track consumption for audited users to evaluate whether more efficient water use results from the audit service.

7. **Outdoor conservation kits.** Beginning in 2007, the City will receive 25 outdoor conservation kits from RWPC. An additional 50 outdoor conservation kits will be purchased at a cost of approximately $500.

8. **Clothes Washer and Toilet replacement (rebate).** Develop a clothes washer replacement program and a toilet replacement program. For the clothes washer replacement program, offer $200 rebates for replacing existing clothes washers with high efficiency models. For the toilet replacement program, offer rebates ranging from $50 to $150 for replacing existing toilets in commercial and residential settings with low flow toilets. Budget at least $13,000 annually for the residential rebate program. Publicize any potential Oregon State tax credit opportunities for use of approved water-saving fixtures. Track consumption for each retrofit installation to verify savings.

9. **Restaurant rinse head replacement (rebate)** Develop a rebate program, and budget at least $2,000 annually, for the use of water-efficient rinse heads in restaurants. Offer a $75 rebate for each new rinse head installed after the old head is given to the City.

10. **Municipal outdoor conservation.** Collaborate with the City of Lake Oswego Parks Department on the replacement of existing clock-timed irrigation controllers to weather-based controllers for the City's large turf areas. Require the use of native and drought-tolerant landscaping and drip irrigation where appropriate.

11. **Demonstration project.** Determine the feasibility of developing an outdoor water use/water conservation demonstration project.

12. **Water conservation coordinator.** Fund a position for a dedicated water conservation coordinator working as a full time employee.

13. **Annual water use reporting for wholesale purchasers.** By December 31 of each year following approval of this WMCP by the OWRD and adoption by the City, require all wholesale customers receiving water from the City during the preceding 12-month period to submit an annual water use report. At a minimum, the report will provide the following information:

    a. Total number of service connections receiving City water.

b. Total service area population.

c. Number of service connections by customer class, with the minimum number of class designations to include: 1) single-family, 2) multi-family, 3) commercial/industrial, 4) irrigation only.

d. Total metered consumption and metered consumption by customer class.

e. Estimates and sources of unaccounted for water.

f. The purchaser's current water rates and rate structure.

g. A description of the purchaser's conservation program specific to the customers receiving City water.

Water Curtailment Element

The proposed curtailment plan presented in this WMCP has five stages, each of which is initiated by one or more events. The five stages, increasing in order of severity, are summarized in **Exhibit ES-2**. Any of the initiating conditions described in Exhibit ES-2 will trigger the appropriate curtailment stage. Initiating conditions and response actions are described in detail in Section 4 of this WMCP.

EXHIBIT ES-2
City of Lake Oswego Curtailment Stages 1 through 5

Curtailment Stages	Initiating Conditions	Actions
Stage 1- Water Shortage Alert	Forecasts of below-normal summer streamflows Mechanical or electrical malfunction causing the loss of any two pumps at intake facility Minor damage to raw or treated water transmission mains (e.g., leaking joint requiring repair)	Inform customers of the potential for a water shortage Use various media to publicize voluntary water use reductions
Stage 2- Serious Water Shortage	Declaration of drought by Governor pursuant to ORS 536.720 Continuation of hot dry weather predicted declining river levels Mechanical or electrical malfunction causing the loss of the largest pump at intake More extensive repairs needed on raw or treated water transmission mains	Use various media to publicize more urgent voluntary restrictions on non-essential water use Prohibit selected outdoor water uses with the goal of 10 percent demand reduction

EXHIBIT ES-2
City of Lake Oswego Curtailment Stages 1 through 5

Curtailment Stages	Initiating Conditions	Actions
Stage 3- Severe Water Shortage	Continuation of hot dry weather predicted Clackamas River streamflows below 510 cubic feet per second (cfs) between July 1 and September 15 or below 750 cfs between September 16 and June 30[1] Loss of pump 1, 2, or 3 at water treatment plant Loss of utility electrical service at intake Multiple failures in the joints of the raw or treated water transmission mains	Use various media to publicize urgent voluntary restrictions on non-essential water use Prohibit selected outdoor water uses with the goal of 20 percent demand reduction
Stage 4- Critical Water Shortage	Clackamas River streamflows below 510 cfs between July 1 and September 15 or below 730 cfs between September 16 and June 30 impacting instream water rights[2] Severe drought conditions Loss of utility electrical service at water treatment plant or intake Major mechanical or electrical malfunctions causing loss of multiple pumps at intake or water treatment plant Transmission main failures Fire at intake or water treatment plant Imminent terrorist threat against supply system Contamination of source of supply	Prohibit all outdoor water uses except to abate public health or fire hazards with the goal of reducing demands by 50 percent
Stage 5- Emergency Water Shortage	Continuation of severe drought conditions Extensive damage to transmission, pumping or treatment processes caused by natural disaster Intentional acts or fire, contamination of source or any other event resulting in an immediate, sustained deprivation of water supply	Immediate notification of customers for contamination; Implementation of Stage 2, 3, or 4 measures if emergency will result in a supply shortage Possible ban on all water use except for necessary human consumption and sanitary needs Possible activation of City's Emergency Operations Center

[1] The approximate total of estimated current peak day withdrawals for the Clackamas River Water Users (107 cfs) and minimum in-stream flows between July 1 through September 15 (400 cfs) and between September 16 and June 30 (640 cfs), measured at U.S. Geological Survey gauging station 14211010 at the South Fork Water Board's intake

[2] Same as footnote 1, but reflects a fifteen percent reduction in current peak day demands spread across all municipal water providers.

Water Supply Element

The City of Lake Oswego currently serves retail customers within the City of Lake Oswego City limits ("City Only"), and residents of water districts within the USB. At some future date, within the 20-year planning period, the City may also be expected to serve residents of the Stafford Triangle. Population projections for Portland Metro's Transportation Analysis Zone (TAZ), historic population data from Portland State University's (PSU's) Population Research Center, and account information from the water districts were used to project all three populations. A per capita method then was used to project the City's demands. This method assumes a) per capita use will remain unchanged compared to recent years, b) the mix of commercial versus residential water use will remain unchanged compared to recent years, and c) the per capita value derived from City residents also applies to residents outside City limits but within the USB, and residents of the Stafford Triangle. The City will periodically monitor and adjust both the per capita demand value and population projections.

Based on the available records, the following values were used to project future demands:

- 2005 retail population within Lake Oswego's City limits = 33,278
- Average annual population growth rate within Lake Oswego = 0.5 percent
- 2005 service population, served by other special service districts within the USB=6,543
- 2005 population within the Stafford Triangle = 1,707
- Average annual population growth rate outside city limits = 1.69 percent
- Average per capita demand = 170 gallons per capita per day (gpcd)
- Maximum day demand (MDD) to average day demand (ADD) ratio = 2.3

Using these criteria, per capita demand projections indicate that by 2027, at the end of the 20-year planning horizon, the City's demands are projected to equal 8.3 mgd (12.8 cfs) for ADD and 19.0 mgd (29.4 cfs) for MDD.

Resource Issues

The City's Clackamas River water rights authorize diversion at RM 0.8. The Clackamas River in the area of Lake Oswego's point of diversion has been placed on the Oregon Department of Environmental Quality's (DEQ's) 303(d) list of water quality limited streams because of summer water temperatures and elevated *E.coli* concentrations.

The City's Willamette River water right permit (S-43246) is currently undeveloped. The Willamette River, near the City's point of diversion, is on DEQ's 303(d) list as water quality limited for elevated levels of fecal coliform in the fall, winter, and spring, and for water temperature in the summer.

The Clackamas and Willamette rivers support a number of fish species that are listed as Threatened, Endangered, or Sensitive under state and federal laws. State and federal permitting will be required prior to expansion of water use from the Clackamas River, and initial diversion of water from the Willamette River.

SECTION 1

Introduction

OAR 690-086-0125

Overview

The source of the City of Lake Oswego's water is the Clackamas River. The Clackamas River Basin includes approximately 940 square miles, with the upper reaches in the Mt. Hood National Forest. As shown on **Exhibit 1-1**, the City has a raw water intake on the Clackamas River at River Mile (RM) 0.8, a short distance upstream of the river's confluence with the Willamette River. The City also holds water right permit S-43246 on the Willamette River that is not currently in use, a Ground Water Registration for municipal water use, and two groundwater permits for irrigation water use.

Raw water from the Clackamas River is pumped to the City's water treatment plant through a 27-inch-diameter pipeline buried beneath the Willamette River. The plant, located in West Linn, was constructed in 1967 and was expanded to its current capacity of 16 mgd in 1980. The treatment steps include coagulation, filtration, and disinfection. The finished water pump station has a firm capacity (largest pump out of service) of approximately 12.2 million gallons per day (mgd). Finished water is pumped to the City's distribution system, which consists of nearly 200 miles of pipeline. The City's Public Water System Identification Number is 4100457.

In 2005, the City of Lake Oswego served a retail customer population of approximately 33,000 within City limits and a wholesale customer population of approximately 61,000 pursuant to intergovernmental agreements for surplus water supply. Within its Urban Services Boundary (USB) the City has agreements to provide water to the Lake Grove Water District, Skylands Water Company, Glenmorrie Water Company, and the cities of Tigard and Portland. The City also maintains emergency interties with the cities of West Linn, Tualatin, and the Rivergrove Water District

Plan Organization

This Water Management and Conservation Plan (WMCP) fulfills the requirements of the Oregon Administrative Rules adopted by the Water Resources Commission in November 2002 (OAR Chapter 690, Division 86). It describes water management, water conservation, and curtailment programs to guide the wise use and stewardship of the City's water supply.

The plan is organized into the following sections, each addressing specific sections of OAR Chapter 690, Division 86:

Section	Requirement
Section 1 – Introduction	OAR 690-086-0125
Section 2 - Water Supplier Description	OAR 690-086-0140
Section 3 - Water Conservation	OAR 690-086-0150
Section 4 – Curtailment	OAR 690-086-0160
Section 5 - Water Supply	OAR 690-086-0170

Affected Local Governments

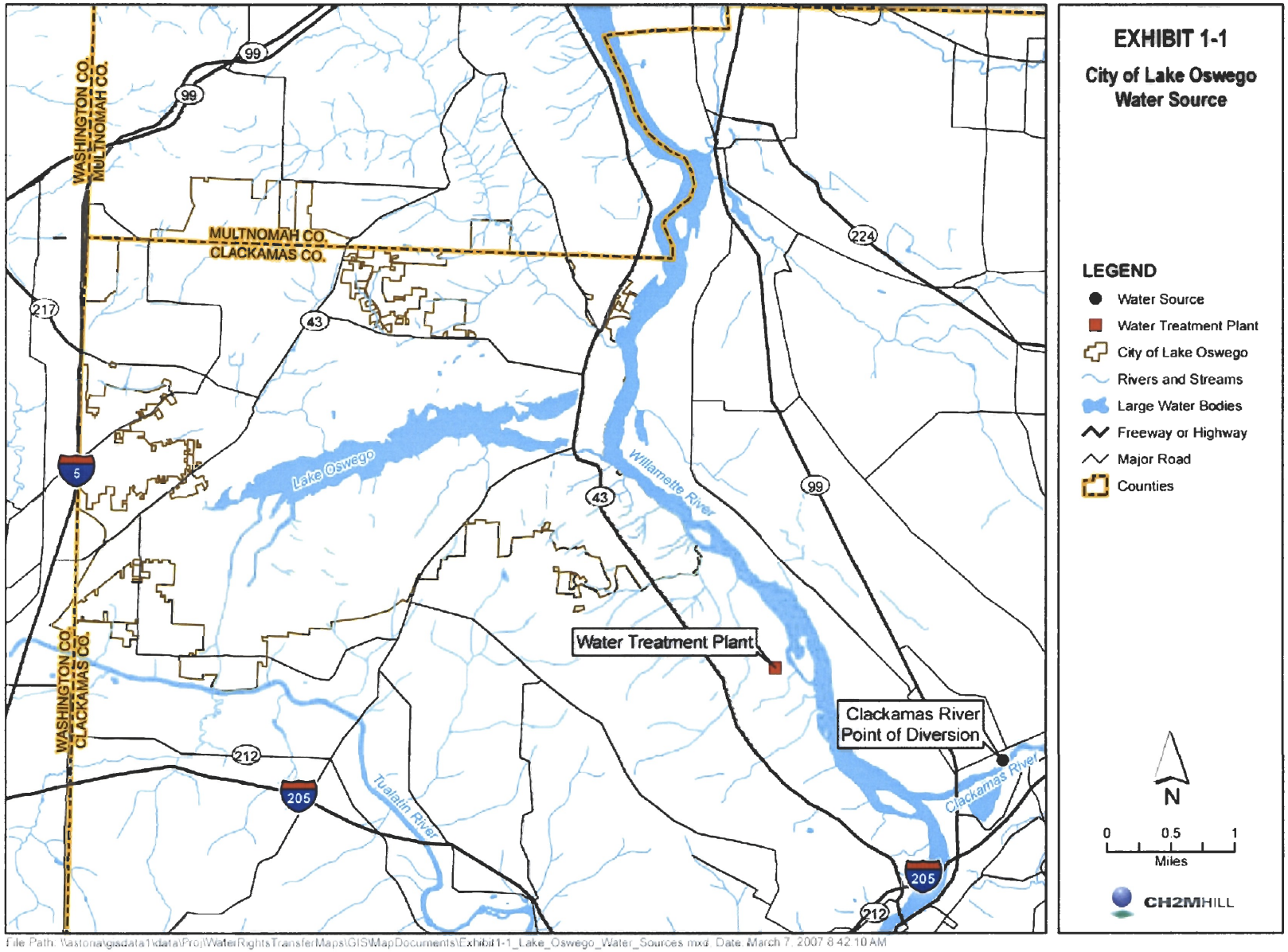
The following governmental agencies may be affected by this WMCP:

- Clackamas County
- City of Portland
- City of Rivergrove
- Skylands Water Company
- City of Tigard
- City of Tualatin
- Glenmorrie Water District
- Lake Grove Water District
- City of Oregon City
- City of West Linn

Thirty days prior to submitting this WMCP to the Oregon Water Resources Department (OWRD), the draft plan was made available for review by each affected local government listed above along with a request for comments relating to consistency with the local government's comprehensive land use plan. The letters requesting this input and the input received are in **Appendix A**.

Plan Update Schedule

The City anticipates submitting an update of this plan within 10 years, or by January 2017. As required by OAR Chapter 690, Division 86, a progress report will be submitted in 5 years, or by January 2012.



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SECTION 2

Water Supplier Description

This section satisfies the requirements of OAR 690-086-0140.

Source 690-086-0140(1)

Lake Oswego's water source is the Clackamas River. The Clackamas River Basin encompasses about 940 square miles, with the upper reaches in the Mt. Hood National Forest. The City's raw water intake is located at River Mile (RM) 0.8 on the Clackamas River, a short distance upstream of the river's confluence with the Willamette River. The City also holds an undeveloped water right on the Willamette River, a Ground Water Registration for municipal water use, and two groundwater permits for irrigation water use.

Interconnections with Other Systems 690-086-0140(7)

The City's drinking water system is interconnected with eight other systems. Within its Urban Services Boundary (USB) the City has agreements to provide water to the Lake Grove Water District, Skylands Water Company, and Glenmorrie Water Company and the cities of Tigard and Portland. The City also maintains emergency inter-ties with the cities of Tualatin, West Linn, and the Rivergrove Water District.

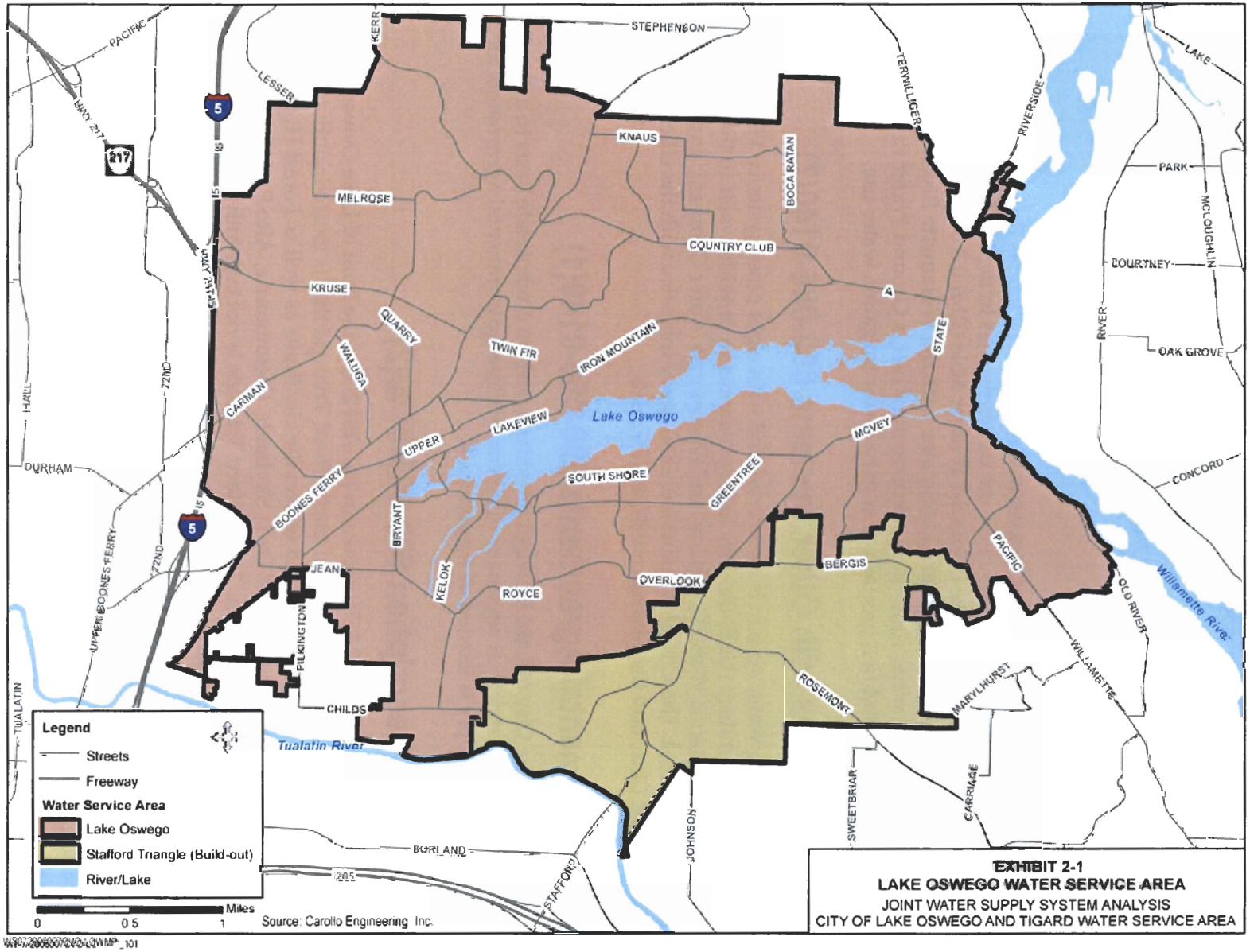
Intergovernmental Agreements 690-086-0140(1)

As noted above, the City of Lake Oswego provides water on a wholesale basis to a number of cities and water districts. A summary of all current intergovernmental agreements for wholesale water supply is located in **Appendix B**.

Service Area Description 690-086-0140(2)

The planning area for this WMCP, shown in **Exhibit 2-1**, is the limit of Lake Oswego's current USB plus a 925-acre area called the Stafford Triangle that is located south of the USB. The current USB includes all land within the city limits as well as Forest Highlands, Lake Grove, Rivergrove, Southwood Park, Skylands, Glennmorrie, Alto Park, and portions of the Palatine Hill Water Districts. The Stafford Triangle is not currently served by the City, but is expected to be included in the City's service area in the future.

The City's system provides water to approximately 14,000 service connections. These connections serve residential areas, commercial establishments, public facilities such as schools, irrigation accounts, and wholesale customers. In 2005, the population served on a retail basis within the City of Lake Oswego city limits was approximately 33,000. The 2005 population residing in water districts within the USB was estimated at approximately 6,500 people. Therefore, the total population within the Lake Oswego USB was nearly 40,000 people in 2005.



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Records of Water Use 690-086-0140(4) and (9)

Terminology

Production refers to the quantity of water delivered to the distribution system from the water treatment plant. By definition, production equals system demand, which includes metered consumption (residential, municipal, commercial/industrial, irrigation, and wholesale), public uses (fire fighting, hydrant flushing, other), and water lost to leakage, and reservoir overflow.

Consumption is equal to the metered water use. Production minus consumption equals unaccounted for water. Unaccounted for water is equal to the sum of unmetered uses (hydrant flushing, for example), leakage, overflows, and inaccuracies of measurement at the production or customer meters.

Generally, demands and consumption in municipal systems are expressed in units of mgd. They may also be expressed in cubic feet per second (cfs) or gallons per minute (gpm). One mgd is equivalent to 1.55 cfs or 694 gpm. For annual or monthly values, it is typical to refer to the total quantity of water in million gallons (MG). Water use per person (per capita use) is expressed in gallons per person per day (gpcd).

The following terms are used to describe specific values of system demands:

- Average day demand (ADD) equals the total annual production divided by 365 days. Production refers to the total amount of water that enters the system from the City's water treatment plant.
- Maximum day demand (MDD) equals the highest system demand that occurs on any single day during a calendar year. It is also called the one-day MDD.
- The three-day maximum day demand (3-d MDD) equals the average of the daily demands that occurred on the day before, the day of, and the day after the MDD.
- Maximum monthly demand (MMD) equals the highest demand in one of the 12 months of a calendar year.
- Peaking factors are the ratios of one demand value to another. The most common and important peaking factor is the ratio of the MDD to the ADD.

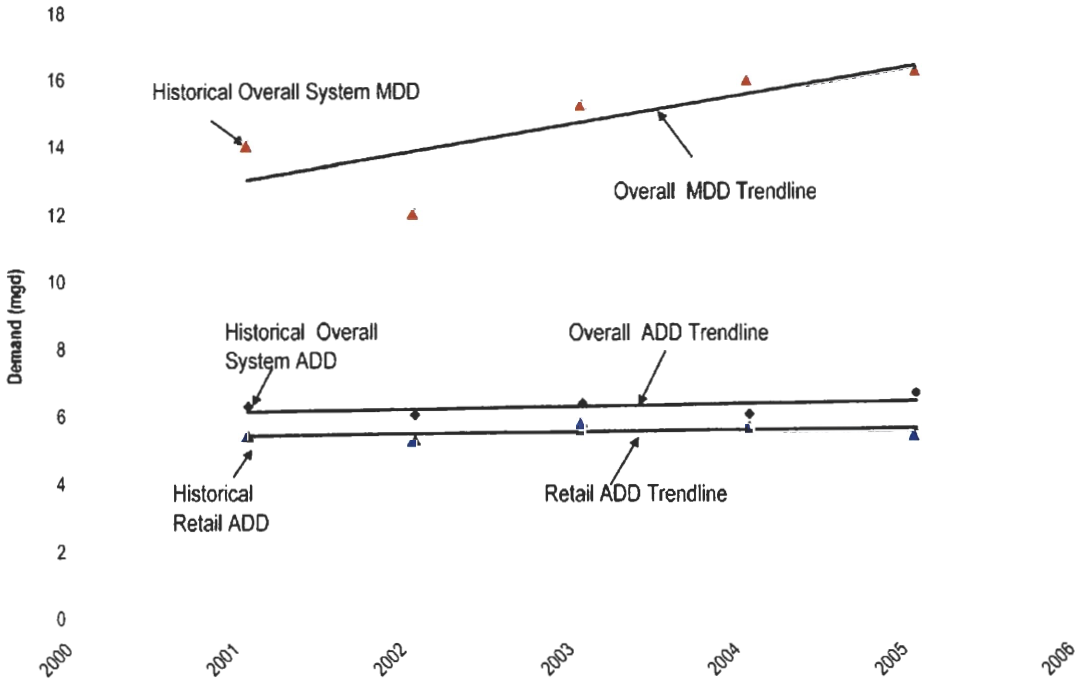
Historical Water Demands

Exhibit 2-2 summarizes demand records for the overall system, and **Exhibit 2-3** displays historical data and linear trends for overall system ADD and MDD for the period 2001 to 2005. Because of the fluctuation in wholesale water sales, an ADD for individual retail customers served by the City of Lake Oswego also is presented in Exhibit 2-3.

EXHIBIT 2-2
Historical Average Day, Maximum Day, 3-day Maximum Day Demands and Peaking Factor for the City of Lake Oswego Overall System

Year	Average Day Demand (mgd)	Maximum Day Demand (mgd)	3-day Maximum Day Demand (mgd)	3-day MDD as percentage of 1-day MDD	Maximum Month Demand (mgd)	Peaking Factor MDD:ADD
1995	9.7				15.1	
1996	9.5				15.6	
1997	6.9				13.6	
1998	6.8				13.8	
1999	6.5				11.0	
2000	6.8				11.0	
2001	6.3	14.0	11.4	82%	9.6	2.2
2002	6.1	12.1	11.2	93%	10.4	2.0
2003	6.4	15.3	14.2	93%	11.4	2.4
2004	6.1	16.0	13.6	85%	11.7	2.6
2005	6.7	16.3	15.6	96%	13.8	2.4
Average				90%		2.3

EXHIBIT 2-3
Overall System Historical and Trendline ADD and MDD, and Retail ADD, 2001 – 2005



Since 2001 the overall system ADD has ranged from 6.1 to 6.7 mgd, and has increased at a rate of approximately 0.08 mgd per year. During the same period, the individual retail customer ADD has ranged from 5.3 to 5.8 mgd, and has increased at a rate of approximately 0.06 mgd per year. In 1995 and 1996 the City sold a significant volume of water to the City of Tigard. Because of this service, the ADD reached 9.7 mgd in 1995, as shown in Exhibit 2-2.

The system-wide MDD has ranged from 12 to 16 mgd for the years 2001-2005, and MDD values have historically trended to increase at a rate of 0.9 mgd per year. Municipal MDDs are generally more variable from year to year than are ADDs because MDDs are sensitive to weather patterns. Unusually hot weather or the combination of hot and dry weather results in more outdoor irrigation, which increases the MDD.

When demand approaches production capacity for a short period (single day) water systems generally can rely on storage to meet demand. However, if high demand persists for an extended period, water shortages may result. The 3-day MDD gives an indication of the duration of periods of maximum demand. Since 2001, the 3-day MDD has ranged from 11.2 to 15.6 mgd, and has averaged approximately 90 percent of MDD. This means that if the MDD equals 16 mgd, it can be expected that the City will experience three consecutive days averaging a demand of 14.4 mgd each day.

Wholesale Water Sales

As noted, the City provides wholesale water to several other cities and water districts. As shown in **Exhibits 2-4 and 2-5**, wholesale sales have fluctuated over the years. In 1995, the City of Tigard purchased 42 percent (1,505 MG out of 3,542 MG) of the water produced by the City of Lake Oswego. In 2001, Tigard stopped purchasing water from Lake Oswego, substituting the Clackamas River source with water from the Bull Run and Trask River systems. In June of 2005, the City of Tigard again began to purchase water from the City of Lake Oswego, and the two cities currently are exploring options for future increased service to Tigard.

Water sales to cities and water districts, other than Tigard, increased between 2000 and 2001, but have declined steadily at a linear rate of 60 million gallons per year (0.2 mgd per year) from 2001 to 2005. During this same period, total wholesale water sales have represented from 6 to 18 percent of the overall system demand.

Peaking Factors

Exhibit 2-6 graphically depicts the MDD to ADD peaking factors shown in Exhibit 2-2 from 2001 to 2005. The MDD to ADD ratio has ranged from 2.0 to 2.6. The average value for the period 2001 to 2005 was 2.3, which is typical for Willamette Valley water utilities.

Monthly Demand

Exhibit 2-7 shows the overall system monthly demand for the period 2001 to 2005. As expected, demand peaks in the summer months, when weather is hot and dry and water is used for irrigation, swimming pools, etc., and is lower during the rest of the year. **Exhibit 2-8** displays the average demands by month for the same period, and **Exhibit 2-9** displays the monthly demand as a percentage of annual demand. In recent years, peak

EXHIBIT 2-4
Total Production and Historical Annual Wholesale Water Sales to the City of Tigard and Other Cities and Water Districts

Year	Total Production (MG)	Wholesale Water to Tigard (MG)	Wholesale Water to Other Cities and Water Districts (MG)	Total Wholesale Water Sales (MG)	Retail Production for Lake Oswego (MG)	ADD Overall System (mgd)	ADD for Retail Customers (mgd)
1995	3,542	1,505	101	1,605	1,936	9.7	5.3
1996	3,459	1,108	87	1,195	2,264	9.5	6.2
1997	2,516	335	203	538	1,979	6.9	5.4
1998	2,494	222	115	337	2,157	6.8	5.9
1999	2,387	122	104	226	2,161	6.5	5.9
2000	2,497	256	104	360	2,138	6.8	5.9
2001	2,300	0	321	321	1,978	6.3	5.4
2002	2,211	0	274	274	1,936	6.1	5.3
2003	2,335	0	211	211	2,125	6.4	5.8
2004	2,219	0	135	135	2,084	6.1	5.7
2005	2,450	343	89	432	2,018	6.7	5.5

EXHIBIT 2-5
Historical Annual Wholesale Water Sales to the City of Tigard and Other Cities and Water Districts

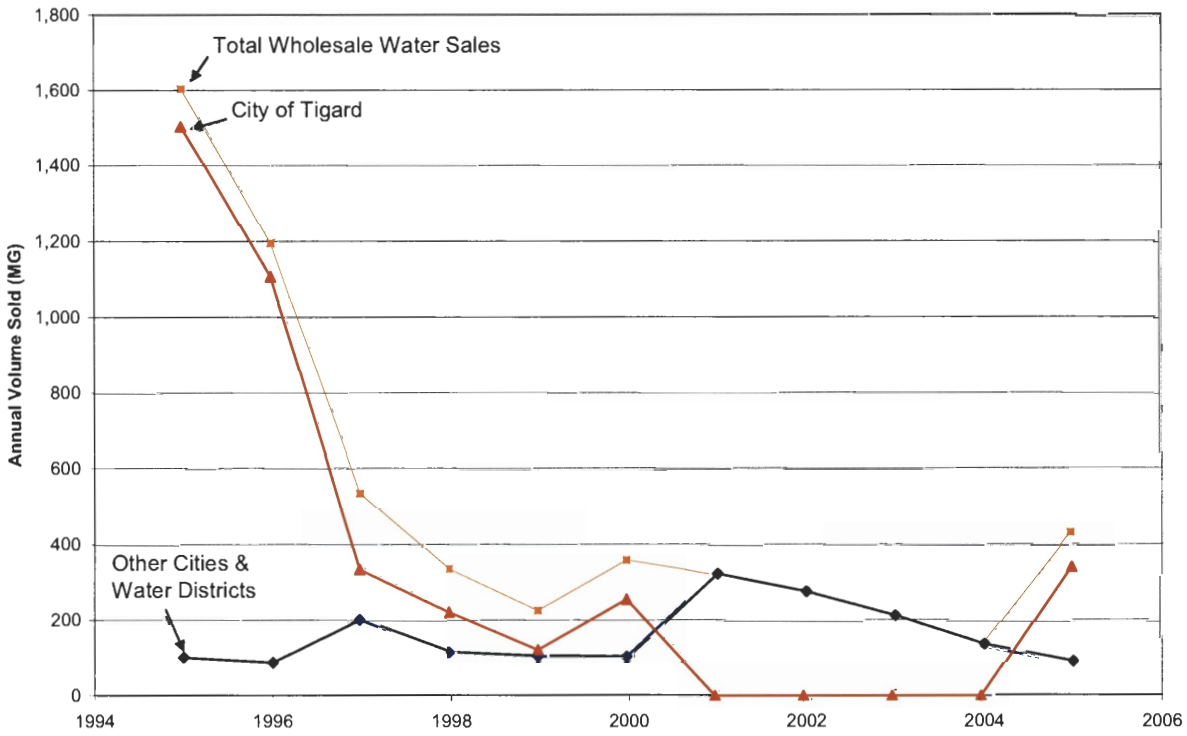


EXHIBIT 2-6
Historical MDD:ADD Peaking Factor

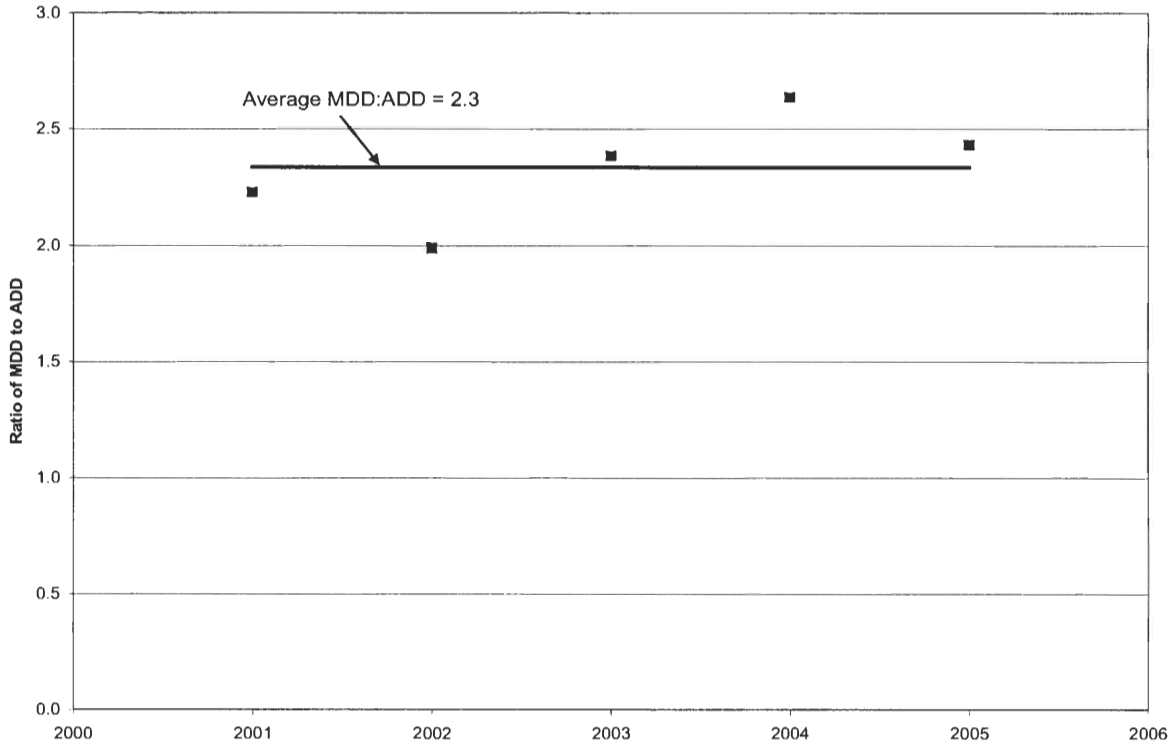


EXHIBIT 2-7
City of Lake Oswego Overall Monthly Demand, 2001-2005

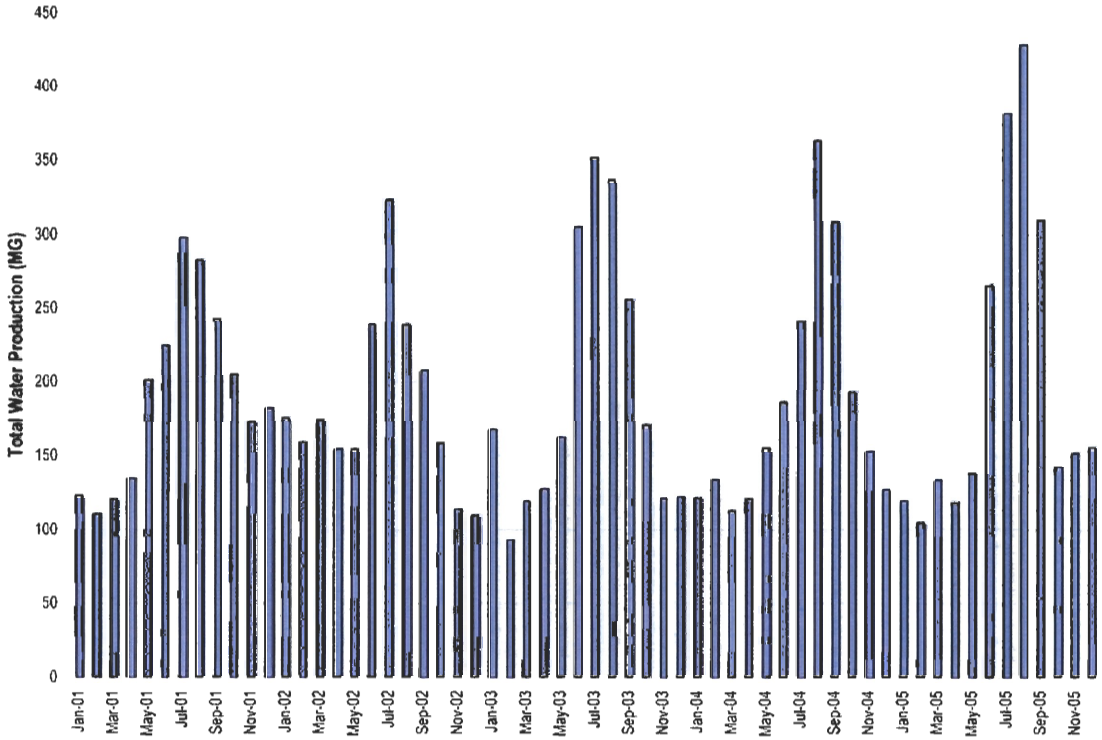


EXHIBIT 2-8
City of Lake Oswego Average Monthly Demand, 2001-2005

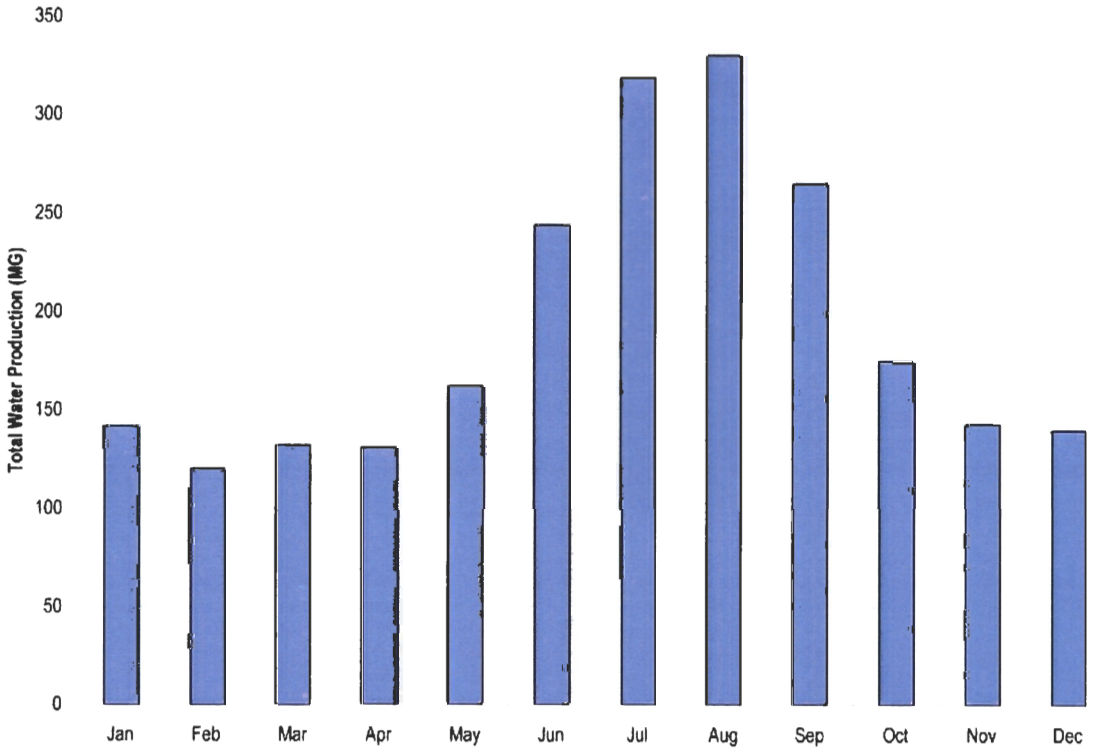
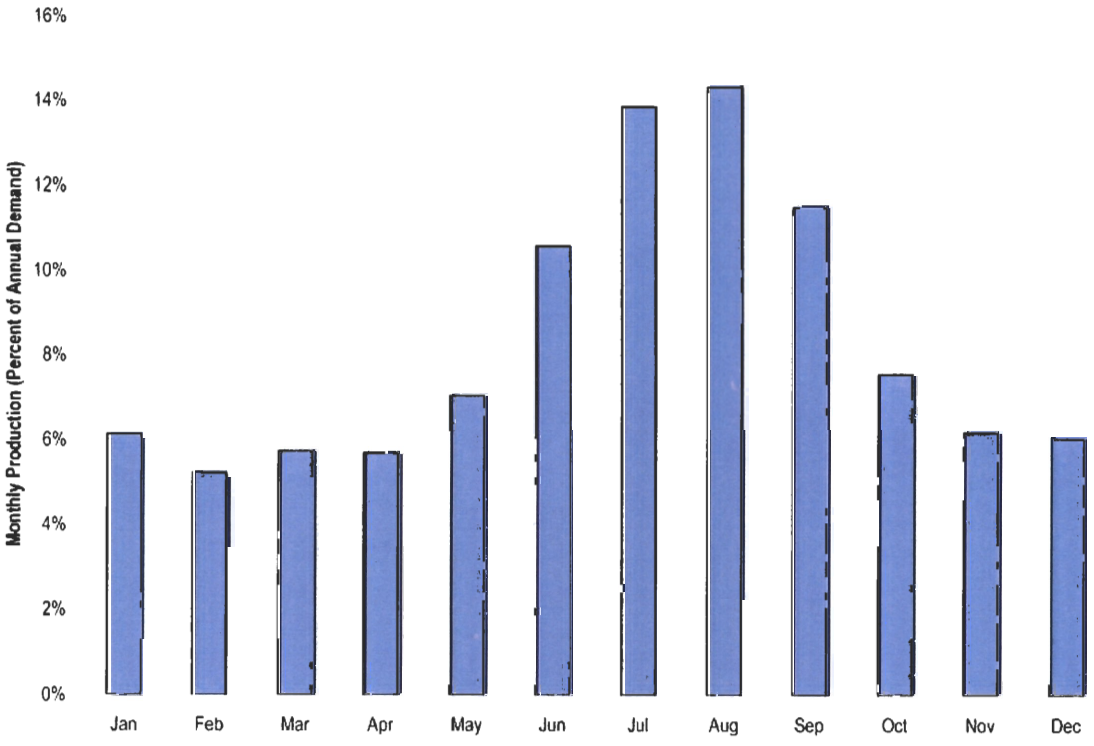


EXHIBIT 2-9
City of Lake Oswego Average Monthly Demand as a Percentage of Annual Demand, 2001-2005



month demand has averaged 330 MG (10.6 mgd), and has occurred in July in three and in August in two of the five years from 2001 to 2005. Demand during the four-month period June through September has accounted for approximately 50 percent of the total annual demand. In other words, half of the annual demand occurs in one quarter of the year and the remaining half of demand is distributed over the remaining three quarters of the year.

In City (Retail Customer) Per Capita Demand

Exhibit 2-10 shows the estimated ADD per capita for retail customers within the City of Lake Oswego city limits. The retail service area population was estimated by excluding populations associated with water districts within city limits from city population estimates from Portland State University's (PSU's) Population Research Center.[1] A MDD was estimated for this same population by multiplying the ADD per capita by the annual overall system MDD:ADD peaking factor of 2.3. ADD per capita for the City of Lake Oswego population has averaged 170 gpcd and the MDD per capita has averaged 392 gpcd over the last 6 years. These constant per capita values were used to estimate future water demands based on population projections within the USB.

Consumption and Unaccounted For Water

Consumption is equal to the metered water use within the system. All customers served by the City of Lake Oswego are metered.

Exhibit 2-11 shows the estimated monthly retail consumption for 2005. Similar to results from production data, approximately 51 percent of the annual retail consumption occurred during the summer months of June through September of 2005. Monthly metered consumption values were estimated from analysis of individual meter records. The City normally has half of the retail customer meters read on alternate months, and in 2005 all meters were read during the summer months of July, August, and September. Bimonthly meter data and monthly meter data were combined and adjusted to obtain monthly consumption estimates.

The difference between production and wholesale and retail consumption divided by production equals the percent of unaccounted for water. Unaccounted for water results from meter inaccuracies (both production and customer meters), unmetered uses such as hydrant flushing or hydrant use for fire fighting, and water lost to leakage, reservoir overflow, or evaporation.

Exhibit 2-12 lists annual total production and wholesale and retail consumption, and percent of unaccounted for water for 2000-2003 and 2005. (Data were not available to determine the unaccounted for water for 2004.) The unaccounted for water percentage has ranged from 3 to 14 percent, with an average of 9 percent. The average value is a favorable unaccounted for water rate that is below the OWRD's goal of no greater than 10 percent for cities. An unaccounted for water rate of 9 percent means that at a 2005 demand level, 0.6 mgd of water were not accounted for.

---

[1] Estimated by Carollo Engineering for the *City of Lake Oswego and Tigard Water "Service Area Joint Water Supply System Analysis.*

EXHIBIT 2-10
Per Capita Demands for the City of Lake Oswego Retail Customers

Year	City of Lake Oswego Retail ADD (mgd)	Estimated City Only Retail Service Population[1]	Retail ADD Per Capita (gpcd)	Peaking Factor MDD:ADD	Retail MDD Per Capita (gpcd)
2000	5.9	32,669	179	2.2	385
2001	5.4	32,821	165	2.2	368
2002	5.3	32,978	161	2.0	320
2003	5.8	33,080	176	2.4	420
2004	5.7	33,144	172	2.6	454
2005	5.5	33,278	166	2.4	404
Average			170	2.3	392

[1]Estimated by Carollo Engineers, using Metro TAZ GIS data, for the Joint Water Supply System Analysis for the Cities of Tigard and Lake Oswego.

EXHIBIT 2-11
City of Lake Oswego Monthly Retail Water Consumption for 2005

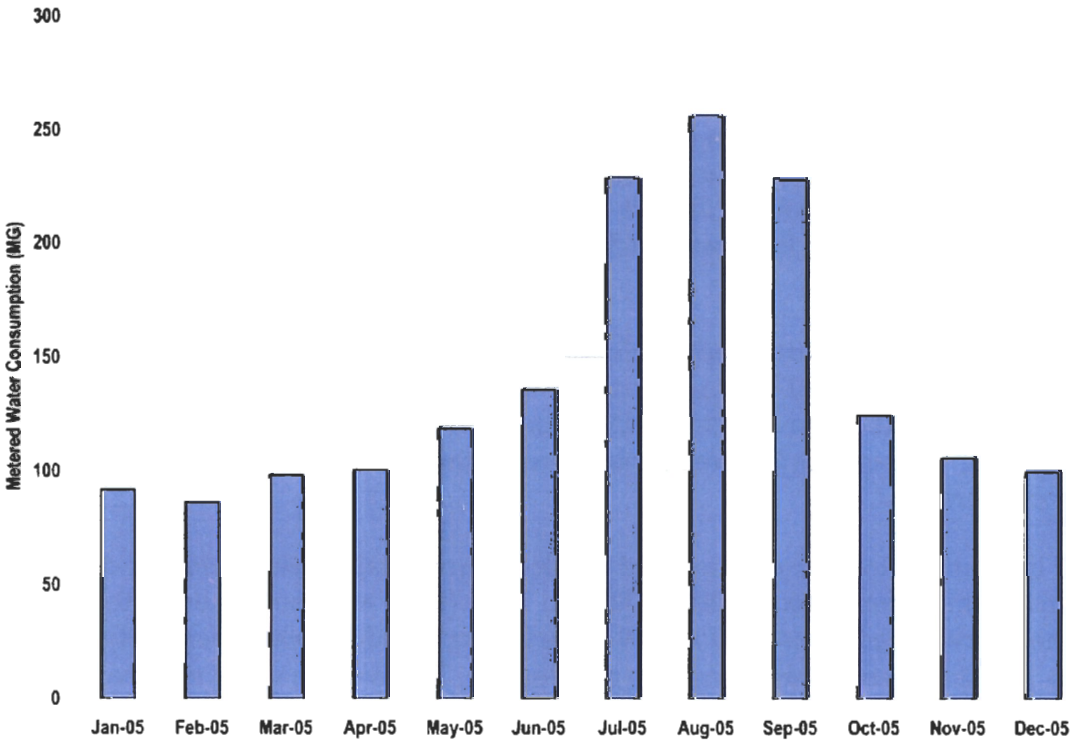


EXHIBIT 2-12
Historical Annual Unaccounted for Water Rate, Calendar Year 2000-2005

Year	Total Production (MG)	Wholesale Consumption (MG)	Lake Oswego Metered Consumption (MG)	Annual Percent Unaccounted for Water
2000	2,497	256	1,880	14%
2001	2,300	322	1,906	3%
2002	2,211	274	1,853	4%
2003	2,335	211	1,919	9%
2004	2,219	135	ND	ND
2005	2,450	432	1,675	14%
			Average =	9%

ND = Incomplete data

Exhibits 2-13 and 2-14 display monthly percent unaccounted for water for calendar year 2005. As explained above, individual meter data were combined and adjusted to obtain monthly consumption estimates. The average for the year was 14.5 percent. The monthly values varied from 3 to 26 percent. One reason for the large monthly variation probably is because customer meters are read bimonthly, and over a period of days. This meter reading schedule is not synchronized with production meter reading, so production and consumption values may not cover the same time period. An average unaccounted for water rate of 14.5 percent means that 1.0 mgd were not accounted for in 2005.

Customer Characteristics and Water Use Patterns

Exhibits 2-15 and 2-16 show annual consumption by customer category for fiscal years (FY) 1999-2000 through 2003-2004. Over the 5-year period, residential use (single- and multi-family) on average has accounted for 80 percent of annual retail sales, commercial and industrial use has averaged 12 percent, municipal use has averaged 4 percent and irrigation use has averaged 5 percent.

Exhibit 2-17 presents the average monthly consumption for residential and non-residential accounts by season for 2005. The summer months are defined as June through September. The total average monthly consumption for the summer months was 212 MG per month (7.0 mgd) compared to an annual average of 140 MG per month (4.6 mgd) and a wet season average of 103 MG per month (3.4 mgd). A dry season to wet season ratio of approximately 2.1 (212/103 = 2.1) is typical for Willamette Valley water utilities. These utilities provide a higher proportion of summer water supply to meet demands for outdoor irrigation.

EXHIBIT 2-13
Monthly Unaccounted for Water Rate for Calendar Year 2005

Month	Total Production (MG)	Wholesale Consumption (MG)	City of Lake Oswego Metered Consumption (MG)[1]	Monthly Unaccounted For Water
Jan-05	120	5.2	92	19.0%
Feb-05	105	0.3	86	17.4%
Mar-05	133	0.4	98	25.9%
Apr-05	118	0.4	101	14.7%
May-05	138	0.4	119	13.8%
Jun-05	266	97.1	136	12.3%
Jul-05	381	117.3	229	9.3%
Aug-05	428	75.4	256	22.6%
Sep-05	310	70.5	228	3.7%
Oct-05	143	6.4	125	8.1%
Nov-05	152	29.7	106	10.6%
Dec-05	156	30.2	100	16.7%
Average				14.5%

[1] Estimated from analysis of individual meter data for 2005. Inaccuracies introduced from inability to capture all metered volume when meters rolled over, and adjustments for timing of meter reading to correspond to month end.

EXHIBIT 2-14
City of Lake Oswego Monthly Unaccounted for Water Rate, 2005

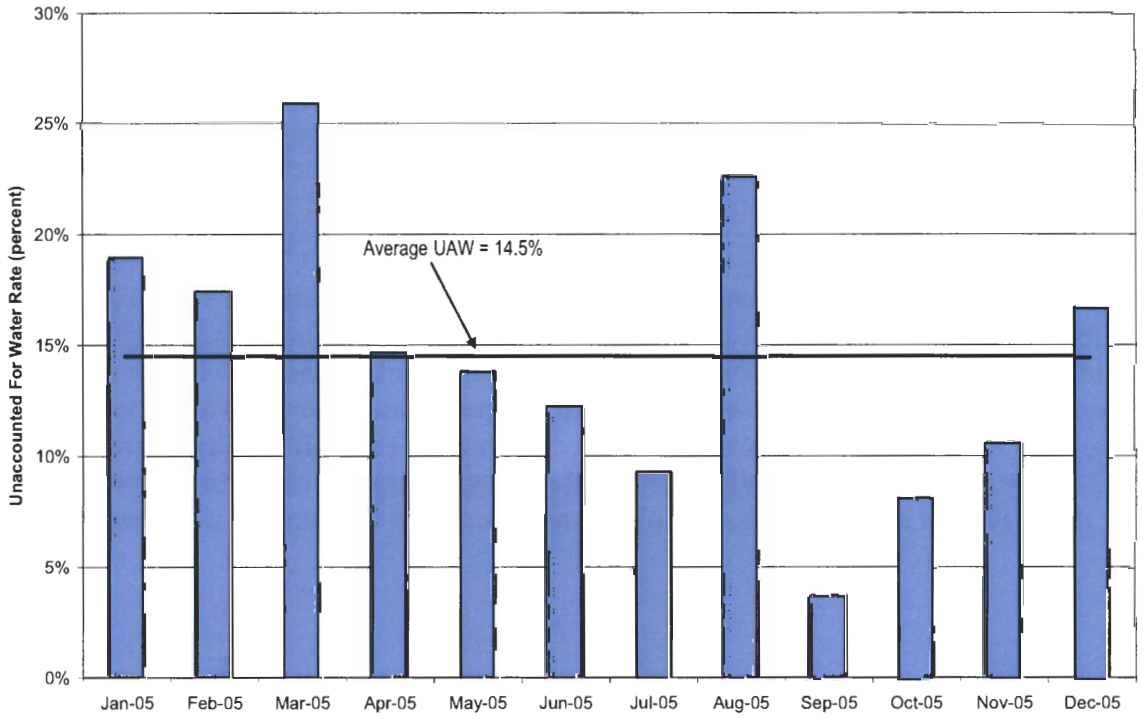


EXHIBIT 2-15
City of Lake Oswego Annual Retail Consumption by Customer Category, FY 99 to FY 03

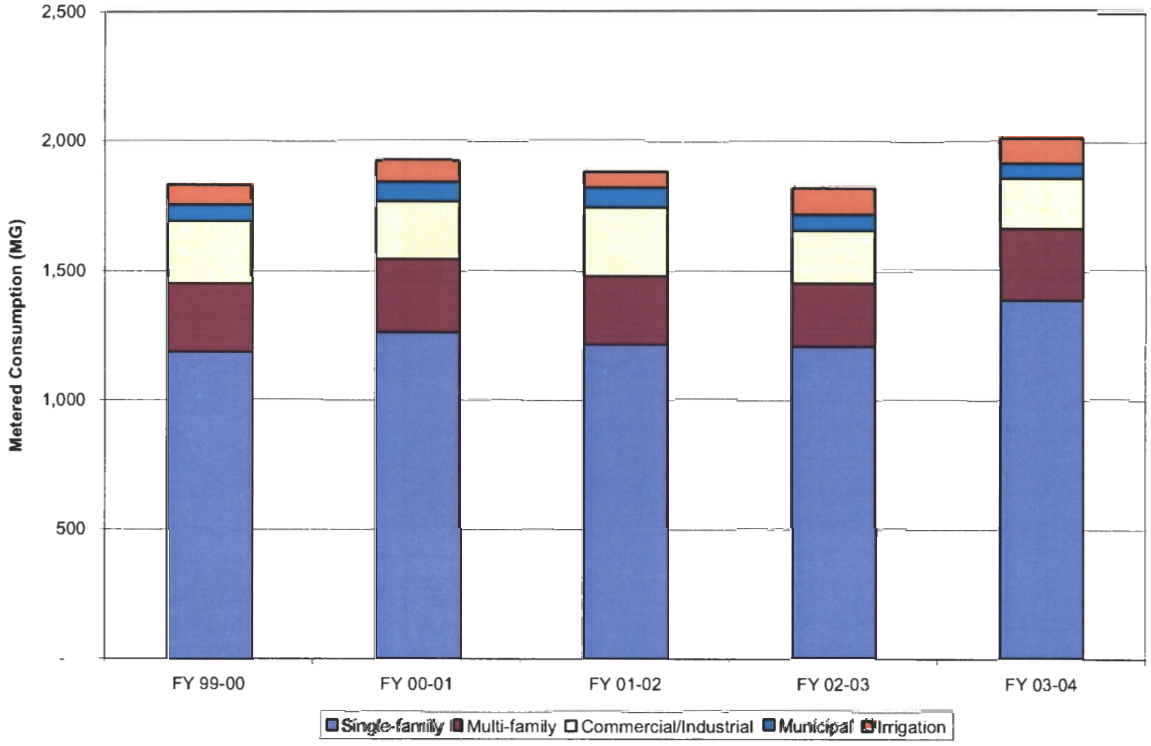


EXHIBIT 2-16
City of Lake Oswego Annual Percent of Retail Metered Consumption by Customer Category, FY 99 to FY 03

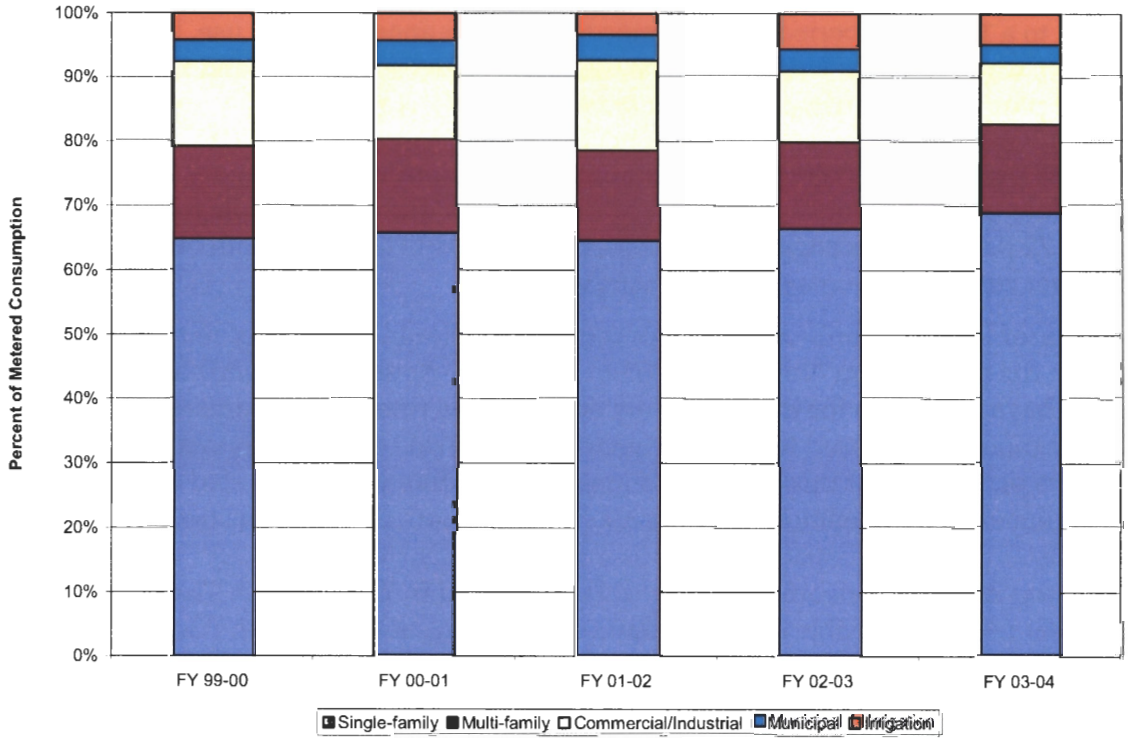
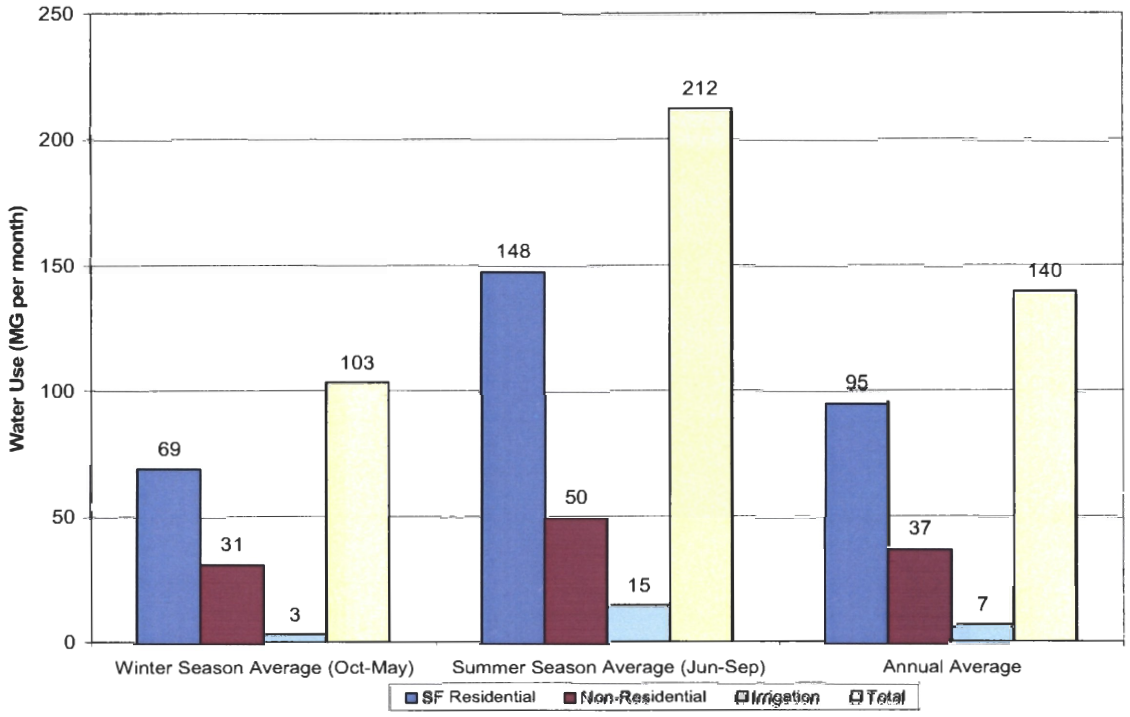


EXHIBIT 2-17
Estimated Average Monthly Consumption by Season and Customer Category, 2005



If wintertime consumption is assumed to be representative of annual indoor water use (or at least to exclude outdoor irrigation), the winter season average rates of 69 MG per month for single-family residential customers and 31 MG per month for non-residential customers can be applied to a 12-month period to determine the average annual indoor use. Under this assumption, water used for irrigation is the difference between total use and the calculated indoor use plus the water used by designated irrigation accounts.

Exhibit 2-18 presents the average annual indoor and outdoor use by category for the period 2005. Outdoor use represents approximately 28 percent of annual use while indoor use represents 72 percent. This suggests that conservation efforts targeting both outdoor and indoor water consumption may prove beneficial.

The number of irrigation-only accounts has increased at double the rate of non-irrigation accounts in the period from November 2003 to June 2006. As shown in **Exhibit 2-19** customers have signed up for irrigation-only accounts at a rate of approximately 0.75 per day (23 per month) compared to a non-irrigation account rate of 0.35 accounts per day (10 accounts per month). If this trend continues, conservation efforts targeted at implementing efficient irrigation practices may become more important as time goes on.

The City's top 20 water consumers for FY '03-'04 are listed in **Exhibit 2-20**. These 20 customers were responsible for approximately 8 percent of the total FY '03-'04 metered consumption. Customers who use large amounts of water may benefit from water audits that identify customer-specific conservation measures.

EXHIBIT 2-18
City of Lake Oswego Estimated Annual Indoor and Outdoor Use, 2005

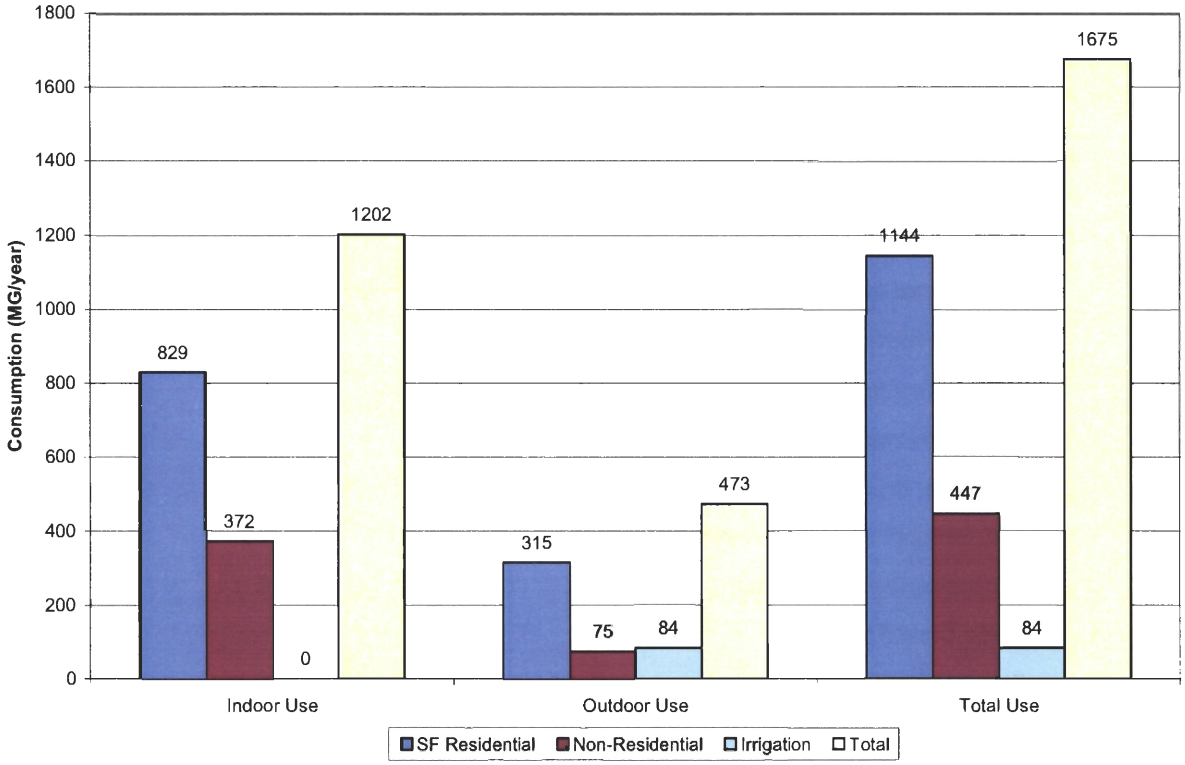
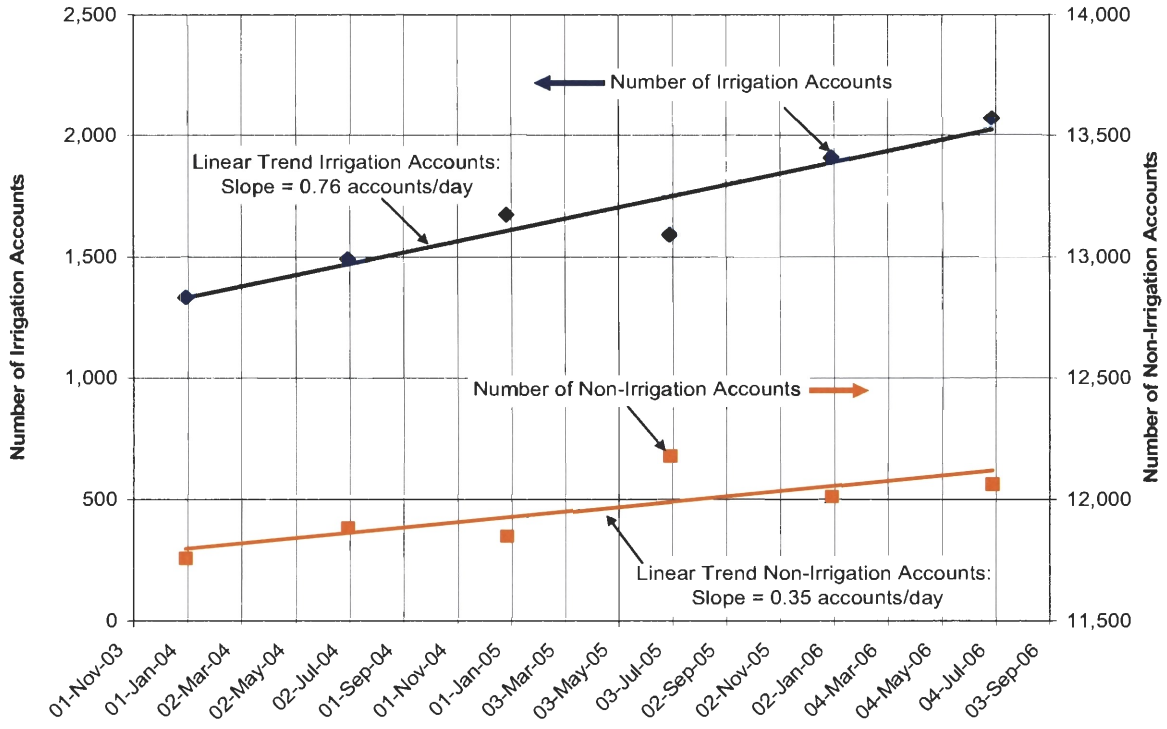


EXHIBIT 2-19
Linear Trend in the number of Irrigation-only Accounts*



* Some irrigation-only accounts are for non-irrigation uses such as fire protection.

EXHIBIT 2-20
Lake Oswego Largest Water System Accounts, FY '03-'04

Customer Name	Number of Accounts	Consumption (MG)
Convent of the Holy Names	8	22.8
LOSD - Dist #7 - Waluga Jr. High	1	17.7
Portland Oregon Temple	2	14.7
Com'l Invest Inc (Bay Roc Apartments)	2	13.4
Oswego Terrace Apartments	2	12.9
Gage Industries	4	11.6
Watumull Properties Corporation	3	8.8
Chili's Bar & Grill	2	7.6
L.O. School Dist #7 (HS & JrH on C.Club)	2	7.2
Centerpointe Owners Assoc	5	5.8
Eagle Crest Apartments	1	5.5
Five Centerpointe	1	5.5
Gran'pa Don's	1	4.7
Two Centerpointe	1	4.3
Six Centerpointe	1	3.7
Three Centerpointe	1	3.7
Parkridge Apartments, Bldg B	1	3.7
McNary Highlands	1	2.9
Ridgeview Homeowner Association	1	2.6
One Centerpointe	1	2.0
Lakeshore Concrete	1	1.9
	Total	163.2

City Water Rights 690-086-0140(5)

The City holds three surface water rights that authorize the use of water for municipal purposes: two for use of the Clackamas River and one for use of the Willamette River. When fully developed, these surface water rights could provide the City with a water supply of up to 42 mgd (65.0 cfs). In addition, the City holds a Ground Water Registration that authorizes the use of up to 0.5 mgd (0.78 cfs) of groundwater for municipal use and two permits that authorize the use of groundwater for irrigation of approximately 24 acres. **Exhibit 2-21** provides a summary of the City's water rights and its Ground Water Registration.

The City's most senior municipal surface water right is permit S-32410, which authorizes the use of up to 32.32 mgd (50 cfs) from the Clackamas River at RM 0.8. The priority date of this water right is March 14, 1967. In November 2001, the OWRD issued water right certificate 78332 confirming the City's full development (perfection) of 16.16 mgd of permit S-32410. The other half of permit S-32140 (16.16 mgd) continues to be in the water right development process as a permit. The City has submitted a permit extension application to OWRD requesting more time to develop permit S-32140.

The City also holds municipal water use permit S-37839, which authorizes the use of up to 5.82 mgd from the Clackamas River. The authorized point of diversion is also at RM 0.8. The priority date of this water right is July 5, 1973. This water use permit currently is not used by the City. Similar to permit S-32410, the City has a pending permit extension application at OWRD.

In addition to the Clackamas River source, the City holds a water right permit for municipal water supply from the Willamette River at approximately RM 24.0. The City's permit S-43246 authorizes the use of up to 3.88 mgd (6.0 cfs) with a priority date of March 24, 1977. This water use permit currently is not used by the City. A request for additional time to develop permit S-43246 is pending at OWRD.

The City of Lake Oswego also holds a Ground Water Registration and two groundwater use permits. A Ground Water Registration is a claim for the use of groundwater prior to Oregon's enactment of a groundwater code in 1955. According to GR 3819, this water use was developed in 1935 for municipal use in Oswego Heights. Prior to a water right certificate being issued that confirms the use claimed in GR 3819, OWRD must conduct an adjudication of the claim and the circuit court must issue a decree. The adjudication is pending and is likely to take many years. Meanwhile, GR 3819 provides the City with the legal authorization to use up to 0.5 mgd of groundwater for municipal use. According to City staff, GR 3819 is only used sparingly in the hottest part of dry summers to meet peak demands. This is largely because of issues associated with the construction of the well and potential water quality concerns.

The City's irrigation water right permits authorize the use of groundwater for the irrigation of approximately 24.0 acres; one permit for the irrigation of 1.4 acres and one for the irrigation of 22.43 acres and domestic use. Both permits are located on City property known as Luscher Farm, which contains restored historic farm structures and an extensive community garden. None of the City's groundwater rights are in a critical groundwater area or a groundwater limited area.

EXHIBIT 2-21
City of Lake Oswego Water Rights

Source	Priority Date	Certificate/ Permit/ Application Numbers	Quantity (cfs)	Quantity (mgd)	Type of Beneficial Use	Maximum Rate of Withdrawal to Date		2005 Average Withdrawal	Five-Year Average Withdrawal	Authorized Date for Completion	Listed Fish Species, Water Quality Limitations
						Instantaneous (mgd)	Annually (million gallons)	monthly (million gallons)	monthly (million gallons)		
Clackamas River	March 14, 1967	Cert: 78332 Permit: S-32410 App: S-43365	25.0	16.16	Municipal	16.3	3,542	204	NA	Partial perfection of permit S-32410	The Clackamas River was placed on DEQ's 303(d) list of water quality limited streams in 1998 due to summer temperature and in 2002 due to E. Coli. The Clackamas River supports the following fish species that are listed as either threatened, endangered, or sensitive under federal or state listings: Coho salmon, Chinook salmon, Steelhead trout, Cutthroat trout, and Pacific lamprey.
Clackamas River	March 14, 1967	Permit: S-32410 App: S-43365	25.0	16.16	Municipal					10/1/2000 Permit extension pending	
Clackamas River	July 5, 1973	Permit: S-37839 App: S-50819	9.0	5.82	Municipal	0.0	-	-	-	10/1/2000 Permit extension pending	
Total Clackamas River Quantity			59	38.14							
Willamette River	March 24, 1977	Permit: S-43246 App: S-55550	6.0	3.88	Municipal	0.0	-	-	-	10/1/2000 Permit extension pending	Numerous sections of the Willamette River are on DEQ's 303(d) list. In the area of this water right listing parameters include fecal coliform and summer temperatures. The Willamette River supports the following fish species that are listed as either threatened, endangered, or sensitive under federal or state listings: Coho salmon, Chinook salmon, Steelhead trout, Cutthroat trout, and Pacific lamprey.
Total municipal surface water supply			65.0	42.02							
Ground water	April 30, 1955	Permit: GR-3819	0.78	0.50	Municipal	-	-	-	-	-	-
Ground water	December 10, 1999	Permit: G-14046 App: G-15075	0.018	N/A	Irrigation of 1.4 acres	-	-	-	-	10/1/2005	None
Ground water	January 31, 2002	Permit: G-15222 App: G-15696	0.29	N/A	Irrigation of 22.43 acres and domestic use	-	-	-	-	10/1/2007	None

Aquatic Resource Concerns

The City's Clackamas River water rights authorize diversion at RM 0.8. In 1998, the Clackamas River from RM 22.9 to RM 0 was placed on Oregon Department of Environmental Quality's (DEQ) 303(d) list of water quality limited streams due to summer water temperatures. According to DEQ, the summer salmonid rearing temperature standard of 64 degrees is exceeded in this reach. In 2002, DEQ also listed RM 15.0 to RM 0 as water quality limited between June 1 and September 30 of each year due to elevated *E.coli* concentrations.

The Willamette River at RM 24.0, the approximate location of the authorized diversion for the City's water use permit S-43246, is on DEQ's 303(d) list as water quality limited for a number of parameters. For example, in 1998 the stretch of the Willamette River from RM 24.8 to RM 0 was listed by DEQ as water quality limited due to elevated levels of fecal coliform in the fall, winter, and spring, and for water temperature in summer. A full list of water quality limiting parameters for the Willamette River can be found on DEQ's web page at http://www.deq.state.or.us/wq/wqldata/SubBasinList02a.asp

The Clackamas and Willamette rivers support a number of fish species that are listed as Threatened, Endangered or Sensitive under state and federal laws. The listed fish species that occur in the Clackamas River are summarized in **Exhibit 2-22.** In addition to the species listed in Exhibit 2-22, the Willamette River (in the location of the City's authorized diversion) also supports Upper Willamette River Winter Steelhead and Upper Willamette River Spring Chinook, both listed as Threatened under the federal Endangered Species Act. State and federal permitting will be required prior to initial diversion of Willamette River water.

EXHIBIT 2-22
Native Fish Species that Occur Within the Clackamas River Basin that are Listed as Sensitive, Threatened, or Endangered Under the Oregon State or Federal Endangered Species Acts

Species	Species Management Unit (SMU)	State Listing Status[1]	Federal Listing Status[1]
Pacific lamprey (*lampetra tridentata*)	Oregon Pacific Lamprey SMU	Sensitive Vulnerable	Species of Concern
Coho salmon (*Oncorhynchus kisutch*)	Lower Columbia Coho SMU	Listed Endangered	Listed Threatened
Coastal cutthroat trout (*Oncorhynchus clarki clarki*)	Lower Columbia Coastal Cutthroat SMU	Sensitive Critical	Species of Concern
Winter-run Steelhead trout (*Oncorhynchus mykiss*)	Lower Columbia Winter Steelhead SMU	Sensitive Critical	Listed Threatened
Fall-run Chinook salmon (*Oncorhynchus tshawytscha*)	Lower Columbia Fall Chinook SMU	Sensitive Critical	Listed Threatened

EXHIBIT 2-22
Native Fish Species that Occur Within the Clackamas River Basin that are Listed as Sensitive, Threatened, or Endangered Under the Oregon State or Federal Endangered Species Acts

Species	Species Management Unit (SMU)	State Listing Status[1]	Federal Listing Status[1]
Spring-run Chinook salmon (*Oncorhynchus tshawytscha*)	Lower Columbia Spring Chinook SMU	Sensitive Critical	Listed Threatened

[1] State and federal listing status obtained from: Rare, Threatened, and Endangered Plants and Animals of Oregon, Oregon Natural Heritage Program, February 2001; and National Marine Fisheries Service ESA Salmon Listings (November 2005), online at http://www.nwr.noaa.gov/ESA-Salmon-Listings/Salmon-Populations/Index.cfm

Evaluation of Water Rights/Supply 690-086-0140(3)

The City holds approximately 38 mgd (59 cfs) of water rights from the Clackamas River and 3.9 mgd (6 cfs) of undeveloped water rights on the Willamette River. However, the City's current system capacity (supply) is limited by the production capacity of its water treatment facility, which is approximately 16 mgd. The City is evaluating alternatives to increase its water treatment plant capacity to 32 mgd or more as part of its analysis of a joint water supply system for Lake Oswego and Tigard.

The amount of water available to satisfy the City's water rights is a function of water right priority date (seniority) and stream flow. For the City, the relative priority date of its Clackamas River water rights is a key factor in water availability and reliability.

The Clackamas River basin produces a significant quantity of water even during the driest months of the year. According to long-term stream flow records on the Clackamas River at Estacada, (USGS gage #14210000, approximately 22 miles upstream from the City's authorized point of diversion), a stream flow of 278 cfs (180 mgd) is met or exceeded 90 percent of the time with flows ranging from 1,500 to 2,300 cfs (970 to 1,487 mgd) during high flow months. Moreover, in the 22 miles between the Estacada gage and the City's point of diversion at RM 0.8, there are several tributaries including Eagle Creek, Deep Creek, Richardson Creek, Clear Creek, and Rock Creek that feed the mainstem Clackamas River, resulting in stream flows at the City's point of diversion considerably greater than those recorded at the Estacada gage.

Access to Clackamas River water is administered through OWRD's water right process. The numerous water rights on the Clackamas River include consumptive uses such as irrigation, industrial and municipal uses, and non-consumptive uses such as power generation and fish protection. These water rights are all regulated under the prior appropriation system. This means that in times of shortage the senior water rights have priority to be satisfied while the junior water rights may be shut off or curtailed in order to meet the senior water right needs. For the City, the most significant of the water rights on the Clackamas River is the instream water right held by the State of Oregon. This water right, certificate 59491, protects flows from appropriation by junior users in the Clackamas River for the purpose of supporting aquatic life. The priority date of the instream water right is August 26, 1968, and the stream flows that it protects are up to 168 cfs (109 mgd) from July 1 to September 15 and

up to 265 cfs (171 mgd) the rest of the year. The reach where these flows are protected is from USGS stream flow gage 142095, near Three Lynx, to the mouth of the Clackamas River.

Based on priority date and abundant stream flow, the City's permit S-32410 and certificate 78332 are highly reliable. The City's access to Clackamas River water under permit S-32410 and certificate 78332 is not impacted by instream water right certificate 59491. The City's permit S-32410 and certificate 78332 have a priority date of March 14, 1967, for up to 32 mgd, senior in priority to the instream water right and therefore not subject to regulation if stream flows fall below the protected levels. Moreover, while there are other senior consumptive water users on the system, their cumulative consumptive use (compared to long-term stream flow records) is negligible.

Access to Clackamas River water under the City's permit S-37839 also is not likely to be regulated in favor of senior consumptive water users; however, the reliability of this water right permit is compromised because it is junior in priority to instream water right certificate 59491. Daily stream flow records for USGS gage 142100, at Estacada, indicate that daily stream flows in the dry years of 1987, 1992, and 1994 have dropped below 265 cfs (171 mgd) (the protected flows from September 15 to June 30) in late September and in October. The potential for low flows in early fall coupled with the continued development of upstream senior municipal water uses makes it extremely likely that the City's permit S-37839 would be subject to regulation in favor of instream water right certificate 59491. However, this regulation would not preclude the City from using permit S-37839 for domestic use. Instream water right certificate 59491 is conditioned to not have priority over domestic use, which is defined by OWRD as the use of water for human consumption, household purposes, and domestic animal consumption related to residential use of the property.

There is ample water available in the Willamette River to satisfy the City's permit S-43246. After considering all existing consumptive use and non-consumptive use water rights (including instream water rights), OWRD's on-line water availability database indicates a water supply in excess of 420 cfs (271 mgd) is available for new appropriations below the confluence of the Molalla River based on an 80 percent exceedance probability.

System Description 690-086-0140(8)

The City operates a public drinking water system (Public Water System Identification Number of 4100457). **Exhibit 2-23** is a map of the City's existing distribution system. The City's raw water intake is on the Clackamas River at River Mile (RM) 0.8, a short distance upstream of the river's confluence with the Willamette River. The firm capacity of the intake (raw water) pump station, with the largest pump out of service, is 15 mgd. With all four pumps operating, the raw water pumping capacity is greater than the water treatment plant capacity of 16 mgd.

The raw water is pumped to the City's water treatment plant through a 27-inch-diameter pipeline buried beneath the Willamette River. The plant, located in West Linn, was constructed in 1967 and was expanded to its current capacity of 16 mgd in 1980. The treatment steps include coagulation, filtration, and disinfection. Finished water is pumped

to the City's distribution system. The finished water pump station has a firm capacity in excess of 12.2 mgd.

The City's system provides water to approximately 14,000 service connections. These connections provide water to a retail population of approximately 33,000 people, as well as many commercial establishments, irrigation accounts, public facilities such as schools, and wholesale customers.

The service to these customers is accomplished through a system comprised of 200 miles of pipelines, 16 reservoir tanks, and 13 pump stations. Summaries of the pipelines, reservoirs, and pump stations are presented in **Exhibits 2-24** through **2-26**. The distribution system is divided into 11 separate pressure zones to maintain acceptable pressures to all customers.

EXHIBIT 2-24
Summary of Pipeline Sizes

Pipe Diameter (in)	Total Length (ft)	Percent of Total Pipeline
< 4	42,250	3.99
4	76,500	7.23
5	1,650	0.16
6	209,700	19.81
8	388,200	36.68
10	70,800,	6.69
12	138,700	13.10
14	5,000	0.47
16	64,000	6.05
18	16,000	1.51
20	100	0.01
24	41,000	3.87
27	4,200	0.40
42	350	0.03
Total	1,058,450 (200.5 miles)	100

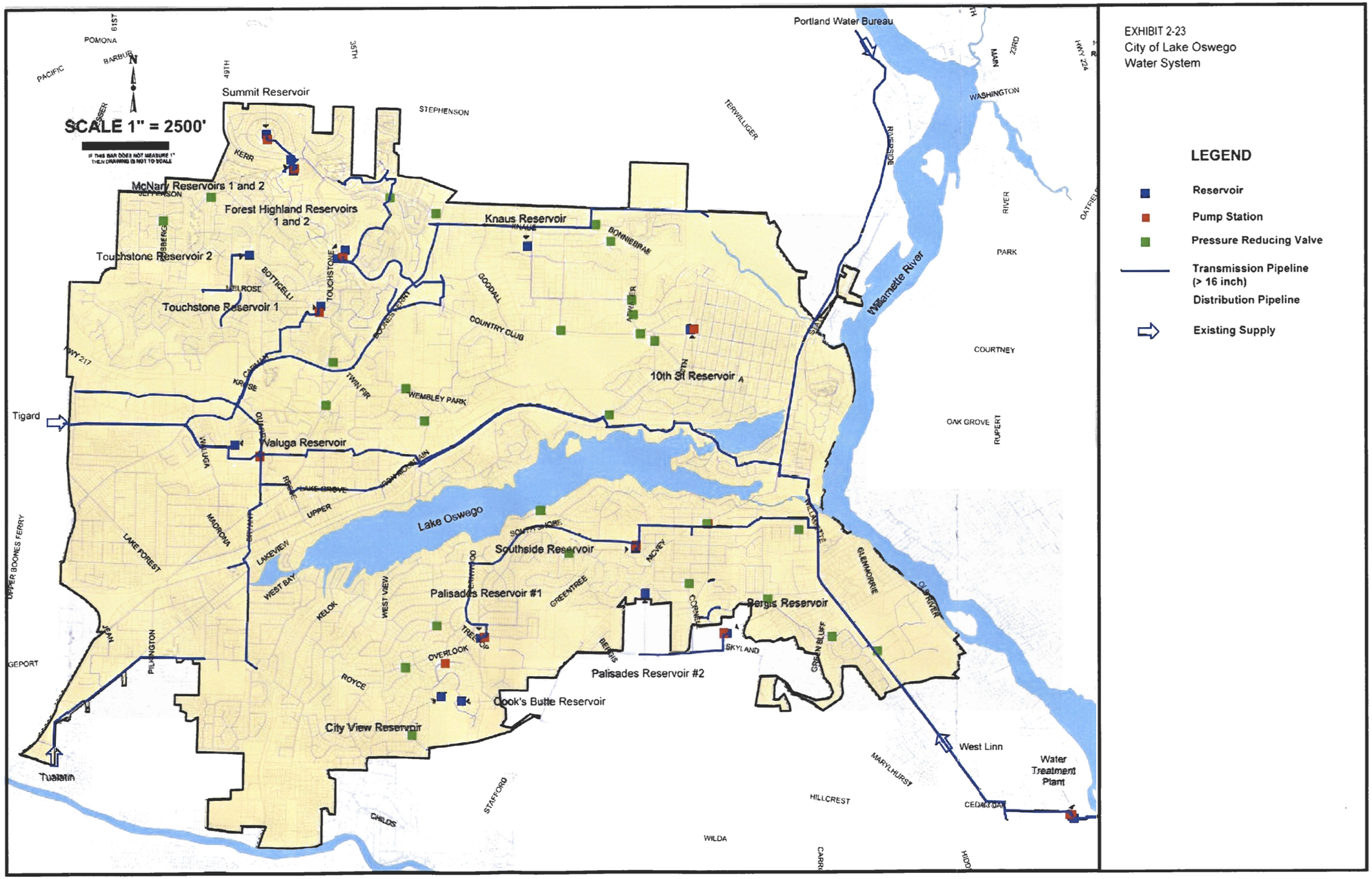


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EXHIBIT 2-25
System Reservoir Inventory

Name	Volume (MG)	Overflow Elevation (ft)	Height	Year Constructed
Bergis	0.5	649	20.0	1960
City View	1.2	656	27.0	1983
Cook's Butte	0.2	726	18.0	1981
Palisades #1	1.0	464	32.0	1968
Palisades #2	2.5	465	31.0	2003
Southside	1.0	318	15.0	1969
Knaus	1.1	475	22.5	1982
Tenth Street	0.5	312	65.0	1925
Summit	1.5	968	19.0	1974
McNary #1	1.0	800	15.5	1969
McNary #2	4.0	800	20.0	2000
Forest Highlands #1	0.5	608	17.9	1960
Forest Highlands #2	2.0	610	26.4	1982
Touchstone #1	1.0	485	22.5	1982
Touchstone #2	5.0	485	22.5	1996
Waluga	4.0	320	20.5	1981

EXHIBIT 2-26
Summary of Existing Pump Stations

Name	Location	No. of Pumps	Rated Capacity (gpm)	Total Installed Capacity (gpm	Nominal Firm Capacity (gpm)
Cook's Butte	Hillside Dr. near Hillside Ln.	**2**	**100**	**200**	**100**
Bergis	Near Upper Cherry Ln. and SW Bergis Rd.	1*	1,500	1,500	0
		3	**90**	**270**	**180**
Palisades	Between Cloverleaf Rd. and Treetop Ln.	**3**	**1,000**	**3,000**	**2,000**
Southside	South Shore Blvd. near Fern Pl.	2	750	1,500	1,500
		1	1,000	1,000	0
		3		**2,500**	**1,500**
McVey	Cornell St. between McVey Ave. and Oak St.	**2**	**415**	**830**	**415**
Tenth Street	10th St. between C Ave. and D Ave.	**2**	**650**	**1,300**	**650**
Summit	Nansen Summit	1	110	110	0
		1	40	40	40
		2		**150**	**40**
McNary	McNary Pkwy and Kerr Rd	**3**	**1,200**	**3,600**	**2,400**
Kerr Road	Between Kerr Pkwy. And Independence Ave.	**3**	**1,500**	**4,500**	**3,000**
Touchstone	Near Brush Ln. and Orchard Way	**3**	**1,500**	**4,500**	**3,000**
Waluga	Quarry Rd. Near Douglas Way	1	3,000	3,000	0
		2	3,000	6,000	6,000
		3		**9,000**	**6,000**
WTP Clearwell	Kenthorpe Way	1	6,000	6,000	0
		3	4,300	12,900	8,600
		4		**18,900**	**8,600**
Clackamas River Intake	Near Windham Oaks Ct.	1	6,000	6,000	0
		3	3,500	10,500	10,500
		4		**16,500**	**10,500**
Total		**38**		**61,780**	**34,005**

* Dedicated fireflow pump.

SECTION 3

Water Conservation

This section addresses the requirements of OAR 690-086-0150 (1) – (6).

Current Conservation Measures 690-086-0150 (1) and (3)

The City of Lake Oswego does not have a previously approved WMCP. However, the City has implemented a number of water conservation measures in recent years.

Public information. The City financially supports and is an active member of the Regional Water Providers Consortium (RWPC), and has been since its inception. Approximately 60 percent of the consortium's $640,233 budget is devoted to water conservation efforts. The efforts of the consortium focus on education and outreach throughout the Portland Metro area. RWPC programs include a variety of public outreach efforts including the following:

- A Web site, www.conserveh2o.org, has indoor and outdoor water conservation information and suggestions.
- A summer media campaign that includes television and radio advertisements and news interviews on local stations. The consortium budgets $130,000 annually for this effort, and gains an additional $100,000 of added value through media partnerships.
- Workshops for developers and landscapers that focus on water-efficient landscape design and installation, and on using water-efficient irrigation equipment. A public lecture on water conserving landscape design was presented at a local Lake Oswego garden shop.
- Conservation displays available to consortium members for use at local events.
- Brochures containing conservation information.
- Presentations at large regional events such as the Portland Yard, Garden and Patio Show and the Portland Salmon Festival.
- The City of Lake Oswego engages in the following additional public education efforts:
- The City's website contains a section on water conservation located at http://www.ci.oswego.or.us/wtp/.
- The Public Affairs Office provides an assortment of water-wise fliers and brochures, and children's activity/coloring books (titled *Where's Rosie*). Materials are available at brochure racks and, during the summer, at the weekly "concert at the park" series hosted by the Lake Oswego Parks Department.
- The City hosts and funds a *Where's Rosie* play at two local elementary schools, Bryant and Waluga. The play is part of the conservation activities developed in collaboration

with the RWPC. Performed by a troupe of actors from Ladybug Theatre, the play's message is the need for water conservation.

- In 2005, the City's annual Earth Day event featured a water conservation theme and was advertised with posters, print advertisements, and flyers.
- In August 2002 and July 2004, the City distributed press releases with a water conservation message.
- The City sponsors gardening classes that feature native plants and xeriscape landscaping; plantings around City Hall incorporate these ideas.
- Water conservation is a frequent topic in the monthly City newsletter *Hello LO*. There have been at least 14 articles on water conservation, water-efficient gardening, and related topics in this newsletter since April 2003.
- The 2005 and 2006 Consumer Confidence Report includes a cut-out flier with indoor and outdoor water conservation tips.
- City staff participates in an annual water conservation event held at Portland Community College.

Rates. The City has a uniform rate structure. Water customers pay $0.83 per hundred cubic feet (748 gallons) of water used regardless of customer class or volume used.

Indoor conservation kits. The City receives fifty indoor conservation kits including low-flow shower heads and toilet diverters every year from RWPC, and distributes them to customers on request.

Irrigation on City land. The City incorporates water-efficient sprinkler heads in City-owned landscape projects. These sprinkler heads are low-volume devices that promote more efficient use of water by reducing runoff. In addition wetting agents, turf aeration, and irrigation head retrofits on existing installations have been used to improve irrigation efficiency. A City employee is certified to conduct indoor and outdoor water audits.

System-wide meter testing. All water customers are metered. Approximately 400-500 meters (¾-in to 1.5-in) are replaced annually. Approximately 50 percent of meters 2-inches and larger are tested annually and repaired or replaced as necessary.

Pipe replacement. Since 1994, the City has annually budgeted and expended an average of $600,000 for pipeline replacement. Most of the areas of the City with known pipeline problems have been addressed through this program.

Leak detection and repair. The City historically has conducted leak detection on 30 miles of its 200 mile pipe network, resulting in a 7-year leak detection cycle. In April 2007, a leak was found in an old 2-inch diameter galvanized service line. Estimated water savings from repair of this leak were from 3 to 6 million gallons per year for at least five years. The need for leak detection will diminish with time because of the annual pipeline replacement program.

Community Conservation Survey. In June 2006, the City commissioned a telephone survey to explore community attitudes toward and awareness of water supply and water conservation issues. (See below.)

Water Conservation Committee. A citizen-based committee including representatives from the School District, the Parks and Recreation Advisory Board, the Home Builders Association, the Lake Oswego Country Club, and the private development community was assembled to provide guidance in the development of this WMCP. (See below.)

Community Survey on Water Conservation

To gauge Lake Oswego water customers' attitudes and perceptions regarding water conservation, the opinion research firm of Davis, Hibbits & Midghall, Inc. conducted a telephone survey on behalf of the City in June 2006. The survey included 300 water service customers representative of Lake Oswego residents. The 17-question survey covered a number of water conservation topics including general awareness and satisfaction with water service, water conservation behavior, reasons for conserving water, perceptions and awareness of water conservation, and means for fostering conservation. The detailed results of the survey are presented in **Appendix C.**

Survey results indicate that the city's residents are satisfied with their water service, with six out of ten giving a combined excellent/good rating to the six aspects of water service investigated. Many of the survey findings also indicate a customer base that is highly motivated to conserve water. A substantial number of households have already implemented conservation measures such as the use of native plant landscaping and the installation of low-flow plumbing fixtures and high-efficiency appliances.

Survey respondents cited a Governor's declaration of drought and receiving a larger than normal water bill as the two factors most likely to prompt them to change their water consumption.

When asked about conservation programs, a high number of survey respondents (75 percent) expressed interest in rebates for high-efficiency appliances, 65 percent expressed interest in rate structures that would encourage water conservation, and 62 percent expressed interest in free water conservation kits. Fewer respondents were interested in investing in the distribution of conservation information, or free seminars on water-efficient landscaping.

Only 36 percent of survey respondents were able to identify the Clackamas River as the source of Lake Oswego's water supply. This suggests an opportunity to increase awareness of where the city's water comes from, the outstanding resource values of the Clackamas River, and the benefit of water management and conservation measures to enhance the city's sustainable water use.

Water Conservation Committee

The City is committed to implementing new conservation measures that achieve greater water use efficiency, prevent waste, and promote sustainability. To facilitate community involvement, the City formed a community-based Water Conservation Committee to provide guidance in the development of water management and conservation measures for

this plan. Committee members, listed in **Appendix D**, were selected to represent a range of water users, interests, and backgrounds.

The Water Conservation Committee met three times. The first meeting served as an orientation, in which the committee reviewed current and projected water use patterns in Lake Oswego, the requirements of a WMCP, and the results of the community survey. In the second and third meetings the committee reviewed water management and conservation programs in Lake Oswego, other Oregon communities, and other states, and explored fishery and water quality resource issues on the Clackamas River. The committee then developed possible 5-year benchmarks for both required and optional conservation measures. Since the conclusion of the committee process City staff has refined the benchmarks and added a few additional conservation measure benchmarks that will be pursued. The City's suite of 5-year benchmarks is presented below, and in **Appendix E**. The 5-year benchmarks will be reviewed and endorsed by the Lake Oswego City Council.

Use and Reporting Program 690-086-0150(2)

The City of Lake Oswego has a water use measurement and reporting program that complies with the measurement standards in OAR Chapter 690, Division 85. The city's water use records can be found on the OWRD webpage (http://apps.wrd.state.or.us/apps/wr/wateruse.)

Required Conservation Programs 690-086-0150(4)

OAR 690-086-0150(4) requires that all water suppliers establish 5-year benchmarks for implementing the following required conservation measures:

- Annual water audit
- System-wide metering
- Meter testing and maintenance
- Unit-based billing program
- Leak detection and repair (if system leakage exceeds 10 percent)
- Public education

The City currently addresses all of the required conservation measures listed above. The Water Conservation Committee reviewed current conservation practices and recommended the following 5-year benchmarks. Matrix 1, located in Appendix E, is a summary of existing, expanded and new water management and conservation activities to be implemented by the City.

Five-Year Benchmarks for Required Existing or Expanded Conservation Measures

Over the next five years, the City plans to continue or expand the following existing conservation measures that are required of all municipalities:

1. **Public education.** Continue involvement with the RWPC, and increase local messaging to disseminate information about water conservation opportunities and programs.

Develop simple targeted messages that emphasize the Clackamas River as the source of the City's water.

2. **Annual water audits.** Continue to conduct annual water audits and evaluate production and consumption data to observe trends in unaccounted for water. Work with the Utility Billing Department to streamline the retrieval of water consumption data by date, volume, and customer class to assist in tracking water use trends.

3. **System metering.** All customers served by the City of Lake Oswego are metered. Continue to require meters for all development within the city.

4. **Meter testing and maintenance.** Continue annual testing and repair or replacement of 50 percent of 2-inch and larger meters. Increase the number of 3/4-inch to 1.5-inch meters replaced annually to achieve a 25-year replacement cycle. Establish a design standard to ensure all meters 2 inches and larger are installed with test ports and by-pass to facilitate testing and repair.

5. **Leak detection and repair.** Periodically audit the City's construction standards to ensure that they remain current relative to industry best practices. Continue to respond to all calls related to possible system leaks in a timely manner, and repair any leaks detected.

Five-Year Benchmarks for Required New Conservation Measures

The City plans to evaluate or implement the following new conservation measures that are required of all municipalities over the next five years:

1. **Public education.** Explore the feasibility of developing an outdoor water use/water conservation demonstration project.

2. **Annual water audits.** Develop and implement administrative policies and procedures to document consumption of authorized un-metered water. This could consist of developing report forms and reporting requirements for such uses. The City should consider developing a permit system for construction uses.

3. **Meter reading/billing cycle.** Evaluate the costs and benefits of changing meter reading and billing cycles from the current bi-monthly cycle to a monthly cycle to improve utility understanding and analysis of customer demand patterns and provide more frequent feedback opportunities to the utility's customers regarding water usage.

4. **Water rate structure.** Within the fiscal year (FY) 2007 to 2009 biennium, fund an analysis of alternate rate structures that encourage conservation. An effort such as this may cost approximately $50,000. Undertake steps to gain acceptance from the community and adoption by the City Council.

Expanded Use under Extended Permits 690-086-0150(5)

Because the City plans to eventually develop water rights associated with extended permits S-32410, S-37839, and S-43246, which are in OWRD's permit extension queue, and because this entails diverting water from areas with resource issues (the Clackamas and Willamette Rivers), the City is required to develop a leak repair and line replacement program within

5 years that will reduce system-wide leakage to less than 15 percent. Current annual unaccounted for water is estimated at 9 percent. Therefore, this rule is not applicable.

Expanded Use under Extended Permits 690-086-0150(6)

Under this rule requirement, a water provider that serves a population greater than 1,000 and intends to expand use under extended permits for which resource issues have been identified shall establish 5-year benchmarks for implementing a number of listed conservation measures or document that the measures are neither feasible nor appropriate.

A summary of the 5-year benchmarks for additional conservation measures developed by the Water Conservation Committee and City staff are contained in **Matrix 2** of Appendix E. Further description of the analysis used to develop the benchmarks is presented below.

Analysis of Potential New Conservation Measures

As described in Section 2, indoor water use represents roughly 70 percent, and outdoor (irrigation) use represents about 30 percent of annual metered consumption. Judging by the recent rate of addition of new irrigation accounts, irrigation may become a larger factor in the future. Furthermore, the twenty water customers that use the most water represented approximately 10 percent of annual metered consumption in FY '03-'04. Therefore, the committee recognized that conservation programs for the City should target two areas: 1) reducing ADD and 2) increasing the efficiency of irrigation water use. Reductions in ADD can be accomplished by programs such as fixture replacement, leak detection and repair, and water audits for consumers of large quantities of water. Reductions in water use by irrigators can be accomplished by programs such as installation of weather-based irrigation devices, landscaping with drought-tolerant plant species, and water audits of large outdoor water users.

Exhibit 3-1 summarizes conservation measures that were given detailed consideration. Water savings and program costs were estimated for required measures as well as potential new conservation measures over a 10-year period based on the assumptions described in Exhibit 3-1. Costs include labor performed by City staff, direct expenses (such as printing for public education brochures), and contract costs (such as the cost for hiring a leak detection company). Actual costs and water savings will vary depending on estimates regarding factors such as the level of participation by customers, the condition of existing plumbing fixtures and the city's distribution pipes, and the level of staff effort required to initiate and maintain a conservation program.

As shown in Exhibit 3-1, a meter repair and replacement program and a public education program are required for all water providers. Public education that motivates customers to reduce water use will result in actual water savings. The meter repair and replacement program will reduce unaccounted for water by improving meter accuracy, but may not result in actual water savings. However, meter repair and replacement may result in water savings if under-reporting customer meters are corrected, and higher bills motivate customers to reduce water use. As noted in the community survey, 73 percent of respondents indicated that receiving a larger-than-usual water bill would motivate them to change their water consumption.

EXHIBIT 3-1
Potential Conservation Measures to be Implemented Over a 10-year Period

Program	Program Type: **Required **Must be Considered **Optional	Description	Number of Participants/ Items	Staff Labor Needed (staff days over life of program)	Costs Over 10 Years	Annual Water Savings in Tenth Year (gpd)	Unit Value ($/gallon per day saved)	Comments
Meter Testing and Maintenance Program	Required	City staff will survey 10% of all system meters per year. Assumes that 10% of these meters will warrant replacement or repair, and that each meter that is repaired or replaced will increase registration by 5%.	14,000 inspected; 1,400 replaced	4900	$1,530,000	34,000	$50	Program implemented over 10 years. Average cost of $400/meter NOTE: Water savings indicate amount of water that would otherwise be classified as unaccounted for water. The meter repair/replacement program does not directly reduce water use, it only provides better accounting of use. The higher water bills that result may promote some conservation.
Leak Detection and Repair Program	Optional (Lake Oswego's unaccounted for water has averaged <10%)	Hire outside firm to perform annual leak detection survey. City staff will repair found leaks.	10	140	$390,000	72,000	$5	Water savings highly dependent on findings from leak surveys. Assumes 1 leak of 5 gpm found each year - a 5 gpm leak that is fixed saves 7,200 gallons per day (2.6 million gallons per year).
Public Education Workshop & Open House	Required	City contributes to the Regional Water Providers Consortium (RWPC) and continues other media programs, workshops, and public information brochures	51	80	$240,000	10,500	$20	Although public education programs do not achieve a high volume of water savings by themselves, they are a critical component that boosts participation in other demand-side conservation measures. Much of the cost to the city is for its annual RWPC membership ($21,000 per year). Water savings based on 2% of households responding to public education messages by saving 5 gpd each.
Technical Assistance	Must be considered	City staff perform audits of water use for customers that use large amounts of water	40	120	$44,000	2,000	$22	Audits may be appropriate for residential customers that use large amounts of water as well as commercial customers. Audits may provide benefits by promoting other conservation programs (i.e., by resulting in the customer participating in a fixture replacement program).
Fixture Retrofit: Restaurant Rinse Heads	Optional	Provide rebate of $75 to restaurants that replace standard kitchen rinse heads with low water use heads.	23	16	$15,000	3,200	$5	Each kitchen spray rinse head saves an average of 170 gpd. Assumes 40% of market penetration for eligible restaurants. Rebates of $75 are provided for each efficient rinse head installed when the old rinse head is turned over to the city. City representatives should visit each eligible restaurant to explain the benefits of low flow rinse heads to business owners.

EXHIBIT 3-1
Potential Conservation Measures to be Implemented Over a 10-year Period

Program	Program Type: **Required **Must be Considered **Optional	Description	Number of Participants/ Items	Staff Labor Needed (staff days over life of program)	Costs Over 10 Years	Annual Water Savings in Tenth Year (gpd)	Unit Value ($/gallon per day saved)	Comments
Fixture Retrofit: Showerheads	Must be considered	Provide low-flow showerheads to customers for $1 each.	319	25	$21,000	3,400	$6	Each showerhead saves an average of 11 gpd. Assumes 5% market penetration for those houses that do not currently have low-flow showerheads. Showerheads provided for nominal $1 cost to homeowners.
Fixture Retrofit: Toilets	Must be considered	Provide rebates of $50 to $150 to customers that replace standard toilets with low-flow models - average cost $200 - $300.	380	48	$78,000	7,700	$10	Assumes that 2% of eligible homeowners or commercial customers, those with old, high-flow toilets, take advantage of the program over its lifetime. Typical water savings is approximately 20 gpd per high efficiency toilet (HET). Utilities that we surveyed provide rebate amounts of $30-160, with an average of $80. Lake Oswego would provide graduated rebates for replacement of existing toilets with HETs. Rebates would range from $50 to $150 for replacing toilets rated at 1.6 gpf and 3 gpf or higher respectively.
Fixture Retrofit: Clothes Washers	Must be considered	Provide rebate of $200 to customers that replace standard clothes washers with high efficiency models - costs can range from $600 - $1600.	90	11	$29,000	1,200	$24	Most customers will only participate in a clothes washer rebate program when their machine wears out and replacement is necessary. Therefore, the expected participation is less than for other programs - assumes 1% of population with low efficiency washers would participate over 10 years. Estimated water savings of 13.5 gpd per unit. Utilities that we surveyed provide rebate amounts of $50-100, with an average of $75. Lake Oswego should consider what the right level of rebate is to encourage participation in the program.
Weather-Based Irrigation Devices	Optional	Provide rebate ($150) to customers that install irrigation controllers that sense weather conditions - average residential installation cost of $200 - $400.	11	6	$28,000	900	$31	A newer program in Oregon. Tualatin Valley Water District began offering a rebate for residential/commercial installation of weather based controllers in June 2006. To date, they've had only 4 customers take advantage of the program. Bend encourages their use and is considering a rebate program. Data on water savings is less certain than for other conservation measures. Assumes 1% of eligible residential/commercial customers would participate over 10 years. Assumes water savings of 82 gpd per unit.

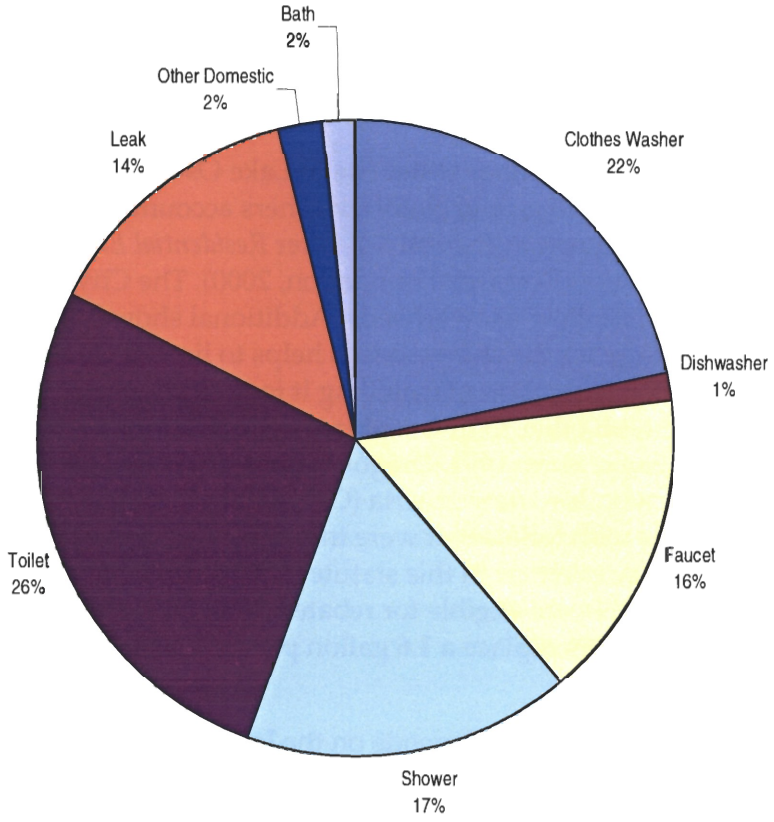
Because the City's historical unaccounted for water rates have been below 10 percent, the leak detection and repair program listed in Exhibit 3-1 is not required under the OWRD's administrative rules. Moreover, the City historically has conducted leak testing on about 30 miles of pipe annually. This means that all pipe within the 200-mile distribution system is tested every 7 years. The City also has an on-going waterline replacement program. Many of the City's problem areas have been identified and replaced, which has reduced the need for leak testing.

As noted in Section 2, single-family residential indoor water use in Lake Oswego accounts for 50 percent of total annual use. Showers, toilets, and clothes washers account for 65 percent of typical indoor water use, as shown in **Exhibit 3-2** (after *Residential End Uses of Water*, by American Water Works Association Research Foundation, 2000). The City already distributes conservation kits containing low-flow showerheads. Additional showerheads could be made available. A nominal charge for the showerheads helps to limit the number of customers who take one without serious intention of installing it in their residence. The City also may implement this program with other fixture replacement measures, such as the toilet, or washing machine rebate programs. Since 1991, Oregon has required that all new toilets and other water fixtures comply with low-flow criteria (ORS 447.145), so the participant pool is limited to households with toilets that were in place prior to the 1991 statute. The 1.6 gallons per flush water use criterion in this statute will be adopted by the City as the criterion for approving toilets that are eligible for rebates. In addition, the City is considering granting a rebate when customers replace a 1.6 gallon per flush toilet with an ultra-low flow toilet (1.3 gallons per flush).

The success of fixture replacement measures largely depends on the level of public participation. Using a conservative estimate of public participation, implementation of the four fixture replacement programs (restaurant rinse head, showerhead, toilet, and clothes washer) shown in Exhibit 3-1 have an estimated annual water savings just over 0.2 percent at the end of the 10-year implementation period. This equates to a savings of 15,500 gpd or 5.7 MG per year. Public education through conservation workshops sponsored by the RWPC or open houses sponsored by the City could help increase the rate of participation. Outreach efforts should include publicizing the State of Oregon Residential Energy Tax Credit Program, which provides tax credits for qualifying energy- and water-saving appliances (www.energy.state.or.us). Also, making fixture replacement programs available to interested commercial facilities could boost participation and the rate of water savings. Simultaneous advertisement and administration of all fixture replacement programs would reduce costs.

Performing on-site audits of larger water customers is a program that also will be pursued by the City. Audits can identify opportunities for water savings and possibly for water reuse. Water audits include an on-site evaluation of water use conducted with the customer, development of recommendations, and a follow-up visit to evaluate water savings. Staff training in the audit process will be required. Potential savings in the tenth year equals 2,000 gpd or 0.7 MG per year. While no reuse opportunities have been identified to date, the audit program listed in Exhibit 3-1 could help to discover future opportunities for reuse.

EXHIBIT 3-2
Typical Indoor Residential Use (based on *Residential End Uses of Water*, by American Water Works Association Research Foundation, 2000)



Providing rebates for weather-based (also known as evapotranspiration-based or ET-based) irrigation devices is a relatively new conservation measure with a limited track record in Oregon. The committee decided that initial measures to reduce irrigation use will focus on public education, distribution of outdoor conservation kits, and implementation of conservation measures such as weather-based irrigation systems on city–owned property. The feasibility of developing an outdoor water use/water conservation demonstration project will also be explored.

Costs for Increasing Supply Compared to Conservation Costs

The Lake Oswego WTP is approaching its 16 mgd capacity. The system-wide MDD in 2005 was 16.3 mgd. The City is planning to expand its production capacity in the near future. Estimated costs for the City range from $54 million to $72 million depending on the extent of expansion and the involvement of Tigard in a joint expansion project.

The cost of producing water in FY '05-'06 was estimated by City staff at $0.32 per hundred cubic feet, or $0.15 per gpd. The current cost of producing water is orders of magnitude less than the unit cost of conserving water for the programs shown in Exhibit 3-1. These costs range from $5 per gallon saved per day to $50 per gallon saved per day. The conservation programs listed in this chapter and summarized in Matrices 1 and 2 in Appendix E will be implemented to promote sustainable use of the city's water supply, and to help defer capital

improvement costs. However, conservation measures will not preclude the need for securing additional long-term water supply.

Five-Year Benchmarks for Additional Conservation Measures

The Water Conservation Committee and City staff recommended and the City Council endorsed the following conservation measures as feasible and appropriate for the City to implement over the next five years:

1. **Leak detection and repair.** Continue annual water main replacement as necessary based on the age of system components, field observations, leak reports, maintenance history and other data sources.

2. **System metering.** Audit meter reading and accounting practices to identify inaccuracies. Adjust such practices as necessary to reduce reporting errors and increase billing and measurement accuracy.

3. **Water rate structure.** Within the fiscal year (FY) 2007 to 2009 biennium, fund an analysis of alternate rate structures that encourage conservation. An effort such as this may cost approximately $50,000. Undertake steps to gain acceptance from the community and adoption by the City Council.

4. **Technical assistance.** Identify the top 20 residential and top 20 commercial water users and provide free water audits for two customers from each category (4 audits) each year so that all 40 customers will have an audit within 10 years. Track consumption for audited users to evaluate whether more efficient water use results from the audit service.

5. **Outdoor conservation kits.** Beginning in 2007, the City will receive 25 outdoor conservation kits from RWPC. An additional 50 outdoor conservation kits will be purchased at a cost of approximately $500.

6. **Clothes washer and toilet replacement (rebate).** Develop a clothes washer replacement program and a toilet replacement program. For the clothes washer replacement program, offer $200 rebates for replacing existing clothes washers with high efficiency models. For the toilet replacement program, offer rebates ranging from $50 to $150 for replacing existing toilets in commercial and residential settings with new low flow toilets. Budget at least $13,000 annually for the residential rebate program. Publicize any potential Oregon State tax credit opportunities for use of approved water-saving fixtures. Track consumption for each retrofit installation to verify savings.

7. **Restaurant rinse head replacement (rebate).** Develop a rebate program, and budget at least $2,000 annually, for the use of water-efficient rinse heads in restaurants. Offer a $75 rebate for each new rinse head installed after the old head is given to the City.

8. **Demonstration project.** Determine the feasibility of developing an outdoor water use/water conservation demonstration project.

9. **Municipal outdoor conservation.** Collaborate with the City of Lake Oswego Parks Department on the replacement of existing clock-timed controllers to weather-based

controllers for the city's large turf areas. Require the use of native and drought-tolerant landscaping and drip irrigation where appropriate.

10. **Water Conservation Coordinator.** Fund a position for a dedicated water conservation coordinator working as a full time employee.

11. **Annual water use reporting for wholesale purchasers.** By December 31 of each year following adoption of this WMCP by the City and approval by OWRD, require all wholesale customers receiving water from the City during the preceding 12-month period to submit an annual water use report. At a minimum, the report will provide the following information:

    a. Total number of service connections receiving City water.

    b. Total service area population.

    c. Number of service connections by customer class. Minimum class designations to include: 1) single-family, 2) multi-family, 3) Commercial/Industrial, 4) irrigation only.

    d. Total metered consumption and metered consumption by customer class.

    e. Estimates and sources of unaccounted for water.

    f. The purchaser's current water rates and rate structure.

    g. A description of the purchaser's conservation program specific to the customers receiving City water.

SECTION 4

Curtailment Plan

This section satisfies the requirements of OAR 690-086-0160

Introduction

Curtailment planning is the development of proactive measures to reduce demand during supply shortages due to prolonged drought, or system failure from unanticipated events including catastrophic events (flooding, landslides, earthquakes and contamination), mechanical or electrical equipment failure or events not under control of the City (e.g., localized or area-wide power outages and intentional malevolent acts.)

History of System Curtailment Episodes 690-086-0160 (1)

Within the last decade, the City of Lake Oswego has not experienced water shortages resulting from a constrained source of supply. The City has experienced short duration interruptions to normal service delivery as a result of mechanical or electrical malfunction of pumps and related electrical equipment at its intake and water treatment plant, local electric utility outages, and in the recent past, interruption of treated water supply due to a localized joint failure in a treated water transmission main. When these events occurred, the City issued press releases to local media outlets, posted alerts on its webpage and contacted its wholesale customers to inform them of the situation and ask that non-essential water use be reduced until repairs were made and normal water service delivery was restored. These service disruptions have been short-lived and have not required sustained curtailment measures because the City has adequate distribution system storage volumes.

Curtailment Event Triggers 690-086-0160 (3)

The City's average day demands (ADD) range from 6.1 to 9.7 million gallons per day (mgd), and maximum day demands (MDD) have ranged from 12 to 16 mgd in the period from 2001 to 2005. Demand records also show that with increasing regularity, the average demand over a three day period, in which the middle day is also the maximum day, approaches 90 percent of the maximum day demand (MDD). There have been times when MDDs equal the maximum supply capacity (16 mgd) and 3-day MDDs have averaged 14.4 mgd.

The City's critical water system facilities include its water supply intake on the Clackamas River (located approximately 0.8 mile upstream of the confluence with the Willamette River), its water treatment plant located in the neighboring community of West Linn, and its raw and finished water transmission mains. These systems are now more than 40 years old. During the peak season, these critical facilities operate 24 hours per day 7 days per week at maximum capacity. Analysis of these systems during an update of the City's water master plan conducted in 2001 indicates that to meet peak demands, all systems must operate at maximum installed capacity. This analysis also showed that firm capacity i.e., actual

delivery capacity with the largest pump out of service, was at or below peak demands as follows:

- The firm pumping capacity of the raw water intake is 14.7 mgd.
- The firm pumping capacity of the treated water pump station is 12.2 mgd.
- The water treatment plant cannot meet regulatory disinfection contact time requirements in the plant and must rely on portions of the treated water transmission main to achieve compliance.
- Both the raw and finished water transmission mains transmit water during peak demand periods at higher than an optimal, 5 feet per second, velocity.

During non-peak demand periods, curtailment triggers are unlikely to be met unless a catastrophic natural disaster impacts multiple elements of the City's source of supply. Absent a trigger of this magnitude, the City is well-positioned to meet its non-peak season customer demands for the following reasons:

- The City has seismically hardened its water intake structure to current UBC design codes.
- The City has seismically hardened its water treatment plant to remain operational after a seismic event exceeding current UBC design codes.
- The City has 27 million gallons (MG) of distribution system storage: enough to meet average day demands for 3 to 4 days. Enacting curtailment measures could extend this supply further.
- Of the City's 27 MG of storage, all but 1.7 MG is fully or partially buried, providing resistance to seismic events and deterring sabotage. In the last decade, the City has added an additional 11.5 MG of new, buried storage reservoirs designed to withstand seismic forces exceeding current UBC design codes.
- If the Clackamas River becomes unusable, the City maintains intersystem connections with the Cities of Portland, Tigard and Tualatin.
- Existing firm pumping capacity in its intake and WTP exceed annual average day demands.

During the peak summer demand period from June through September when the system is operating at or near its maximum capacity, interruption of supply due to natural disaster, mechanical failure, a terrorist act, or loss of source could present significant challenges to the City. Therefore, the triggers and related curtailment stages in this curtailment plan are based primarily on events occurring during this time period.

Curtailment Stages 690-086-0160 (2)

Depending upon the nature of the event giving rise to a water supply shortage and considering predecessor and successor conditions, this curtailment plan for the City of Lake Oswego is designed to be initiated and implemented in progressive stages.

Events causing this plan to be activated would include but not be limited to the following:

- Abnormal weather conditions preceding the peak summer supply season that present a high likelihood for below normal summer streamflows in the Clackamas River
- Declaration of a drought for Clackamas County by the Governor pursuant to ORS 536.720
- Catastrophic natural disaster that damages individual critical facilities or extensive portions of the City's distribution system
- Mechanical or electrical malfunction of critical pumping facilities at the City's intake or water treatment plant
- Interruption of local utility electrical service
- Terrorist act perpetrated on any of the City's critical facilities or storage reservoirs, or contamination of source water

The City's curtailment plan has five distinct stages (Exhibit 4-1), each of which is triggered by one or more of the events listed above and grouped as follows:

EXHIBIT 4-1
Curtailment Stages 1 through 5

Curtailment Stages	Initiating Conditions
Stage 1 – Water Shortage Alert	• forecasts of below-normal summer streamflows • mechanical or electrical malfunction causing the loss of any two pumps at intake facility • minor damage to raw or treated water transmission mains (e.g., leaking joint requiring repair.)
Stage 2- Serious Water Shortage Demand Reduction Target: 10 percent of MDD	• declaration of drought by Governor pursuant to ORS 536.720 • continuation of hot dry weather predicted • declining river levels • mechanical or electrical malfunction causing the loss of the largest pump at intake • extensive repairs needed on raw or treated water transmission mains
Stage 3- Severe Water Shortage Demand Reduction Target: 20 percent of MDD	• continuation of hot dry weather predicted • Clackamas River streamflows below 510 cubic feet per second (cfs) between July 1 and September 15 or below 750 cfs between September 16 and June 30[1] • loss of pump 1, 2, or 3 at water treatment plant • loss of utility electrical service at intake • multiple failures in the joints of the raw or treated water transmission mains

EXHIBIT 4-1
Curtailment Stages 1 through 5

Curtailment Stages	Initiating Conditions
Stage 4 – Critical Water Shortage Demand Reduction Target: 50 percent of MDD	• Clackamas River streamflows below 510 cfs between July 1 and September 15 or below 730 cfs between September 16 and June 30 impacting instream water rights[2] • severe drought conditions • loss of utility electrical service at water treatment plant or intake • major mechanical or electrical malfunctions causing loss of multiple pumps at intake or water treatment plant • transmission main failures • fire at intake or water treatment plant • imminent terrorist threat against supply system • contamination of source of supply
Stage 5 – Emergency Water Shortage	• continuation of severe drought conditions • extensive damage to transmission, pumping or treatment processes caused by natural disaster • intentional acts or fire, contamination of source or any other event resulting in an immediate, sustained deprivation of water supply

[1] The approximate total of estimated current peak day withdrawals for the Clackamas River Water Users (107 cfs) and minimum in-stream flows between July 1 through September 15 (400 cfs) and between September 16 and June 30 (640 cfs), measured at U.S. Geological Survey gauging station 14211010 at the South Fork Water Board's intake

[2] Same as footnote 1, but reflects a fifteen percent reduction in current peak day demands spread across all municipal water providers.

Authority

Actions under Stages 2 through 5 of this plan may be initiated only after a declaration of emergency by the City Manager or City Council.

Plan provisions will remain in effect until the emergency is declared ended by the initiating party, provided that the City Council may rescind an emergency declaration issued by the manager upon a finding that demonstrates the emergency no longer exists, or that the original declaration was made in error.

Actions may be applied to the entire system, or only to those water use sectors, or in those geographic areas, which are directly impacted by any water supply shortage.

The City Manager is responsible for execution of the plan provisions once an emergency has been declared.

Curtailment Plan Implementation and Enforcement 690-086-0160 (4)

In implementing this curtailment plan, the City will work closely with the Clackamas River Water Providers to assure consistent approaches to dealing with water shortages by coordinating stage designations, public notices, press releases, and other outreach activities.

Under the City's code relating to Sewer, Water, and Surface Water Management (Chapter 38), violations of any mandatory curtailment requirements may be punishable by fines of up to $1,000, community service, or discontinuance of service.

Stage 1: Water Shortage Alert

Water Shortage Alert status will activate a program to inform customers of the potential for drought or the need for temporary reductions in consumption due to reasons other than drought where there is potential for the system supply capacity to fall below the 3-day MDD. The City Manager shall issue a general request for voluntary reductions in water use by all water users. The request will include a summary of the current water situation, the reasons for the requested reductions, and a warning that mandatory cutbacks will be required if voluntary measures do not sufficiently reduce water usage. Stage 1 public information program elements would include the following:

1. Contacting local media outlets to get the word out about the potential for summer water shortages or temporary interruptions to normal service delivery.
2. Post pre-prepared public service announcement on City's webpage and in the City's Hello LO newsletter and LOdown Weekly News letter. Include prepared information regarding conservation tips.
3. Provide notice on water bills or through utility bill inserts.
4. Activate water conservation hotline in the City's Citizens Information Center. Include pre-recorded message providing conservation tips. Update recording weekly to maintain current status of event trigger.
5. Initiate contact with senior operations staff at City of West Linn and Tigard regarding potential need to activate intersystem connections for temporary water supply to Lake Oswego.
6. Contact wholesale customers notifying them of the existence or potential for water shortages. In certain circumstances it may be necessary to "lock-out" interties with wholesale customers as a means of reducing demand on the City's system.

Stage 2: Serious Water Shortage

Serious Water Shortage status is similar to Stage 1 except that certain water uses will be prohibited. There will be more emphasis on the reduction of nonessential water use. Stage 2 is intended to respond to the Governor's drought declaration or equipment failures reducing system supply capacity below the 3-day MDD, there is continued hot dry weather and streamflows in the Clackamas River continue to decline. A demand reduction target of

10 percent of maximum day demand (MDD) will be communicated to the general public. Additional Stage 2 voluntary program elements would include:

1. Provide handouts to field personnel with direction to remind customers of voluntary measures and shortage status.
2. Encourage, through public service announcements, voluntary restrictions on outdoor irrigation and limit irrigation times to between the hours of 8 pm and 10 am.
3. Encourage customers to refrain from washing cars except at commercial establishments that recycle or reuse water in their cleaning process. Offer free single-wash coupons to encourage compliance.
4. Prohibit filling of swimming pools and pressure washing roofs, decks or home siding unless such uses were contracted for prior to implementation of this curtailment action and are necessary for painting, repair, remodeling or reconstruction.
5. Prohibit hosing or washing off sidewalks and using water for dust control unless there is a demonstrable need to do so in order to meet public health or safety requirements including but not limited to abatement of fire or sanitation hazards or to meet air quality standards mandated by the Oregon Department of Environmental Quality.

Stage 3: Severe Water Shortage

In addition to the actions included in Stage 1 and 2, Stage 3 will impose an expanded suite of mandatory prohibitions on non-essential water use with the goal of achieving reductions of 20 percent of MDD. Under Stage 3, the City would introduce the following mandatory water reduction measures:

1. Restricting outdoor irrigation to only 3-days days per every 7-day period (including use of specific schedules imposed by the City Manager) and only between the hours of 8 pm and 10 am. This restriction and prohibition applies to all outdoor irrigation unless:
    a. grass, turf or landscaping is less than 1-year old, or;
    b. grass or turf is part of a commercial sod farm, or;
    c. grass or turf areas are within a high use athletic field used for organized play, or;
    d. grass or turf areas are used for golf tees or greens, or;
    e. grass or turf areas are part of a park or recreation area deemed by the City Council to be of particular significance and value to the community.

Notwithstanding the exceptions to the outdoor irrigation restrictions and prohibitions noted above, outdoor watering schedules shall be limited to only that necessary to maintain plant health and shall not water unnecessarily.

2. Prohibition on all water waste:
    a. No unfixed leaks
    b. No hosing of paved surfaces
    c. No fountains except those using re-circulated water
    d. No water running onto streets, sidewalks, or into gutters
    e. No washing of vehicles other than in establishments that recycle water

f. No washing of roofs, decks or home siding unless such uses are solely to abate a potential fire hazard (also see Stage 2 measure 4, above).

3. Activation of intersystem connection with Tigard or West Linn. If the severe water shortage was due to an event not related to a shortage in the Clackamas River, either alternate system could be used. If the Clackamas River system is constrained, the Tigard connection could be used to provide temporary supply from Portland's Bull Run or the Joint Water Commission's Trask River source.

In addition, City staff would work with local industrial and commercial large water users to minimize their water use.

Stage 4: Critical Water Shortage

Conditions causing Stage 4 curtailment measures are severe enough in terms of extent and duration that significant reductions in water use must be achieved as quickly as possible. Stage 4 builds on measures enacted through the previous stages. In a Stage 4 curtailment all outside watering is prohibited and any exceptions noted above for outdoor water uses are rescinded unless such uses are solely to abate public health or fire hazards. Stage 4 measures attempt to achieve reductions in residential and commercial demands of up to 50 percent of MDD. If water loss is due to major damage to critical supply system facilities or local electrical utility systems, it may be necessary to go directly to Stage 4 or 5.

Under Stage 4 it will be expressly prohibited to:

1. Water, sprinkle or irrigate lawns, grass, landscaping or turf.
2. Wash, wet down, or sweep sidewalks walkways, driveways, parking lots, open ground or other hard-surfaced areas with water.
3. Wash vehicles, unless the City Council finds that the public health, safety, and welfare is contingent upon frequent vehicle cleaning such as cleaning of solid waste transfer vehicles, vehicles that transfer food and other perishables, or as otherwise required by law.
4. Flush water mains, except for water quality concerns or emergency purposes.

If such a critical water shortage takes place in the Clackamas Basin, (that is, plant power failures, transmission line breaks), additional restrictions and exemptions may be passed as necessary.

Stage 5: Emergency Water Shortage

Stage 5 responds to events causing an immediate and sustained loss of the source of supply or major damage to critical treatment, transmission and pumping systems. Examples include failure of a main transmission line, failure of the intake or water treatment plant, a chemical spill into the Clackamas River upstream of the intake, or a malevolent attack on the system that introduces a contaminant at some point in the system.

Under the Emergency Water Shortage stage, all water use may be prohibited, except that necessary for human consumption and sanitation needs. If the emergency causes or is

SECTION 5

Water Supply

This section satisfies the requirements of OAR 690-086-0170.

Delineation of Service Areas 690-086-0170 (1)

The planning area for this Water Management and Conservation Plan, shown in **Exhibit 5-1**, is the limit of Lake Oswego's current USB plus a 925-acre area called the Stafford Triangle that is located south of the USB. The current USB includes all land within the City limits as well as Forest Highlands, Lake Grove, Rivergrove, Southwood Park, Skylands, Glennmorrie, Alto Park, and portions of the Palatine Hill Water Districts. The Stafford Triangle is not currently served by the city, but is expected to be included in the city's service area prior to 2030.

Population Projections 690-086-0170 (1)

Population projections for Portland Metro's Transportation Analysis Zone (TAZ), historic population data from PSU's Population Research Center, and account information from the water districts were used to project three populations that will ultimately merge to become the service area population for the city:

- Retail customers within the City of Lake Oswego city limits ("City only")
- Residents of water districts within the USB
- Residents of the Stafford Triangle

Population Projections to 2030

Lake Oswego "City Only"

The 2005 "city-only" service population was estimated at 33,278 by excluding the estimated number of residents of water districts within City boundaries from the 2005 city-wide population reported by PSU's Population Research Center.[2] According to recent population data compiled by the Population Research Center, the City of Lake Oswego population has grown at an annual rate somewhat less than 0.5 percent. This rate was used to project the city-only population through 2030. The estimated 2030 city-only population is approximately 37,700.

Outside Lake Oswego

Based on account data from each special service water district, and using a housing density of 2.25 people per household, City staff estimates the current water district population at

[2] Estimated by Carollo Engineering for the *City of Lake Oswego and Tigard Water Service Area Joint Water Supply System Analysis*.

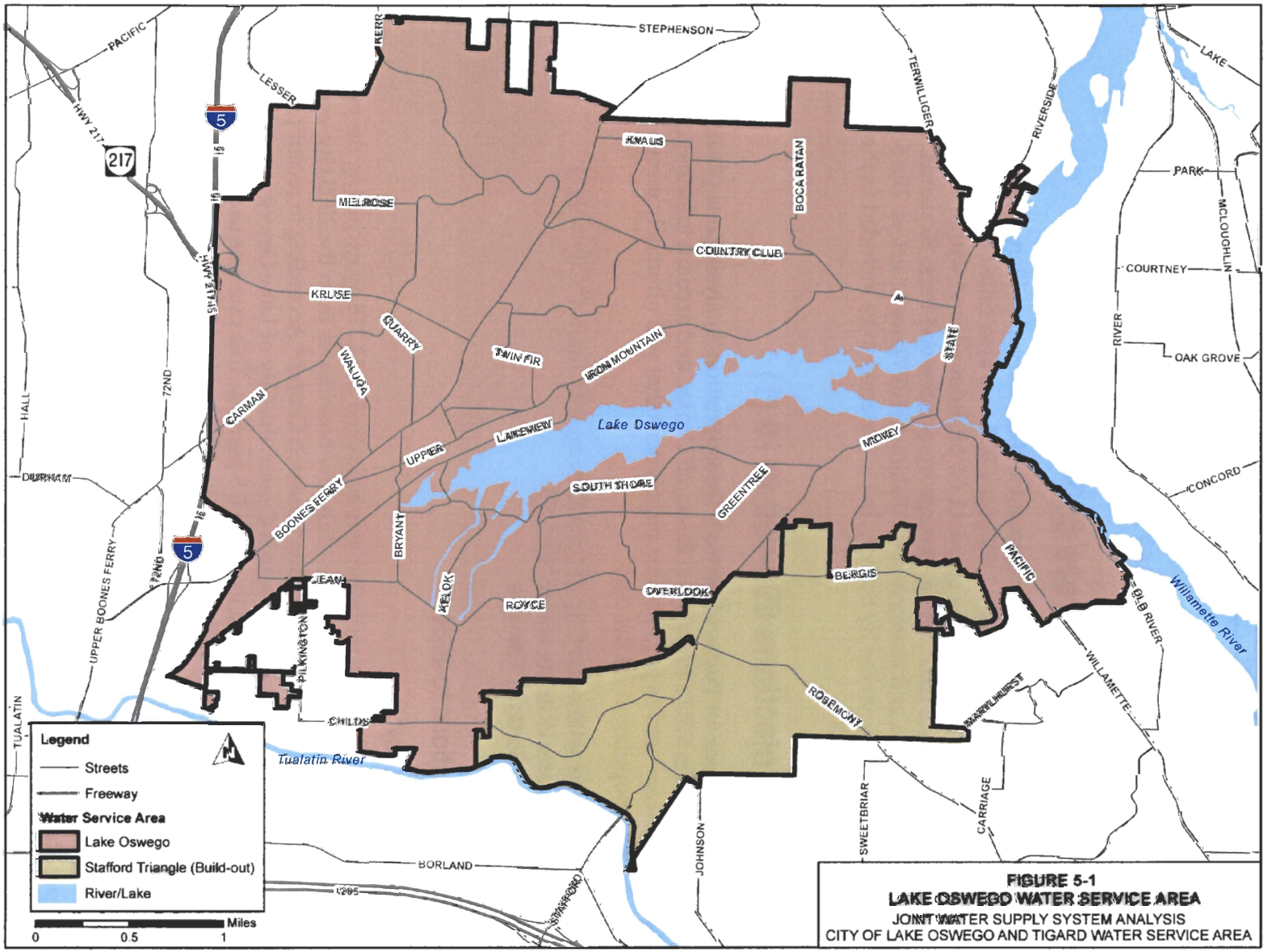


FIGURE 5-1
LAKE OSWEGO WATER SERVICE AREA
JOINT WATER SUPPLY SYSTEM ANALYSIS
CITY OF LAKE OSWEGO AND TIGARD WATER SERVICE AREA

CVO\070690013

6,543. Two wholesale customers, the Southwood Park Water District and Skylands Water Company, are fully developed, with a total population estimated at 711. This population was held constant during the projection period. TAZ population forecasts suggest that for the period 2005 to 2030, the average annual population growth rate within the USB will be 1.69 percent. This rate was applied to an initial, "outside city" population of 5,832 (6,543-711 = 5,832) to project the 2030 population. The total outside city population for 2030, including the 711 people in the built out area, was estimated at 9,600. Combining the City only and outside city populations yields a 2030 USB population of 47,300.

Stafford Basin

TAZ data were used to estimate the current population of the Stafford Basin at 1,707. This population is not currently served by Lake Oswego, but connection to the Lake Oswego system is anticipated prior to 2030. Growth of this population through 2030 was also projected using the USB average annual growth rate of 1.69 percent, to yield a 2030 population of 2,600.

Buildout Projections

Lake Oswego USB

A saturation analysis was performed to estimate the population expected to reside within the USB (within city limits and the water districts) at buildout. This analysis was based on the number of acres available for future residential development and estimates of the population densities in each residential zoning class. A summary of this analysis is shown in **Exhibit 5-2.** TAZ data for the USB were used to determine the number of acres of land in each residential zoning class available for future development. Average households per acre densities for each zoning class were estimated and multiplied by the number of developable acres to obtain the number of households expected to be developed in each zoning class. The number of households was converted to population by multiplying by a housing density of 2.25 people per household. (City planners currently use this density for both single and multi-family households.) A buildout population within the USB was estimated at 54,100.

EXHIBIT 5-2
Buildout Population Estimate for the City of Lake Oswego USB

Zoning Class	Developable Acres	Average No. of Households Per Acre[1]	Average No. of Households at Buildout	Buildout Population[2]
R-0	184	0.5	95	214
R-2	10	0.5	5	12
R-2.5	2	15.2	35	79
R-3	181	10.8	1,959	4,407
R-5	463	8.0	3,694	8,311
R-6	105	6.5	685	1,541
R-7.5	1,958	5.1	9,949	22,386

EXHIBIT 5-2
Buildout Population Estimate for the City of Lake Oswego USB

Zoning Class	Developable Acres	Average No. of Households Per Acre[1]	Average No. of Households at Buildout	Buildout Population[2]
R-10	1,751	3.6	6,357	14,303
R-15	617	1.9	1,154	2,596
DD	20	1.9	37	82
WR	7	10.8	74	167
Total	**5,298**		**24,044**	**54,098**

[1] Estimated based on the minimum lot area per household in each zoning class defined in the City of Lake Oswego Code.

[2] Estimated using a single- and multiple-family household density of 2.25 people per household.

Stafford Basin

Metro has projected the population of the estimated 925 developable acres of the Stafford Basin at 8,183. This yields a population density of 8.85 people per acre (8,183 people/ 925 acres = 8.85 people/acre). The City of Lake Oswego has acquired and set aside 143 acres of this area for open space, leaving 782 acres available for future development. Multiplying the original Metro density of 8.85 people per acre by the net developable 782 acres yields a buildout population estimate for the Stafford Basin of approximately 6,900.

Exhibit 5-3 summarizes population projections for each of the three areas for 2005, 2030, and buildout. The projected buildout service population for the Lake Oswego USB is approximately 54,000 people. This is 1.4 times the estimated 2005 USB population of approximately 40,000. The inclusion of the Stafford Basin is expected to add approximately 7,000 people at buildout, for a total system buildout population of 61,000.

EXHIBIT 5-3
Population Projections

	2005	2030	Buildout
Lake Oswego City Only	33,278	37,697	-
Outside City	6,543	9,578	-
Subtotal USB	39,821	47,275	54,098
Stafford Basin	1,707	2,595	6,918
Total	**41,528**	**49,870**	**61,016**

Demand Forecast 690-086-0170 (3)

Future demands for the Lake Oswego USB were projected using a per capita approach. The historical per capita demand of 170 gpcd, estimated for City of Lake Oswego retail

customers, was applied to population projections for the three populations defined above: those within city limits, those outside city limits, and those residing in the Stafford Basin region.

Demand Projection Summary

Average and maximum day demand projections for the Lake Oswego USB and the Stafford Triangle are summarized in **Exhibit 5-4**. Stafford is not yet connected to the city's system, so demand from this source is not included in the 2005 estimate, but is included in the 2030 and buildout demand estimates. ADD and MDD estimates for 2027, the end of the 20-year planning period, were estimated by interpolation, and are shown in Exhibit 5-4. All of the projected demands indicated in Exhibit 5-4 exclude service to the City of Tigard.

EXHIBIT 5-4
City of Lake Oswego Water System Demand Projections

	ADD (mgd)[1]	MDD (mgd)[3]
2005 (excluding Stafford)[2]	7.1	16.2
2027 (interpolated)	8.3	19.0
2030 (including Stafford)	8.5	19.5
Buildout	10.4	23.9

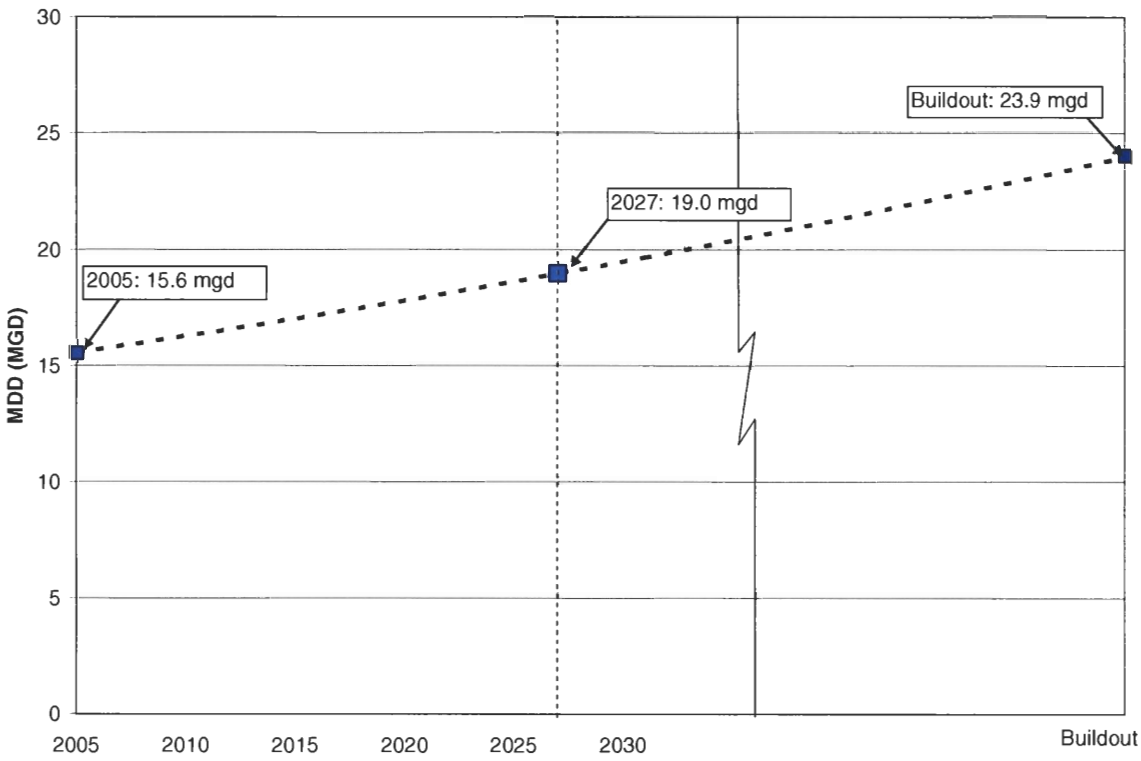
[1] Estimated from population projections for city-only and water district populations using an average per capita demand of 170 gpcd.

[2] Values for 2005 assume that water districts obtain all water from Lake Oswego. Actual demand by water districts was lower, Therefore actual ADD and MDD for the USB was lower in 2005.

[3] Estimated from ADD using a MDD: ADD peaking factor of 2.3.

The ADD is projected to reach 8.3 mgd by 2027. The MDD is projected to reach 19.0 mgd. These represent 20 to 30 percent increases over current demand levels. The buildout estimates for average and maximum day demands are 10.4 mgd and 23.9 mgd, respectively. **Exhibit 5-5** shows the MDD projections graphically. Although a smooth curve is shown in Exhibit 5-5, the actual pattern of demand increase will vary depending on how and when the water districts and the Stafford Triangle are incorporated into the Lake Oswego service area.

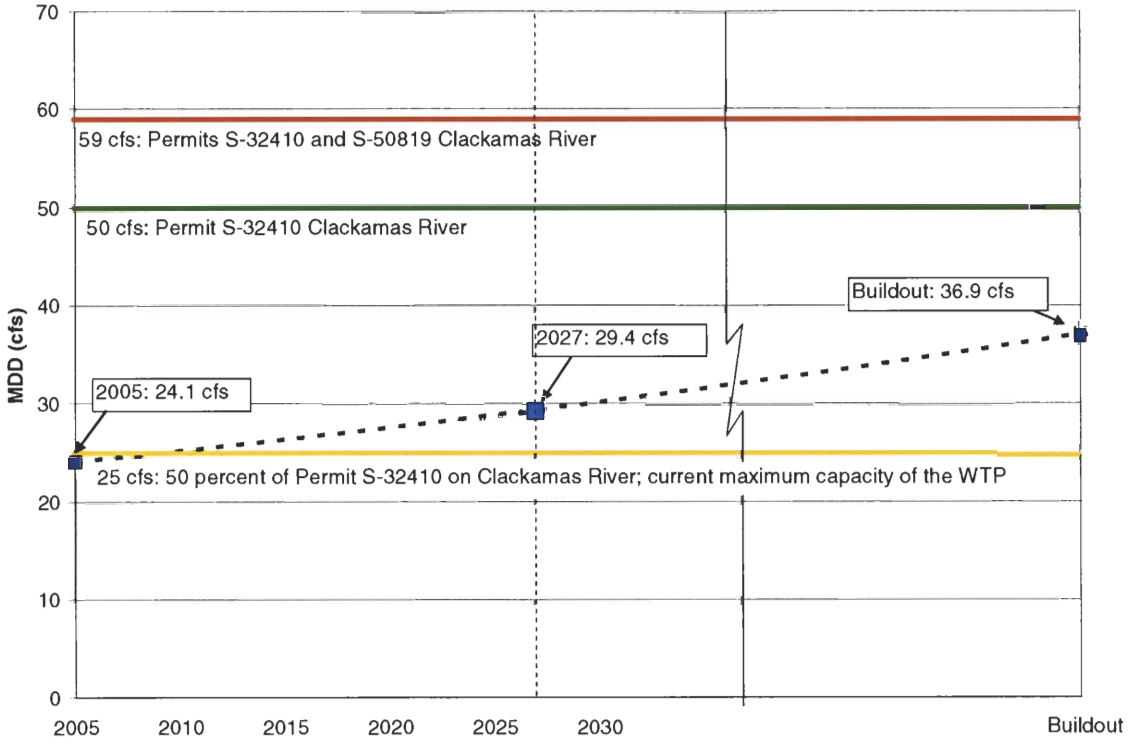
EXHIBIT 5-5
Projected Maximum Day Demands for the Lake Oswego Service Area (excludes Tigard)



Schedule to Exercise Permits and Comparison of Projected Need to Available Sources 690-086-0170 (2) and (4)

The City holds approximately 59 cfs (38 mgd) of water rights from the Clackamas River and 6.0 cfs (3.9 mgd) of undeveloped water rights on the Willamette River. However, the city's current system capacity (supply) is limited by the production capacity of its water treatment facility, which is approximately 25 cfs (16 mgd). **Exhibit 5-6** shows the city's Clackamas River water rights superimposed upon the maximum day demand projection in units of cfs.

EXHIBIT 5-6
Projected Maximum Day Demands, and Water Rights on the Clackamas River for the Lake Oswego Service Area (excludes Tigard)



The Cities of Lake Oswego and Tigard are currently exploring options for becoming a joint water system. Details of this process are contained in *City of Lake Oswego and Tigard Water Service Area Joint Water Supply System Analysis Technical Memorandum No.1 Water Supply System Evaluation*, November 2006. As shown in Exhibit 5-6, by 2027 the City will need approximately 29.4 cfs (19.0 mgd). A service to Tigard of 20.6 cfs (13.3 mgd) during MDD conditions will result in full use of the city's 50 cfs, 1967 water right (S-32410) from the Clackamas River. For buildout conditions, if the city's use reaches 36.9 cfs (23.9 mgd) as projected, the wholesale supply to Tigard could be limited to 22.1 cfs (14.3 mgd) based on the city's total Clackamas River water rights of 59 cfs (38 mgd).

The amount of water available to satisfy the city's water rights is a function of water right "priority date" or seniority, and stream flow. For the city, the relative priority date of its Clackamas River water rights is a key factor in water availability and reliability.

The reliability of the city's water rights was evaluated in Section 2 of this WMCP. As described previously, the Clackamas River basin produces a significant quantity of water even during the driest months of the year. According to long-term stream flow records on the Clackamas River at Estacada, (USGS gage #14210000, approximately 22 miles upstream from the city's authorized point of diversion), a stream flow of 665 cfs is met or exceeded 90 percent of the time with flows ranging from 3,558 to 5,569 cfs during high flow months. Moreover, in the 22 miles between the Estacada gage and the city's point of diversion at RM 0.8, there are several tributaries including Eagle Creek, Deep Creek, Richardson Creek,

Clear Creek and Rock Creek that feed the mainstem Clackamas River resulting in stream flows at the city's point of diversion considerably greater than those recorded at the Estacada gage.

Based on priority date and abundant stream flow, the city's permit S-32410 and certificate 78332 are highly reliable. The city's access to Clackamas River water under permit S-32410 and certificate 78332 is not affected by instream water right certificate 59491. The city's permit S-32410 and certificate 78332 have a priority date of March 14, 1967, for up to 32 mgd, senior in priority to the instream water right and therefore not subject to regulation due to stream flows falling below the protected levels. Moreover, while there are other senior consumptive water users on the system, their cumulative consumptive use (compared to long-term stream flow records) are negligible.

Access to Clackamas River water under the city's permit S-37839 also is not likely to be "regulated" in favor of senior consumptive water users; however, the reliability of this water right permit is compromised because it is junior in priority to instream water right certificate 59491. While an independent hydrological analysis has not been conducted by CH2M HILL, daily stream flow records for USGS gage 14210000 at Estacada indicate that daily stream flows in the dry years of 1987, 1992, and 1994 have dropped below 640 cfs (410 mgd) (the protected flows from September 15 to June 30) in late September and in October. The potential for low flows in early fall coupled with increased water demands of upstream "senior" municipal water user (South fork Water Board, North Clackamas Water Commission) makes it extremely likely that the City's permit S-37839 would be subject to regulation in favor of instream water right certificate 59491. However, this regulation would not preclude the City from using permit S-37839 for domestic use. Instream water right certificate 59491 is conditioned to not have priority over domestic use, which is defined by OWRD as the use of water for human consumption, household purposes, and domestic animal consumption related to residential use of the property.

There is ample water available in the Willamette River to satisfy the city's permit S-43246.

Alternative Sources 690-086-170 (5)

As noted above, the City also holds permit S-43246 for 6.0 cfs (3.88 mgd) on the Willamette River. Development of this source will require a large capital investment as treatment requirements are likely to be greater than for the Clackamas River. No infrastructure enabling the City to use this source currently exists.

Quantification of Maximum Rate and Monthly Volume 690-086-0170(6)

OAR 690-086-0170(6) requires a quantification of the maximum rate of withdrawal and maximum monthly use if initial diversion of water allocated under an existing permit is necessary to meet demands in the 20-year planning horizon. The City of Lake Oswego is projected to require approximately 4 cfs of the second half of permit S-32410 within the next 20 years. If the City joins with Tigard in a joint water supply system, the entire 25 cfs of the second half of permit S-32410 potentially could be used within 20 years. In addition, if a

joint water system between Lake Oswego and Tigard is formed, permit S-50819 for 9 cfs also is likely to be fully used by buildout.

Mitigation Actions under State and Federal Law 690-086-0170(7)

Under OAR 690-086-0170(7), for expanded or initial diversion of water under an existing permit, the water supplier is to describe mitigation actions it is taking to comply with legal requirements of the Endangered Species Act (ESA), Clean Water Act, and other applicable state or federal environmental regulation. The City of Lake Oswego currently is not required to take any mitigation actions under state or federal law.

The City installed new screens on its intake facility in 2002. As part of the permitting for the new screens and expansion of the intake facility, the National Marine Fisheries Service issued a Biological Opinion that diversion of up to 50 cfs (32.2 mgd) would not jeopardize the existence of ESA listed fish species.

June xx, 2007

Addressee, Title
Organization Name
Mailing Address
City, State Zip Code

Subject: Water Management and Conservation Plan for the City of Lake Oswego

Dear Mr./Ms.XXX:

Transmitted herewith is a copy of the City of Lake Oswego's Final Draft Water Management and Conservation Plan for your review and comment as it pertains to your agency's Comprehensive Land Use Plan.

The City has prepared this plan to fulfill the requirements of Oregon Administrative Rule (OAR) Chapter 690, Division 86 of the Oregon Water Resources Department (OWRD). As you review our draft plan, I want to bring to your attention one of the plan elements planned for implementation once the plan is approved by OWRD. It is described on page 3-12 and requires wholesale customers receiving water from the City or special water service districts providing water to Lake Oswego citizens to submit an annual water use report. As described, the information asked for in each annual report will assist the City in better understanding the water use characteristics of "non-city customers" who receive some portion of their annual water supply from Lake Oswego and those City customers who receive their water service from a provider other than the City. I welcome your thoughts or concerns on this particular aspect of our draft plan.

Please provide comments to me within 30 days from the date of this letter. If the plan appears consistent with your agency's Comprehensive Land Use plan and acceptable as written, a letter response to that effect would be appreciated. You may send your comments to me at the address on this letterhead or email them to me directly at: jkomarek@ci.oswego.or.us.

If you have any questions, please feel free to contact me at 503-697-6588.

Thank you,

Joel B. Komarek, P.E.
City Engineer

CVO/070690015
c: XX

APPENDIX B

Intergovernmental Agreements for Wholesale Water Supply

Lake Oswego

Contract Supplier	Supply Source	Contract Purchaser	Date Contract Executed	Duration of Contract	Termination Provisions	Rate Adjustment Provisions	Supply Terms	Current Contract Price/ccf	Notes:	Emergency Contacts
City of Lake Oswego	Clackamas River	City of Portland/ Arrowood (Stephenson High Zone)	1/8/1985	Perpetual: 5-year intitial term. subsequent 5-year periods.	Written notice to either party by 1/30 after initial term. Effective 6/30 of same year	60-day written notice of rate adjustment required.	Surplus supply to max. 70 connections at Pt. 'A' + emergency supply only to Pt. 'B'	$0.93 (Non-Peak), $1.00 (Peak).	Pt. 'A' located south of terminus of 34th ave. and Arrowood Dr. Pt. 'B' located at intersection of Hidalgo and Bolivar. (See water atlas pgs. 1&3).	To Follow
City of Lake Oswego	Clackamas River	City of Portland/ Alto Park	4/12/1971	Perpetual: 5-year intitial term. subsequent 5-year periods.	Written notice to either party after initial term One year notice by City. 60 day notice by purchaser	60-day written notice of rate adjustment required.	Surplus supply only. 14,000 cf minimum purchase/month.	$0.88 (Non-Peak), $0.95 (Peak).	Intertie is located behind the Park Place Condominiums approximately 500 feet west of 29th Ave Alto Park Water District assigned original water supply contract to City of Portland on March 1, 1973.	To Follow
City of Lake Oswego	Clackamas River	City of Rivergrove/ Rivergrove Water District.	2/8/1984	Perpetual	Written notice to either party by 1/30. Effective 6/30 of same year	Amendment of terms by mutual consent only	Emergency supply only.	$0.62 per ccf	Annual water use report required for City residents served by District. Interties: SW 65th Ave/McEwan Rd. and Centerwood St. at District/City boundary.	D.J. Ezell General Manager - 503.635.6041:Don Murray: District Engineer 503.670.9007
City of Lake Oswego	Clackamas River	Skylands Water Company	4/5/1960	Perpetual	none	Written notice of rate adjustment required. Effective upon reciept of notice by purchaser	none	$0.81 (Non-Peak). $0.85 (Peak)	Connection point/supply at Bergis Reservoir. Pumps controlled from Skylands reservoir level.	Dick Dechaine: Supt. 503.636.0424(H); 503.310.1245 (M); Don Murray: District Engineer 503.670.9007
City of Lake Oswego	Clackamas River	City of Tigard	7/1/1983	Perpetual: 10 yr. Initial term. 5 yr. Periods thereafter.	Written notice by either party by 7/30 of year prior to effective date.	90-day written notice of rate adjustment required.	Surplus supply. Minimum annual purchase of $75,000.	$0.87 (Non-Peak), $0.92 (Peak).	Bi-directional intertie at Tigard's Bonita Rd. PS. 16-inch supply to Tigard/10-inch supply to LO from Tigard 410' service level. Metered both directions.	Dennis Koellermier: PW Dir. 503.639.4171 X2596;Richard Sattler PW 503.718.2609(w); 503.920.1968(m)
City of Lake Oswego	Clackamas River	City of Tualatin	8/22/1988. Amended payment provision on February 15, 2000	Perpetual: One year terms (8/1-7/31)	Written notice by either party two years prior to effective date.	n/a	Emergency supply only.	Repayment at current rate charged in-city customers. ($0.83/ccf 7/1/00 to 6/30/04)	Hydraulic constraints don't allow Tualatin supply to LO. Intertie at SW 65th and McEwan Rd.	Mike McKillup: City Engineer 503.692.2000; Dan Boss: Operations Director 503.691.3090
City of Lake Oswego	Clackamas River	Glenmorrie Water District.	2/8/1984	Perpetual:	Written notice by 1/30. Effective 6/30 of same year.	Written notice of rate adjustment required. Effective upon reciept of notice by purchaser	Surplus supply only.	$0.81 (Non-Peak), $0.85 (Peak).	Supplied from Bergis system through one-way intersystem connection and 6-inch turbine meter located near Cherry Lane and Chapin Way.	Dick Dechaine: Supt. 503.636.0424(H); 503.310.1245 (M); Don Murray: District Engineer 503.670.9007
City of Lake Oswego	Clackamas River	Lake Grove Water District	7/25/1975	Perpetual: Two year initial term. Subsequent two year terms.	Written notice to either party 6 months in advance of termination date.	60-day written notice of rate adjustment required.	Surplus supply only.	$0.81 (Non-Peak), $0.85 (Peak).	Supplied from Touchstone system through 8-inch intersystem connection at Carmen Drive/Davis Lane intersection. 50% of annual LGWD demand supplied by LO.	John Goodwin: Distribution; 503.636.1617
City of Lake Oswego	Clackamas River	City of West Linn/South Fork Water Board	12/3/2003	Perpetual	Written notice to either party 36 months in advance of termination date.	as necessary and mutually agreed	Emergency Supply - mutual consent of exec. Officer; Non-emergency < 2wks by mutual consent of exec. Officer; Non-emergency > 2 wks requires 30-day notice to West Linn.	$0.58	Bi-directional intertie. Supply to LO via O.C. 490' service level. Supply to West Linn via LO WTP and West Linn intertie PS located on Old River Rd. S. of Kenthorpe.	Jim Whynot: PW 503.880.9196(m); 503.656.6081(w)
City of Portland via LGWD	Bull Run	City of Lake Oswego/ Blackhawk Subdivision (14 connections)	6/21/89; Amended 8/7/89	Perpetual	12 month advance notice by either party prior to termination.	Written notice of rate adjustment required. Effective upon reciept of notice by purchaser.	LGWD supply to LO for Blackhawk Subdivision through 8" and 2" combo turbine meter	COP supply: $0.68/ccf; LO supply: $0.83/ccf	either supply incurs transport fee of $0.03/ccf. Interconnect off Waluga Dr. west of Hartford Pl.	

TO: City of Lake Oswego
FROM: Davis, Hibbitts & Midghall, Inc.
DATE: June 27, 2006
SUBJ: Lake Oswego Community Survey on Water Conservation

I. Introduction & Methodology

Davis, Hibbitts & Midghall, Inc. (DHM) is pleased to present the results of a survey conducted for the City of Lake Oswego (City) to gauge its water system customers' attitudes and perceptions about water conservation. Survey questions covered these general areas:

- Awareness and satisfaction with water service,
- Water conservation behavior,
- Reasons and support for water conservation,
- Support for joint water supply agency, and
- Communications.

We conducted a total of 300 interviews June 8-10, 2006 among City water service customers. Survey respondents were general voters residing in the City (residents from the following water districts were omitted from the sample: Rivergrove, Lake Grove, Skylands, Glenmorrie). Quotas were set to reflect the general population for the City by age and gender. In gathering the survey responses, DHM employed quality control measures which included questionnaire pretesting, callbacks, and verification.

This report highlights key findings and notable subgroup variations. For the exact wording and order of questions, see the annotated questionnaire in the Appendix.[1] For complete information on the survey and data subgroups, including all significant and other variations, refer to the accompanying set of referenced data tables.[2]

A. Statement of Limitations

Any sampling of opinions or attitudes is subject to a margin of error, which represents the difference between a sample of a given population and the total population. If respondents answered a particular question in the proportion of 90% one way and 10% the other, the margin of error would be +/- 3.4% for n=300. If respondents answered 50% each way, the margin of error would be +/- 5.7%. These plus-minus error margins represent differences between the sample and total population at a confidence interval, or probability, calculated to be 95%. This means that there is a 95% probability that the

[1] The annotated questionnaire includes results for the total sample (N=300).
[2] Combined percentages may not be the same as adding individual table percentages and may not always add up to 100% due to rounding.

sample taken for this study would fall within the stated margins of error if compared with the results achieved from surveying the entire target population.

B. Demographic Information

The research surveyed a representative sample of Lake Oswego. The demographic information collected includes:

Note: Demographic results below do not include respondents who did not answer the question.

Age	
18-24	7%
25-34	9%
35-54	51%
55-64	15%
65 plus	16%
Own or Rent Home	
Own	83%
Rent	13%
Household Size	
1	12%
2	34%
3	18%
4	21%
5 or >	12%
Years of Residence in Lake Oswego	
5 years or less	19%
6-10 years	23%
11-20 years	26%
21+ years	29%
Household Income	
under $30K	6%
$30-50K	13%
$50-75K	13%
$75-100K	14%
$100-$150K	13%
More than 150K	16%
Gender	
Female	52%
Male	48%

Source: Davis, Hibbitts & Midghall, Inc.; June 2006

II. General Awareness and Satisfaction with Water Service

Overall, customers think Lake Oswego is doing a good job providing water services. We presented specific aspects of water service and asked customers if they think the City is doing an excellent, good, poor, or very poor job (Q1).

The following shows excellent, good, and don't know responses for each of six services, in descending order of combined excellent/good ratings:

Rating of Lake Oswego Water Services

Water Service	Combined Excellent/ Good	Excellent	Good	DK
Providing drinking water that is safe and pleasant tasting	90%	35%	55%	2%
Keeping you informed about issues related to your water service	80%	24%	56%	12%
Providing reasonable rates	75%	11%	64%	11%
Working to maintain and preserve the City's water source	69%	18%	51%	24%
Promoting water conservation	68%	16%	52%	16%
Providing responsive customer service	63%	17%	46%	34%

Source: Davis, Hibbitts & Midghall, Inc.; June 2006

It is notable that there are substantial combined excellent/good ratings for all of the services, with near unanimity across all demographic groups for providing safe and good tasting drinking water and at least a majority rating the City excellent/good for the remaining services. It is worth noting the high "don't know" response for customer service (34%) and for maintaining and preserving the City's water source (24%).

In general, older customers (those age 55 and older) rate the City higher than younger customers for all of the services. More males than females rate the City higher for providing reasonable rates (81% and 71%, respectively). Females, on the other hand, rate the City higher for keeping them informed (85% and 74% for males). We found no other significant subgroup variations.

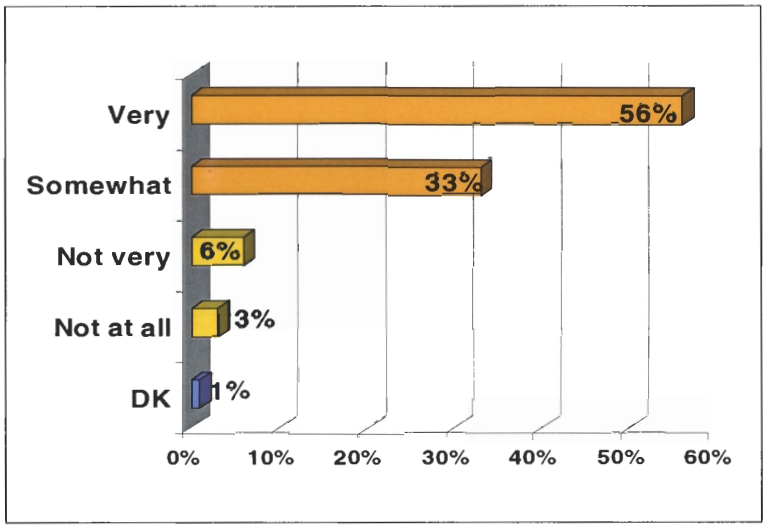
We asked customers *unprompted* if they know from where the City gets its water (Q2). Nearly four in ten (36%) correctly name the Clackamas River, and a nearly equal number (37%) did not identify a source and said 'don't know.' The second highest named source is Bull Run at 21%.

More males than females (42% vs. 30%), residents of more than 20 years compared to residents of 20 years or less (48% vs. 31%), and those who pay their water bill versus non-bill payers (37% vs. 29%) correctly name the Clackamas River. Customers age 55 and older and non-bill payers are more likely to say Bull Run. The newest residents (0-5 years) have the highest don't know at 53%.

III. Water Conservation Behavior

A substantial 89% say water conservation is very or somewhat important to them, with over a majority saying it's *very* important (Q4).

Importance of Water Conservation

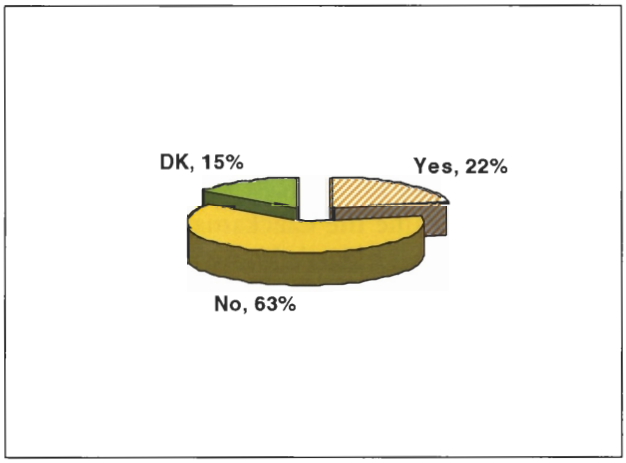


Source: Davis, Hibbitts & Midghall, Inc.; June 2006

Nearly nine out of ten customers across all subgroups say water conservation is important to them, with at least a majority saying it is *very* important - except slightly less for those age 18-34 (45%) and households with incomes over $100K (42%).

Most customers *do not believe* that Lake Oswego has or will have in the near future a water supply problem (Q3). Six out of ten (63%) say the City will not have a water supply problem.

Water Supply Problem?



Source: Davis, Hibbitts & Midghall, Inc. June 2006

More males than females (69% and 58%, respectively) believe the City will not have a water supply problem, as do longer-term residents compared to new residents (69% of residents living in the City more than 20 years versus 59% living in the City five years or less).

When asked unaided what efforts their household makes to conserve water, the top response is general: Don't waste water/Don't let water run too long (20%); 14% provide no specific response (Q5). Other and more specific responses can be grouped by efforts inside or outside the home:

Inside the Home:

- Take shorter/Less showers — 17%
- Do less laundry/Only do full loads — 10%
- Replace appliances/faucets/showerheads — 10%
- Use dishwasher less/Only do full loads — 6%
- Turn off water when brushing teeth — 5%
- Replace toilets/use low flow — 3%

Outside the Home:

- Changed sprinkler systems/Monitor outside watering — 16%
- Water lawns less/Water during recommended times — 14%
- Have plants that don't need water — 4%
- Don't wash cars/use car wash — 2%

A related question asked respondents unaided what they believe consumes the greatest amount of water in the average household (Q7). Responses fall into three tiers:

Tier One:

- Showers/Baths — 39%
- Laundry — 32%

Tier Two:

- Landscaping/Lawns — 19%
- Toilets — 10%

Tier Three:

- Dishwasher — 3%
- Sewer — 1%
- Leaky faucets — 1%
- Other mentions — 1%

Ten percent (10%) of customers did not provide a response. Females tend to say laundry consumes the greatest amount of water (37%, 26%), while males identify toilets more often than females (15%, 5%).

IV. Reasons for Conserving Water

We approached customers' opinions about reasons for conserving water (Q6).

Factors Prompting Households to Change Water Consumption

Factor	Yes	No	No Difference	DK
Oregon's Governor declaring a drought in your area	75%	15%	8%	2%
Receiving a larger than usual water bill	73%	13%	12%	2%
Receiving information with your water bill on how to conserve water	62%	19%	15%	4%
Knowing that Lake Oswego's water source is habitat for special fish species	51%	26%	18%	5%

Source: Davis, Hibbitts & Midghall, Inc.; June 2006

Declaring a drought in the City or receiving a large water bill would most prompt customers to conserve water, followed closely by conservation information with their water bill and more distantly knowing that special fish species habitat the water source.

Youngest customers, those age 18-34, are least likely to say a drought declaration would convince them to conserve water (59%, 79% for those older). We found no other significant subgroup differences worth nothing.

We also asked customers to rate a list of reasons for conserving water (Q8).

Reasons for Conserving Water

Water Conservation:	Very Good	Good	Poor/Very Poor	DK
...is the right thing to do	50%	43%	6%	1%
...will benefit fish, wildlife, and our rivers and streams	49%	39%	8%	4%
...may reduce water bills	48%	42%	7%	3%
...may delay the need to develop new water supply options	36%	48%	11%	5%

Source: Davis, Hibbitts & Midghall, Inc.; June 2006

All reasons rate quite high, with half or nearly half of respondents rating all reasons (but delaying the need to develop new water supply options) as *very good.* The combined very good/good ratings range from a high of 93% (right thing to do) to 84% (develop new water supply options).

Customers who strongly believe water conservation is the right thing to do (saying very good reason) are more likely to be age 55 and older, and households with incomes of less than $100,000. Conservation efforts that will benefit fish, wildlife and our rivers register more strongly with females, those age 35-54, and residents of five years or less. Females

and households making less than $100,000 feel strongest when it comes to conservation efforts reducing water bills. Delaying the need to develop new water supply options registers more strongly with those age 35-54, and residents of more than five years.

When asked which of these same reasons is the *best* reason for conserving water, the rank order is (Q9):

Will benefit fish, wildlife, rivers, streams	30%
Is the right thing to do	29%
May delay the need to develop new supply options	19%
May reduce rates	17%
DK / Na / Refused	5%

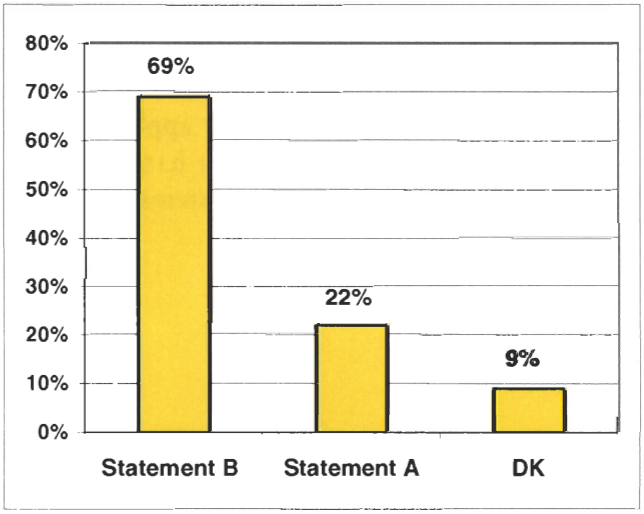
We found no significant subgroup differences, and subgroup results were very consistent with overall findings.

V. Perceptions and Awareness of Water Conservation

Customers clearly prefer one of two statements about water conservation (Q10):

> Statement A. Requiring customers to reduce their water use during the dry season is unnecessary. Additional sources of water should be developed now so that water conservation measures will not have to be mandated.
>
> Statement B. We should enact conservation programs to stretch our existing water supply before spending the money to build new water supply options.

Point of View on Water Conservation



Source: Davis, Hibbitts & Midghall, Inc.; June 1006

Customers support conservation efforts (statement B) over developing new water supply options (statement A) by 3 to 1. Results were consistent across all subgroups with at least two-thirds support for conservation efforts.

Customers were then presented five items and asked if they believe these items conserve water, make no difference, or use more water (Q11), and then whether they or members of their household use any of these items (Q12).

Items That May Conserve Water

Action:	Conserves	No Difference	Uses More	DK	Yes, Household Uses It (Q12)
High efficiency appliances	81%	11%	5%	4%	69%
Low flow plumbing fixtures, faucet aerators, flow restrictors inside home	79%	14%	2%	4%	75%
Native plants in landscaping	73%	18%	4%	5%	77%
In-ground sprinkler systems	51%	16%	19%	14%	46%
Above ground sprinklers and hoses	16%	23%	52%	9%	53%

Source: Davis, Hibbitts & Midghall, Inc.; June 2006

Customers clearly believe high efficiency appliances, low flow plumbing, and native plants are items that conserve water; and at least seven out of ten customers use these items in their homes. While a slight majority believe in-ground sprinkler systems conserve water, it is worth noting the higher 'don't know' response (14%) in comparison to other items - almost a majority of customers say they use in-ground sprinklers. A slight majority say above ground watering systems use more water and almost one-quarter believe it makes no difference - a majority of customers use above ground sprinklers and hoses in their homes. We found no major subgroup differences.

Overall, customers with higher incomes are more likely to say they use the items tested above (with the exception of above ground sprinklers and hoses); so the higher the income the more likely they are to use high efficiency appliances, low flow plumbing, natives plants and in-ground sprinklers. On the other hand, lower income customers are more likely to say they use above ground sprinkler systems.

VI. Fostering Conservation

Customers were asked if they are very, somewhat, not too, or not at all interested in each of seven efforts to foster water conservation (Q13). There is a fairly high level of interest in the top three proposed efforts listed below:

Interest in Efforts to Foster Water Conservation

Effort	Very/Somewhat Interested	Not too/ Not at all Interested	DK
Rebate program for customers who purchase high efficiency appliances	75%	23%	2%
Water rate structure that encourages conservation	65%	32%	3%
Free kit on water conservation	62%	37%	1%
Information on replacing fixtures with new low water use ones	49%	49%	1%
Free onsite water assessment	49%	50%	1%
Information on retrofitting irrigation systems with soil moisture sensing controllers	43%	53%	4%
Free seminar on water-efficient landscaping	36%	63%	0%

Source: Davis, Hibbitts & Midghall, Inc.; June 2006

A high number of customers, 75%, and customers across all subgroups are interested in rebates for high efficiency appliances. This is followed closely in interest by a rate structure that encourages water conservation (65%) and a free conservation kit (62%). The next tier of interest is for information - to replace old plumbing fixtures (49%), an onsite water assessment (49%), and retrofitting time of day irrigation systems with sensing controllers (43%). The least interest is for a free seminar on water-efficient landscaping (36%).

In general, customers age 18-34 are more interested in the conservation efforts we tested compared to older customers. Households of three or more people compared to households with less members are more interested (very/somewhat) in five of the seven efforts: rebate program (82% vs. 68%), replacing old fixtures (56%, 41%), onsite water assessment (55%, 41%), information on retrofitting (55%, 29%), and the free seminar (42%, 29%). The lowest income customers, those making less than $50,000 compared to those with higher incomes, are more interested in a water rate structure to encourage conservation (79%, 63%). Youngest customers (61% age 18-34 vs. 47% age 35+) and lowest income households (60% for less than $50K vs. 49% for $50K or more) are most interested in information on replacing old plumbing fixtures. Customers age 18-54 (50% vs. 30% age 55+) and households making more than $100,000 in income (60% vs. 37% less than $100K) are most interested in receiving information on time of day controllers for irrigation systems.

VII. Joint Water Supply Agency

Nearly seven in 10 customers say they strongly (49%) or somewhat (20%) support a joint water supply agency with the City of Tigard if such a partnership would reduce the expected rise in water rates over the long term (Q14).

Total support is strong across the board with about two-thirds to three-fourths support in each subgroup. Looking at combined strong/somewhat support, males are more supportive than females (75%, 63%). Customers age 18-34 have 20% higher support (86%) compared to age 35+ (66%). The most recent residents show more support at 81% than those of 6 or more years (66% average), as do households with incomes of less than $50K compared to households with higher incomes (79%, 66%).

VIII. Communications

A large number of customers (86%) say they have read or seen Lake Oswego's newsletter, Hello LO (Q15) and half (50%) say they have visited the City's website within the last two years.

At least eight out of ten customers across all subgroups are familiar with Hello LO. While less customers have visited the City's website, about half across all subgroups say they have visited the site within the last two years (with the exception of those age 55 and older at 35%).

Customers have two clear preferences for the best way to inform them about their water service (Q17): bill inserts (40%) and the Hello LO Newsletter (36%). Other mentions are newspaper (9%), website (5%), and flyers (5%).

IX. Conclusions and Observations

Overall customer perceptions. Customers are satisfied with their water service and at least six out of ten give combined excellent/good ratings to all six services we tested - providing drinking water that is safe and pleasant tasting (90%), keeping customers informed about water service (80%), providing reasonable rates (75%), preserving the City's water source (69%), promoting water conservation (68%), and providing responsive customer service (63%).

We found high don't know responses for customer service (34%) and preserving the City's water source (25%). The former may be due to little or no need for customer service given the high ratings. The latter may present an opportunity for further education and information.

Motivating water conservation. Many survey findings indicate a customer base highly motivated to conserve water. A solid majority (56%) say water conservation is personally *very* important to them, and an additional 33% say it is somewhat important - for a total importance rating of 89%. Seven in ten customers agree that enacting conservation

programs to stretch the existing water supply comes closer to how they personally feel than developing additional water sources to avoid mandated water conservation measures.

A substantial number of households use several water conservation measures: native plants (77%), low flow plumbing fixtures (75%), and high efficiency appliances (69%). Customer responses also show that a variety of reasons to conserve resonate with them. Nearly half say three of four reasons are *very* good ones for conserving water: right thing to do, may reduce water bills, and will benefit fish, wildlife, and our rivers and streams. The fourth -delaying the development of new water supply options - may not have a majority saying it's a *very* good reason but still has strong support (36% very good, 38% good).

Public information opportunities. Customers clearly are familiar with the City's newsletter - Hello LO - and many also visit the City's website. With a substantial number of customers (86%) who have read or seen Hello LO, this is a great communications tool within the community. Billing inserts and Hello LO are also customer's preferred means of being informed about water services.

While 36% of customers correctly name the Clackamas River (29% also mention other sources) as the City's water source, 37% say they do not know. This high "don't know" response, in addition to the nearly one-fourth for how well the City maintains and preserves its water source offer additional opportunities for public information.

Rates. While rates may not be an overriding issue or concern, customers are responsive to rates. We find that for 73% of customers, receiving a larger than usual water bill would prompt them to conserve water and nearly half *strongly* support a joint partnership with Tigard if a study shows it will reduce the expected rise in water rates over the long term.

Appendix
Davis, Hibbitts & Midghall, Inc.
Lake Oswego Community Survey on Water Conservation (CH2MHill)
June 8-10, 2006; N=300; City service area

Q1. The City of Lake Oswego provides water service in your community. I would like to ask you about some specific aspects of the water service that Lake Oswego provides to you as a customer. Please tell me if you think they are doing an excellent job, good, poor, or very poor job in each of the following areas.

ROTATE	Excellent	Good	Poor	Very Poor	DK/ NA
a. Providing reasonable rates	11%	64%	13%	1%	11%
b. Providing drinking water that is safe and pleasant tasting	35%	55%	7%	1%	2%
c. Providing responsive customer service	17%	46%	3%	0%	34%
d. Keeping you informed about issues related to your water service	24%	56%	6%	2%	12%
e. Promoting water conservation	16%	52%	13%	4%	16%
f. Working to maintain and preserve the City's water source	18%	51%	4%	2%	24%

Q2 Would you happen to know where the City of Lake Oswego gets its water from? If you don't know, or aren't sure, just let me know. **(Open, probe for specifics.)**

Clackamas River	36%
Bull Run	21%
Willamette River	5%
Tualatin River	2%
City of Portland	1%
[DON'T READ] DK / Na / Refused	37%

Note: All responses included above.

Q3 Do you believe that Lake Oswego currently has a water supply problem or will have one in the near future?

Yes	22%
No	63%
[DON'T READ] DK / Na / Refused	15%

Q4 How important is water conservation to you personally - very important, somewhat important, not very important, or not at all important?

Very important	56%
Somewhat important	33%
Not very important	6%
Not at all important	3%
[DON'T READ] DK / Na / Refused	1%

Q5 What specific efforts, if any, do you and members of your household make to conserve water? **(OPEN, PROBE for specifics.)**

Don't waste water/Don't let water run too long	20%
Take shorter/Less showers	17%
Changed sprinkler systems/Monitor outside watering	16%
Water lawns less/Water during recommended times	14%
Do less laundry/Only do full loads	10%
Replace appliances/faucets/showerheads	10%
Use dishwasher less/Only do full loads	6%
Turn off water when brushing teeth	5%
Have plants that don't need water	4%
Replace toilets/use low flow	3%
Don't wash cars/use car wash	2%
[DON'T READ] DK / Na / Refused	14%

Note: All responses included above.

Q6 Please tell me if each of the following would prompt you and your household to conserve water or make no difference in your water consumption.

ROTATE	Yes	No	No Diff.	DK/ NA
a. Receiving a larger than usual water bill.	73%	13%	12%	2%
b. The Governor of Oregon declaring a drought in your area.	75%	15%	8%	2%
c. Knowing that Lake Oswego's water source is habitat for special fish species.	51%	26%	18%	5%
d. Receiving information with your water bill on how to conserve water.	62%	19%	15%	4%

Q7 In general, what do you believe consumes the greatest amount of water in the average household? **(OPEN, PROBE for specifics.)**

Showers/Baths	39%
Laundry	32%
Landscaping/Lawns	19%
Toilets	10%
Dishwasher	3%
Sewer	1%
Leaky faucets	1%
[DON'T READ] DK / Na / Refused	10%

Note: All responses included above.

Q8 I'd like to read you a list of reasons for conserving water. Please tell me if you believe each of the following is a very good reason, good, poor, or very poor reason for conserving water.

(ROTATE)	Very Good	Good	Poor	Very Poor	DK/ NA
a. Water conservation is the right thing to do.	50%	43%	5%	1%	1%
b. Water conservation may delay the need to develop new water supply options.	36%	48%	8%	3%	5%
c. Water conservation may reduce water bills.	48%	42%	6%	1%	3%
d. Water conservation will benefit fish, wildlife, and our rivers and streams.	49%	39%	7%	1%	4%

Q9 I'd like to reread those same reasons. Please tell me which one you believe is the best reason for conserving water. **(Reread list above. Choose only ONE.)**

A — 29%
B — 19%
C — 17%
D — 30%
[DON'T READ] DK / Na / Refused — 5%

Q10. I'd like to read two statements. Which statement comes closer to how you personally feel about conserving water? **(ROTATE)**

A. Requiring customers to reduce their water use during the dry season is unnecessary. Additional sources of water should be developed now so that water conservation measures will not have to be mandated. — 22%

OR

B We should enact conservation programs to stretch our existing water supply before spending the money to build new water supply options. — 69%

[DON'T READ] DK / Na / Refused — 9%

Q11 Do you believe the following conserves water, makes no difference, or uses more water?

ROTATE	Conserves Water	No Diff.	Uses More	DK/ NA
a. Low flow plumbing fixtures, faucet aerators and flow restrictors inside the home.	79%	14%	2%	4%
b. In-ground sprinkler systems.	51%	16%	19%	14%
c. High efficiency appliances like front-loading clothes washers, dishwashers, and hot water heaters.	81%	11%	5%	4%
d. Above ground sprinklers and hoses.	16%	23%	52%	9%

e. Native plants in your landscaping. ——————73%——18%——4%——5%

Q12 Do you or members of your household do the following?

ROTATE	Yes	No	DK/ NA
a. Use low flow plumbing fixtures, faucet aerators and flow restrictors inside the home.	75%	22%	3%
b. Use in-ground sprinkler systems.	46%	50%	4%
c. Use high efficiency appliances like front-loading clothes washers, dishwashers, and hot water heaters.	69%	26%	6%
d. Use above ground sprinklers and hoses.	53%	43%	4%
e. Use native plants in your landscaping.	77%	17%	6%

Q13 Please tell me if you are very interested, somewhat interested, not too interested, or not at all interested in each of the following.

ROTATE	Very Interest	Smwt Interest	Not too Interest	Not at all Interest	DK/ NA
a. Attending a free seminar on water-efficient landscaping.	11%	25%	31%	32%	0%
b. A free onsite water assessment by your water provider to identify water patterns and suggest improvements to reduce your household consumption of water.	19%	30%	26%	24%	1%
c. A water rate structure that encourages conservation.	31%	34%	18%	14%	3%
d. A free kit on water conservation.	31%	31%	21%	16%	1%
e. Information on replacing old plumbing fixtures with new low water use fixtures.	22%	27%	27%	23%	1%
f. Information on retrofitting time of day controllers with soil moisture sensing controllers for your irrigation systems.	22%	21%	22%	31%	4%
g. A rebate program for customers who purchase high efficiency appliances.	50%	25%	12%	11%	2%

Q14 The City of Lake Oswego is studying the costs and benefits of creating a joint water supply agency with the City of Tigard. If the study results indicate such a partnership would reduce the expected rise in water rates over the long term would you support or oppose such a partnership? (Ask: Strong or somewhat support/oppose)

Strongly support	49%
Somewhat support	20%
Somewhat oppose	4%

Strongly oppose——————————————————————11%
[DON'T READ] DK / Na / Refused——————————————16%

Q15 Have you read or seen the Hello LO, the City of Lake Oswego's newsletter?

Yes	86%
No	13%
[DON'T READ] DK / Na / Refused	2%

Q16 Have you visited the City of Lake Oswego's website within the last two years?

Yes	50%
No	47%
[DON'T READ] DK / Na / Refused	2%

Q17 What is the best way to inform you about your water service?

Bill inserts/with bill	40%
City newsletter/Hello LO	36%
Newspaper	9%
Website	5%
Flyers	5%
Other (specify and record)	4%
[DO NOT READ] Don't know	1%

These last few questions are for statistical purposes only.

D1. Is your age between...**[READ LIST]**?

18-24	7%
25-34	9%
35-54	51%
55-64	15%
65 +	16%
[DO NOT READ] Refused	2%

D2 Do you currently own or rent your home?

Own	83%
Rent	13%
[DO NOT READ] Refused	4%

D3 Are you the person responsible for paying the utility bills for your household?

Yes	72%
No	17%
Share responsibility	8%
[DO NOT READ] Refused	2%

D4 How many people, including yourself, live in your household?

1	12%
2	34%
3	18%
4	21%
5 or more	12%
[DO NOT READ] Refused	3%

D5 How many years have you lived in Lake Oswego?

1 year or less	2%
2 to 5 years	17%
6-10 years	23%
11-20 years	26%
21+ years	29%
[DO NOT READ] Refused	3%

D6 Is your total household income before taxes ... **[READ LIST]**?

Less than $30,000	6%
Between $30,000 and $50,000	13%
Between $50,000 and $75,000	13%
Between $75,000 and $100,000	14%
Between $100,000 and $150,000	13%
More than $150,000	16%
[DO NOT READ] Refused	25%

Thank you for your time.

D7 Gender **(DO NOT ASK, RECORD BY OBSERVATION)**

Female	52%
Male	48%

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Lake Oswego School District

Matrix 1: Required Conservation Measures

Lake Oswego

OAR 690-086-0150	OWRD Requirement	City of Lake Oswego: Current Measures	5-Year Benchmarks
(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 supplies:	(a) An annual water audit that includes a systematic and documented methodology for estimating any un-metered authorized and unauthorized uses;	The City's water utility documents production and wholesale consumption on a monthly basis. Retail consumption can be documented on a bi-monthly basis but typically is not for purposes of 690-086-0150(4). Authorized but un-metered uses consist of hydrant flushing and filling water tanks for hand watering landscaping within the public ROW. According to staff familiar with these practices, the annual volumes of water authorized but un-metered are insignificant. This utility is unaware of any un-metered unauthorized uses. If any are discovered, City code establishes that such uses are subject to citation and civil penalties.	Continue to conduct annual water audits and evaluate production and consumption data to observe trends in unaccounted for water. Work with the Utility Billing Department to streamline the retrieval of water consumption data by date, volume, and customer class to assist in tracking water use trends. Develop and implement Administrative Policies and Procedures to document consumption of authorized un-metered water. This could consist of developing report forms and reporting requirements for such uses. The City should consider developing a permit system for construction 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;	The City's water utility is fully metered except for those uses noted in (a) above.	Continue to require meters for all development within the City.
	(c) A meter testing and maintenance program;	Approximately 400-500 meters (3/4"-1.5") are replaced annually. 30-40 of these meters are bench tested before disposal to confirm registration accuracy as a means to gauge an appropriate replacement schedule. Approximately 50% of meters 2" and above are tested annually and replaced or repaired as necessary to maintain registration accuracy within industry specified tolerances.	Establish design standard to ensure all meters 2" and above are installed with test ports and by-pass to facilitate testing and repair. Increase number of 3/4" to 1.5" meters replaced annually to achieve a 25-year replacement cycle. Continue program for 2" and larger meters. Evaluate the costs and benefits of changing meter reading and billing cycles from the current bi-monthly cycle to a monthly cycle to improve utility understanding and analysis of customer demand patterns and provide more frequent feedback opportunities to the utility's customers regarding water usage.
	(d) A rate structure under which customers' bills are based, at least in part, on the quantity of water metered at the service connections;	The City utility currently operates with a uniform rate structure i.e., cost per unit of water is uniform for all customer classes and irrespective of volumes consumed.	Within the fiscal year (FY) 2007 to 2009 biennium, the City utility will fund an analysis of alternate rate structures that would encourage conservation of water. An effort such as this may cost approximately $50,000. The community and City Council would then determine whether or not to implement an alternate rate structure, recognizing that an outreach program would be required for successful implementation.
	(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	Current data suggests unaccounted for water ranges from 3% to 15% (with an average of 9%) of total production annually. The City historically has conducted leak testing on about 30 miles of pipe annually resulting in a 7-year cycle. The trend in leak testing is diminishing over time as a result of the City's annual waterline replacement program.	Continue City's annual water main replacement program as necessary based on the age of the system components, field observations, leak reports, maintenance history and other data sources. Periodically audit the City's construction standards to ensure they remain current relative to industry best practices. It is recognized that the leak detection program will diminish over time as waterline replacement occurs. Continue to respond to all calls related to possible system leaks in a timely manner, and repair any leaks detected.
	(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	Lake Oswego financially supports and is an active member of the Regional Water Providers Consortium (RWPC). The City budgets and expends approximately $25,000/yr targeted at water conservation activities including landscape workshops, distribution of water conservation kits for homeowners, development and distribution of water conservation brochures and hosting water conservation programs at K-5 schools.	Continue involvement with the RWPC, and increase local messaging to disseminate information about water conservation opportunities and programs. Develop simple targeted messages that emphasize the Clackamas River as the source of water. Explore the feasibility of developing an outdoor water use/water conservation demonstration project.

Matrix 2: Additional Conservation Measures That Must Be Considered

Lake Oswego

OAR 690-086-0150	OWRD Requirement	City of Lake Oswego: Current Measures	5-Year Benchmarks
(6) … 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;	Current unaccounted for water is estimated to range from 3%-15% (with an average of 9%). The City conducts leak testing on about 30-miles of water mains annually resulting in system-wide testing being completed on a 7-year cycle. Since 1994, the City has annually budgeted and expended an average of $600,000 for main replacement. Most areas of the City with known problems in the distribution system have been addressed through this program. It is more likely that unaccounted for water is due to inaccuracies in meter reading and accounting vagaries.	Continue annual main replacement program as necessary based on age of system components, field observations, leak reports, maintenance history and other data sources. Audit meter reading and accounting practices to identify reading/billing inaccuracies. Adjust such practices as necessary to reduce reporting errors and increase billing and measurement accuracy.
	(b) Technical and financial assistance programs to encourage and aid residential, commercial and industrial customers in implementation of conservation measures;	The City utility currently offers no technical or financial assistance to aid in the implementation of conservation measures.	The City shall identify its top 20 residential and its top 20 commercial water users and provide a free water audits for two customers of each category each year so that all 40 will have an audit within 10 years. Track consumption for audited users to evaluate whether more efficient water use results from the audit services.
	(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;	The City utility currently offers free indoor water conservation kits. No other rebate or incentive programs exist at the present time.	Develop a clothes washer replacement program and a toilet replacement program. For the clothes washer replacement program, offer $200 rebates for replacing existing clothes washers with high efficiency models. For the toilet replacement program, offer rebates ranging from $50 to $150 for replacing existing toilets in commercial and residential settings with new low flow toilets. Budget at least $13,000 annually for the residential rebate program. Publicize any potential Oregon State tax credit opportunities for use of approved water-saving fixtures. Track consumption for each retrofit installation to verify savings. Develop a rebate program, and budget at least $2,000 annually, for the use of water-efficient rinse heads in restaurants. Offer a $75 rebate for each new rinse head installed after the old head is given to the City.
	(d) Adoption of rate structures, billing schedules and other associated programs that support and encourage water conservation;	The City currently bills on a bi-monthly cycle. Water rates are uniform across all customer classes irrespective of volume consumed.	Within the fiscal year (FY) 2007 to 2009 biennium, fund an analysis of alternate rate structures that encourage conservation. An effort such as this may cost approximately $50,000. Undertake steps to gain acceptance from the community and adoption by the City Council.
	(e) Water reuse, recycling and non-potable water opportunities; and	No current practices or systems are in place that would allow such uses.	Currently there are no feasible projects for potable water offsets through reuse.
	(f) Any other conservation measures identified by the water supplier that would improve water use efficiency	The City's parks department aggressively uses practices that reduce water use requirements for large landscaped areas including frequent mulching, aerating, programmable logic controlled central irrigation system for better monitoring and adjustment of irrigation cycles, and applying wetting agents on turf.	The City utility and parks department will collaborate on the replacement of existing clock-timed controllers to weather-based controllers for its large turf areas and will encourage the use of native and drought tolerant landscaping, as well as drip irrigation where appropriate. Determine the feasibility of developing an outdoor water use/water conservation demonstration project. The City will provide funding for a dedicated water conservation coordinator working as a full time employee. Following adoption of this WMCP by the City and approval by OWRD, require all wholesale customers receiving water from the City during the preceding 12-month period to submit an annual water use report.

RESOLUTION 92–42

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF LAKE OSWEGO EMPOWERING THE CITY MANAGER TO IMPLEMENT WATER CONSERVATION AND/OR CURTAILMENT MEASURES DURING WATER SHORTAGES.

WHEREAS, water shortages and drought conditions have significantly impacted the supply sources of many water utilities in the region; and,

WHEREAS, the City of Lake Oswego finds that it is necessary to clarify and delineate the specific actions to be taken in the event that a water supply shortage is experienced; and,

WHEREAS, the City of Lake Oswego serves it own water customers within the City limits as well as intermittent service of surplus water to various water agencies under agreement. The Tigard Water District is provided water by the City of Lake Oswego; and,

WHEREAS, the City of Lake Oswego's single source of water is a water intake facility on the Clackamas River located in the City of Gladstone, Oregon. If the level of the Clackamas River drops below the level at which the City's permanent pumps can no longer draw water from the Clackamas River, a contingency plan has been formulated to continue uninterrupted flow from the water intake facility; and,

WHEREAS, the City of Lake Oswego desires that water conservation be an objective of all of its water customers; and,

WHEREAS, L.O.C. Chapter 38 authorizes the City Council to adopt water conservation/curtailment measures by resolution; and,

THEREFORE, be it resolved:

Section 1. Upon determination by the City Manager that water consumption exceeds availability and/or that water storage within the system is approaching the minimum required to meet fire protection and other essential requirements the City Manager shall have authority to impose voluntary restrictions to reduce water use by customers and surplus water customers, including but not limited to the following:

A. Watering landscaping only between the hours of 6:00 p.m. and 10:00 a.m.

B. Establishing an alternate day system for landscape watering (i.e. even numbered addresses water on even numbered days, and odd numbered addresses on odd numbered days).

C. Other voluntary measures to reduce water use.

Section 2. Upon determination by the City Manager that a serious water shortage exists, the City Manager may declare an emergency and impose mandatory water usage restrictions including:

A. Prohibiting landscape watering between the hours of 10:00 a.m. and 6:00 p.m.

B. Requiring compliance with alternative day system for landscape watering (i.e. even numbered addresses water on even numbered days, and odd numbered addresses on odd numbered days).

C. Restricting other outdoor uses as determined by the City Manager.

Section 3. Upon determination by the City Manager of a critical water shortage, the City Manager may declare an emergency and prohibit certain water uses. The City Manager shall prohibit:

A. The watering of grass lawns, or turf, unless:
   i. The grass lawn, or turf has been newly seeded or sodded. In such cases the turf or grass may be watered as necessary until established;
   ii. The grass lawn, or turf is part of a commercial sod farm;
   iii. The grass lawn or turf is within a high use athletic field that is used for organized play; or
   iv. The grass lawn or turf is used for golf tees and greens; or
   v. The grass lawn or turf is part of a park and recreation area deemed by the City Manager to be of a particular significance and value to the community.

B. The washing, wetting down or sweeping on sidewalks, walkways, driveways, parking lots, open ground or other hard surfaced areas with water unless:
   i. In the opinion of the City Manager there is a demonstrable need to do so in order to meet public health, safety requirements including but not limited to alleviation of immediate fire or sanitation hazards, or dust control to meet air quality requirements mandated by the Oregon Department of Environmental Quality.
   ii. The water is for the power washing of buildings, roofs and homes prior to painting, repair, remodeling or reconstruction.

C. The washing of cars, trucks, trailers, tractors, other vehicles or boats except by commercial establishments or fleet washing facilities which recycle or reuse the water in their washing processes or by bucket and hose with a shut–off mechanism, unless the City Manager finds that the public health, safety and welfare is contingent upon frequent vehicle cleaning such as cleaning of solid waste transfer vehicles, vehicles that transport food and other perishables or as otherwise required by law.

Section 4. Any violation of the restrictions stated in Section 2 and 3 shall be enforced by the City as follows: The City shall personally deliver a notice of violation to the occupants at the premises. If the occupant is not present, the City may post the notice on the premises advising the user of the violation and warning that water service may be discontinued if the violations continue. The City shall also mail the notice of violation by regular mail to the occupant at the address of the subject premises where the violation has occurred. If violations persist or are not remedied, the City Manager may discontinue water service and/or may impose a fine for wasting water. A schedule of fines shall be established by the City Manager at the time he or she imposes restrictions pursuant to sections 2 and 3. If not paid, the amount of the fine may be added to the user's water bill.

Considered and enacted at the regular Council meeting of the City of Lake Oswego held on this 18th day of August, 1992.

AYES: SCHLENKER, CHRISMAN, D. ANDERSON, PUSKAS, HOLSTEIN, MARCOTTE

NOES: NONE

ABSTAIN: NONE

ABSENT: M. ANDERSON

Alice L. Schlenker, Mayor

ATTEST:

Kristi Hitchcock, City Recorder

Approved as to Form:

Jeffrey G. Condit, City Attorney

[1992.2]<utility>RESOLUTION/92-42/COUNCIL