City of Olympia

Business Plan for Reclaimed Water Distribution

June 9, 2005

HDR

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Business Plan for Reclaimed Water Distribution City of Olympia

1.0 Introduction

The City of Olympia is developing a program to distribute reclaimed water for use by its water utility customers. Reclaimed water is highly treated wastewater effluent that meets standards for reuse established by the Washington State Department of Health. In the Olympia area, the LOTT Wastewater Alliance produces reclaimed water. By agreement among LOTT and its four members, Olympia will deliver reclaimed water to its utility customers. Lacey and Tumwater will each receive allocations of reclaimed water for delivery to their respective utility customers.

This Business Plan presents a long-range vision for the reclaimed water program and defines market expectations for reclaimed water sales. It discusses policy issues that affect development and financing of the reclaimed water program. Finally, the Plan estimates the costs of constructing the reclaimed water distribution system and provides a framework for financing capital investments.

This Business Plan is based on a series of technical memoranda developed in 2004 and 2005. A list of these documents and other relevant studies is presented in the Bibliography.

The City's reclaimed water program will continue to evolve as the City gains experience with reclaimed water distribution. Therefore the policies, assumptions and findings of this Business Plan are expected to be updated regularly, particularly in the first several years as the program is being developed.

1.1 Purposes of Reclaimed Water Program

The City's reasons for developing the reclaimed water program can be organized into the following categories:

- ***Wastewater Management***
  - *Capital Investments:* LOTT's 1999 Wastewater Resource Management Plan identifies use of reclaimed water as an important tool for managing increases in wastewater treatment costs. Reuse of reclaimed water produced at satellite plants reduces flows that need to be treated at the downtown WWTP. This in turn can reduce the need for major new investments in wastewater treatment capacity at the downtown WWTP, by allowing for incremental construction of treatment capacity at satellite facilities instead. Since costs can be deferred, there are cost savings to wastewater customers.
  - *Sustainability:* LOTT's discharges of treated effluent to Budd Inlet are limited by conditions of its discharge permit. By using reclaimed water, the quantity of treated effluent discharged into Budd Inlet can be managed, thereby reducing the impact on water quality. In addition, use of reclaimed water to recharge aquifers and support wetlands enhances environmental quality.

- ***Water Supply***
  - *Capital Investments:* By using reclaimed water for irrigation and other uses, the City will need less raw water pumped from McAllister Springs and ground water aquifers. This can potentially reduce or defer investment in new supplies as the City's need for water grows over time.
  - *Sustainability:* Where reclaimed water is substituted for raw water production, potential harmful impacts of pumping on local aquifers or stream flow can be reduced.

The cost recovery mechanisms built into this Business Plan recognize that the program is intended to produce broad public benefits. Therefore it is appropriate to spread costs across a broad cross section of the community. It is also recognized that the City's utility customers pay for both wastewater treatment by LOTT and water service from the City. Where LOTT costs are contained, the City's utility customers benefit.

1.2 Production Facilities

LOTT currently produces reclaimed water at its downtown Wastewater Treatment Plant (WWTP). In addition LOTT plans to construct "satellite" facilities to produce reclaimed water. Two of these, the Hawks Prairie and Chambers Prairie satellite facilities, are anticipated to be used by the City of Olympia. The Hawks Prairie plant is scheduled to come on line in 2006, and the Chambers Prairie plant is planned to come on line in 2025. Water from these facilities will also be used by LOTT and the City of Lacey. Table 1 shows quantities of reclaimed water available for distribution to City of Olympia utility customers.

Table 1
Reclaimed Water Production Available to City of Olympia

Site	Initial Production Date	Current Production Available to City (gpd)	Future Production Available to City[1] (gpd)
Downtown WWTP	2004	460,000	At least 460,000
Hawks Prairie Satellite	2006	0	At least 300,000
Chambers Prairie Satellite	2025	0	At least 300,000
Total Production		**460,000**	**At least 1,060,000**

(1) Quantities shown reflect current agreements among LOTT partners. Expansion of these facilities will allow for increased supply, but exact quantities have not been allocated at this time.

A third LOTT satellite facility is planned for construction in Tumwater. However, due to its distance from Olympia, this facility is not expected to be used as a source of supply for Olympia customers.

1.3 Distribution Systems

Under current state regulations, delivery of reclaimed water will require construction of piping systems that are wholly separate from the City's potable water distribution system. The City has assessed where these piping systems should be constructed to deliver water from the production facilities listed above. Four distinct areas have been analyzed.

These four areas are listed below, together with the facilities that will produce reclaimed water for each area:

- Downtown (downtown WWTP)
- West Side (downtown WWTP)
- Hawks Prairie (Hawks Prairie satellite plant)[1]
- Chambers Prairie (Chambers Prairie satellite plant).

Exhibit 1 identifies the three production facilities. This exhibit also provides a conceptual layout of major reclaimed water mains that could deliver reclaimed water. The conceptual layout is intended to ensure the largest potential users of reclaimed water can be served.

As shown in Exhibit 1, a portion of the downtown piping system has already been constructed. More detail on infrastructure needs and potential customers is presented in later sections of this Business Plan.

2.0 Recommendations

Recommendations of this Business Plan are summarized below. More detailed information is provided in subsequent sections of this document.

2.1 Near -Term Recommendations

- ***Initial Delivery of Reclaimed Water.*** Existing reclaimed water mains have been constructed to deliver water from the downtown WWTP to Marathon Park, Heritage Park, and Port of Olympia property along Marine Drive. The City should commence deliveries to these sites as soon as possible consistent with required procedures under LOTT's State Permit. The City should also provide connections to other suitable customers adjacent to the existing mains (see Exhibit 1).
- ***Investment in Dual Piping System.*** In the near term the City should develop the reclaimed water program based on current conditions and regulatory requirements. Investment in the City's dual piping[2] system should continue, at a level sufficient to get the reclaimed water program up and running and build familiarity with operational requirements.
- ***Project Selection.*** Prior to extensive investment in this system, it is recommended that individual distribution system projects be defined. Individual projects should be compared using a cost-benefit framework. The initial focus for these comparisons should be on Downtown, the West Side and Hawks Prairie. The project-by-project comparison should also include as a criterion which projects offer the best opportunities to demonstrate the value of reclaimed water to the public and to other potential customers.

[1] This area is named for the production facility, sited in the Hawks Prairie area of Lacey. Actual delivery of water by the City of Olympia will be to the northeast portion of Olympia's Urban Growth Area and does not include any customers in Lacey.
[2] Dual piping refers to one piping system for potable water and a separate piping system for reclaimed water.

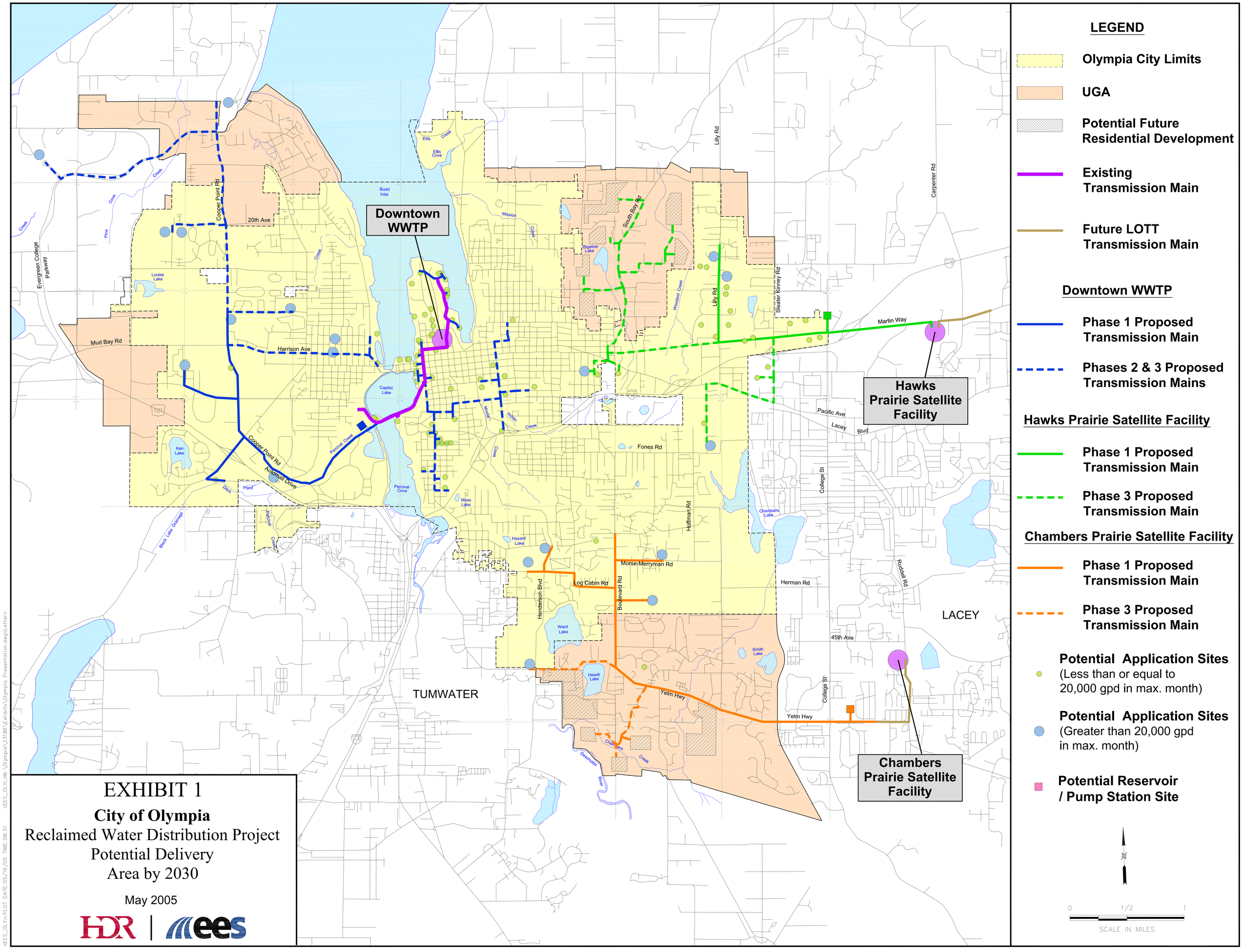


EXHIBIT 1

City of Olympia

Reclaimed Water Distribution Project
Potential Delivery
Area by 2030

May 2005

HDR | ees

- ***Relationship to Other Improvements.*** In some cases, reclaimed water projects can conveniently be combined with other utility or street improvements. This will affect the cost-benefit comparison described above. The City should incorporate consideration of reclaimed water projects into its routine Capital Facilities Planning procedures for other major utility or street improvement projects.

- ***Rate Structure for Reclaimed Water.*** It is recommended that customers receiving reclaimed water pay a rate that is 70% of the rate for potable water in a similar end use. This level strikes a balance between the need to recover revenue for system construction, operation and maintenance, and the need to provide an incentive to customers to use reclaimed water.

- ***Charges to Recover Costs Not Covered by Reclaimed Water Rates.*** It is recommended that additional costs not recovered from rates charged to reclaimed water users be covered by a combination of water system General Facilities Charges (GFCs) charged to new hookups and water consumption rates charged to all potable water customers. This is appropriate due to the broad public benefits associated with the reclaimed water system. Dividing revenues between these sources balances the burden between new growth and existing customers, recognizing the benefits of the reclaimed water program to these groups.

- ***Customer use requirements.*** It is recommended that customers of the City's water utility who meet certain criteria be required to use reclaimed water for high-volume consumption for irrigation and other non-potable applications. Criteria will need to be developed to implement this policy.

- ***Payment for improvements needed on Customer's property.*** Connection to reclaimed water mains will require certain improvements on the customer's property. It is recommended that reclaimed water customers bear these costs. However, it is further recommended that the City develop a grant program to partially offset the cost of such improvements. The cost of the grant program will be recovered from the same sources as other program costs, discussed above.

- ***Installation of Piping in New Developments.*** It is recommended that developers of subdivisions or other projects meeting certain criteria be required to install reclaimed water lines during project construction. Specific criteria should be developed and may include factors such as meter size or quantity of water to be used for non-potable purposes, and proximity to City's planned "backbone" system of reclaimed water mains. The City should explore opportunities for cost-sharing with project developers.

- ***Demonstration Projects.*** The state Department of General Administration (GA) and the Port of Olympia have made investments in reclaimed water infrastructure (pipe mains and irrigation systems) that provide benefits to the City's reclaimed water system. These sites offer opportunities for public demonstration of the use of this resource. In view of these contributions, it is recommended that reclaimed water be provided to three sites (two GA sites and one Port site) free of charge for a period of three years. Following this demonstration period, these sites will be subject to the same rate policy as other reclaimed water sites.

2.2 Long-term Recommendations

- ***Program Adaptation.*** In the long term, the City should continue to be forward looking and adaptable. Use of reclaimed water as a resource will gradually become more common in communities across the state and nation. Substantial evolution will likely occur in reclaimed water technology, state regulations, and public perceptions of reclaimed water. The City should be prepared to adjust its policies and infrastructure program accordingly. It is recommended that the vision statement and Business Plan, or other program documents developed in the future, be reviewed at least once every five years. Modifications should be made as needed in response to experience gained and changing opportunities.
- ***Avoid Over-Investment in Dual Pipe System.*** Currently, state requirements prohibit mixing reclaimed water with potable supplies. Because of this, dual pipe systems must be constructed: one system for potable supply and another system for reclaimed supply. If in the future reclaimed water regulations move toward allowing mixing of reclaimed water with potable water, further construction of a dual piping system would become unnecessary. Under this scenario, most of the infrastructure costs described in this Business Plan could be avoided, making the system far more affordable. To avoid over-investing in a dual piping system, this possibility should be considered as the City periodically re-evaluates its strategy for system development.

3.0 Long-Range Vision

Establishing a reclaimed water distribution program is a long-term enterprise. In existing developed areas within Olympia installation of reclaimed water piping is costly due to the need to work around existing buried infrastructure and restore streets and other surface features. The most cost-effective approach is to install piping in conjunction with other needed utility or street improvements that occur over years and decades. In the case of new developments within the Urban Growth Area (UGA), piping can be installed at the time streets are constructed. However, developments will be built based on market factors and do not necessarily match with priorities for development of the reclaimed water distribution system. In any area, customers must become familiar with the special characteristics of reclaimed water in order to effectively use this resource.

Because of these factors, a long-term vision is needed for the reclaimed water program. This vision can help establish expectations and define appropriate priorities for installing reclaimed water mains and related facilities. Once the long-term vision is established, short-term steps can be defined to build the foundation of the system. The purpose of this discussion is not to fully define the future, but to establish a framework for the remainder of this Business Plan.

A 25-year horizon was defined to assist in developing the long-term vision. This time period is long enough to allow for multiple cycles of utility and street improvements throughout the City, yet soon enough that growth and development can be projected with some degree of confidence. Therefore the discussion below begins by focusing on the year 2030.

3.1 Assumptions

To establish the vision for 2030, the following assumptions are made:

- Regulatory constraints on delivery and application of reclaimed water may well change over time, as technological advances in treatment technology occur, and as communities throughout Washington State become more accustomed to its use. Therefore, this Business Plan should be flexible enough to respond to these changes, so the City does not over- invest in redundant infrastructure.
- Olympia will create incentives for the use of reclaimed water, coupled with requirements that customers meeting certain criteria use reclaimed water for irrigation or other non-potable applications.
- Olympia's currently defined UGA will be fully built out. Densities will increase in currently developed areas; however the existing downtown area and neighborhoods will remain similar to their current layout and character.
- The economic base will remain similar to its current makeup, with State agencies and commercial activity predominating. Industrial activity will remain a minor component of the City's economic base.
- Current parks and schools will remain in their existing locations. Some new parks will be constructed as growth occurs, primarily in the southeast portion of the City and UGA.
- Capacity for producing reclaimed water will not be constrained by LOTT's current plans. More reclaimed water could be produced, if there were sufficient demand. However, the amount of reclaimed water produced cannot exceed the amount of wastewater generated in the community.
- This vision is not constrained by the locations of LOTT's downtown WWTP and satellite facilities for producing reclaimed water. Instead, it is assumed that over the time period involved, water mains can be installed to reach all of the major sites listed above, and to serve smaller streets in the vicinity of larger reclaimed water mains.

3.2 How Might Reclaimed Water be Used in Olympia in 2030?

Based on these assumptions, a reasonable vision for reclaimed water use in 2030 might include the elements listed below.

- All of the larger ***public irrigated sites*** in Olympia's UGA are fully irrigated using reclaimed water. This includes large City parks such as Yauger Park and LBA; smaller City parks where located near a reclaimed water main; all public high schools and middle schools; The Evergreen State College; South Puget Sound Community College; and the state Capitol Campus and associated office buildings on both sides of Capitol Way.
- Many ***private sites with large landscapes*** are also irrigated with reclaimed water, where they are in close proximity to reclaimed water mains. This includes large office complexes, churches, private schools, golf courses and cemeteries.

- ***Industrial processes*** using large volumes of water rely on reclaimed water.
- Reclaimed water is used for ***landscape irrigation in newly constructed developments in selected areas*** within the City that are in close proximity to reclaimed water mains. This includes commercial sites, multi-family housing and single-family housing.
- Reclaimed water is used in ***new commercial buildings and multi-family residences for a range of non-potable uses***, such as washing laundry, flushing toilets, performing maintenance, ornamental fountains and washing vehicles.
- ***Pre-existing sites are retrofitted in selected areas*** adjacent to reclaimed water mains to receive reclaimed water for ***landscape irrigation***. This could include older commercial sites, as well as single-family and multi-family residential housing.
- Reclaimed water is used for ***environmental purposes*** such as recharging ground water and supporting wetlands.

In accordance with the assumptions discussed above, although future technology may make it feasible to use reclaimed water for potable uses, the vision does not incorporate this element by 2030. Therefore, the distribution system is envisioned as a dual pipe system, with one set of water mains distributing conventional potable water, and a second set of water mains carrying reclaimed water. Related facilities, such as storage tanks and pumps, would also be separated. This is consistent with current regulations and design parameters.

This vision does not entail providing access to reclaimed water to every customer or street in the City. However, achievement of this vision will require installation of water mains reaching many different areas within the City. Exhibit 1 shows the City's UGA with many of the larger existing sites as identified in the vision discussion above. Based on locations of these sites, Exhibit 1 also shows where major transmission mains could be installed.

The discussion above presents one vision that appears attainable with phased installation of reclaimed water mains over a 25-year period and a reasonable level of participation by the City's customers. More expansive use of reclaimed water could also be envisioned, depending on assumptions about the willingness of customers to participate, evolution of City policies and ordinances, and the City's willingness to invest in the dual distribution system.

4.0 Current Status of Reclaimed Water Program

Development of the reclaimed water program involves both LOTT and the City. The following permits and agreements provide a foundation for the program:

- Reclaimed Water Permit issued to LOTT by Department of Ecology for the downtown Wastewater Treatment Plant. Permit runs from March 1 2004 to February 28, 2009. The Permit establishes a number of conditions that affect LOTT and the City of Olympia as a distributor of reclaimed water.

- General Interlocal Agreement between LOTT, Thurston County, and the Cities of Lacey, Olympia and Tumwater for distribution and use of reclaimed water. Executed January 16, 2004.
- Reclaimed Water Distribution Agreement No. 1 between LOTT, Thurston County, and the Cities of Lacey, Olympia, and Tumwater.
- City Ordinance detailing Olympia's responsibilities in enforcing LOTT's permit requirements. It defines reclaimed water rates and charges and authorizes end user service agreements with customers.
- End user agreements are developed to ensure each customer receiving reclaimed water understands allowable and prohibited uses of reclaimed water. The agreements also detail the quantity, types and locations of intended uses.

In addition, City staff have discussed delivery of reclaimed water with those customers in the downtown area capable of using large quantities. These include the Washington State Department of General Administration (GA), Port of Olympia and City Department of Parks, Arts and Recreation. The City has retained a consultant, HDR/EES, to perform studies of the market for reclaimed water, capital projects needed, and approaches to financing these projects. Results of these studies are incorporated in this Business Plan. The LOTT Partners have developed public information materials, including signage that will be posted at reclaimed water application sites.

5.0 Policy Issues

With implementation of the reclaimed water program the City will begin delivering dual supplies of potable and reclaimed water. Development of this new system raises a number of policy issues. Resolution of these policy issues affects the Business Plan, particularly in terms of funding sources to pay for the new distribution infrastructure.

Six key policy issues were assessed during preparation of this Business Plan. These are:

- Rate structure for reclaimed water
- Which revenue sources should cover infrastructure costs not recovered from reclaimed water customers?
- Should customers be required to use reclaimed water?
- Should the customer or City bear costs on the customer's property?
- Should developers be required to install reclaimed water mains?
- How far in advance should reclaimed water mains be installed, ahead of customer demands in growing areas?

For each of these topics, a range of options was identified. Options were discussed initially at the staff level. Staff recommendations were then discussed with the City's Utilities Advisory

Committee and with the City Council.[3] Council guidance was used to finalize recommendations, which are presented in Section 2.1 of this document.

Further information on these six policy issues and the basis for each policy recommendation is presented in Appendix A.

6.0 Market for Reclaimed Water

Working with a consulting firm, the City has identified customer sites that appear well suited for use of reclaimed water, located in areas that could be served from the three LOTT production facilities. For the most part, these are sites where irrigation usage averages at least 1,000 gallons per day (gpd) during the highest water-using month of the summer[4]. Many of the sites identified use far more than 1,000 gpd. A summary of demands from these sites is presented in Table 2. Exhibit 1 displays locations of these customers. Further details on customer sites and demands are included in Appendix B.

Table 2
Summary of Reclaimed Water Sites and Demands

Quantity Used (Irrigation Days in Max. Month)	Number of Potential Sites (1)				
	Downtown (1)	West Side	Hawks Prairie	Chambers Prairie	Total
100 - 1,000 gpd	9	0	1	0	10
1,000 - 10,000 gpd	21	3	6	1	31
10,000 - 30,000 gpd	7	3	14	4	28
30,000 - 100,000 gpd	4	6	2	3	15
> 100,000 gpd (2)	0	2	1	2	5
Total Quantity (gpd):	**516,203**	**877,140**	**568,559**	**857,091**	**2,818,993**

(1) In some situations, multiple sites are owned by the same customer. For example, the Department of General Administration owns the Capitol campus, comprised of 9 sites consuming a total of 249,000 gpd.
(2) These "sites" refer primarily to large future subdivisions with many end users (e.g., new residential development in Hawks and Chambers Prairies). There may be additional sites of this nature on the west side, but that area has not been reviewed in detail.

For comparison, in recent years the City's total average usage during the highest water using month has been approximately 13.5 mgd. Maximum day demand[5] for all water uses is currently on the order of 16.5 mgd.

An assessment was made of how use of reclaimed water could defer the need for additional potable water supply in the future. Based on the City's existing production sources and demand for water projected in the City's 2004 Water System Plan, use of reclaimed water could potentially defer development of a new source of supply by approximately 10 to 15 years. Assuming water supply projects listed in the 2004 Water System Plan are constructed, the next new source of supply would be needed some time around 2025. If the full reclaimed water system described in this Business Plan is built and the identified demands are supplied with reclaimed water, the next new source (after currently planned projects) could potentially be

[3] Policy Issue No. 6 was discussed only at the staff level, as it is more of an operational policy issue.
[4] A few of the sites identified use less than 1,000 gpd but are in close proximity to other sites and are otherwise well suited for reclaimed water use.
[5] Maximum day demand is the total water produced on the single highest water-using day of the year.

deferred until the 2035-2040 time frame. This is one of the intended benefits of the reclaimed water program as described in Section 1.1.

7.0 Infrastructure Needs and Costs

7.1 Distribution System Infrastructure

Under current regulations separate distribution systems must be constructed for reclaimed water, so that reclaimed water is kept separate from potable water supplies. The City has worked with a consulting firm to develop a conceptual approach to distributing reclaimed water. It is anticipated that three distribution systems would be constructed:

- One distribution system will deliver reclaimed water from the downtown WWTP to customer sites in the Downtown and West Side areas. The downtown WWTP has been capable of producing reclaimed water since 2004, and portions of the distribution piping system have been constructed.
- A second distribution system is planned to deliver water from the Hawks Prairie satellite production facility to customer sites in northeast Olympia. The satellite facility is slated to begin producing reclaimed water in 2006. No distribution lines have been constructed for Olympia sites to be served from the Hawks Prairie facility.
- A third distribution system could be constructed to deliver water from the Chambers Prairie satellite production facility to customer sites in southeast Olympia. The satellite facility is slated to begin producing reclaimed water in 2025. No distribution lines have been constructed for Olympia sites. Because of the time period involved, and the desire to avoid over-investing in a dual pipe system, the City anticipates deferring major projects on the Chambers Creek System for the time being. If reclaimed water policies and regulations change in the future, it is conceivable this area could be served through existing, potable water lines, at greatly reduced cost.

These distribution systems are shown on Exhibit 1. Generally, each of these distribution systems would eventually include reclaimed water mains, pump stations, re-chlorination facilities, and storage tanks.

7.2 Phasing of System Construction

Distribution system components can be phased over time to reduce rate impacts and target customer sites that have the largest demands and are situated nearest to the production facilities. A preliminary phasing schedule is shown in Table 3.

These phases are defined for large components of each distribution system. A more detailed schedule of projects should be developed as a step in implementing this Business Plan. The project-by-project schedule should be based on a comparison of project-specific costs and benefits, as well as other criteria (e.g. public visibility) relevant to developing the reclaimed water program. This will determine, for example, whether large portions of the Downtown and West Side systems should be constructed prior to

any projects in the Hawks Prairie system, or whether these systems should be developed in parallel stages.

Table 3
Conceptual Phasing of Distribution System Construction

	Year of Construction	Reclaimed Water Demand [1] (gpd)	Capital Cost	Annual O&M Cost
Downtown Area				
Phase 1	2007	171,270	$808,000	$14,500
Phase 2	2008	248,933	$3,311,000	$28,500
Phase 3	2011	96,000	$2,595,000	$14,500
Total		516,203	$6,714,000	$57,500
West Side Area				
Phase 1	2008	287,007	$4,055,000	$34,300
Phase 2	2015	260,235	$4,389,000	$21,100
Phase 3	2019	329,898	$3,116,000	$19,500
Total		877,140	$11,560,000	$74,900
Hawks Prairie				
Phase 1	2006	98,409	$2,640,000	$26,800
Phase 2	2009	165,749	$1,058,000	$5,100
Phase 3	2016	304,401	$6,840,000	$20,800
Total		568,559	$10,538,000	$52,700
Chambers Prairie				
Phase 1	2025	154,428	$3,542,000	$33,700
Phase 2	2027	311,569	$1,527,000	$5,400
Phase 3	2029	391,094	$6,119,000	$20,800
Total		857,091	$11,188,000	$59,900
TOTAL		**2,818,993**	**$40,000,000**	**$245,000**

[1]Average Day Demand during highest water-using month of year.
All costs expressed in 2004 dollars.

In some cases, reclaimed water projects can conveniently be combined with other utility or street improvements. This will affect the cost-benefit comparison described above. The City should incorporate consideration of reclaimed water projects into its routine procedures for planning other major utility or street improvement projects. For example, upcoming utility projects that could potentially incorporate reclaimed water piping include: a.) the water utility's Percival Creek Pump Station project; b.) the sewer utility's Water Street/Capitol Way project and c.) the sewer utility's Jefferson/Franklin Streets Project. From a strategic perspective, the Percival Creek project appears particularly attractive, because it would provide a means to deliver reclaimed water to the West Side in the near future. However, final decisions should not be made until a project-specific analysis of costs and benefits has been performed with regard to reclaimed water.

7.3 Infrastructure and Operating Costs

Planning-level cost estimates have been developed for the major components of the three distribution systems. These estimates are summarized in Table 3. More detailed information is presented in Appendix C. All costs are presented in 2004 dollars.

The capital costs presented include installation of distribution mains and street restoration, pump stations, storage tanks, and rechlorination stations. These costs also include on-site costs at customer sites, such as meter installation and installation of backflow prevention assemblies.

One of the policies included in this plan is that customers should bear on-site costs, but the City should consider developing a grant program to partially cover such on-site costs. Therefore, the on-site costs included in Table 3 will likely be reduced. Tables presented in Appendix C itemize these costs.

Operations and maintenance costs include power for pump stations, rechlorination, periodic inspection of backflow-prevention assemblies, and maintenance activities.

8.0 Financing the Reclaimed Water System

The engineering analysis completed as part of this project identified operating and maintenance costs, capital infrastructure costs and the anticipated reclaimed water demands. A financing plan was developed from this information to quantify the financial impact to City customers of implementing the reclaimed water program. A cash basis approach was utilized to calculate the revenue need of the reclaimed water program. The cash basis approach includes operating and maintenance expenses, taxes and debt service on capital projects. The driving factor of the calculation is the manner in which capital costs will be funded.

8.1 Capital Funding

A number of financing alternatives were reviewed to fund capital projects. The primary financing alternatives include; 1) issuance of revenue bonds, or 2) application for low interest loans from the State of Washington or federal government.

While the City will apply for low-interest loans, the remainder of this analysis assumes that revenue bonds will be used as a means to finance projects. This approach provides a conservative estimate of expenditures, since interest rates on bonds will typically be higher than interest rates on low-interest loans. The debt issue assumptions include a 20 year term and an interest rate of 6.0 percent.

A second key question is what sources of revenue should be used to pay for program costs, including capital costs. Customers using reclaimed water will pay for their consumption, but this revenue will only partially cover program costs, primarily operations and maintenance. Policy Issue No. 2 recommended that remaining costs be met through a combination of water system GFCs and rates charged to all water customers (see Appendix A). These sources recognize the broad public purposes of the reclaimed water program. The calculations used (Appendix D) assume the following:

- 50% of the City's capital cost for each construction phase will be paid through water utility GFCs. This reflects the benefits of the reclaimed water program to serve growth in demand.

- The remaining 50% of the City's capital cost will be financed through revenue bonds, and the debt service on the bonds will be paid from potable water consumption rates paid by all City water customers.
- Costs on customer sites (e.g. meters, backflow prevention equipment, irrigation system modifications) will be paid by customers. It should be noted that Policy Issue No. 4 in Appendix A also recommends the City provide grants to partially offset these customer costs. At this time, however, the amount of grant that will be available from City sources has not been defined. Use of a grant program will be analyzed further as an implementation step for this Business Plan.

As a step in implementing this Business Plan, more detailed work will be needed to address details of cash flow and management of revenues from these sources. This will include further analysis of the exact proportions of GFCs and potable water revenues to achieve an equitable and practical financial program.

To assist in understanding the potential impact to the City's customers and developers, Table 4 shows different cost recovery combinations for each one million dollar increment of capital investment.

Table 4
Rate Impact of $1 Million in Construction Costs

	Water GFC	Potable Water Rate per CCF[1]
25/75 Ratio	25% $22 per ERU	75% $0.02 per CCF
50/50 Ratio	50% $43 per ERU	50% $0.01 per CCF
75/25 Ratio	75% $65 per ERU	25% $0.01 per CCF

(1) Potable water rate shown indicates impact of annual debt service for remaining costs after GFC applied to construction cost.

8.2 Defining Revenue Needs

The revenue required to support the reclaimed water program must cover operating and maintenance expenses, a City utility tax of seven percent and debt service on capital projects. The engineering analysis identified costs needed to define the revenue needs of the reclaimed water system. Exhibit 2 shows the operating and maintenance costs and debt service costs out to 2015. This exhibit follows the approach discussed above.

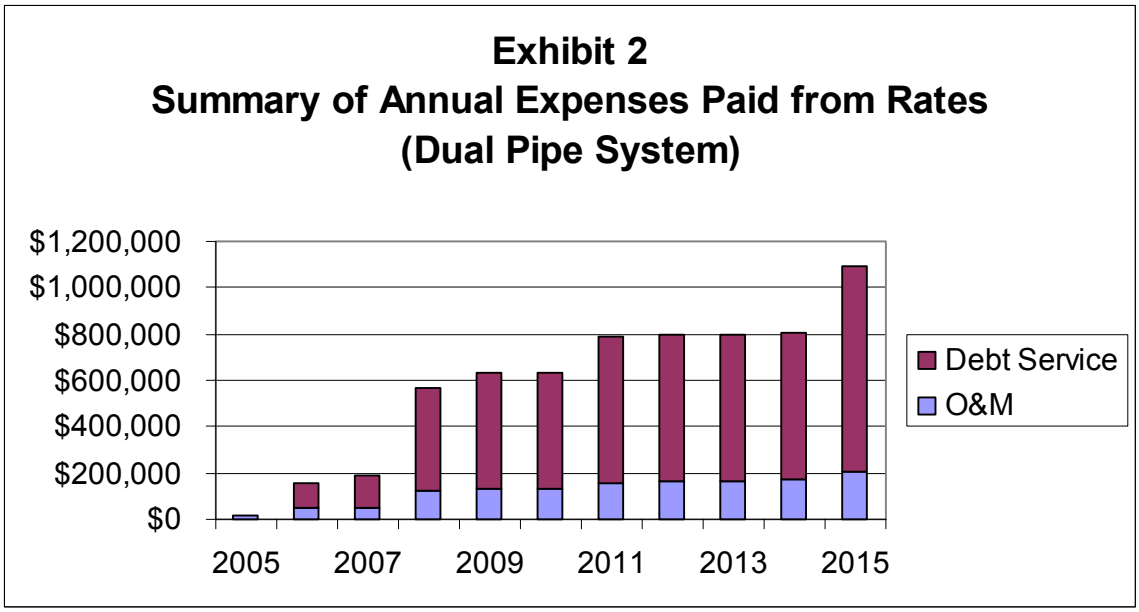


Exhibit 2 does not show the GFC revenue which would be applied prior to issuing revenue bonds. For purposes of this Business Plan, it is assumed the GFC revenue would be one half the capital cost of each construction phase, escalated for inflation. This quantity is shown in Table 5 for the specific years when construction phases are identified. In reality, collection of these GFCs will be spread over time, and GFC revenue may be used either at the time construction occurs, or as another means of paying debt service.

Table 5
GFC Funded Expenditures

Year	2006	2007	2008	2009	2011	2015
GFC Expenditure[(1)]	$1,359,600	$404,000	$4,024,514	$595,394	$1,549,283	$2,949,225

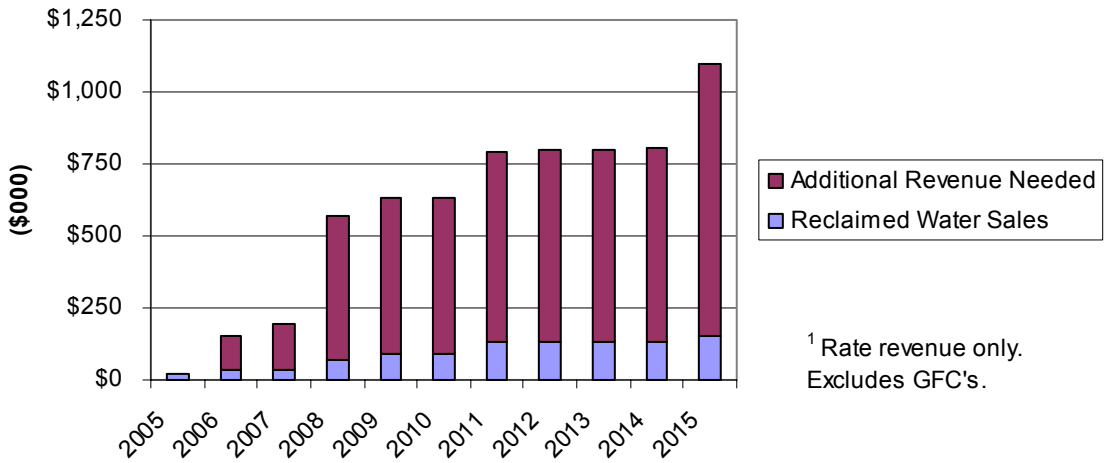
(1) Using dates of phases as shown in Table 3. Note GFCs can be accumulated in advance of each phase.
(2) Assuming 50% of capital cost paid by GFCs, and using phases as shown in Table 3.

8.3 Revenue from Reclaimed Water Rates

Most of the City's utility systems are operated on the basis that utility revenues must cover capital costs and O&M Costs. However, a different philosophy is needed for the reclaimed water program. Because the costs of building a dual pipe system are substantial, and water deliveries are limited primarily to summertime irrigation uses, pricing the water at full cost would result in a very high rate, on the order of five times higher than potable water. This would discourage interest in reclaimed water by customers. Moreover, the purposes of the reclaimed water system are broad public purposes, and it would not be equitable to require a small number of customers to pay for the program.

As discussed in Policy Issue No. 1 (Appendix A), the City will set rates at 70% of the City's applicable rate for potable water. Based on reclaimed water demand identified in the engineering analysis, the 70 percent calculation was applied to the irrigation rate, since most reclaimed water consumption has been identified as irrigation usage. A summary of the resulting revenue generated from reclaimed water sales compared to the total revenue need is shown in Exhibit 3. As new parts of the system are constructed over time, more customers can be connected, generating additional revenue. At the same time, debt service and O&M costs increase, requiring additional revenue from other sources.

Exhibit 3
Revenue from Reclaimed Water Customers
Compared to Total Revenue Needed[1]
(Dual Pipe System)



[1] Rate revenue only. Excludes GFC's.

9.0 Additional Considerations for Program Development

9.1 Public Outreach

As part of its public involvement and education strategy for reclaimed water, the LOTT Reclaimed Water Task Force produced a series of educational pieces, include a brochure, frequently asked questions handout, and write-ups about each of the reclaimed water facilities. As the first LOTT Partner to purvey reclaimed water, Olympia is tailoring this strategy to meet its unique needs.

During June, 2005 a telephone survey of 400 randomly-selected Olympia residents will ascertain public opinion regarding reclaimed water. Results of this survey will assist the City in developing its educational goals and programs.

At this writing (June, 2005), a "grand opening" for introducing the use of reclaimed water at Heritage and Marathon Parks is in the planning stages.

9.2 Reclaimed Water Ordinance

The City's Reclaimed Water Ordinance was approved by Council in May, 2005 as part of Chapter 13.24 of the Olympia Municipal Code. It details Olympia's responsibility in enforcing LOTT's permit requirements. The ordinance defines reclaimed water rates and charges, authorizes end user service agreements with customers, and outlines provisions regarding the construction, extension, and operation of reclaimed water distribution facilities.

9.3 Capital Improvement Plan

As a step in implementing this Business Plan, a Capital Improvement Plan (CIP) needs to be developed listing specific capital projects to be constructed in each year, together with their costs. As indicated in Section 7.2, the CIP should be based on project-by-project costs and benefits as well as other criteria.

9.4 Coordination with Other Utility and Street Improvement Projects

Installation of reclaimed water mains under existing City streets has a substantial cost. Where reclaimed water mains can be installed in conjunction with other utility projects or street projects, this cost can be reduced. Therefore, there is value in coordinating projects on a routine basis as the reclaimed water distribution system is being constructed over a period of many years. The City should incorporate consideration of reclaimed water projects into its routine procedures for planning other major utility or street improvements.

As noted in Section 7.2, three upcoming utility projects have been identified that may be suitable for reclaimed water main installation. These are:

- The water utility's Percival Creek Pump Station project
- The sewer utility's Water Street/Capitol Way project
- The sewer utility's Jefferson/Franklin Streets project.

Policy Issue No. 6 in Appendix A identifies other considerations related to long-term decisions on installing segments of the reclaimed water piping system.

9.5 Demonstration Projects

Two of the City's water customers in the Downtown area have made investments in reclaimed water systems already. The Washington State Department of General Administration (GA) has constructed an irrigation system at Marathon Park that was specifically designed for a reclaimed water system. The Port of Olympia included installation of a reclaimed water main in its upgrade and realignment of Marine Drive in 2004. The City paid one half the cost of this main installation project. In both cases, these investments were made at a time when City policies on reclaimed water deliveries and pricing had not been established.

Both GA and the Port have sites that provide excellent opportunities to demonstrate the value of reclaimed water to the public. These are the first sites in Olympia or the region

(other than LOTT itself) that will utilize reclaimed water. In view of the risk and investment already undertaken, it is recommended that selected sites operated by these two entities be treated as demonstration projects, and that a special arrangement be made for delivery of reclaimed water, as follows:

- The City will provide reclaimed water for irrigation of Marathon and Heritage Parks, adjacent to Capitol Lake, at no charge for the first three years. Following that, reclaimed water delivered to these sites will be charged at the standard rate for reclaimed water.
- The City will provide reclaimed water for an existing pond feature at the Port of Olympia. Up to 4,000 gallons per day will be provided at no charge for an indefinite period of time. This arrangement will be reviewed periodically.

In other respects, City policies on reclaimed water will apply to these sites the same as any other customer or site. This includes the requirement for signs indicating that reclaimed water is being used.

9.6 Customer Contracts

In order to fulfill LOTT's permit requirements with the State Departments of Health and Ecology, Olympia must complete End User Agreements with each reclaimed water customer. This agreement ensures that our customers understand allowable and non-allowable uses of Class A reclaimed water. It also details the quantity, types, and location of intended uses.

9.7 Cost Sharing and City Grants

The recommendations described in Section 2 include two items where cost sharing and City grants need to be developed. These are installation of on-site facilities on customer properties and installation of distribution mains in new developments. The City will assess means of contributing to these costs in order to improve the economic attractiveness of reclaimed water.

10.0 Operational Procedures

The City is developing reclaimed water distribution system development standards, for use by its reclaimed water purveyors in guiding installation, operation, and maintenance of distribution system facilities. These development standards will include items such as:

- Installation of backflow prevention assemblies
- Water quality monitoring procedures and protocols
- Water quality reporting procedures
- Reclaimed water line installation and maintenance procedures including protocols to segregate reclaimed water maintenance activities and equipment from potable water activities and equipment.

The City is involved in the development of these standards, and will incorporate them into its reclaimed water program when completed.

Bibliography

Technical Memoranda

The City contracted with a consulting firm, HDR/EES, to assess opportunities for reclaimed water, provide preliminary engineering and planning services, and analyze financial impacts. The following technical memoranda produced under this contract provide additional information on the reclaimed water program. Memoranda are listed in chronological order.

EES, Inc. March 4, 2004. Summary of Engineering Parameters Related to Reclaimed Water Distribution in Downtown Area.

EES, Inc. March 30, 2004. Water Chemistry Concerns Related to Use of Reclaimed Water at General Administration's Steam Plant.

EES, Inc. May 18, 2004. Summary of Planning-Level Cost Estimates Related to Reclaimed Water Distribution in Downtown Area.

EES, Inc. July 2, 2004. Summary of Reclaimed Water Rates and Alternative Revenue Sources.

EES, Inc. September 7, 2004. Assumptions Regarding a Hypothetical Future Source of Supply (in Relation to the City of Olympia Reclaimed Water Distribution Project).

HDR/EES. November 29, 2004. Cost-Effectiveness Comparison for Reclaimed Water Distribution System.

HDR/EES. March 24, 2005. Summary of Engineering Parameters Related to Reclaimed Water Distribution in the Hawks Prairie and Chambers Prairie Areas.

HDR/EES. April 15, 2005. Olympia Reclaimed Water Distribution System – Summary of West Side Analysis.

HDR/EES. April 15, 2005. Summary of Planning-Level Cost Estimates Related to Reclaimed Water Distribution in the Hawks Prairie and Chambers Prairie Areas.

HDR/EES. April 15, 2005. Financial Impact Analysis.

Additional Sources

LOTT Wastewater Alliance. 1998. Wastewater Resource Management Plan.

R.W. Beck. September 2002. Economic Analysis of Reclaimed Water Distribution and Use. (Prepared for LOTT Wastewater Alliance)

Appendix A
Policy Issues

Appendix A
Policy Issues

This appendix contains a discussion of the following policy issues:

1. Rate structure for reclaimed water.
2. Which revenue sources should cover infrastructure costs not recovered from reclaimed water customers?
3. Should customers be required to use reclaimed water?
4. Should customer or City bear costs on customer's property?
5. Should developers be required to install reclaimed water mains?
6. How far in advance should reclaimed water mains be installed, ahead of customer demands in growing areas?

Policy Issue No. 1:
Rate structure for reclaimed water

Background

The standard approach to setting rates for utility services is to use "cost-of-service" methodology. Cost-of-service means that the full cost of building and operating the utility system are passed on to customers; and that various customer classes may pay differing rates, based on how their use of the utility service drives system costs.

A standard cost of service approach would produce reclaimed water rates that are much higher than rates for the City's potable water service. This is because the costs of installing a distribution system for reclaimed water are substantial while the number of customers who can use the water and the quantity of water they will use is limited. In contrast, all water customers city-wide share in the costs of the potable water system. Paying a higher rate for reclaimed water would create a disincentive for customers to take reclaimed water.

In addition, the purposes of installing the reclaimed water system are broad public purposes. It would not be equitable for a small number of customers to finance a system intended for broader public purposes.

It should also be recognized that from the customer's perspective, using reclaimed water creates additional on-site costs and requires more managerial attention to comply with State requirements. This creates a barrier for substituting reclaimed water for their current use of potable water. This being the case, it is reasonable to consider offering the product at a lower rate than potable water.

Option 1: Pass the full cost of constructing the reclaimed water system on to reclaimed water customers.

Pros:

- Recovers full cost of constructing and operating the reclaimed water system.
- Similar to cost-recovery mechanism for Olympia's other utility systems.

Cons:

- Rates for reclaimed water would be much higher than for potable water. For example, analysis of the downtown reclaimed water system indicated full cost recovery would require a rate of $9.68/ccf, compared with the 2004 irrigation rate for potable water of $2.39/ccf.
- Price creates a substantial disincentive for customers to use reclaimed water. Could cause backlash against the reclaimed water program overall.

- The benefits of the reclaimed water system are broad public benefits, but the costs would be borne by a small set of customers (those able to use large quantities of water for irrigation and other non-potable uses, and located in proximity to available supplies).

Option 2: Set the rate for reclaimed water equal to the potable water rate for similar uses (e.g. irrigation rate for irrigation uses).

Pros:

- Easy to administer and communicate to the public.
- Recovers more costs than Option 3.
- More equitable than Option 1, since a few customers do not bear entire cost of a system built for broad public purposes.

Cons:

- Provides no incentive for customers to use reclaimed water, since there are no cost savings.
- Does not offset the on-site costs and management challenges for customers using reclaimed water, necessary to meet State requirements.

Option 3: Set the rate for reclaimed water significantly lower than the potable water rate for similar uses.

Pros:

- Provides a financial incentive to substitute reclaimed water for potable water.
- Offsets, at least in part, on-site costs and increased managerial attention to water applications.
- More equitable than Option 1, since a few customers do not bear entire cost of a system built for broad public purposes.

Cons:

- Recovers less cost than Options 1 or 2. This leaves more cost to be covered by other means.
- Since customers that would receive reclaimed water are currently using potable supply, the reduced rate will reduce revenues to the City's water utility. This reduction must be made up by increased revenues through some other means. Analysis of the downtown system indicated this would be on the order of $23,000 per year. This is a relatively small dollar amount, compared with overall water utility revenue and compared with other costs of the reclaimed water system.

Recommendation

Option 3 is recommended, with the rate for reclaimed water set at 70% of the comparable potable water rate. For example, if reclaimed water is used for irrigation (through an irrigation meter), the rate will be 70% of the City's rate for irrigation use in the potable system. If the reclaimed water is used for a non-potable commercial process (cooling, car wash, etc.), the rate will be 70% of the applicable rate charged to commercial customers for potable water use.

The 70% level was selected after reviewing data on rates set by other communities in the U.S. Rate levels set in other communities typically ranged from 50% to 100% of potable water rates.

The 70% rate is adequate to fully cover operations and maintenance costs of the reclaimed water system, but will cover only a small portion of infrastructure costs. In comparison with the overall costs of the reclaimed water system, there is not a large difference in revenue between a 50% level and the 70% level.

In summary, the 70% level offers an appropriate compromise between the need to recover costs and the need to create a meaningful financial incentive for customers to use reclaimed water.

Policy Issue No. 2:
Which revenue sources should cover infrastructure costs not recovered from reclaimed water customers?

Background

Revenues from sales of reclaimed water will cover only a small portion of the cost of building the distribution system. This is acceptable to the City, given the broader benefits yielded by developing a reclaimed water system. However, this means that other revenue streams must be tapped to cover the infrastructure costs.

The Business Plan is based on the assumption that all costs must be borne by the City, and no grants will be available for this purpose. This does not preclude seeking grants, but provides for a conservative financial analysis.

Additional cost recovery mechanisms that have been reviewed include:

Charge	Characteristics
1. Potable water consumption rate	Paid by City water customers. Revenue varies seasonally and year-to-year.
2. Fixed monthly ready-to-serve charge paid by water customers	Paid by City water customers. Revenue constant and predictable.
3. City wastewater monthly charge, estimated per Equivalent Residential Unit (ERU)	Paid by City wastewater customers. Revenue less variable than water consumption revenues.
4. City utility tax	Broader based, within City. Paid by all City utility customers (water, wastewater, stormwater, solid waste). Revenue less variable than water consumption revenues
5. Water General Facilities Charge (GFC)	Paid by developers of new construction as growth occurs and passed on to new customers. Revenue variable, depending on rate of growth.
6. Funding from LOTT	Characteristics would depend on how LOTT collected the revenue. Broader based regionally, since LOTT covers additional jurisdictions.

These charges could be applied either alone, or in combination with one another. Selection of an appropriate mechanism for recovering costs should be based on at least two considerations: 1.) who benefits from development of the reclaimed water system, and 2.) administrative practicality. In terms of benefits, the reclaimed water system is designed to address both utility capital investments and sustainability. Each of these are relatively broad-based purposes yielding benefits to the public at large. It should also be noted that there is substantial overlap in some of the sources of revenue listed above, in terms of who pays the bills. For example, most City customers who pay a utility tax are also customers of the water and wastewater utilities. On the other hand, those paying GFCs and LOTT customers have only partial overlap with the remaining categories.

The options below identify alternative ways these sources can be combined. The exact breakdown of revenues for the selected options will be determined based on ratepayer impacts and revenue effects.

Option 1: Recover costs from a combination of LOTT, water system GFC and potable water consumption rates.

Pros:

- Billing would spread utility costs among the utility systems linked most closely to reclaimed water program. Existing water system, growth requiring additional water supplies, and LOTT system for wastewater treatment and effluent discharge.
- Sharing costs with LOTT would reduce cost borne by City portion of utility bill. However, ultimately Olympia customers still pay for overall system on the LOTT portion of their utility bills. If all three cities received LOTT funding, customers in all three Cities would share the cost.

Cons:

- More complex for customers to understand, since costs are split among three portions of their utility bill.
- LOTT has paid for infrastructure needed to produce reclaimed water; and appears to have less interest in paying for the distribution infrastructure, since Olympia, Lacey and Tumwater will each sell the water to their customers.
- Non-LOTT portion of revenue stream variable, requires financial management to ensure variable revenues can cover fixed costs of infrastructure investment. LOTT portion may also be variable, depending on formula used.

Option 2: Recover costs from a combination of water system GFC and potable water consumption rates.

Pros:

- Given that funding from LOTT is uncertain, all costs of building City distribution system are recovered by City (Lacey and Tumwater assumed to follow same course; since it would not be equitable if they received LOTT funding and Olympia did not)
- Splits costs between existing City water customers and new growth, reflecting dual benefits of reclaimed water system for overall sustainability and growth-related infrastructure
- Large reliance on potable water consumption rate reinforces price signal that customers who use more potable water pay more (contrast with "ready-to-serve" component of water bill, which is a fixed monthly charge no matter how much water is consumed).
- Easier for customers to understand

Cons:

- Could be higher charges to City customers, compared with Option 1 (depends on LOTT policies under Option 1).
- Revenue sources are variable, particularly GFCs. Requires financial management attention to ensure variable revenue can cover fixed costs of infrastructure investments.

Option 3: Recover costs from a combination of water system GFC potable water consumption rates and City wastewater rates.

Pros:

- Retains split between existing and future customers, same as Option 2.
- Includes a component on the wastewater side.

Cons:

- More complex to administer and communicate to customers.
- Differentiation between sewer and water customers may make little difference, since they are generally the same customers.
- Revenue variability requires financial management, as with Option 2.

Recommendation

Option 2 is recommended. This option is relatively simple to communicate and administer, compared with the other options. It recognizes that LOTT may not have an interest in funding local distribution infrastructure. It balances the burden of the reclaimed water system between new growth and existing customers, reflecting the dual benefits of the reclaimed water program. While this approach does involve variable revenues, financial policies can be applied to ensure fixed infrastructure costs are covered.

Policy Issue No. 3:
Should customers be required to use reclaimed water?

Background

Initially, reclaimed water lines will be installed to convey water from the LOTT production facilities downtown and at satellite sites to selected customer sites where relatively large quantities can be used. These lines will pass by many other properties that could use smaller quantities. In the longer run, there will be opportunities to construct branch lines off the original trunk lines. The more customers that connect to the system, the more reclaimed water can be used. If many small connections are added, the total quantity from this expanded customer base may rival quantities used at the large water-using sites. Passing an ordinance requiring customers to connect if a line passes their property would increase the number of customers using reclaimed water, the quantity consumed, and the revenue available to offset system costs.

Option 1: Require all customers using irrigation water (and selected other uses) to connect and use reclaimed water.

Pros:

- Increases the quantity of reclaimed water used, thereby furthering the goals of the reclaimed water program. (Depending on area involved, the increase may be slight to substantial).
- Increases the number of customers, which raises visibility of the program and encourages further development of the system.
- Simple to communicate to public.

Cons:

- May create problems with compliance and customer relations:
  - Customers may prefer potable water over reclaimed water.
  - Many customers will likely object to cost of reclaimed water tap, meter, backflow prevention, etc. On order of $4,500 to $9,000 per customer, depending on size of connection. This cost is multiplied by the number of connections, for customers having multiple meters. This cost will not be quickly recouped by most customers through reduced water bills.
  - Higher risk to City's potable system from many cross-connection opportunities.

Sub-options:

- Require connection immediately upon availability of reclaimed water adjacent to the property
- Require connection on a phased-in basis (e.g. within three years)
- Require connection upon change of ownership

Option 2: Do not require any customers to connect and use reclaimed water. In this case, connection would be entirely at the customer's option.

Pros:

- Creates incentives for use of reclaimed water, rather than implement regulations that require its use.
- Avoids potential problems with customer relations.
- Simple to communicate.

Cons:

- Reduces quantity of reclaimed water used.
- Reduces program visibility, since fewer customers will participate.

Option 3: Require only those customers meeting certain criteria (e.g. based on meter size). Allow other customers to connect, at their option.

Pros:

- Ensures the largest customers with greatest opportunity to use reclaimed water, will participate.
- Reduces potential problems with customer relations city-wide.

Cons:

- Less reclaimed water usage and revenue, compared with Option 1.
- Still creates potential for some problems with customer relations.
- Could be perception of inequity, since some customers must connect, while others are not required to connect.

Based on review of water consumption data by City customers and an analysis of the payback periods for customer-side installation costs, it is suggested that a meter size of 2 inches be used as the threshold for requiring use of reclaimed water. Typically, customers using irrigation water in an amount requiring at least a 4-inch meter will be able to recoup customer-side installation costs associated with connecting to the reclaimed water system within 3 years. Customers using a 2- to 3-inch meter will have a payback period within 9 years.

This approach excludes single-family residences and small businesses using irrigation meters less than 2 inches in size. These customers would require at least 10 years to recoup customer-side installation costs.

If the City provided grant assistance (see discussion under Policy Issue No. 4), these payback periods would be reduced.

Recommendation

Option 3 is recommended. This option is will ensure that the infrastructure built by the will be used, without being overly burdensome on customers that could use only small quantities of reclaimed water.

Policy Issue No. 4:
Should customer or City bear costs on customer's property?

Background

Development of the reclaimed water system will require installation of some equipment on customers' sites. For each point of connection to the reclaimed water distribution system, this will include a meter, a reduced pressure backflow assembly (to protect the customer's backup potable connection from cross-connection contamination), and miscellaneous connection piping and fittings. In addition, some customers may need to modify irrigation systems due to a difference in pressure between the existing potable water supply and the new reclaimed water supply. Use of water for industrial processes may require on-site plant modifications. Use of water for flushing toilets in new commercial construction would require dual plumbing systems in new buildings.

The planning level estimates for customer side installation costs are summarized below, based upon meter size. These estimates include material, labor, sales tax, and contingencies. These costs would be multiplied for customers having more than one meter, or point of connection to the water system (e.g., the Capitol Campus). Costs of modifying irrigation systems and other on-site modifications could be on the order of $1,000 to $20,000 per site, but would likely apply to only a small number of sites.

Meter Size	Customer-Side Installation Cost
¾ to 1½"	$4,500
2 to 3"	$6,000
4" and larger	$9,000

The reclaimed water system does not provide a direct benefit to individual reclaimed water customers. Instead, the benefits are broad public benefits. In addition these costs represent a disincentive for customers to participate in the reclaimed water program. For these reasons it is appropriate to consider investment of City funds to install on-site equipment needed for use of reclaimed water by customers.

Option 1: Customer bears all on-site costs

Pros:

- Consistent with the City's other utility programs, where customer is responsible for facilities on their property or their side of the meter.
- Lower cost to City, reducing amount needed from other utility revenue sources.
- Simple to administer.

Cons:

- Inequitable, in that customers receiving reclaimed water would bear cost disproportionate to benefit received. The public at large receives benefits from reclaimed water program, but would not share in the on-site component of the cost.
- The on-site cost presents a significant disincentive to accept reclaimed water. If use of reclaimed water is not mandated by the City, this disincentive would prevent participation by most potential customers. Even if use is mandated, this factor may reduce compliance and cause complaints from affected property owners.

Option 2: City bears all on-site costs

Pros:

- Improves equity, since all utility customers served by City receive benefit of reclaimed water program, and costs would be spread among City's utility customers.
- Eliminates one disincentive for customer participation.

Cons:

- Raises costs that City must recover from other utility customers.
- More complex to administer. If customer is reimbursed for on-site work, requires site-by-site evaluation of customer costs. If City performs work, requires work on customer's property.
- May create perception that City is subsidizing improvements on behalf of individual customers.

Option 3: City and customer split on-site costs 50/50

Pros:

- Reduced costs to other utility customers, compared with Option 2.
- Promotes concept of partnership between City and reclaimed water customers.

Cons:

- Just as complex to administer as Option 2.
- Still may not be equitable for customers receiving reclaimed water.
- Disincentive to customer participation not eliminated, and may still prevent customers from participating in reclaimed water program.

Option 4: Customer bears on-site costs; City would budget a fixed amount annually, and provide variable grant amounts to customers (based on specific criteria) to partially offset costs

Pros:

- Like Option #1, consistent with the City's other utility programs, where customer is responsible for facilities on their property or their side of the meter.
- Reduced costs to other utility customers, compared with Options 2 and 3.
- Reduces disincentives to customer participation, compared with Option 1 (though not as much as options 2 and 3).
- Promotes concept of partnership between City and reclaimed water customers.
- With fixed grant amounts, less complex to administer than Options 2 and 3. No need to evaluate customer costs site-by-site.

Cons:

- Still may not be equitable for customers receiving reclaimed water.
- Disincentive to customer participation not eliminated, and may still prevent customers from participating in reclaimed water program.

Costs of the grants would be included in the O&M portion of the program budget, and would be generated from the same revenue sources listed under Policy Issue #2.

The grant amount can be pre-defined, but amounts can be graduated to account for larger on-site costs for customers with larger and more complex sites. For example, the fixed grant award could be larger for customers with larger meters or multiple meters; customers who use more reclaimed water, etc.

Recommendation

Option 4 is recommended. This option preserves the basic philosophy that customers are responsible for improvements needed on their properties. The grants will improve equity for those customers and reduce disincentives for customers to participate, while allowing for a relatively simple administrative process. The costs of the grants are relatively modest in the overall framework of reclaimed water infrastructure. For example, if the City were to provide grants covering 25 or 50 percent of the total customer-side installation costs, the amounts of the grants would be as follows:

Meter Size	Grant Amount at 25%	Grant Amount at 50%
¾ to 1½"	$1,125	$2,250
2 to 3"	$1,500	$3,000
4" and larger	$2,250	$4,500

Policy Issue No. 5:
Should developers be required to install reclaimed water mains?

Background

Over time new development and re-development will occur in areas that can be served with reclaimed water. Developers are currently required to install public utilities including water and sewer lines. Requiring installation of reclaimed water lines would be one way of developing the network of distribution lines needed for this system.

Option 1: Require all developers to install reclaimed water lines when property is developed.

Pros:

- Maximizes installation of mains.
- Cost of these mains borne by purchasers of newly-developed properties.

Cons:

- Mains may be installed in areas where service cannot be provided for years or decades
- City would still need to install mains to reach newly developed areas, mostly on outer fringes of UGA.
- Opposition from developers and real-estate community due to costs on top of existing requirements

Sub-option: Establish a cost-sharing program.

Option 2A: Require developers of property only in selected areas to install reclaimed water lines. Areas to be selected based on proximity to City's planned "backbone" system of reclaimed water lines (locations TBD).

Pros:

- Maximizes installation of mains in areas where they are needed.
- Cost of these mains borne by purchasers of newly-developed properties.
- Reduced burden on developers and real-estate community

Cons:

- City would still need to install mains to reach newly developed areas, mostly on outer fringes of UGA.
- Perception of inequity, since some developers must install mains, while others are not required to do so.

- More complex to administer than Option 1.

Sub-option: Establish a cost-sharing program.

Option 2B: Require developers of projects meeting certain criteria to install reclaimed water lines. Criteria to include meter sizes or quantity of water used for non-potable needs, as well as proximity to City's planned "backbone" system of reclaimed water lines (as in Option 2). Also establish a cost-sharing program.

Pros:

- Provides for installation of mains in areas where they are needed and large quantities of water can be used.
- Cost of these mains borne by purchasers of newly-developed properties.
- Reduced burden on developers and real-estate community

Cons:

- City would still need to install mains to reach newly developed areas, mostly on outer fringes of UGA.
- Perception of inequity, since some developers must install mains, while others are not required to do so.
- More complex to administer than Option 1 or 2A.

Option 3: Do not require developers to install reclaimed water lines. Establish a cost-sharing program to encourage installation for development projects defined in Options 2A or 2B.

Pros:

- Limits installation of mains to areas where they are needed.
- Reduces burden on developers and real-estate community.
- No inequity, as no one is required to install lines.

Cons:

- Higher cost to City.
- May be less installation of reclaimed water lines.
- More complicated than Options 1 and 2.

Recommendation

Option 2B is recommended. This option advances the City's goal of installing reclaimed water lines in advance of use, while balancing the burden of cost between new growth and existing customers.

Policy Issue No. 6:
How far in advance should reclaimed water mains be installed, ahead of customer demands in growing areas?

Background

The cost of installing reclaimed water mains (i.e., purple pipe) can be reduced if the lines are installed during the course of other utility or road improvement projects. However, some purple pipe installed in the near term may not be utilized for quite some time. In some cases, there is risk that the installed purple pipe may not be used at all in the future, as the Reclaimed Water Program is subject to change over time (e.g., new potential customers identified, new conveyance routes selected).

Assumptions

- The lifetime of reclaimed water piping is long (50-75 years), and is therefore not a significant factor in this decision.
- Utility and road improvement projects along a given street occur approximately every 10-25 years.
- The Reclaimed Water Program will identify planned "transmission" line routes. The routes will be prioritized (in terms of scheduled implementation), based upon the following factors associated with the planned uses each route will serve:
  - Amount of reclaimed water demand;
  - Distance from reclaimed water source; and,
  - Location relative to other use sites.

Option 1: Install purple pipe as part of other utility or road improvement projects that are to occur along <u>any</u> planned reclaimed water transmission line route, regardless of priority of route. Policy also applies to spurs or side routes.

Pros:

- The maximum amount of anticipated purple pipe is installed in advance of use.
- Cost savings are equal to the avoided costs of stand-alone project pipe installation, such as mobilization, traffic control, and pavement restoration (on the order of 30-50% of total stand-alone pipe installation cost).

Cons:

- In the case of low priority routes whose use is not anticipated for more than approximately 20 years, there is a risk that the installed purple pipe may not be used prior to future road improvement projects. In such cases, any modifications to the purple pipe design (due to changes in customer use or locations) are not able to be taken into account. This may require future retrofit of the installed pipe.

- In some cases, low priority routes may be significantly modified or deleted, rendering the installed purple pipe of no use, unless an alternative use is identified (e.g., as conduit or casing for other utilities).
- Sunk costs include cost of installed purple pipe eventually not used.

Option 2: Install purple pipe as part of other utility or road improvement projects that are to occur along high priority planned reclaimed water transmission line routes. Policy also applies to spurs or side routes of high priority transmission lines.

Pros:

- High degree of certainty that the installed purple pipe will be put to use, prior to future road improvement projects.
- The advance installation program can track changes to the Reclaimed Water Program, as low priority routes are modified or upgraded to high priority over time.
- Minimize or eliminate sunk costs associated with Option 1.

Cons:

- Not as much purple piping is installed in advance as compared to Option 1.
- Higher expense to install pipes later, if done as stand-alone projects.

Recommendation

Option 2 is recommended. This supports the City's goal of reducing program costs by installing in advance only those portions of purple pipe that have high certainty for being used.

Next Steps:

1. Identify high priority reclaimed water transmission lines.
2. Compare transmission lines with planned renewal and replacement projects for transportation and other utilities.
3. Advanced-installation purple pipe projects are identified and planned according to the CIP schedules for transportation and other utilities.

Appendix B
Potential Demand for Reclaimed Water

Table B-1
Downtown Area Reclaimed Water Demands

Potential Customer (irrigation except where noted)	Water Demand: Average Annual (gallons) [1]	Water Demand: Average Day in Maximum Month (gpd) [2]	Water Demand: Maximum Instantaneous (gpm) [3]	Required Pressure (psi) [4]
Phase 1				
Dept. of General Administration				
Irrigation				
Capitol Lake Area				
GA-10: Heritage Park 1 - 635 Water Street SW	2,500,000	47,700	100	60
GA-11: Heritage Park 2 - 330 5th Ave SW	756,000	11,700	24	60
GA-12: Marathon Park - 1120 Deschutes Pkwy [5]	325,600	5,940	13	[5]
Irrigation Area Sub-Total	***3,581,600***	***65,340***	***137***	
Other Areas				
GA-13: Sylvester Park - 600 Block Capitol Way S	337,000	5,400	11	60
Toilet/Urinal Flushing				
GA-14: Heritage Park (near GA-11)	45,600	160	10	40
GA-15: Marathon Park (near GA-12)	45,600	160	10	40
General Administration Sub-Total	***4,009,800***	***71,060***	***168***	
Port of Olympia				
Irrigation				
Marine Drive Area				
PO-1: 540 Marine Dr	1,140,000	19,300	40	60
PO-2: 732 Marine Dr	737,000	13,300	28	60
PO-3: 1120 Marine Dr	1,290,000	25,700	54	60
Irrigation Area Sub-Total	***3,167,000***	***58,300***	***122***	
Toilet/Urinal Flushing				
PO-7: 722 Marine Dr (JKL Restroom)	45,600	160	10	40
PO-8: 1022 Marine Dr (GHI Restroom & Office)	45,600	160	10	40
PO-9: 1122 Marine Dr (North Restroom)	45,600	160	10	40
PO-10: New Marina restroom facility	45,600	160	10	40
Other Uses				
PO-11: Boat Lift/Washing - 700 Marine Dr [7]	12,700	110	10	40
PO-14: Dust control trucks - tenants [9]	630,000	10,500	50	40
Port of Olympia Sub-Total	***3,992,100***	***69,550***	***222***	
City Dept of Parks, Arts, and Recreation				
Irrigation				
Percival Landing Area				
PAR-1: 300 4th Ave	115,000	1,700	4	60
PAR-4: 301 Water St NW	106,000	1,500	3	60
PAR-5: 303 Columbia St NW	590,000	7,900	17	60
PAR-6: 217 Thurston Ave	490,000	6,000	13	60
Irrigation Area Sub-Total	***1,301,000***	***17,100***	***37***	
Toilet/Urinal Flushing				
PAR-7: Near Playground Equipment	45,600	160	10	40
City Sub-Total	***1,346,600***	***17,260***	***47***	
Other Customers (all irrigation)				
OC-2: Transit Center	490,000	7,000	15	60
OC-4: Phoenix Inn	420,000	6,400	13	60
Other Sub-Total	***910,000***	***13,400***	***28***	60
Phase 1 Subtotal	***10,258,500***	***171,270***	***465***	

Table B-1 (cont.)
Downtown Area Reclaimed Water Demands

Potential Customer (irrigation except where noted)	Water Demand: Average Annual (gallons) (1)	Water Demand: Average Day in Maximum Month (gpd) (2)	Water Demand: Maximum Instantaneous (gpm) (3)	Required Pressure (psi) (4)
Phase 2				
Dept. of General Administration				
Capitol Campus - West				
GA-1: 1225 Capitol Way S (Tivoli Fountain)	5,920,000	97,560	203	60
GA-2: 1401 Columbia St SW	2,730,000	46,730	97	60
Irrigation Area Sub-Total	***8,650,000***	***144,290***	***300***	
Capitol Campus - East				
GA-3: 1424 Capitol Way S	495,000	27,490	57	60
GA-4: 106 Maple Park Ave SE (Employment Security Annex)	24,600	163	1	60
GA-5: 302 Maple Park Ave SE	987,000	15,230	32	60
GA-6: 310 Maple Park Ave SE (DOT)	387,000	8,490	18	60
GA-7: 422 Maple Park Ave SE	272,000	5,470	11	60
GA-8: 424 Maple Park Ave SE	844,000	15,000	31	60
GA-9: 1313 Jefferson St SE (NRB)	2,075,000	32,800	69	60
Irrigation Area Sub-Total	***5,084,600***	***104,643***	***219***	
Phase 2 Subtotal	***13,734,600***	***248,933***	***519***	
Phase 3				
East Side sites (E1-E8) (10)	2,912,000	48,000	100	
South Capitol Neighborhood sites (S1-S3) (11)	2,912,000	48,000	100	
Phase 2 Subtotal	***5,824,000***	***96,000***	***200***	
Downtown Total	**29,817,100**	**516,203**	**1,184**	

NOTES:

gpd = gallons per day; gpm = gallons per minute; psi = pounds per square inch

(1) Average yearly water demand.
For irrigation sites, based upon analysis of City billing records for years 1996-2003, except where noted.
For toilet/urinal flushing, based upon 1.6 gallons per flush, and 50 flushes per facility per day (in 5 winter months) and 100 flushes per facility per day (7 summer months).
For other uses, see specific notes as referenced.

(2) Average daily water demand during maximum month (used to determine piping requirements and storage needs, if any).
For all included uses, the maximum consumption occurs in summer (July and August).
For irrigation sites, calculated as total maximum monthly usage divided by 18 irrigation days.
For toilet/urinal flushing, based upon 1.6 gallons per flush, and 100 flushes per facility per day.
For other uses, see specific notes as referenced.

(3) Maximum instantaneous water demand (used to determine pumping and piping requirements).
Totals include only those instantaneous demands that would potentially occur simultaneously, for use in defining peak demand periods.
Therefore, only irrigation demands (which predominantly occur at night, and many of which may occur simultaneously) are included in the instantaneous totals.
Demands that occur during the day are significantly lower, including restroom and "other" uses, and are not included in the instantaneous totals.
For irrigation sites, calculated as average daily usage in maximum month divided by 8 hours of irrigation per day, and 60 minutes per hour.
For toilet/urinal flushing, a minimum instantaneous demand of 10 gpm is assumed.
For other uses, see specific notes as referenced.

(4) Minimum pressure required for facility operation.
For irrigation sites, a minimum pressure of 60 psi is required, based upon discussions with customers.
For toilet/urinal flushing, a minimum pressure of 40 psi is assumed.
For other uses, see specific notes as referenced.

(5) Consistent billing data was not available for Marathon Park. Therefore, water demands were calculated based upon Heritage Park demands.
Marathon Park is approximately one-tenth the size of Heritage Park, so total Heritage Park demands were divided by 10 to arrive at estimated Marathon Park demands.
The irrigation system at Marathon Park was installed to accommodate the low pressures available in the existing purple pipe that extends to the park;
therefore, no additional pressurizing is required.

(6) There are significant concerns regarding water chemistry requirements for use in the steam plant; therefore, potential water demands are not included in this summary at this time.
If water were to be provided to the steam plant, a pressure of approximately 100 psi would be required, according to plant staff.

(7) Average annual demand obtained from City billing records.
Average daily water demand during maximum months is calculated as total maximum monthly usage divided by 20 working days.
A minimum instantaneous flow rate of 10 gpm is assumed.

(8) The Marine Terminal area where the Port practices dust control drains to storm sewers that discharge to Budd Inlet. Therefore, water volume is not shown .
If water were provided for this purpose, a minimum instantaneous flow rate of 50 gpm is assumed.

(9) Average annual demand calculated as 3 months of use at average daily rate calculated below, assuming 20 work days per month.
Average daily water demand during maximum month is calculated as volume of two tenant trucks (3,500 gallons) times three fills per day.
A minimum instantaneous flow rate of 50 gpm is assumed.

(10) Includes City Hall, Yashiro Gardens, St. Michael Church/School, Madison School, Old Madison School, Armory, Bigelow Park, City Maintenance Facility

(11) Includes Capitol Museum, Lincoln School, Stevens Field

Table B-2
West Side Area Reclaimed Water Demands

Potential Customer (irrigation, except where noted)	Reclaimed Water Demand				Basis for Demands [1]
	Average Annual (gallons)	Average Summer Day (gpd)	Average Day in Maximum Month (gpd)	Maximum Instantaneous (gpm) [2]	
Phase 1					
W-3: Capital Medical Center	2,816,322	15,184	52,403	218	Meter data
W-6: Capital Auto Mall	7,226,180	33,734	80,114	334	Meter data
W-7: South Puget Sound Community College	1,170,901	5,914	14,229	59	Meter data
W-8: Yauger Park	219,111	1,146	4,489	19	Meter data
W-10: Capital High School	6,477,608	33,958	135,772	566	Meter data
Phase 1 Area Sub-Total	***17,910,122***	***89,936***	***287,007***	***1,196***	
Phase 2					
W-1: Seven Oars Park	400,000	2,250	10,000	46	Small park - 1/2 of Lions Park
W-2: West Bay Park	400,000	2,250	10,000	46	Small park - 1/2 of Lions Park
W-4: Garfield Elementary	1,038,338	5,463	24,941	104	Meter data
W-5: Woodruff Park	837,422	4,575	21,487	90	Lions Park
W-9: Jefferson Middle School	3,243,238	14,363	63,978	267	Meter data
W-11: Hansen Elementary	2,102,832	11,211	46,638	194	Meter data
W-12: Marshall Middle School	4,120,161	22,209	83,191	347	Meter data
Phase 2 Area Sub-Total	***12,141,991***	***62,321***	***260,235***	***1,094***	
Phase 3					
W-13: Olympia Country Club and Golf Course	4,646,576	24,423	81,490	340	LBA
W-14: Evergreen State College	7,567,032	41,463	248,408	1,035	Meter data
Phase 3 Area Sub-Total	***12,213,608***	***65,886***	***329,898***	***1,375***	
West Side Total	***42,265,721***	***218,143***	***877,140***	***3,665***	

NOTES:
gpd = gallons per day; gpm = gallons per minute
All potential customers represent landscape and turf irrigation, unless otherwise noted.
(1) Estimates of demand are based on analysis of meter records and/or similar sites reviewed in previous efforts (i.e., for the Hawks and Chambers Prairie areas).
(2) Based on 4-hour irrigation period for each site. System-wide instantaneous demand is assumed to be half of the total instantaneous demand for all sites.

Table B-3
Hawks Prairie Area Reclaimed Water Demands

Potential Customer	Reclaimed Water Demand			
	Average Annual (gallons) [1]	Average Summer Day (gpd) [2]	Average Day in Maximum Month (gpd) [3]	Maximum Instantaneous (gpm) [4]
Phase 1				
HP-1: Safeway	976,364	2,677	15,147	63
HP-2: Lowes Home Improvement	1,656,558	8,089	18,550	77
HP-11: Group Health Cooperative	4,010,160	21,853	64,712	270
Phase 1 Area Sub-Total	***6,643,083***	***32,619***	***98,410***	***410***
Phase 2				
HP-3: Martin Way Shari's	352,138	1,787	4,878	20
HP-4: Red Lobster	838,782	4,065	10,834	45
HP-5: Rodda Paint	252,061	1,229	2,899	12
HP-6: Martin Way "Welcome to Olympia" sign	23,006	121	362	2
HP-7: Olympic Apartments[5]	1,214,684	6,364	18,937	79
HP-8: Talisman Apartments	1,100,532	5,707	16,134	67
HP-9: Merrill Gardens	872,966	4,777	18,898	79
HP-10: Garden Courte Apartments	684,071	3,540	9,192	38
HP-12: Saint Peters Hospital	436,358	2,008	10,285	43
HP-13: Sequoia Assisted Living Facility	680,615	3,406	12,318	51
HP-14: Landis Pointe Apartments[5]	1,214,684	6,364	18,937	79
HP-15: Huntington Apartments	2,735,237	14,389	38,145	159
HP-16: 205 Lilly Road Association	87,696	440	3,929	16
Phase 2 Area Sub-Total	***10,492,831***	***54,197***	***165,749***	***691***
Phase 3				
HP-17: Applebees	477,653	2,180	7,327	31
HP-18: Lacey Target	213,429	1,042	2,826	12
HP-19: Home Depot	1,099,485	6,022	18,560	77
HP-20: Bellwether Apartments	1,283,842	6,869	24,835	103
HP-21: Forest Memorial Garden Cemetery[6]	1,404,000	7,714	19,500	81
HP-22: Cambridge Court Apartments[5]	1,214,684	6,364	18,937	79
HP-23: Lions Park	837,422	4,575	21,487	90
HP-24: North Thurston High Schoo[7]	NA	NA	NA	NA
HP-25: Chinook Middle School[7]	NA	NA	NA	NA
HP-26: Future Residential Development - Irrigation (UGA[8]	11,583,000	63,643	190,929	796
Phase 3 Area Sub-Total	***18,113,516***	***98,410***	***304,401***	***1,268***
Hawks Prairie Total	***35,249,430***	***185,226***	***568,559***	***2,369***

NOTES:
gpd = gallons per day; gpm = gallons per minute
All potential customers represent landscape and turf irrigation.

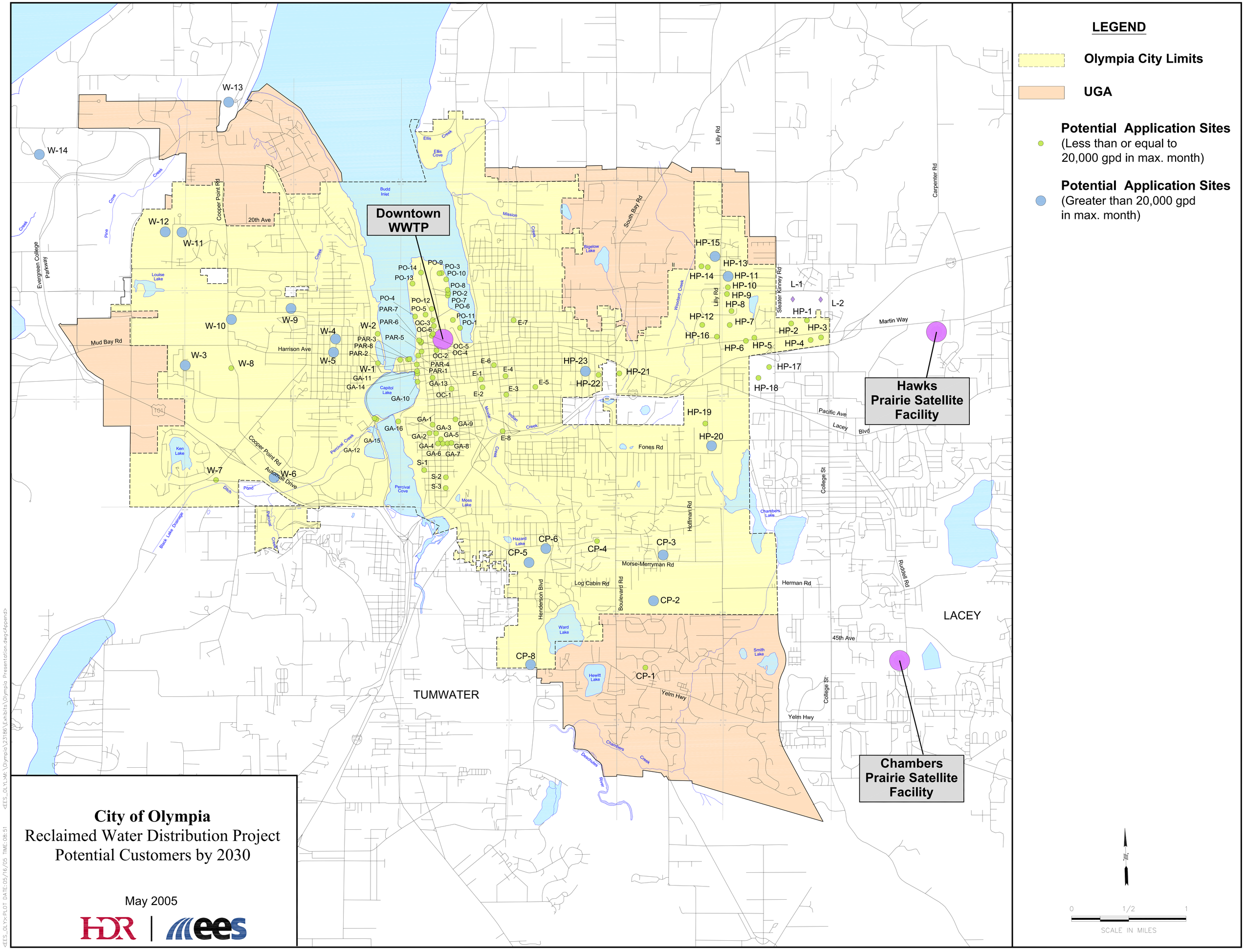
[1] Annual water demand, averaged over 365 days per year. Based on an average annual total from City billing records for 2002-2004, except where noted.
[2] Summer water demand, averaged over 6 months, or 182 days (i.e., April-September). Based on City billing records for 2002-2004, except where noted.
[3] Total maximum bi-monthly usage, divided by 36 days (assuming irrigation during 18 days per month).
[4] Calculated as average daily usage in maximum month divided by 8 hours of irrigation per day, and 60 minutes per hour.
[5] City billing record data could not be easily retrieved. Irrigation demand is based upon an average of other apartment irrigation sites (i.e., sites HP-8, -9, -10, -13, -15).
[6] No separate metered irrigation data available from City records. Assumed Average Day during Maximum Month:Average Summer Day peaking factor of 3.0.
[7] These sites are located in, and are served by, the City of Lacey. Therefore, Lacey would be the provider of reclaimed water. They are listed and mapped due to their proximity to City of Olympia sites in the Hawks Prairie area. However, their demands are not included since they are not Olympia customers.
[8] Based on 1-inch per week irrigation of 16.5 acres for 6 months. Assumed Average Day during Maximum Month:Average Summer Day peaking factor of 3.0.

Table B-4
Chambers Prairie Area Reclaimed Water Demands

Potential Customer (irrigation, except where noted)	Reclaimed Water Demand			
	Average Annual (gallons) [1]	Average Summer Day (gpd) [2]	Average Day in Maximum Month (gpd) [3]	Maximum Instantaneous (gpm) [4]
Phase 1				
CP-1: Centennial Elementary	749,995	4,033	12,079	50
CP-2: LBA Park	4,646,576	24,423	81,490	340
CP-3: McKenny Elementary	1,768,895	9,559	32,794	137
CP-4: Washington Middle School	299,726	1,585	5,629	23
CP-6: Pioneer Elementary [5]	1,259,445	6,796	22,437	93
Phase 1 Area Sub-Total	***8,724,637***	***46,396***	***154,429***	***643***
Phase 2				
CP-5: Olympia High School	4,429,756	22,103	80,140	334
CP-7: New City Parks (at present Spooner Berry Farm) [7]	14,040,000	77,143	231,429	964
Phase 2 Area Sub-Total	***18,469,756***	***99,246***	***311,568***	***1,298***
Phase 3				
CP-8: Briggs YMCA	975,766	5,110	15,874	66
CP-9: Future Residential Development - Irrigation (UGA) [8]	22,113,000	121,500	364,500	1,519
CP-10: Future Residential Development - Toilet Flushing (UGA) (9)	3,912,800	10,720	10,720	214
Phase 3 Area Sub-Total	***27,001,566***	***137,330***	***391,094***	***1,799***
Chambers Prairie Total	***54,195,959***	***282,972***	***857,091***	***3,741***

NOTES:
gpd = gallons per day; gpm = gallons per minute
All potential customers represent landscape and turf irrigation.

(1) Annual water demand, averaged over 365 days per year. Based on an average annual total from City billing records for 2002-2004, except where noted.
(2) Summer water demand, averaged over 6 months, or 182 days (i.e., April-September). Based on City billing records for 2002-2004, except where noted.
(3) Total maximum bi-monthly usage, divided by 36 days (assuming irrigation during 18 days per month).
(4) Calculated as average daily usage in maximum month divided by 8 hours of irrigation per day, and 60 minutes per hour.
(5) City billing record data could not be easily retrieved. Irrigation demand is based upon an average of other elementary school sites (i.e., sites CP-1, -3).
(6) Based on 1-inch per week irrigation of 20 acres (lawn irrigation) for 6 months. Assumed Average Day during Maximum Month:Average Summer Day peaking factor of 3.0.
(7) Based on 1-inch per week irrigation of 20 acres (approximate new park areas) for 6 months. Assumed Average Day during Maximum Month:Average Summer Day peaking factor of 3.0.
(8) Based on 1-inch per week irrigation of 31.5 acres for 6 months.
(9) Based on toilet flushing in new multi-family residential development. Assumptions include:
67 acres of new multi-family residential development, at 10 units per acre (based on zoning of 7-13 units per acre)
2 people per unit
5 toilet flushes per day
1.6 gallons per flush
times (i.e., at night), and therefore does not contribute to system-wide peaking.



City of Olympia
Reclaimed Water Distribution Project
Potential Customers by 2030

May 2005

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Appendix C
Planning Level Cost Estimates

Table C-1
Downtown System Cost Estimate

Item No.	Item Description	Quantity	Units		Unit Price		Cost
	Phase 1 - Service to Downtown Area and Port						
Capital Costs							
Downtown Area Base System							
1	Mobilization at 10% of construction cost	1	LS	$	24,000	$	24,000
2	2" Purple Pipe in ROW	1,200	LF	$	50	$	60,000
3	4" Purple Pipe in ROW	1,000	LF	$	65	$	65,000
4	6" Purple Pipe in ROW	300	LF	$	85	$	26,000
5	Individual Service Meter	7	EA	$	3,000	$	21,000
6	Backflow Prevention Assembly	11	EA	$	3,000	$	33,000
7	Existing Irrigation System Retrofit	1	LS	$	35,000	$	35,000
					Subtotal (A):	$	264,000
					Construction Contingency at 25% of (A):	$	66,000
					Subtotal (B) = Subtotal (A) + Contingency:	$	330,000
					Sales Tax at 8.8% of (B):	$	29,000
					Subtotal (C) = Subtotal (B) + Sales Tax:	$	359,000
					Design Engineering at 10% of (C):	$	36,000
					Construction Engineering at 10% of (C):	$	36,000
					City Administration at 10% of (C):	$	36,000
					Legal/Permitting at 10% of (C):	$	36,000
					Surveying/Geotechnical at 10% of (C):	$	36,000
					Chlorine Analyzer Station (3):	$	15,720
					TOTAL = Subtotal (C) + Above Items:	**$**	**555,000**
Port of Olympia Area							
	(Note: Minimal piping needed, as Port has installed transmission piping.)						
1	Mobilization at 10% of construction cost	1	LS	$	11,000	$	11,000
2	2" Purple Pipe out of ROW	400	LF	$	25	$	10,000
3	4" Purple Pipe out of ROW	700	LF	$	40	$	28,000
4	Individual Service Meter	1	EA	$	5,000	$	5,000
5	Backflow Prevention Assembly	9	EA	$	3,000	$	27,000
6	Existing Irrigation System Retrofit	1	LS	$	35,000	$	35,000
					Subtotal (A):	$	116,000
					Construction Contingency at 25% of (A):	$	29,000
					Subtotal (B) = Subtotal (A) + Contingency:	$	145,000
					Sales Tax at 8.8% of (B):	$	13,000
					Subtotal (C) = Subtotal (B) + Sales Tax:	$	158,000
					Design Engineering at 10% of (C):	$	16,000
					Construction Engineering at 10% of (C):	$	16,000
					City Administration at 10% of (C):	$	16,000
					Legal/Permitting at 10% of (C):	$	16,000
					Surveying/Geotechnical at 10% of (C):	$	16,000
					Chlorine Analyzer Station (3):	$	15,720
					TOTAL = Subtotal (C) + Above Items:	**$**	**253,000**
					TOTAL CAPITAL COST = Downtown Area + Port:	**$**	**808,000**
Annual Operations and Maintenance Costs							
1	Maintenance of Distribution System	80	Labor Hrs	$	100	$	8,000
2	Chlorine Residual Testing	100	Labor Hrs	$	60	$	6,000
3	Safety Training and Equipment	1	LS	$	500	$	500
					Total:	**$**	**14,500**

Table C-1 (cont.)
Downtown System Cost Estimate

Item No.	Item Description	Quantity	Units		Unit Price		Cost
	Phase 2 - Service to General Administration (Capitol Campus), with Oversizing to Accommodate Phase 3						
Capital Costs							
1	Mobilization at 10% of construction cost	1	LS	$	120,000	$	120,000
2	4" Purple Pipe out of ROW	2,700	LF	$	40	$	108,000
3	6" Purple Pipe in ROW	700	LF	$	85	$	60,000
4	8" Purple Pipe in ROW	1,900	LF	$	105	$	200,000
5	Pump Station - 519 gpm, 240 ft of head	1	EA	$	350,000	$	350,000
6	200,000 Gallon Storage Tank [(2)]	1	EA	$	325,000	$	325,000
7	Rechlorination Facility	1	LS	$	75,000	$	75,000
8	Individual Service Meter	1	EA	$	5,000	$	5,000
9	Backflow Prevention Assembly	9	EA	$	3,000	$	27,000
10	Existing Irrigation System Retrofit	1	LS	$	50,000	$	50,000
					Subtotal (A):	$	1,320,000
					Construction Contingency at 25% of (A):	$	330,000
					Subtotal (B) = Subtotal (A) + Contingency:	$	1,650,000
					Sales Tax at 8.8% of (B):	$	145,000
					Subtotal (C) = Subtotal (B) + Sales Tax:	$	1,795,000
					Design Engineering at 10% of (C):	$	180,000
					Construction Engineering at 10% of (C):	$	180,000
					City Administration at 10% of (C):	$	180,000
					Legal/Permitting at 10% of (C):	$	180,000
					Surveying/Geotechnical at 10% of (C):	$	180,000
					Chlorine Analyzer Station [(3):]	$	15,720
					Oversizing of Select Components to Accommodate Phase 3 Demands [(4)]:	$	600,000
					TOTAL = Subtotal (C) + Above Items:	**$**	**3,311,000**
Annual Operations and Maintenance Costs							
1	Maintenance of Distribution System	80	Labor Hrs	$	100	$	8,000
2	Chlorine Residual Testing	60	Labor Hrs	$	60	$	4,000
3	Maintenance of Pump Station	100	Labor Hrs	$	100	$	10,000
4	Electrical Cost of Pump Station	15,034	kW-hr	$	0.10	$	1,500
5	Maintenance of Reservoir and Rechlorination Facility	40	Labor Hrs	$	100	$	4,000
6	Chlorine	1	LS	$	500	$	500
7	Safety Training and Equipment	1	LS	$	500	$	500
					Total:	**$**	**28,500**
	Phase 3 - Extension to Serve East and South Sites						
Capital Costs							
1	Mobilization at 10% of construction cost	1	LS	$	113,000	$	113,000
2	6" Reclaimed Watermain in ROW	1,875	LF	$	85	$	159,000
3	6" Reclaimed Watermain in ROW - Advanced Install	5,625	LF	$	60	$	335,000
4	8" Reclaimed Watermain in ROW	1,875	LF	$	105	$	197,000
5	8" Reclaimed Watermain in ROW - Advanced Install	5,625	LF	$	74	$	413,000
6	Individual Service Meter	8	EA	$	1,500	$	12,000
7	Backflow Prevention Assembly	8	EA	$	1,500	$	12,000
8	Chlorine Analyzer Station	2	EA	$	15,720	$	31,000
					Subtotal (A):	$	1,272,000
					Construction Contingency at 25% of (A):	$	318,000
					Subtotal (B) = Subtotal (A) + Contingency:	$	1,590,000
					Sales Tax at 8.8% of (B):	$	140,000
					Subtotal (C) = Subtotal (B) + Sales Tax:	$	1,730,000
					Indirects at 50% of (C):	$	865,000
					TOTAL = Subtotal (C) + Above Items:	**$**	**2,595,000**
Annual Operations and Maintenance Costs							
1	Maintenance of Distribution System	80	Labor Hrs	$	100	$	8,000
2	Chlorine Residual Testing	100	Labor Hrs	$	60	$	6,000
3	Safety Training and Equipment	1	LS	$	500	$	500
					Total:	**$**	**14,500**

Notes: All costs in 2004 Dollars

LS=Lump Sum LF=Lineal Feet EA=Each

(1) Capital Costs do not include estimates of land acquisition costs.

(2) Reservoir costs reflect construction of a partial-buried or fully-buried storage reservoir.

(3) Cost provided by City staff

(4) Includes oversizing of pump station, reservoir, and 1,000 feet of piping in the Capitol Campus system.

Table C-2
West Side Sites Distribution System Cost Estimate

Item No	Item Description	Quantity	Units		Unit Price		Cost
	Phase 1 - Percival Creek Pump Station and Service to SPSCC, Yauger Park, and Capital HS						
Capital Costs							
1	Mobilization at 10% of construction cost	1	LS	$	179,000	$	179,000
2	Land Acquisition - Pump Station	0.25	ACRE	$	125,000	$	31,000
3	8" Reclaimed Watermain in ROW	1,250	LF	$	105	$	131,000
4	8" Reclaimed Watermain in ROW - Advanced Install	3,750	LF	$	74	$	276,000
5	12" Reclaimed Watermain in ROW	2,500	LF	$	115	$	288,000
6	12" Reclaimed Watermain in ROW - Advanced Install	7,500	LF	$	81	$	604,000
7	Individual Service Meter - Commercial	4	EA	$	1,500	$	6,000
8	Backflow Prevention Assembly	4	EA	$	1,500	$	6,000
9	Pump Station (957 gpm, 250 ft of head)	90	HP	$	5,000	$	450,000
10	Chlorine Analyzer Station	1	EA	$	15,720	$	16,000
					Subtotal (A):	$	1,987,000
					Construction Contingency at 25% of (A):	$	497,000
					Subtotal (B) = Subtotal (A) + Contingency:	$	2,484,000
					Sales Tax at 8.8% of (B):	$	219,000
					Subtotal (C) = Subtotal (B) + Sales Tax:	$	2,703,000
					Indirects at 50% of (C):	$	1,352,000
					TOTAL = Subtotal (C) + Above Items:	**$**	**4,055,000**
Annual Operations and Maintenance Costs							
1	Maintenance of Distribution System	120	Labor Hrs	$	100	$	12,000
2	Chlorine Residual Testing	100	Labor Hrs	$	60	$	6,000
3	Maintenance of Pump Station	100	Labor Hrs	$	100	$	10,000
4	Electrical Cost of Pump Station	58,320	kW-hr	$	0.10	$	5,800
5	Safety Training and Equipment	1	LS	$	500	$	500
					Total:	**$**	**34,300**
	Phase 2 - Storage and Service to Remaining Sites within City Limits						
Capital Costs							
1	Mobilization at 10% of construction cost	1	LS	$	193,000	$	193,000
2	Land Acquisition - Reservoir	0.50	ACRE	$	125,000	$	63,000
3	Storage Reservoir (1)	210,000	Gal	$	1.75	$	368,000
4	Rechlorination Facility	1	LS	$	75,000	$	75,000
5	8" Reclaimed Watermain in ROW	2,375	LF	$	105	$	249,000
6	8" Reclaimed Watermain in ROW - Advanced Install	7,125	LF	$	74	$	524,000
7	6" Reclaimed Watermain in ROW	2,375	LF	$	85	$	202,000
8	6" Reclaimed Watermain in ROW - Advanced Install	7,125	LF	$	60	$	424,000
9	Individual Service Meter - Commercial	7	EA	$	1,500	$	11,000
10	Backflow Prevention Assembly	7	EA	$	1,500	$	11,000
11	Chlorine Analyzer Station	2	EA	$	15,720	$	31,000
					Subtotal (A):	$	2,151,000
					Construction Contingency at 25% of (A):	$	538,000
					Subtotal (B) = Subtotal (A) + Contingency:	$	2,689,000
					Sales Tax at 8.8% of (B):	$	237,000
					Subtotal (C) = Subtotal (B) + Sales Tax:	$	2,926,000
					Indirects at 50% of (C):	$	1,463,000
					TOTAL = Subtotal (C) + Above Items:	**$**	**4,389,000**

Table C-2 (cont.)
West Side Sites Distribution System Cost Estimate

Item No	Item Description	Quantity	Units		Unit Price		Cost
	Phase 2 - Storage and Service to Remaining Sites within City Limits						
Annual Operations and Maintenance Costs							
1	Maintenance of Distribution System	120	Labor Hrs	$	100	$	12,000
2	Chlorine Residual Testing	60	Labor Hrs	$	60	$	4,000
3	Maintenance of Reservoir and Rechlorination Facility	40	Labor Hrs	$	100	$	4,000
4	Chlorine	1	LS	$	600	$	600
5	Safety Training and Equipment	1	LS	$	500	$	500
					Total:	**$**	**21,100**
	Phase 3 - Service Extended Outside UGA to Evergreen and Olympia Country Club/Golf Course						
Capital Costs							
1	Mobilization at 10% of construction cost	1	LS	$	137,000	$	137,000
2	12" Reclaimed Watermain in ROW	3,500	LF	$	115	$	403,000
3	12" Reclaimed Watermain in ROW - Advanced Install	10,500	LF	$	81	$	845,000
4	Individual Service Meter - Commercial	2	EA	$	1,500	$	3,000
5	Backflow Prevention Assembly	2	EA	$	1,500	$	3,000
6	Pump Station Upgrade (337 gpm, 100 ft of head)	15	HP	$	8,000	$	120,000
7	Chlorine Analyzer Station	1	EA	$	15,720	$	16,000
					Subtotal (A):	$	1,527,000
					Construction Contingency at 25% of (A):	$	382,000
					Subtotal (B) = Subtotal (A) + Contingency:	$	1,909,000
					Sales Tax at 8.8% of (B):	$	168,000
					Subtotal (C) = Subtotal (B) + Sales Tax:	$	2,077,000
					Indirects at 50% of (C):	$	1,039,000
					TOTAL = Subtotal (C) + Above Items:	**$**	**3,116,000**
Annual Operations and Maintenance Costs							
1	Maintenance of Distribution System	120	Labor Hrs	$	100	$	12,000
2	Chlorine Residual Testing	100	Labor Hrs	$	60	$	6,000
3	Electrical Cost of Pump Station	9,720	kW-hr	$	0.10	$	1,000
4	Safety Training and Equipment	1	LS	$	500	$	500
					Total:	**$**	**19,500**

Note: All costs in 2004 Dollars

LS=Lump Sum LF=Lineal Feet EA=Each

(1) Reservoir costs reflect construction of a ground-level storage tank.

Table C-3
Hawks Prairie Distribution System Cost Estimate

Item No	Item Description	Quantity	Units		Unit Price		Cost
	Phase 1						
Capital Costs							
1	Mobilization at 10% of construction cost	1	LS	$	115,000	$	115,000
2	Land Acquisition - Pump Station	0.25	ACRE	$	125,000	$	31,000
3	4" Reclaimed Watermain in ROW	670	LF	$	65	$	44,000
4	6" Reclaimed Watermain in ROW	1,730	LF	$	85	$	147,000
5	12" Reclaimed Watermain in ROW	5,200	LF	$	115	$	598,000
6	Individual Service Meter	16	EA	$	1,500	$	24,000
7	Backflow Prevention Assembly	16	EA	$	1,500	$	24,000
8	Pump Station (550 gpm, 180 ft of head)	35	HP	$	8,000	$	280,000
9	Chlorine Analyzer Station	2	EA	$	15,720	$	31,000
					Subtotal (A):	$	1,294,000
					Construction Contingency at 25% of (A):	$	324,000
					Subtotal (B) = Subtotal (A) + Contingency:	$	1,618,000
					Sales Tax at 8.8% of (B):	$	142,000
					Subtotal (C) = Subtotal (B) + Sales Tax:	$	1,760,000
					Indirects at 50% of (C):	$	880,000
					TOTAL = Subtotal (C) + Above Items:	**$**	**2,640,000**
Annual Operations and Maintenance Costs							
1	Maintenance of Distribution System	80	Labor Hrs	$	100	$	8,000
2	Chlorine Residual Testing	100	Labor Hrs	$	60	$	6,000
3	Maintenance of Pump Station	100	Labor Hrs	$	100	$	10,000
4	Electrical Cost of Pump Station	22,680	kW-hr	$	0.10	$	2,300
5	Safety Training and Equipment	1	LS	$	500	$	500
					Total:	**$**	**26,800**
	Phase 2						
Capital Costs							
1	Mobilization at 10% of construction cost	1	LS	$	47,000	$	47,000
2	Land Acquisition - Reservoir	0.50	ACRE	$	125,000	$	63,000
3	Storage Reservoir (1)	190,000	Gal	$	1.75	$	333,000
4	Rechlorination Facility	1	LS	$	75,000	$	75,000
					Subtotal (A):	$	518,000
					Construction Contingency at 25% of (A):	$	130,000
					Subtotal (B) = Subtotal (A) + Contingency:	$	648,000
					Sales Tax at 8.8% of (B):	$	57,000
					Subtotal (C) = Subtotal (B) + Sales Tax:	$	705,000
					Indirects at 50% of (C):	$	353,000
					TOTAL = Subtotal (C) + Above Items:	**$**	**1,058,000**
Annual Operations and Maintenance Costs							
1	Maintenance of Reservoir and Rechlorination Facility	40	Labor Hrs	$	100	$	4,000
2	Chlorine	1	LS	$	600	$	600
3	Safety Training and Equipment	1	LS	$	500	$	500
					Total:	**$**	**5,100**

Table C-3 (cont.)
Hawks Prairie Distribution System Cost Estimate

Item No	Item Description	Quantity	Units		Unit Price		Cost
		Phase 3					
Capital Costs							
1	Mobilization at 10% of construction cost	1	LS	$	305,000	$	305,000
2	4" Reclaimed Watermain in ROW	1,388	LF	$	65	$	90,000
3	4" Reclaimed Watermain in ROW - Advanced Install	4,162	LF	$	46	$	189,000
4	6" Reclaimed Watermain in ROW	2,300	LF	$	85	$	196,000
5	6" Reclaimed Watermain in ROW - Advanced Install	6,900	LF	$	60	$	411,000
6	8" Reclaimed Watermain in ROW	1,125	LF	$	105	$	118,000
7	8" Reclaimed Watermain in ROW - Advanced Install	3,375	LF	$	74	$	248,000
8	Individual Service Meter - Residential	650	EA	$	750	$	488,000
9	Individual Service Meter - Commercial	7	EA	$	1,500	$	11,000
10	Backflow Prevention Assembly	657	EA	$	1,500	$	986,000
11	Pump Station Upgrade (634 gpm, 180 ft of head)	35	HP	$	8,000	$	280,000
12	Chlorine Analyzer Station	2	EA	$	15,720	$	31,000
					Subtotal (A):	$	3,353,000
					Construction Contingency at 25% of (A):	$	838,000
					Subtotal (B) = Subtotal (A) + Contingency:	$	4,191,000
					Sales Tax at 8.8% of (B):	$	369,000
					Subtotal (C) = Subtotal (B) + Sales Tax:	$	4,560,000
					Indirects at 50% of (C):	$	2,280,000
					TOTAL = Subtotal (C) + Above Items:	**$**	**6,840,000**
Annual Operations and Maintenance Costs							
1	Maintenance of Distribution System	120	Labor Hrs	$	100	$	12,000
2	Chlorine Residual Testing	100	Labor Hrs	$	60	$	6,000
3	Electrical Cost of Pump Station	22,680	kW-hr	$	0.10	$	2,300
4	Safety Training and Equipment	1	LS	$	500	$	500
					Total:	**$**	**20,800**

Note: All costs in 2004 Dollars

LS=Lump Sum LF=Lineal Feet EA=Each

(1) Reservoir costs reflect construction of a ground-level storage tank.

Table C-4
Chambers Prairie Distribution System Cost Estimate

Item No.	Item Description	Quantity	Units	Unit Price	Cost
	Phase 1				
Capital Costs					
1	Mobilization at 10% of construction cost	1	LS	$ 156,000	$ 156,000
2	Land Acquisition - Pump Station	0.25	ACRE	$ 125,000	$ 31,000
3	4" Reclaimed Watermain out of ROW	1,070	LF	$ 40	$ 43,000
4	4" Reclaimed Watermain in ROW	300	LF	$ 65	$ 20,000
5	4" Reclaimed Watermain in ROW - Advanced Install	900	LF	$ 46	$ 41,000
6	6" Reclaimed Watermain in ROW	1,465	LF	$ 85	$ 125,000
7	6" Reclaimed Watermain in ROW - Advanced Install	4,395	LF	$ 60	$ 262,000
8	12" Reclaimed Watermain in ROW	800	LF	$ 115	$ 92,000
9	12" Reclaimed Watermain in ROW - Advanced Install	2,400	LF	$ 81	$ 193,000
10	16" Reclaimed Watermain in ROW	800	LF	$ 135	$ 108,000
11	16" Reclaimed Watermain in ROW - Advanced Install	2,400	LF	$ 95	$ 227,000
12	Individual Service Meter - Commercial	7	EA	$ 1,500	$ 11,000
13	Backflow Prevention Assembly	7	EA	$ 1,500	$ 11,000
14	Pump Station (971 gpm, 220 ft of head)	80	HP	$ 5,000	$ 400,000
15	Chlorine Analyzer Station	1	EA	$ 15,720	$ 16,000
				Subtotal (A):	$ 1,736,000
				Construction Contingency at 25% of (A):	$ 434,000
				Subtotal (B) = Subtotal (A) + Contingency:	$ 2,170,000
				Sales Tax at 8.8% of (B):	$ 191,000
				Subtotal (C) = Subtotal (B) + Sales Tax:	$ 2,361,000
				Indirects at 50% of (C):	$ 1,181,000
				TOTAL = Subtotal (C) + Above Items:	**$ 3,542,000**
Annual Operations and Maintenance Costs					
1	Maintenance of Distribution System	120	Labor Hrs	$ 100	$ 12,000
2	Chlorine Residual Testing	100	Labor Hrs	$ 60	$ 6,000
3	Maintenance of Pump Station	100	Labor Hrs	$ 100	$ 10,000
4	Electrical Cost of Pump Station	51,840	kW-hr	$ 0.10	$ 5,200
5	Safety Training and Equipment	1	LS	$ 500	$ 500
				Total:	**$ 33,700**
	Phase 2				
Capital Costs					
1	Mobilization at 10% of construction cost	1	LS	$ 68,000	$ 68,000
2	Land Acquisition - Reservoir	0.50	ACRE	$ 125,000	$ 63,000
3	Storage Reservoir (1)	310,000	Gal	$ 1.75	$ 543,000
4	Rechlorination Facility	1	LS	$ 75,000	$ 75,000
				Subtotal (A):	$ 749,000
				Construction Contingency at 25% of (A):	$ 187,000
				Subtotal (B) = Subtotal (A) + Contingency:	$ 936,000
				Sales Tax at 8.8% of (B):	$ 82,000
				Subtotal (C) = Subtotal (B) + Sales Tax:	$ 1,018,000
				Indirects at 50% of (C):	$ 509,000
				TOTAL = Subtotal (C) + Above Items:	**$ 1,527,000**

Table C-4 (cont.)
Chambers Prairie Distribution System Cost Estimate

Item No.	Item Description	Quantity	Units		Unit Price		Cost
	Phase 2						
Annual Operations and Maintenance Costs							
1	Maintenance of Reservoir and Rechlorination Facility	40	Labor Hrs	$	100	$	4,000
2	Chlorine	1	LS	$	900	$	900
3	Safety Training and Equipment	1	LS	$	500	$	500
					Total:	**$**	**5,400**
	Phase 3						
Capital Costs							
1	Mobilization at 10% of construction cost	1	LS	$	270,000	$	270,000
2	8" Reclaimed Watermain in ROW	500	LF	$	105	$	53,000
3	8" Reclaimed Watermain in ROW - Advanced Install	1,500	LF	$	74	$	111,000
4	Individual Service Meter - Commercial	1	EA	$	1,500	$	2,000
5	Individual Service Meter - Residential	1,000	EA	$	750	$	750,000
6	Backflow Prevention Assembly	1,001	EA	$	1,500	$	1,502,000
7	Pump Station Upgrade (900 gpm, 100 ft of head)	35	HP	$	8,000	$	280,000
8	Chlorine Analyzer Station	2	EA	$	15,720	$	31,000
					Subtotal (A):	$	2,999,000
					Construction Contingency at 25% of (A):	$	750,000
					Subtotal (B) = Subtotal (A) + Contingency:	$	3,749,000
					Sales Tax at 8.8% of (B):	$	330,000
					Subtotal (C) = Subtotal (B) + Sales Tax:	$	4,079,000
					Indirects at 50% of (C):	$	2,040,000
					TOTAL = Subtotal (C) + Above Items:	**$**	**6,119,000**
Annual Operations and Maintenance Costs							
1	Maintenance of Distribution System	120	Labor Hrs	$	100	$	12,000
2	Chlorine Residual Testing	100	Labor Hrs	$	60	$	6,000
3	Electrical Cost of Pump Station	22,680	kW-hr	$	0.10	$	2,300
4	Safety Training and Equipment	1	LS	$	500	$	500
					Total:	**$**	**20,800**

Note: All costs in 2004 Dollars

LS=Lump Sum LF=Lineal Feet EA=Each

(1) Reservoir costs reflect construction of a ground-level storage tank.

Appendix D
Financing Approach

Appendix D
City of Olympia
Reclaimed Water Utility Fund
Development of Revenue Requirements
Total System

Escalation O&M	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Escalation Capital	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Growth Rate	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Low Interest Loan												
Term	20	20	20	20	20	20	20	20	20	20	20	20
Rate	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Revenue Bond												
Term	20	20	20	20	20	20	20	20	20	20	20	20
Rate	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Operating and Maintenance Expenses												
Operations												
Downtown Phase I	$0	14,500	14,935	15,383	15,845	16,320	16,809	17,314	17,833	18,368	18,919	19,487
Downtown Phase II	0	0	0	0	31,143	32,077	33,040	34,031	35,052	36,103	37,186	38,302
Downtown Phase III	0	0	0	0	0	0	0	17,314	17,833	18,368	18,919	19,487
Hawks Prairie Phase I	0	0	27,604	28,432	29,285	30,164	31,069	32,001	32,961	33,949	34,968	36,017
Hawks Prairie Phase II	0	0	0	0	0	5,740	5,912	6,090	6,272	6,460	6,654	6,854
Hawks Prairie Phase III	0	0	0	0	0	0	0	0	0	0	0	0
Chambers Prairie Phase I	0	0	0	0	0	0	0	0	0	0	0	0
Chambers Prairie Phase II	0	0	0	0	0	0	0	0	0	0	0	0
Chambers Prairie Phase III	0	0	0	0	0	0	0	0	0	0	0	0
West Phase I	0	0	0	0	37,481	38,605	39,764	40,957	42,185	43,451	44,754	46,097
West Phase II	0	0	0	0	0	0	0	0	0	0	0	28,357
West Phase III	0	0	0	0	0	0	0	0	0	0	0	0
Total Operations	$0	$14,500	$42,539	$43,815	$113,754	$122,906	$126,593	$147,705	$152,136	$156,700	$161,401	$194,601
Taxes/Transfers												
Utility Tax	$0	$1,015	$2,978	$3,067	$7,963	$8,603	$8,862	$10,339	$10,650	$10,969	$11,298	$13,622
TOTAL O&M PLUS TAXES	$0	$15,515	$45,517	$46,882	$121,716	$131,510	$135,455	$158,045	$162,786	$167,670	$172,700	$208,223
		$1.13										
Debt Service												
Low Interest Loans	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Revenue Bond	0	0	109,033	144,256	446,133	498,042	498,042	633,116	633,116	633,116	633,116	885,971
	$0	$0	$109,033	$144,256	$446,133	$498,042	$498,042	$633,116	$633,116	$633,116	$633,116	$885,971
TOTAL O&M PLUS DEBT SERVICE	$0	$15,515	$154,550	$191,138	$567,850	$629,552	$633,497	$791,161	$795,902	$800,785	$805,816	$1,094,193
		$1.13										
Capital Projects												
Downtown Phase I	$0	$0	$0	$808,000	$0	$0	$0	$0	$0	$0	$0	$0
Downtown Phase II	0	0	$0	$0	$3,618,019	$0	0	0	0	0	0	0
Downtown Phase III	0	0	0	0	0	0	0	3,098,566	0	0	0	0
Hawks Prairie Phase I	0	0	$2,719,200	0	0	0	0	0	0	0	0	0
Hawks Prairie Phase II	0	0	0	0	0	1,190,788	0	0	0	0	0	0
Hawks Prairie Phase III	0	0	0	0	0	0	0	0	0	0	0	0
Chambers Prairie Phase I	0	0	0	0	0	0	0	0	0	0	0	0
Chambers Prairie Phase II	0	0	0	0	0	0	0	0	0	0	0	0
Chambers Prairie Phase III	0	0	0	0	0	0	0	0	0	0	0	0
West Phase I	0	0	0	0	4,431,008	0	0	0	0	0	0	0
West Phase II	0	0	0	0	0	0	0	0	0	0	0	5,898,449
West Phase III	0	0	0	0	0	0	0	0	0	0	0	0
Total Capital Projects	$0	$0	$2,719,200	$808,000	$8,049,027	$1,190,788	$0	$3,098,566	$0	$0	$0	$5,898,449
Less: Funding Sources												
Capital Contributions	$0	$0	$109,000	$0	$562,000	$0	$0	$0	$0	$0	$0	$49,000
General Facility Charges	0	0	1,359,600	404,000	4,024,514	595,394	0	1,549,283	0	0	0	2,949,225
Grant	0	0	0	0	0	0	0	0	0	0	0	0
Transfer from Water/Sewer Utility	0	0	0	0	0	0	0	0	0	0	0	0
Low Interest Loan	0	0	0	0	0	0	0	0	0	0	0	0
Revenue Bond	0	0	1,250,600	404,000	3,462,514	595,394	0	1,549,283	0	0	0	2,900,225
Total Funding Sources	$0	$0	$2,719,200	$808,000	$8,049,027	$1,190,788	$0	$3,098,566	$0	$0	$0	$5,898,449
Net Capital Project Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Revenue Requirement (RR)	$0	$15,515	$154,550	$191,138	$567,850	$629,552	$633,497	$791,161	$795,902	$800,785	$805,816	$1,094,193
Total O&M plus Taxes - CCF	$0.00	$1.13	$2.01	$2.07	$2.97	$2.39	$2.46	$1.96	$2.02	$2.08	$2.14	$2.33
Total Debt Service	$0.00	$0.00	$4.83	$6.38	$10.89	$9.06	$9.06	$7.85	$7.85	$7.85	$7.85	$9.89
Total Capital	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Unit Costs CCF	$0.00	$1.13	$6.84	$8.46	$13.86	$11.45	$11.52	$9.81	$9.87	$9.93	$10.00	$12.22
$2.39 Less: Reclaimed Revenue @ 70% Irrigation Rate	$0	$22,944	$37,803	$37,803	$68,522	$91,990	$91,990	$134,873	$134,873	$134,873	$134,873	$149,803
70% Additional Funding Required	$0	($7,429)	$116,747	$153,335	$499,328	$537,562	$541,507	$656,288	$661,029	$665,913	$670,943	$944,390