PLANNING COMMISSION AGENDA
City Commission Chambers - City Hall
625 Center Street, Oregon City, Oregon 97045
December 12, 2011 at 7:00 p.m.

The Planning Commission agendas, including staff reports, memorandums, and minutes are available from the Oregon City Web site home page under meetings.(www.orcity.org)

1. CALL TO ORDER

2. PUBLIC COMMENT ON ITEMS NOT LISTED ON AGENDA

3. ADOPTION OF PLANNING COMMISSION MINUTES

   a. Adoption of Planning Commission minutes for worksession of June 27, 2011

4. PLANNING COMMISSION HEARING

   a. Water Master Plan Update (Continued from October 24, 2011).

5. ADJOURN

Video Streaming & Broadcasts: The meeting is streamed live on Internet on the Oregon City's Web site at www.orcity.org and available on demand following the meeting. The meeting can be viewed live on Willamette Falls Television on Channels 23 and 28 for Oregon City and Gladstone residents; Channel 18 for Redland residents; and Channel 30 for West Linn residents. The meetings are also rebroadcast on WFTV. Please contact WFTV at 503-650-0275 for a programming schedule.

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CITY OF OREGON CITY
PLANNING COMMISSION HEARING

June 27, 2011, 7:00 P.M.
City Commission Chambers - City Hall

1. CALL TO ORDER

Chair Stein called the meeting to order at 7 p.m.

Roll Call:	**Staff Present:**
Chair Carter Stein	Tony Konkol, Senior Planner
Commissioner Chris Groener	Laura Butler, Assistant Planner
Commissioner Charles Kidwell	Christina Robertson Gardiner,
Commissioner Damon Mabee	Associate Planner
Commissioner Denyse McGriff	Pete Walter, Associate Planner
Commissioner Zachary Henkin	Carrie Richter, Assistant City Attorney

2. PUBLIC COMMENT ON ITEMS NOT LISTED ON AGENDA

There was no public comment on items not on the agenda.

3. WORK SESSION

2011 Goals

Draft Planning Commission Goals

Mr. Konkol included the draft goals and the feedback from Commissioner Kidwell on the goals for discussion.

There was discussion on Goal #1, public involvement, and the Planning Commission's role in the process. The Commission wanted to hold three public information presentations at Planning Commission meetings, advertised in the *Trail News*, on current topical issues.

Mr. Konkol stated staff would make an outline of topics and a timeline and bring it back for discussion.

On Goal #2, regarding visioning, the Planning Commission decided they had to wait for City Commission direction. No further work was being done on the South End Concept Plan until the direction was given.

Regarding Goal #3, the Commission would issue communcation to other City Commissions and Boards inviting dialogue on topical issues and request for a report, either oral or written.

On Goal #4, obtain a Tree City USA designation, the Commission thought this was a City goal, not the Planning Commission's goal. They wanted to change the wording to support the City Commission's goal to obtain Tree City USA.

For Goal #5, promote and educate sustainable development, there was discussion about incentives for sustainable development. The Commission discussed the need for more education on sustainability, smart growth, and energy efficient development. This goal was suggested by Commissioner Espe who was not in attendance and the Commission agreed to leave it as it was and let Commissioner Espe explain his ideas at a later date.

The Commission then discussed Goal #6, other projects and programs.

Commissioner Mabee suggested adding producing a comprehensive new sign code by the end of 2012. Mr. Konkol stated the City Commission took the sign code off the list of goals.

Mr. Konkol explained the other items listed under this goal were projects that were currently in process and to show the workload of the Planning department.

Commissioner McGriff asked that the status of each project be added to the list.

Each Planning Commissioner then gave their introductions and backgrounds.

4. ADJOURN

Chair Stein adjourned the meeting at 9:21 p.m.

Meeting Date: December 12, 2011

COMMISSION REPORT: CITY OF OREGON CITY

TO:	The Planning Commission
FROM:	Pete Walter, Planner
PRESENTER:	Pete Walter, Planner
SUBJECT:	Legislative File: L 10-02 - Water Distribution System Master Plan
Agenda Type: Hearing	
Approved by: Tony Konkol, Community Development Director	

RECOMMENDED ACTION (Motion):

Staff recommends that the Planning Commission recommend approval of the Oregon City Water Distribution System Master Plan, included as Exhibit 1, as an ancillary document to the Oregon City Comprehensive Plan to the City Commission for their consideration at the January 18th, 2012 public hearing.

BACKGROUND:

The proposal is to update the Oregon City Water Distribution System Master Plan, which is an adopted Ancillary Document to the Oregon City Comprehensive Plan (2004). The purpose of the Water Distribution System Master Plan is to identify existing water system deficiencies and required improvements, to analyze existing and future water demands and develop a capital improvement program (CIP) to meet these needs.

BUDGET IMPACT:

FY(s):
Funding Source:

ATTACHMENTS:

Staff Report L 10-02
A. Comments from Commissioner McGriff
B. Staff Responses to Planning Commission Questions, dated 12/5/2011
C. SFWB Water Management and Conservation Plan, including Emergency Curtailment Plan, September 2004.
D. Public Information Presentation, November 21, 2011.
E. CIC presentation, December 5, 2011.

OREGON CITY

Community Development – Planning

221 Molalla Ave. Suite 200 | Oregon City OR 97045
Ph (503) 722-3789 | Fax (503) 722-3880

FILE NO.: Legislative File: L 10-02 - Water Distribution System Master Plan

HEARING DATE: Monday, December 12th, 2011 (Continued from October 24th, 2011)
7:00 p.m., City Hall - Commission Chambers
625 Center Street
Oregon City, OR 97045

APPLICANT: Oregon City Public Works Department – Nancy Kraushaar – City Engineer
Attn: John Burrell, Project Manager
625 Center Street, Oregon City, Oregon 97045

REPRESENTATIVE: West-Yost Associates Consulting Engineers
Attn: Walt Meyer, P.E.
8100 SW Nyberg Rd., Suite 200, Tualatin, OR 97062

REQUEST: Update of the Oregon City Water Distribution System Master Plan, an Ancillary Document to the Oregon City Comprehensive Plan (2004).

LOCATION: City-wide.

REVIEWER: Pete Walter, AICP, Associate Planner

RECOMMENDATION: Staff recommends that the Planning Commission recommend approval of the Oregon City Water Distribution System Master Plan, included as Exhibit 1, as an ancillary document to the Oregon City Comprehensive Plan to the City Commission for their consideration at the January 18th, 2012 public hearing.

17.50.170 - Legislative hearing process.
A. Purpose. Legislative actions involve the adoption or amendment of the city's land use regulations, comprehensive plan, maps, inventories and other policy documents that affect the entire city or large portions of it. Legislative actions which affect land use must begin with a public hearing before the planning commission.
B. Planning Commission Review.
1. Hearing Required. The planning commission shall hold at least one public hearing before recommending action on a legislative proposal. Any interested person may appear and provide written or oral testimony on the proposal at or prior to the hearing. The community development director shall notify the Oregon Department of Land Conservation and Development (DLCD) as required by the post-acknowledgment procedures of ORS 197.610 to 197.625, as applicable.
2. The community development director's Report. Once the planning commission hearing has been scheduled and noticed in accordance with Section 17.50.090(C) and any other applicable laws, the community development director shall prepare and make available a report on the legislative proposal at least seven days prior to the hearing.
3. Planning Commission Recommendation. At the conclusion of the hearing, the planning commission shall adopt a recommendation on the proposal to the city commission. The planning commission shall make a report and recommendation to the city commission on all legislative proposals. If the planning commission recommends

adoption of some form of the proposal, the planning commission shall prepare and forward to the city commission a report and recommendation to that effect.
C. City Commission Review.

1. City Commission Action. Upon a recommendation from the planning commission on a legislative action, the city commission shall hold at least one public hearing on the proposal. Any interested person may provide written or oral testimony on the proposal at or prior to the hearing. At the conclusion of the hearing, the city commission may adopt, modify or reject the legislative proposal, or it may remand the matter to the planning commission for further consideration. If the decision is to adopt at least some form of the proposal, and thereby amend the city's land use regulations, comprehensive plan, official zoning maps or some component of any of these documents, the city commission decision shall be enacted as an ordinance.
2. Notice of Final Decision. Not later than five days following the city commission final decision, the community development director shall mail notice of the decision to DLCD in accordance with ORS 197.615(2).
(Ord. No. 08-1014, §§ 1—3(Exhs. 1—3), 7-1-2009; Ord. No. 10-1003, § 1(Exh. 1), 7-7-2010)

IF YOU HAVE ANY QUESTIONS ABOUT THIS APPLICATION, PLEASE CONTACT TONY KONKOL IN THE PLANNING DIVISION OFFICE AT 657-0891.

Proposed Project
The proposal is to update the Oregon City Water Distribution System Master Plan, which is an adopted Ancillary Document to the Oregon City Comprehensive Plan (2004).

The purpose of the Water Distribution System Master Plan is to identify existing water system deficiencies and required improvements, to analyze existing and future water demands and develop a capital improvement program (CIP) to meet these needs.

According to the 2004 Oregon City Comprehensive Plan (Introduction, “Implementing the Plan” Page 4, Exhibit 6): “Ancillary Plans are adopted by the City Commission for such things as parks and recreation, transportation systems, water facilities, and sewer facilities. Usually prepared by City departments through a public process, ancillary plans are approved by the City Planning Commission and adopted by the City Commission to provide operational guidance to city departments in planning for and carrying out city services. These plans are updated more frequently than the Comprehensive Plan.”

The Oregon City Water Distribution System Master Plan is a "public facilities plan", which is defined in the administrative rules implementing Goal 11, OAR 660-0110005(1), and provides: "A public facility plan is a support document or documents to a comprehensive plan. The facility plan describes the water, sewer and transportation facilities which are to support the land uses designated in the appropriate acknowledged comprehensive plans within an urban growth boundary containing a population greater than 2,500. Certain elements of the public facility plan also shall be adopted as part of the comprehensive plan, as specified in OAR 660-11-045.".

A more detailed memorandum from Assistant City Attorney Carrie Richter detailing the Goal 11 requirements for the Water Distribution System Master Plan is provided in Exhibit 5.

Plan Document

The Water Distribution System Master Plan is a necessary part of the city's public facilities program relating to water infrastructure. The draft plan consists of an executive summary, nine chapters, and four (4) appendices (See Exhibit 1). Additionally, development of the master plan process resulted in three major work products which are included in the plan document:

1. A Diurnal Curve Development Technical Memorandum.
2. A recommended Capital Improvement Program (CIP) for the City's existing and future water system including renewal and replacement pipeline projects; and
3. A financing plan that addresses implementation of the recommended CIP. The 1996 City Charter requires rates to be rolled back to pro-bond levels once the bonds are paid which will occur in Fiscal Year 2014-15. The City must address this requirement before any long term water fund planning can realistically be established.

Recommended Capital Improvements

The executive summary describes recommended capital improvements which are organized into improvements to the existing water system, future improvements and renewal and replacement improvements.

Projects that will be required to extend water service into the urban growth boundary will primarily be funded by developers. Some projects could be funded by developers and could be reimbursed based on the capacity provided to other users. SDCs (System Development Charges) can be used to finance such improvements.

Planning Horizon and Growth Assumptions

The Water Distribution System Master Plan has a planning horizon of 2030 and future water demand is based on the anticipated rate of population growth in the city over the next 20 years based on Metro's 20 and 50 year regional population and employment forecasts, April 2009. The projections anticipate that the region will grow at an annual average rate of 1.14 to 1.3 percent. However, based on historical data for the 1990's, the plan recommends that the city consider the possibility of faster growth rates than the Metro projections, both 1.5 percent and 3.0 percent.

At a growth rate of 1.5 percent, the city's population of 30,405 will grow to 41,565 by 2030. At a growth rate of 3.0 percent, the population will grow to 56,562 by 2030.

Based on the 3.0 percent population projection, the Year 2030 Water Demand is 7.76 mgd. It is important to remember that this demand is planned only. Should the City grow more slowly than Metro or plan projections, improvements identified to upsize facilities to meet demand will not be triggered. However, changes in growth will have no effect on the overall system maintenance and operation costs.

The water demand calculations are a function of several measures, as described in Chapter 3 of the plan "Water Demand Analysis". These include an analysis of historical annual average demand, monthly average demand, maximum day demand, and peak hour demand. Based on these measures, the development of historical "peaking factors" is necessary to compare system-wide water use patterns in the city to other communities and for projecting future water use patterns.

Chapter 3 also presents water use in mgd (millions of gallon per day) by generalized customer classes which correlate to land use categories identified in the comprehensive plan and map: single family (2.32 mgd / 59%); institutional (0.33 mgd /8%), multi family (0.61 mgs / 16%); and industrial / commercial 0.69 mgd / 17%). Based on analysis of water demand by existing land use category within the city limit, a "unit demand factor" was derived that can be allocated to the various plan districts that provides a basis for future planning (See table 3-12 – Summary of Recommended Unit Water Demand Factors).

UGB Build-Out Water Demand Projection

The projection of water demand in the City at build-out of the urban growth boundary is based on the land use demand factors extrapolated for the City's ultimate urban area. Using these acreages and the unit demand factors developed for these customer use categories, the projected average annual water demand at the City's UGB build-out condition is 7.0 mgd.

Since the demand projection based on land use falls very close to the year 2030 estimate at a growth rate of 3.0 percent, the plan assumes that the City could achieve build-out of those lands within the existing UGB within 20 years. System development charges would allow for new development to cover these expansion costs.

Water Transmission and Fire Flow

In addition to water demand, the plan includes water distribution system service standards to ensure adequate water storage of a variety of contingencies including operational storage, equalization storage, fire storage and emergency storage. These standards include the need to provide a minimum allowable service pressure of 40 PSI, and a maximum day demand plus minimum fire flow minimum standards.

City Charter Implications

The financing section in Chapter 9 addresses the fiscal aspects of the 1996 City Charter rollback. Because the current City charter requires that rates be rolled back once the bonds are paid, several scenarios for future rates are evaluated. Scenarios include continuation of the existing level of services and costs without the rollback, a rollback of rates including cutbacks in operations, maintenance and upgrades, and identification of the rates that are required for maintaining the system at a sustainable level of system replacements.

FACTS

Service Area

As stated in the Executive Summary, the City of Oregon City currently provides potable water service to most of the City's residents. As shown on Figure ES-1 of the Executive summary the City's service area is approximately 4,134 acres. Areas within the City limits not served by City are served by the Clackamas River Water District (CRW). There are also portions of the City that are adjacent to undeveloped, unincorporated county land that has the potential for development and annexation into the City's service area.

From the 2004 Oregon City Comprehensive Plan (Page 80):

"Water Distribution and Storage. Surface water from the Lower Clackamas River is the source of potable water for Oregon City and West Linn. The wholesale water supplier is the South Fork Water Board, which is

owned equally by Oregon City and West Linn. Water is distributed by each city under separate utility departments. The South Fork Water Board has rights to withdraw 42.6 million gallons per day (mgd), which is expected to meet demand for Source of Supply."

Public Involvement and Public Comment

The Water Distribution System Master Plan update process provides opportunities for public involvement in the legislative decision making process through the public hearing process, newspaper noticing, meetings with the Citizen Involvement Committee, and work sessions with the City Commission.

The following public information meetings have been held or are scheduled to be held in order to discuss the plan prior to formal consideration by the City Commission:

- Citizen Involvement Council (CIC), September 13, 2010.
- Public Informational Presentation - Monday, November 21, 2011, 7:00 P.M (Exhibit D).
- Citizen Involvement Council CIC) - Monday, December 5, 2011, 7:00 P.M. (Exhibit E).
- Work Session with City Commission - Tuesday, December 13, 2011, 5:30 P.M.

The Water Distribution System Master Plan (July 2010 draft) has been available for review on the Oregon City website at the following address: http://www.orcity.org/publicworks/water-master-plan-model-updates

Notice of the first Planning Commission public hearing for the proposal was published in the Clackamas Review on January 26, 2011, and mailed to the affected agencies, the CIC and all Neighborhood Associations January 21, 2011.

In accordance with ORS 197.610 and OAR 660-018-000, a Notice of Proposed Amendment to the Oregon City Comprehensive Plan was provided to the Oregon Department of Land Conservation and Development 45 days prior to the first noticed Evidentiary Hearing on January 21st, 2011.

Notice of the proposed amendment was provided to the following affected agencies: South Fork Water Board (SFWB), Clackamas River Water (CRW), Clackamas County, Clackamas Fire District #1, Oregon City School District, City of West Linn, City of Gladstone, City of Milwaukie, Tri-City Services District, Metro, and Oregon Department of Transportation (ODOT).

Various comments and questions were received from the Planning Commission at the first public hearing on October 24th, 2011, and staff received faxed comments and questions from Commissioner McGriff on November 3rd, 2011 (See Exhibit 1).

Staff has prepared a summarization of responses to these comments and questions in Exhibit 2.

Comments were received from the following entities prior to the first Planning Commission hearing on October 24th, 2011.

- Exhibit 2. Comments from Lee Moore, General Manager, Clackamas River Water (CRW), 4/18/2011.
- Exhibit 3. Comments from Paul Edgar, Canemah Neighborhood Association Land Use Chair, 1/26/2011.
- Exhibit 4. Comments from Paul Edgar, Canemah Neighborhood Association Land Use Chair, 10/10/2011.

None of comments received indicate which decision making criteria addressed below have not been met or cannot be met.

DECISION-MAKING CRITERIA:
According to the 2004 Oregon City Comprehensive Plan (Introduction, "Implementing the Plan" Page 4): "Ancillary Plans are adopted by the City Commission for such things as parks and recreation, transportation systems, water facilities, and sewer facilities. Usually prepared by City departments through a public process, ancillary plans are approved by the City Planning Commission and adopted by the City Commission to provide operational guidance to city departments in planning for and carrying out city services. These plans are updated more frequently than the Comprehensive Plan."

As an ancillary plan, the Water Distribution System Master Plan requires findings for consistency with applicable Comprehensive Plan Goals and Policies and also with Statewide Planning Goals. These findings are presented below.

Consistency with Oregon City Comprehensive Plan
Chapter O of the 2004 Oregon City Comprehensive Plan, Comprehensive Plan Maintenance and Update, contains criteria for approving changes to the comprehensive plan and plan map. Review of the comprehensive plan should consider:

1. *Plan implementation process.*
2. *Adequacy of the Plan to guide land use actions, including an examination of trends.*
3. *Whether the Plan still reflects community needs, desires, attitudes and conditions. This shall include changing demographic patterns and economics.*
4. *Addition of updated factual information including that made available to the City of regional, state and federal governmental agencies.*

Chapter O. Comprehensive Plan Maintenance and Update
Regular Review and Update
Another method of Plan maintenance and updating is a continuous technical review of the Plan by the Planning staff. This review and any subsequent recommendations for Plan updating should be presented to the Neighborhood Associations, Planning Commission and City Commission for input and discussion in the same manner as requested Plan changes. The continuous review should consider:

- ***Plan implementation process;***

Finding: The Water Distribution System Master Plan is a special purpose plan that is an adopted Ancillary Document to the Oregon City Comprehensive Plan. It is a technical document that requires regular review in order to maintain and update it. The applicant, Oregon City Public Works Department, has or will present the update of the Water Plan for input by the Citizen Involvement Committee, Neighborhood Associations, Planning Commission and City Commission in accordance with the recommended method described in the

Comprehensive Plan and pursuant to the applicable process described in Oregon City Municipal Code section 17.50.170. The plan implementation process is consistent with the Comprehensive Plan.

- ***Adequacy of the Plan to guide land use actions, including an examination of trends.***

As an ancillary document to the Comprehensive Plan, the Water Distribution System Master Plan Update provides an analysis of existing water distribution facilities and provides direction for future development, funding and needs. The plan provides a comprehensive review of the water distribution system and provides an adequate guide for future land use actions and the development of criteria to be utilized in land use actions.
The update includes updated construction cost estimates and contingencies for the planning and design of recommended water system facilities for the City (See Appendix D).

Adoption and implementation of the Water Distribution System Master Plan update accomplishes the following Goals and Policies of the adopted Oregon City Comprehensive Plan (2004).

- ***Whether the Plan still reflects community needs, desires, attitudes and conditions. This shall include changing demographic patterns and economics.***

The provision of a dependable, quality water supply is a basic human need. As part of this planning effort, the consultant conducted technical analysis of the city's existing water system and projected future demand within the planning area based on the land use designations in the City Comprehensive Plan. Water demands were projected through buildout of the City's Urban Growth Boundary (UGB) using a unit demand methodology based on land uses in the City's Comprehensive Plan. Individual water use (by meter) was linked to individual parcels using addresses. The unit demand factor for each land use designation was then calculated by dividing the total water use by the total parcel area for which it was linked. The same peaking factors used for existing water demands were used for future projections. Buildout water demand projections are shown by customer class in Table ES-2 of the Executive Summary.

Adoption of the Water Distribution System Master Plan update will address necessary improvements to ensure the orderly extension of water service to accommodate the projected growth envisioned in the City's Comprehensive Plan.

- ***Addition of updated factual information including that made available to the City by regional, state and federal governmental agencies.***

The consultant has included an analysis of the existing water distribution system based on available existing information provided by the City, the City's water supplier, and water metering data from Clackamas River Water (CRW).

The projections of water demand for existing and future service areas reflect updated population projections, recent comprehensive plan amendment areas (Park Place and East of Beavercreek Road), and new regulatory requirements at the state and federal level. This information is provided in the Water Demand Analysis in Chapter 3 and the Water Distribution System Service Standards in Chapter 4.

The City of Oregon City maintains benchmarks for service quality that are used to measure performance of the water utility. These benchmarks include service standards for water quality, quantity, and pressure, as well as the minimum supply levels for fire protection. For example, the Oregon City water distribution system was analyzed to ensure that service pressures are maintained above 40 psi during normal demand scenarios and fire flows are available without dropping system pressures below 20 psi. The service standards set forth in this master plan are derived from regulations, rules, and recommendations established by a variety of sources including the Oregon State Department of Human Services (DHS), the Environmental Protection Agency (EPA), the American Water Works Association (AWWA), the Insurance Services Office (ISO), and the Uniform Fire Code (UFC). A summary of these standards is presented in Table ES-3. A detailed description of the City's service standards is provided in Chapter 4.

The addition of this updated information will allow the City to keep the Water Distribution System Master Plan current.

CONSISTENCY WITH STATEWIDE PLANNING GOALS

STATEWIDE PLANNING GOAL 1: To develop a citizen involvement program that insures the opportunity for citizens to be involved in all phases of the planning process.
Finding: This goal is implemented through the applicable Goals and Policies in Section 1 of the Oregon City Comprehensive Plan: Citizen Involvement. A detailed description of the public involvement process for development of the Water Distribution System Master Plan is provided in the project description on Page 5 under "Public Involvement and Public Comment". Additional public meetings to discuss the water master plan have been summarized. Implementation of a water rate structure that will address the mandated rate roll-back in the City Charter will be necessary for plan implementation. Additional public meetings and workshops that have been held or are scheduled to be held prior to final consideration and adoption of the proposed draft plan by the City Commission. Subsequently, staff finds that the Water Distribution System Master Plan update process is consistent with Statewide Planning Goal 1.

STATEWIDE PLANNING GOAL 2: To establish a land use planning process and policy framework as a basis for all decision and actions related to use of land and to assure an adequate factual base for such decisions and actions.
Finding: This goal is implemented through the applicable Goals and Policies in Section 2 of the Oregon City Comprehensive Plan: Land Use. Because the Water Distribution System Master Plan is an ancillary document to the City's Comprehensive Plan, the application was processed pursuant to the legislative hearing process outlined in Section 17.50.170 of the Oregon City Municipal Code. The Water Distribution System Master Plan document and maps, analysis, projections, capital improvement program, cost estimates, and recommended funding mechanisms to finance the plan are based a variety of current sources which are cited throughout the plan. These sources include information, documents and technical data provided by the following departments and agencies:

- Oregon City Public Works Department
- Oregon City Geographic Information Systems (GIS)
- Oregon City Community Development Department
- Oregon City Utility Billing
- Clackamas River Water (CRW)
- South Fork Water Board (South Fork Water Distribution System Master Plan)
- Metro (Population projections)
- Engineering News Record Construction Cost Index (ENR CCI) of 8596 (20 Cities Average)
- USGS (United State Geological Survey)
- DOGAMI (Oregon Department of Geology and Mineral Industries)

The plan's Capital Improvement Plan (CIP) includes approximate alignments of future pipeline extensions within the City's Urban Growth Boundary (UGB) (See Appendix D). The alignments of future pipeline extensions shown on the drawings in Appendix D are estimates and actual alignments may be modified as necessary to accommodate actual development patterns when the extensions are actually proposed. The majority of these extensions will be constructed within public right-of-way. Future planning review of pipeline extensions would vary:

1. If the pipeline extension is part of newly dedicated public right-of-way within a development proposal, the alignment will be reviewed as part of a land use application such as a land division (subdivision or partition), site plan and design review, master plan, detailed development plan, or conditional use application.
2. If an extension or expansion is proposed to occur within an existing public right-of-way and will not affect private property, the project is typically exempt from land use review. In this case, there will be no impact on private property.
3. In all residential zones and commercial zones, the placement of new public utilities outside of the right-of-way requires a Conditional Use permit along with a Site Plan and Design Review application approved by the Planning Commission.
4. If any extensions / expansions are proposed within a an adopted City overlay district such as a Floodplain Overlay District, Natural Resource Overlay District or Geologic Hazard Overlay District, then applicable overlay review processes will apply when the extension is proposed. Within each of these overlay districts, the review process for utility lines currently codified in the Oregon City Municipal Code is as follows:

Overlay District	**OCMC**	**Subsection**
Natural Resource	17.49	-.080 (Exempt Uses), -190 (Standards for new Utility Lines)
Geologic Hazard	17.44	-.035 (Exemption for existing ROW) -.080 (new utilities require permit)
Flood Management	17.42	Water lines may be reviewed administratively by city engineer (subject to applicable site and construction standards / i.e. no net fill)
Willamette River	17.48	-.100 (compatibility review and public access to Willamette River).
Historic	17.40	May apply to new facilities not in existing ROW and where proposed development affects native soils, designated

		landmarks and structures.

Based on the existing review processes defined in the Oregon City Municipal Code and the adequacy of the facts provided in the proposed application, the proposed Water Distribution System Master Plan update is consistent with Statewide Planning Goal 2.

STATEWIDE PLANNING GOAL 5: To protect natural resources and conserve scenic and historic areas and open spaces.

Finding: This goal is implemented through the applicable Goals and Policies in Section 5 of the Oregon City Comprehensive Plan: Open Spaces, Scenic and Historic Areas, and Natural Resources. As stated in the responses to Statewide Planning Goal 2 above, the city code contains specific review criteria for the placement of public utilities within overlay districts to assure that designated Goal 5 resources are appropriately considered when development is proposed.

The Natural Resource Overlay District designation provides a review process for development proposals that have the potential to affect protection of Metro Title 3 and 13 lands (streams, wetlands, sensitive habitat areas) and Goal 5 resources within Oregon City. Utilities repair, replacement and expansions, including water lines, are either exempted from review or reviewed as a limited land use decision (Type II) or Planning Commission review (Type III) depending on the location.

Within the Historic Overlay District, which includes the Canemah historic district, McLoughlin Conservation district, designated Landmarks and Historic corridors, proposed public utility projects may be reviewed by the Historic Review Board if they are potential impact historic resources. The Historic Review Board has adopted character guidelines that pertain to improvements in the public right of way, utilities and related equipment to assure compatibility with historic resources.

Goal 5 resources outside the city limit within the Urban Growth Boundary are reviewed as part of the required Concept Planning for those areas prior to and subsequent with annexation. Concept plans must be implemented through zoning designations and overlay protections zones to assure that Goal 5 resources are protected to the extent required by State law and Metro. The City has mapped the known Goal 5 resource areas out to the current UGB based on the following documents:

1. The 1999 Oregon City Local Wetland Inventory.
2. The Oregon City Water Quality Resource Area Map (Ord. 99-1013).
3. 2004 Oregon City slope data and mapping (LIDAR).
4. Metro Regionally Significant Habitat Map (Aerial Photos taken 2002).
5. National Wetland Inventory (published 1992).
6. Beavercreek Road Concept Plan (adopted September 2008).
7. Park Place Concept Plan (adopted April 2008).

Based on the existing review processes defined in the Oregon City Municipal Code, the proposed Water Distribution System Master Plan update is consistent with Statewide Planning Goal 5.

STATEWIDE PLANNING GOAL 6: To maintain and improve the quality of the air, water and land resources of the state.

Finding: This goal is implemented through the applicable Goals and Policies in Section 6 of the Oregon City Comprehensive Plan: Quality of Air, Water and Land Resources. By planning water system repair and upgrade based on projected demand and land use patterns, the proposed plan will ensure that land suited for development will be served efficiently. Further, by identifying a proactive plan for maintenance will protect

lands and waters of Oregon City from contamination resulting from facility corrosion or leaking. Water conservation objectives, as identified in the South Fork Water Board Master Plan remain a priority and will not be affected by this plan that is directed at providing maintenance and service extension objectives. As discussed above under the responses to Statewide Planning Goals 2 and 5, the proposed Water Distribution System Master Plan provides approximate locations for the locations of needed water facilities necessary to serve the Urban Growth Boundary. The alignments of future pipeline extensions and locations of other water facilities such as pump stations, pressure reducing valves and reservoirs is subject to further site planning when those facilities are proposed within the city limits. Based on the existing review processes defined in the Oregon City Municipal Code, the proposed Water Distribution System Master Plan update is consistent with Statewide Planning Goal 6.

STATEWIDE PLANNING GOAL 7: To protect people and property from natural hazards.
Finding: This goal is implemented through the applicable Goals and Policies in Section 7 of the Oregon City Comprehensive Plan: Natural Hazards. This goal primarily addresses how the city should plan development to avoid hazard posed by floods, steep slopes, geologically unstable areas and other natural hazards. The Water Distribution System Master Plan includes in the Appendices a seismic vulnerability assessment prepared by ABS Consulting Structural Engineers (Exhibit 1.ii.(b)). The report outlines the seismic hazards, facility evaluations, pipeline evaluations, and provides findings and recommendations for the short-term, mid-term and long term mitigation and protection of the existing water system from seismic hazards. New water facilities will be designed to avoid seismic hazards and identified hazard areas to the extent practicable. New facilities shall be constructed in conformance with the city's adopted public works standards and retrofitted where necessary according to the recommendations provided. Water line looping recommendations have been evaluated throughout the system, so that the water system may still function if one portion of the system has been disconnected. These measures, along with the existing review processes defined in the Oregon City Municipal Code, will assure that the proposed Water Distribution System Master Plan update is consistent with Statewide Planning Goal 7.

STATEWIDE PLANNING GOAL 9: To provide adequate opportunities throughout the state for a variety of economic activities vital to the health, welfare, and prosperity of Oregon's citizens.
Finding: This goal is implemented through the applicable Goals and Policies in Section 9 of the Oregon City Comprehensive Plan: Economic Development. Identification of needed water facilities within the UGB includes areas identified for future job creation, notably the Beavercreek Concept Plan area east of Beavercreek Road. The proposed Water Distribution System Master Plan identifies the approximate location of needed pipelines in this area in Appendix D (pipeline project 14). This infrastructure will be constructed and driven by development of the Beavercreek Concept Plan Area. Adoption of the CIP for the Water Distribution System Master Plan will allow the incorporation of the costs of building this water infrastructure into the System Development Charge (SDC) schedule. In existing developed areas, the CIP identifies necessary renewal and replacement of the system to ensure a high quality water supply to existing residential, commercial and industrial areas. The water infrastructure investments in this proposed Water Distribution System Master Plan are essential to support the continued and sustained economic development of the city. Based on the existing review processes defined in the Oregon City Municipal Code, the proposed Water Distribution System Master Plan update is consistent with Statewide Planning Goal 9.

STATEWIDE PLANNING GOAL 10: To provide for the housing needs of citizens of the state.

Finding: This goal is implemented through the applicable Goals and Policies in Section 10 of the Oregon City Comprehensive Plan: Housing. A dependable and high quality water supply for existing Oregon City residents depends in timely upgrades to the existing system. Water service to newly annexed developing areas and those areas zoned to higher density within the existing city limits will be largely developer constructed and driven. Adoption of the Water Distribution System Master Plan update will address necessary improvements to ensure the orderly extension of water service to accommodate the projected growth envisioned in the City's Comprehensive Plan, which includes a variety of housing types. The proposed Water Distribution System Master Plan update is consistent with Statewide Planning Goal 10.

STATEWIDE PLANNING GOAL 11: To plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.
Finding: This goal is implemented through the applicable Goals and Policies in Section 11 of the Oregon City Comprehensive Plan: Public Facilities. A detailed memorandum from Assistant City Attorney Carrie Richter detailing the Goal 11 requirements for the Water Distribution System Master Plan is provided in Exhibit 5. The relevant goals and policies and findings are provided below.

Goal 11.1 Provision of Public Facilities
Serve the health, safety, education, welfare, and recreational needs of all Oregon City residents through the planning and provision of adequate public facilities.
Finding: The Water Distribution System Master Plan is necessary to maintain compliance with Statewide Planning Goal 11, Public Facilities. Goal 11 requires that public facilities and services be provided in a timely, orderly and efficient manner. The goal's central concept is that local governments should plan public services in accordance with the community's needs as a whole rather than be forced to respond to individual developments as they occur. This includes water distribution and storage. As shown in the findings below, the proposed update of the Water Distribution System Master Plan is consistent with Goal 11.1.

Policy 11.1.1
Ensure adequate public funding for the following public facilities and services, if feasible:
• *Water distribution*
Finding: the Water Distribution System Master Plan includes a comprehensive and detailed discussion of financing scenarios to assure that the existing and future water facilities can be funded. Because the current City charter requires that water rates be rolled back once the bonds are paid, several scenarios for future rates are evaluated. Scenarios include continuation of the existing level of services and costs, a rollback of rates coupled with an overall reduction of operations and maintenance, and the identification of rates that are required for maintaining the system at a sustainable level of system replacement. The plan recommends adoption of Scenario No. 3, adoption of water rates sufficient to assure maintenance of the system at a sustainable level of system replacements. This scenario would require amendment of the city charter and approval of voters, however it would ensure adequate funding for the city's water distribution system. The proposed Water Distribution System Master Plan is consistent with this policy.

Policy 11.1.2
Provide public facilities and services consistent with the goals, policies and implementing measures of the Comprehensive Plan, if feasible.

Finding: As discussed in this staff report, the Water Distribution System Master Plan provides guidance for the timely, efficient and economic provision of water service within the existing city and to new development areas within the Urban Growth Boundary consistent with the relevant goals, policies and implementing measures of the Comprehensive Plan. The proposed Water Distribution System Master Plan is consistent with this policy.

Policy 11.1.4

Support development on underdeveloped or vacant buildable land within the city where public facilities and services are available or can be provided and where land-use compatibility can be found relative to the environment, zoning, and Comprehensive Plan goals.

Finding: The plan includes a capital improvement program based on water demand for buildout of the city's urban growth boundary based on adopted land use categories within the City's Comprehensive Plan. The sizing of water pipes envisioned in the plan provides an adequate basis for evaluation of development and redevelopment proposals within the city. Chapter 7 of the plan evaluates the future water distribution system. This analysis is based on UGB buildout land use as shown on figure 7-2 and water duty factors developed in Chapter 3. The analysis includes underdeveloped and vacant buildable land within the city (See Figure 7-1). In most cases the extension of new water services will occur in existing or planned public right-of-ways as part of development in accordance with applicable public works standards, land division laws and zoning regulations, including applicable environmental overlay district standards depending on where development occurs. The specific locations of new city utility lines is not within the purview of this Plan, however the adopted city development code standard are sufficient to assure land use compatibility of future water service extensions identified in the Plan. The proposed Water Distribution System Master Plan is consistent with this policy.

Policy 11.1.5

Design the extension or improvement of any major public facility and service to an area to complement other public facilities and services at uniform levels.

Finding: The Water Distribution System Master Plan is designed to meet water distribution system services standards for existing and future development within the UGB. These standards are discussed in Chapter 4 of the plan and include Water Service Quality Standards, Fire Flow Requirements, Water Supply Capacity during High Demand Periods, Pumping Facility Capacity, Critical Pumping Facilities, Water Storage Capacity, and Water Transmission and Distribution System. These service standards, summarized in Table 4-1, reflect typical water system industry standards, including the Oregon State Department of Human Services (DHS), the Environmental Protection Agency (EPA), the American Water Works Association (AWWA), the Insurance Services Office, Inc. (ISO), and the Oregon Fire Code (OFC). The plan includes a detailed analysis of levels of service and existing and projected water demand within the UGB based on the City comprehensive plan. The plan also discusses the City's performance criteria for the water system (See Table 4-1). The city has adopted development code and engineering standards to ensure concurrent provision of public facilities and services at uniform levels. Pursuant to these requirements, water lines are typically required to be extended to a new development area at the same time as other public facilities such as sewer, storm drainage, and emergency services. The proposed Water Distribution System Master Plan is consistent with this policy.

Policy 11.1.7

Develop and maintain a coordinated Capital Improvements Plan that provides a framework, schedule, prioritization, and cost estimate for the provision of public facilities and services within the City of Oregon City and its Urban Growth Boundary.

Finding: The Water Distribution System Master Plan CIP in Chapter 8 for the years 2011-2022 which provides the necessary framework for scheduling, prioritization and cost estimates for existing and future capital improvements of the water system within the UGB. Chapter 9 includes three scenarios for financing the necessary capital improvements and a recommendation to the city commission to adopt scenario 3, which adopts a pay-as-you-go financing strategy to fund the project identified in the master plan. Tables 9-10 and 9-11 include an estimated schedule for when improvements could be funded addressing the need for a schedule identified in the city attorney's memo. The proposed Water Distribution System Master Plan is consistent with this policy.

Goal 11.3 Water Distribution

Seek the most efficient and economic means available for constructing, operating, and maintaining the City's water distribution system while protecting the environment and meeting state and federal standards for potable water systems.

Finding: As described in Chapter 4, the plan includes service standards for compliance with state and federal law, summarized in Table 4-1 which reflect typical water system industry standards, including the Oregon State Department of Human Services (DHS), the Environmental Protection Agency (EPA), the American Water Works Association (AWWA), the Insurance Services Office, Inc. (ISO), and the Oregon Fire Code (OFC). The CIP program and financing options described in Chapters 8 and 9 provide an adequate basis for determination of the most efficient and economic means to fund the construction, operation and maintenance of the water distribution system. The proposed Water Distribution System Master Plan is consistent with this policy.

Policy 11.3.1

Plan, operate and maintain the water distribution system for all current and anticipated city residents within its existing Urban Growth Boundary and plan strategically for future expansion areas.

Finding: The purpose of updating the Water Distribution System Master Plan is to assure that all current and anticipated city residents within the UGB can receive a dependable, high quality water supply as the city continues to develop. This includes maintenance and where needed, upgrading the existing system as well as to serve future expansion areas. The proposed Water Distribution System Master Plan is consistent with this policy.

Policy 11.3.2

Collaborate with the South Fork Water Board to ensure that an adequate water supply system is maintained for residents. Coordinate with the South Fork Water Board, the City of West Linn, and Clackamas River Water to ensure that there is adequate regional storage capacity.

Finding: The plan includes a description of the existing water distribution system in Chapter 2, along with a detailed discussion of how water supply is provided to the City of Oregon City by the South Fork Water Board and as discussion of the regional master metering system for the three customers sharing the water supply. The SFWB is a water wholesaler that works with its customers, City of Oregon City, City of West Linn and CRW to ensure that all residents have an adequate water supply. The Water Distribution System Master Plan is consistent with this policy.

Policy 11.3.3

Maintain adequate reservoir capacity to provide all equalization, operational, emergency, and fire flow storage required for the City's distribution system.

Finding: In addition to water demand, the plan includes water distribution system service standards to ensure adequate water storage of a variety of contingencies including operational storage, equalization storage, fire storage and emergency storage. These standards include the need to provide a minimum allowable service pressure of 40 PSI, and a maximum day demand plus fire flow minimum standard. The Water Distribution System Master Plan is consistent with this policy.

Policy 11.3.4

Adopt a progressive water rate structure that will encourage water conservation.

Finding: The proposed Water Distribution System Master Plan does not recommend the adoption of a progressive water rate structure at this time. Additional public meetings to discuss the implementation of a water rate structure that will address the mandated rate roll-back in the City Charter will be necessary for plan implementation.

Financing scenarios presented in the plan include continuation of the existing level of services and costs without the rollback, a rollback of rates including cutbacks in operations, maintenance and upgrades, and identification of the rates that are required for maintaining the system at a sustainable level of system replacements.

The South Fork Water Board promotes the conservation of treated water in several ways. One is through the SFWB Water Conservation Program. At the beginning of 2001 SFWB began implementing water conservation programs for both Oregon City and West Linn. South Fork Water Board began its conservation efforts in 1996 when it joined with other regional water providers to make up the Columbia Willamette Water Conservation Coalition, which is now the Regional Water Providers Consortium. Since then, regional water providers have been working together to further the role of water conservation and efficient water use region wide. The program consists of public education and incentives to promote and implement water conservation by the end user. For more information see http://www.sfwb.org/conservation.html.

Water conservation efforts by the city include maintenance and upgrade of the water system to minimize unaccounted-for water usage, as discussed on pages 3-9 and 3-10 of the water demand analysis chapter of the plan. Unaccounted for water was estimated at 16.8 percent for the years 2002-2008, and includes unmetered customers, transmission system leaks, reservoir leaks, main breaks, faulty meters, over-filling reservoirs, fire fighting activities, system flushing and other miscellaneous hydrant uses. Mitigation of this unaccounted-for water includes ongoing refinement of the master metering and record keeping practices, meter change-outs, and repair and replacement of the water distribution system in order to account for all usage.

STATEWIDE PLANNING GOAL 13: To conserve energy. Land and uses developed on the land shall be managed and controlled so as to maximize the conservation of all forms of energy, based upon sound economic principles.

Finding: This goal is implemented through the applicable Goals and Policies in Section 13 of the Oregon City Comprehensive Plan: Energy Conservation.

The water distribution system proposed will support efficient use of a land within the city limits and urban growth boundary based on the adopted land use designations within the City Comprehensive Plan and zoning categories within the city limit through the timely, orderly and efficient delivery of water system extensions where it is efficient to promote higher intensity land uses and avoiding leap-frog development.

The city promotes the efficient use of land and conservation of energy through its Comprehensive Plan and Zoning Code and through the implementation of building codes. Higher density and mixed use zoning, land division, and site plan design standards promote more compact development patterns, and promote bicycling and walking instead of relying on the automobile for routine errands. New annexations are required to show that public utilities can be efficiently extended to new urban areas. Metro-approved Concept Plans are required prior to annexation to the city to assure that urban services and amenities will be developed in logical places as the community develops. Building codes require that new homes and businesses conserve energy through choice of materials, insulation, and installation of efficient plumbing, heating and cooling systems. The proposed Water Distribution System Master Plan is consistent with Statewide Planning Goal 13.

RECOMMENDATION

The Planning Commission may recommend City Commission adoption of the draft Water Master Plan finding that it is consistent with the City's Comprehensive Plan and the Statewide Land Use Goals. With respect to financing , rather than take a position on the most appropriate financing solution, the Planning Commission could acknowledge that under any of the financing scenarios identified in the plan, adequate water service can be made available to serve planned development including the UGB expansion areas.

Staff recommends that the Planning Commission recommend approval of the Oregon City Water Distribution System Master Plan, included as Exhibit 1, as an ancillary document to the Oregon City Comprehensive Plan to the City Commission for their consideration at the January 18th, 2012 public hearing.

LATEST EXHIBITS FOR PUBLIC HEARING OF 12/12/2011

A. Questions and Comments from Planning Commissioner McGriff, dated 11/3/2011
B. Staff Responses to Planning Commission Questions, dated 12/5/2011
C. SFWB Water Management and Conservation Plan, including Emergency Curtailment Plan, September 2004.
D. Public Information Presentation, November 21, 2011.
E. CIC presentation, December 5, 2011.

EXHIBITS FROM PUBLIC HEARING OF 10/24/2011 (ALREADY ENTERED INTO RECORD)

1) Oregon City Water Distribution System Master Plan – Full Document (On File).
   a) Executive Summary
      (1) Introduction
      (2) Existing Water Distribution System
      (3) Water Demand Analysis
      (4) Water Distribution System Service Standards
      (5) Hydraulic Model Update
      (6) Existing Water Distribution System Evaluation
      (7) Future Water Distribution System Evaluation
      (8) Recommended Capital Improvement Program
      (9) Water Distribution System Financing Plan (Revised)
   ii) Appendices
      (a) Diurnal Curve Development Technical Memorandum
      (b) Water System Seismic Vulnerability Assessment
      (c) Cost Estimating Assumptions
      (d) Project Sheets (Pipeline Project Maps and Data w/ Costs)
2) Comments from Lee Moore, General Manager, Clackamas River Water (CRW), 4/18/2011.
3) Comments from Paul Edgar, Canemah N.A. Land Use Chair, 1/26/2011.
4) Comments from Paul Edgar, Canemah N.A. Land Use Chair, 10/10/2011.
5) Memorandum from City Attorney Carrie Richter, regarding Goal 11 Requirements.
6) Oregon City Comprehensive Plan (2004). ***Note****: Goals and Policies for Public Facilities are in Section 11.*
7) Oregon City Water Master Plan (October 2004)

FAX

DATE 11-3-2011

TO Pete Walter

COMPANY City of Oregon City

FAX # 503-722-3880

FROM D McGriff

PAGES (including cover page) 2

[x] For Your Information [ ] Per Your Request
[ ] For Your Approval [ ]
[ ] For Review/Comment [ ]

SUBJECT Water Master plan question

COMMENTS

Here are some of the questions from my notes after reading the WMP

I think question 1, 6 & part of 4 were answered at our last meeting.

Thanks, Denyse

Questions about the Water master Plan:

1. ES-10: how were the population projects arrived at?
2. Page 1-1: Required systems improvements? By whom?
3. Page 2-9: What are the emergency conditions referred to in the paragraph?
4. Page 3-5: water demand- how are water conservation measures taken into account during the peak demand and does conservation affect financing?
5. Page 3-9: How does closure of Blue heron affect table 3-6?
6. Page 3-9: Browning and Ferris Industries no longer operates the Metro Transfer Station?
7. Page 3-15: how were the assumptions arrived at in section year 2030 water demand projections
8. Page 3-17: how did CRW arrive at their annual growth rate of 2%?
9. Page 4-9: Does the city have an extensive emergency curtailment plan?
10. Page 9-2 & 9-3: basis of rate payer demand?

OREGON CITY

Public Works

625 Center Street | Oregon City OR 97045
Ph (503) 657-0891 | Fax (503) 657-7892

TO:	Planning Commission
FROM:	Nancy Kraushaar, PE, City Engineer/Public Works Director Pete Walter, Associate Planner Carrie Richter, Assistant City Attorney
DATE:	December 5, 2011
SUBJECT:	Water Master Plan - Staff Responses to Questions from the Planning Commission

Who is responsible for constructing required system improvements?
The required water system improvements generally fall into two categories: 1) upgrades to the existing water distribution system, and 2) improvements needed to provide more capacity or extend pipes into planned growth areas within the City's urban growth boundary.

Upgrades to the existing water distribution system are the responsibility of the City. These types of projects are generally been funded from water rates.

The water system improvements for increased capacity or extensions into planned growth areas within the city's urban growth boundary are accomplished either by the City or a developer. If the project is constructed by the City, it is funded through system development charges.

The water master plan sets forth the sizing of the major water distribution system network, storage and pumping needs. When development is proposed, this information will be used to condition land use approvals for water system improvements where new water infrastructure is identified in the plan as needed.

What are the emergency conditions referred to on Page 2-9?
The emergency condition referenced in this paragraph relates to the ability to maintain pressure in the higher elevation areas served by the Boynton Reservoir. When the reservoir level drops due to high demand or interruption of service at the Mountainview Pump Station, the pressure in the area needs to be boosted by the Boynton Pump Station. The station is operated manually so operations staffs are required to start and stop the pumps in the event that the station is needed.

Generally, maintenance of pressure in the system is a key distribution system standard as discussed in detail in Chapter 4 and summarized in Table 4-1. These include fire flow, water supply capacity, pressure, storage, pumping facility capacity, etc.

Water demand – How are water conservation measures taken into account during the peak demand and does conservation affect financing?

Peak demand estimates are based on actual experience in the City where some water conservation measures have already been implemented through the programs adopted by the South Fork Water Board. Water conservation measures will reduce the revenue obtained by the City. Water is metered on a monthly use basis and not on a peak use basis. Consequently, measures that reduce overall use may have a minor effect on peak demand but will similarly reduce revenue. Reduced water consumption will result in reduced revenues to the Water Fund because water is currently charged at a flat rate regardless of how much water the customer uses. Since the City is financing improvements on a pay-as-you-go basis, water conservation will likewise reduce the financing capacity of the water fund.

Peak demand is also affected by the City's efforts to decrease the amount of unaccounted-for water through the installation of new meters and the replacement and repair or leaky pipelines. Also, as mentioned on Page 9-2, during years with a wet summer, domestic water consumption and corresponding revenue can drop significantly.

How does closure of Blue Heron affect Table 3-6?

Closure of the mill reduces the average water demand of the City. However, as land that is currently zoned for General Industrial use, this master plan must assume that an industrial user will locate on the property in the future, in which case some or all of this demand would be restored. Table 3-6 will be modified in the final version of the report to note this reduction in existing water demand although estimates for future use will continue to include the site for use as an industrial development.

How were the assumptions arrived at for the year 2030 water demand projections presented on Page 3-15?

The water demand projections are based on two possible rates of growth, 1.5% and 3.0%. These projections are provided to give the reader an indication of the possible range of future water demand. The master plan does not assume a definite time frame for this growth. Planning of the water distribution system was based on actual measured water use within existing developed areas and applying that same water use to similarly zoned vacant areas within the City and its urban growth area. The projections shown in Table 3-15 form the basis for estimating the size of pipelines needed to extend water service.

How did the Clackamas River Water District (CRW) arrive at their annual growth rate of 2% on Page 3-12?

Oregon City currently provides water through our distribution system to several areas served by CRW. Planning data was not available for these areas so an estimate was used and confirmed with CRW staff to provide a reasonable base flow for evaluation of the water distribution system. The estimate provides the capacity for infill and possibly some higher density development for these areas and a future base flow for analyzing the capacity of the Oregon City water distribution system.

Does the City have an extensive emergency curtailment plan as discussed on Page 4-9?
The Water Management and Conservation Plan prepared for South Fork Water Board by CH2M Hill in September 2004 was adopted by Oregon City, West Linn and South Fork Water Board. Section 4 titled 'Curtailment' satisfies the requirements of the Oregon Administrative Rules. It is a joint usage plan developed by the Clackamas River water users. The four and half page curtailment section outlines the alert stages and actions.

What is the basis of rate payer demand on Page 9-2 and 9-3 ?
For the purpose of developing the financial evaluation, actual water sold to customers has been used to calculate revenues. Thus, the single family dwelling revenue shown in Table 9-2 as well as the number of accounts are based on the billing records provided by the Finance Department. The average amount of water used is also based on actual water meter records from the Finance Department.

How does the water demand analysis provide for the possibility of development at higher densities than that envisioned by the Comprehensive Plan (e.g. redevelopment of lower density areas within the city limits)?
Such changes would require further analysis at the time the rezoning or plan amendment is proposed. The applicant would bear the burden of showing how the density increase could be accommodated under the current plan or else the application would be conditioned to increase the capacity through an exaction if the existing SDC structure does not already factor in the increased density.

What is the area of vacant buildable lands within the three Urban Growth Boundary (UGB) areas?

GIS staff calculated the following for the 3 UGB areas:

UGB Area	Total Acres	Vacant Acres	Vacant Percent	Unconstrained Vacant Acres	Unconstrained Vacant Percent
South End	471.1	252.1	53.5%	234.1	49.7%
Beavercreek Road	301.5	95.7	31.7%	61.8	20.5%
Park Place	527.4	348.9	66.2%	154.7	29.3%

The table above presents calculated vacant acres and also unconstrained vacant acres. Unconstrained acres exclude the following areas from the vacant acres:

- Flood Prone Soils
- Parks
- 1996 Flood Inundation
- FEMA 100-year floodplain
- Slopes 25% and greater
- Title 13 Natural Resource Overlay District
- Publicly owned tax lots
- Power and gas lines (15-foot buffer)
- Existing building footprints

Can the Planning Commission recommend approval of the Water Master Plan without resolution of the Water Rate / Financing discussion? If so, how?
Yes. The Planning Commission may recommend City Commission adoption of the draft Water Master Plan finding that it is consistent with the City's Comprehensive Plan and the Statewide Land Use Goals. Rather than take a position on the most appropriate financing solution, the Planning Commission could acknowledge that under any of the financing scenarios identified, adequate water service can be made available to serve planned development including the UGB expansion areas.

What is the level of community support for rate rollback?
The work sessions with the City Commission and Citizen Involvement Council (CIC) are intended to prepare the City Commission for adoption of the Water Master Plan. Then the City Commission will be asked to review rate scenarios for use in selecting the best finance strategy needed to ensure that Oregon City residents are well served by a safe and sustainable water system long into the future. At that time the City will hold comprehensive public discussions about the water system, the rate rollback mandated by the City Charter, and appropriate financing for the water system to best serve the community. Community opinion on the rate rollback will be better understood at that time.

Need better findings for Goal 1 compliance – based on subsequent meetings.
Staff will update the findings for Goal One compliance in the staff report based on the additional schedule of public meetings and work sessions.

Need to better illustrate what expenditures are covered with the rate rollback in 1991, 1992, 1994.

Expenses for Fiscal Year 2015-16 for operation and maintenance of the water distribution system are projected as follows:

Description	Expenses, $
Salaries	1,013,000
Fringe Benefits	666,000
Materials and Services	932,000
SFWB payment for water	1,778,000
Pump Station Operations	135,000
Chemicals and Materials	174,000
General Fund Administration	135,000
Franchise Fee	367,000
Total	5,200,000

If water rates are rolled back, revenue will be as low as $3.9 million and possibly as much as $4.7 million. Either way, no funding for capital projects would be available and major cuts in operational expenses will be necessary.

Well water rights – Can the City require that well water rights be conveyed to the City at annexation. Is there liability associated with the quality of that water? Quality of water of aquifers is unknown. CRW has identified water quality concerns.

There are a couple of issues associated with requiring conveyance of water rights upon annexation. First, it is unlikely that any of the existing domestic wells currently serving the UGB expansion areas exist pursuant to a water right rather than a well permit issued by the Water Resources Dept pursuant to OAR 690-205-0175. These domestic well permits are issued directly to property owners and are valid for 6 months with opportunities for renewal. As mere licenses running to the owner, these are not rights that the City could obtain as a condition of annexation. Second, acquiring and using water through prior appropriation does not ripen into a water right until it is acknowledged by the State. In cases where such acknowledgment has not occurred, it can be very difficult to assess the extent of the right. Third, in those limited cases where large landholders may hold recognized rights to acquire ground water (and staff knows of none), the City could exact those rights only in cases where the impacts from the proposed development were roughly proportional to the extent of the right under the *Dolan / Nollan* tests.

The City of Bend has struggled to find such proportionality in acquiring property owner water rights to nearby rivers and streams as a condition of annexation. Given the significant effort associated in determining whether any rights exist in these expansion areas and the extent of those rights, staff determined it wasn't worth looking any further into this issue.

Report

Water Management and Conservation Plan

Prepared for

South Fork Water Board

September 2004

EXPIRES: 12/31/05

CH2MHILL

PDX\032530015.DOC

Contents

Figures

Acronyms

ADD	average daily demand
ADP	average daily production
ccf	hundred cubic feet
cfs	cubic feet per second
CRW-N	Clackamas River Water (North)
CRW-S	Clackamas River Water (South)
gpcd	gallons per capita per day
gpm	gallons per minute
IGA	intergovernmental agreement
MDD	maximum day demand
MDP	maximum daily production
MG	million gallons
mgd	million gallons per day
MMD	maximum monthly demand
MMP	maximum monthly production
msl	mean sea level
NCCWC	North Clackamas County Water Commission
OWRD	Oregon Water Resources Department
POD	point of diversion
RFP	request for proposals
RWPC	Regional Water Providers Consortium
RWSP	Regional Water Supply Plan
SFWB	South Fork Water Board
UFW	unaccounted for water
UGB	urban growth boundary
WMCP	Water Management and Conservation Plan
WMP	water master plan
WTP	water treatment plant

SECTION 1

Introduction

This section addresses the requirements of OAR 690-086-0125.

1.1 System Overview

The South Fork Water Board (SFWB) owns and operates a water treatment plant (WTP) on the Clackamas River, as well as one pump station and approximately 5 miles of distribution piping. The SFWB was originally formed by and primarily supplies the Cities of Oregon City and West Linn, but also supplies water to Clackamas River Water (South) (CRW-S). SFWB also supplies the North Clackamas County Water Commission (NCCWC) and Lake Oswego on an as-needed or emergency basis.

1.2 Plan Organization

This Water Management and Conservation Plan (WMCP) is intended to provide guidance to the SFWB and the cities of Oregon City and West Linn in the development and implementation of future conservation efforts. Ultimately, it also will be submitted to the Oregon Water Resources Department (OWRD) for approval and will satisfy the Oregon Administrative Rules (OAR) Division 86 conservation requirements for the SFWB and the Cities of West Linn and Oregon City. Table 1-1 presents the WMCP sections addressing specific sections of OAR 690-86.

TABLE 1-1
Water Management and Conservation Plan Organization and Code Requirements
2004 South Fork Water Board WMCP

Section	*Code 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*

1.3 Affected Local Governments

This draft WMCP will be made available to the following affected agencies:

- South Fork Water Board
- City of Oregon City
- City of West Linn
- City of Lake Oswego
- North Clackamas County Water Commission
- Clackamas River Water—South

1.4 Plan Update Schedule

The SFWB, Oregon City, and West Linn anticipate submitting an update of the WMCP within 10 years or by 2014. As required by OAR 690-86, a progress report will be submitted in 5 years, or by December 2009.

1.5 Time Extension

No time extension is required or requested.

SECTION 2

Water Supplier Description

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

2.1 Source

The SFWB's source of water is the Clackamas River. River water is treated by the WTP, flows by gravity to the Division Street Pump Station, and is pumped into the distribution system. The WTP has a current capacity of 20 million gallons per day (mgd). Table 2-1 presents a summary of SFWB supply and possible alternate sources through connections with adjacent utilities. Interties are discussed in Section 2.2.

TABLE 2-1
Water Supply Summary[1,2,3]
2004 South Fork Water Board WMCP

Source Description	Capacity (mgd)
Clackamas River – SFWB Treatment Plant	20
North Clackamas County Water Commission Intertie	12
Clackamas River Water Intertie	4
Lake Oswego-West Linn Intertie	4

Notes:

[1] An intergovernmental agreement (IGA), dated February 29, 2000, states that 12 mgd maximum is to be transferred from SFWB to NCCWC. This is the assumed bi-directional capacity of the intertie available in an emergency, without consideration of the availability of water.

[2] An agreement with Clackamas River Water, dated April 24, 2000, states an average of 2 MG to be delivered by SFWB to CRW-S. Historical maximum day transfer was 4 mgd (in 1995). This is the assumed bi-directional capacity of the intertie available in an emergency, without consideration of the availability of water.

[3] West Linn received a maximum day flow of 2.7 mgd in 2002 from Lake Oswego. The stated capacity of the intertie per SFWB Draft Emergency Curtailment Plan is 4 mgd. This is the assumed bi-directional capacity of the intertie available in an emergency, without consideration of the availability of water.

mgd - million gallons per day.
MG - million gallons.
SFWB - South Fork Water Board.
CRW-S - Clackamas River Water (South).
IGA - intergovernmental agreement.

2.2 Interties

An agreement dated February 24, 2000, between the NCCWC and SFWB provided for the construction of a pipeline connecting the SFWB and NCCWC. This project is currently complete. The agreement allows SFWB to sell a winter water supply to NCCWC, and it also provides SFWB with an emergency backup source from NCCWC and CRW-S.

An agreement dated April 20, 2000, among CRW-S, the NCCWC, and SFWB provides for emergency interties, as discussed in Section 2.3.

An emergency intertie exists through a standby connection to the City of Lake Oswego system via a West Linn 18-inch-diameter mainline. This connection is bi-directional and is intended to supply up to 4 mgd either direction.

2.3 Intergovernmental Agreements

2.3.1 SFWB and NCCWC

The February 29, 2000, agreement provided that the SFWB would provide up to 12 mgd to the NCCWC between October 1 and April 30 of each year (winter water). Between May 1 and September 30 (summer water), the SFWB agreed to provide surplus water as available to the NCCWC. The SFWB supplies water to the NCCWC through the transmission line connecting SFWB's WTP to NCCWC's WTP.

2.3.2 CRW, NCCWC, and SFWB

The April 24, 2000, Intergovernmental Cooperative Agreement for Construction of Water Transmission Line was developed among CRW, NCCWC, and SFWB. All parties agreed to participate in the cost of engineering and construction of an interconnecting transmission line between the SFWB WTP and NCCWC's WTP. In addition, as part of this agreement, the parties also agreed to supply water as follows:

- **CRW**: Supplies water to CRW-North (CRW-N) and supplies 1.5 mgd to the NCCWC. CRW also will supply CRW-S to meet demands exceeding the 2 mgd (average daily demand [ADD]) to be delivered by the SFWB (CRW-S is the former service area of the Clairmont Water District). CRW also will supply the City of Gladstone pursuant to the April 9, 1985, agreement; the City of Milwaukie pursuant to the July 1, 1998, agreement, and the SFWB per the April 24, 2000, agreement.
- **NCCWC**: Supplies water to Oak Lodge; wheel water through CRW's system to Mt. Scott and Damascus (now Sunrise Water Authority); together with 1.5 mgd to be delivered to the NCCWC from CRW pursuant to the May 1, 1995, agreement.
- **SFWB:** Supplies water to Oregon City and West Linn. This agreement allows the SFWB to provide water to CRW-S at an annual average of 2 mgd and to the NCCWC pursuant to the water agreement dated February 29, 2000, at a rate of up to 12 mgd.

2.4 Service Area Description

A delineation of the area served by the SFWB, including all incorporated cities, water districts, and wholesale purchasers is presented in Figure 2-1. Historical population estimates are presented in Table 2-2 and are consistent with applicable land use plans.

TABLE 2-2
Historical Population Estimates
2004 South Fork Water Board WMCP

Calendar Year	Oregon City		West Linn	
	Population[1,2]	Annual Growth Rate	Population[3]	Annual Growth Rate
1991	16,760		17,160	
1992	16,810	0.30%	17,645	2.83%
1993	17,315	3.00%	18,165	2.95%
1994	17,545	1.33%	18,860	3.83%
1995	18,980	8.18%	19,930	5.67%
1996	20,410	7.53%	20,520	2.96%
1997	21,895	7.28%	20,975	2.22%
1998	22,560	3.04%	21,965	4.72%
1999	23,405	3.75%	23,395	6.51%
2000	26,200	11.94%	23,000	-1.69%
2001	26,680	1.83%	23,650	2.83%
2002	27,270	2.21%	23,990	1.44%

[1] 1991-1996 estimates from SFWB Water Master Plan (MSA, 9/97), which are based on Portland State University (PSU) Population Research Center (PRC) data.
[2] 1997-2001 estimates from draft Oregon City Water Distribution Master Plan (West Yost & Associates, November 2002), which are based on PSU PRC data.
[3] Estimates from PSU PRC data; beginning with 1995, includes 560 people served outside West Linn limits in deferred annexation zone.
[4] Negative growth rate for West Linn is the result of 2000 Census corrections.

2.5 Historical Use

2.5.1 Treatment Plant Production

SFWB produced approximately 20 mgd during peak periods during summer 2002. Average 2002 production was about 8.5 mgd. Table 2-3 presents production data for 1991-2002.

TABLE 2-3
Historical Treatment Plant Production[1,2]
2004 South Fork Water Board WMCP

	Total Production (mgd)				
Calendar Year	ADP	MMP	MDP	MMP/ADP	MDP/ADP
1991	7.08	10.66	15.16	1.51	2.14
1992	7.33	10.57	14.72	1.44	2.01
1993	6.66	9.27	12.25	1.39	1.84
1994	7.43	12.43	15.64	1.67	2.10
1995	7.17	11.83	18.21	1.65	2.54
1996	7.70	12.96	18.34	1.68	2.38
1997	8.11	12.48	16.31	1.54	2.01
1998	8.32	14.23	17.58	1.71	2.11
1999	7.90	11.92	16.01	1.51	2.03
2000	7.98	13.55	17.08	1.70	2.14
2001	7.50	12.15	16.51	1.62	2.20
2002	8.53	15.61	19.86	1.83	2.33

Notes:

[1] 1991-1996 data taken from 1997 South Fork Water Board Water Master Plan (Montgomery Watson, 1997).
[2] 1997-2002 data taken from South Fork Water Board water treatment plant production summaries.

ADP - average daily production.
MDP - maximum daily production.
mgd - million gallons per day.
MMP - maximum monthly production.

2.5.2 Demand

Historical demand data for Oregon City and West Linn are presented in Table 2-4 and 2-5 and were taken from SFWB master meter readings. Historical demand data for CRW-S, Lake Oswego, and NCCWC are presented in Tables 2-6 and 2-7 and were taken from SFWB billing data.

TABLE 2-4
Historical Demand Data for City of Oregon City[1,2]
2004 South Fork Water Board WMCP

Calendar Year	Est. Population Served	ADD	Total Demand (mgd)				Per Capita Demand (gpcd)		
			MMD	MDD[3]	MMD/ADD	MDD/ADD	ADD	MMD	MDD
1991	16,760	2.77	4.12	5.93	1.49	2.14	165	246	354
1992	16,810	2.86	4.18	5.75	1.46	2.01	170	249	342
1993	17,315	2.68	3.49	4.93	1.30	1.84	155	202	285
1994	17,545	3.07	4.70	6.45	1.53	2.10	175	268	367
1995	18,980	2.85	4.56	7.24	1.60	2.54	150	240	381
1996	20,410	3.15	5.04	7.50	1.60	2.38	154	247	367
1997	21,895	3.25	4.73	6.53	1.46	2.01	148	216	298
1998	22,560	3.57	5.46	7.53	1.53	2.11	158	242	334
1999	23,405	3.41	5.21	6.41	1.53	1.88	146	223	274
2000	26,200	3.49	5.75	7.43	1.65	2.13	133	219	284
2001	26,680	3.65	5.54	8.03	1.52	2.20	137	208	301
2002[4]	27,270	4.00	6.43	8.80	1.61	2.20	147	236	323

[1] Data from 1991-1996 reproduced from 1997 SFWB Water Master Plan (Montgomery Watson, September 1997)
[2] Data from 1997-2001, except where noted, reproduced from Draft Oregon City Water Distribution System Master Plan (West Yost & Associates, January 2003)
[3] For 1997-2001, MDD calculated from maximum daily peaking factors derived in Draft Oregon City Water Distribution System Master Plan (West Yost & Associates, January 2003)
[4] 2002 ADD received from West Yost & Associates (January 2003). Monthly flow readings through May were not available as a result of master meter replacement MMD based on maximum June-December flows, MDD based on MDD/ADD ratio from 2001.

ADD - average daily demand.
gpcd - gallons per capita per day.
MDD - maximum day demand.
mgd - million gallons per day.
MMD - maximum monthly demand.

TABLE 2-5
Historical Demand for City of West Linn[1,2]
2004 South Fork Water Board WMCP

Calendar Year	Est. Population Served	Total Demand (mgd)					Per Capita Demand (gpcd)		
		ADD	MMD	MDD	MMD/ADD	MDD/ADD	ADD	MMD	MDD
1991	17,160	2.51	4.25	5.33	1.69	2.12	146	248	311
1992	17,645	2.62	4.53	5.59	1.73	2.13	148	257	317
1993	18,165	2.47	3.67	4.52	1.49	1.83	136	202	249
1994	18,860	2.85	4.92	6.31	1.73	2.21	151	261	335
1995	19,930	2.72	4.47	5.72	1.64	2.10	136	224	287
1996	20,520	2.84	4.75	6.50	1.67	2.29	138	231	317
1997[3]	20,975	2.79	4.52	6.00	1.62	2.15	133	215	286
1998	21,965	2.91	5.38	6.54	1.85	2.25	133	245	298
1999	23,395	3.06	5.08	6.21	1.66	2.03	131	217	265
2000	23,000	3.16	5.75	6.79	1.82	2.15	137	250	295
2001[4]	23,650	3.04	4.97	6.17	1.64	2.03	129	210	261
2002[4]	23,990	3.35	6.88	9.15	2.05	2.73	140	287	381

Notes:

[1] Data from 1991-1996 reproduced from 1997 SFWB Water Master Plan (Montgomery Watson, September 1997).
[2] Data from 1997-2002, except where noted, reproduced from master meter records.
[3] 1997 data from 1999 City of West Linn Water System Master Plan (Montgomery Watson, April 1999).
[4] 2001/2002 data include water received from Lake Oswego from October 2001 to April 2002.

ADD - average daily demand.
gpcd - gallons per capita per day.
MDD - maximum day demand.
mgd - million gallons per day.
MMD - maximum monthly demand.

TABLE 2-6
Historical Demand Data for Clackamas River Water - South[1,2]
2004 South Fork Water Board WMCP

	Total Demands (mgd)				
Calendar Year	**ADD**	**MMD**	**MDD[3]**	**MMD/ADD**	**MDD/ADD**
1991	1.49	2.57	3.19	1.72	2.14
1992	1.5	2.56	3.02	1.71	2.01
1993	1.36	2.18	2.50	1.60	1.84
1994	1.49	2.86	3.13	1.92	2.10
1995	1.62	2.79	4.11	1.72	2.54
1996	1.7	3.18	4.05	1.87	2.38
1997	1.74	2.61	3.62	1.50	2.08
1998	1.75	3.20	3.82	1.83	2.18
1999	1.65	2.70	3.23	1.64	1.95
2000	1.65	3.12	3.52	1.90	2.14
2001	1.57	2.67	3.31	1.70	2.11
2002	2.00	2.95	4.92	1.48	2.46

Notes:

[1] Data from 1991-1996 reproduced from 1997 SFWB Water Master Plan (Montgomery Watson, September 1997).
[2] Data from 1997-2002 reproduced from SFWB master meter billing records.
[3] MDD calculated using average MDD/ADD factors from Oregon City and West Linn for same period.

ADD - average daily demand.
MDD - maximum day demand.
mgd - million gallons per day.
MMD - maximum monthly demand.

TABLE 2-7
Historical Consumption Data for Lake Oswego and NCCWC
2004 South Fork Water Board WMCP

User	**Month**	**Use (MG)[1]**
Lake Oswego	Jul-02	2.23
	Aug-02	34.98
NCCWC	Dec-02	20.74
	Jan-03	22.78
	Feb-03	11.52

Notes:

[1] Data from SFWB master meter billing records.

NCCWC - North Clackamas County Water Commission.
MG - million gallons.

2.6 Consumer Characteristics

Tables 2-8 through 2-11 and Figures 2-2 and 2-4 present description of customers served including type of user, number of connections, and quantities of water used for Oregon City and West Linn, respectively. Both Oregon City and West Linn are predominantly residential in nature. Single family residences account for about 87 percent of the connections and 55 percent of the consumption in Oregon City. Single family residences account for about 96 percent of the connections and 81 percent of the consumption in West Linn.

TABLE 2-8
Water Consumption by Customer Class – Oregon City[1]
2004 South Fork Water Board WMCP

	Consumption (mgd)					
Customer Class	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Residential	1.47	0.87	1.40	1.59	1.58	1.78
Institutional	0.27	0.22	0.27	0.30	0.29	0.37
Commercial	0.53	0.28	0.51	0.53	0.52	0.55
Industrial	0.01	0.00	0.01	0.00	0.01	0.01
Multiple Units	0.48	0.33	0.49	0.50	0.53	0.51
Senior Citizens	0.02	0.01	0.02	0.01	0.01	0.02
Annual Total	**2.78**	**2.84**	**2.70**	**2.93**	**2.94**	**3.24**

Notes:

[1] Data from Oregon City water billing records.

mgd - million gallons per day.

TABLE 2-9
2003 Customer Connection Records for Oregon City[1]
2004 South Fork Water Board WMCP

	Connections	**Percent Connections**	**Percent Consumption**
Residential	7,261	87.20%	55.01%
Institutional	85	1.02%	11.39%
Commercial	456	5.48%	16.87%
Industrial	5	0.06%	0.40%
Multiple Units	406	4.88%	15.85%
Senior Citizens	113	1.36%	0.48%
Annual Total	**8,327**	**100%**	**100%**

Notes:

[1] Data from Oregon City water billing records.

TABLE 2-10
2003 Customer Connection Records for West Linn[1]
2004 South Fork Water Board WMCP

	Consumption (mgd)				
Customer Class	**1998**	**1999**	**2000**	**2001**	**2002**
Residential - SF	NA	NA	2.17	2.16	2.32
Residential - MF	NA	NA	0.28	0.27	0.26
Commercial	NA	NA	0.21	0.21	0.21
Public Facilities	NA	NA	0.06	0.06	0.06
Discount Billing	NA	NA	0.01	0.01	0.01
Total	**NA**	**NA**	**2.73**	**2.70**	**2.86**

Notes:

[1] Data from West Linn Water Billing Department.

NA = Data prior November 1999 not available.
mgd - million gallons per day.

TABLE 2-11
2002 Consumption Billing Records for West Linn[1]
2004 South Fork Water Board WMCP

Customer Class	Connections	Percent Connections	Percent Consumption
Residential - Single Family	7,743	95.16%	80.03%
Residential - Multifamily	188	2.31%	9.84%
Commercial	129	1.58%	7.81%
Public Facilities	39	0.47%	2.11%
Discount Billing	39	0.47%	0.23%
Total	**8,137**	**100%**	**100%**

Notes:

[1] Data from West Linn Water Billing Department.

2.7 Evaluation of Supply

The SFWB owns and operates one river intake on the Clackamas River, a raw water pumping station, a WTP, finished water pumping station, and raw and finished water transmission pipelines. The "new" river intake was constructed in 1996 and is located approximately 500 feet downstream of the "old" intake. The "old" intake has been decommissioned. The capacity of the fish screen is 42.6 mgd and the structure and piping are designed to carry this flow. The current firm pumping capacity of the intake is approximately 21 mgd.

The existing SFWB Water Master Plan addresses capital improvements required to meet the projected 20-year demands.

2.8 Evaluation of Water Rights

The SFWB manages four surface water rights on the Clackamas River. Table 2-12 presents a summary of these water rights. Water use under these rights includes 3.9 mgd under certificate C1067 and the remaining capacity of the WTP and delivery systems is used under permit P-22581. One partial certification of permit P-22581 (for 14.5 mgd) is pending Oregon Water Resources Department (OWRD) review. The remaining 34.0 mgd will require certification when the WTP is expanded. Water rights held by the SFWB total 74.98 mgd. However, the diversion points for permits P-9982 and P-3778 are located high in the Clackamas River watershed. Low-flow conditions at this location may limit use of these permits to 9.7 mgd at certain times of the year. This 22.6 mgd reduction would reduce the SFWB's total water available during low flow conditions to 52.4 mgd.

The SFWB's new intake can be used as the point of diversion (POD) for these rights. The SFWB has no groundwater rights. Permits P-3778 and P-9982 also may be amended for use at additional PODs on the Clackamas River.

The SFWB's water rights are all senior to the 1966 and 1968 in-stream water rights held by the OWRD. Should the SFWB choose to obtain additional points of diversion for permits P-3778 and P-9982 to the Clackamas River intake, the total available withdrawal rate at the intakes during low flow periods would be approximately 52.4 mgd.

The future demand projections are discussed in Section 5 and estimate a 2023 maximum day demand (MDD) of approximately 31 mgd. Therefore, the SFWB has adequate water rights to meet 20-year projected demands and to plan for events beyond the 20-year horizon.

2.9 System Description

Figure 2-1 presents a schematic of the source, treatment, pumping, storage, and major transmission facilities for the SFWB, West Linn, and Oregon City. Figure 2-5 presents a schematic of the current pressure zones for the system. Tables 2-13 through 2-18 present detailed inventories of the SFWB, West Linn, and Oregon City transmission, pumping, and storage facilities.

TABLE 2-12
Clackamas River Water Rights Managed by South Fork Water Board
2004 South Fork Water Board WMCP

Permit Holder	Certificate/Permit (Application No.)	Max Instantaneous Allowed		Status	Estimated Total Remaining Right to Certificate (mgd)	Type of Beneficial Use	Authorized Date of Completion	Maximum Instantaneous Diverted 2002 (mgd)	Average Daily Diverted 2002 (mgd)	POD[1]	Source	Priority Date
		mgd	cfs									
City of Oregon City[2]	P-3778 (S-5942)	12.9	20	Permitted use may be limited in certain months because of water flow	4.85 at low flow conditions	Municipal	10-1-2050[5]	0	0	Section 29[1]	South Fork Clackamas	1/16/1918
City of Oregon City[2] and City of West Linn	P-9982 (S-11007)	19.4	30	Permitted use may be limited in certain months because of water flow	4.85 at low flow conditions	Municipal	N/A[6]	0	0	Section 29[2]	Memaloose Creek	8/11/1926; 1/16/1931
South Fork Water Board (SFWB)[3]	P-22581 (S-28676)	38.8	60	Partial proof of 14.5 mgd has been submitted	24.3	Municipal	10-1-2049[5]	14.5	4.7	SFWB new intake	Clackamas River	8/3/1953
South Fork Water Board	T6162 confirming right of C1067 (P-2257)	3.9	6.0	T6162 order cancelled C1067, but a confirming right was to be issued. Status of confirming right unknown.	0	Municipal	Complete	3.9	3.9	SFWB old intake	South Fork Clackamas and Clackamas	7/17/1914
Total Permit		**75.0**	**116**		**34.0**			**18.4**	**8.6**			

[1] Section 29 refers to the intakes authorized as follows:
P-3778 point of diversion (POD): Section 29 T4S R5E WM at a point from which the ¼ section corner between Sections 29 and 30 bears N 37 degrees and 3 minutes W 1402.0' distant.
P-9982 POD: From south fork near SW corner of S29, being upstream approximately 1,300 feet from the junction of Memaloose Creek and South Fork. From Memaloose Creek, South 18 degrees 6 minutes East, 4.042 feet from the NW corner of S29.

[2] The water right P-9982 is permitted for a total of 30 cubic feet per second (cfs) (19.4 million gallons per day [mgd]), 10 cfs to supplement Permit 2257 (C1067) from Memaloose Creek and 20 cfs from South Fork to supplement P3778. South Fork believes that because of low streamflows, likely only 15 cfs (9.7 mgd) would be available to certificate. The actual amount is to be determined in the future from long-term monitoring data.

[3] POD changed by Declaratory Ruling, Vol. 49, p. 173

[4] Streamflow dependent species listed as sensitive, threatened or endangered: Summer and Winter Steelhead, Spring Chinook, and Coho in South Fork Clackamas and Clackamas. None listed for Memaloose Creek. Ref: Stream Net Website, and Clackamas Watershed Atlas, EPA, December 1997.

[5] Pending current extension application.

[6] No time limit fixed in permit.

cfs = cubic feet per second
mgd = million gallons per day
POD = point of diversion

TABLE 2-13
Water System Inventory - Pipelines
2004 South Fork Water Board WMCP

Pipe Size (inches)	Length (miles)		
	Oregon City[1]	West Linn[2]	SFWB[3]
2	2.4	4.05	
4	7.5	10.56	
6	41.9	49.28	
8	49.9	26.63	
10	8.3	7.58	
12	15.1	3.70	
14		3.12	
16	3.5	1.63	
18	8.1	3.52	
20		0.97	
24		2.01	3.36
30			1.59
48			0.39
Total	**137**	**113**	**5.3**

Notes:

[1] From City of Oregon City Water draft WMP (West Yost & Associates, January 2003).

[2] From City of West Linn Water System geographical information system (GIS) data.

[3] From Oregon City Water System AutoCAD data.

SFWB - South Fork Water Board.

TABLE 2-14
Water System Inventory - Oregon City Reservoirs
2004 South Fork Water Board WMCP

Reservoir[1]	Overflow Elevation (feet msl)	Year Built	Volume (MG)
Mountainview	492	1916	10.50
Boynton	592	1984	2.00
Henrici	592	1994	2.00
Barlow Crest	549	1999	1.75

[1] From City of Oregon City draft WMP (West Yost & Associates, January 2003).

MG - million gallons.
msl - mean sea level.

TABLE 2-15
Water System Inventory - West Linn Reservoirs
2004 South Fork Water Board WMCP

Reservoir[1]	Overflow Elevation (feet msl)	Year Built	Volume (MG)
Bolton	440	1913	2.50
Horton	731	1974	1.50
Rosemont	860	1991	0.40
Bland Circle	585	1981	0.50
Willamette	351	1970	0.60
View Drive	328	1967	0.50

[1] From 1999 City of West Linn Water System Master Plan (Montgomery Watson, April 1999).

MG - million gallons.
msl - mean sea level.

TABLE 2-16
Water System Inventory - Oregon City Pump Stations
2004 South Fork Water Board WMCP

Pump Station[1]	Number of Pumps	Total Capacity (gpm)
Mountainview	4	7,050
Boynton	2	2,600
Hunter Avenue	3	1,800
Fairway Downs	4	1,550
Livesay Road	1	30

[1] From City of Oregon City draft WMP (West Yost & Associates, January 2003).

TABLE 2-17
Water System Inventory - West Linn Pump Stations
2004 South Fork Water Board WMCP

Pump Station[1]	Number of Pumps	Total Capacity (gpm)
Bolton	6	5,750
Horton	4	3,350
Willamette	3	1,500

[1] From 1999 City of West Linn Water System Master Plan (Montgomery Watson, April 1999).

gpm - gallons per minute.

TABLE 2-18
Water System Inventory – South Fork Water Board Pump Station
2004 South Fork Water Board WMCP

Pump Station[1]	Number of Pumps	Total Capacity (mgd)
Division Street	3	17

[1] From 1999 City of West Linn Water System Master Plan (Montgomery Watson, April 1999).

mgd - million gallons per day

2.10 System Leakage and Unaccounted for Water

In this subsection, unaccounted for water (UFW) is calculated separately for the SFWB, West Linn, and Oregon City. UFW rates for the SFWB, Oregon City, and West Linn are presented in Tables 2-19, 2-20, and 2-21, respectively. For the SFWB, water recorded at the master meters and billed to Oregon City, West Linn, CRW-S, NCCWC , and Lake Oswego was subtracted from WTP production data to obtain an estimate of the quantity of UFW. For Oregon City and West Linn, billed consumption was subtracted from water recorded at the master meters and billed by the SFWB to obtain an estimate of the quantity of UFW.

It is important to note that the UFW rate calculated in this subsection is based on the best available information at the time of this WMCP. Because UFW includes all uses that are not metered or estimated and documented in some way, it is not equal to leakage. For both West Linn and Oregon City estimates of unmetered uses were not available, therefore, the actual leakage rates could not be determined. As the cities develop their water audit procedures, the UFW estimates will be reduced and more closely approximate the actual leakage rate. Because detailed water audits are not available, UFW is assumed to equal leakage.

2.10.1 SFWB Unaccounted for Water

The SFWB production records are taken from the effluent meters at the WTP. Therefore, backwash water does not need to be accounted for separately in UFW calculations.

Since 1997, the SFWB has billed customers for 1.5 percent more water than produced at the WTP. Because the SFWB transmission system facilities are limited, leakage would be expected to be low. This negative UFW rate could be the result of inaccurate flow measuring either at the WTP or at the individual master meters.

2.10.2 Oregon City Unaccounted for Water

Since 1997, Oregon City has billed customers for about 18 percent less than was metered coming from the SFWB. Because UFW is more than 10 percent and there is no available data regarding unmetered uses to show that leakage is less than 15 percent, Oregon City will be required to implement a leak detection as stated in Division 86. Also, because leakage is greater than 15 percent, a leak repair program is required. The following are possible causes of this discrepancy:

- Leaking pipes
- Leaking tanks
- Inaccurate metering
- Unmetered use
  - Parks use
  - Public buildings
  - Hydrant testing
  - Fire fighting uses
  - Line flushing
  - Developer and construction use

The following are possible remedies:

- Improved leak detection and repair
- Meter testing and replacement
- Meter all uses and read all meters
- Improve estimating and documentation procedures for all uses that are not metered such as fire fighting and line flushing.

2.10.3 West Linn Unaccounted for Water

Since 2000, West Linn has billed customers for about 13 percent less than metered from the SFWB. Because UFW (and therefore leakage) is less than 15 percent, a leak repair program is not required, however, a leak detection program is required for UFW rates greater than 10 percent.

TABLE 2-19
Unaccounted for Water - SFWB
2004 South Fork Water Board WMCP

Calendar Year	Delivered Water from WTP (MG)	Master Meter Demand (MG)	UFW
1997	2,960	2,840	4.0%
1998	3,037	3,006	1.0%
1999	2,884	2,965	-2.8%
2000	2,913	3,027	-3.9%
2001	2,738	2,833	-3.5%
2002	3,113	3,242	-4.1%
Average			**-1.5%**

MG - million gallons.
SFWB - South Fork Water Board.
UFW - unaccounted for water.
WTP - water treatment plant.

TABLE 2-20
Unaccounted for Water - City of Oregon City
2004 South Fork Water Board WMCP

Calendar Year	Received from SFWB (MG)	Billed Consumption (MG)	UFW
1997	1,186	1,014	14%
1998	1,303	1,036	21%
1999	1,245	985	21%
2000	1,274	1,069	16%
2001	1,332	1,074	19%
2002	1,460	1,182	19%
Average			**18.4%**

MG - million gallons.
SFWB - South Fork Water Board.
UFW - unaccounted for water.

TABLE 2-21
Unaccounted for Water - West Linn
2004 South Fork Water Board WMCP

Calendar Year	Received from SFWB (MG)	Billed Consumption (MG)	UFW
1997	1,018	NA	NA
1998	1,063	NA	NA
1999	1,118	NA	NA
2000	1,153	995	14%
2001	1,111	986	11%
2002	1,223	1,043	15%
Average			**13.2%**

MG - million gallons.
NA - not available.
SFWB - South Fork Water Board.
UFW - unaccounted for water.

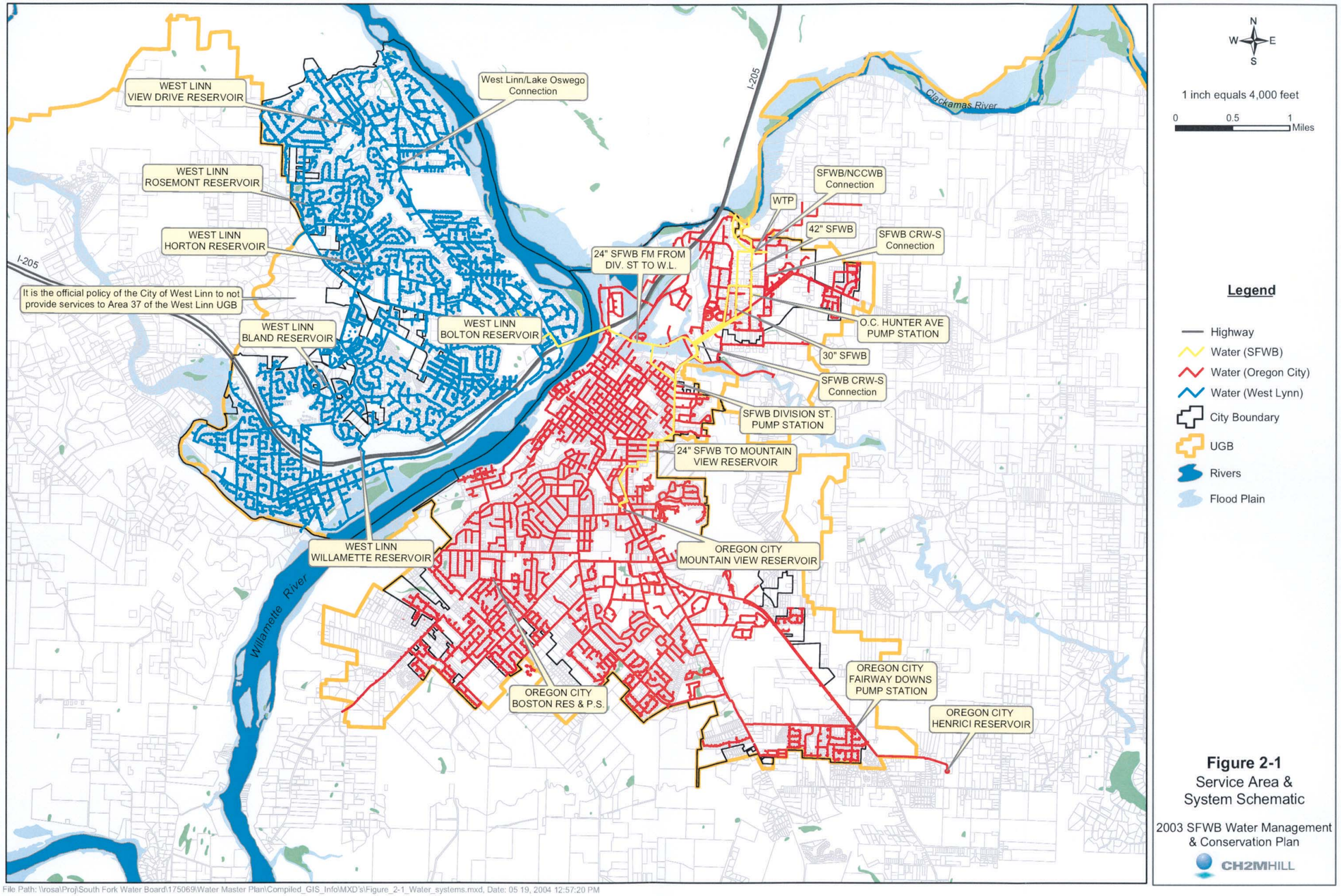

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Figure 2-1
Service Area &
System Schematic

2003 SFWB Water Management
& Conservation Plan

CH2MHILL

FIGURE 2-2
Water Demand and Consumption – SFWB
2004 South Fork Water Board WMCP

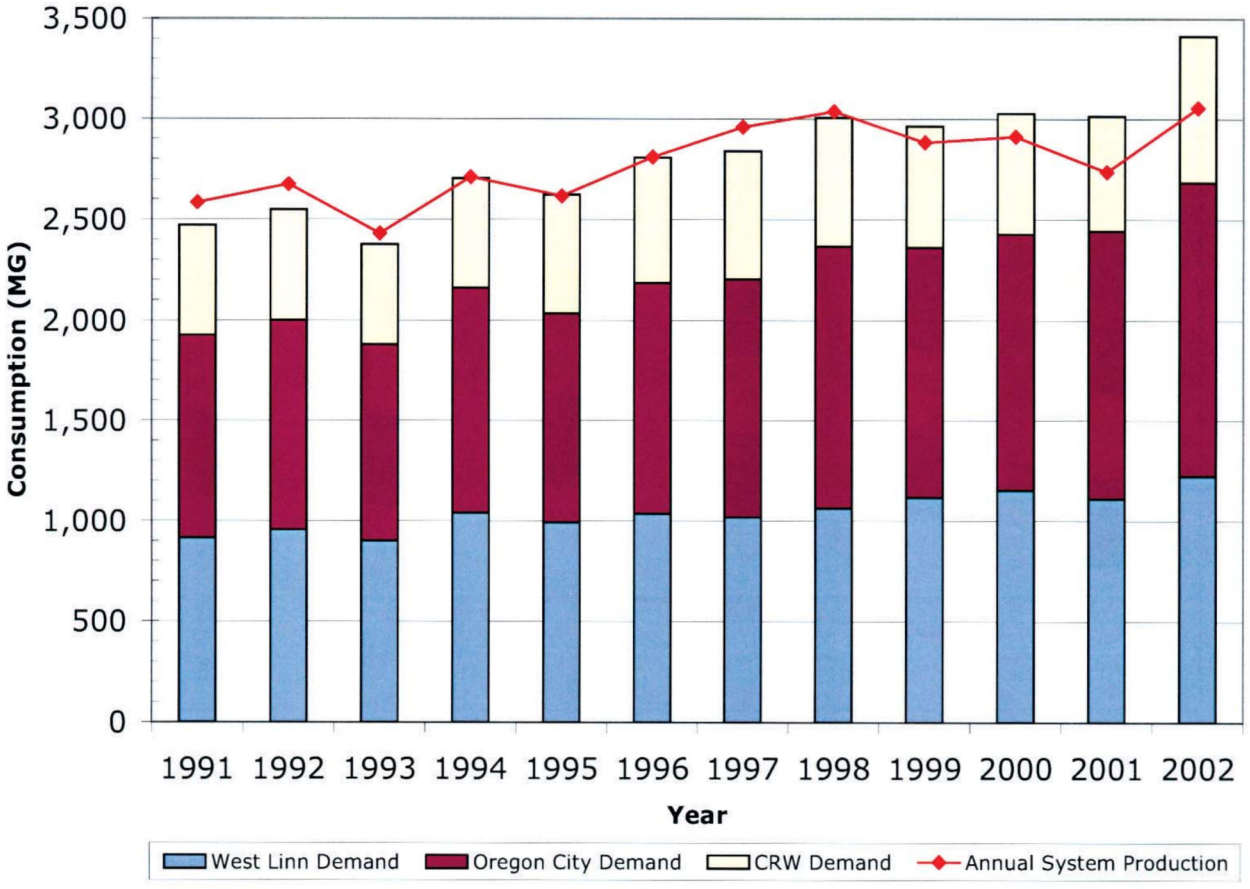


FIGURE 2-3
Water Demand and Consumption – Oregon City
2004 South Fork Water Board WMCP

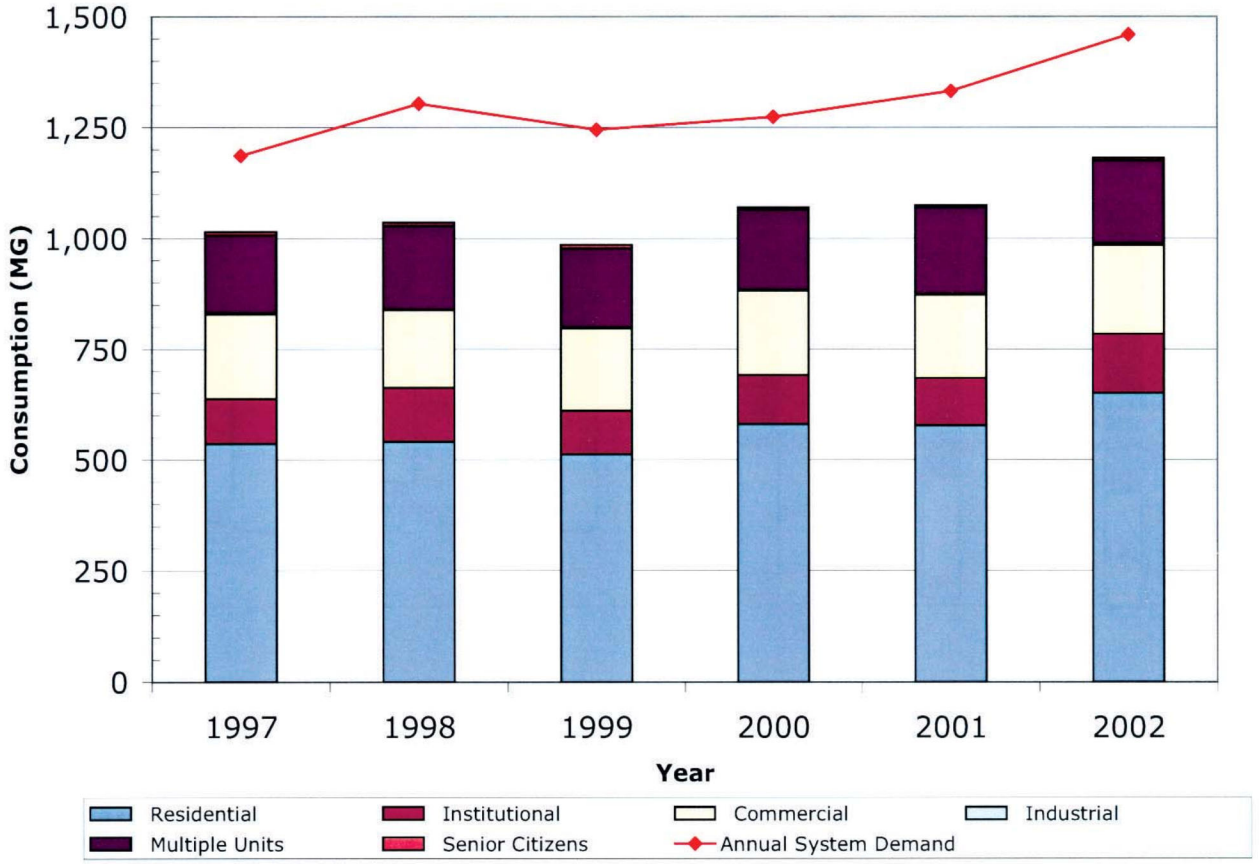
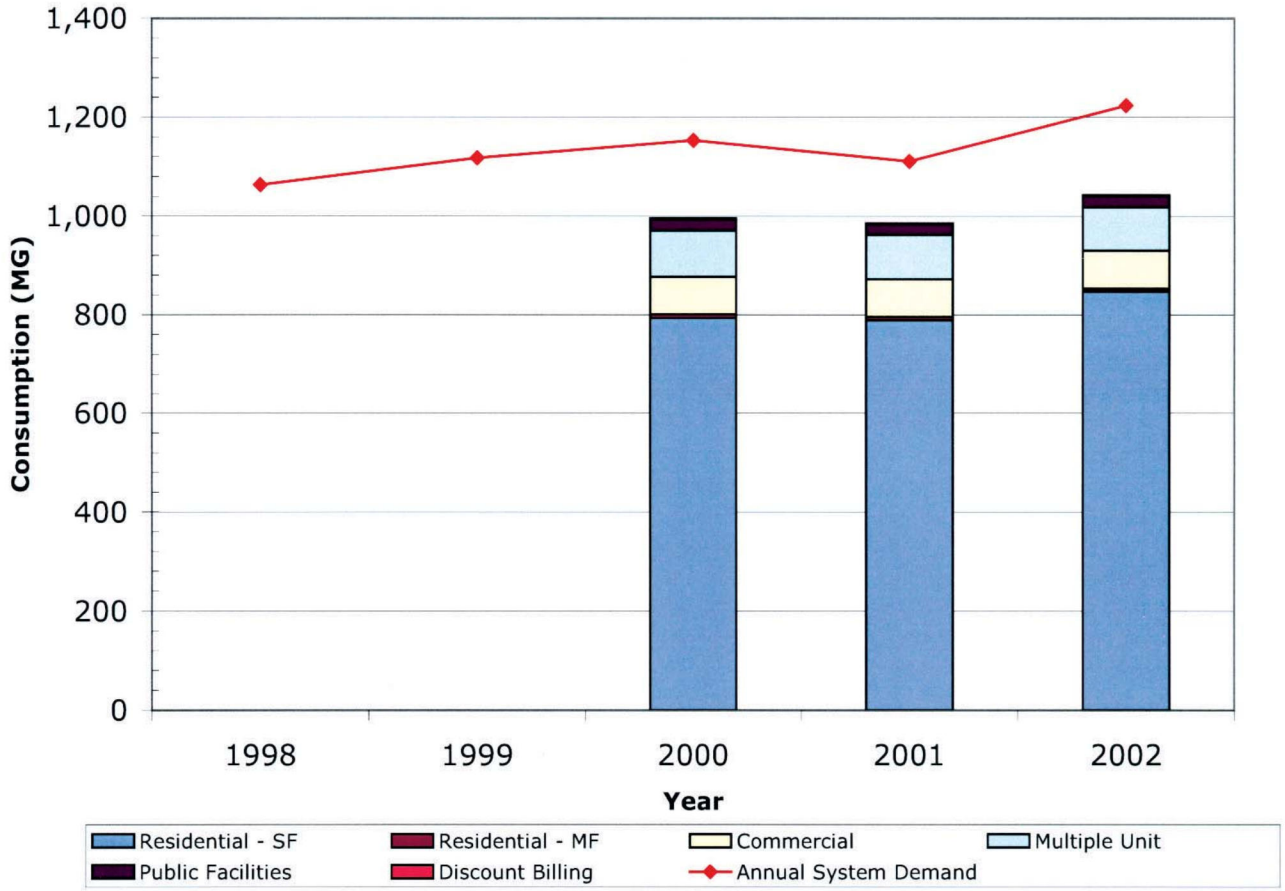


FIGURE 2-4
Water Demand and Consumption – West Linn
2004 South Fork Water Board WMCP



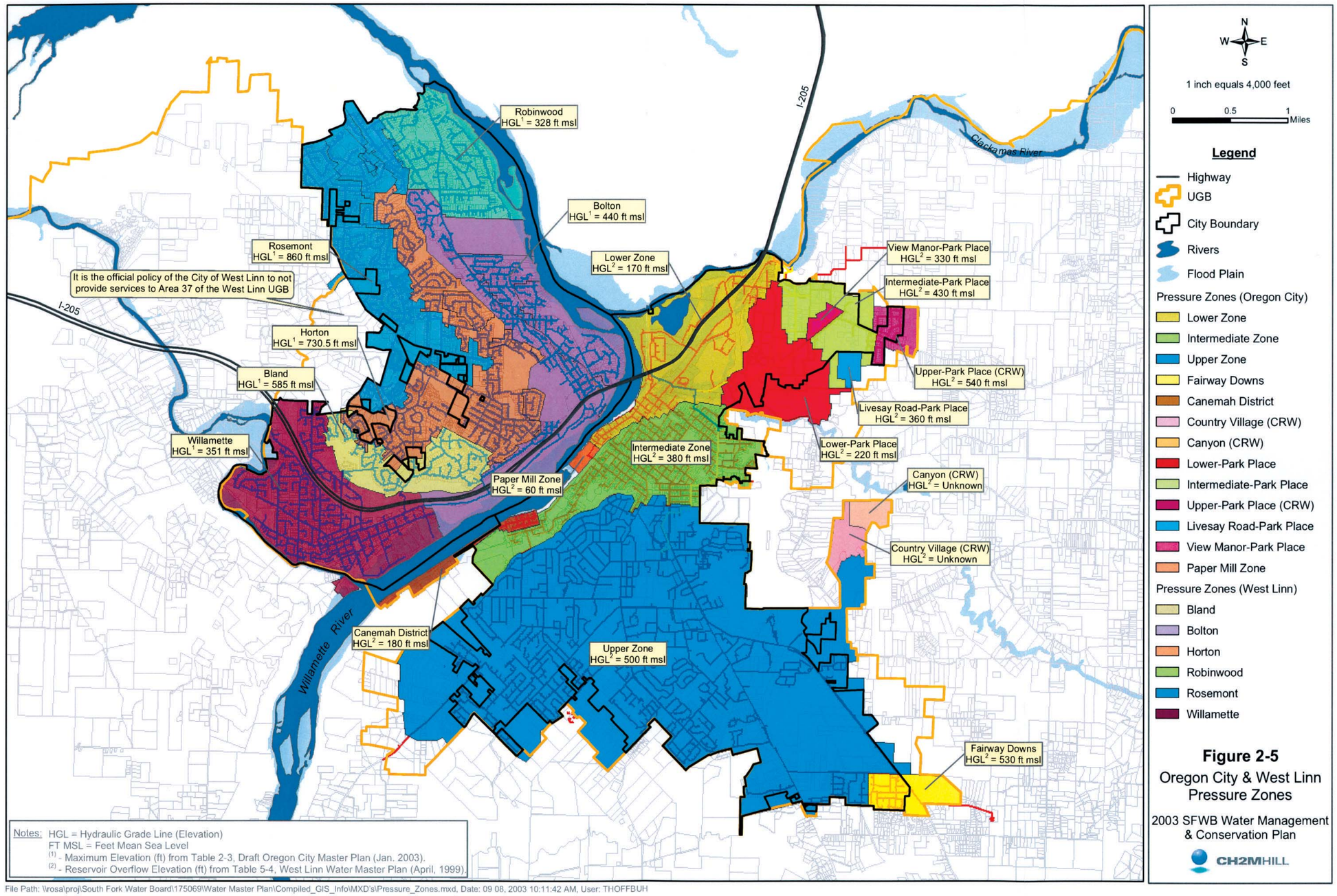


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Figure 2-5
Oregon City & West Linn Pressure Zones
2003 SFWB Water Management & Conservation Plan

CH2MHILL

SECTION 3

Water Conservation

This section addresses the requirements of OAR 690-086-0150.

3.1 Progress Report on Current Conservation Measures

The SFWB, Oregon City, or West Linn do not currently have an approved WMCP. This WMCP will serve as their first plan. UFW, leakage, and repair programs have been addressed in both Oregon City's draft water master plan (WMP) and West Linn's 1999 WMP and are discussed below.

3.1.1 SFWB

On August 19, 1992, the SFWB adopted Resolution 92-3 empowering the General Manager to implement conservation/curtailment measures during water shortages. Respectively, the Cities of Oregon City and West Linn passed ordinances in 1992 giving the directors of their public works the authority to declare a water shortage and to prescribe limitations and enforce penalties.

In January 2001, the SFWB hired a water environment coordinator, who is responsible for coordinating and implementing conservation programs for the Cities of Oregon City and West Linn. The coordinator conducts educational programs and provides technical assistance about water conservation to citizens of Oregon City and West Linn.

The SFWB currently monitors all incoming and outgoing flows and tests and calibrates all meters annually. The SFWB WTP has been recycling backwash water since 1976. Two backwash meters were installed in June 2003. Based on readings from these meters, it is estimated that the SFWB saves approximately 3 percent through this recycling program.

3.1.2 City of Oregon City Water Master Plan, DRAFT, January 2003

The draft WMP reports an average UFW rate of about 18 percent for the period 1997-2001. It is recommended in the draft WMP that Oregon City make an effort to meter all use points and conduct a leak detection survey. Oregon City has installed meters at all known use points, so the system currently is 100 percent metered. A request for proposals (RFP) for leak detection services is being drafted.[1] The 2004 fiscal budget will include $75,000 for this project.

3.1.3 City of West Linn Water Master Plan, 1999

As part of the WMP, an UFW and pilot leak detection survey was conducted. The pilot leak detection survey was conducted in March 1997. The UFW survey was based on flow data from February 1996 to February 1997.

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[1] Fax from Gail Johnson, Oregon City, August 27, 2003.

As a result of the leak survey, it was determined that total UFW for West Linn was approximately 9 percent. This value was based on several assumptions regarding unmetered and under-metered use, in addition to metered consumption records. At the time of the survey, storm drain flushing, sewer cleaning, and street cleaning programs routinely metered and recorded consumption, while fire fighting and main flushing programs did not.

Approximately 15 percent of the system was surveyed for leaks. The survey identified 13 leaks with a total flow of approximately 23 gallons per minute (gpm). Based on this estimate, the survey estimated system-wide leakage to be about 7.8 percent. Including an estimate of leakage from the Bolton Reservoir (5 gpm), total leakage was estimated to be about 8.1 percent.

Based on the survey, the following recommendations were made:

- Conduct a leak detection survey every 5 years using West Linn's sonic leak detection equipment.
- Maintain a leak repair log.
- Prepare monthly unmetered use reports.
- Test all large meters on an annual basis for accuracy.
- Pilot test residential meters for accuracy.
- Establish a program to meter and bill all construction use.

West Linn has kept records of non-billable uses and leak repair efforts; however, these records have not been documented and compiled into finalized reports. West Linn will continue its efforts to establish and conduct these programs on a regular basis.

Currently, the annual budget for main replacement is about $350,000. Replacement projects are identified and prioritized on the basis of the number of repairs and leaks.

3.2 Use and Reporting Program

In accordance with OAR 690-85, the SFWB submits annual water use reports to the OWRD. The last two annual reports are included in Appendix A.

3.3 Other Conservation Programs

The SFWB is a member of the Regional Water Providers Consortium (RWRC), which was created in 1996 to coordinate implementation of the Regional Water Supply Plan (RWSP) for the Portland metropolitan area. The RWRC provides a forum for collaboration on water supply, resource management, and conservation efforts. Conservation is a critical component of the supply plan for meeting the regions future water needs.

Consortium members are working closely to increase awareness about the need to conserve water and educate consumers how to be resourceful. Awareness efforts include a multi-media campaign each summer and information booths at regional events such as the Yard, Garden & Patio Show and the Salmon Festival. For fiscal year 2001/2002 and 2002/2003 the

RWPC spent approximately $250,000 and $282,000, respectively, for implementation of conservation programs. The 2003/2004 budget is $333,000, which includes a full-time staff person. Of the $18,518 dues paid by the SFWB to the RWPC, it is estimated that about $11,000 are budgeted for conservation programs. A copy of this budget is included in Appendix B.

To give consumers practical information on conserving water, the RWPC partners with local nurseries to host landscape workshops on topics such as landscape design, native planting, healthy soils, and low-water-use lawns. The RWPC also has focused on educating children about water conservation by developing youth education programs and holding "Project WET" workshops for teachers.

3.4 Required Conservation Programs

The following programs are required by Division 86 for all water suppliers. Each program is described below and 5-year bench marks for each program are established. Table 3-1 provides a summary of the 5-year goals for required conservation programs.

TABLE 3-1
Five-Year Goals for Required Conservation Programs
2004 South Fork Water Board WMCP

Program	SFWB 5-year Goal	West Linn 5-year Goal	Oregon City 5-year Goal
Water Audit	Conduct individual, annual water audits and compile the results in a common report to be archived and distributed internally.		
Meter Installation Program	Currently, 100 percent metered. Continue to install meters on all new connections to the system and document the calibration of these meters. Compile and archive meter installation and testing summaries for all new connections on an annual basis.	Establish a written procedure for estimating unmetered uses. Document and develop a plan for metering any unmetered uses. Compile and archive meter installation and testing summaries for all new connections.	Currently, 100 percent metered. Continue to install meters on all new connections to the system and document the calibration of these meters. Compile and archive meter installation and testing summaries for all new connections on an annual basis.
Meter Testing and Maintenance Program	Document the current Meter Testing and Maintenance Program and compile and archive meter testing summaries on an annual basis.	Establish and document the current Meter Testing and Maintenance Program and compile and archive meter testing summaries on an annual basis.	
Rate Structure	Continue to charge based on the quantity of water received and to document any changes in rate structure.		
Leak Detection Program	Currently, a leak detection program is not required. Continue to conduct annual water audits and implement a leak detection program if it is determined that leakage exceeds 10 percent.	Establish, document, and implement an annual leak detection program using city-owned sonic leak detection equipment.	Establish, document, and implement an annual leak detection program.

TABLE 3-1
Five-Year Goals for Required Conservation Programs
2004 South Fork Water Board WMCP

Program	SFWB 5-year Goal	West Linn 5-year Goal	Oregon City 5-year Goal
Public Education Program	Develop metrics for the effectiveness of current education programs and compile the results. Conducted by SFWB for both cities.		

3.4.1 Water Audit

The purpose of annual water audits is to establish a bench mark against which to measure conservation and leak removal efforts. Water audits are currently only informally prepared by the SFWB, Oregon City, and West Linn.

Beginning in 2003, the SFWB, West Linn, and Oregon City will prepare annual water audits. The 5-year bench mark for this program is to conduct individual annual water audits for the SFWB, Oregon City, and West Linn, and compile these reports into a single report to be distributed internally and archived for future reference. These reports will be included in the 5-year progress report for this WMCP.

To prepare water audits, a detailed accounting of water entering and leaving the system is required. Billing records account for a major part of these data, however, non-billed and non-metered use also must be included. The goal is to account for all legitimate and known uses and estimate UFW and leakage as accurately as possible. Detailed guidance for preparing water audit reports can be found in the American Water Works Association (AWWA) Manual of Practice 36, 1990, *Water Audits and Leak Detection*. This manual is available online for AWWA members at a cost of about $45. Water audit forms, reproduced from the appendix of this manual, are included in Appendix C of this WMCP.

3.4.2 Meter Installation Program

SFWB

The SFWB meters water produced at the WTP. All entrance and exit points to the SFWB distribution system are metered. There is a raw water meter and a finished water meter, and there are meters on the filter backwash water.

Water supply from the SFWB to the City of Oregon City is metered through five revenue meters. These meters are owned by the SFWB and are read monthly by Oregon City. Water supply from the SFWB to the City of West Linn is metered through a master meter owned by the SFWB. West Linn's data management system and the SFWB's supervisory control and data acquisition (SCADA) systems record daily total flows as well as instantaneous minimum and maximum daily flows. Water supply from the SFWB to CRW-S is metered through four revenue meters. These meters are owned by the SFWB and read monthly by CRW-S.

The SFWB should continue to install meters on all new connections to the system and document the calibration of all meters. The 5-year goal for this program is to compile and archive meter installation and testing summaries for all new connections on an annual basis.

West Linn

Influent water to West Linn is metered, recorded, and billed by the SFWB. West Linn also meters water flowing both to and from Lake Oswego. West Linn consumption is fully metered except that line flushing and fire fighting uses are estimated and recorded.[2] If it is determined that it is unfeasible to meter these uses, estimates should be made at the time of use and recorded daily. The 5-year goal for this program is to establish a written procedure for estimating these uses, such as fire fighting, hydrant testing, and line flushing. A description of this procedure will be documented by West Linn and provided in the 5-year progress report. In addition, the West Linn should compile and archive meter installation and testing summaries for all new connections on an annual basis.

Oregon City

Influent water to Oregon City is metered, recorded, and billed by the SFWB. As a result of the recent WMP work, Oregon City has completed metering programs at all known use points so that the system is 100 percent metered. Oregon City should continue to install meters on all new connections to the system and document the calibration of these meters. The 5-year goal for this program is to establish a written procedure for estimating unmetered uses, such as fire fighting, hydrant testing, and line flushing. A description of this procedure will be documented by Oregon City and provided in the 5-year progress report. In addition, Oregon City should compile and archive meter installation and testing summaries for all new connections on an annual basis.

3.4.3 Meter Testing and Maintenance Program

SFWB

All SFWB meters are tested, repaired, and calibrated by the SFWB on an annual basis. The SFWB will continue to install meters on all new connections to the system and test all meters on an annual basis for accuracy. These testing reports should be compiled and included as part of the 5-year progress report. The 5-year benchmark for this program is to establish and document the current Meter Testing and Maintenance Program and to compile and archive meter testing summaries on an annual basis. These summaries should include tested accuracy and repairs made.

West Linn

West Linn replaces meters as necessary based on field inspections conducted by maintenance staff. Between August 2001 and August 2003, West Linn replaced 226 meters out of about 8,000.[3] Residential meters typically last about 10 to 20 years. Assuming a 15-year life of residential meters, West Linn should be replacing approximately 500 meters per year.

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[2] 1999 West Linn WMP, Montgomery Watson (April 1999).
[3] Jim Whynot, West Linn Operations. E-mail communication. August 19, 2003.

West Linn should establish a program and methodology for regular testing of large meters. West Linn also should establish a method for documenting the age and condition of all customer meters and for annually testing a portion of the systems meters for accuracy. The program should use the AWWA Manual of Practice 6, 1990, *Water Meters- Selection, Installation, Testing, and Maintenance* as the basis for establishing the testing intervals and acceptable accuracy range. The 5-year benchmark for this program is to establish and document West Linn's Meter Testing and Maintenance Program and to compile and archive meter testing summaries on an annual basis.

Oregon City

Oregon City tests approximately 12 large (3 inches and larger) meters every 2 to 3 years. Currently, there is no methodology to select which meters are tested.[4] It is recommended that Oregon City select criteria for testing of large meters based on consumption.

Residential meters are not tested regularly, but are replaced as needed. Oregon City replaced 537 meters during the fiscal year 2002. At this rate, meters will be replaced approximately every 15 years. This is a reasonable rate of replacement; however, the number of meters replaced per year should increase as the system grows.

Oregon City should establish a method for documenting the age and condition of all customer meters and for annually testing a portion of the systems meters for accuracy. The program should use the AWWA Manual of Practice 6, 1990, *Water Meters- Selection, installation, testing, and Maintenance* as the basis for establishing the testing intervals and acceptable accuracy range. The 5-year benchmark for this program is to establish and document Oregon City 's Meter Testing and Maintenance Program and to compile and archive meter testing summaries on an annual basis.

3.4.4 Rate Structure

The intent of this requirement is to ensure that suppliers charge based on the quantity of water consumed. SFWB, West Linn, and Oregon City currently satisfy this requirement. More progressive rate structures are discussed in Section 3.6.4.

SFWB

The SFWB bills all customers on a monthly basis using a uniform rate structure based the quantity recorded at the various master meters. The 2003 rates are $0.54, $0.55, $0.65, $0.40, and $0.30 per hundred cubic feet (Ccf) to West Linn, Oregon City, CRW-S, Lake Oswego, and NCCWC , respectively. The 5-year goal for this program is to continue to charge based on the quantity of water received and to document any changes in rate structure for inclusion in the 5-year progress report.

West Linn

West Linn bills water customers bi-monthly. There is base charge for the first 700 cubic feet of between $22.78 and $27.00 for residential customers and between $22.78 and $52.18 depending on meter size. All use exceeding 700 cubic feet is billed at $1.30 per cubic foot.

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[4] Personal communication from Gail Johnson, Oregon City, August 2003.

The 5-year goal for this program is to continue to charge based on the quantity of water received and to document any changes in rate structure for inclusion in the 5-year progress report.

Oregon City

Oregon City bills water customers monthly. There is base charge of between $5.30 and $10.60 for residential customers and between $13.69 and $76.01 for larger meters, depending on meter size. All use is billed at $1.78 per cubic foot. The 5-year goal for this program is to continue to charge based on the quantity of water received and to document any changes in rate structure for inclusion in the 5-year progress report.[5]

3.4.5 Leak Detection Program

Where leakage exceeds 10 percent, leak detection programs are required (OAR 690-86-150(4)(e)). Both Oregon City and West Linn have UFW rates higher that 10 percent. This is not equivalent to leakage, but without more detailed water audits accounting for metered and unbilled use, UFW is the best estimate of leakage available. Leak detection programs, therefore, need to be implemented. If the water audits in 5-year progress report show leakage rates at less than 10 percent, the leak detection programs may be re-evaluated.

SFWB

Because of the SFWB's low UFW rate, a leak detection program is not required. The SFWB should continue to conduct water audits as described above and implement a leak detection program if it is determined that leakage exceeds 10 percent. Although not required by law, it is recommended that SFWB conduct a leak detection survey every 5 years.

West Linn

Although the UFW and leak detection study in the 1999 WMP concluded that the leakage in the West Linn system is less than 10 percent, it was based on many assumptions for unmetered and under-metered uses. Until a procedure for estimating the existing unmetered uses is established and the accuracy of the existing meters is determined by actual testing, West Linn should implement a leak detection program. West Linn owns sonic leak detection equipment. A leak detection program should be established, documented, and implemented immediately. The results of this program should be compiled in an annual leak detection report and included in the 5-year progress report.

Oregon City

Oregon City should establish, document, and implement a leak detection program. The results of this program should be compiled into an annual leak detection report and included in the five-year progress report. An RFP for an initial leak detection survey is being drafted. The 2004 budget includes $75,000 for this project.[6]

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[5] Fax from Gail Johnson, Oregon City, August 27, 2003.
[6] Fax from Gail Johnson, Oregon City, August 27, 2003.

3.4.6 Public Education Program

In January 2001, the SFWB hired a water environment coordinator, who is responsible for coordinating and implementing conservation programs. The estimated cost to SFWB to fund this position is $60,000 per year. The coordinator provides technical assistance about water conservation to citizens in Oregon City and West Linn.

Some of the duties of this position include the following:

- Developing and implementing a youth education program for West Linn and Oregon City schools
- Providing information and workshops to citizens about water conservation and water-efficient landscaping
- Encouraging conservation by educating customers on the environmental and economic benefits of conserving water by providing water-saving tips and conservation-related articles in the cities' newsletters.

This position also increases regional participation in the RWPC.

The SFWB 2003-2004 fiscal year budget for conservation programs is $45,500 not including the cost of the water environment coordinator position. Current efforts are almost entirely dedicated to public outreach and education. For such a significant investment, the SFWB should develop metrics for the effectiveness of these programs and compile the results for the 5-year progress report.

3.5 Streamflow Dependent Sources

As part of the Regional Water Supply Plan (RWSP)[7], analysis of available supply on the Clackamas River was completed. It concluded that water was available 100 percent of the time for all existing Lower Clackamas municipal diversions at current withdrawal amounts and that the instream flow requirements would be satisfied 98 percent of the time when the senior rights are fully used and the instream right is satisfied. The rights junior to the instream right will be satisfied 97 percent of the time when the senior rights are fully used and the instream right is satisfied.

The sum of estimated current peak day withdrawals for the Clackamas River Water Users was reported to be 107cubic feet per second (cfs) and minimum in-stream flows between September 16 and June 30 were estimated at 640 cfs. Therefore, the current draft curtailment plan proposes "Critical Water Shortage Status" if there is a continuation of predicted hot, dry weather and declining river levels below 510 cfs between July 1 and September 15 or below 750 cfs between September 16 and June 30.

A description of the leak detection and repair programs is required if the supplier proposes to expand or initiate diversion that may affect stream flow dependent species, with the goal of reducing leakage to 15 percent, regardless of size. For the SFWB, West Linn, and Oregon

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[7] March 26, 1996 revisions.

City, this is an irrelevant distinction. This program is required for all of them because each serves more than 7,500 customers. Leak detection programs are discussed in Section 3.6.

3.6 Additional Required Conservation Programs

A description of the following programs is required for systems with leaks exceeding 15 percent serving more than 7,500 customers. Therefore, these programs are required for the SFWB, Oregon City, and West Linn and are addressed in the following subsections. Table 3-2 is a summary of these programs and recommendations.

3.6.1 Leak Repair Program

Leak repair programs are required for suppliers that serve more than 7,500 customers and have leakage rates greater than 15 percent. Leak repair programs should focus on the most cost-effective removal of leaks with the goal of reducing leakage to less than 15 percent.

TABLE 3-2
Five-Year Goals for Additional Required Conservation Programs
2004 South Fork Water Board WMCP

Program	SFWB 5-year goal	West Linn 5-year Goal	Oregon City 5-year Goal
Leak Repair Program	Continue to conduct water audits, periodic leak detection surveys, and implement a leak repair program if it is determined that leakage exceeds 15 percent.	Currently not required. Continue current leak repair efforts. Produce an annual summary of leak removal projects, cost, and magnitude of leaks removed.	Pursue leak repair efforts, focusing on the most cost-effective leaks. Establish a plan to reduce leakage below 15 percent. Provide annual summaries of leak detection projects. Produce an annual summary of leak removal projects, cost, and magnitude of leaks removed.
Technical Assistance	Contact the top 10 users for each of the cities and evaluate potential conservation measures. Complete a technical summary of the results of these investigations, with recommendations for future programs. To be conducted by SFWB.		
Fixture Replacement	Conduct a fixture replacement study that will evaluate potential savings from these programs and establish applicable programs. To be conducted by SFWB.		
Rate Structures	Conduct a rate evaluation using the AWWA Manual of Practice 1, *Principals of Water Rates Fees and Charges*, and provide recommendations for alternative rate structures, if any. Conducted individually by each entity.		
Reuse	Complete a reuse feasibility report. Contact the top 10 users for each of the cities, evaluate potential reuse opportunities, and provide a technical summary of the results. To be conducted by SFWB.		

SFWB

Because of the SFWB's low UFW rate, a leak repair program is not required. The SFWB should continue to conduct water audits as described above and implement a leak repair program if it is determined that leakage exceeds 15 percent.

West Linn

UFW in West Linn from 2000 to 2003 has averaged about 13 percent. This is less than the threshold requiring a leak repair program, however, leak repairs are made as needed.

West Linn has repaired 57 leaks from August 2001 to August 2003. The cost to make these repairs was approximately $48,450. West Linn also replaced 7,810 feet of main from August 1999 to August 2003. Main replacement projects included services and fire hydrants. West Linn spends approximately $350,000 per year on main replacement.[8]

The 5-year goal for this program is to continue current leak repair efforts, focusing on the most cost-effective leaks as identified in the leak detection program discussed above. Additionally, the goal includes providing annual summaries of leak detection projects and continuation of monitoring leakage rates to ensure that leakage remains below 15 percent. A summary of leak removal projects, cost, and magnitude of leaks removed should be included in the 5-year progress report.

Oregon City

Oregon City is required to implement a leak repair and line replacement program, as a result of the high UFW rate observed. As stated previously, an RFP for leak detection services will be issued by Oregon City and the results of this work will be the basis for Oregon City's leak repair plan.

The 5-year goal for this program is to pursue leak repair efforts, focusing on the most cost-effective leaks as identified in the leak detection efforts discussed above. Additionally, the goal establishes plan to reduce leakage below 15 percent, provide annual summaries of leak detection projects, and continues to monitor leakage rates. A summary of leak removal projects, cost, and magnitude of leaks removed should be included in the 5-year progress report.

3.6.2 Technical and Financial Assistance Programs

In January 2001, the SFWB hired a water environment coordinator, who provides technical assistance to the citizens of Oregon City and West Linn. Because this position is already established, the SFWB should look at expanding its program to include financial incentive or rebate programs, fixture replacement programs, and reuse.

Suggested technical assistance programs include rebate programs, cost-share programs, individual water audits, training opportunities, irrigation, and other technical workshops. Large water users are compiled for each city and included in Appendix D. These users should be contacted to determine what technical assistance may help to promote conservation.

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[8] Jim Whynot, West Linn Operations. E-mail. August 19,2003.

In addition, reuse opportunities should be evaluated. This investigation should identify possible sources and uses for reclaimed water and evaluate the feasibility of implementation of these programs.

The 5-year goal for this program is to contact the top 10 users for each of the cities, evaluate potential conservation measures, and complete a reuse feasibility study as described in Section 3.6.5. A technical summary of the results of these investigations, with recommendations for future programs, will be provided in the 5-year progress report.

3.6.3 Fixture Replacement

Modern improvements in plumbing efficiency have made replacement of old and inefficient fixtures a viable and cost effective option for conservation in many cases. Rebates and subsidies of water-efficient fixtures can promote their use and decrease overall water use.

This program will be the responsibility of the SFWB. The 5-year goal for this program is to conduct a fixture replacement study that will evaluate potential savings from these programs and establish applicable programs. This study should also assess the effectiveness and political acceptability of implementing building codes and ordinances that reduce water use.

3.6.4 Rate Structures

SFWB

As discussed above, the SFWB charges a flat rate to all users. The rates vary depending on the user, however, the rate does not vary based on the quantity used. Because the SFWB is a wholesale provider, is does not have significant influence over changing what the individual cities charge their customers. Therefore, it does not make sense for the SFWB to pursue an "inverted block rate structure" (where the rate per unit of water increases as consumption increases) for the cities. The SFWB should, however, investigate the potential benefits of adopting alternative rate structures for CRW-S, NCCWC, and Lake Oswego.

The 5-year goal for this program is to conduct a rate evaluation using the AWWA Manual of Practice 1, *Principals of Water Rates Fees and Charges*, and provide recommendations for alternative rate structures, if any. Rate evaluations will also be conducted separately for each city.

West Linn and Oregon City

As discussed above, both Oregon City and West Linn charge a base charge and a uniform rate for consumption that exceeds the base quantity. This can result in high use by the absence of incentive to conserve water.

The 5-year goal for this program is for each city to conduct a rate evaluation using the AWWA Manual of Practice 1, *Principals of Water Rates Fees and Charges*, and provide recommendations for alternative rate structures, if any.

3.6.5 Reuse, Recycling, and Non-potable Use

A list of large water users for each city is presented in Appendix D. Most are apartment buildings, which may not present significant possibilities for onsite reuse or recycling, but

may be potential users of reuse water for irrigation purposes. There are several industrial users and a golf course that may represent reuse, recycling, and non-potable use opportunities.

These users should be contacted by the SFWB to determine potential reuse, recycling, and non-potable use opportunities. The 5-year goal for this program is to contact the top 10 users for each city, evaluate potential conservation measures, and provide a technical summary of the results and recommendations in the 5-year progress report.

SECTION 4

Curtailment

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

The curtailment plan presented here is taken from the draft plan provided by the SFWB. It is a joint plan developed by the Clackamas River Water Users and has not been officially adopted by the SFWB or the cities. The cities will be required to adopt the finalized version of this plan and ordinances for its initiation and enforcement.

4.1 Historical Supply Deficiencies

There have been no curtailment efforts or water shortages during the last 10 years.

4.2 Alert Stages

Implementation of curtailment plans would be initiated on a declaration of a drought by the governor pursuant to ORS 536.720. Successive stages of the curtailment plan would be initiated on the basis of in-stream flows measured by the U.S. Geological Survey (USGS) gauging station located at SFWB's intake. The goal of the curtailment plan is to reduce out-of-stream diversions to the extent possible without jeopardizing the health, safety, and welfare of SFWB customers.

The SFWB, City of Oregon City, and City of West Linn propose a curtailment plan with four distinct stages, each of which is initiated by one or more events. The four stages, increasing in order of severity are:

- Stage I: Water Alert Status
- Stage II: Serious Water Shortage Status
- Stage III: Critical Water Shortage Status
- Stage IV: Emergency Water Shortage Status

4.3 Curtailment Stages

The alert stages will be triggered on the basis of the criteria presented in Table 4-1.

TABLE 4-1
Water Shortage Stages and Initiating Conditions
2004 South Fork Water Board WMCP

Shortage Stage	Initiating Conditions
Stage I: Water Alert Status	Water shortage declared by governor
Stage II: Serious Water Shortage Status	Continuation of hot, dry weather predicted; declining river levels
Stage III: Critical Water Shortage Status	Continuation of hot, dry weather predicted; declining river levels below 510 cubic feet per second (cfs) between July 1 and September 15 or below 750 cfs[1] between September 16 and June 30.
Stage IV: Emergency Water Shortage Status	Continuation of hot, dry weather predicted; declining river levels below 510 cfs between July 1 and September 15 or below 730 cfs[2] between September 16 and June 30 affecting in-stream flow rights; major transmission line break, spill in river, natural disaster resulting in deprivation of water supply

[1] The sum of estimated current peak day withdrawals for the Clackamas River Water Users (107cfs) and minimum in-stream flows between September 16 and June 30 (640 cfs).

[2] Requires a 15 percent reduction in current peak day demands spread across all municipal water providers.

4.4 Curtailment Actions

4.4.1 Stage I: Water Alert Status

Curtailment activities for Stage 1: A program to inform customers of the potential for drought and water shortage, and reasons to voluntarily conserve water.

The SFWB governing bodies (SFWB, Oregon City Council, and West Linn City Council) would issue a request for a voluntary reduction in water use by all customers. The request would include a summary of the current water situation, the reason for the requested cutback in use, and a warning that mandatory cutbacks will be required if voluntary measures are not sufficient to achieve reduction goals. Additional Stage I program elements would include the following:

- Send news release about drought and water provider conservation programs.
- Prepare and disseminate educational brochures containing conservation tips.
- Develop a combination of media outreach – public service announcements for radio, newspaper, and television.
- Provide notice on water bills or through utility bill inserts.
- Activate speakers' bureau and set up public information booths where opportunities exist.

4.4.2 Stage II: Serious Water Shortage Status

Curtailment activities: A program to limit nonessential water use by both Stage I Voluntary measures and regulation of water use.

Additional Stage II program elements would include the following:

- Provide handouts to field personnel - tips to remind customers of voluntary measures.
- Send brochures or flyers to homeowners' associations, neighborhood groups, apartments, home builders.
- Encourage irrigation only in the late evening or early morning hours.
- Ask residents and businesses to limit outdoor water use to odd/even days corresponding to their house or building number (includes lawn and garden watering and car washing).
- Encourage customers to refrain from washing cars.
- Encourage the use of automatic water shut-off nozzles.
- Encourage customers to refrain from hosing and/or washing off sidewalks, etc.

4.4.3 Stage III: Critical Water Shortage Restrictions

Upon determination of a serious water shortage by the Clackamas River Water Users, or if measured river flows are less than 510 cfs between July 1 and September 15 or below 750 cfs[9] between September 16 and June 30, the Clackamas River Water Users may, by ordinance, impose emergency restrictions on certain water uses. Upon such an action the following program elements would be initiated:

Curtailment Activities: A program to limit nonessential water use by both Stage I and Stage II voluntary measures and regulation of water use in addition to mandatory curtailment requirements.

Additional Stage III program elements would include the following:

- Continue rigorous public outreach effort.
- Restrictions will be developed, implemented, and enforced by the SFWB, Oregon City, and West Linn.
- Require even/odd watering days corresponding to house or building number (includes lawn and garden watering and car washing).
- Restrict lawn watering between 8 a.m. and 8 p.m.
- Prohibit all water waste
  - No unfixed leaks
  - No hosing of paved surfaces
  - No fountains except those using recirculated water
  - No water running onto streets, sidewalks, or into gutters

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9 The sum of estimated current peak day withdrawals for the Clackamas River Water Users (107 cfs) and minimum in-stream flows between September 16 and June 30 (640 cfs).

  - Restrict washing of vehicles other than in establishments that recycle water

- Work with local industrial and commercial large water users to minimize their water use.

4.4.4 Stage IV: Emergency Water Shortage Status

Upon determination of a critical water shortage by the Clackamas River Water Users, or if measured river flows are less than 510 cfs between July 1 and September 15 or below 750 cfs[10] between September 16 and June 30, the Clackamas River Water Users may declare, by ordinance, an emergency prohibiting certain water uses. Upon such an action by the agency, curtailment program elements for Stages I, II, and III will continue. (In case of temporary water loss, in cases such as natural disasters, transmission line breaks, etc., it may be necessary to go directly to Stage IV.) In addition, all outside water use and all non-essential use will be eliminated. Therefore, it will be expressly prohibited to:

- Water, sprinkle or irrigate lawns, grass or turf unless:
  - It is a new lawn, grass, or turf that has been seeded or sodded after March 1 of the calendar year in which any restriction are imposed, and in such cases it may be watered as necessary until established.
  - Lawn, grass, or turf that is part of a commercial sod farm
  - High-use athletic fields that are used for organized play
  - Golf tees and greens
  - Park and recreation areas deemed by the cities to be of a particular significance and value to the community that would allow exceptions to the prohibition
- Washing, wetting down, or sweeping with water, sidewalks, walkways, driveways, parking lots, open ground, or other hard-surfaced areas unless:
  - In the opinion of the cities, there is a demonstrable need to meet public health or 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.
  - The water is for the power washing of buildings, roofs, and homes before painting, repair, remodeling, or reconstruction.
- Prohibit washing of vehicles other than in establishments that recycle water, unless the cities find that the public health, safety, and welfare are contingent on frequent vehicle cleaning, such as cleaning of solid waste transfer vehicles, vehicles that transfer food and other perishables, or as otherwise required by law.

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[10] The sum of estimated current peak day withdrawals for the Clackamas River Water Users (107 cfs) and minimum in-stream flows between September 16 and June 30 (640 cfs).

- Water main flushing allowed only for water quality concerns or for emergency purposes.
- Additional exceptions and enforcement may be outlined by individual agencies

If such an emergency takes place in the Clackamas Basin, (that is, plant power failures, transmission line breaks), the Clackamas River Water Users will be empowered to pass future restrictions, if necessary.

SECTION 5

Water Supply

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

5.1 Current and Future Service Areas

The current and future service areas are presented in Figure 2-1. For the purpose of this WMCP, the future study area will be the current Urban Growth Boundary (UGB) for both cities. It is assumed that the SFWB will continue its current agreements with CRW-S in the long term, but will provide water to the NCCWC and Lake Oswego in emergency situations only, therefore, these areas are not included in the areas under consideration.

5.2 Future Demands

Population projections for Oregon City and West Linn are presented in Table 5-1. These projections are consistent with the current comprehensive plans for each city.

TABLE 5-1
Population Projections for Oregon City and West Linn
2004 South Fork Water Board WMCP

	Year						
	2000 [1]	**2005**	**2010**	**2015**	**2020**	**2023**	**Buildout**[4]
Oregon City[2]							
2003 Water Master Plan Update (Draft) - 3.0% Growth Rate	26,200	*31,120*	*36,670*	*42,220*	*47,770*	51,100	45,700
West Linn[3]							
City of West Linn Planning Department - 1.8% Growth Rate	23,000	*24,927*	*26,488*	*28,049*	*29,610*	*29,610*	*29,610*

[1] July 1, 2000, Census population estimates provided by the Population Research Center (PRC). The estimate for West Linn includes a population of 560 served in a deferred annexation area.

[2] Oregon City estimates obtained from the City of Oregon City draft WMP (West Yost & Associates, 2003). Italicized estimates are interpolated.

[3] West Linn estimates are based on population projected for 2020 of 29,610, as provided by the West Linn Planning Department. Italicized population estimates are interpolated.

[4] Oregon City buildout estimate obtained from Oregon City Planning department via e-mail August 19, 2003.

The demand projections given in Table 5-2 and 5-3 are based on the population projections given in Table 5-1 and the average 1997-2002 per capita consumption derived in Section 2.

The future demand for CRW-S is based on the current agreement, which allows for 2.0 mgd ADD. An MDD/ADD peaking factor of 2.46 was assumed.[11]

TABLE 5-2
ADD Demand Projections
2004 South Fork Water Board WMCP

	Year					
	2005	**2010**	**2015**	**2020**	**2023**	**Buildout**
Oregon City [1]	4.51	5.31	6.12	6.92	7.40	6.62
West Linn [1]	3.53	3.89	4.24	4.60	4.81	4.39
CRW-S [2]	2.00	2.00	2.00	2.00	2.00	2.00
Total	**10.04**	**11.20**	**12.36**	**13.52**	**14.21**	**13.01**

[1] Taken from population data shown in Table 2-10 and average daily demand (ADD) for 1997-2002 as presented in Table 4-4 (145 gpcd, Oregon City; 1348 gpcd, West Linn).

[2] (Information to follow).

CRW-S = Clackamas River Water-South.
gpcd = gallons per capita per day.

TABLE 5-3
MDD Demand Projections
2004 South Fork Water Board WMCP

	Year					
	2005	**2010**	**2015**	**2020**	**2023**	**Buildout**
Oregon City [1]	9.41	11.08	12.76	14.44	15.45	13.81
West Linn [1]	8.94	9.84	10.74	11.14	11.66	11.10
CRW-S [2]	4.93	4.93	4.93	4.93	4.93	4.93
Total	**23.28**	**25.85**	**28.43**	**30.51**	**32.04**	**29.84**

Notes:

[1] Taken from population data shown in Table 5-1 and average maximum day demand (MDD) for 1997-2002 for Oregon City (302 gallons per capita per day [gpcd]) as presented in Table 2-4 and for West Linn an MDD of 350 gpcd until 2015 buildout and 335 gpcd thereafter as recommended in the 1999 Water System Master Plan with 2000 Update.

[2] CRW-S MDD/average daily demand (ADD) is 2.46, which is the maximum ratio observed for Oregon City and West Linn during the last 6 years. The Montgomery Watson South Fork Water Board 1997 master plan states a maximum ratio of 2.54 (1995) in Table 2-5 (Montgomery Watson, 1997).

CRW-S = Clackamas River Water-South.

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[11] 2.46 is the maximum peaking factor observed for the combined Oregon City and West Linn systems.

5.3 Meeting Future Demands

The SFWB will meet future demand with a combination of conservation, system upgrades, and expansion of existing permitted sources, namely, the existing permits listed in Table 2-12, which are owned by the SFWB. An analysis of options for satisfying future needs through existing sources, conservation, interties, and other costs-effective measures follows.

5.3.1 Expansion of Existing Permitted Sources

As part of the RWSP undertaken in 1996 by 27 metropolitan water providers, analysis of available supply on the Clackamas River was completed. It concluded that water was available 100 percent of the time for all existing Lower Clackamas River municipal diversions at current withdrawal amounts, and that the in-stream flow requirements would be satisfied 98 percent of the time when the senior rights are fully used. The rights junior to the in-stream right will be satisfied 97 percent of the time when the senior rights are fully used and the instream right is satisfied.

A schedule for beneficial use and certification of the SFWB's existing permits is presented in Figure 5-1. As shown, the current permits and certificate are anticipated to accommodate growth through the year 2070. The SFWB reserves the right to enter into future agreements allowing for the sale or lease of a portion of these rights if future system expansion levels off and do not occur as assumed in Figure 5-1, thereby reducing projected demand.

5.3.2 Implementation of Conservation Measures

An analysis of the conservation measures presented in Section 3 was performed to give the SFWB, Oregon City, and West Linn guidance in pursuing future conservation measures. The detailed analysis, assumptions, and notes are included in Appendix E. The programs discussed in Section 3 were compared on the basis of feasibility, reliability, and environmental acceptability. A summary of the results of this comparison is presented in Table 5-4.

In general, expansion of the existing source is feasible and reliable, giving this option a high overall ranking for all purveyors. Because of the potential revenue losses associated with inaccurate meters and lost water, both the Meter Testing, Maintenance, Repair and Replacement Program and the Leak Detection and Repair Program are cost effective when compared to the cost of water.

Conservation education is also a cost-effective method for meeting future demand. This includes current programs supported and performed by the SFWB. The efficiency of having the SFWB perform these programs for the cities is apparent and it is expected that the SFWB will continue in this role. As recommended in Section 3, the SFWB should further pursue the development of metrics to evaluate the effectiveness of these programs and guide future efforts.

For the most part, conservation measures that are focused on individual users will be the responsibility of the SFWB. It appears that measures to reduce outdoor use would be effective and reducing future demand. An added benefit of these programs is that they are focused on reducing MDD, which drives WTP and distribution system expansion. Currently, the available data are not adequate to analyze these programs in detail, however,

TABLE 5-4
Comparison of Conservation Measures
2004 South Fork Water Board WMCP

Program [2]	Location	Responsibility	Unit Cost ($/gpd) [1]	Feasibility	Reliability	Environmental Acceptability	Overall Score [3]
Leak Detection and Repair Program	SFWB	SFWB	$0.22	1	1	1	3
Meter Testing and Maintenance [5]	SFWB	SFWB	-$0.20	1	1	0	2
Expansion of Existing Source [4]	SFWB	SFWB	$0.53	1	1	-1	1
Reuse, Recycle, Non-potable Use Program	OC/WL	SFWB	$2.68	0	0	1	1
Public Education Program	OC/WL	SFWB	0.91	0	0	1	1
Regional Water Providers Consortium	OC/WL	SFWB	0.10	0	-1	1	0
Technical and Financial Assistance Programs	OC/WL	SFWB	$0.74	0	-1	0	-1
Leak Detection and Repair Program	Oregon City	Oregon City	$4.30	1	1	1	3
Meter Testing, Maintenance, and Replacement [5]	Oregon City	Oregon City	-$0.03	1	1	0	2
Expansion of Existing Source [4]	Oregon City	Oregon City	$0.53	1	1	-1	1
Commercial ET Controller	Oregon City	SFWB	$3.95	0	-1	1	0
Residential ET Controller	Oregon City	SFWB	$3.08	0	-1	1	0
Waterless Urinal Rebate	Oregon City	SFWB	$1.84	0	-1	0	-1
Toilet Rebate	Oregon City	SFWB	$3.47	0	-1	0	-1
Washing Machine Rebate	Oregon City	SFWB	$4.84	0	-1	0	-1
Leak Detection and Repair	West Linn	West Linn	$4.31	1	1	1	3
Meter Testing, Maintenance, and Replacement [5]	West Linn	West Linn	$0.05	1	1	0	2
Expansion of Existing Source [4]	West Linn	SFWB	$0.53	1	1	-1	1
Commercial ET Controller	West Linn	SFWB	$1.59	0	-1	1	0
Residential ET Controller	West Linn	SFWB	$2.68	0	-1	1	0
Toilet Rebate	Oregon City	SFWB	$3.47	0	-1	0	-1
Waterless Urinal Rebate	West Linn	SFWB	$3.00	0	-1	0	-1
Washing Machine Rebate	West Linn	SFWB	$4.81	0	-1	0	-1

[1] See Appendix E. A negative value implies that the program actually will save money.

[2] Bold indicates proposed program, as discussed in Section 3.

[3] Programs are ranked based on perceived feasibility, reliability, and environmental acceptability.

[4] Based on the SFWB Water Master Plan Capital Improvement Plan. See Appendix E. Because the cities bill and are billed on a volume basis, an appropriate comparison cannot be made except to compare the cost of increasing the capacity at the SFWB and assume that these costs will be passed on accordingly.

[5] Includes cost of Water Audit.

$/gpd = dollars per gallon per day.
OC/WL = Oregon City/West Linn.
SFWB = South Fork Water Board.

4a. Water Master Plan Update (Continued from October 24, 2011).

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as the cities develop data collection and reporting programs, a more detailed evaluation is warranted and recommended.

A summary of the proposed management and conservation program budget for SFWB, Oregon City, and West Linn is presented in Table 5-5. The current plan includes budget for spending over $650,000 on management and conservation activities, saving over 140 MG of water annually. This is equal to about 2 percent of current use. SFWB, Oregon City, and West Linn reserve the right to re-evaluate and modify this plan based on budgetary concerns and effectiveness of the recommended programs.

TABLE 5-5
Management and Conservation Budget
2004 South Fork Water Board WMCP

Program	Location	Annual Cost	Estimated Annual Water Savings (MG)
Public Education Program[1]	SFWB	$105,500	42
Meter Testing and Maintenance/Water Audit	SFWB	$28,200	0
Regional Water Providers Consortium	SFWB	$11,000	42
Leak Detection and Repair Program	SFWB	$14,000	11
Reuse, Recycle, Non-potable Use Program	OC/WL	$48,000	7
Technical and Financial Assistance Programs	OC/WL	$48,000	24
		$254,700	***125***
Oregon City			
Annual Water Audit	Oregon City	$3,200	0
Meter Testing, Maintenance, and Replacement	Oregon City	$103,236	0
Leak Detection and Repair Program (incl. init.)	Oregon City	$131,600	11
		$238,036	***11***
West Linn			
Annual Water Audit	West Linn	$3,200	0
Meter Testing, Maintenance, and Replacement	West Linn	$108,402	0
Leak Detection and Repair	West Linn	$66,000	5
		$174,402	***5***

1) Includes cost of Conservation Coordinator Position

5.3.3 Interties and Cooperation

An emergency intertie exists through a standby connection to the City of Lake Oswego via a West Linn 18-inch-diameter mainline. This connection is bi-directional and can supply up to 4 mgd. In addition, the new intertie with the NCCWC has a capacity of approximately 12 mgd. While these interties may be used in emergency situations, it is not anticipated that there will be long-term surplus water available for purchase by the SFWB.

5.4 Meeting Future Demands by Expansion of Diversions

Figure 5-1 presents a comparison of current demand projections versus an assumed reduction as a result of conservation measures. For the purposes of comparison, it is assumed that through 2020, a 2 percent system-wide reduction as a result of conservation

measures will be achieved and 3 percent thereafter. It is further assumed that Oregon City will reduce leakage by 4 percent through 2020 and 5 percent thereafter. Finally, it is assumed that West Linn will reduce leakage by 2 percent through 2020 and 3 percent thereafter. As shown, these measures, while fairly conservative, may delay full utilization of the current permit by as much as 10 years.

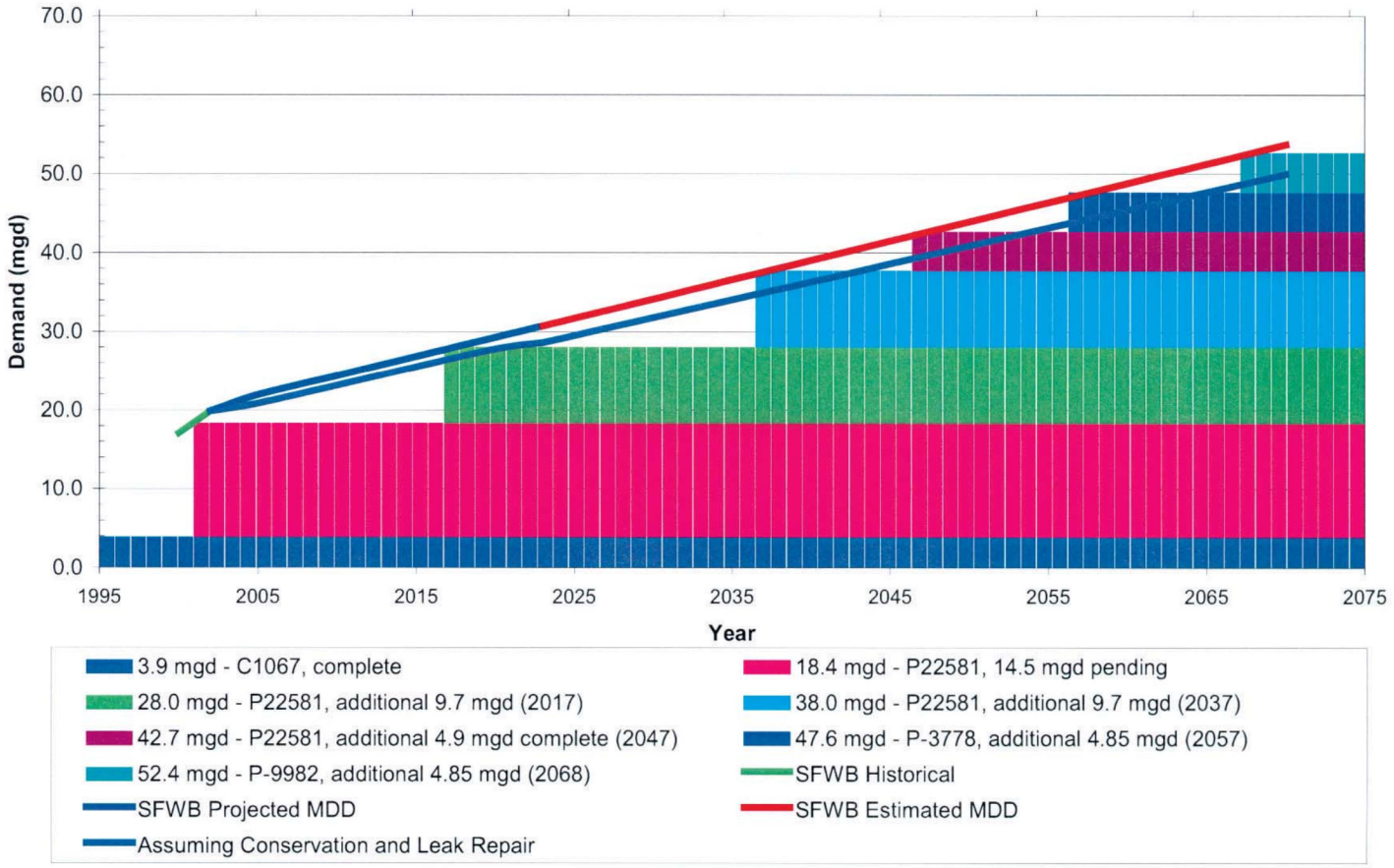
5.5 Mitigation Requirements

The current intake is designed according to OWRD design criteria for a total flow of 52 mgd. Therefore, mitigation actions are not anticipated to be required as a result of the expansions described above, however, future requirements may change. If compliance regulations become more stringent, SFWB will have to respond as necessary.

5.6 Acquisition of New Water Rights

The SFWB will not require the acquisition of new water rights for the foreseeable future.

FIGURE 5-1
Water Rights Schedule
2003 South Fork WaterBoard WMCP



APPENDIX A

Annual Water Use Reports 2001–2002

PDX\032530015.DOC

USER-ID 1604

2001 2002

Oregon Water Resources Department
October 2001 through September 2002
Annual Water Use - Monthly Quantities Form

WRD

Facility ☞ POD-ID ✏	1197	11919	13154	26791	
October - 2001	Ø	Ø	194.04 MG	Ø	
November - 2001	Ø	Ø	131.76 MG	Ø	
December - 2001	Ø	Ø	133.32 MG	Ø	
January - 2002	Ø	Ø	156.12 MG	Ø	
February - 2002	Ø	Ø	146.91 MG	Ø	
March - 2002	Ø	Ø	157.48 MG	Ø	
April - 2002	Ø	Ø	187.12 MG	Ø	
May - 2002	Ø	Ø	244.66 MG	Ø	
June - 2002	Ø	Ø	334.48 MG	Ø	
July - 2002	Ø	Ø	438.22 MG	Ø	
August - 2002	Ø	Ø	483.99 MG	Ø	
September - 2002	Ø	Ø	347.89 MG	Ø	
TOTAL *	Ø	Ø	2,953.99 MG	Ø	

* Describe the units of measure as G (gallons), KG (thousand gallons), MG (million gallons), CF (cubic feet), MCF (million cubic feet), or AF (acre-feet)

Describe method of measuring the water used: 20" mainline meter. If use is irrigation, total number acres irrigated N/A
I certify this information is true and accurate to the best of my knowledge.

Signature	Title	Reporting Entity	Date
John Collins	Plant Supervisor	South Fork Water Board	10-14-02

John Collins
Name - Please Print

Please complete and mail to: Water Resources Department; Water Use Reporting Program;
158 12th Street NE; Salem, OR 97310-0210

OREGON WATER RESOURCES DEPARTMENT SUMMARY OF WATER RIGHTS FOR WATER USE REPORT

Dear Water User: It is a new water year! All water use reports for October 2001 to September 2002 are requested to be submitted by January 1, 2003. This information is important for water management in Oregon. Please complete the form on the reverse side for the water rights listed below. If you have questions, or need more time please, contact me at 503-378-8455 ext. 333. Thank you for your attention to this matter. Mary Grainey

JOHN D COLLINS SR PLANT OPERATOR USER-ID 1604
SOUTH FORK WATER BOARD
15962 S HUNTER AVENUE
OREGON CITY OR 97045-1345

POD-ID	FACILITY	CERT	PERMIT	APPL	PRIORITY	USE	L/S	TWP	RANGE	SEC	Q/Q	RATE	SOURCE	TRIBUTARY TO
11917		0 S	3778 S	5942	1/16/1918	MU	L	4 S	5 E	29	NWSW	20 C P	S FK CLACKAMAS R	CLACKAMAS R
11917		0 S	9982 S	11007	8/11/1926	MU	L	4 S	5 E	29	SWSW	20 C P	S FK CLACKAMAS R	CLACKAMAS R
11919		0 S	9982 S	11007	1/16/1931	MU	L	4 S	5 E	29	SESW	10 C P	MEMALOOSE CR	S FK CLACKAMAS R
12472	FM PARKPLACE WD	35292 G	2361 G	2540	2/4/1963	QM	L	2 S	2 E	28	NENW	0.15 C P	A WELL	CLACKAMAS R
12944	FM PARKPLACE WD	14376 S	11997 S	15937	7/15/1935	MU	L	2 S	2 E	27	NWSW	0.5 C P	SPRS	CHARMAN CR
13154		0 S	22581 S	28676	8/3/1953	MU	L	2 S	2 E	21	NWSW	60 C P	CLACKAMAS R	WILLAMETTE R
26790	FM PARKPLACE WD	9824 S	6035 S	9179	9/17/1923	MU	S	2 S	2 E	20	SESE	0.074 C P	UNN STR	CLEAR CR
26791		0 CS	2257 T	6162	7/17/1914	MU	L	2 S	2 E	21	NWSW	6 C P	S FK CLACKAMAS R	CLACKAMAS R

OREGON WATER RESOURCES DEPARTMENT SUMMARY OF WATER RIGHTS FOR WATER USE REPORT

Reporting Entity

JOHN D COLLINS SR PLANT OPERATOR **USER_ID** 1604
SOUTH FORK WATER BOARD
15962 S HUNTER AVENUE
OREGON CITY OR 97045-1345 503-657-5030

POD_ID	FACILITY	CERT	PERMIT	APPLN	PRIORITY	USE	L/S	TWP	T	RNG	R	SEC	Q/Q	RATE	U	P_A_S	SOURCE	TRIBUTARY TO
11917		0 CS	2257	T 6162	07/17/1914	MU	L	4	S	5	E	29	SWSW	6.000	C	A	S FK CLACKAMAS R	CLACKAMAS R
11917		0 S	3778	S 5942	01/16/1918	MU	L	4	S	5	E	29	NWSW	20.000	C	P	S FK CLACKAMAS R	CLACKAMAS R
11917		0 S	9982	S 11007	08/11/1926	MU	L	4	S	5	E	29	SWSW	20.000	C	P	S FK CLACKAMAS R	CLACKAMAS R
11919		0 S	9982	S 11007	01/16/1931	MU	L	4	S	5	E	29	SESW	10.000	C	P	MEMALOOSE CR	S FK CLACKAMAS R
12472	FM PARKPLACE WD	35292 G	2361	G 2540	02/04/1963	QM	L	2	S	2	E	28	NENW	0.150	C	P	A WELL	CLACKAMAS R
12944	FM PARKPLACE WD	14376 S	11997	S 15937	07/15/1935	MU	L	2	S	2	E	27	NWSW	0.500	C	P	SPRS	CHARMAN CR
13154		0 S	22581	S 28676	08/03/1953	MU	L	2	S	2	E	21	NWSW	60.000	C	P	CLACKAMAS R	WILLAMETTE R
26790	FM PARKPLACE WD	9824 S	6035	S 9179	09/17/1923	MU	S	2	S	2	E	20	SESE	0.074	C	P	UNN STR	CLEAR CR
26791		0 CS	2257	T 6162	07/17/1914	MU	L	2	S	2	E	21	NWSW	6.000	C	P	S FK CLACKAMAS R	CLACKAMAS R

USER-ID 1604

2000 Oregon Water Resources Department 2001
October 1998 through September 1999
Annual Water Use - Abbreviated Water Use Report

Reporting Entity: South Fork Water Board

I certify the water rights listed on the enclosed Summary of Water Rights which allow for less than 0.1 cubic foot per second or the storage of less than 9.2 acre-feet of water (noted by an S in the L/S field) were used within the limits of the rights for the period October 1, 2000 through September 30, 2001.

Signature _____ Date 11-06-01

John Collins Plant Supervisor
Printed Name Title

Please submit this statement of compliance and a copy of your summary of water rights to:

Oregon Water Resources Department
Water Use Reporting Program
158 12th Street NE
Salem, Oregon, 97310-0210

Questions regarding this form or any of the Water Resources Department's requirements for water use reporting by governmental entities may be directed to:

John Wynn
Water Use Reporting Coordinator
Phone: 503-378-8455, ext. 302
Fax: 503-378-8130; or
E-mail: wynnja@wrd.state.or.us

USER-ID 1604

2000

Oregon Water Resources Department
October 1999 through September 2000
Annual Water Use - Monthly Quantities Form

2001

WRD

Facility ☞ POD-ID ✏	1197	11919	13154	26791	
October - 2000	Ø	Ø	216.41 MG	Ø	
November - 2000	Ø	Ø	181.41 MG	Ø	
December - 2000	Ø	Ø	176.57 MG	Ø	
January - 2001	Ø	Ø	174.11 MG	Ø	
February - 2001	Ø	Ø	147.93 MG	Ø	
March - 2001	Ø	Ø	198.14 MG	Ø	
April - 2001	Ø	Ø	190.33 MG	Ø	
May - 2001	Ø	Ø	250.65 MG	Ø	
June - 2001	Ø	Ø	285.13 MG	Ø	
July - 2001	Ø	Ø	369.73 MG	Ø	
August - 2001	Ø	Ø	376.53 MG	Ø	
September - 2001	Ø	Ø	309.11 MG	Ø	
TOTAL *		Ø	2,875.95 MG	Ø	

* Describe the units of measure as G (gallons), KG (thousand gallons), MG (million gallons), CF (cubic feet), MCF (million cubic feet), or AF (acre-feet)

Describe method of measuring the water used: 20" mainLine Meter. If use is irrigation, total number acres irrigated _____

I certify this information is true and accurate to the best of my knowledge.

John D Collins — Signature

plant supervisor — Title

South Fork Water Board — Reporting Entity

11-6-01 — Date

John D Collins — Name - Please Print

Please complete and mail to: Water Resources Department; Water Use Reporting Program; 158 12th Street NE; Salem, OR 97310-0210

OREGON WATER RESOURCES DEPARTMENT SUMMARY OF WATER RIGHTS FOR WATER USE REPORT

Reporting Entity

JOHN D COLLINS , SR PLANT OPERATOR USER_ID: 1604

SOUTH FORK WATER BOARD
15962 S HUNTER AVENUE
OREGON CITY , OR 97045-1345 PHONE: 5036575030

POD_ID	FACILITY	CERT	PERMIT	APPLN	L/S	PRIORITY	TWP	T	RGE	R	SEC	Q/Q	USE	RATE	U	P/A/S	SOURCE	TRIBUTARYTO
26791		0	CS 2257	T 6162	L	07/17/1914	2.00	S	2.00	E	21	NWSW	MU	6	C	P	S FK CLACKAMAS R	CLACKAMAS R
11917		0	CS 2257	T 6162	L	07/17/1914	4.00	S	5.00	E	29	SWSW	MU	6	C	A	S FK CLACKAMAS R	CLACKAMAS R
11917		0	S 3778	S 5942	L	01/16/1918	4.00	S	5.00	E	29	NWSW	MU	20	C	P	S FK CLACKAMAS R	CLACKAMAS R
11917		0	S 9982	S 11007	L	08/11/1926	4.00	S	5.00	E	29	SWSW	MU	20	C	P	S FK CLACKAMAS R	CLACKAMAS R
11919		0	S 9982	S 11007	L	01/16/1931	4.00	S	5.00	E	29	SESW	MU	10	C	P	MEMALOOSE CR	S FK CLACKAMAS R
13154		0	S 22581	S 28676	L	08/03/1953	2.00	S	2.00	E	21	NWSW	MU	60	C	P	CLACKAMAS R	WILLAMETTE R
26790	FM PARKPLACE WD	9824	S 6035	S 9179	S	09/17/1923	2.00	S	2.00	E	20	SESE	MU	.074	C	P	UNN STR	CLEAR CR
12944	FM PARKPLACE WD	14376	S 11997	S 15937	L	07/15/1935	2.00	S	2.00	E	27	NWSW	MU	.5	C	P	SPRS	CHARMAN CR
12472	FM PARKPLACE WD	35292	G 2361	G 2540	L	02/04/1963	2.00	S	2.00	E	28	NENW	QM	.15	C	P	A WELL	CLACKAMAS R

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APPENDIX B

Conservation Budgets

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APPENDIX B

Conservation Budgets

Regional Water Providers Consortium Conservation Budget for FY 2003-2004

Trade Ally				**$6,000**
	IA Grants			
	IA Membership			
	OLCA Summit Partnership			
Regional Events				**$8,500**
e.g.	Salmon Festival			
	YGP Show			
	Promo materials./giveaways			
	Event sponsorships			
Regional Resources				**$10,000**
	Display materials			
	Reprinting existing materials			
	Conservation Kits			
Website hosting/registration				**$575**
Contingency				**$2,725**
Marketing Campaign 2003				**$188,000**
	Dsi Contract	$40,591		
		(128,000 - 87,409)		
	New Mktg. Contract	87,409		
	PARC Radio	$18,000		
	Brochures (3)	$20,000		
	Sub-total	$27,800		
		- $3,300	*Youth Ed*	
		-$1,500	*special projects*	
		-$1,000	*Trade Ally*	
	Not yet allocated (Media?)	**$22,000**		
Youth Education				**$17,500**
	Youth Education Web Page (phase 2)			
	Clean Water Festival			
	Assembly Programs (As the Faucet Turns)			
Special Projects				**$5,000**
	CCC Garden?			
	($3,500 Naturescaping/ $1,500 special projects)			
	TOTAL for PROGRAMS:			**$238,300**
• **Conservation Programs**		**$238,300**		
• **Demand Tracking**		**$3,200**		
• **Conservation Staffing**		**$89,009**		
• **Travel & Training**		**$2,491**		
Total for FY 2003 -2004:		**$333,000**		

*SFWB annual dues are $18,518, of which it is estimated that about $11,000 goes toward conservation efforts.

SFWB Conservation Budget 2003-2004

Program	Dollars Allocated	Line Item
Contracted Services		
1) "Where's Rosie?" 12 shows @ $210	$2520	
2) "As the Faucet Turns" 9 shows @ $235	$2115	
3) Water Education Scholarships for schools	$2000	386
4) Partnerships (WES, OSU Extension, ELC)	$2455	$11,500
5) Landscape workshops	$2000	
6) Clean Water Festival $500	$500	
Promotions and Public Relations for Local Programs and Events		
1) Brochures/activity books	$3700	
2) Promotional items	$3600	318
3) Supplies for youth education programs and events	$1200	$10,000
4) Advertising for local conservation events	$500	
5) Partnership with Oregon City/West Linn Parks Dept.	$1000	
Printing		
1) Summer 2004 water conservation utility bill insert	$2000	316
2) 2005 Water Conservation Calendar	$11,000	$14,000
3) Reprint Consortium brochures	$1,000	
Capital Outlay	$10,000	$10,000
• Demonstration Garden Implementation		
	Total	**$45,500**

APPENDIX C
Water Audit Forms

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Water Audit Worksheet

For:_____ **Audit Study Period:**_____

Line	Item	Water Volume		
		Subtotal	Total Cumulative	Units
Task 1 - Measure the Supply				
1	Uncorrected total water supply to the distribution system (total of master meters)			
2A-C	Adjustments to total water supply			
2A	Source meter error (+ or -)			
2B	Change in reservoir and tank storage (+ or -)			
2C	Other contributions or losses (+ or -)			
3	Total adjustments to total water supply (add lines 2A, 2B, and 2C)			
4	Adjusted total water supply to the distribution system (add lines 1 and 3)			
Task 2 - Measure Authorized Metered Use				
5	Uncorrected total metered water use			
6	Adjustments due to meter reading lag time (+ or -)			
7	Metered deliveries (add lines 5 and 6)			
8A-C	Total sales meter error and system-service meter errors (+ or -)			
8A	Residential meter error			
8B	Large meter error			
8C	Total (add lines 8A and 8B)			
9	Corrected total metered water deliveries (add lines 7 and 8C)			
10	Corrected total unmetered water (subtract line 9 from line 4)			
Task 3 - Measure Authorized Unmetered Use				
11A	Firefighting and firefighting training			
11B	Main flushing			

"Water Audits and Leak Detection", *American Water Works Association Manual of Water Supply Practices,* App.. A, 1999.

Line	Item	Water Volume		
		Subtotal	Total Cumulative	Units
	Measure authorized unmetered use (continued)			
11C	Storm-drain flushing			
11D	Sewer cleaning			
11E	Street cleaning			
11F	Schools			
11G	Landscaping in large public areas:			
	Parks			
	Golf Courses			
	Cemeteries			
	Playgrounds			
	Highway median strips			
	Other landscaping			
11H	Decorative water facilities			
11I	Swimming pools			
11J	Construction Sites			
11K	Water quality and other testing (pressure-testing pipe, water quality, etc.)			
11L	Process water at treatment plants			
11M	Other unmetered uses			
12	Total authorized unmetered water (add lines 11A through 11M)			
13	Total water losses (subtract line 12 from line 10)			
	Task 4 - Measure Water Losses			
14A	Accounting procedure errors			
14B	Unauthorized connections			
14C	Malfunctioning distribution system controls			
14D	Reservoir seepage and leakage			
14E	Evaporation			

"Water Audits and Leak Detection", *American Water Works Association Manual of Water Supply Practices,* App.. A, 1999.

		Water Volume		
Line	**Item**	**Subtotal**	**Total Cumulative**	**Units**
	Measure identified water losses (continued)			
14F	Reservoir Overflow			
14G	Discovered leaks			
14H	Unauthorized use			
15	Total identified water losses (add lines 14A through 14H)			
Task 5 - Analyze Audit Results				
16	Potential water system leakage (subtract line 15 from line 13)			
17	Recoverable leakage (multiply line 16 by 0.50)			

Line	**Item**	**Dollars per Unit of Volume**		
18A-B	Other landscaping			
18A	Decorative water facilities			
18B	Swimming pools			
19	Construction Sites			

Line	**Item**	**Dollars per Year**		
20	One-year benefit form recoverable leakage (multiply line 17 by line 19)			
21	Total benefits from recovered leakage (multiply line 20 by 2)			
22	Total costs of leak detection project			
23	Benefit-to-cost ratio (divide line 21 by line 22)			

Prepared by:
Name:_____
Title:_____ Date:_____

"Water Audits and Leak Detection", *American Water Works Association Manual of Water Supply Practices,* App.. A, 1999.

Leak Detection and Repair Plan

Name of Agency:_____

A. Area to be Surveyed

A-1. Using the results of the water audit, show on a map which areas in the distribution system will be surveyed. Indicate which areas have the higher potential for recoverable leakage. Consider records of previous leaks, type of pipe, age of pipe, soil conditions, high pressures, ground settlement, and improper installation procedures.

Describe each area to be surveyed under item B-2 of this plan.

A-2. Total miles of main to be surveyed: _____.
When calculating the miles of main, include the total length of pipe and exclude service lines. If only a portion of the system is being surveyed, calculate the benefit-to-cost ratio to reflect only the portion included in the survey.

A-3. Average number of miles of main surveyed per day: _____.
The average survey crew can survey about two miles of main per day. Items to consider include distances between services, traffic and safety conditions, and number of listing contact points. Explain if more than three miles per day are surveyed._____

A-4. Number of working days needed to complete survey (divide line 2 by line 3):_____

B. Procedures and Equipment

B-1. Describe the procedures and equipment you will use to detect leaks. Experience shows that the best results are obtained by listening for leaks at all system contact points (such as water meters, valves, hydrants, and blowoffs)._____

B-2. Describe why the areas noted on the map in step A-1 have the greatest potential for recovering leakage._____

B-3 If you will not be listening for leaks at all system contact points, describe your plan for effectively detecting leaks._____

B-4 Describe the procedures and equipment you will use to pinpoint the exact location of the detected leaks._____

B-5 Describe how the leak detection team and the repair crew will work together. How will they resolve the problem of dry holes?_____

"Water Audits and Leak Detection", *American Water Works Association Manual of Water Supply Practices,* App. A, 1999.

B-6 Describe the methods you will use to determine the flow rates for excavated leaks of various sizes._____

_____

_____

_____

_____

C. Staffing

C-1 How many agency staff will be used?_____

Staff costs including wages and benefits:

Person 1	$/hour_____	$/day_____
Person 2	$/hour_____	$/day_____
Total	$/hour_____	$/day_____

C-2 How many consultant staff will be used?_____

Cost of consultant staff:

Person 1	$/hour_____	$/day_____
Person 2	$/hour_____	$/day_____
Total	$/hour_____	$/day_____

D. Leak Detection Survey Costs

Leak detection surveys:	$/day	# days	Cost
D-1 Agency-crew costs			
D-2 Consultant-crew costs			
D-3 Vehicle costs			
D-4 Other			
D-5 Total survey costs			

E. Leak Detection Budget

E-1 Cost of leak detection equipment	
E-2 Leak detection team training	
E-3 Leak detection survey costs	
E-4 Total leak detection costs	

F. Leak Survey and Repair Schedule

Indicate realistic, practical dates.

F-1 When will the leak survey begin?_____

F-2 When will the leak survey be completed?_____

F-3 When will leak repairs begin?_____

F-4 When will leak repairs be completed?_____

Prepared by:

Name:_____ Date:_____

Title:_____

"Water Audits and Leak Detection", *American Water Works Association Manual of Water Supply Practices*, Apx. A, 1999.

Leak Detection Survey Daily Log

Agency:_____ Date:_____

Leak Detection Team Members:_____

Manufacturer and Models of Equipment Used:_____

Area Surveyed:_____ Map Reference:_____

Street and Block Numbers:_____ Page & Coordinates:_____

Leak Number	Location or Address of Suspected Leak	Agency or Customer (A or C)	Leak Pinpointed (Y or N)	Leak to Be Rechecked (Y or N)	Leak Repaired (Y or N)	Not a Leak (Date)

Indicate Number of Listening Points Used	Meters	Hydrants	Valves	Test Rods	Other

Miles of Main Surveyed:_____ Survey Time_____ hours

Number of Leaks Suspected:_____ To Be Rechecked_____ (number)

Number of Leaks Pinpointed:_____ Pinpointed Time_____ hours

Remarks: _____

"Water Audits and Leak Detection", *American Water Works Association Manual of Water Supply Practices,* Apx. A, 1999.

LEAK REPAIR REPORT

Agency:_____ Date:_____

W.O. No.:_____ Foreman:_____

LEAK IDENTIFICATION Map Reference:_____

Refer to Leak Discovery Report Page and Coordinates:_____

Discovery Date:_____ Leak No.:_____

Location (include street name and number):_____

FOR MAIN AND SERVICE LATERAL LEAKS ONLY

Sketch a map of the site including:
1. Street name; north arrow.
2. Meter number (if applicable).
3. Mains and hydrants in shutdown area.
4. All valves (give valve numbers and show which were closed during repair).
5. Locate leak to nearest intersection or house with address. Show distances to property lines or street centerlines.

Leak found?_____(Yes/No)

If Main or Service Leak, Attach Three Photos:
1. Straight down over leak or damage.
2. Close-up of leak and damage.
3. Any other photo which you feel will help.

TYPE OF LEAK

Meter Leak	_____	Main Line Leak	_____	Joint Leak	_____
Meter Spud Leak	_____	Service Lateral Leak	_____	Other Leak	_____
Meter Yoke Leak	_____	Fire Hydrant Leak	_____	Describe:_____	
Curb Stop Leak	_____	Valve Leak	_____	_____	

DESCRIPTION OF REPAIR

Damaged part was: _____ Repaired _____ Replaced

If replaced, what material was used?_____

Repair Time: _____ (From/To)

Crew Size: _____ (persons)

Equipment Used for Repair: _____ Backhoe

_____ Dumptruck

If repaired, what repairs were made?

_____Leak Clamp _____Repacked Valve

_____Welded _____Recaulked Joint

_____ Other (describe)

Repair Costs:

Materials	$_____
Labor	$_____
Equipment	$_____
Other	$_____
Total	$_____

Size of Leak:

Measured _____ gpm

Estimated _____ gpm

Method Used:_____

"Water Audits and Leak Detection", *American Water Works Association Manual of Water Supply Practices,* App. A, 1999.

DESCRIPTION OF DAMAGE FOR MAINS AND SERVICES

What part was damaged?

_____Pipe Barrel _____Flange Nuts, Bolts, Tie Rods
_____Joint _____Other (describe)
_____Valve _____

In your opinion, what caused the damage?

_____
_____
_____

Estimated Age of Leak in Months:_____
How Determined:_____
Diameter of Main or Lateral in Inches:_____
Depth to Top of Pipe in Inches:_____

Type of Break

_____ Split
_____ Hole
_____ Circumferential Split
_____ Broken Coupling
_____ Service Pulled
_____ Cracked at Corporation Stop
_____ Gasket Blown
_____ Crushed Pipe
_____ Cracked Bell
_____ Other (describe)

_____
_____

Pipe Material:

_____Galv. Iron _____Ductile Iron _____A.C.P.
_____Black Iron _____Steel _____P.V.C.
_____Cast Iron _____Copper _____Polybutylene

System Pressure:_____
How Determined:_____
_____

Examine broken edge of cast- or ductile-iron pipe:

Original Thickness:
_____Inches

Min. Thickness of Good Grey Metal Remaining:
_____Inches

Deterioration is on:
____Inside _____Outside

Is there evidence of previous leak or repairs in same general area? _____

Number of Previous Leak Repair Clamps Present _____

Last Repair Date (if known):_____

Cause of Leak:_____
_____

In your opinion, should the pipe be replaced? _____Yes _____No _____Do not know
If yes, explain extent:_____

FOR EXCAVATIONS, INDICATE GROUND CONDITIONS

Type of Soil:

_____Rocky _____Sandy
_____Clay _____Hard Pan
_____Adobe _____Loam
_____Other
_____

Existing Bedding:

_____Gravel/Sand
_____Native Soil
_____Pea Gravel
_____Other
_____

Type of Cover:

_____Concrete
_____Asphalt
_____Soil
_____Other
_____

"Water Audits and Leak Detection", *American Water Works Association Manual of Water Supply Practices,* Apx. A, 1999.

LEAK DETECTION AND REPAIR PROJECT SUMMARY

Agency:_____

Name of Report Preparer:_____

Date:_____

LEAK DETECTION SURVEY

Total Number of Days Leak Surveys Were Conducted: _____

First Survey Date:_____ Last Survey Date:_____

	Meters	Hydrants	Valves	Test Rods	Other
Number of Listening points:					

Number of suspected leaks:_____ Number of pinpointed leaks:_____

Survey Time:_____ hours Miles of main surveyed:_____

Pinpointing time:_____ hours

Average survey rate = $\frac{\text{miles of main surveyed x 8}}{\text{total survey and pinpointing hours}}$ =_____miles per day

Total number of visible leaks reported since survey started, from other sources (not discovered during leak detection surveys):_____

LEAK REPAIR SUMMARY

First Leak Repair Made:_____ Last Leak Repair Made:_____

Number of Repairs Needing Excavation:_____

Number of Repairs Not Needing Excavation:_____

Total Number of Repaired Leaks:_____

Total Water Losses From Excavated Leaks:_____gpm

Total Water Losses From Nonexcavated Leaks:_____gpm

Total Water Losses:_____gpm

	Excavated Leak Repair Costs	Nonexcavated Leak Repair Costs	Total Repair Costs
Materials	$	$	$
Labor	$	$	$
Equipment	$	$	$
Other	$	$	$
Subtotal	$	$	$

"Water Audits and Leak Detection", *American Water Works Association Manual of Water Supply Practices,* Apx. A, 1999.

LEAK DETECTION PROJECT COST-EFFECTIVENESS

Step 1. Calculate the value of water recovered (Vwr) from all repaired leaks.
(Vwr) = (Total leakage recovered in gpm)(water cost, Wc)
Wc = Line 19 of Water Audit Report = water purchase price + operating costs per unit water
Vwr = _____gpm x 60 min x 24 hrs x _____days x $_____/mil gal = $_____

Step 2. Determine the total cost of the leak detection survey.
Leak Detection Survey Costs:

Equipment	$_____
Training	$_____
Survey Costs	$_____
Total	$_____

Step 3. Divide Vwr (from step 1) by the total costs (calculated in step 2).

$$\text{Benefit:Cost Ratio (B:C)} = \frac{\text{value of water recovered}}{\text{total cost leak detection survey}} = \_\_\_\_\_$$

For planning future leak detection efforts, you can calculate average survey costs per mile.

Step 4. Determine average survey costs per mile of main surveyed (C/mi).

$$\text{C/mi} = \frac{\text{total cost of leak detection survey}}{\text{total number of miles surveyed}} = \frac{\$\_\_\_\_\_}{\_\_\_\_\_\text{mi}}$$

C/mi = $_____/mi

"Water Audits and Leak Detection", *American Water Works Association Manual of Water Supply Practices,* Apx. A, 1999.

APPENDIX D

Large Water Users

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Class	Name	Consumption 2002 (ccf)
Apartment	Summerlinn Apartments	8,505
	Hidden Village Apartments	8,450
	Cascade Summit Apts.	5,890
	Summerlinn Apartments	5,820
	Linnwood Heights Apartments	5,554
	Cascade Summit Apts.	5,402
	Cascade Summit Apartments	5,320
	Cascade Summit Apartments	4,985
	Cascade Summit Apartments	4,983
	Riverwest Apartments	4,383
	Tanner Spring Assisted Living	5,215
	Rose Linn Care Center	4,381
Commercial	Riverwest Apartments	32,445
	Willamette Car Wash	5,822
	Kaddy Car Wash	3,480
	Robinwood Shopping Center	2,919
	Safeway Inc.	2,229
	Childrens Discovery Center	1,895
	Wysk Investment Services	1,819
	Albertsons	1,708
	West Linn School District #3J	6,270
	West Linn School District	4,233
	City of West Linn	6,270
	City of West Linn	2,220
	City of West Linn	1,585
	City of West Linn	1,385
	West Linn School District #3J	1,228
	Challenge Realty	1,971
	Hidden Springs Ranch	1,179
	Willamette Capital Investments	1,080
Single-family	Osterlund, Aric & Kim	5,081
	Nelson, Reid	1,652
	Nimz, Donald & Ginger	1,406
	Underwood, Rachel	1,242
	Molendyk, Denise S	1,076

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Class	Name	Consumption 2000-2001 (ccf)
Multi-Family	Pioneer Ridge Apartments	28,133
	King's Berry Heights Apts	24,000
	Clairmont Mobile Home Park	13,223
	Barclay Village Apts.	13,046
	Fernwood Apts.	13,041
	Oregon City View Manor	10,405
	Hidden Creek Apartments	9,855
	Mt. Pleasant Mobile Park	9,357
	Mt. View Apts.	8,837
Institutional	Clackamas Community College	29,123
	Willamette Falls Hospital	23,053
	Clackamas County Jail & Complex	20,254
	Sierra Vista Nursing Home	7,468
Industrial/Commercial	Blue Heron Paper Co.	49,957
	Larsen's Creamery	10,833
	Browning Ferris	7,586
	So. Ridge Shopping Center	7,697

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APPENDIX E

Conservation Programs Comparison

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Appendix E
SFWB Conservation
Programs Cost Analysis

Average Consumption per Connection (ccf/month/connection)

	Residential	Commercial, Industrial, Institutional (CII)	Multiple Unit	Institutional
West Linn				
indoor	9.24	53.68	68.17	n/a
outdoor	7.79	45.24	57.45	n/a
Oregon City				
indoor	6.86	41.87	39.66	105.92
outdoor	7.12	19.14	28.19	169.25

West Linn data compiled over 1994-2002.
Oregon City data compiled over 2002.
ccf = 100 cubic feet

Appendix E
SFWB Conservation
Programs Cost Analysis

	Number of Connections [1]				Percent of Connections				Percent Consumption			
	Residential Single Family	Multiple Unit	Commercial/ Industrial	Institutional	Residential Single Family	Multiple Unit	Commercial/ Industrial	Institutional	Residential Single Family	Multiple Unit	Commercial/ Industrial	Institutional
SFWB	15,117	525	585	85								
Oregon City	7,374	406	456	85	92.30%	5.17%	5.86%	1.08%	66.31%	21.12%	25.05%	11.81%
West Linn	7,743	119	129		96.01%	1.47%	1.58%		80.72%	9.15%	7.81%	

1) For SFWB the Number of Connections is assumed to be the sum of Oregon City and West Linn Connections.

Appendix E
SFWB Conservation
Programs Cost Analysis

Estimate of Cost of Water Based on SFWB CIP [1]

	1997 dollars	2003 dollars	Existing Capacity (mgd)	Expansion Capacity (mgd)	$/mgd	$/gpd	$/1000 gal
New Raw Water Pipe Line	$ 1,525,000	$ 2,006,796	20	52	$ 62,712	$ 0.06	$ 0.17
WTP 10 MGD Expansion	$ 4,210,000	$ 4,210,000	20	30	$ 421,000	$ 0.42	$ 1.15
Raw Water PS Expansion to 35 MGD	$ 695,000	$ 695,000	20	35	$ 46,333	$ 0.05	$ 0.13
Total						**$ 0.53**	**$ 1.45**

1) Improvements and expansion capacity taken form 1997 SFWB WMP (Montgomery Watson)
assumed interest rate = 4.00%

Appendix E
SFWB Conservation
Programs Cost Analysis

Program	Supplier	Labor Required[4]	Other Costs[1]	Total Estimated Cost[2] ($/yr.)	Estimated Water Savings[2] (ccf/yr.)	Estimated Water Savings[2] (gal/yr.)	Annual Loss of Revenue or Increased Cost	Unit cost ($/gpd)[3]	Notes	Comment
Meter Testing and Maintenance	**SFWB**	0.25 FTE	$13,200	$28,200	207,386	155,125,000	$114,063	-$0.20	All meters annually tested and repaired. Assumes 5% accuracy savings at $0.55 per ccf. 2002 ADD = 8.5 mgd. Includes cost of Water Audit.	
Public Education Program	**SFWB**	1.00 FTE	$45,500	$105,500	56,385	42,176,130	$0	$0.91	Education program for Cities schools; workshops on water conservation, landscaping; water conservation info in Cities newsletter.	Assume residential use reduced 2%.
Regional Water Providers Consortium	**SFWB**	N/A	$11,000	$11,000	56,385	42,176,130	$0	$0.10	Dues are paid to the RWPC once a year to provide regional education programs that are available to the public.	Assume residential use reduced 2%.
Annual Water Audit	**SFWB**	0.05 FTE	$200	$3,200	-	-	-	-	Currently only informal water audit reports are prepared. Annual reports will be produced and archived for future reference.	
Meter Testing, Maintenance, and Replacement	**Oregon City**	0.49 FTE	$73,740	$106,436	61,835	46,252,251	$110,066	-$0.03	Tested and repaired. Assumes 5% accuracy savings at $1.78 per ccf. Includes cost of Water Audit.	Assumes 2 hrs. per meter replace at 15 year intervals plus $150 per meter.
Annual Water Audit	**Oregon City**	0.05 FTE	$200	$3,200	-	-	-	-	Currently only informal water audit reports are prepared. Annual reports will be produced and archived for future reference.	
Leak Detection	**West Linn**	0.08 FTE	$10,000	$15,000	-	-	-	-	Initial leak detection contract: 15% system surveyed + Bolton Reservoir; leakage estimate = 8.1%.	
Leak Detection and Repair	**West Linn**	0.05 FTE	$63,000	$66,000	7,027	5,256,000	$3,865	$4.31	Includes Cost of Leak Detection. Leak repair program not required by WRD because leakage rate is <15%.	Find and eliminate 10 gpm leaks per year.
Meter Testing, Maintenance, and Replacement	**West Linn**	0.52 FTE	$77,430	$111,602	79,128	59,188,073	$102,867	$0.05	Tested and repaired. Assumes 5% accuracy savings at $1.30 per ccf. Includes cost of Water Audit.	Assumes 2 hrs. per meter replace at 15 year intervals plus $150 per meter.
Annual Water Audit	**West Linn**	0.05 FTE	$200	$3,200	-	-	-	-	Currently only informal water audit reports are prepared. Annual reports will be produced and archived for future reference.	

[1] Includes equipment, supplies, outside services, etc.
[2] Estimated costs and water savings are based on the Update of the Regional Water Supply Plan Conservation Element (March 2003) and Conservation Program Descriptions.
[3] Negative cost means that the supplier can actually save money as a result of this program.
[4] Cost of 1.0 FTE = $60,000 per year.

Appendix E
SFWB Conservation
Programs Cost Analysis

Program	Location	Responsibility	Labor Required	Other Costs[1]	Estimated Cost[2] ($/yr.)	Estimated Water Savings[2] (ccf/yr.)	Estimated Water Savings[2] (gal/yr.)	Annual Loss of Revenue or Increased Cost	Cost/gal saved	Cost/1000 gal saved	Unit cost ($/gpd)[3]	Notes	Comments
Leak Detection and Repair Program	**SFWB**	**SFWB**	1.00 FTE	$10,000	$14,000	14,053	10,512,000	$7,729	$0.00	$0.60	$0.22	Program not required by WRD because leakage rate is <10%. However, consider this program if it compares favorable to other conservation programs. Conduct once every 5 years.	Assume 20 gpm leaks detected and repaired every five years. 8.5 MG ADD at 0.55/ccf.
Reuse, Recycle, Non-potable Use Program	**OC/WL**	**SFWB**	0.30 FTE	$30,000	$48,000	8,737	6,535,564	$0	$0.01	$7.34	$2.68	"Industrial audits" - evaluating re-use opportunities, irrigation, cooling etc, system wide.	Assume 5% industrial reduction in outdoor usage.
Technical and Financial Assistance Programs	**OC/WL**	**SFWB**	0.30 FTE	$30,000	$48,000	31,464	23,535,306	$0	$0.00	$2.04	$0.74	Individual water audits, training opportunities, irrigation and other technical workshops currently not performed; recommend fixture rebate responsibility be on Cities	Property manager workshops: 0.5% multi-unit and commercial participation per year. Customer water consumption decreases by approx. 2% outdoor use. Irrigation and landscape workshops: 0.2% single family, multi-unit participation per year. Customer water consumption decreases by approx. 2% outdoor use.
Fixture Rebate Program	**Oregon City**	**Oregon City**	0.05 FTE	$31,860	$34,860	5,426	4,058,610	$0	-	-	-	Fixtures eligible for rebates: toilets, waterless urinals, washing machines Irrigation System Components eligible for rebates: ET Controller	
Toilet Rebate	**Oregon City**	**SFWB**	0.01 FTE	$14,748	$15,348	2,159	1,614,906	$0	$0.01	$9.50	$3.47	$100 rebate	2% single family participation per year. Residential customer water consumption decreases by approx. 30 gal/d.
Waterless Urinal Rebate	**Oregon City**	**SFWB**	0.01 FTE	$4,058	$4,658	1,237	925,385	$0	$0.01	$5.03	$1.84	$150 rebate	5% commercial and institutional participation per year. Commercial customer consumption decreases by approx. 81 gpd, and institutional customer by 162 gpd.
Washing Machine Rebate	**Oregon City**	**SFWB**	0.01 FTE	$3,687	$4,287	432	322,981	$0	$0.01	$13.27	$4.84	$50 rebate	1% single family participation per year. Residential customer water consumption decreases by approx. 12 gal/d.
Commercial ET Controller	**Oregon City**	**SFWB**	0.01 FTE	$1,625	$2,225	275	205,620	$0	$0.01	$10.82	$3.95	50% of controller cost ($475 maximum rebate)	0.75% commercial participation per year. Commercial customer water consumption decreases by approx. 35% outdoor use.
Residential ET Controller	**Oregon City**	**SFWB**	0.01 FTE	$7,743	$8,343	1,323	989,718	$0	$0.01	$8.43	$3.08	50% of controller cost ($175 maximum rebate)	0.6% single family participation per year. Residential customer water consumption decreases by approx. 35% outdoor use.
Initial Leak Detection	**Oregon City**	**Oregon City**	0.01 FTE	$75,000	$75,600	0	0	$0	-	-	-	Oregon City is in the process of issuing a leak detection contract to survey. The cost is expected to be approx. $75,000.	Cost included in Leak Repair Program
Leak Detection and Repair Program	**Oregon City**	**Oregon City**	0.10 FTE	$125,600	$131,600	14,053	10,512,000	$7,729	$0.01	$11.78	$4.30	Leak detection program required by WRD because leakage rate is >10% (UFW ~18%).	Find and eliminate 20 gpm leaks per year. Assume $0.55 lost revenue due to increased water purchased from SFWB.
Fixture Rebate Program	**West Linn**	**West Linn**	0.05 FTE	$28,068	$31,068	4,679	3,499,927	$0	-	-	-	Fixtures eligible for rebates: toilets, waterless urinals, washing machines Irrigation System Components eligible for rebates: ET Controller	
Toilet Rebate	**West Linn**	**SFWB**	0.01 FTE	$15,486	$16,086	2,267	1,695,717	$0	$0.01	$9.49	$3.46	$100 rebate	2% single family participation per year. Residential customer water consumption decreases by approx. 30 gal/d.
Waterless Urinal Rebate	**West Linn**	**SFWB**	0.01 FTE	$968	$1,568	255	190,694	$0	$0.01	$8.22	$3.00	$150 rebate	5% commercial and institutional participation per year. Commercial customer consumption decreases by approx. 81 gal/d, and institutional customer by 162 gal/d (see assumptions).
Washing Machine Rebate	**West Linn**	**SFWB**	0.01 FTE	$3,872	$4,472	453	339,143	$0	$0.01	$13.18	$4.81	$50 rebate	1% single family participation per year. Residential customer water consumption decreases by approx. 12 gal/d.
Commercial ET Controller	**West Linn**	**SFWB**	0.01 FTE	$0	$600	184	137,497	$0	$0.00	$4.36	$1.59	50% of controller cost ($475 maximum rebate)	0.75% commercial participation per year. Commercial customer water consumption decreases by approx. 35% outdoor use.
Residential ET Controller	**West Linn**	**SFWB**	0.01 FTE	$7,743	$8,343	1,520	1,136,876	$0	$0.01	$7.34	$2.68	50% of controller cost ($175 maximum rebate)	0.6% single family participation per year. Residential customer water consumption decreases by approx. 35% outdoor use.

[1] Includes equipment, supplies, outside services, etc.
[2] Estimated costs and water savings are based on the Update of the Regional Water Supply Plan Conservation Element (March 2003) and Conservation Program Descriptions.
[3] Negative cost means that the supplier can actually save money as a result of this program.
[4] Cost of 1.0 FTE = $60,000 per year.

Table 5-4
SFWB Conservation
Programs Cost Analysis

Program [2]	Location	Responsibility	Unit cost ($/gpd) [1]	Feasibility	Reliability	Environmental Acceptability	Overall Score [3]
Leak Detection and Repair Program	SFWB	SFWB	$0.22	1	1	1	***3***
Meter Testing and Maintenance [5]	SFWB	SFWB	-$0.20	1	1	0	***2***
Expansion of Existing Source [4]	SFWB	SFWB	$0.53	1	1	-1	***1***
Reuse, Recycle, Non-potable Use Program	OC/WL	SFWB	$2.68	0	0	1	***1***
Public Education Program	OC/WL	SFWB	$0.91	0	0	1	***1***
Regional Water Providers Consortium	OC/WL	SFWB	$0.10	0	-1	1	***0***
Technical and Financial Assistance Programs	OC/WL	SFWB	$0.74	0	-1	0	***-1***
Leak Detection and Repair Program	Oregon City	Oregon City	$4.30	1	1	1	***3***
Meter Testing, Maintenance, and Replacement [5]	Oregon City	Oregon City	-$0.03	1	1	0	***2***
Expansion of Existing Source [4]	Oregon City	Oregon City	$0.53	1	1	-1	***1***
Commercial ET Controller	Oregon City	SFWB	$3.95	0	-1	1	***0***
Residential ET Controller	Oregon City	SFWB	$3.08	0	-1	1	***0***
Waterless Urinal Rebate	Oregon City	SFWB	$1.84	0	-1	0	***-1***
Toilet Rebate	Oregon City	SFWB	$3.47	0	-1	0	***-1***
Washing Machine Rebate	Oregon City	SFWB	$4.84	0	-1	0	***-1***
Leak Detection and Repair	West Linn	West Linn	$4.31	1	1	1	***3***
Meter Testing, Maintenance, and Replacement [5]	West Linn	West Linn	$0.05	1	1	0	***2***
Expansion of Existing Source [4]	West Linn	West Linn	$0.53	1	1	-1	***1***
Commercial ET Controller	West Linn	SFWB	$1.59	0	-1	1	***0***
Residential ET Controller	West Linn	SFWB	$2.68	0	-1	1	***0***
Toilet Rebate	Oregon City	SFWB	$3.47	0	-1	0	***-1***
Waterless Urinal Rebate	West Linn	SFWB	$3.00	0	-1	0	***-1***
Washing Machine Rebate	West Linn	SFWB	$4.81	0	-1	0	***-1***

[1] See Appendix E. A negative value impious that the program will actually save money.

[2] Bold indicates proposed program.

[3] Programs are ranked by positive and negative aspects taken into account by adding (1) or subtraction (-1), if applicable.

[4] Based on SFWB WMP CIP. See Appendix E. Because the cities bill and are billed on a volume basis, there is no way to make an appropriate comparison except to compare the cost of increasing the capacity at SFWB and assume that these costs will be passed on accordingly.

[5] Includes cost of Water Audit.

Table 5-5
SFWB Conservation
Programs Cost Analysis

Program	Location	Annual Cost	Estimated Annual Water Savings (MG)
Public Education Program[1]	SFWB	$105,500	42
Meter Testing and Maintenance/Water Audit	SFWB	$28,200	0
Regional Water Providers Consortium	SFWB	$11,000	42
Leak Detection and Repair Program	SFWB	$14,000	11
Reuse, Recycle, Non-potable Use Program	OC/WL	$48,000	7
Technical and Financial Assistance Programs	OC/WL	$48,000	24
		$254,700	***125***
Oregon City			
Annual Water Audit	Oregon City	$3,200	0
Meter Testing, Maintenance, and Replacement	Oregon City	$106,436	0
Leak Detection and Repair Program (incl. init.)	Oregon City	$131,600	11
		$241,236	***11***
West Linn			
Annual Water Audit	West Linn	$3,200	0
Meter Testing, Maintenance, and Replacement	West Linn	$111,602	0
Leak Detection and Repair	West Linn	$62,800	5
		$174,402	***5***

1) Includes cost of conservation coordinator position

Oregon City
Water Distribution System
Master Plan

Public Meeting

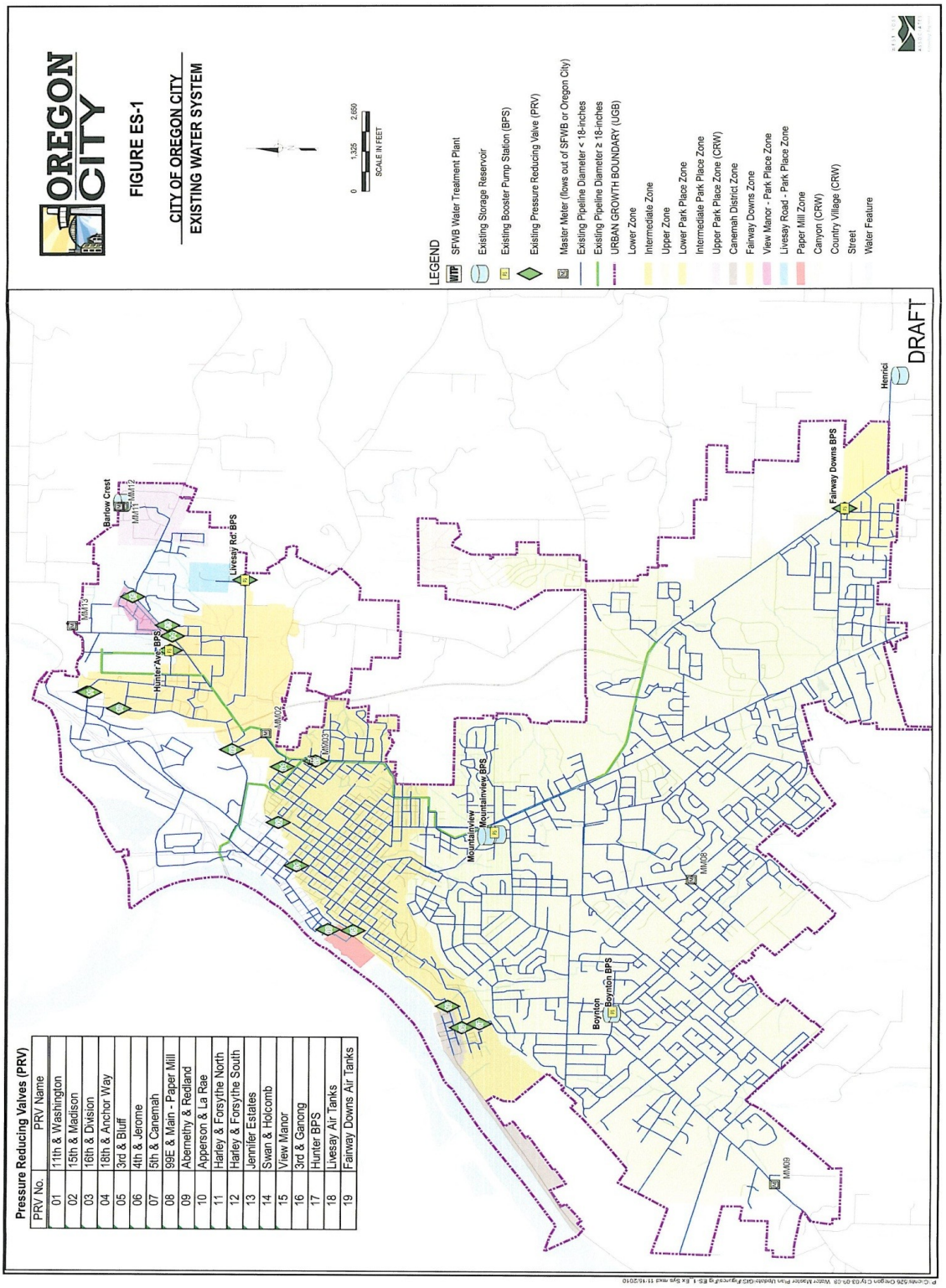
November 21, 2011

Presentation Overview

* Service Area
* Water Demand
* Existing System
* Future System Expansion
* Recommended Improvements
* Financing
* Questions

Service Area

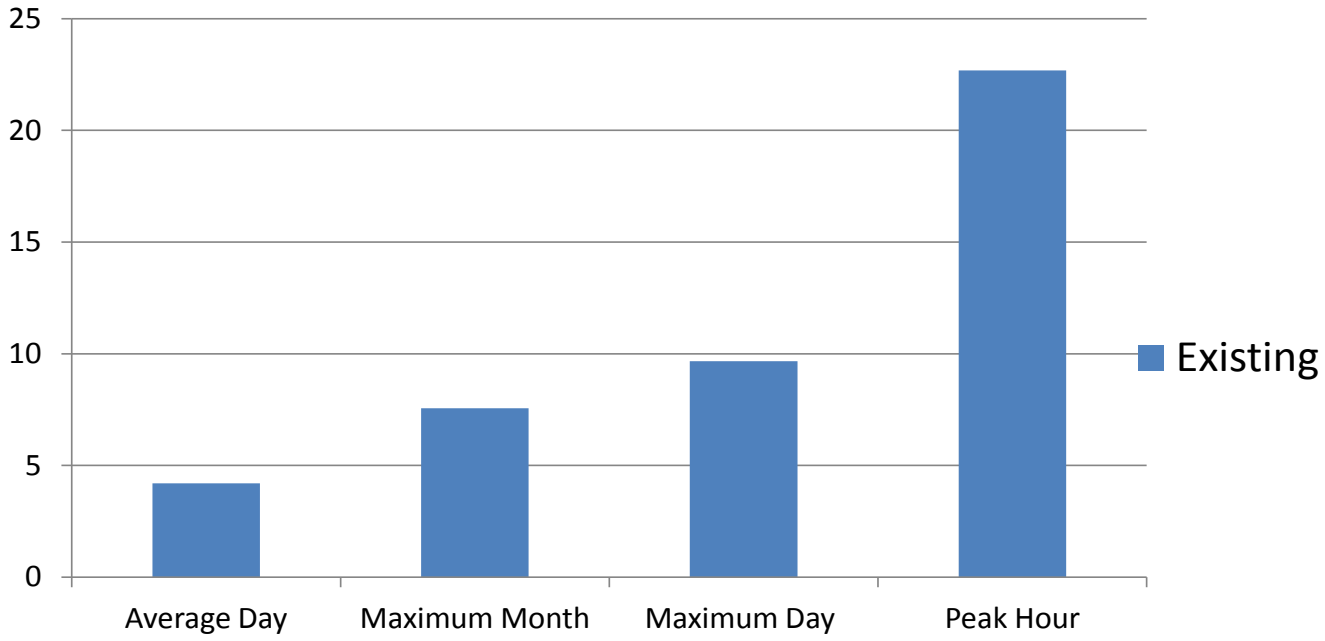
* Oregon City
* 32,000 Inhabitants
* 9,975 Customer Accounts
* Planning for the Urban Growth Boundary



4a. Water Master Plan Update (Continued from October 24, 2011).

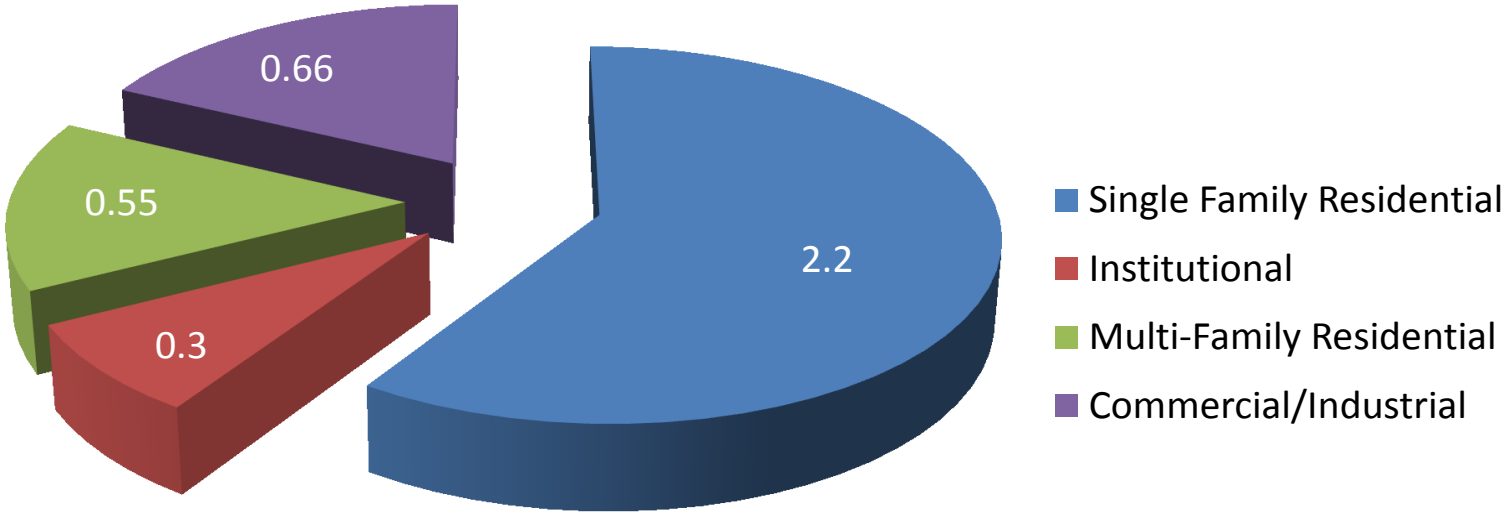
Existing Water Demand

Million Gallons Per Day

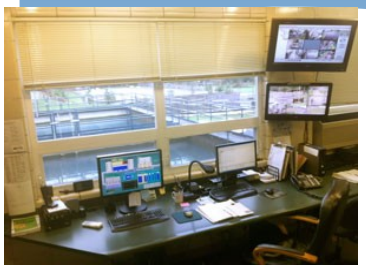


Average Water Demand by User Groups

million gallons per day



Existing System



* Great Water Supply
* Storage
* Metering System
* Pumping Stations
* Distribution Piping

Storage

* 18 million gallons of treated water storage.
* 5 reservoirs
* Adequate storage for existing system

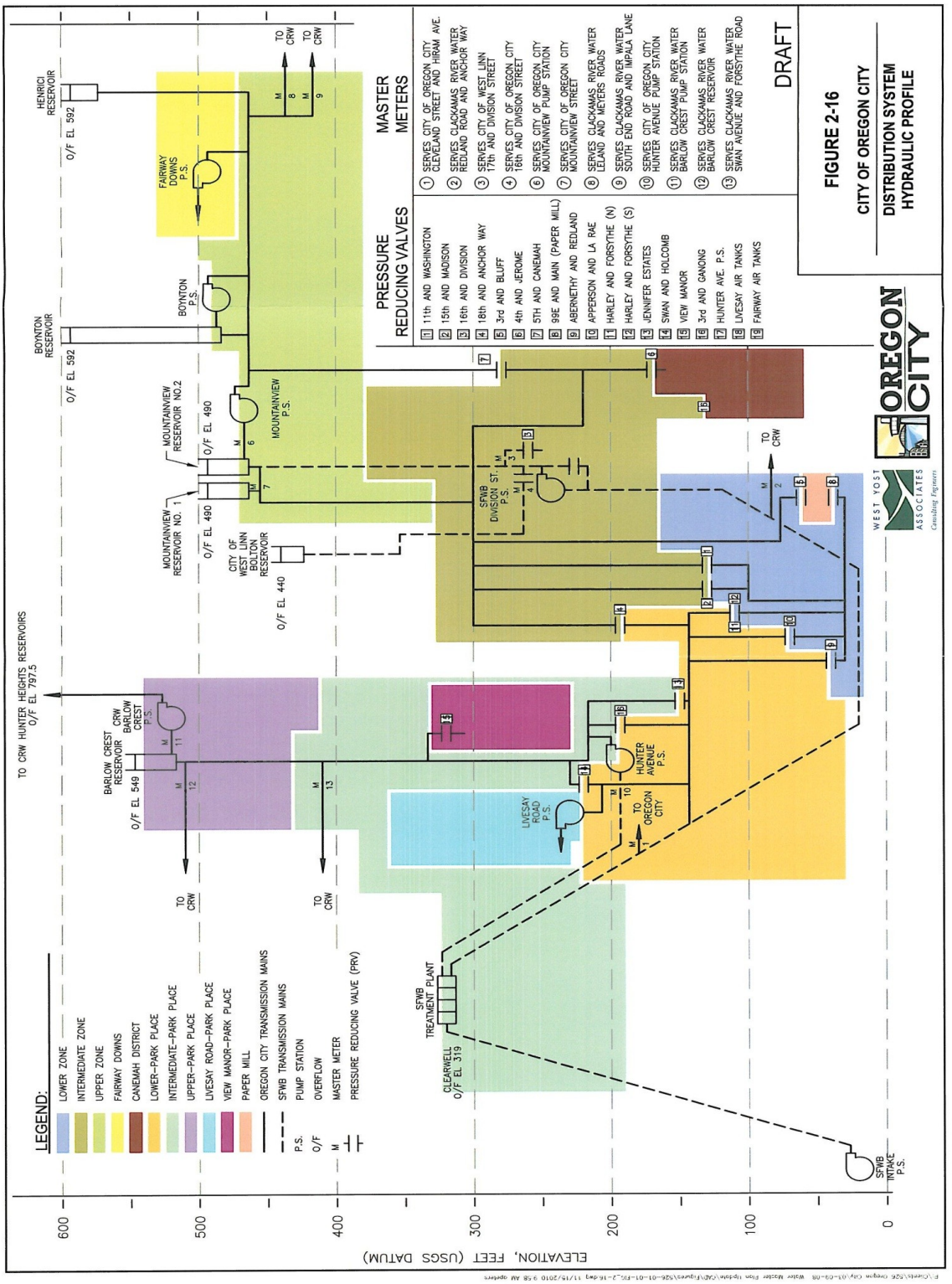


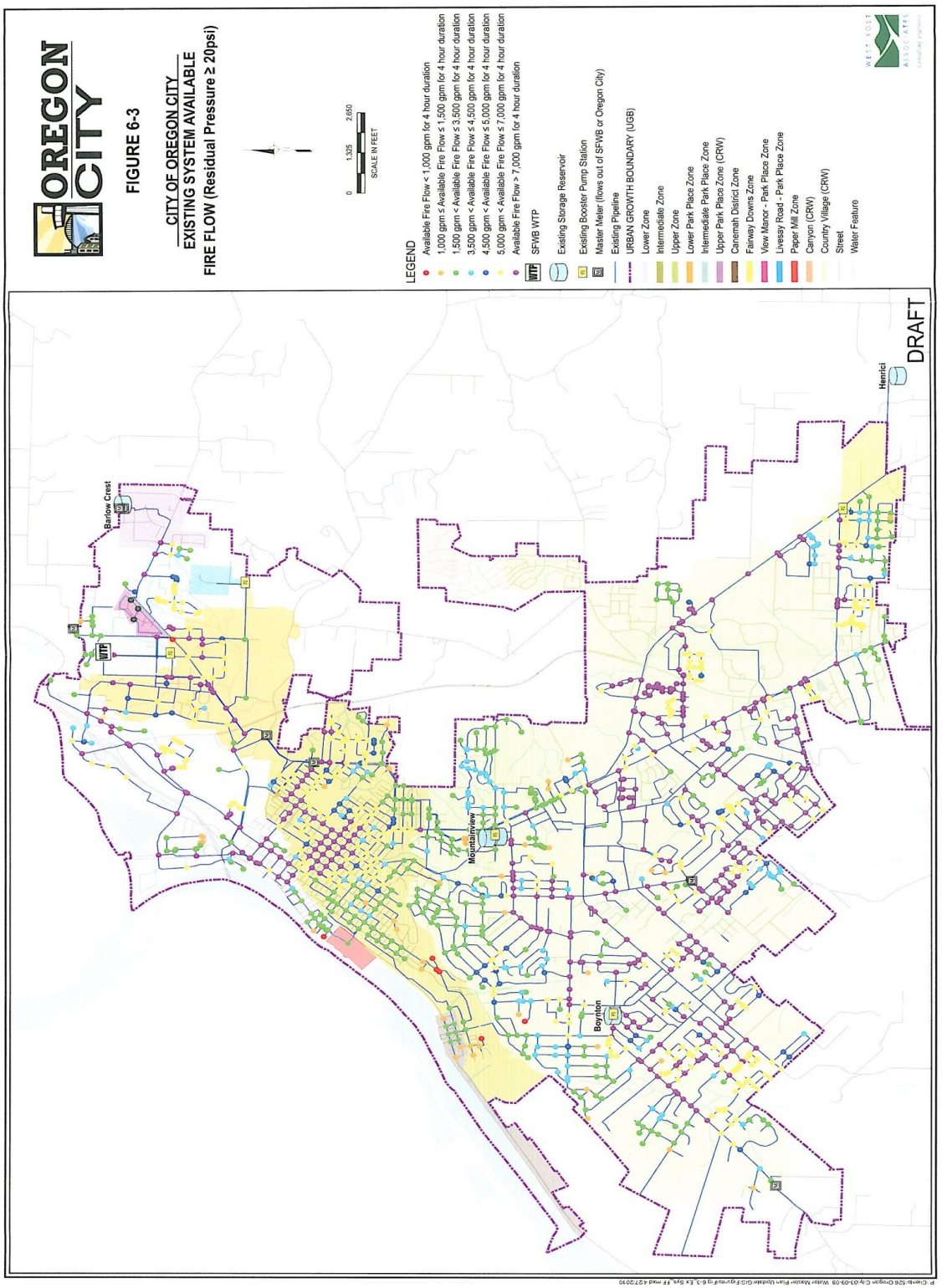
FIGURE 2-16
CITY OF OREGON CITY
DISTRIBUTION SYSTEM
HYDRAULIC PROFILE
DRAFT
OREGON CITY
WEST YOST ASSOCIATES
MASTER METERS
PRESSURE REDUCING VALVES
LEGEND:
ELEVATION, FEET (USGS DATUM)
TO CRW HUNTER HEIGHTS RESERVOIRS O/F EL 797.5
HENRICI RESERVOIR O/F EL 592
BOYNTON RESERVOIR O/F EL 592
BOYNTON P.S.
FAIRWAY DOWNS P.S.
MOUNTAINVIEW RESERVOIR NO.2 O/F EL 490
MOUNTAINVIEW RESERVOIR NO. 1 O/F EL 490
MOUNTAINVIEW P.S.
CITY OF WEST LINN BOLTON RESERVOIR O/F EL 440
SFWB DIVISION ST. P.S.
BARLOW CREST RESERVOIR O/F EL 549
CRW BARLOW CREST P.S.
HUNTER AVENUE P.S.
LIVESAY ROAD P.S.
TO OREGON CITY
SFWB TREATMENT PLANT
CLEARWELL O/F EL 319
SFWB INTAKE P.S.
TO CRW
LOWER ZONE
INTERMEDIATE ZONE
UPPER ZONE
FAIRWAY DOWNS
CANEMAH DISTRICT
LOWER-PARK PLACE
INTERMEDIATE-PARK PLACE
UPPER-PARK PLACE
LIVESAY ROAD-PARK PLACE
VIEW MANOR-PARK PLACE
PAPER MILL
OREGON CITY TRANSMISSION MAINS
SFWB TRANSMISSION MAINS
P.S. PUMP STATION
O/F OVERFLOW
M MASTER METER
PRESSURE REDUCING VALVE (PRV)
1 11th AND WASHINGTON
2 15th AND MADISON
3 16th AND DIVISION
4 18th AND ANCHOR WAY
5 3rd AND BLUFF
6 4th AND JEROME
7 5TH AND CANEMAH
8 99E AND MAIN (PAPER MILL)
9 ABERNETHY AND REDLAND
10 APPERSON AND LA RAE
11 HARLEY AND FORSYTHE (N)
12 HARLEY AND FORSYTHE (S)
13 JENNIFER ESTATES
14 SWAN AND HOLCOMB
15 VIEW MANOR
16 3rd AND GANONG
17 HUNTER AVE. P.S.
18 LIVESAY AIR TANKS
19 FAIRWAY AIR TANKS
1 SERVES CITY OF OREGON CITY CLEVELAND STREET AND HIRAM AVE.
2 SERVES CLACKAMAS RIVER WATER REDLAND ROAD AND ANCHOR WAY
3 SERVES CITY OF WEST LINN 17th AND DIVISION STREET
4 SERVES CITY OF OREGON CITY 16th AND DIVISION STREET
6 SERVES CITY OF OREGON CITY MOUNTAINVIEW PUMP STATION
7 SERVES CITY OF OREGON CITY MOUNTAINVIEW STREET
8 SERVES CLACKAMAS RIVER WATER LELAND AND MEYERS ROADS
9 SERVES CLACKAMAS RIVER WATER SOUTH END ROAD AND IMPALA LANE
10 SERVES CITY OF OREGON CITY HUNTER AVENUE PUMP STATION
11 SERVES CLACKAMAS RIVER WATER BARLOW CREST PUMP STATION
12 SERVES CLACKAMAS RIVER WATER BARLOW CREST RESERVOIR
13 SERVES CLACKAMAS RIVER WATER SWAN AVENUE AND FORSYTHE ROAD

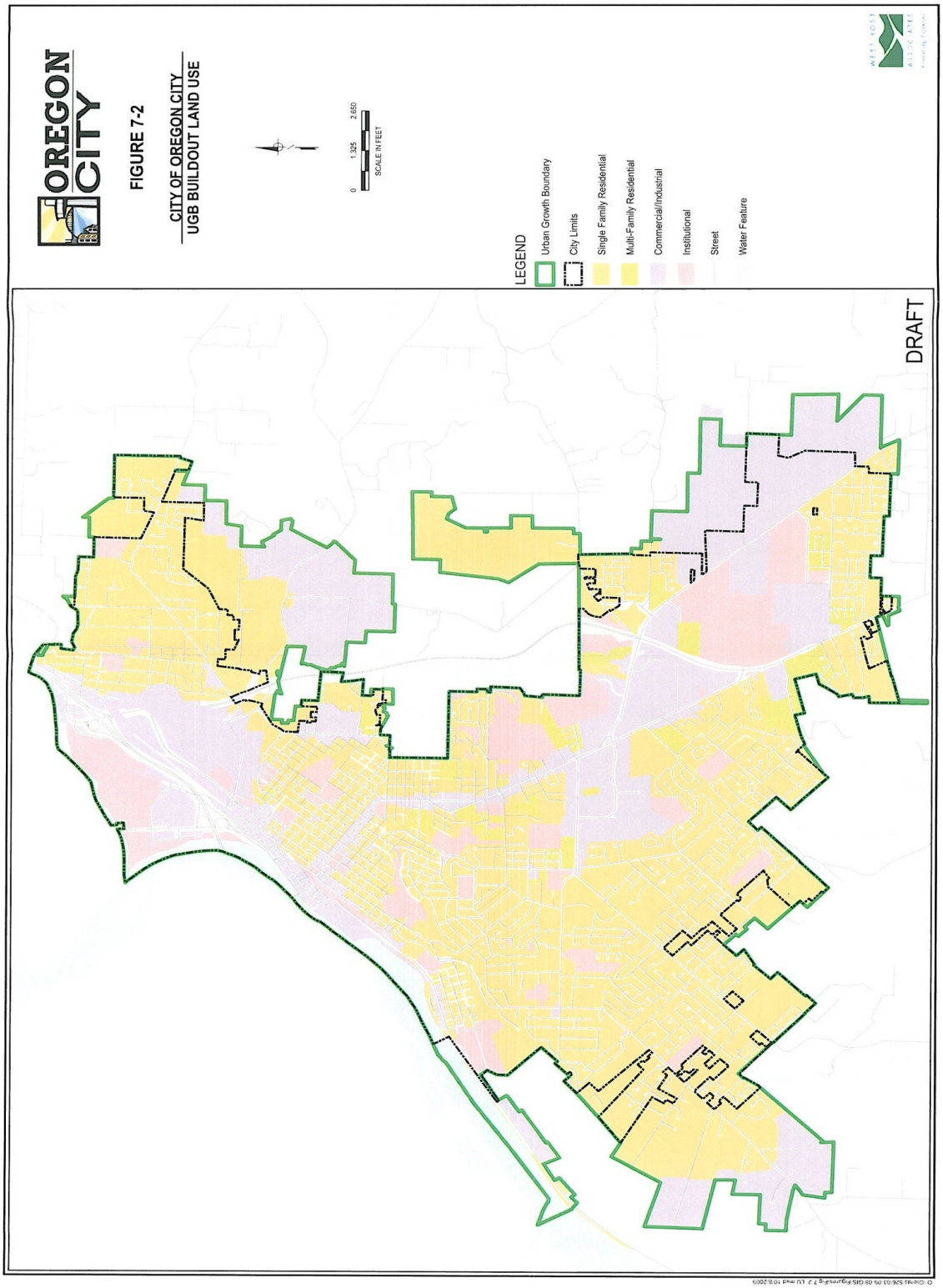
Water Distribution System Pipes

Pipeline Diameter, inches	Length, miles	Percent of Water System
2	4.6	3.0
3	0.3	0.2
4	7.3	4.7
6	39.9	25.8
8	62.4	40.4
10	8.8	5.7
12	17.1	11.1
14	0.4	0.2
16	11.2	7.2
20	2.4	1.6
24	0.02	< 0.1
30	0.01	< 0.1
Total	154.4	100.0

Pipe Replacement

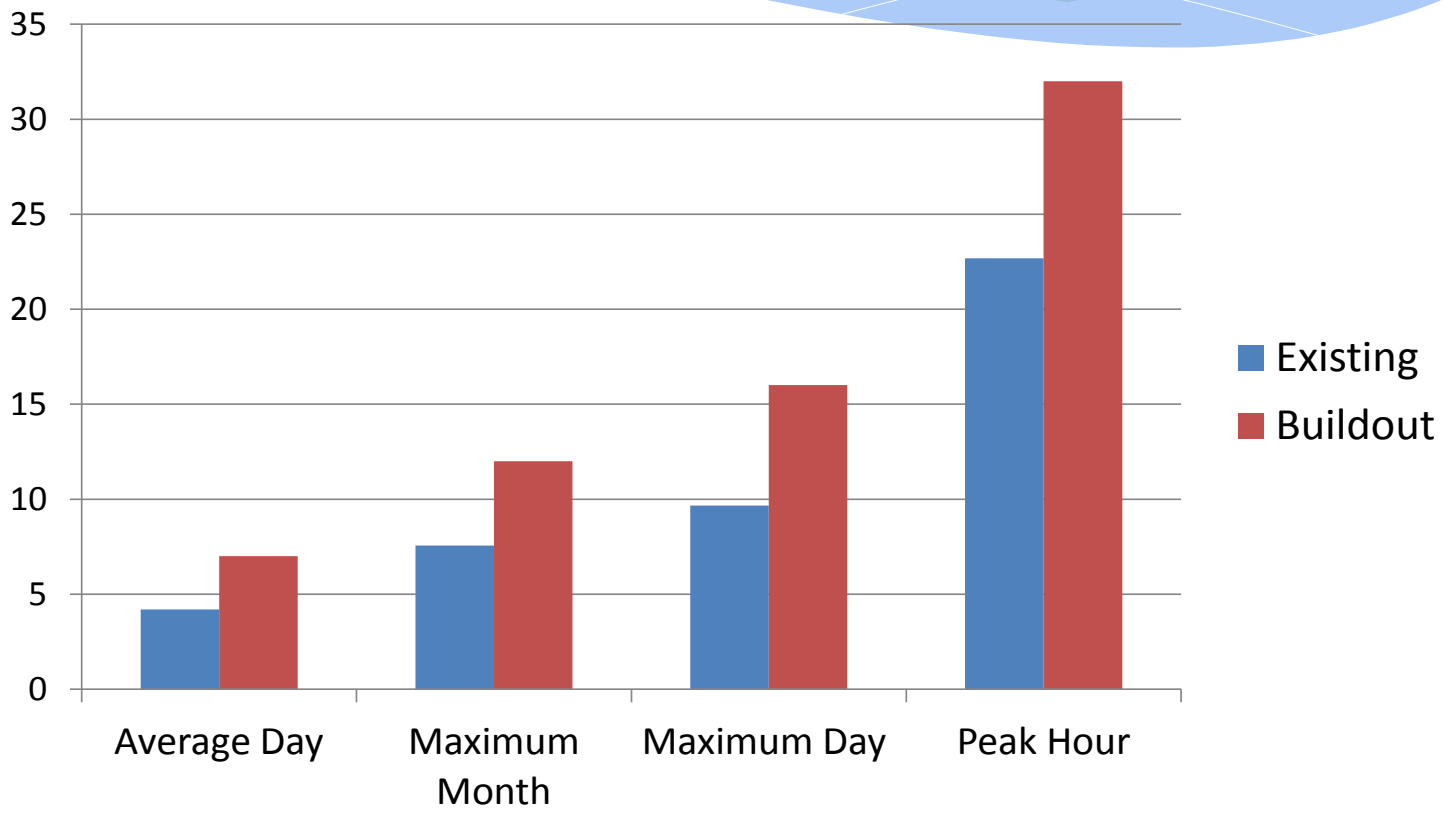
* Pipelines have a useful life between 50 and 100 years
* Average life of 75 years
* Need to replace 2 miles per year
* Annual cost of $2.3 million


OREGON CITY
FIGURE 6-3
CITY OF OREGON CITY
EXISTING SYSTEM AVAILABLE
FIRE FLOW (Residual Pressure ≥ 20psi)
0
1,325
2,650
SCALE IN FEET
LEGEND
Available Fire Flow < 1,000 gpm for 4 hour duration
1,000 gpm ≤ Available Fire Flow ≤ 1,500 gpm for 4 hour duration
1,500 gpm < Available Fire Flow ≤ 3,500 gpm for 4 hour duration
3,500 gpm < Available Fire Flow ≤ 4,500 gpm for 4 hour duration
4,500 gpm < Available Fire Flow ≤ 5,000 gpm for 4 hour duration
5,000 gpm < Available Fire Flow ≤ 7,000 gpm for 4 hour duration
Available Fire Flow > 7,000 gpm for 4 hour duration
SFWB WTP
Existing Storage Reservoir
Existing Booster Pump Station
Master Meter (flows out of SFWB or Oregon City)
Existing Pipeline
URBAN GROWTH BOUNDARY (UGB)
Lower Zone
Intermediate Zone
Upper Zone
Lower Park Place Zone
Intermediate Park Place Zone
Upper Park Place Zone (CRW)
Canemah District Zone
Fairway Downs Zone
View Manor - Park Place Zone
Livesay Road - Park Place Zone
Paper Mill Zone
Canyon (CRW)
Country Village (CRW)
Street
Water Feature
DRAFT
Barlow Crest
Mountainview
Boynton
Henrici

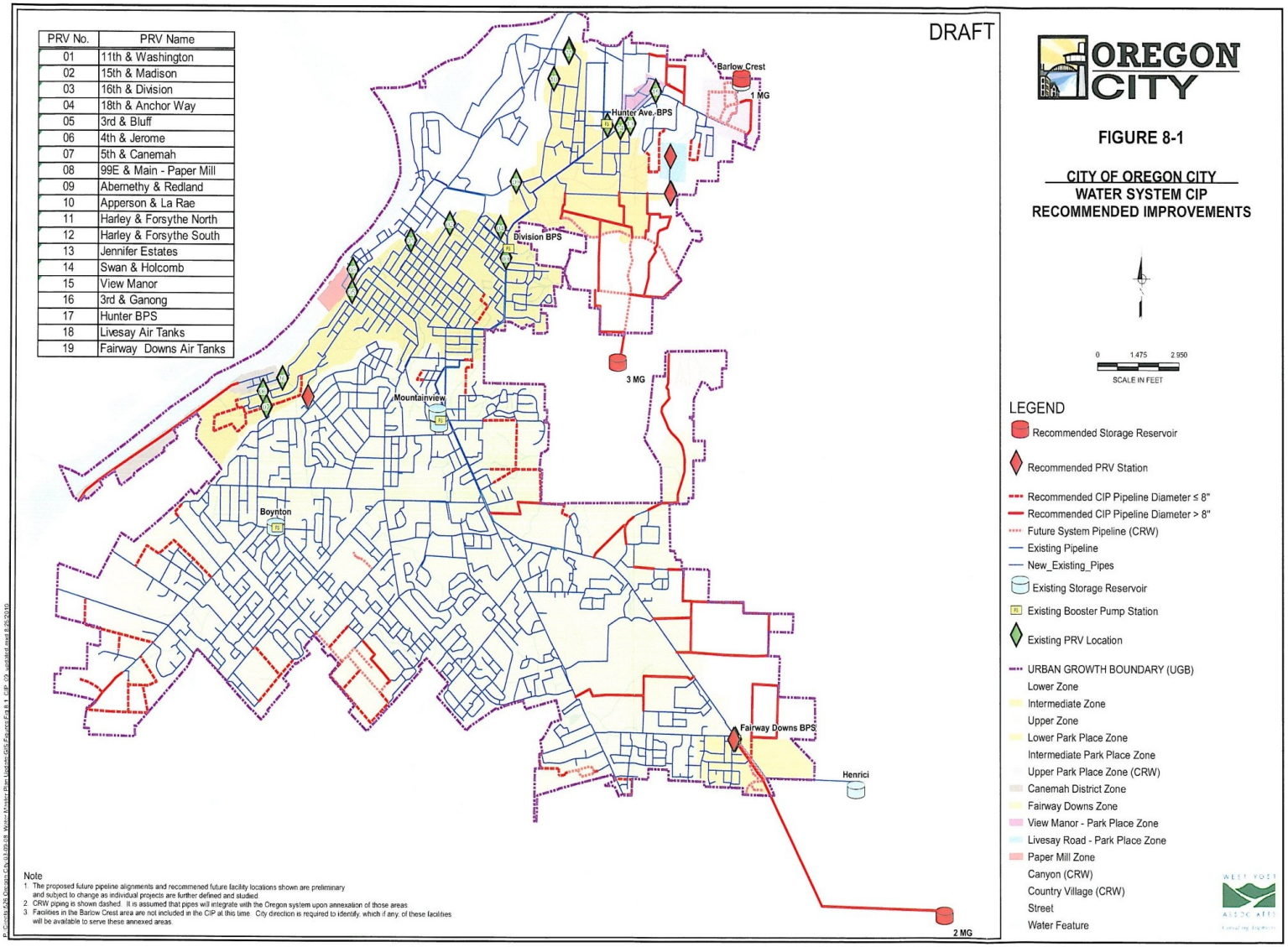

OREGON CITY
FIGURE 7-2
CITY OF OREGON CITY
UGB BUILDOUT LAND USE
0
1,325
2,650
SCALE IN FEET
LEGEND
Urban Growth Boundary
City Limits
Single Family Residential
Multi-Family Residential
Commercial/Industrial
Institutional
Street
Water Feature
DRAFT

Buildout Water Demand

million gallons per day



PRV No.	PRV Name
01	11th & Washington
02	15th & Madison
03	16th & Division
04	18th & Anchor Way
05	3rd & Bluff
06	4th & Jerome
07	5th & Canemah
08	99E & Main - Paper Mill
09	Abernethy & Redland
10	Apperson & La Rae
11	Harley & Forsythe North
12	Harley & Forsythe South
13	Jennifer Estates
14	Swan & Holcomb
15	View Manor
16	3rd & Ganong
17	Hunter BPS
18	Livesay Air Tanks
19	Fairway Downs Air Tanks



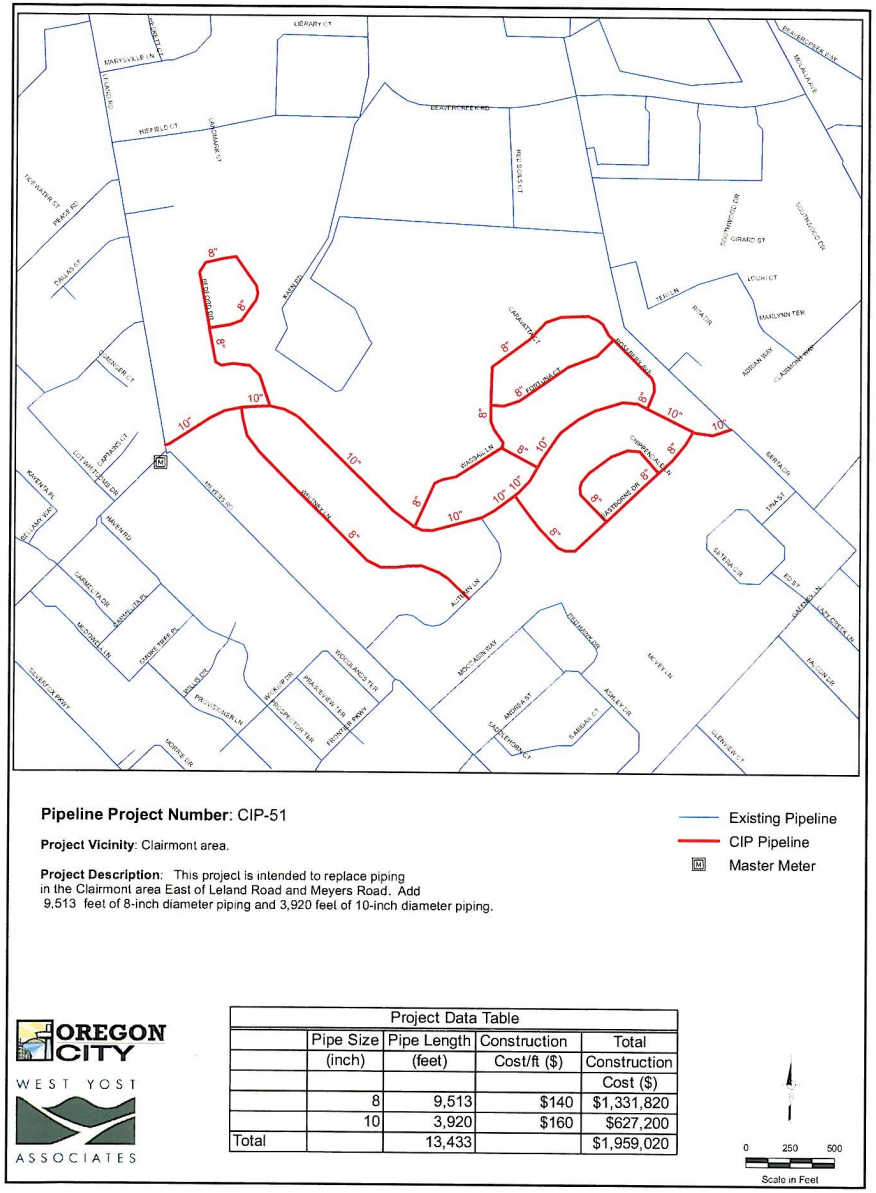
Improvements for the Existing System

Capital Improvement Description	Capital Cost,$
Existing System Improvements	
New Pipeline & PRV -- Abernethy Road to Taylor Street	39,936
New Pipeline & PRV - South Center Street and Odgen Dr.	209,050
New Pipeline & PRV – Livesay Road to Lower Park Place	118,840
Pipeline Improvement – Livesay Rd. form Holcomb Blvd. to S. Swan Avenue	1,025,096
Pipeline Improvement – Abernethy from Washington St. to Holcomb Blvd.	434,811

Renewal and Replacements

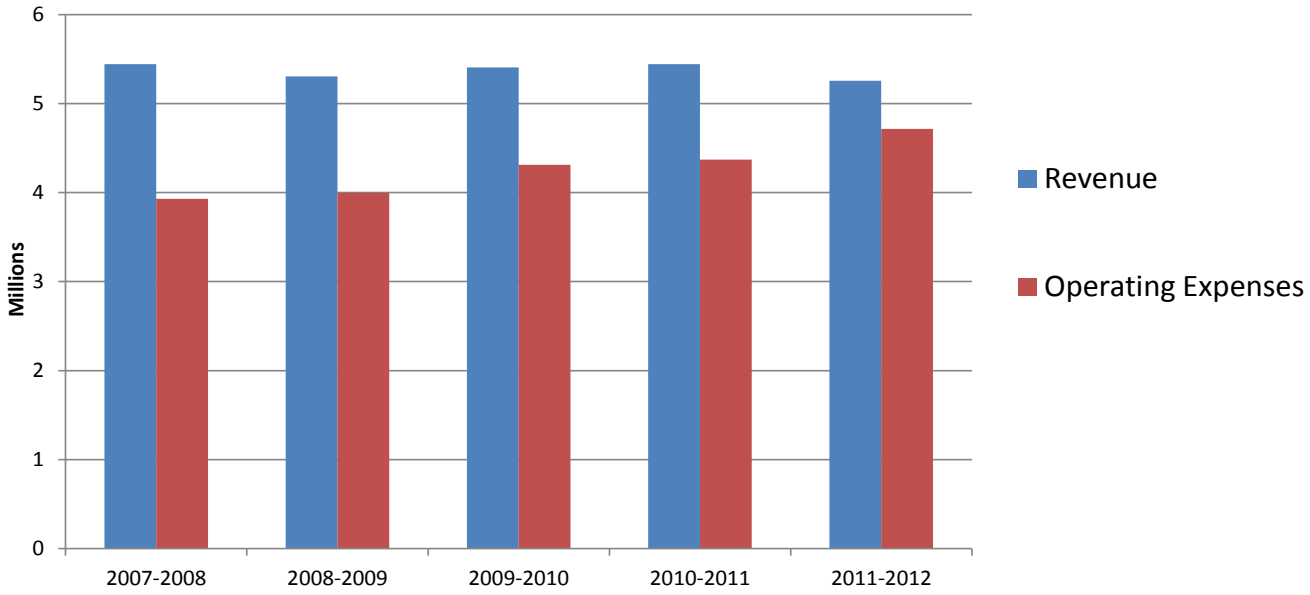
Capital Improvement Description	Capital Cost,$
View Manor Pressure Zone – Pipe Replacement Northwest of Holcomb Blvd. near Swan Avenue.	1,076,091
Clairmont Area, 8 inch diameter	3,009,055
Rivercrest Area	1,617,316
I-205 Crossing between Pope Lane and Park Place Court	119,347
15th St from Main St to Division St, PRV#2	935,071
Main St from 5th St to 18th Street	1,012,992
South End Rd and Warner Parrott Rd	1,190,246
Seismic and Mixing Improvements for Boynton Reservoir	560,640

Sample CIP Description

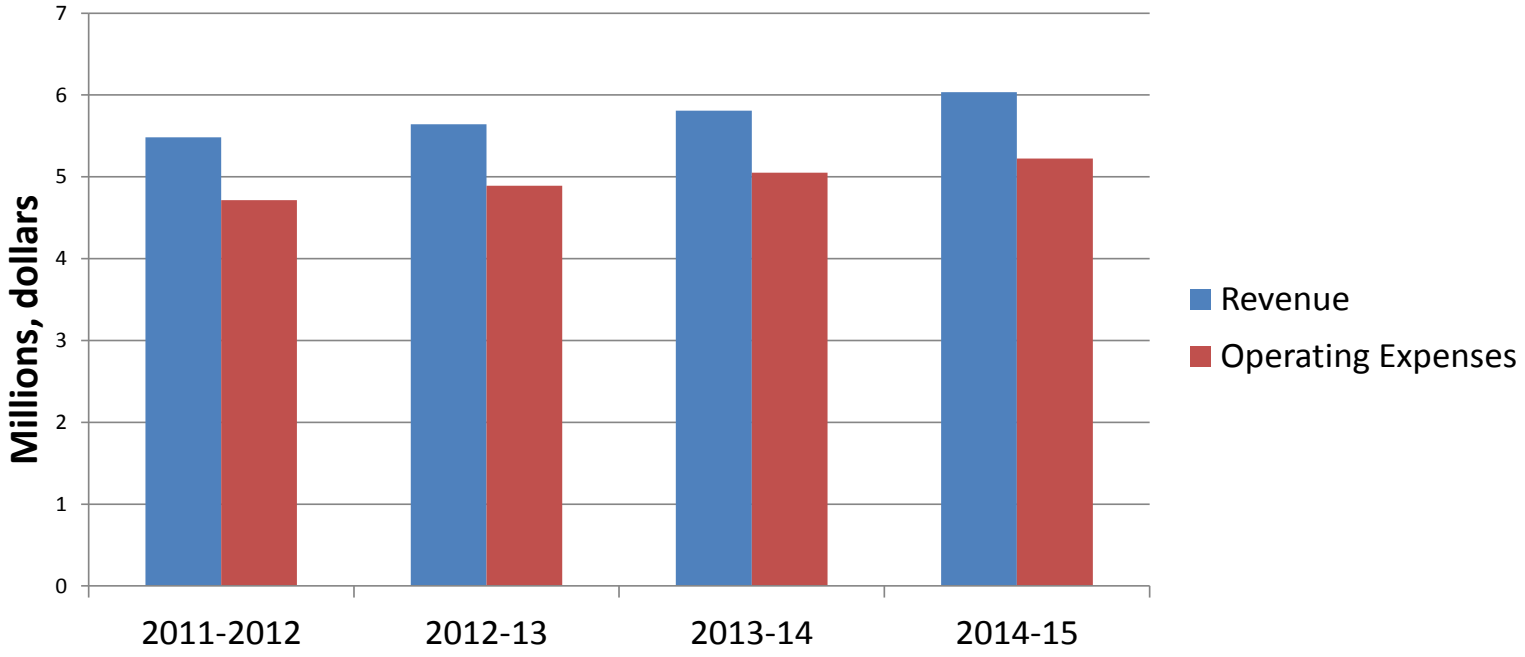


- Location
- Cost
- Size

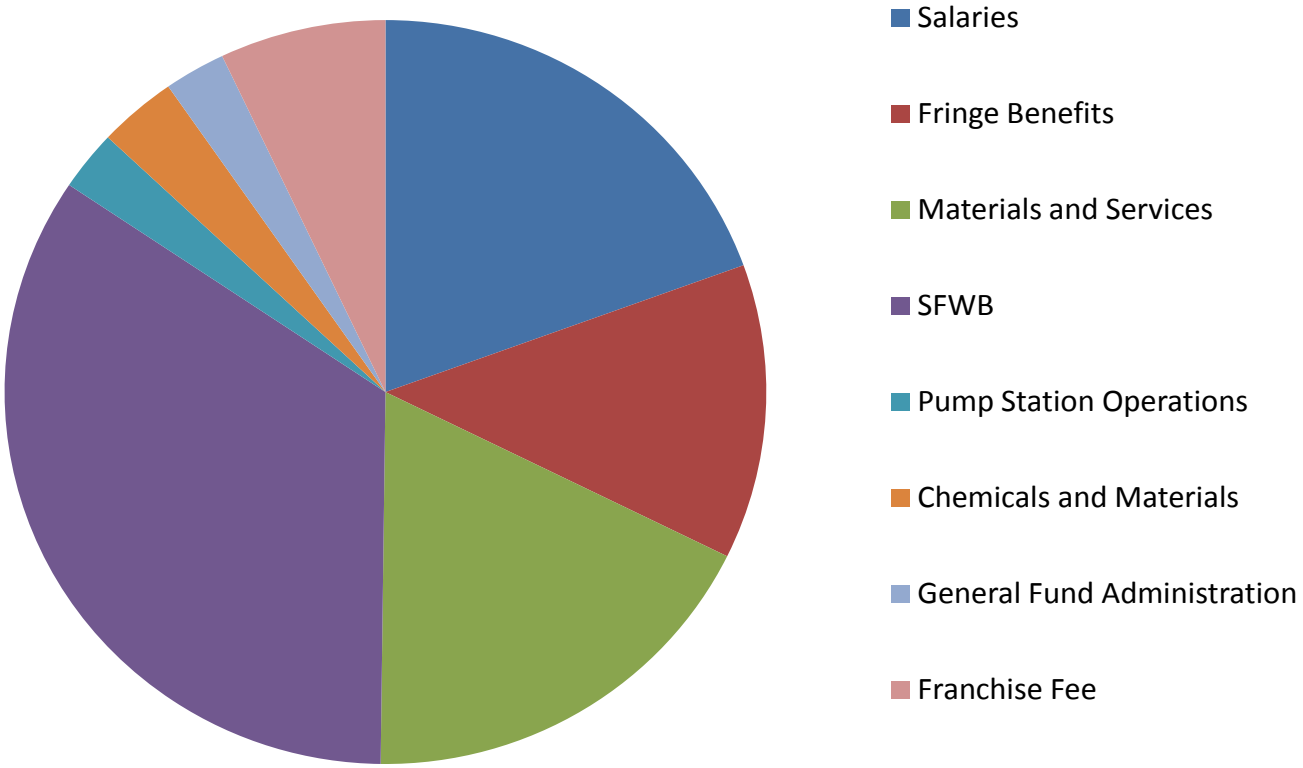
Revenue and Expenses



Short-term Revenue and Expenditure Projection



Expenditure Summary



Remaining Debt Service

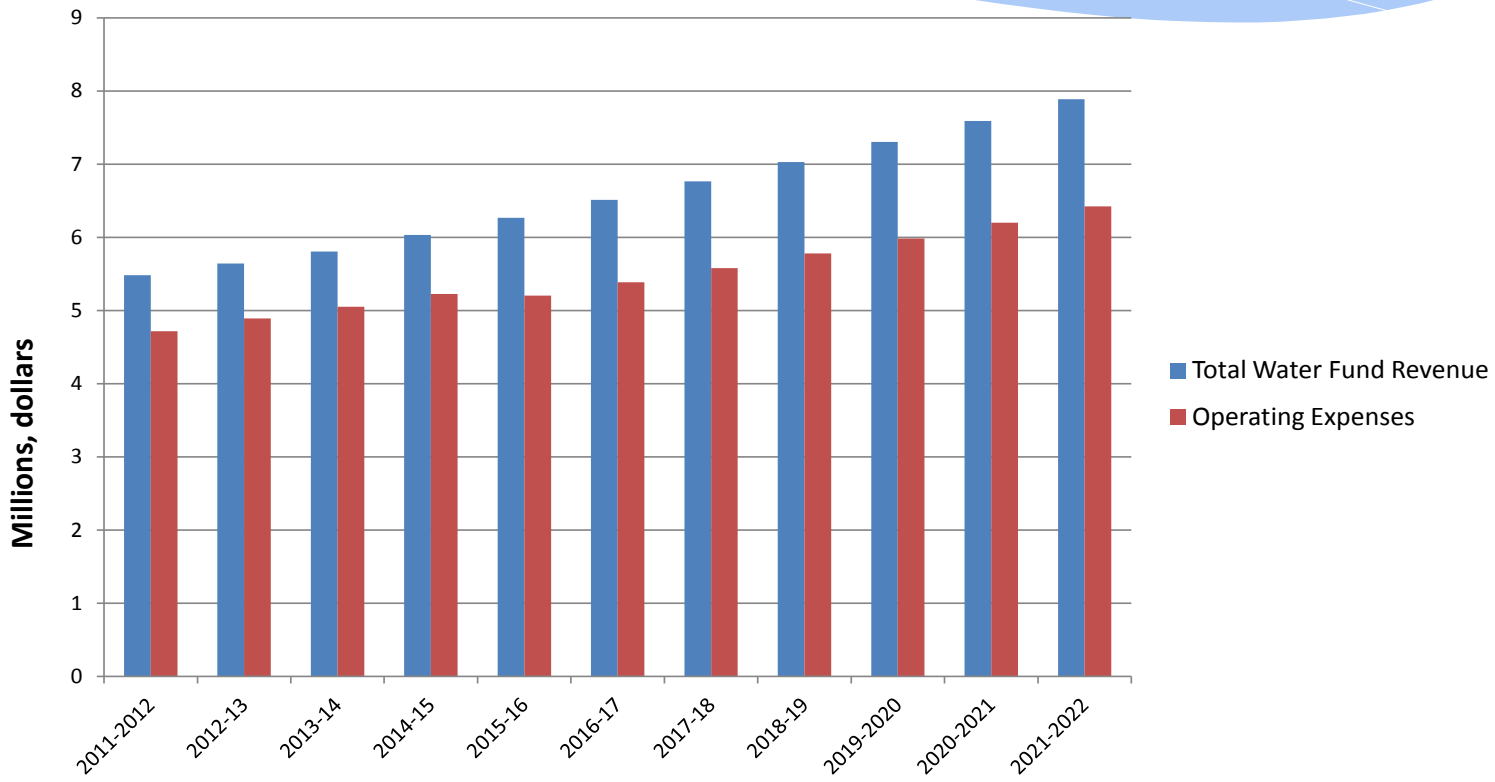
Fiscal Year	Debt Service Payment, $
2011/12	199,138
2012/13	201,393
2013/14	198,179
2014/15	199,485

Rate Scenarios

1. Projection Scenario 1 – No rollback of rates and 3% annual rate increase
2. Projection Scenario 2A – Rate rollback in Fiscal Year 2015-16 and 3% rate annual increases
3. Projection Scenario 2B – Rate rollback in Fiscal Year 2015-16 and a 3% rate increase in those years an increase was adopted by the commission
4. Projection Scenario 3 – Sustainable system investment with no rate rollback and higher rate increases to support capital improvements

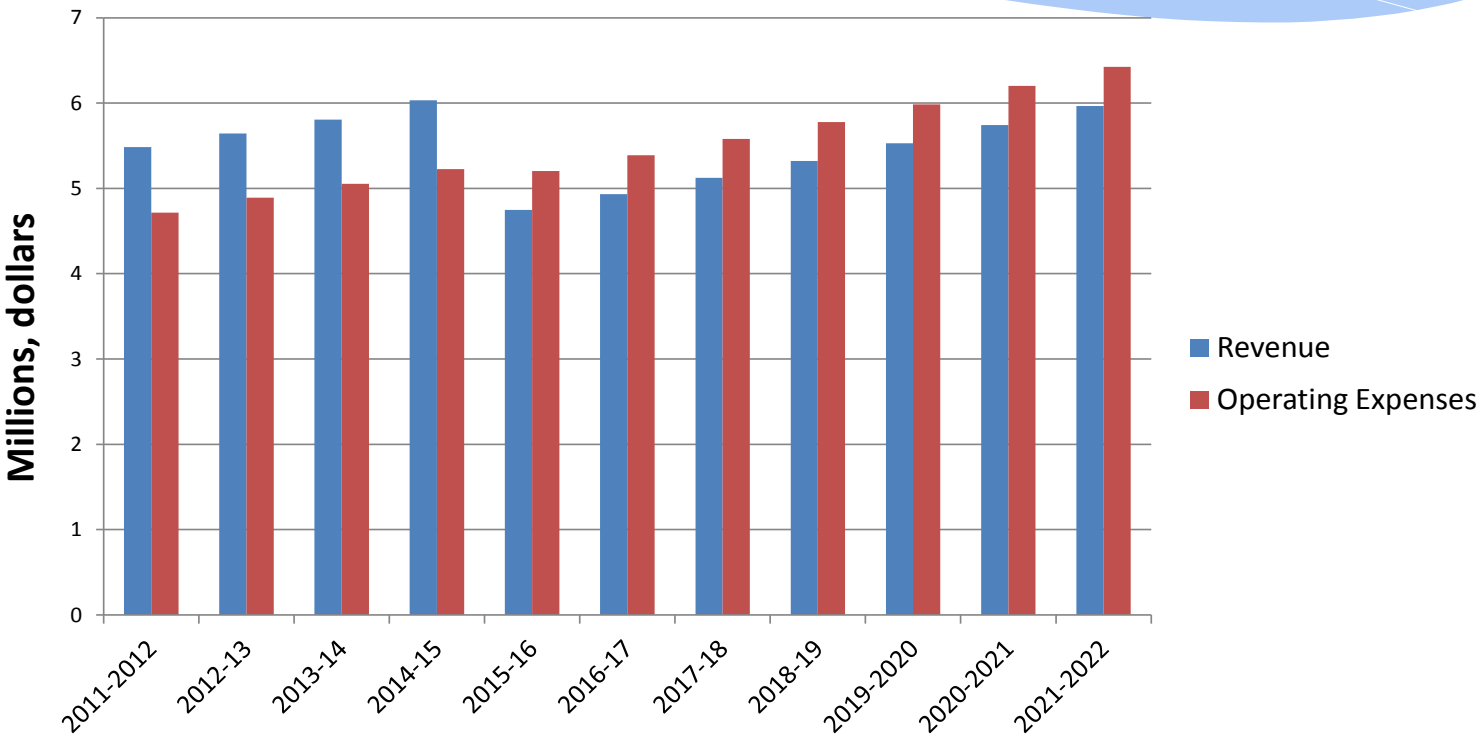
Scenario 1

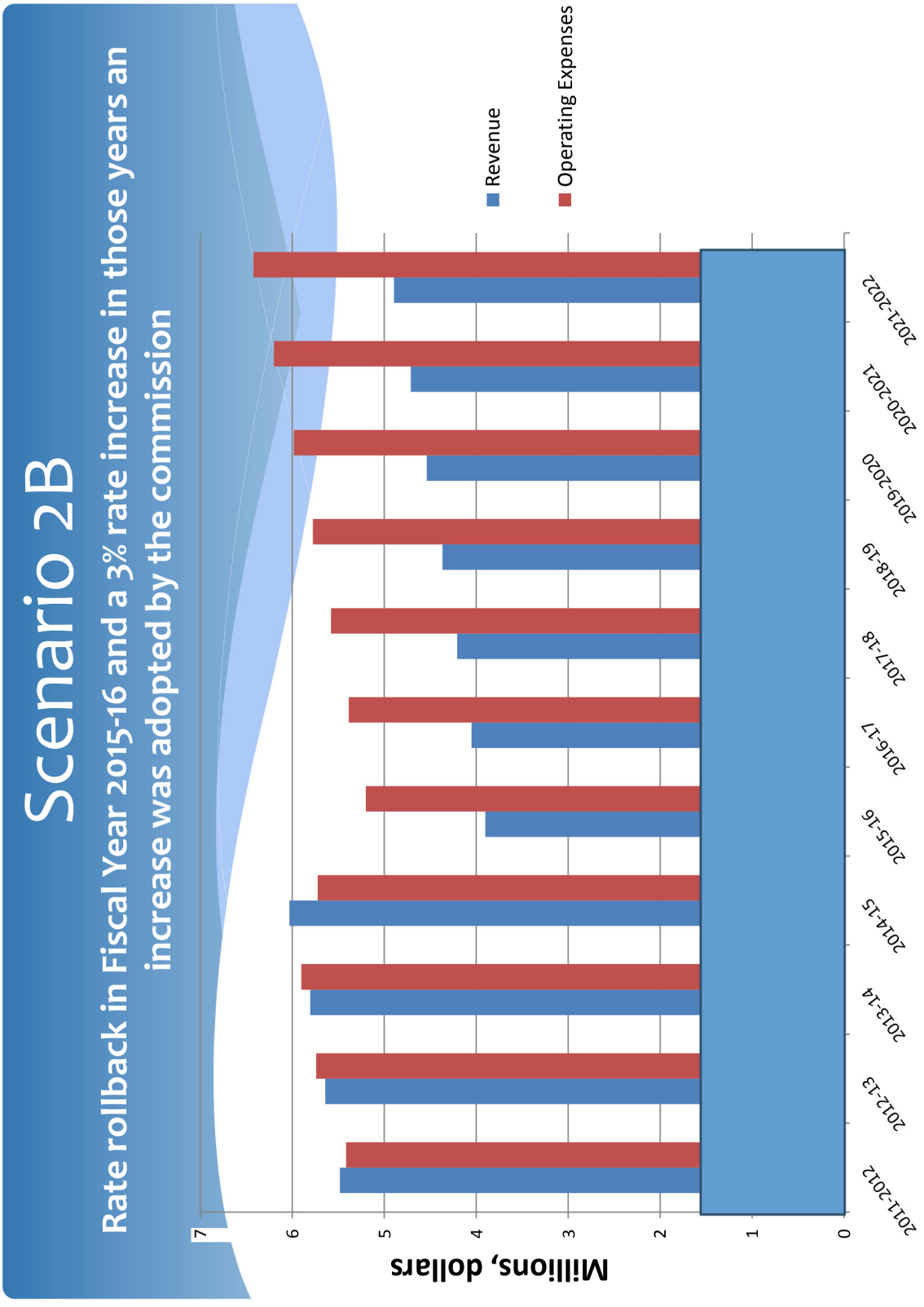
No rollback of rates and 3% annual rate increase



Scenario 2A

Rate rollback in Fiscal Year 2015-16 and 3% rate annual increases



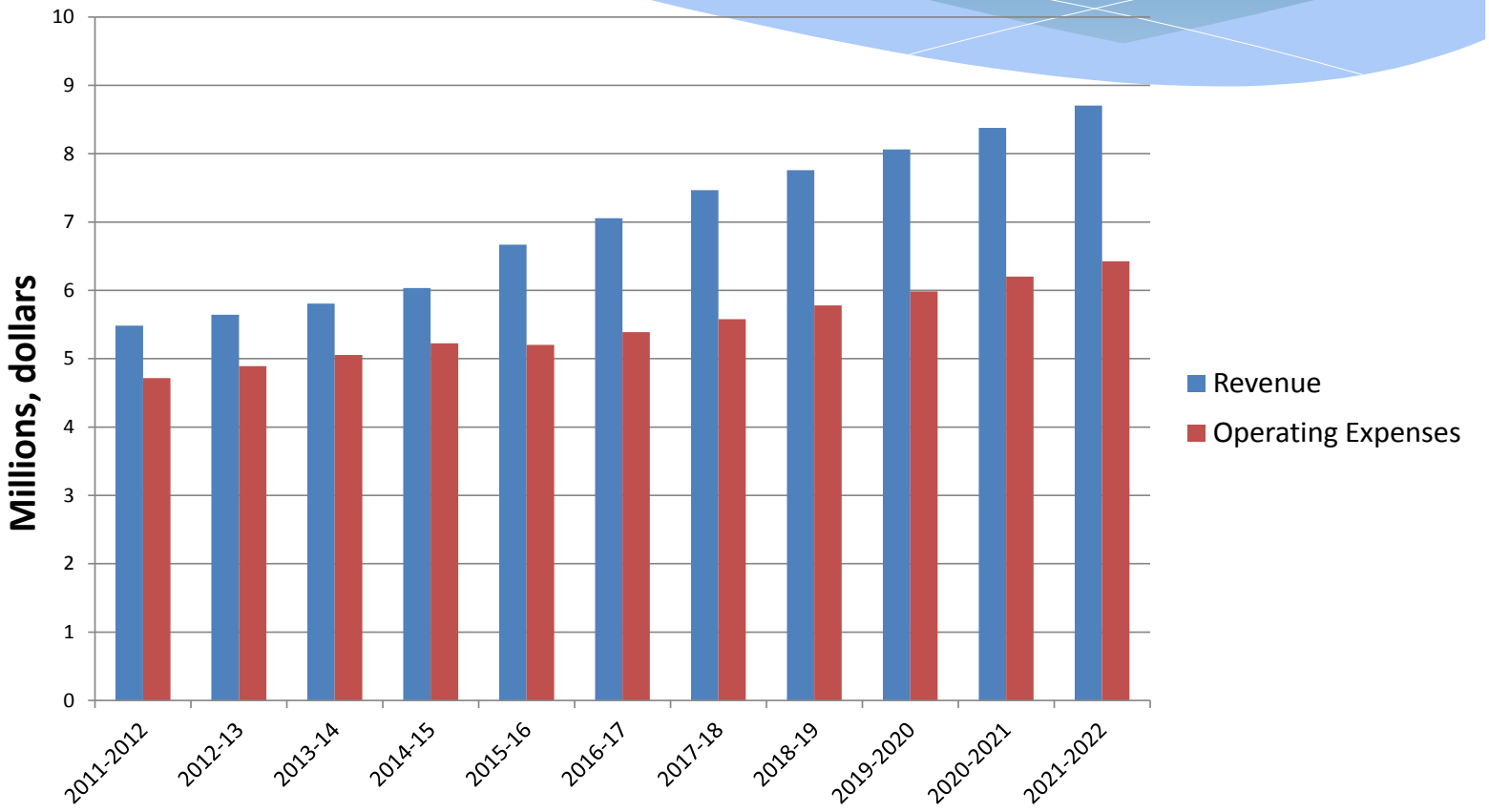

Scenario 2B
Rate rollback in Fiscal Year 2015-16 and a 3% rate increase in those years an increase was adopted by the commission
Revenue
Operating Expenses
Millions, dollars
0
1
2
3
4
5
6
7
2011-2012
2012-13
2013-14
2014-15
2015-16
2016-17
2017-18
2018-19
2019-2020
2020-2021
2021-2022

Scenario 3

* No rate rollback
* 3% annual increase through Fiscal Year 2014-15
* 10% increase for Fiscal Year 2015-16
* 5% increase for Fiscal Years 2016-17 and 2017-18
* 3% annual increase thereafter

Scenario 3

No rate rollback; 3 % annual increase through Fiscal Year 2014-15; 10% increase for Fiscal Year 2015-16; 5% increase for Fiscal Years 2016-17 and 2017-18; and 3% annual increase thereafter



Financing Recommendations

* **Begin a dialogue with the citizens to explain the current conditions with the goal to modify the Charter**
* **Adopt a financial plan for Scenario 3**
* **Bill system users directly for water treatment costs that are adopted by the South Fork Water Board**


Questions?

Oregon City
Water Distribution System
Master Plan

CIC Meeting

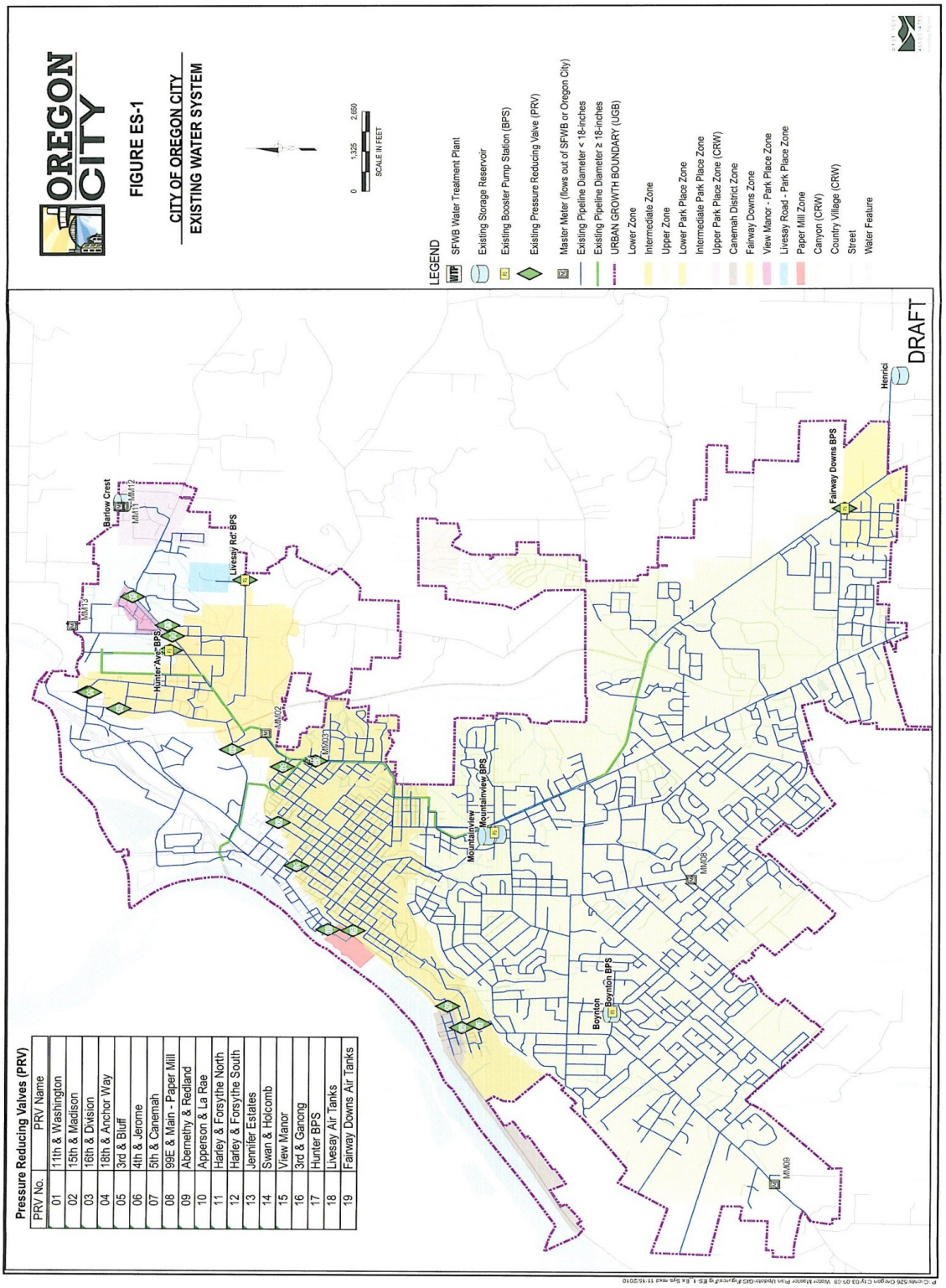
December 5, 2011

Presentation Overview

* Service Area
* Water Demand
* Existing System
* Future System Expansion
* Recommended Improvements
* Financing
* Questions

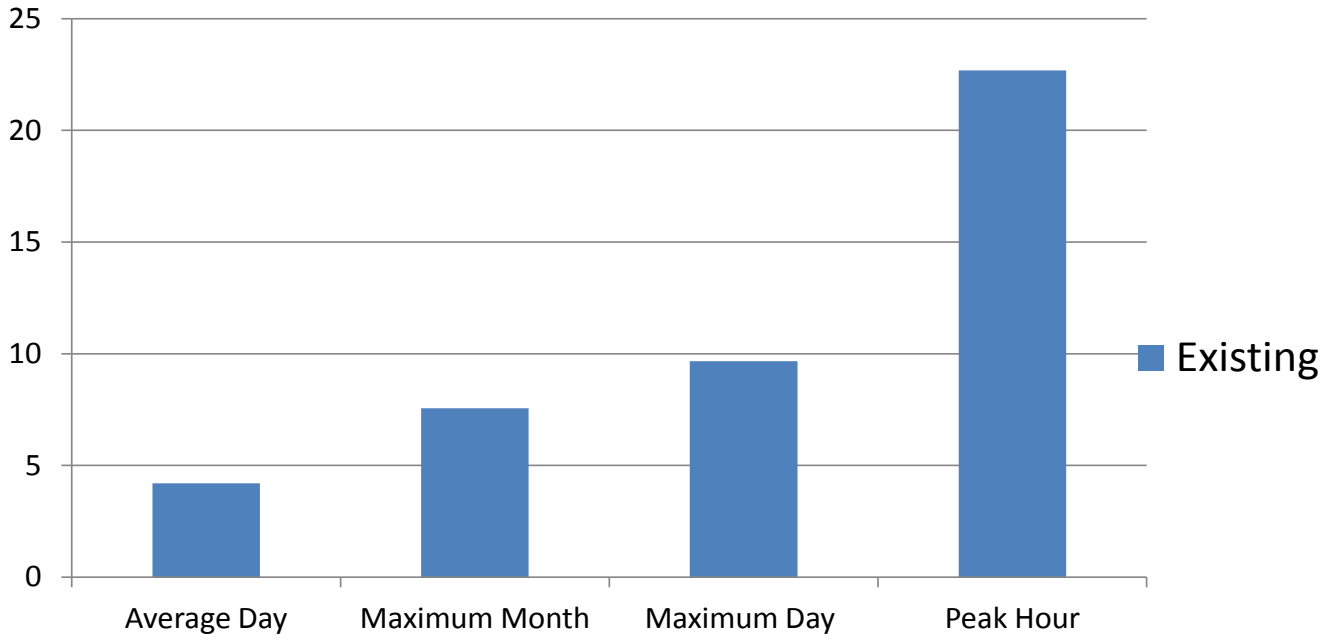
Service Area

* Oregon City
* 32,000 Inhabitants
* 9,975 Customer Accounts
* Planning for the Urban Growth Boundary


OREGON CITY
FIGURE ES-1
CITY OF OREGON CITY
EXISTING WATER SYSTEM
0 1,325 2,650
SCALE IN FEET
LEGEND
SFWB Water Treatment Plant
Existing Storage Reservoir
Existing Booster Pump Station (BPS)
Existing Pressure Reducing Valve (PRV)
Master Meter (flows out of SFWB or Oregon City)
Existing Pipeline Diameter < 18-inches
Existing Pipeline Diameter ≥ 18-inches
URBAN GROWTH BOUNDARY (UGB)
Lower Zone
Intermediate Zone
Upper Zone
Lower Park Place Zone
Intermediate Park Place Zone
Upper Park Place Zone (CRW)
Canemah District Zone
Fairway Downs Zone
View Manor - Park Place Zone
Livesay Road - Park Place Zone
Paper Mill Zone
Canyon (CRW)
Country Village (CRW)
Street
Water Feature
Pressure Reducing Valves (PRV)
PRV No. PRV Name
01 11th & Washington
02 15th & Madison
03 16th & Division
04 18th & Anchor Way
05 3rd & Bluff
06 4th & Jerome
07 5th & Canemah
08 99E & Main - Paper Mill
09 Abernethy & Redland
10 Apperson & La Rae
11 Harley & Forsythe North
12 Harley & Forsythe South
13 Jennifer Estates
14 Swan & Holcomb
15 View Manor
16 3rd & Ganong
17 Hunter BPS
18 Livesay Air Tanks
19 Fairway Downs Air Tanks
Barlow Crest
Livesay Rd BPS
Hunter Ave BPS
Mountainview BPS
Boynton BPS
Fairway Downs BPS
Henrici
MM01
MM02
MM03
MM04
MM05
MM06
MM07
MM08
MM09
MM10
MM11
MM12
DRAFT

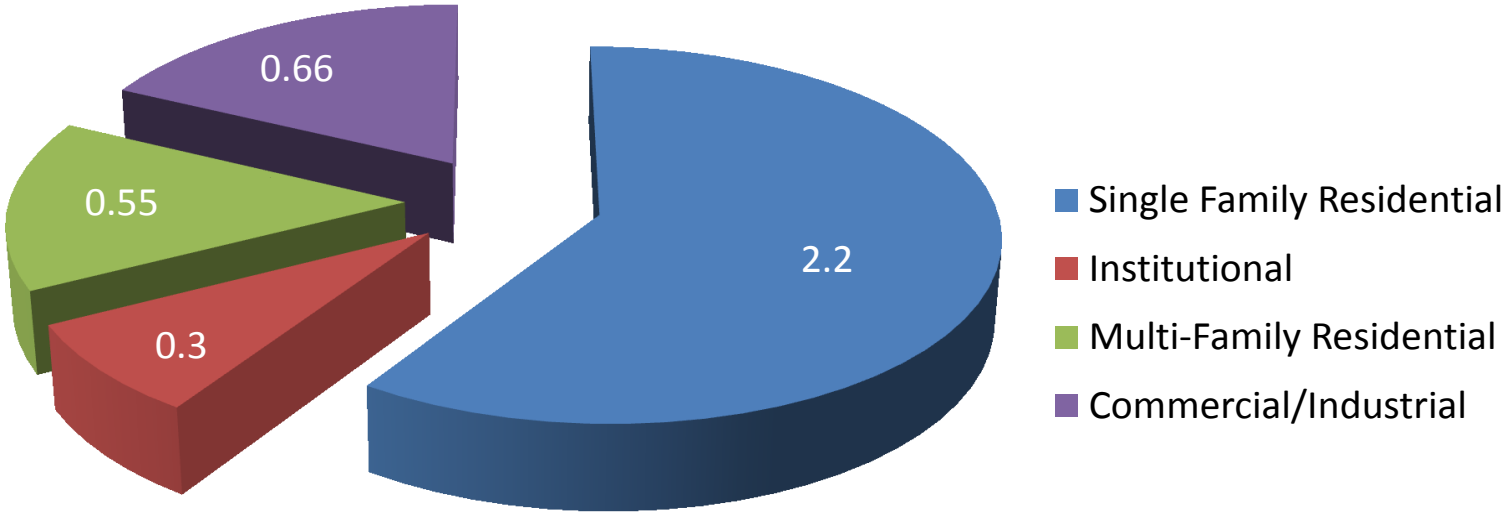
Existing Water Demand

Million Gallons Per Day

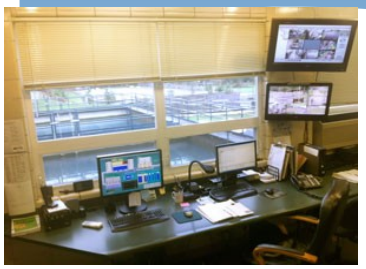


Average Water Demand by User Groups

million gallons per day



Existing System



* Great Water Supply
* Storage
* Metering System
* Pumping Stations
* Distribution Piping

Storage

Reservoir	Volume, mg
Barlow Crest	1.75
Boynton	2.0
Henrici	2.0
Mountainview 1	2.0
Mountainview 2	10.5

* 18 million gallons of treated water storage.
* 5 reservoirs
* Adequate storage for existing system

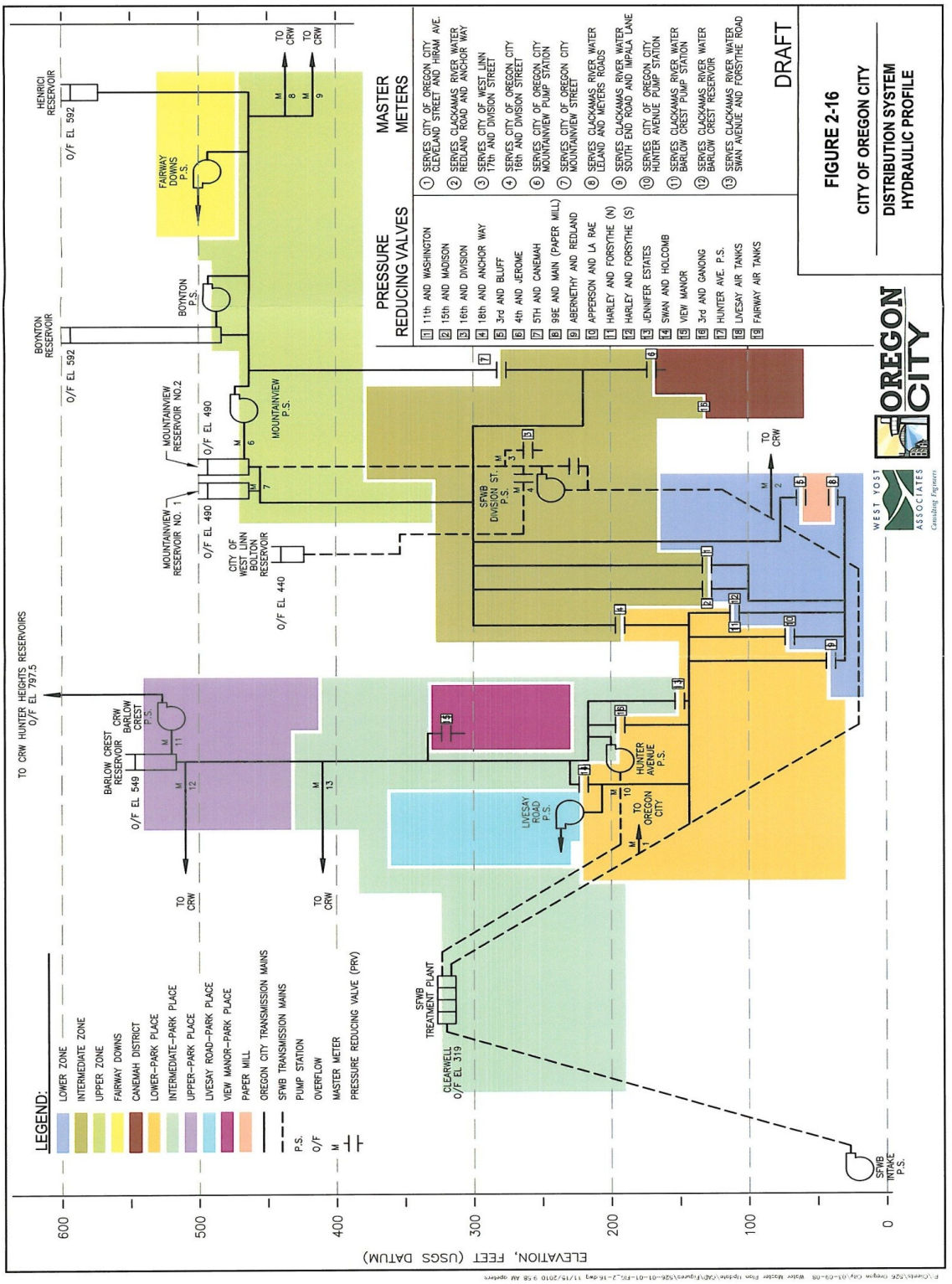


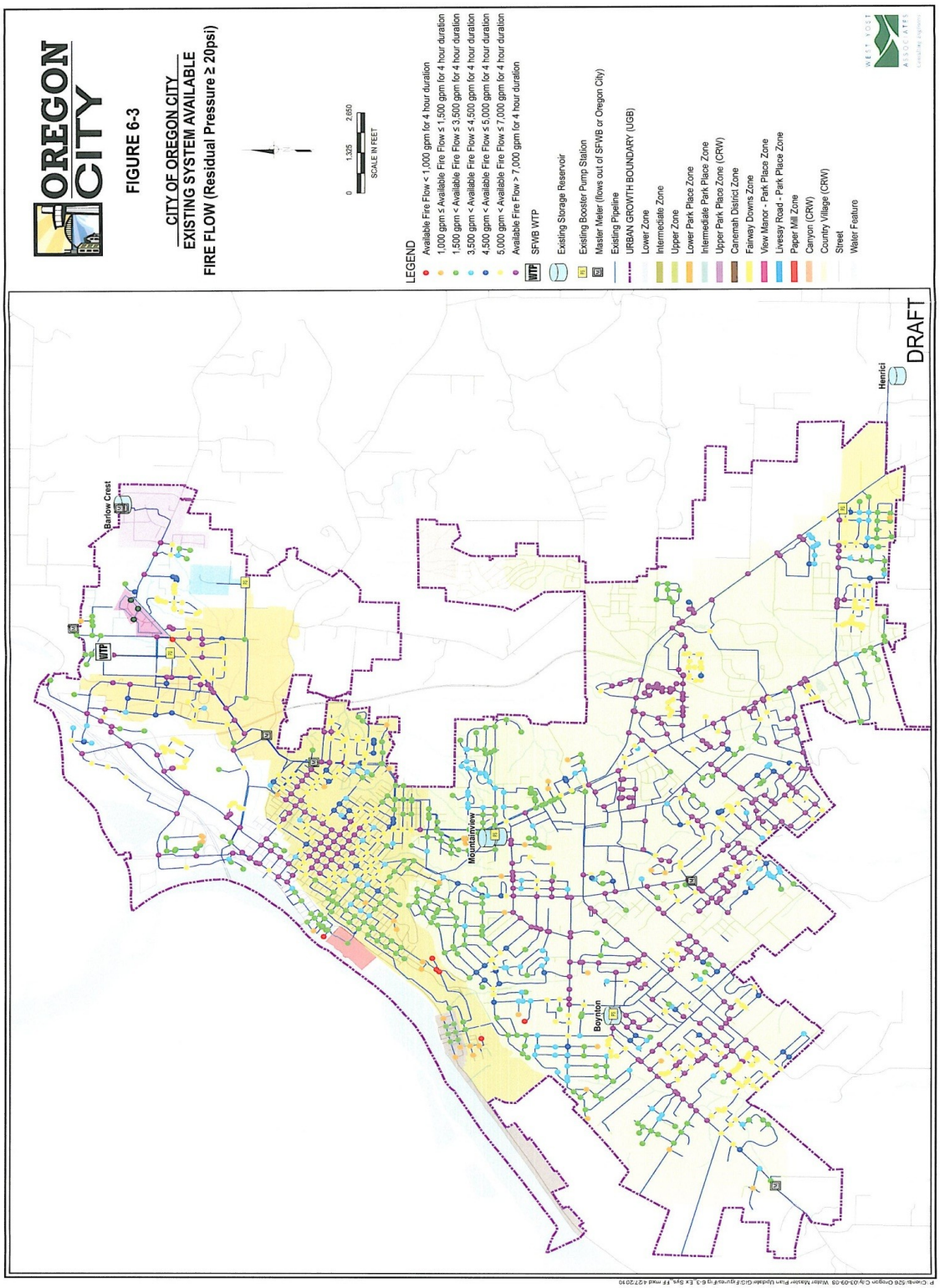
FIGURE 2-16
CITY OF OREGON CITY
DISTRIBUTION SYSTEM
HYDRAULIC PROFILE
DRAFT
OREGON CITY
WEST YOST ASSOCIATES
MASTER METERS
PRESSURE REDUCING VALVES
LEGEND:
ELEVATION, FEET (USGS DATUM)
TO CRW HUNTER HEIGHTS RESERVOIRS O/F EL 797.5
HENRICI RESERVOIR O/F EL 592
BOYNTON RESERVOIR O/F EL 592
BOYNTON P.S.
FAIRWAY DOWNS P.S.
MOUNTAINVIEW RESERVOIR NO.2 O/F EL 490
MOUNTAINVIEW RESERVOIR NO. 1 O/F EL 490
MOUNTAINVIEW P.S.
CITY OF WEST LINN BOLTON RESERVOIR O/F EL 440
SFWB DIVISION ST. P.S.
BARLOW CREST RESERVOIR O/F EL 549
CRW BARLOW CREST P.S.
HUNTER AVENUE P.S.
LIVESAY ROAD P.S.
SFWB TREATMENT PLANT
CLEARWELL O/F EL 319
SFWB INTAKE P.S.
TO OREGON CITY
TO CRW

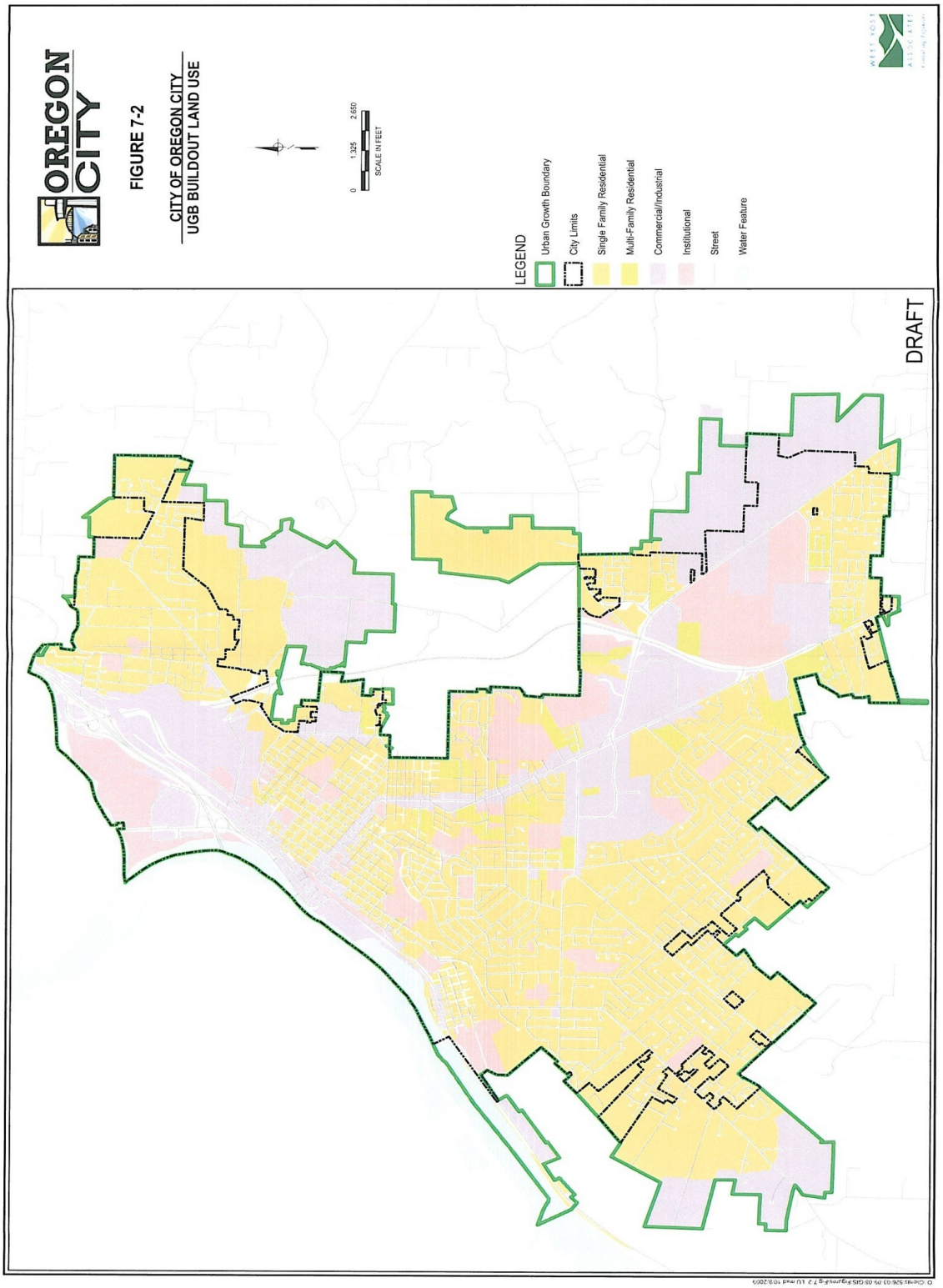
Water Distribution System Pipes

Pipeline Diameter, inches	Length, miles	Percent of Water System
2	4.6	3.0
3	0.3	0.2
4	7.3	4.7
6	39.9	25.8
8	62.4	40.4
10	8.8	5.7
12	17.1	11.1
14	0.4	0.2
16	11.2	7.2
20	2.4	1.6
24	0.02	< 0.1
30	0.01	< 0.1
Total	154.4	100.0

Pipe Replacement

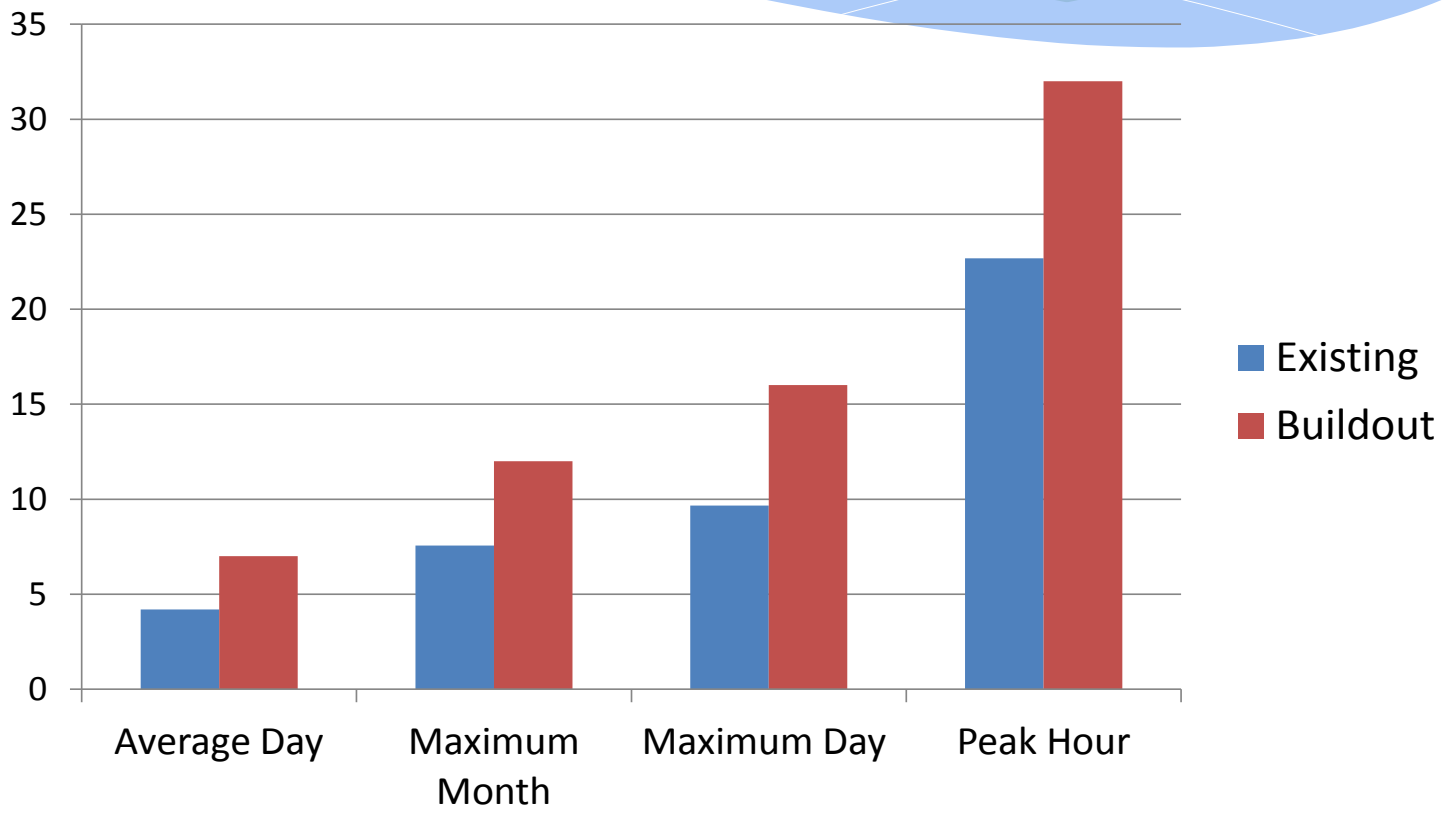
* Pipelines have a useful life between 50 and 100 years
* Average life of 75 years
* Need to replace 2 miles per year
* Annual cost of $2.3 million

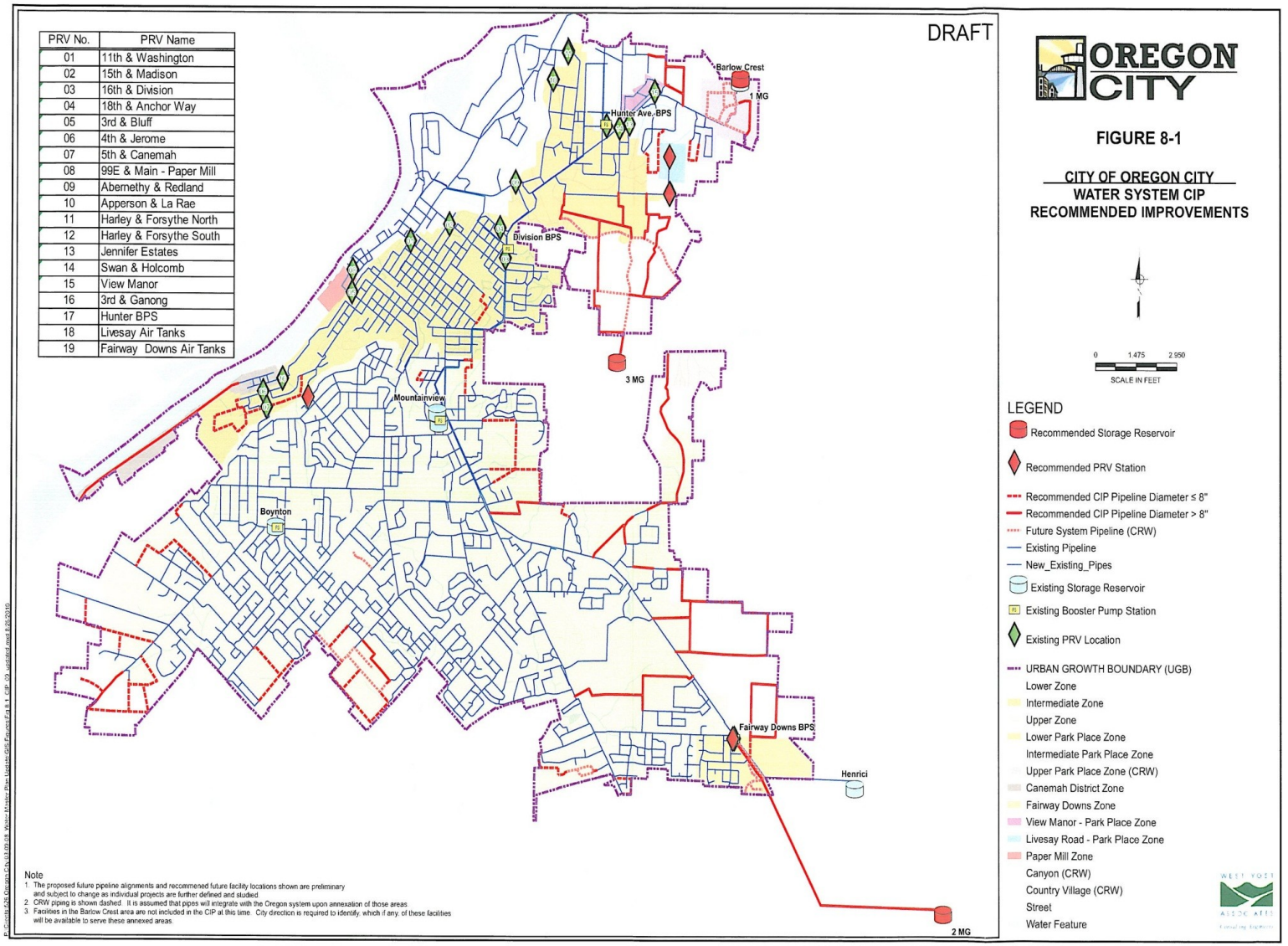

OREGON CITY
FIGURE 6-3
CITY OF OREGON CITY
EXISTING SYSTEM AVAILABLE
FIRE FLOW (Residual Pressure ≥ 20psi)
0
1,325
2,650
SCALE IN FEET
LEGEND
Available Fire Flow < 1,000 gpm for 4 hour duration
1,000 gpm ≤ Available Fire Flow ≤ 1,500 gpm for 4 hour duration
1,500 gpm < Available Fire Flow ≤ 3,500 gpm for 4 hour duration
3,500 gpm < Available Fire Flow ≤ 4,500 gpm for 4 hour duration
4,500 gpm < Available Fire Flow ≤ 5,000 gpm for 4 hour duration
5,000 gpm < Available Fire Flow ≤ 7,000 gpm for 4 hour duration
Available Fire Flow > 7,000 gpm for 4 hour duration
SFWB WTP
Existing Storage Reservoir
Existing Booster Pump Station
Master Meter (flows out of SFWB or Oregon City)
Existing Pipeline
URBAN GROWTH BOUNDARY (UGB)
Lower Zone
Intermediate Zone
Upper Zone
Lower Park Place Zone
Intermediate Park Place Zone
Upper Park Place Zone (CRW)
Canemah District Zone
Fairway Downs Zone
View Manor - Park Place Zone
Livesay Road - Park Place Zone
Paper Mill Zone
Canyon (CRW)
Country Village (CRW)
Street
Water Feature
DRAFT
Barlow Crest
Mountainview
Boynton
Henrici


OREGON CITY
FIGURE 7-2
CITY OF OREGON CITY
UGB BUILDOUT LAND USE
0
1,325
2,650
SCALE IN FEET
LEGEND
Urban Growth Boundary
City Limits
Single Family Residential
Multi-Family Residential
Commercial/Industrial
Institutional
Street
Water Feature
DRAFT

Buildout Water Demand

million gallons per day




DRAFT
PRV No. | PRV Name
01 | 11th & Washington
02 | 15th & Madison
03 | 16th & Division
04 | 18th & Anchor Way
05 | 3rd & Bluff
06 | 4th & Jerome
07 | 5th & Canemah
08 | 99E & Main - Paper Mill
09 | Abernethy & Redland
10 | Apperson & La Rae
11 | Harley & Forsythe North
12 | Harley & Forsythe South
13 | Jennifer Estates
14 | Swan & Holcomb
15 | View Manor
16 | 3rd & Ganong
17 | Hunter BPS
18 | Livesay Air Tanks
19 | Fairway Downs Air Tanks
Barlow Crest
1 MG
Hunter Ave. BPS
Division BPS
3 MG
Mountainview
Boynton
Fairway Downs BPS
Henrici
2 MG
Note
1. The proposed future pipeline alignments and recommened future facility locations shown are preliminary and subject to change as individual projects are further defined and studied.
2. CRW piping is shown dashed. It is assumed that pipes will integrate with the Oregon system upon annexation of those areas.
3. Facilities in the Barlow Crest area are not included in the CIP at this time. City direction is required to identify which if any of these facilities will be available to serve these annexed areas.
OREGON CITY
FIGURE 8-1
CITY OF OREGON CITY
WATER SYSTEM CIP
RECOMMENDED IMPROVEMENTS
0 1,475 2,950
SCALE IN FEET
LEGEND
Recommended Storage Reservoir
Recommended PRV Station
Recommended CIP Pipeline Diameter ≤ 8"
Recommended CIP Pipeline Diameter > 8"
Future System Pipeline (CRW)
Existing Pipeline
New_Existing_Pipes
Existing Storage Reservoir
Existing Booster Pump Station
Existing PRV Location
URBAN GROWTH BOUNDARY (UGB)
Lower Zone
Intermediate Zone
Upper Zone
Lower Park Place Zone
Intermediate Park Place Zone
Upper Park Place Zone (CRW)
Canemah District Zone
Fairway Downs Zone
View Manor - Park Place Zone
Livesay Road - Park Place Zone
Paper Mill Zone
Canyon (CRW)
Country Village (CRW)
Street
Water Feature

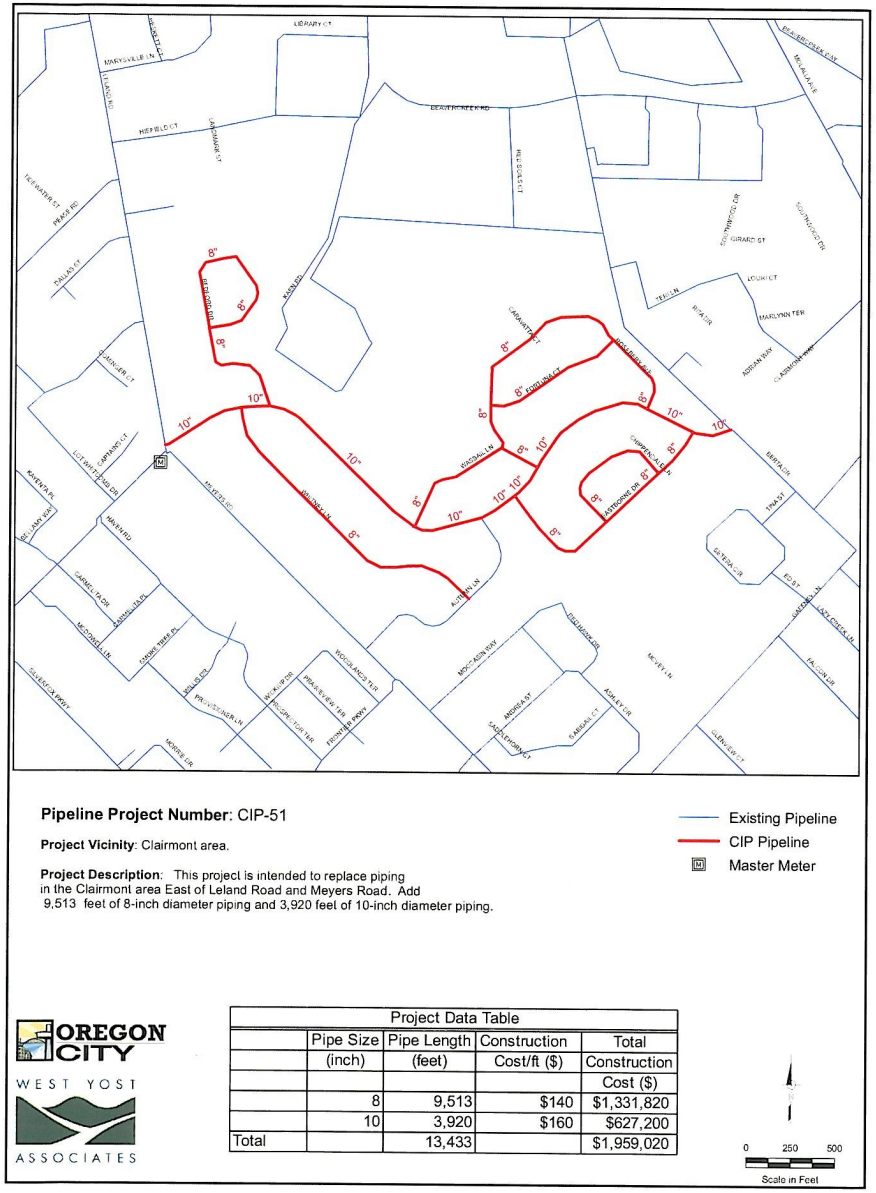
Improvements for the Existing System

Capital Improvement Description	Capital Cost,$
Existing System Improvements	
New Pipeline & PRV -- Abernethy Road to Taylor Street	39,936
New Pipeline & PRV - South Center Street and Odgen Dr.	209,050
New Pipeline & PRV – Livesay Road to Lower Park Place	118,840
Pipeline Improvement – Livesay Rd. form Holcomb Blvd. to S. Swan Avenue	1,025,096
Pipeline Improvement – Abernethy from Washington St. to Holcomb Blvd.	434,811

Renewal and Replacements

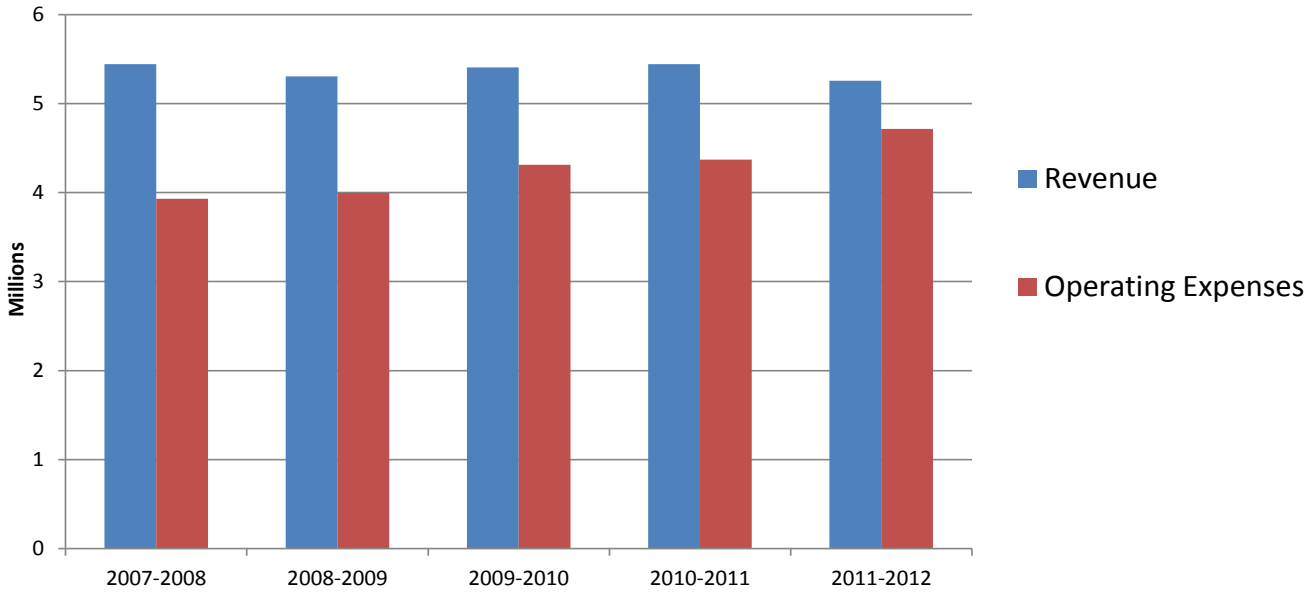
Capital Improvement Description	Capital Cost,$
View Manor Pressure Zone – Pipe Replacement Northwest of Holcomb Blvd. near Swan Avenue.	1,076,091
Clairmont Area, 8 inch diameter	3,009,055
Rivercrest Area	1,617,316
I-205 Crossing between Pope Lane and Park Place Court	119,347
15th St from Main St to Division St, PRV#2	935,071
Main St from 5th St to 18th Street	1,012,992
South End Rd and Warner Parrott Rd	1,190,246
Seismic and Mixing Improvements for Boynton Reservoir	560,640

Sample CIP Description

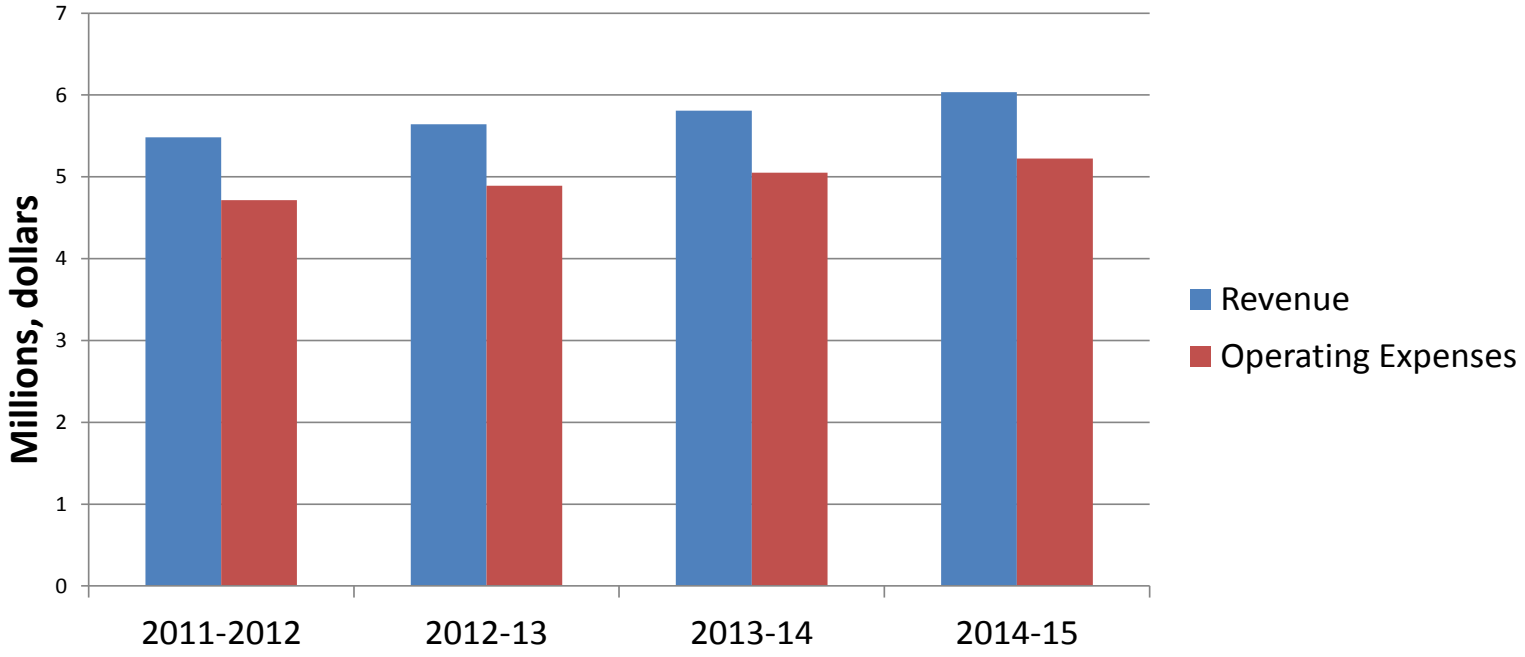


- Location
- Cost
- Size

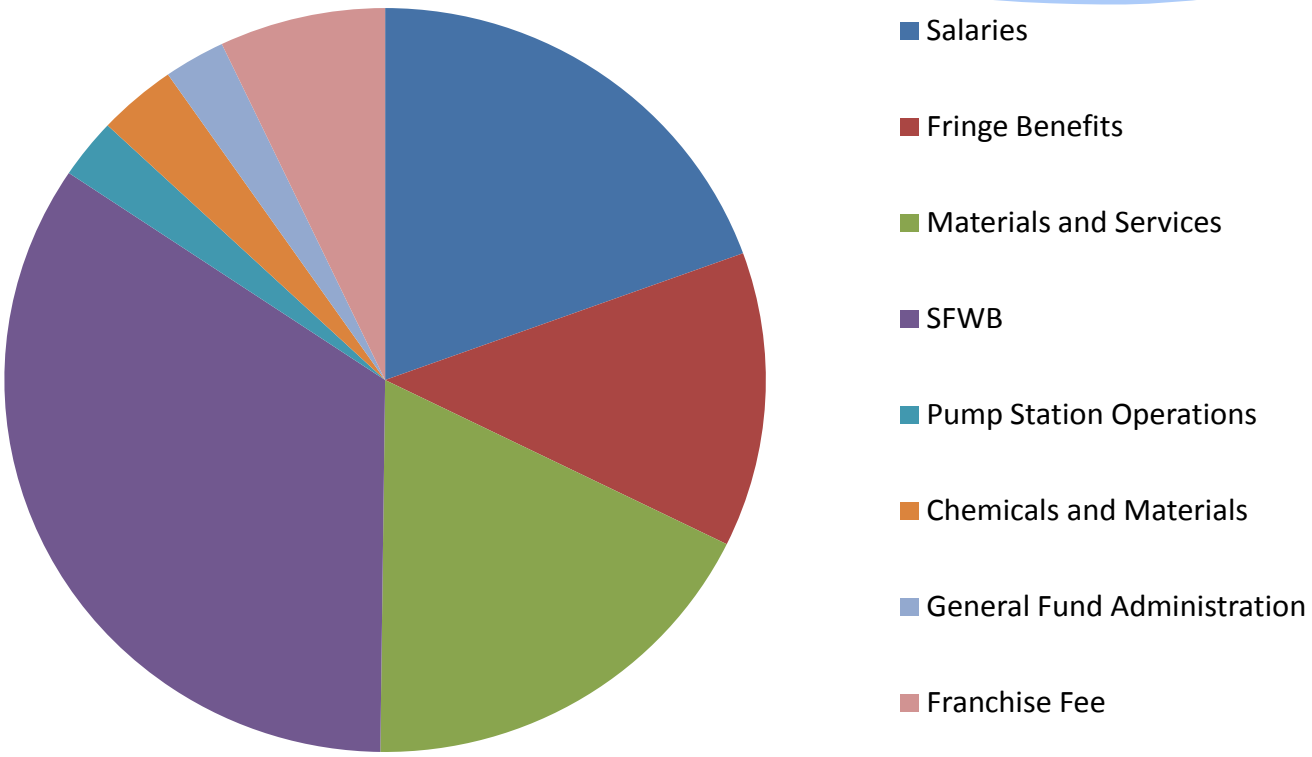
Revenue and Expenses



Short-term Revenue and Expenditure Projection



Expenditure Summary



Remaining Debt Service

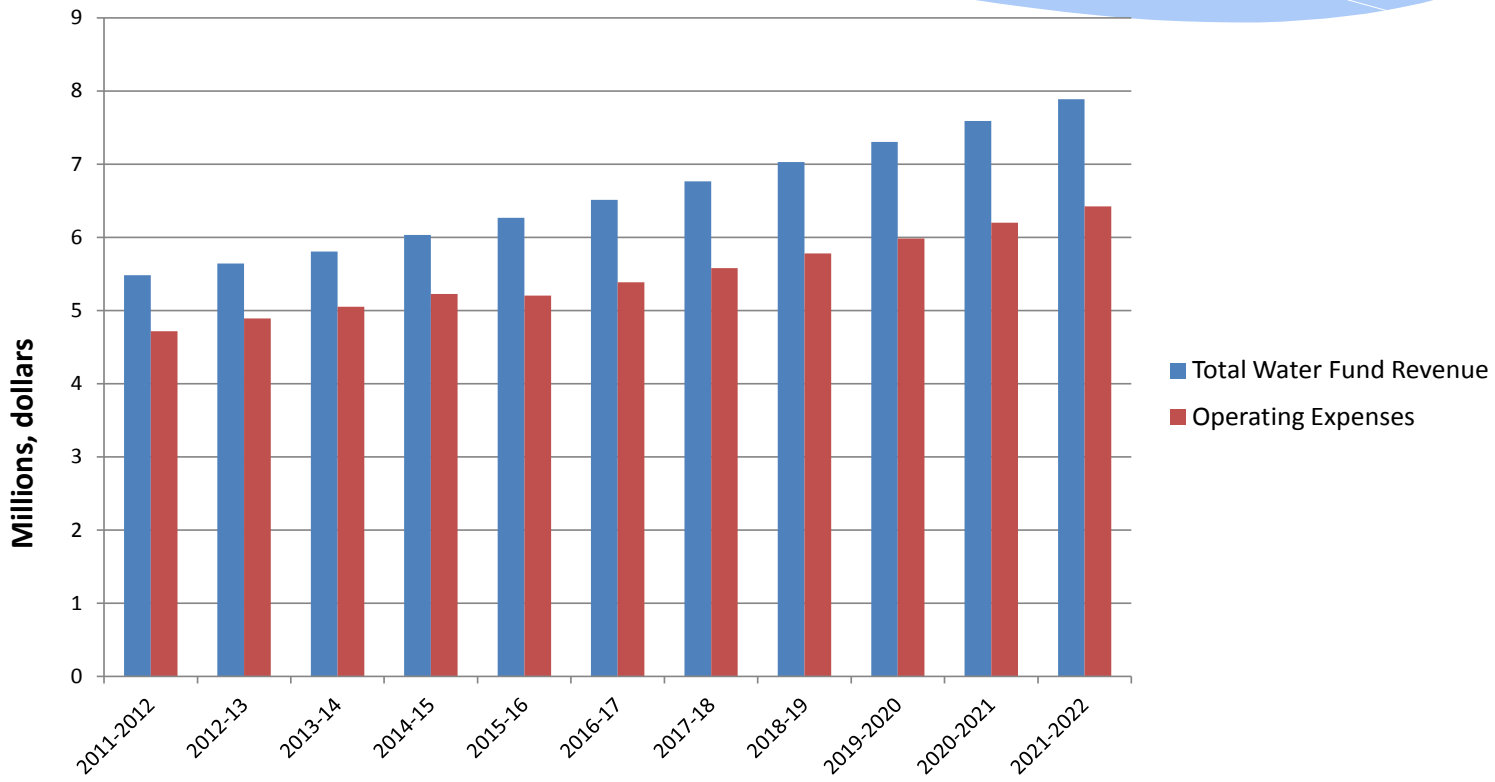
Fiscal Year	Debt Service Payment, $
2011/12	199,138
2012/13	201,393
2013/14	198,179
2014/15	199,485

Rate Scenarios

1. Projection Scenario 1 – No rollback of rates and 3% annual rate increase
2. Projection Scenario 2A – Rate rollback in Fiscal Year 2015-16 and 3% rate annual increases
3. Projection Scenario 2B – Rate rollback in Fiscal Year 2015-16 and a 3% rate increase in those years an increase was adopted by the commission
4. Projection Scenario 3 – Sustainable system investment with no rate rollback and higher rate increases to support capital improvements

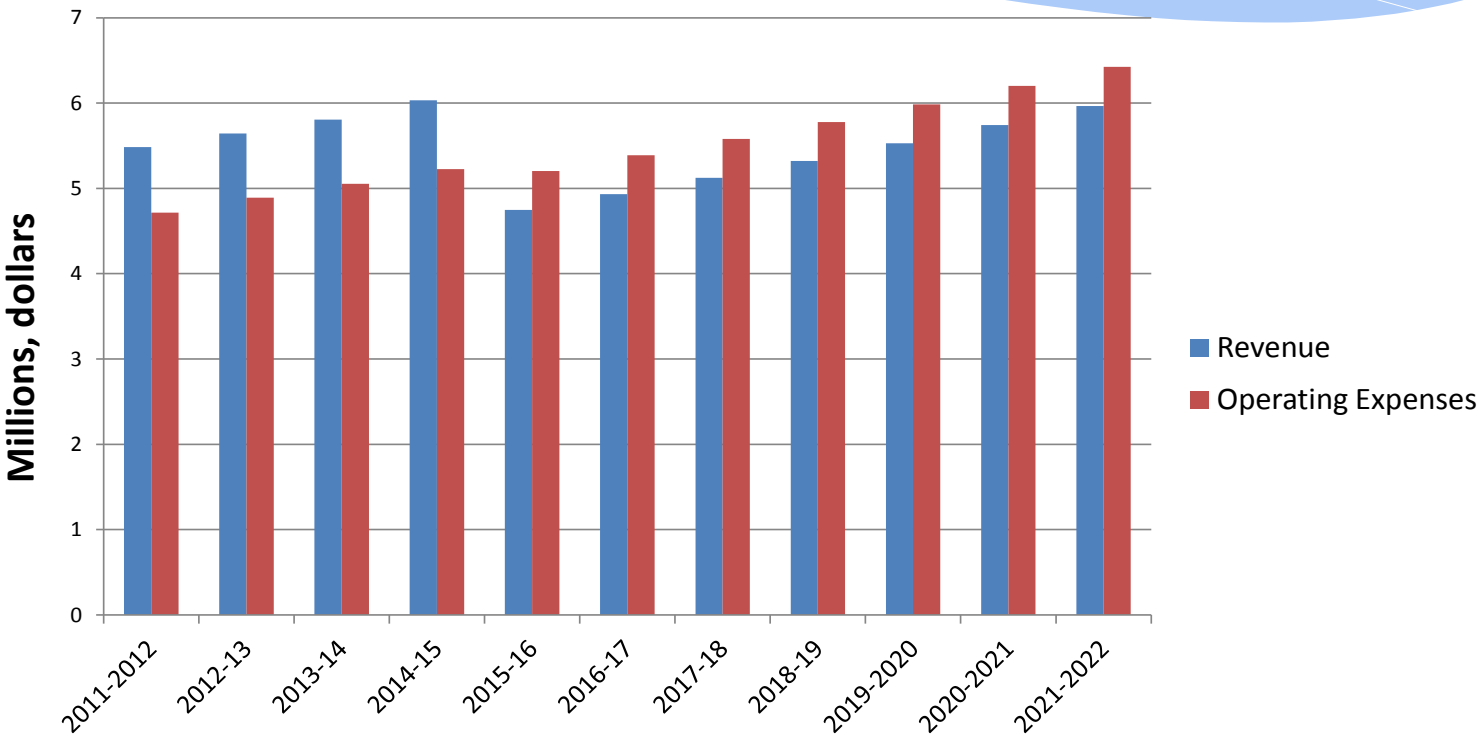
Scenario 1

No rollback of rates and 3% annual rate increase



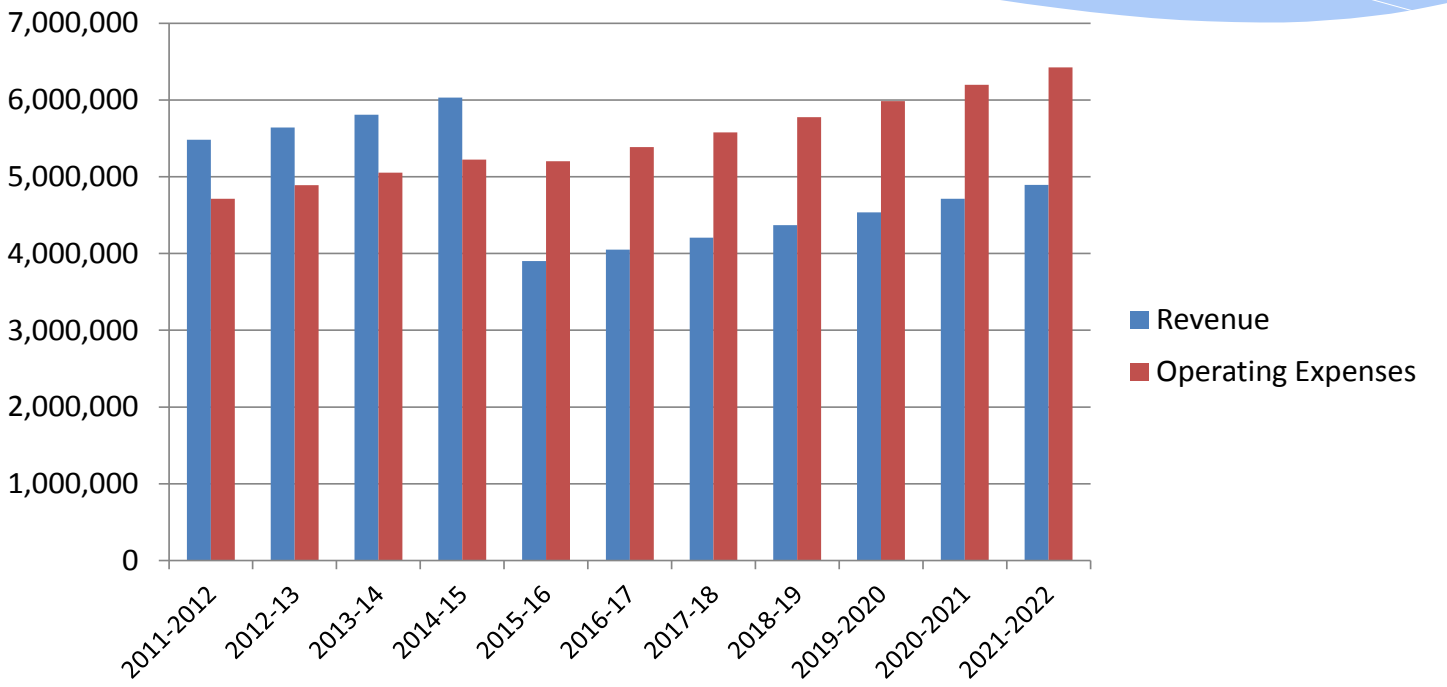
Scenario 2A

Rate rollback in Fiscal Year 2015-16 and 3% rate annual increases



Scenario 2B

Rate rollback in Fiscal Year 2015-16 and a 3% rate increase in those years an increase was adopted by the commission



Scenario 3

* No rate rollback
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Scenario 3

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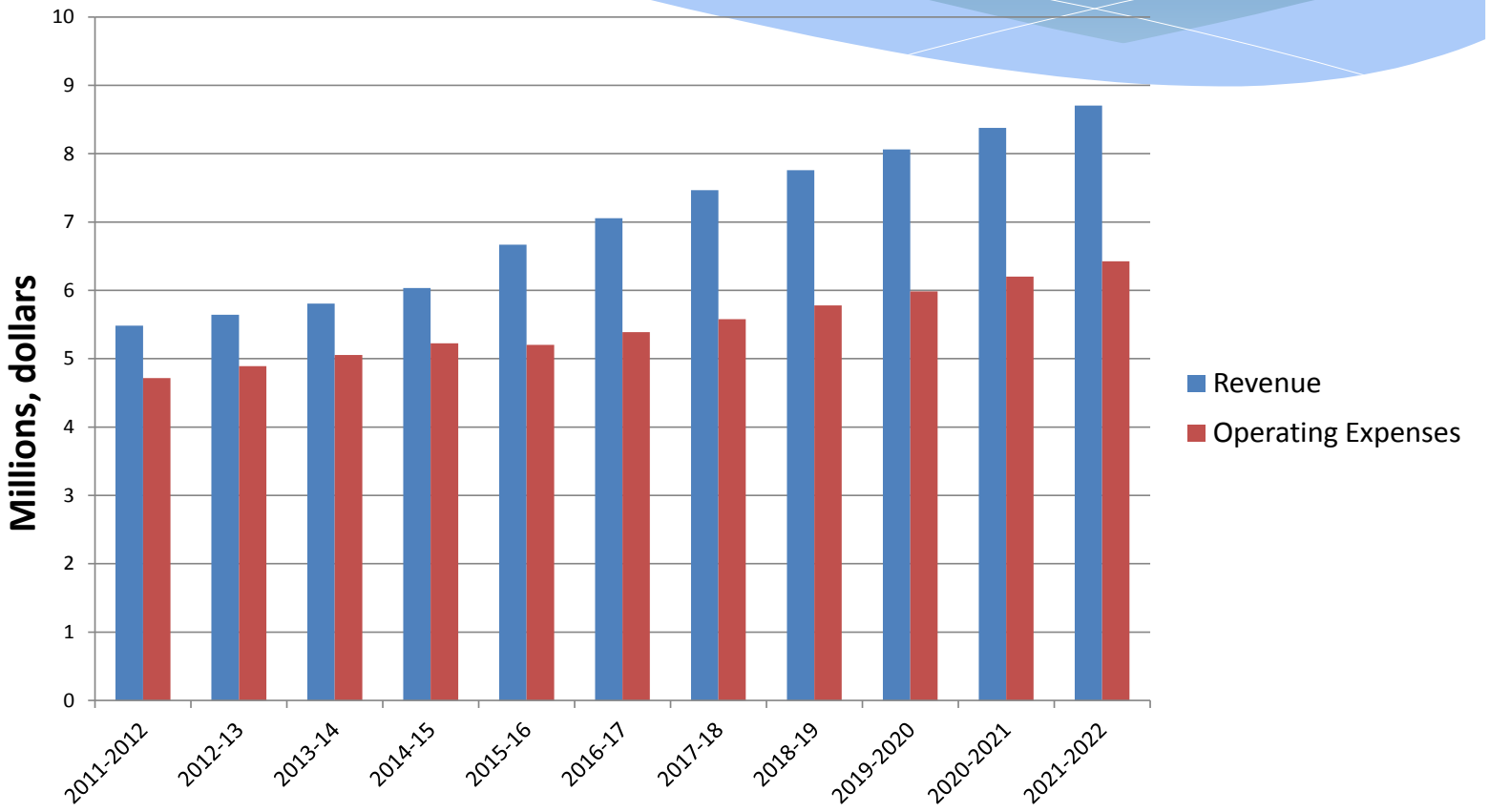

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