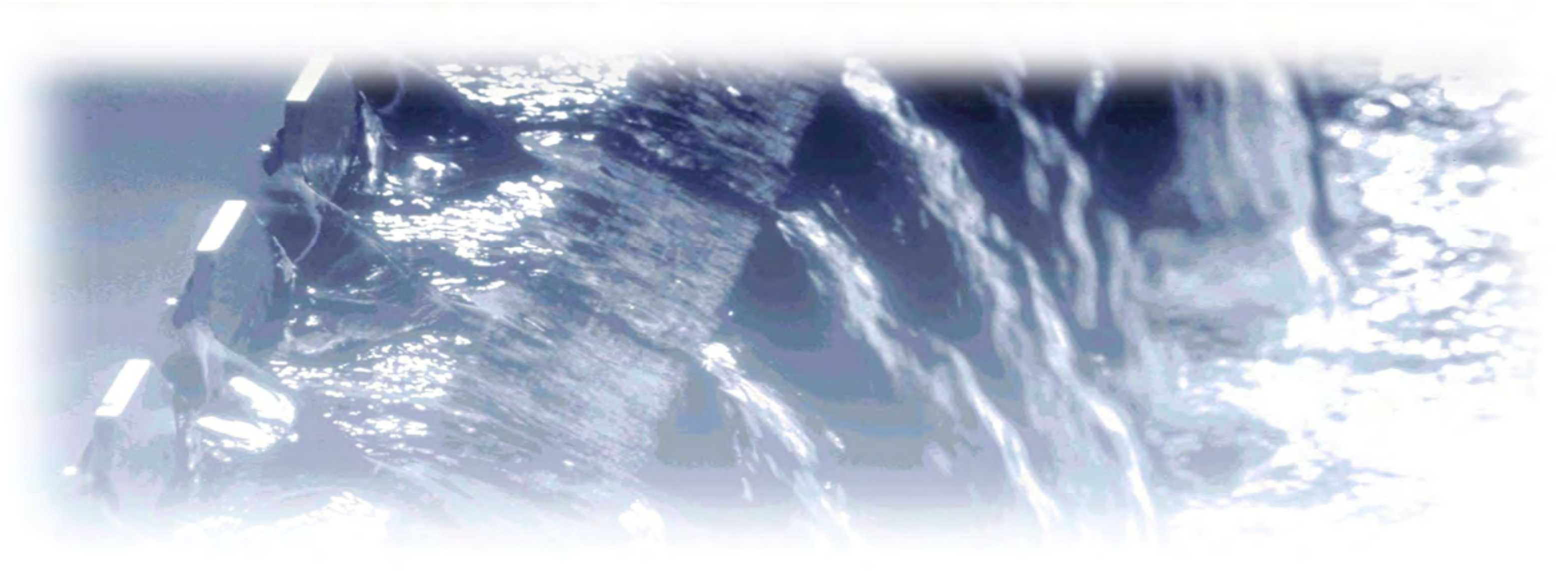

Regional Water Supply Strategy Final Report

January 2005

Presented to:

Polk County Water Providers

Prepared by:

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Acknowledgments

The individuals listed below volunteered there time and knowledge to aid in the development of this document. The Polk County Community Development Department thanks the members of the Technical Advisory Committee, Agency Participants, and County Commissioners for their efforts.

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Section 1

Executive Summary

1.1 Objectives

The objective of this report is to provide an analysis of future water supply strategies for the citizens of Polk County. Elements of this objective include the following:

- Identify the county's future needs for water
- Identify the most viable long term drinking water source
- Develop a preliminary plan for production and delivery
- Estimate the financial impacts
- Discuss potential administrative options required for financing and operation

In meeting these objectives the Technical Advisory Committee (TAC) played an integral role in developing the alternatives, comparing and selection of alternatives, and incorporating their years of experience in dealing with the region's water resources and supplying drinking water to the county's residents.

1.2 Overview

In response to a lack of viable long-term sources of supply, Polk County recently formed a Technical Advisory Committee (TAC) to identify, research, and evaluate future potential sources of water and to ultimately make a recommendation to their elected officials on a comprehensive regional water supply strategy.

In meeting this task, the Committee commissioned a water supply planning study. The study's objective was to examine and quantify the County's need for water and identify a safe and reliable long-term source of water for the region. The following alternatives were considered:

- Willamette River (Adair Village WTP Point of Diversion)
- Willamette River (Point of Diversion near the City of Independence)
- Gorge Dam and Reservoir (Storage Site #1)
- Big Rock Creek Dam and Reservoir (Storage Site #2)
- Rickreall Creek (Storage Site #3)
- Valstez Dam and Reservoir (Storage Site #4)
- Willamina Creek Storage (Storage Site #5)
- Rickreall Creek Storage/Groundwater Development
- Setnicker Wellfield
- ASR Development
- Conservation
- Reuse/Non-Potable Sources

Through this work, a "fatal flaws" analysis guided the decision-making process. The ultimate goal of this process was to evaluate the various alternatives under a relative weighting system and to select a maximum of three options which would be investigated in more detail. The selection process was based on a consideration of the positive and negative impacts of potential costs, environmental limitations, permitting requirements, capacities, reliability, water quality, risks from natural or manmade hazards, and location (i.e. proximity to location of need). Considering these factors, the TAC selected the following two alternatives:

- Willamette River (Adair Village WTP Point of Diversion – WR-1)
- Willamette River (Point of Diversion near the City of Independence – WR-2)

With the selection of the two Willamette River alternatives, several items were identified which would require a greater level of examination before the TAC could reliably develop a recommended course of action. These items included an extensive analysis of the expandability of the City of Adair Village's water treatment plant, refined cost estimates, infrastructure requirements, and scheduling of long term capital needs. The refined cost estimates and scheduling of long term capital requirements were determined necessary to develop financial models that would help predict future wholesale rates.

After developing cost estimates, capital improvement plans, and wholesale rate estimates, from a technical perspective, the TAC decided that each of the alternatives are viable options and a decision to select one or the other would solely be based on policy decisions.

1.3 Projected Water Supply Deficiencies

Population Projections

The County's Community Development Department with input from the TAC provided population projections for each of the pertinent cities and area water providers as shown in Table 1-1.

Table 1-1
Polk County
Population Forecast

	2000	2020	2025	2030	2035	2040
City/Water Association/Water District/Water Authority						
Dallas[1]	12,278	19,207	21,414	23,876	26,621	29,681
Monmouth[1]	8,146	12,837	14,360	16,089	18,026	20,197
Independence[1]	6,035	9,480	10,570	11,785	13,140	14,650
Falls City[2]	990	1,316	1,422	1,536	1,659	1,793
Willimina[2]	602	894	987	1,090	1,204	1,329
Unincorporated Area Purveyors						
Buell Red Prairie[7]	*530*	*609*	*622*	*634*	*647*	*660*
Rock Creek[6]	*370*	*450*	*450*	*450*	*450*	*450*
Luckiamute Water Co-op[3]	*2,310*	*2,656*	*2,709*	*2,764*	*2,820*	*2,877*
Grande Ronde Community Water Assoc. (minus Willimina)[9]	*2,000*	*2,299*	*2,381*	*2,466*	*2,553*	*2,644*
Rickreall Water Association[8]	*1,190*	*1,368*	*1,396*	*1,424*	*1,453*	*1,482*
Perrydale Water Association[10]	*1,625*	*4,170*	*4,170*	*4,170*	*4,170*	*4,170*
Tanglewood Area[11]	*180*	*220*	*231*	*243*	*255*	*268*
Others	*7,773*	*6,598*	*6,781*	*6,968*	*7,157*	*7,347*
Total Unincorporated Population	15,978	18,370	18,740	19,118	19,504	19,897
Total (minus West Salem)	**44,029**	**62,104**	**67,493**	**73,494**	**80,154**	**87,547**
West Salem (UGB for all)[4]	16,340	34,250	37,852	41,465	45,423	49,753
Total Polk County Population (MWVCOG)	**60,369**	**96,354**	**105,345**	**114,959**	**125,577**	**137,300**
Comparative Polk County Population Projections						
Polk County OEA Forecast	*62,700*	*81,752*	*87,153*	*92,529*	*97,803*	*103,120*
Polk County PSU Study Forecast (High)	*62,380*	*84,901*	*90,766*	*96,453*	*101,994*	*107,385*
Polk County PSU Study Forecast (Medium)	*62,380*	*80,649*	*85,266*	*89,695*	*93,969*	*98,091*
Polk County PSU Study Forecast (Low)	*62,380*	*76,611*	*80,100*	*83,411*	*86,576*	*89,601*
Population Projection Summary - (Study Participants Only)						
Study Participants Outside Polk County (Adair Village)	825	1,235	1,503	1,828	2,224	2,706
Polk County Study Participants	44,029	62,104	67,493	73,494	80,154	87,547
Total (Study Participants)	**44,854**	**63,339**	**68,996**	**75,322**	**82,378**	**90,253**

Notes:

1. From CH2MHill Regional Water Supply Project, Phase 1 & 2, Summary Report, Feb 6, 2003
2. Falls City forecast based on a 1.6% growth rate. Willimina forecast based on a 1.1% growth rate.
3. 2000 Population taken from 1994 water master plan. 0.7% Growth Rate 2000-2020. 0.4% Growth Rate 2020-2040.
4. 2000 and 2025 population from the SKATS RTSP 2002.
5. Adair Village 2000 population extrapolated from 2005 projection in water master plan. 2020 population as reported in water master plan. Population growth after 2020 assumed to be 1.04%.
6. Rock Creek projection from an additional 20 service connections. From an existing population of 370 and 94 connections there are approximately 4 people per connection, for a build-out population of 450.
7. 0.7% Growth Rate 2000-2020. 0.4% Growth Rate 2020-2040. The District had a service population of 530 in 1997. This number was used as the base year.
8. Base year was estimated from a 2002 estimate of 1,200 from the 2002 Water Master Plan. 0.7% Growth Rate 2000-2020. 0.4 % Growth Rate 2020-2040.
9. Assumes approximately 800 connections in year 2000 and a population/connection of 2.5 (800 x 2.5 = 2000). Growth rate is 0.7%
10. Perrydale's population estimated from 1992 addendum to Water Conservation Plan. The association reported a service area of 517 residences with a projected growth of 12 to 17 residences per year to a build-out of 150 additional connections to be reached by 2020.
11. Tangelwood service area assumes a total of 72 connections from Tanglewood Water Project Feasibility study. Population estimate calculated from an estimate of 2.5 persons per connection. Growth was assumed to be 1%.

From these population projections and a breakdown of per capita use (see Section 3 – Regional Demand for Water), an estimate of future water consumption was developed. Exhibit 1-1 shows that peak day water needs will grow to close to 40 MGD by year 2040 under a high growth scenario and slightly more than 30 MGD under a low growth scenario.

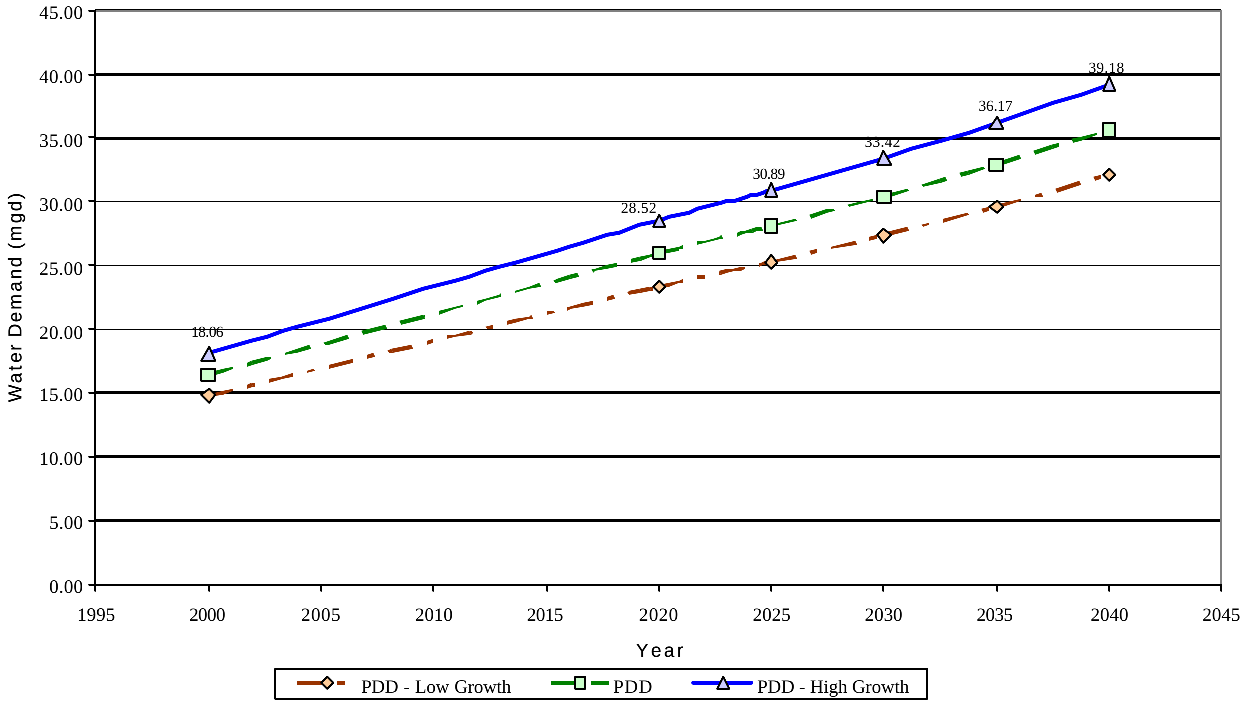


Exhibit 1-1
Polk County
Peak Day Demand (Low, Medium, and High Growth Scenarios)

Available water supplies for each water provider were compared against future water needs and a total deficiency in supply was developed. Exhibit 1-2 shows a deficiency in peak day water supply approaching 13 MGD by year 2040. A discussion of this work is provided in Section 4 (Future Needs Analysis).

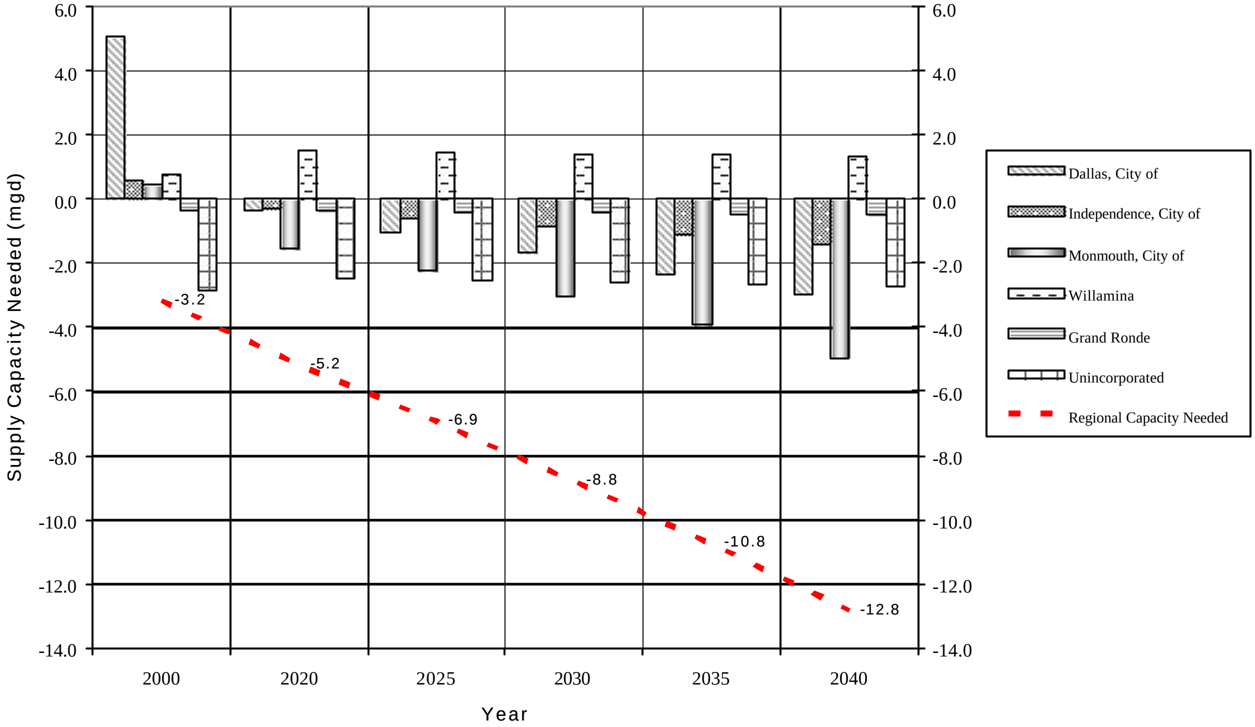


Exhibit 1-2
Polk County
Water Supply Deficiencies (Average Growth Assumptions)

1.4 Supply Strategies

A list of water supply alternatives were summarized, developed, and considered with regards to an agreed upon set of criteria. Each of the alternatives were compared relative to one another by assigning a rating of favorable, neutral, and unfavorable for each criteria. Under this comparison process the TAC selected alternative WR-1 and WR-2 as the most viable. A summary of this comparison is provided in Table 1-2. The Adair Village WTP option (WR-1) involves upgrading an existing water treatment plant on the Willamette River upstream of Albany. The distance of the plant from the county's population centers results in a substantial upfront cost associated with the construction of over 13 miles of transmission piping. The Regional WTP alternative (WR-2) solves this issue by placing a new treatment plant in the vicinity of the Cities of Monmouth and Independence. However, the Wilsonville water treatment plant, as the only plant downstream of major industrial sites in the vicinity of Albany, has set a precedent as to the cost and level of treatment required of a plant sited near Independence. For these reasons, WR-2, although allowing much lower transmission costs, has significant upfront cost associated with treatment. A more detailed discussion of each alternative as well as the comparative evaluation process is provided in Section 5 (Supply Strategies).

Table 1-2
Polk County
Evaluation of Water Supply Alternatives

◉ Favorable	○ Neutral	● Unfavorable

Evaluation Criteria

Supply Alternative	Description	Water Availability	Environmental Impacts	Raw Water Quality	Vulnerability to Catastrophic Events	Ease of Implementation	Cost
Willamette River							
WR-1** *Willamette River – Adair Village POD*	▪ Source – (J) Willamette River only – Adair Village ▪ RW/Treatment – (C) Willamette River POD with Regional WTP ▪ FW – (B) Finished water transmission from Regional WTP	◉	◉	○	○	○	○ to ● (See Footnote 1)
WR-2** *Willamette River – Independence POD (Regional WTP)*	▪ Source – (A) Willamette River only - Independence ▪ RW/Treatment – (C) Willamette River POD with Regional WTP ▪ FW – (B) Finished water transmission from Regional WTP	◉	◉	○	○	◉	◉ to ● (See Footnote 2)
WR-3** *Willamette River – Independence POD (Regional WTP – Supplemental Storage)*	▪ Source – (A) Willamette River with supplemental storage ▪ RW/Treatment – (C) Willamette River POD with Regional WTP ▪ FW – (B) Finished water transmission from Regional WTP	◉	◉	○	○	◉	○ to ● (See Footnote 2)
Raw Water Storage							
R-1 *Gorge Dam and Reservoir*	▪ Source – (D) Gorge Dam and Reservoir ▪ RW/Treatment – (A) Rickreall Creek POD with Dallas WTP ▪ FW – (A) Finished water transmission from Dallas WTP	○	●	◉	●	●	●
R-2 *Big Rock Creek/Sunshine Creek Dam and Reservoir*	▪ Source – (C) Big Rock Creek/Sunshine Creek Dam and Reservoir ▪ RW/Treatment – (C) Willamette River POD with Regional WTP ▪ FW – (B) Finished water transmission from Regional WTP	○	●	◉	●	●	●
R-3 *Rickreall Creek Storage*	▪ Source – (E) Rickreall Creek Storage ▪ RW/Treatment – (A) Rickreall Creek PD with Dallas WTP ▪ FW – (B) Finished water transmission from Dallas WTP	●	●	◉	●	●	●
Groundwater Development							
G-1** *Groundwater Development*	▪ Source – (I) Groundwater Development ▪ RW/Treatment – n/a ▪ FW – (C) Finished water transmission from proposed wellfield areas	○	◉	○ to ● (See Footnote 3)	○	◉	◉ to ○ (See Footnote 3)

** Selected Alternative (Polk County Water Resources Planning Committee – January 13, 2004

(1) Range of costs in reference to possible savings in rehabilitation of existing infrastructure

(2) Range of costs in reference to possible need for advanced treatment at this point of diversion

(3) Variability in water quality and cost associated with possible presence of nitrate contamination

1.5 Phased Capital Plans

The two selected alternatives were considered in greater detail to verify the impacts on cost and, at the same time, to develop a phased capital improvement plan. A more thorough understanding of the infrastructure requirements and timing of needed improvements offered an ability to directly calculate the cost to produce and deliver the water to the County's customers. A summary of the timing of the capital improvements as categorized by transmission, pumping, and treatment are shown in Exhibits 1-3 and 1-4. For the Adair Village WTP alternative (WR-1), the majority of the capital cost would be a result of the requirement to construct a finished water transmission main from Adair Village to Monmouth-Independence. The total required capital over the planning horizon was $55.8 million dollars.

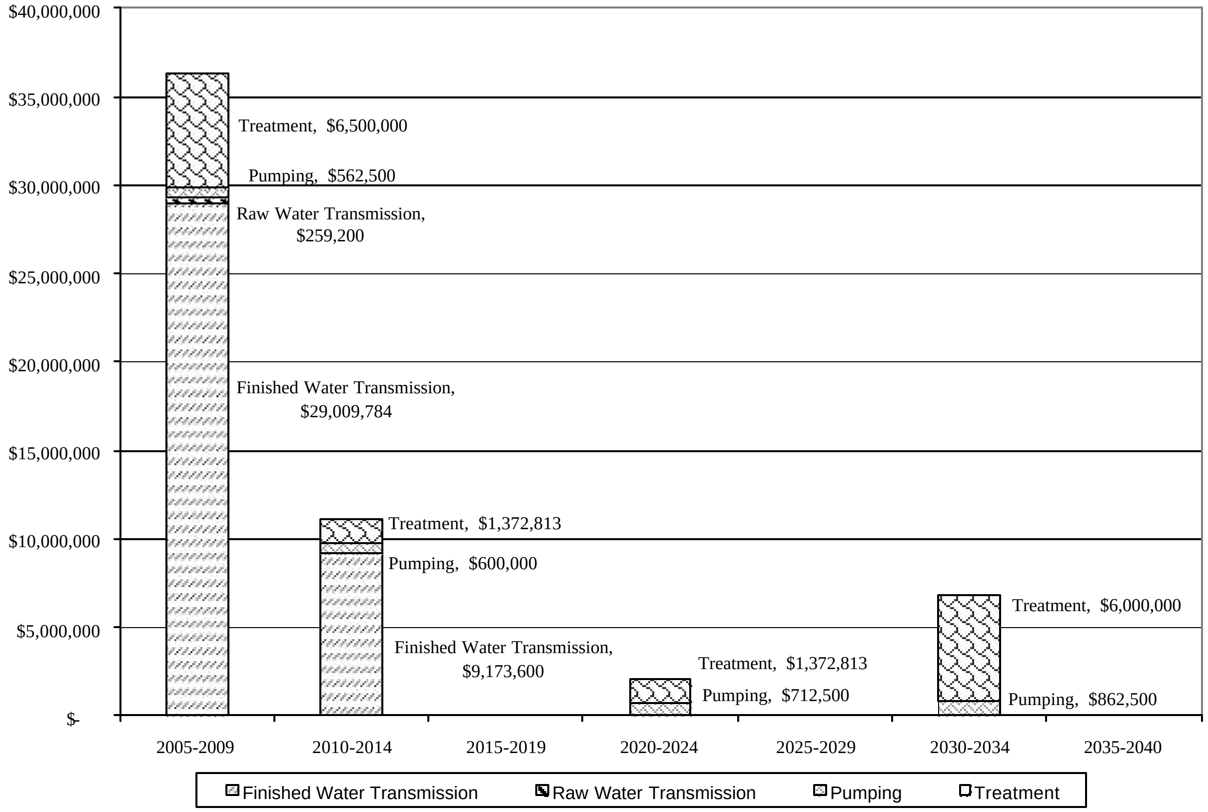


Exhibit 1-3
Adair Village WTP (Alternative WR-1) – CIP Summary

For the Regional WTP alternative (WR-2), the majority of the capital cost would be due to the anticipated expense of building a new treatment plant. A significant reason for the high cost of treatment is the assumption that this plant would be similar to the Wilsonville WTP, which is the only water treatment plant on the Willamette River downstream of key industrial sites north of the City of Corvallis. The total required capital over the planning horizon was $51.4 million dollars. Details of the pipeline alignments and cost estimates are provided in Section 6 (Phased Capital Plan and Pre-Design).

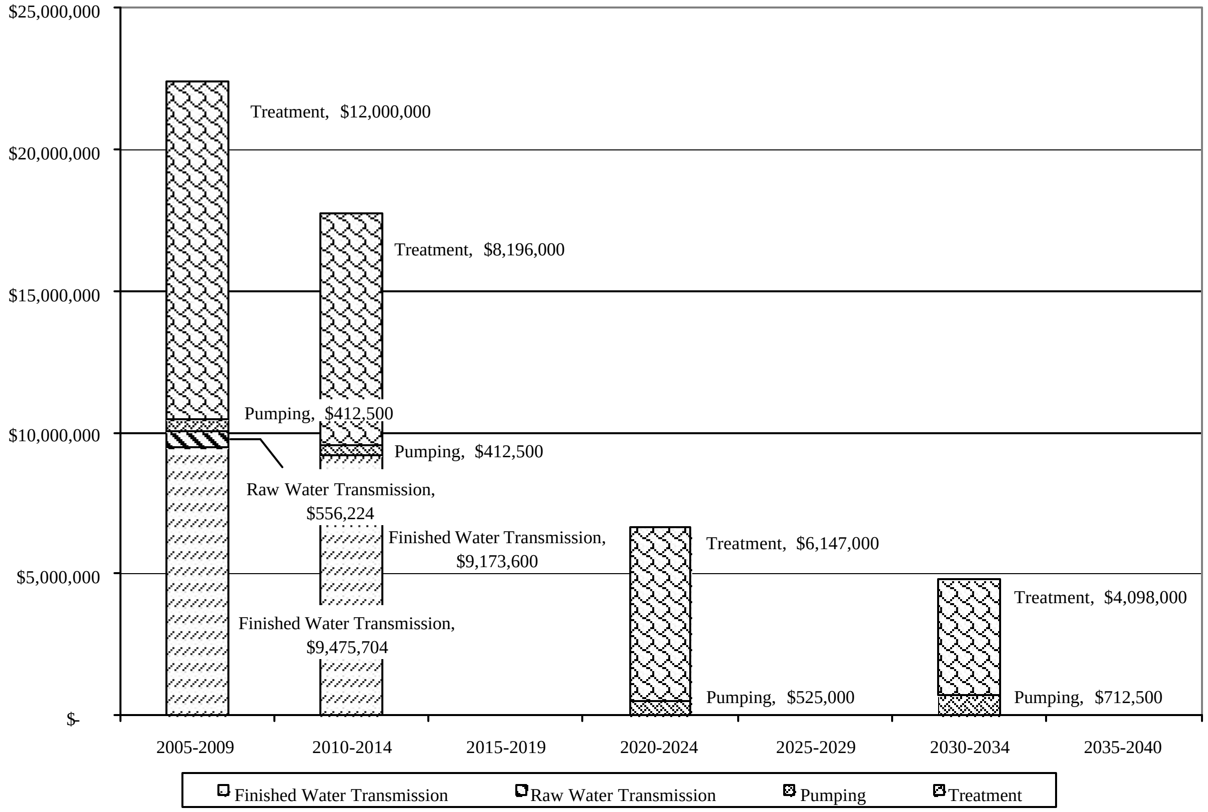


Exhibit 1-4
Regional WTP Alternative – CIP Summary

The significant differences between the two alternatives lie in the upfront costs projected in the 2005-2009 timeframe. WR-1 has substantial costs associated with finished water transmission (~$29 million) and relatively smaller treatment costs (~$6.5 million) whereas WR-2 results in over $12 million in finished water transmission and $12 million in treatment. In addition, the projected costs in the 2010-2014 timeframe are substantially lower under the WR-1 option. However, over the entire planning horizon the two alternatives exhibit roughly the same total cost with $55.8 million under alternative WR-1 and $51.4 million under WR-2.

1.6 Wholesale Rate Estimates

The phasing of capital construction, as well as projected operational expenses, provided the background data to develop estimates for wholesale water rates. Projected wholesale water rates were calculated for each of the selected two supply alternatives. These rate estimates consist of a base rate and a local transmission rate, which includes the additional unit costs incurred by the individual entities based on their projected demand and costs of transmission infrastructure from the Monmouth area. The purpose of this analysis was to provide a general projection of the fiscal viability of the Region's water providers with regards to the capital costs, related operation and maintenance, and debt service associated with the potential water supply infrastructure.

The unit cost of water was calculated by dividing the estimated annual revenue requirements by the projected sales volume (ccf = 100 cubic feet). Annual revenue requirements were estimated by calculating operating expenses, principle and interest for debt service, and a debt service coverage of 25%. In general, the wholesale water rates under either scenario would be quite high. Exhibit 1-5 provides a chart that provides the annual unit cost projections for both alternatives for the first twenty years of supply service. Under the Adair Village WTP (WR-1) alternative, the costs range from $3.8/ccf to a high of $4.44/ccf in 2010. The Regional WTP (WR-2) alternative shows a range of $3.0/ccf to a high of $5.0/ccf in 2012.

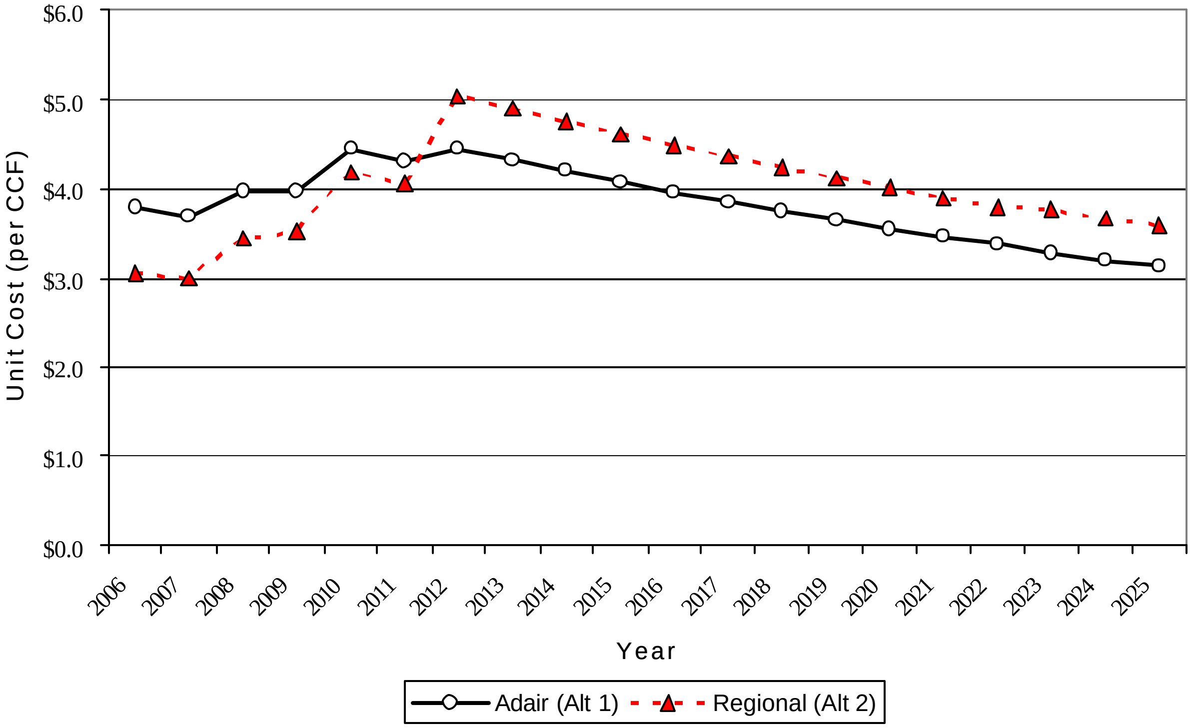


Exhibit 1-5
Annual Unit Costs by Alternative

In addition to the base rate, i.e. the cost to produce and deliver water to the Monmouth-Independence area, the local transmission rates were estimated based on the debt service required to construct the delivery capacity to the region's water providers. These unit cost estimates are significantly affected by water sales. If the future water supply infrastructure is administered by a regional water supplier, such an entity may need to consider using minimum purchase requirements or contracts as a way to effectively meet the revenue requirements of the new source, and accurately establish proper wholesale rates. The rates established in this section are dependent, in large part, on the projected sales to the Region and to individual entities for local transmission. To the extent that actual sales do not meet projected sales, or even exceed projections, the wholesale rates would need to be adjusted. However, the above projections provide a general estimate as to the cost of water under the two Willamette River supply options.

1.7 Administrative Options

The final objective involved an analysis of the organizational/business model that would ultimately be required to finance, construct, and operate a proposed regional water supply system. This type of business model would include the following components: ownership options and rights, rate setting, financing options, and organization options (see Exhibit 1-5). Driving the issues with ownership options are (1) decisions with regards to whether a regional entity would serve all demands or be limited to new demands and existing/future deficiencies and (2) whether the individual partners would share in ownership or the regional entity would be the sole owner of any regionally based infrastructure. The issues of financing and rates are dependent on each other. With the issuance of debt, the financing component may drive rate setting components. In fact, the bond market will dictate to the regional entity the components that must be included in the rates. To the extent that the regional entity does not issue debt, then the rate components become strictly a policy issue. Financing options are generally limited to whether or not the individual participants provide funds or if the regional entity serves as the main funding source for capital improvements. Organizational options are limited to five different governmental organizations as defined by Oregon statutes, each with their associated pros and cons. A more thorough discussion of the various organizational and administrative options is presented in Section 8 (Administrative Options).

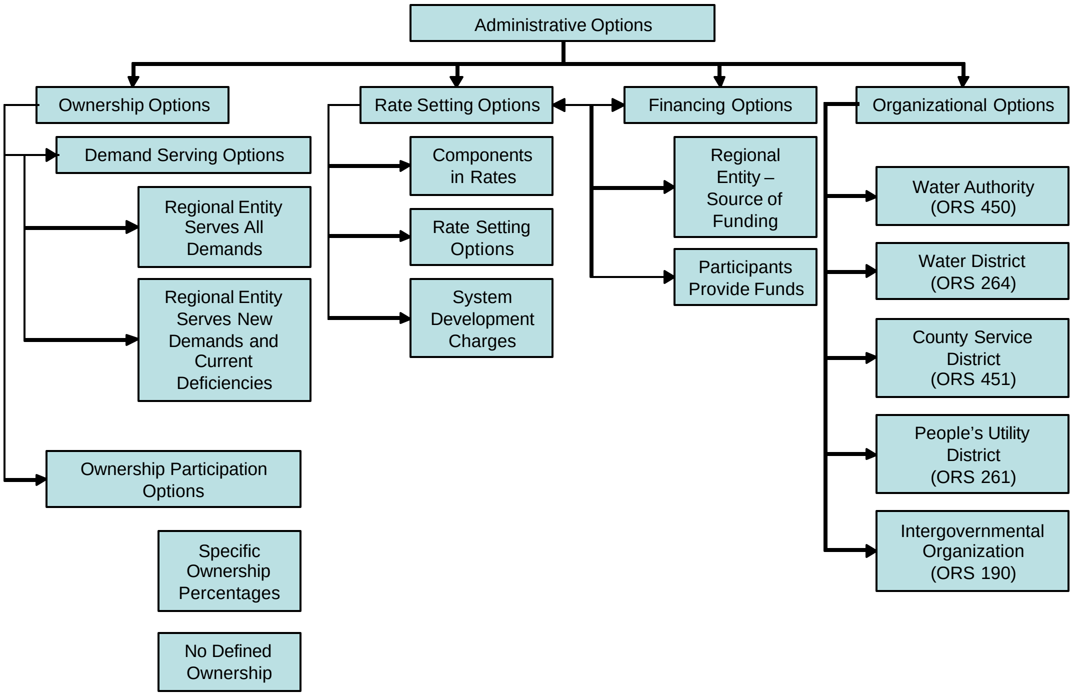


Exhibit 1-6
Administrative Options for a Regional Water Provider

1.8 Next Steps

Originally, the TAC's goal, as a group, was to recommend a single alternative which would focus future efforts with regards to organizational and funding options. However, after reviewing the data and information contained in this report, the TAC came to the conclusion that Alternatives WR-1 and WR-2, from a technical perspective, were both viable options. The decision to select one of the two alternatives was considered to be based more on policy and the political environment as opposed to purely technical issues. As a result, the TAC developed a matrix of pros and cons that highlighted the considerations included during the entire evaluation process. This matrix is provided in Table 1-3.

Table 1-3

Alternative WR-1 and WR-2 - Comparison Matrix

<table>
<tr><td>favorable</td><td>◉</td><td colspan="2">Alternative WR-1</td><td colspan="2">Alternative WR-2</td></tr>
<tr><td>neutral</td><td>○</td><td colspan="2">Adair Village WTP</td><td colspan="2">Regional WTP</td></tr>
<tr><td>unfavorable</td><td>●</td><td>Rating</td><td>Notes</td><td>Rating</td><td>Notes</td></tr>
<tr><td colspan="2">Water Availability</td><td>◉</td><td>No proposed change in point of diversion will allow the use of Adair Village water use permit (S-35819, priority date 07/07/1971) for municipal use.</td><td>○</td><td>A permit amendment would be required to allow access to Adair Village water use permit (S-35819) and would most likely not be approved by OWRD. The acquisition of a new water right on the Willamette River with a junior priority date would be required. OWRD's water availability database shows that greater than 1,000 cfs would be available at a point of diversion near the City of Independence.</td></tr>
<tr><td colspan="2">Environmental Impacts</td><td>○</td><td>Involves construction of an additional 16 miles of water transmission pipeline, creating a greater potential for environmental disturbance. A permitting review estimates less than $50,000 would be required for the additional environmental permitting and review. Upgrading the Adair Village WTP would require modifications to the existing intake creating the potential for disturbance of wetlands and natural fish habitat.</td><td>○</td><td>Involves construction of a new intake on the Willamette River with the potential for disturbance of wetlands and natural fish habitat.</td></tr>
<tr><td colspan="2">Raw Water Quality</td><td>◉</td><td>Upstream of major industrial sites near Albany may potentially result in better source water quality and a decreased potential of contamination near the intake.</td><td>○</td><td>Downstream of major industrial sites results in the potential for poorer source water quality and the requirement for a higher level of treatment.</td></tr>
<tr><td colspan="2">Vulnerability to Catastrophic Events</td><td>○</td><td>Greater finished water transmission distance would result in increased susceptibility to earthquakes, landslides and other natural hazards.</td><td>◉</td><td>Vulnerability is less than Alternative 1 due to proximity of the source to the county's major population centers (i.e. less finished water transmission).</td></tr>
</table>

Table 1-3 (cont)
Alternative 1 and 2 - Comparison Matrix

<table>
<tr><td>favorable</td><td>⊙</td><td colspan="2">Alternative 1</td><td colspan="2">Alternative 2</td></tr>
<tr><td>neutral</td><td>○</td><td colspan="2">Adair Village WTP</td><td colspan="2">Regional WTP</td></tr>
<tr><td>unfavorable</td><td>●</td><td>Rating</td><td>Notes</td><td>Rating</td><td>Notes</td></tr>
<tr><td colspan="2">Ease of Implementation</td><td>○</td><td>Upgrading the Adair Village WTP would potentially allow for quicker access to finished water, since it may prove easier to upgrade existing facilities as opposed to constructing a new treatment facility. However, an additional 16 miles of pipeline would also need to be constructed before the water could be delivered to the County's customers. Also, the permit to legally use the water is already in place bypassing the need to apply for new water use permits.</td><td>○</td><td>Requires a new treatment facility and intake at a point of diversion near Independence which could potentially increase the timeframe for future delivery and sales of water, assuming that construction of a new facility proves more difficult than upgrading an existing facility. Also, an application must be approved and submitted for municipal use of Willamette River water at a point of diversion near Independence.</td></tr>
<tr><td colspan="2">Total Capital Cost (Production and Delivery to Monmouth-Independence Area)</td><td>○</td><td>$39.9 million</td><td>○</td><td>$35.4 million</td></tr>
<tr><td colspan="2">Total Capital Cost (Delivery to Individual Water Providers)</td><td>○</td><td>$16.3 million</td><td>○</td><td>$16.3 million</td></tr>
<tr><td colspan="2">Projected Bond Requirements</td><td>○</td><td>$53 million</td><td>○</td><td>$48 million</td></tr>
<tr><td colspan="2">Wholesale Rate Analysis (Through 2025)</td><td>○</td><td>Maximum - $4.45/ccf
Minimum - $3.13/ccf</td><td>○</td><td>Maximum - $5.05/ccf
Minimum - $2.99/ccf</td></tr>
</table>

In summary, there are several important decisions to be made before the idea of a regional water supply can become a reality. However, progress cannot be made in this manner without a consensus as to the future direction of water supply development in Polk County. The County's water providers must reach a consensus that a cooperative framework is the best way to accomplish individual goals and future service requirements. Although financial requirements are a particularly important factor in assessing the viability of various supply options; other factors that play an exceedingly important role are environmental impacts, long term availability, water quality, and vulnerability. These other factors are difficult to quantify and subject to wide-ranging opinions. However, it is these factors, when thoughtfully and reasonably considered, that may be a driving force in building consensus.

A decision as to the best regional water supply option is based more on policy and the political environment than on quantifiable factors. For this reason, it is recommended that the County develop a Policy Committee, similar in structure to the Technical Advisory Committee. However, this committee would be made up of elected officials with the authority to consider and make decisions that are political in nature. This committee should be charged with the following tasks:

1) Determine if a cooperative framework is the best approach for addressing regional water supply issues, and,
2) If so, build a consensus on the best organizational framework that would provide the right balance of ownership, operational control, and risk management for each of the individual partners.
3) Select a preferred water supply alternative.
4) Develop a plan to address potential funding options and shortfalls.

From the beginning of this process, it was the TAC's charge to consider and evaluate the various supply options and develop the technical background to aid in future decision-making and planning objectives. Through the focus provided by the TAC's work and information in this document, the Policy Committee could potentially set the stage for regional water supply development, which may provide the community with quality drinking water for years to come.

Section 2

Background Information

2.1 Introduction

In year 2000, the census for Polk County totaled 62,380, with more than 70% of that total being located in four main population centers – the Cities of Dallas, Monmouth, and Independence and the western portion of the City of Salem. The remaining population is largely dispersed within the unincorporated areas of the County. Polk County has historically been an agricultural community and continues to maintain a thriving agricultural base that includes vineyards, grass seed, and other valuable commodities. In addition, however, there has been significant growth in domestic residences outside of historically urban areas. In general, these domestic residences outside of the county's cities are served by water cooperatives. These water cooperatives and the county's cities form the backbone of the county's drinking water supplies. The combination of population growth and increasingly stringent environmental regulations are having an impact on the County's water providers and, as with many areas throughout the Western United States, access to a long-term and viable drinking water supply for the county's residents is becoming an issue that can no longer be overlooked.

Like many areas in Oregon, Polk County is anticipating growth over the next 50 years. A recent consulting study indicates that the three Cities of Dallas, Monmouth, and Independence will add approximately 15,500 persons by year 2020 and another 36,000 persons by year 2050. Paralleling the increase in population is a growth in demand for water. Unfortunately, the area simply does not have enough water at this time to meet the 50-year anticipated demand. In particular, the City of Dallas is expected to experience deficit conditions during maximum day demands as early as year 2006, depending on whether or not the local plywood mill (or equivalent) reopens. Even if no large industrial customer were to return, the City would experience potential summertime water supply shortages by year 2017 without adding treatment capacity and treated water storage. Similarly, in the Cities of Independence and Monmouth, maximum day demands may exceed supplies by as early as year 2013 and 2026, respectively.

Accordingly, the County is in need of water. Residents of the County are presently served by both surface and ground water supplies, the latter representing the larger of the two sources in terms of the number of agencies who rely on that source for their water. In fact, only four of the water systems within the County rely on surface water. Ground water, however, is not readily abundant throughout the County. The principal aquifers are those located near the Willamette River which are relatively shallow and potentially impacted by land based activities such as agriculture, domestic septic systems and other sources of contamination. Away from the river, the availability of groundwater diminishes, forcing service to rely on cooperative water agreements among various supply companies and agencies.

In response, the County has formed a Technical Advisory Committee (TAC) comprised of representatives from thirteen (13) water providers in the area, including:

- City of Dallas
- City of Monmouth
- City of Independence
- City of Adair Village
- City of Willamina
- City of Falls City
- Perrydale Water Association
- Grand Ronde Community Water
- Association
- Rickreall Community Water
- Association
- Tanglewood Water Cooperative
- Luckiamute Domestic Water
- Cooperative
- Rock Creek Water District
- Buell Red Prairie Water District

A summary of the basic descriptions for each of the study participants is provided in Appendix A.

The TAC was, in turn, charged with the task of identifying a future water supply strategy that includes elements of system planning, financial planning, and organizational planning.

2.2 Study Objectives

The objective of this work seeks to answer questions of where and how the county can provide drinking water supplies for its residents. Elements of this objective include the following:

- Identify the county's future needs for water
- Identify the most viable long term drinking water source
- Develop a preliminary plan for production and delivery
- Estimate the financial impacts
- Discuss potential administrative options required for financing and operation

In meeting these objectives the TAC played an integral role in developing the alternatives, comparing and selection of alternatives, and incorporating their years of experience in dealing with the region's water resources and supplying drinking water to the county's residents.

2.3 General Approach

2.3.1 Analysis of Water Supply Alternatives

The general approach used to "screen" various supply alternatives and prioritize options for meeting a predicted long-term demand included a general consideration of all significant timing, cost, financing, environmental, and legal impacts. The approach began with a review of the technical details of each source, such as capacity, water quality, reliability, water right availability (or seniority), risk from natural or manmade hazards, environmental impact and public acceptance. At the same time, a demand forecast for the TAC members was created that identifies average and maximum day demand, as well as seasonal changes.

This information was then brought together to develop a range of possible supply options that satisfied the predicted demand. These alternatives were then tested against defined criteria in an "organized screening" against such factors as cost, reliability, feasibility, environmental and social impact, and availability both in terms of capacity and timing. The outcome offered a limited set of viable alternatives for which further assessment could be prioritized.

The search concluded with a review of possible implications with regards to intergovernmental sharing of resources and the administrative structure(s) that would allow for the effective implementation of the prioritized strategies. Recommendations were then made as to which alternatives were most viable from a technical, economic, and political viewpoint. The overall process of investigation is outlined in the flowchart below:

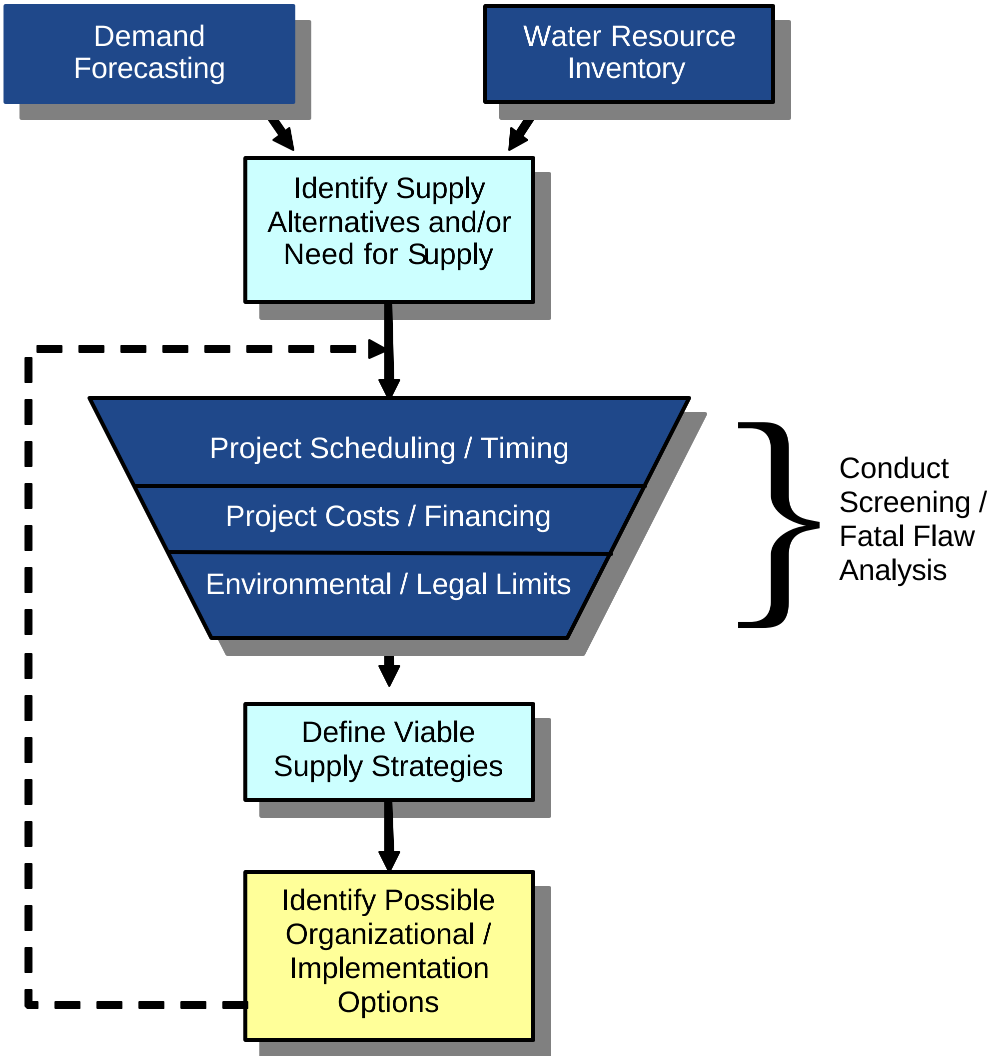


Exhibit 2-1
Approach to Develop Long-Range Water Supply Alternatives for Polk County

One of the more interesting potential sources is that associated with City of Adair Village. Dating back to a time when Adair Village was a vibrant military installation, the City acquired substantial water rights (82 cfs) on the Willamette River. The City has since radically diminished in population yet holds several important municipal water right permits on the Willamette River. In addition, the County identified several other potential sources of water including:

- Surface water storage along Mill Creek
- Surface water storage along Sunshine and Rock Creeks
- Surface water storage along Rickreall Creek
- Surface water storage in the Valsetz area
- Expansion of ground water withdrawals from the Setniker wellfield
- Broadened resource sharing among study participants

This process allowed for a general comparison of each of the alternatives resulting in a selection of two or three alternatives that were considered viable and merited more detailed analysis.

2.3.2 Refinement of Selected Alternatives

After selecting the most viable alternatives, it was evident that a more detailed analysis would be required to qualify both financial and administrative impacts. The approach used to refine the selected alternatives involved a planning process that generally falls under three separate pathways with components that are closely intertwined. These pathways include system planning, financial planning, and organizational planning, each of which can be considered iterative and dependent on one another. Exhibit 1-2 provides a model of our planning approach.

System Planning

System planning involves the engineering analysis required develop estimates for capital and operational expense over a specific planning horizon. This task incorporated our planning projections of population growth, land use changes, and economic development; all of which are required to adequately forecast water consumption needs. These forecasts were refined to include both time and spatial components. An understanding of the location and timing of water consumption provides the basis for developing a preliminary estimate of infrastructure needs as calculated from hydraulic calculations, i.e. size and length of pipelines, pump station and treatment capacities. The capital improvement program provides a plan for construction projects needed to meet projected water supply requirements. After developing a plan for the installation and operation of water supply infrastructure, estimates can be developed for operational and maintenance expenses. As clearly shown, the system planning process develops an estimate of the financial requirements (operational and capital expense) for delivering water to those who need it.

Financial Planning

The financial planning process develops a business model for identifying the required cost of delivering this water to consumers throughout the proposed service area. This model accounts for how the City will adequately generate the revenue (operational and capital expenses) required to operate the proposed utility. The charge to the utility's customers is calculated from assumptions of system development charge revenue, cash reserves, and debt service coverage. These revenue components can provide a means of paying for the operational and capital expenses prompted by the supply of water to area citizens, businesses, and government.

Organizational Planning

The organizational planning process takes into account the various legal entities allowed under the Oregon Statutes to help develop an organization that will work efficiently and effectively now and into the future. Decisions and compromises must be made with regards to risk management, ownership, financing, rate setting, and operational control.

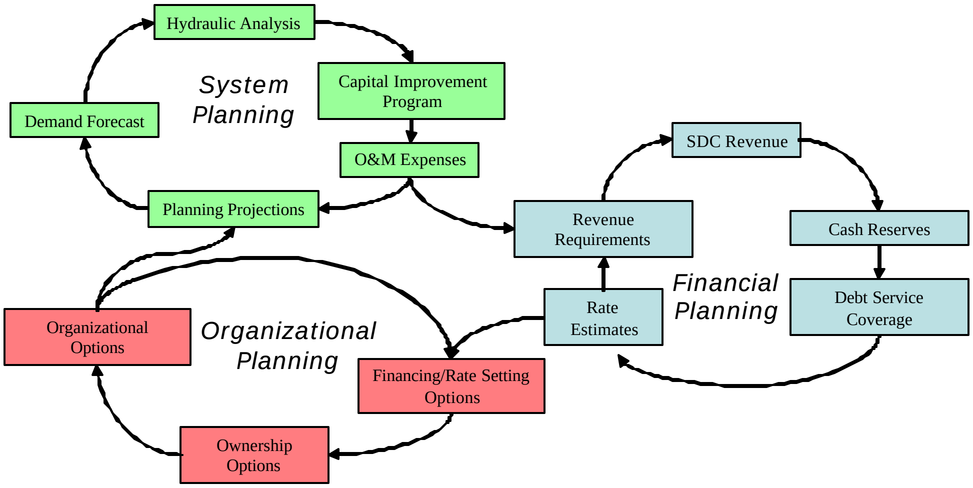


Exhibit 2-2
Regional Water Supply Entity - Planning Framework

Section 3

Regional Demand for Water

3.1 Introduction

The first step in the study process is to document the approved population (growth) estimates for each of the study participants, then produce a future water demand forecast based on historical per capita water consumption rates. The resulting demand forecast is intended to produce estimates for both average day (ADD) and maximum day demands (MDD) through year 2040. In addition, a range of outcomes is developed to reflect the uncertainty embedded in long-range forecasting of this kind, resulting in estimates highlighted in terms of high, medium and low forecasted outcomes. This section is intended to document the methods and results of that forecast and examine potential implications on regional demands.

3.2 Regional Population Projections

The desired estimate of demand is founded in two main elements – a projection of regional population and an estimate of per capita use. The two elements are then multiplied together in producing a forecast of water demand.

The central feature of the demand forecast, however, resides in the population estimates for the area. The principal study area is that of the entire County, with the inclusion of the City of Adair Village. Here, population projections were provided from the Polk County Planning Department staff based on numbers taken from:

1) The “Regional Water Supply Project, Phase 1 and 2, Summary Report (dated February 6, 2003)” for the cities of Dallas, Monmouth, and Independence;
2) Various master planning documents for the study participants; and
3) An assumed growth rate for the unincorporated portion of the County.

A summary of those findings is outlined in Table 3-1.

Table 3-1
Polk County
Population Forecast

City/Water Association/Water District/Water Authority	2000	2020	2025	2030	2035	2040
Dallas[1]	12,278	19,207	21,414	23,876	26,621	29,681
Monmouth[1]	8,146	12,837	14,360	16,089	18,026	20,197
Independence[1]	6,035	9,480	10,570	11,785	13,140	14,650
Falls City[2]	990	1,316	1,422	1,536	1,659	1,793
Willimina[2]	602	894	987	1,090	1,204	1,329
Unincorporated Area Purveyors						
Buell Red Prairie[7]	*530*	*609*	*622*	*634*	*647*	*660*
Rock Creek[6]	*370*	*450*	*450*	*450*	*450*	*450*
Luckiamute Water Co-op[3]	*2,310*	*2,656*	*2,709*	*2,764*	*2,820*	*2,877*
Grand Ronde Community Water Assoc. (minus Willimina)[9]	*2,000*	*2,299*	*2,381*	*2,466*	*2,553*	*2,644*
Rickreall Water Association[8]	*1,190*	*1,368*	*1,396*	*1,424*	*1,453*	*1,482*
Perrydale Water Association[10]	*1,625*	*4,170*	*4,170*	*4,170*	*4,170*	*4,170*
Tanglewood Area[11]	*180*	*220*	*231*	*243*	*255*	*268*
Others	*7,773*	*6,598*	*6,781*	*6,968*	*7,157*	*7,347*
Total Unincorporated Population	15,978	18,370	18,740	19,118	19,504	19,897
Total (minus West Salem)	**44,029**	**62,104**	**67,493**	**73,494**	**80,154**	**87,547**
West Salem (UGB for all)[4]	16,340	34,250	37,852	41,465	45,423	49,753
Total Polk County Population (MWVCOG)	**60,369**	**96,354**	**105,345**	**114,959**	**125,577**	**137,300**
Comparative Polk County Population Projections						
Polk County OEA Forecast	*62,700*	*81,752*	*87,153*	*92,529*	*97,803*	*103,120*
Polk County PSU Study Forecast (High)	*62,380*	*84,901*	*90,766*	*96,453*	*101,994*	*107,385*
Polk County PSU Study Forecast (Medium)	*62,380*	*80,649*	*85,266*	*89,695*	*93,969*	*98,091*
Polk County PSU Study Forecast (Low)	*62,380*	*76,611*	*80,100*	*83,411*	*86,576*	*89,601*
Population Projection Summary - (Study Participants Only)						
Study Participants Outside Polk County (Adair Village)	825	1,235	1,503	1,828	2,224	2,706
Polk County Study Participants	44,029	62,104	67,493	73,494	80,154	87,547
Total (Study Participants)	**44,854**	**63,339**	**68,996**	**75,322**	**82,378**	**90,253**

Notes:

1. From CH2MHill Regional Water Supply Project, Phase 1 & 2, Summary Report, Feb 6, 2003
2. Falls City forecast based on a 1.6% growth rate. Willimina forecast based on a 1.1% growth rate.
3. 2000 Population taken from 1994 water master plan. 0.7% Growth Rate 2000-2020. 0.4% Growth Rate 2020-2040.
4. 2000 and 2025 population from the SKATS RTSP 2002.
5. Adair Village 2000 population extrapolated from 2005 projection in water master plan. 2020 population as reported in water master plan. Population growth after 2020 assumed to be 1.04%.
6. Rock Creek projection from an additional 20 service connections. From an existing population of 370 and 94 connections there are approximately 4 people per connection, for a build-out population of 450.
7. 0.7% Growth Rate 2000-2020. 0.4% Growth Rate 2020-2040. The District had a service population of 530 in 1997. This number was used as the base year.
8. Base year was estimated from a 2002 estimate of 1,200 from the 2002 Water Master Plan. 0.7% Growth Rate 2000-2020. 0.4 % Growth Rate 2020-2040.
9. Assumes approximately 800 connections in year 2000 and a population/connection of 2.5 (800 x 2.5 = 2000). Growth rate is 0.7%
10. Perrydale's population estimated from 1992 addendum to Water Conservation Plan. The association reported a service area of 517 residences with a projected growth of 12 to 17 residences per year to a build-out of 150 additional connections to be reached by 2020.
11. Tangelwood service area assumes a total of 72 connections from Tanglewood Water Project Feasibility study. Population estimate calculated from an estimate of 2.5 persons per connection. Growth was assumed to be 1%.

In addition, a summary of the projected population growth for the entire Polk County area and Adair Village is shown in Exhibit 3-1 (at the end of this section). The results indicate the Cities of Dallas, Independence, and Monmouth serve approximately 70% of the total population, with the other participating rural water providers serving about 20% of the total. The remaining 10% is comprised of the Cities of Falls City, Willamina, and Adair Village - as well as any remaining population not served by one of the identified water providers (the latter listed as "others" in Table 3-1).

These growth projections are also adjusted to account for projected changes in land use and uncertainty in long-range estimates of growth. To accommodate this uncertainty, a range of +/- 10% is established around the projected medium population forecast, representing a potential high and low in the projected outcomes, respectively. The range of +/- 10% is often used by analyst to predict the uncertainty of this kind over a forecast period of 20 to 40 years. It is expected that the county's population growth will lie somewhere within this window as shown in Exhibit 3-2.

3.3 Summary of Present Water Use

The second major element of the demand forecast is that of estimated per capita consumption. Here, water consumption for the county was analyzed through two principal approaches. First, for the major incorporated areas such as the Cities of Dallas, Monmouth and Independence, each has recently completed a formal water master plan. Here, no analysis was required – the appropriate numbers for present and future water use were simply taken directly from those plans. Also within Polk County is the area known as West Salem – whose water is provided by the City of Salem. Accordingly, West Salem is not included in this study since they currently receive and plan to continue to receive service from the City of Salem.

To develop a water demand forecast for the other incorporated portions of the county, a review of water use reporting for the Oregon Water Resources Department (OWRD) and master plans was conducted to develop reasonable water usage per capita estimates for the Cities of Falls City, Willamina, and Adair Village. Water usage for the City of Willamina was reviewed from a Regional Water Resources Study of the Willamina/Grand Ronde area (Balfour 1999). There was a lack of data documenting Falls City's historical and present water usage. Here, it was assumed that water usage in Falls City was similar to that in Willamina and the two were assigned the same water use factors based on the records available for Willamina. This assumption is presumed generally valid due to the similar size, proximity, and projected growth rate for the two cities.

Although not in Polk County, this report also includes the City of Adair Village. Adair Village's inclusion in this study is largely a result of their extensive amount of permitted water at a Willamette River point of diversion. Per capita water use estimates for the cities of Adair Village, Willamina, and Falls City are shown in Table 3-2.

Table 3-2
Polk County
Water Use Factors for Adair Village, Falls City, and Willamina

Water Provider	Average Day (gpcd)	Maximum Month (gpcd)	Peak Day (gpcd)
Adair Village[1]	371	575	1,195
Falls City[2]	170	194	350
Willamina[3]	170	194	350

1. Adair Village per capita use estimates and peaking factors taken from 2001 Water Master Plan.
2. Falls City per capita use estimates assumed to be the same as the City of Willamina.
3. Willamina per capita use estimates taken from a Grand Ronde/Willamina Regional Water Resource Study prepared for the Mid-Willamette Valley Council of Governments, 1998.

For the unincorporated areas, data was again collected from OWRD water use reports and master plans (as available). From these numbers and an estimate of the total population served by each supplier, an average water use factor per capita was calculated for average day and maximum monthly demands. Also, an estimate of peak day use was estimated either from reported data in master plans or by using a common regional average of about 2 to 3 times average daily use. Table 3-3 provides a summary of these factors used for the county's unincorporated areas (reported in gallons per capita day or gpcd).

Table 3-3
Polk County
Water Use Factors for Unincorporated Portions of Polk County

Water Provider	Average Day (gpcd)	Maximum Month (gpcd)	Peak Day (gpcd)
Tanglewood	150	225	480
Perrydale[1]	66	115	212
Buell Red Prairie[2]	128	166	319
Rickreall[3]	125	163	325
Grand Ronde[4]	147	206	412
Luckiamute[5]	125	188	281
Rock Creek[6]	141	212	296
Average	**126**	**181**	**332**

1. Perrydale use factor assumes a population of 1,625 and incorporates an annual water usage of 0.11 mgd (Year 2000)
2. Buell Red Prairie assumes a population of 530 and incorporates an annual water usage of 0.067 mgd (Year 2000). 1997 WMCP shows a peak day factor of 2.5.
3. Rickreall water use factor of 108 gpcd taken from draft water master plan, 2002.
4. Grand Ronde water use factor of 147gpcd was taken from a Grand Ronde/Willamina Regional Water Resource Study prepared for the Mid-Willamette Valley Council of Governments, 1998.
5. Luckiamute water use factors taken from 1994 water master plan.
6. Rock Creek water use factors taken from 2003 WMCP.

3.4 Water Demand Projections

The Cities of Dallas, Monmouth, and Independence recently completed water demand projections for their communities in a combined report titled, "Regional Water Supply Project" conducted by CH2M-Hill in 2003. Data regarding present and future water use for those cities were taken directly from this report without modification.

For the other principal cities, Falls City, Willamina, and Adair Village, demand estimates were produced from the product of population projection and per capita use factors, with a similar approach being taken to fill out the estimates for the unincorporated portions of the County. These water demand projections were then combined to generate a total water demand for all study participants. Table 3-4 provides a summary of average daily demands in millions of gallons per day (mgd) for each water provider.

Table 3-4
Polk County
Average Daily Demand Projections (mgd)

	Year					
Water Provider	**2000**	**2020**	**2025**	**2030**	**2035**	**2040**
Dallas, City of	2.61	4.03	4.32	4.61	4.88	5.15
Independence, City of	0.78	1.12	1.22	1.32	1.42	1.52
Monmouth, City of	0.92	1.67	1.91	2.19	2.51	2.88
Falls City	0.17	0.22	0.24	0.26	0.28	0.30
Willamina	0.10	0.15	0.17	0.19	0.20	0.23
Buell Red Prairie	0.07	0.08	0.08	0.08	0.08	0.08
Rickreall	0.15	0.17	0.17	0.18	0.18	0.19
Grande Ronde	0.29	0.34	0.35	0.36	0.38	0.39
Luckiamute	0.29	0.33	0.34	0.35	0.35	0.36
Perrydale	0.11	0.28	0.28	0.28	0.28	0.28
Rock Creek	0.05	0.06	0.06	0.06	0.06	0.06
Tanglewood	0.02	0.03	0.03	0.03	0.03	0.03
Others	1.05	0.89	0.92	0.94	0.97	0.99
Adair Village	0.31	0.46	0.56	0.68	0.83	1.00
Totals	**6.92**	**9.82**	**10.64**	**11.52**	**12.45**	**13.46**

The largest water provider is the City of Dallas with a 2040 projected average daily demand (ADD) of 5.15 mgd. The total average daily demand (ADD) for all study participants is about 13.5 mgd in year 2040.

Estimates were also produced for maximum month demands (MMD) and maximum day demands (MDD) using the factors shown in Tables 3-2 and 3-3, as well as the master plans noted for the major cities. A summary of the total future demands for the County, including the City of Adair Village, is shown in Table 3-5.

Table 3-5
Polk County
Regional Water Demand Projections (mgd)

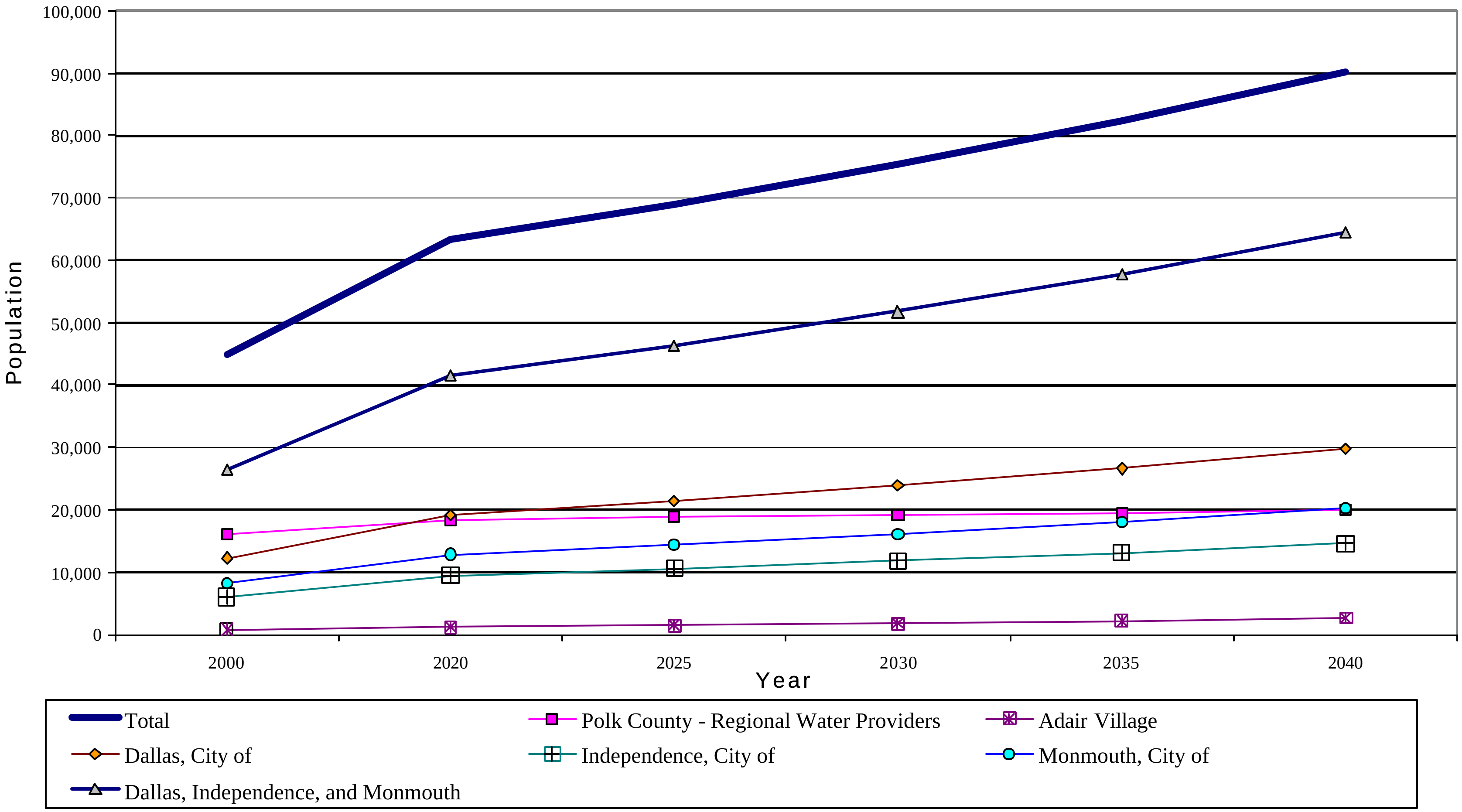
Year	ADD	MMD	MDD
2000	6.92	10.17	16.41
2020	9.82	14.20	25.93
2025	10.64	15.35	28.08
2030	11.52	16.56	30.38
2035	12.45	17.87	32.89
2040	13.46	19.30	35.62

To account for varying growth rates, changes in land use, and changes in water use efficiency the demand projections were adjusted to develop a low, moderate, and high estimate of increased need for water. The low and high estimates were calculated by adjusting the population growth assumptions 10% either upwards or downwards throughout the entire county. Exhibit 3-3 visually shows this "window" of projected water demand out to 2040 for peak day demand.

3.5 Distribution of Regional Demand

When evaluating viable options for meeting future water needs, the distribution of the demand across the region will have a large impact on selection of a water supply option. As a result, the demand of each of the entities was mapped to provide a visual representation of how this demand varies across the county. Exhibit 3-4 shows that over 75% of the region's demand centers around the Cities of Dallas, Monmouth, and Independence, the remaining 25% is distributed widely among the rural purveyors and unincorporated areas of the County.

Exhibit 3-1
Polk County (with Adair Village)
Regional Population Forecasts



* Includes the following water providers: Buell Red Prairie, Rickreall, Grand Ronde, Luckiamute, Perrydale, Rock Creek, and Tanglewood

Exhibit 3-2
Polk County (with Adair Village)
Population Projections - High, Median, and Low Growth Assumptions

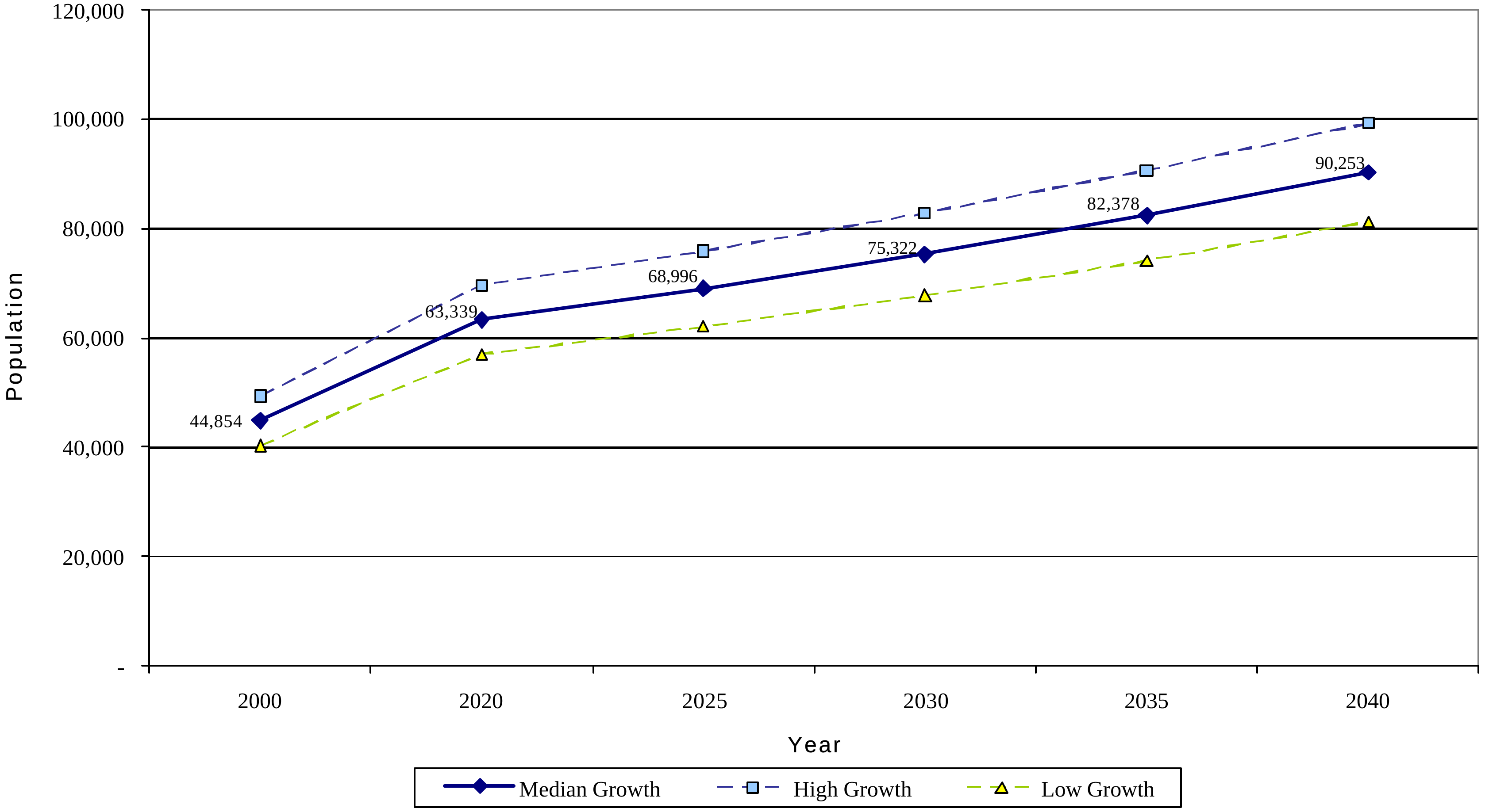
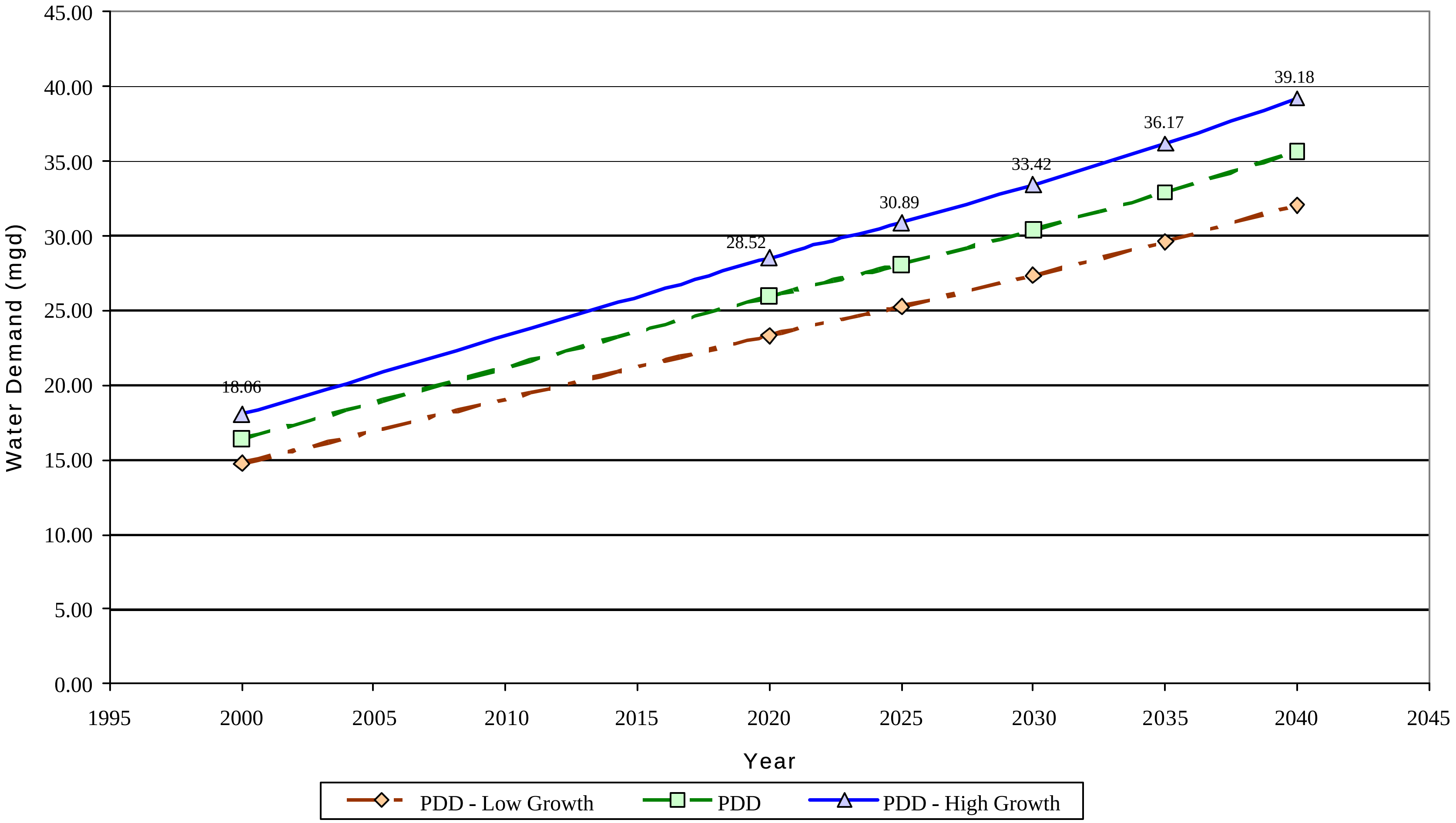
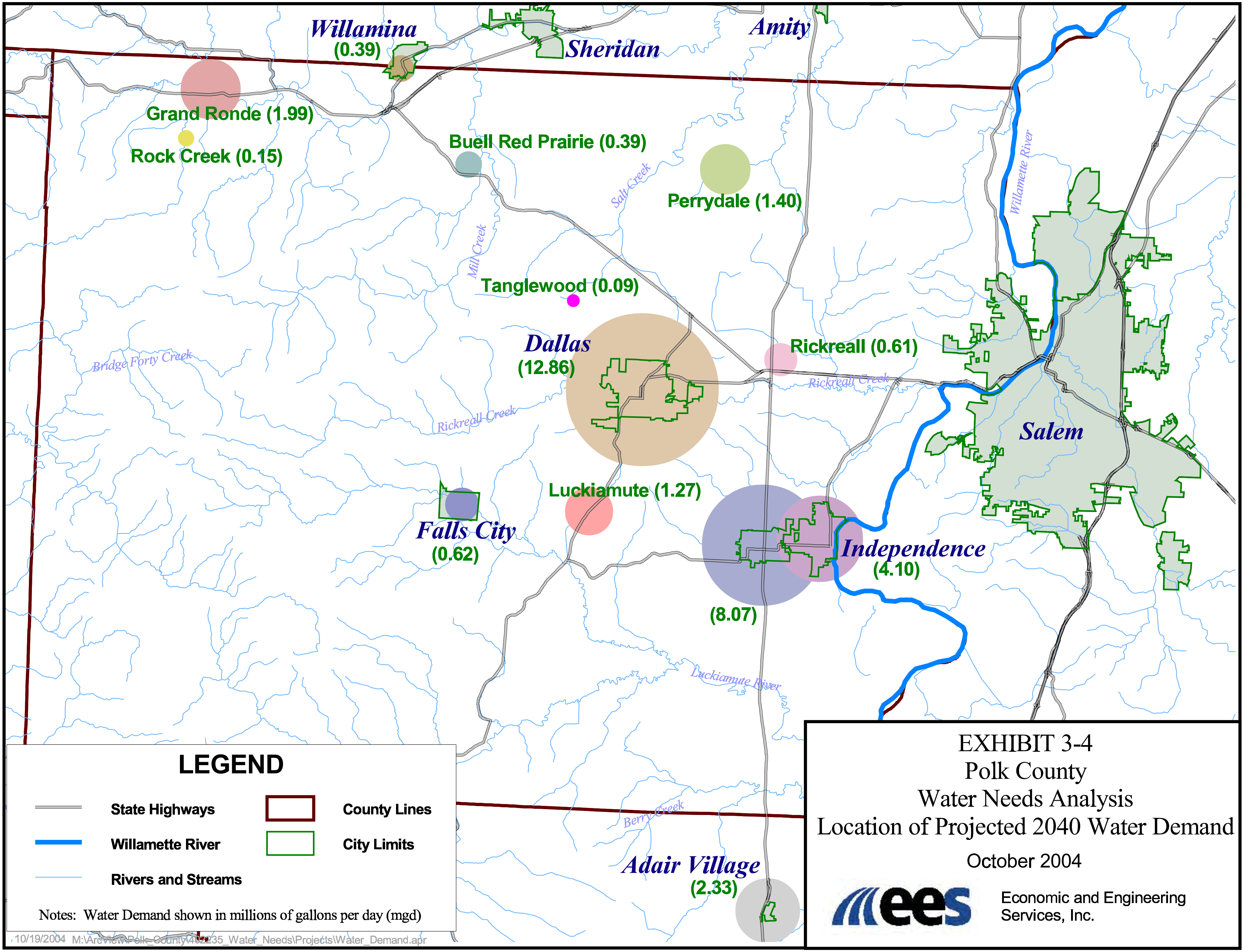


Exhibit 3-3
Polk County
Peak Day Demand (Low, Medium, and High Growth Scenarios)





Notes: Water Demand shown in millions of gallons per day (mgd)

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EXHIBIT 3-4
Polk County
Water Needs Analysis
Location of Projected 2040 Water Demand

October 2004

ees Economic and Engineering
Services, Inc.

Section 4

Future Needs Analysis

4.1 Introduction

The next step in the analysis is to compare the future demand for water with that of available supplies for each water provider, noting future supply needs. The resulting unmet water needs (or water supply deficits) are defined as the difference between the provider's available water and projected water demand. A detailed description of the methods and assumptions used in developing these estimates is provided in the remainder of this section.

4.2 Summary of Existing Water Rights

4.2.1 General Access to Supplies

The water providers involved in this study hold varying amounts of ground and surface water rights, some of which have been fully developed and certificated. Over 40% of the county's population relies on surface water as a source of drinking water. Groundwater supplies another 30% of the population, with the remaining portion being served from a combination of ground and surface water sources. Table 4-1 provides a summary of the total amount of water available to each water provider under existing rights.

Table 4-1
Polk County Water Providers (with Adair Village)
Total Permitted Diversion Rate

Water Provider	Permitted Rate – cfs (mgd)
Perrydale Domestic Water Association	5.34 (3.45)
Monmouth, City of	11.88 (7.68)
Dallas, City of	15.33 (9.91)
Buell Red Prairie Water District	0.84 (0.54)
Independence, City of	7.68 (4.96)
Falls City	5.26 (3.40)
Rickreall Community Water Association	4.37 (2.82)
Grand Ronde Community Water Association	0.74 (0.48)
Luckiamute Domestic Water Cooperative	6.05 (3.91)
Rock Creek Water District	0.14 (0.10)
Willamina, City of	3.80 (2.46)
Adair Village	85.00 (55.0)
Total (with Adair Village)	146.4 (94.6)
Total (without Adair Village)	**61.4 (39.7)**

These numbers were generated from querying the Oregon Water Resources Department's (OWRDs) water rights database and cross referencing those results with documentation and water master plans provided by the individual providers. Exhibit 4-1 provides a summary of points of diversion and their associated water rights for each provider and details how the total permitted capacity shown in Table 4-1 was calculated. In addition, a map was created (Exhibit 4-2) to display the location of that information. It is important to note, the permitted rate of diversion does not take into account seasonal limitations and is nothing more than a summary of the total maximum rate of diversion authorized under the noted water rights.

The numbers indicated the majority of the groundwater rights in the County are located in the low-lying areas adjacent to the Willamette River, while the majority of the surface water sources are in the Rickreall Creek and Luckiamute River drainage areas. Willamina, Grand Ronde Community Water Association, and Rock Creek Water District also have surface water rights in the Yamhill River drainage basin in the northern portions of Polk County. Of the surface water points of diversion, the only water utilities that rely on "live" stream flow (i.e. non-storage related diversions) are the Grand Ronde Community Water Association and the Cities of Falls City and Adair Village.

By contrast, the Cities of Dallas and Willamina, along with the Buell Red Prairie Water District and the Rock Creek Water District, all rely to some degree on surface water releases from reservoirs. The largest being the City of Dallas who holds 1,550 acre-feet of stored water rights in the Mercer Reservoir, located along Rickreall Creek to the west of the City. Others include the Buell Red Prairie Water District who holds 61 acre-feet of stored water rights on a lake fed by Gooseneck Creek and the Rock Creek Water District who holds 0.15 acre-feet of stored water rights on Rock Creek Hideout Reservoir, located directly south of the community of Grand Ronde. The City of Willamina also holds 20 acre-feet of stored water rights on a reservoir along Willamina Creek - a tributary of the Yamhill River.

4.2.2 City of Adair Village Water Rights

Certainly of those rights potentially available, the approximate 85 cfs (55 mgd) available in the City of Adair Village's water rights is an important feature. Because of the mere size of potentially available water under these rights, the TAC and its study participants have a keen interest in the potential for utilizing these rights as a potential source of water for the county. It is important to note, however, several important features associated with these rights. First, the permitted volume of water is outlined under two separate rights. Moreover, each of these rights has special provisions attached that affect their use. The first of these rights is a 1941 certificate for 3 cfs (1.94 mgd) that was originally granted to the U.S. Air Force and later assigned to the City of Adair Village, while the second is a 1971 permit for 82 cfs originally granted to the City of Albany and assigned to the City of Adair Village. Although both the certificate and permit do not accurately identify a place of use that includes the area encompassed by the study participants, the law provides for exemption of this element provided the use of water under these rights remains for municipal purpose.

The more relevant question surrounds interest in potentially moving the point of diversion for each of these rights to support a new intake and treatment plant located downstream of the City of

Albany. To do that, the first of these rights (i.e. 3 cfs certificate) would have to undergo a transfer request. The transfer process, although preserving priority date, is subject not only to an injury test (by potentially affected parties) but also public comment and review, thus opening such a request to intervention by environmental and other public interest groups. By contrast, the second right of 82 cfs is only a permit and cannot be formally transferred. Rather, a change in its point of diversion may be accomplished through an amended permit application, which is again subject to traditional injury tests among other water users, as well as potential intervention by public interest and review.

Thus, the issue raised is one of the value of the City of Adair Village's water rights in comparison to potential public interest garnered in any attempt to modify their use. One of the more contentious issues has been that of the exempt nature of municipal water right holders to the traditional timelines for construction and actual diversion of a permitted right (usually five years). Those opposing the municipal exemption cite the state's over appropriation of waters, especially to municipalities who have potentially more water rights permitted on paper than is required to serve reasonable demand. In making that argument, the opposition commonly cites the existing City of Adair Village water right of 82 cfs – a quantity much larger than potentially needed by the City itself. As a result, this right is at the forefront of environmental group interests and any attempt to modify it will likely result in public intervention.

The alternative is to apply for a new water right on the Willamette River that specifies multiple points of diversion and place of use sufficient to encompass the service area of all study participants. By the state's account, there is sufficient water available for diversion from the Willamette River for new domestic and municipal use. The advantage of such an application is that it will not be subject to the on-going scrutiny of the existing rights held by the City of Adair Village however; it would be granted a much more junior priority date (i.e. the date of the actual application). The seniority of that right, however, may not be a major issue since the state does report the availability of sufficient supplies in the Willamette River at this time and there is no current minimum instream flow standards set on the river. In fact, as of October 1, 2003, the Oregon Water Resources Department (OWRD) reported that 1,000 cfs of water was available from the Willamette River above Mill Creek. The one outstanding issue of interest is that associated with Portland General Electric (PGE). PGE has, however, submitted a pre-1900 claim for a substantial portion of the river at its hydroelectric operations at Willamette Falls. If approved, that claim could require limits on access to essentially all users of the Willamette River, including those defined under the existing City of Adair Village water rights or any new permit application approved by OWRD. Determination of the validity of PGE's claim, however, can only be made through formal adjudication which is not foreseeable at this time.

4.3 Available Water Supplies

Although the water providers listed above have a large amount of permitted water, the actual amount of water available in terms of reliable, high quality sources is usually less. The difference is often related to the natural limits of a well or the limited capacity of installed infrastructure. As a result, to quantify the actual need for water, an estimate of "true" water availability is required. This is the amount of water actually available to a specific provider at any given time. Estimates are often achieved through interviews with operational staff or through reviews of documented capacities in master plans or other planning reports. Factors to be considered include the natural limits of the source, installed infrastructure, operational redundancy, ability to withdraw from various diversions, or reserves for future supply development.

Here, consideration must be given to the reliability and access to water under existing permits. For example, a “live” stream flow right may allow diversions of up to 1 cfs; however, the stream may have an 80% exceedance flow of less than 0.3 cfs – thus, allowing the City to access their full right less than 40% of the time. Similarly, a groundwater well permit may allow for a maximum withdrawal rate of 1,500 gpm, but due limited aquifer productivity the well may only produce 750 gpm. For these two examples, the total water available under existing permits is far less than that permitted on paper. However, for the ground water right, the permit may also allow for a second point of diversion in the same aquifer and access to the full permitted right. By contrast, the stream flow right holder may have fewer options because of seniority and may be limited to the smaller rate of withdrawal due to a lack of reliability of flow at that point in the drainage basin. Thus, natural limits to a given source represent important differences to actual permitted rights and those truly accessible by the permit holder.

Moreover, access to a given source may be limited by the capacity of the infrastructure installed used to divert, treat or distribute the water. For a particular source, the “installed capacity” represents the actual amount of water that can beneficially apply from that source. Exhibit 4-3 provides a map of major points of infrastructure within the study area and graphically depicts the amount of water each provider may produce and distribute through its service area.

In addition, unlike the traditional landowners, municipal and quasi-municipal permit holders may reserve the unused portion of a right for future use. The amount of undeveloped water and plans for its use are a very important component of net available water. This future development may occur under existing permits or, possibly, under newly acquired rights. As a result, some assumptions need to be made with respect to when and how much additional water development will be anticipated under both existing and potential new water rights.

From estimates of reliable amounts of water under each permit, as well as the ability to pump and/or treat and distribute that water, a refined estimate of actual water availability can be generated. This estimate can vary through time as plans for source water development and expansion of infrastructure are executed. From these approximations a more realistic need for water can be evaluated. Table 4-2 provides a preliminary version of water availability estimates.

Table 4-2
Polk County Water Providers with Adair Village
Available Source Capacity (mgd)

	Year					
Provider	**2000**	**2020**	**2025**	**2030**	**2035**	**2040**
Buell Red Prairie	0.54	0.54	0.54	0.54	0.54	0.54
Dallas, City of	9.91	9.91	9.91	9.91	9.91	9.91
Rickreall	1.98	2.82	2.82	2.82	2.82	2.82
Grand Ronde	0.48	0.58	0.58	0.58	0.58	0.58
Luckiamute	1.00	1.58	2.00	2.00	2.00	2.00
Perrydale	0.50	1.00	1.00	1.00	1.00	1.00
Rock Creek	0.06	0.06	0.06	0.06	0.06	0.06
Monmouth, City of	3.10	3.10	3.10	3.10	3.10	3.10
Independence, City of	2.70	2.70	2.70	2.70	2.70	2.70
Falls City	0.35	0.35	0.35	0.35	0.35	0.35
Adair Village	55.00	55.00	55.00	55.00	55.00	55.00
Tanglewood	--	--	--	--	--	--
Willamina	1.00	1.80	1.80	1.80	1.80	1.80
Total (with Adair Village)	76.62	79.44	79.86	79.86	79.86	79.86
Total (without Adair Village)	**21.62**	**24.44**	**24.86**	**24.86**	**24.86**	**24.86**

The numbers shown in this table are intended to provide a starting point and are merely estimates developed from other studies, documented rates of withdrawal (groundwater) or diversion (surface water), well yields, installed pump capacities, and/or treatment capacities.

4.4 Regional Water Supply Deficiencies

This study is focused on developing an estimate of “regional” deficiency in supply to establish a framework with which each entity could enter into a partnership to meet their unmet needs for water through a centralized approach to future source water development. From the estimates shown in Table 4-2, the projected demand for water was compared to the amount of available water and a projected deficiency in source water supply was identified. In determining this deficiency in supply, a few assumptions were required. A first assumption was that if a water provider had an unmet demand, it would not receive any water from providers with a surplus of supply. It is assumed that providers with a surplus of supply would hold that water until their demands reach that level. Table 4-3 shows each provider and their deficiency in water supplies from the present through year 2040. These supply deficiencies are calculated from subtracting the total available water amount shown in Table 4-2 from the peak day water demand previously calculated.

Table 4-3
Polk County Water Providers with Adair Village
Regional Water Supply Deficits – Median Growth (mgd)

	Year											
Water Provider	**2000**		**2020**		**2025**		**2030**		**2035**		**2040**	
	Median	High	Median	High	Median	High	Median	High	Median	High	Median	High
Dallas, City of	5.05	4.56	-0.36	-1.39	-1.03	-2.12	-1.68	-2.84	-2.32	-3.54	-2.95	-4.24
Independence, City of	0.61	0.40	-0.32	-0.62	-0.59	-0.92	-0.86	-1.22	-1.13	-1.51	-1.40	-1.81
Monmouth, City of	0.44	0.17	-1.56	-2.03	-2.25	-2.79	-3.04	-3.65	-3.94	-4.64	-4.97	-5.78
Falls City	0.00	-0.03	-0.11	-0.16	-0.15	-0.20	-0.19	-0.24	-0.23	-0.29	-0.28	-0.34
Willamina	0.79	0.77	1.49	1.46	1.45	1.42	1.42	1.38	1.38	1.34	1.33	1.29
Buell Red Prairie	0.37	0.35	0.35	0.33	0.34	0.32	0.34	0.32	0.33	0.31	0.33	0.31
Rickreall	1.59	1.55	2.38	2.33	2.37	2.32	2.36	2.31	2.35	2.30	2.34	2.29
Grand Ronde	-0.34	-0.43	-0.46	-0.46	-0.40	-0.50	-0.44	-0.54	-0.47	-0.58	0.51	-0.62
Luckiamute	0.35	0.29	0.83	0.76	1.24	1.16	1.22	1.15	1.21	1.13	1.19	1.11
Perrydale	0.16	0.12	0.12	0.03	0.12	0.03	0.12	0.03	0.12	0.03	0.12	0.03
Rock Creek	-0.05	-0.06	-0.07	-0.09	-0.07	-0.09	-0.07	-0.09	-0.07	-0.09	-0.07	-0.09
Tanglewood	-0.06	-0.06	-0.07	-0.08	-0.07	-0.08	-0.08	-0.09	-0.08	-0.09	-0.09	-0.09
Others	-2.72	-2.99	-2.31	-2.54	-2.37	-2.61	-2.44	-2.68	-2.50	-2.76	-2.57	-2.83
Total Water Supply Deficiency	**-3.2**	**-3.6**	**-5.2**	**-7.4**	**-6.9**	**-9.3**	**-8.8**	**-11.3**	**-10.8**	**-13.5**	**-12.8**	**-15.8**

Exhibit 4-4 graphically depicts the region's water supply needs from the present through year 2040. The region shows a water supply deficit of 12.8 mgd under the median growth assumption. The water providers requiring the most water are the Cities of Dallas, Grand Ronde Community Water Association, and eventually, due to projected growth, the Cities of Monmouth and Independence. In 2040, the water providers showing no need for water are Perrydale Domestic Water Association, Luckiamute Domestic Water Cooperative, Rickreall Community Water Association, Buell Red Prairie Water District, and the City of Willamina. However, it's important to note that these results will be strongly affected from the estimates for "available" water shown in Table 4-2.

The estimates, as calculated using the high growth assumptions for the region, show a water supply deficit of over 15.8 mgd by year 2040. The high growth assumption has no impact on when water supply deficits occur. As compared to the median growth assumptions, the total supply deficit increases by 3.0 mgd to 15.8 mgd by year 2040.

Under any of the growth assumptions, the Cities of Dallas, Monmouth, and Independence make up the majority of the region's water supply deficits as shown in Exhibit 4-5 for the high growth assumption. The other water providers (including Adair Village) exhibit relatively small supply deficits and when treated as one entity show enough available water to meet projected 2040 demands.

4.5 Distribution of Regional Demand

When evaluating viable options for meeting future water needs, the distribution of the demand across the region will have a large impact on selection of a water supply option. As a result, the demand of each of the entities was mapped to provide a visual representation of how this demand varies across the county. Exhibit 4-4 shows that over 75% of the region's demand centers around the Cities of Dallas, Monmouth, and Independence.

4.6 Geographical Distribution of Need

Consideration must also be given to the geographical distribution of water need, as depicted in Exhibit 4-6. This fact will play an important role in the decision as to the location of any future supply development and the cost associated with the delivery of water for the study participants. Certainly, this element is not the only factor that important in the final decision to develop a particular source, however, given the distance between the various participants and the potential source locations, the spatial distribution of water need will be a key element in the costs associated with any such decision.

In many cases, delivering surplus water will not be a feasible option due to the cost of transmission and pumping. These considerations and others will be discussed in further detail through evaluation of water supply options. From the estimates for water needs identified in this document, a list of potential water supply options will be developed along with a set of evaluation criteria with which to compare and weight those options relative to each other. The end result will be selection of the most viable supply options for all concerned parties with which to conduct future plans for source water development and infrastructure expansion.

Exhibit 4-1

Summary of Permitted Capacity - Polk County Water Providers and Adair Village

Provider	Permit Type	Permit Number	Certificate	Source	Use	Permitted Rate (cfs)
Perrydale	G	10986	-	WELL 4	QM	0.33
	G	10987	-	WELL 2A	QM	0.13
	G	12721	-	WELL A	QM	4.00
		12721	-	WELL B	QM	-
		12721	-	WELL C	QM	-
		12721	-	WELL D	QM	-
		12721	-	WELL E	QM	-
		12721	-	WELL F	QM	-
		12721	-	WELL G	QM	-
		12721	-	WELL H	QM	-
		12721	-	WELL I	QM	-
		12721	-	WELL J	QM	-
		12721	-	WELL K	QM	-
		12721	-	WELL L	QM	-
		12721	-	WELL M	QM	-
		12721	-	WELL N	QM	-
		12721	-	WELL O	QM	-
		12721	-	WELL P	QM	-
		12721	-	WELL Q	QM	-
		12721	-	WELL R	QM	-
	G	6352	60020	A WELL	QM	0.20
	G	10908	-	WELL 3	QM	0.67
Perrydale Total						**5.34**
Monmouth, City of	G	8579	-	WELL #1	MU	5.00
		8579	-	WELL #2	MU	-
	G	4818	62436	WELL 4	MU	0.55
		4818	62436	WELL 5	MU	0.33
	G	12976	-	WELL A	MU	6.00
		12976	-	WELL B	MU	-
Monmouth, City of Total						**11.88**
Dallas, City of			80166	CANYON CR	MU	0.77
			38631	RICKREALL CR	MU	0.50
	S	4053	68474	APPLEGATE CR	MU	4.00
		4053	68474	ROCKHOUSE CR	MU	-
		4053	68474	RICKREALL CR	MU	-
	S	26397	80163	A RES	MU	10.00
	S	33202	39181	DALLAS RESERVOIR	DO	0.06
		33202	39181	RICKREALL CR	DO	-
Dallas, City of Total						**15.33**
Buell Red Prairie	S	51165	-	GOOSENECK CR	GR	0.17
	G	8748	-	WELL #1	QM	0.45
		8748	-	WELL #2	QM	0.22
Buell Red Prairie Total						**0.84**
Independence, City of	S	14237	-	S FK ASH CR	RC	1.00
	GR	3141	-	WELL 1	MU	0.56
	GR	3142	-	WELL 2	MU	0.89
	GR	3143	-	WELL 3	MU	-
	G	10375	-	WELL 4	QM	0.89
		10375	-	WELL 5	QM	1.34
	G	12134	-	A WELL	MU	2.00
	G	13015	-	WELL 4	MU	1.00
		13015	-	WELL 5	MU	-
Independence, City of Total						**7.68**

Exhibit 4-1

Summary of Permitted Capacity - Polk County Water Providers and Adair Village

Provider	Permit Type	Permit Number	Certificate	Source	Use	Permitted Rate (cfs)
Falls City	S	2700	1832	UNN STR	MU	1.00
	S	4592	5072	BOUGHEY CR	MU	0.50
	S	13970	14247	LITTLE LUCKIAMUTE R	IM	0.50
	S	35215	39319	A SPR	MU	0.26
	S	35222	-	BERRY CR	MU	1.00
	S	46807	-	GLAZE CR	MU	2.00
Falls City Total						**5.26**
Rickreall	G	5701	-	WELL #1	QM	0.27
	G	11288	-	WELL 2	QM	0.74
		11288	-	WELL 3	QM	0.74
		11288	-	WELL 4	QM	0.74
	G	11977	-	WELL 5	CM	0.56
		11977	-	WELL 5	DO	-
	G	12403	-	WELL 6	QM	1.32
Rickreall Total						**4.37**
Grand Ronde	S	15608	68530	ROCK CR	QM	0.30
	S	41436	-	SPR AREA	GD	0.44
	S	41437	-	SPR AREA	QM	-
Grand Ronde Total						**0.74**
Luckiamute	G	4480	-	A WELL	GD	1.00
	G	6093	-	A WELL	QM	0.52
	G	8747	-	ONE WELL	GD	0.78
	G	9543	-	WELL 1	DO	0.05
		9543	-	WELL 2	DO	-
		9543	-	WELL 3	DO	-
	G	12001	-	WELL 1	QM	3.70
		12001	-	WELL 2	QM	-
		12001	-	WELL 3	QM	-
		12001	-	WELL 4	QM	-
Luckiamute Total						**6.05**
Rock Creek	S	32029	-	UNN STR	MU	0.14
		32029	-	ROCK CR HIDEOUT RES	MU	-
Rock Creek Total						**0.14**
Adair Village	S	15077	28782	WILLAMETTE R	DO	3.00
Adair Village Total						**3.00**
Willimina	S	14420	-	WILLAMINA CR	DO	0.45
	S	15022	-	WILLAMINA CR	MU	0.70
		15022	67793	WILLAMINA CR	FI	0.20
	S	127	1018	LADY CR	MU	1.00
	S	23560	-	WILLAMINA CR	MU	1.45
Willimina Total						**3.80**
Grand Total						**64.42**

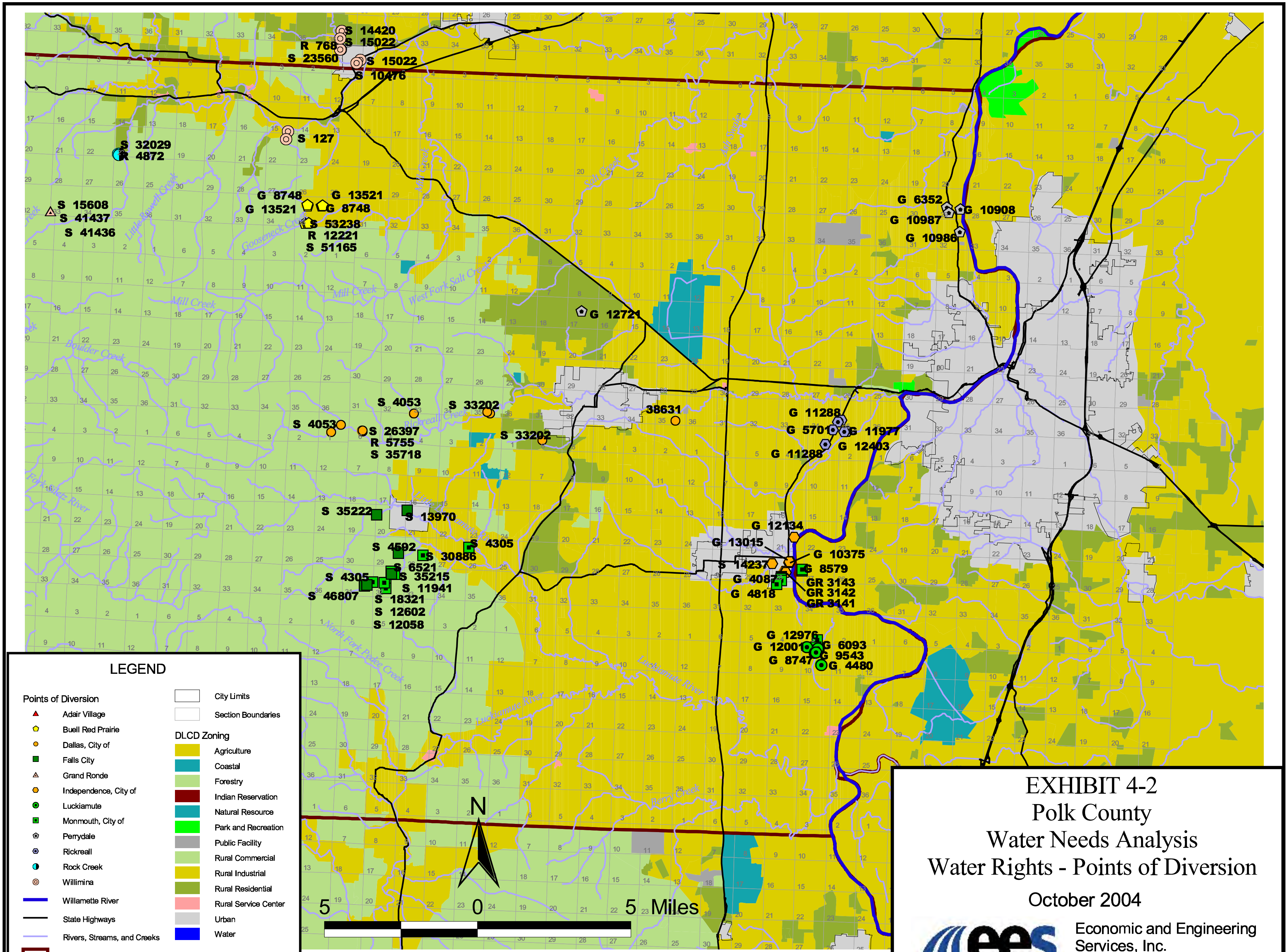

EXHIBIT 4-2
Polk County
Water Needs Analysis
Water Rights - Points of Diversion

October 2004

Economic and Engineering Services, Inc.
Bellevue Mount Vernon Olympia Portland Tri-Cities

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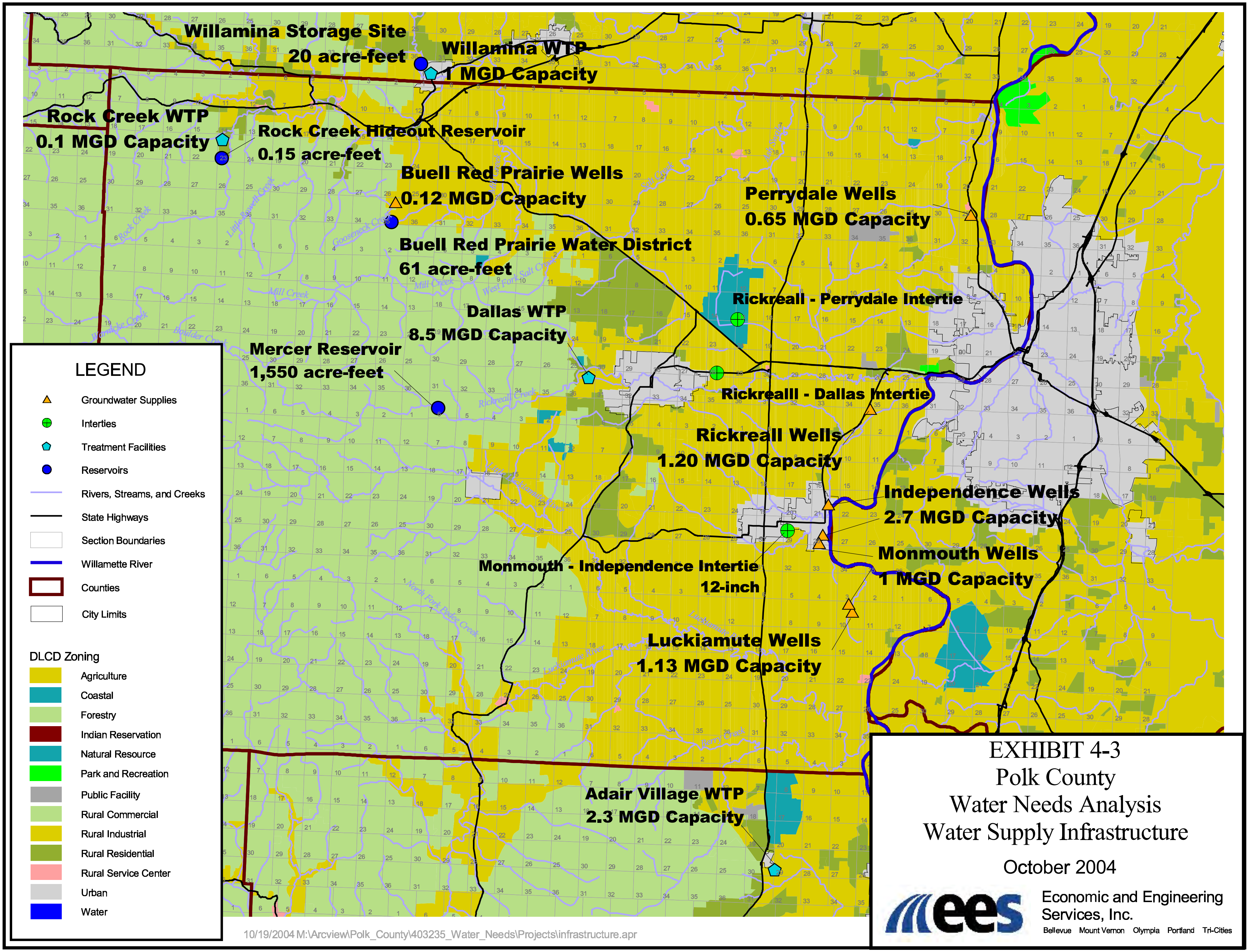


EXHIBIT 4-3
Polk County
Water Needs Analysis
Water Supply Infrastructure

October 2004

Economic and Engineering Services, Inc.
Bellevue Mount Vernon Olympia Portland Tri-Cities

Exhibit 4-4

Polk County - Water Needs Analysis

Water Supply Deficiencies (mgd) - Median Growth Assumption

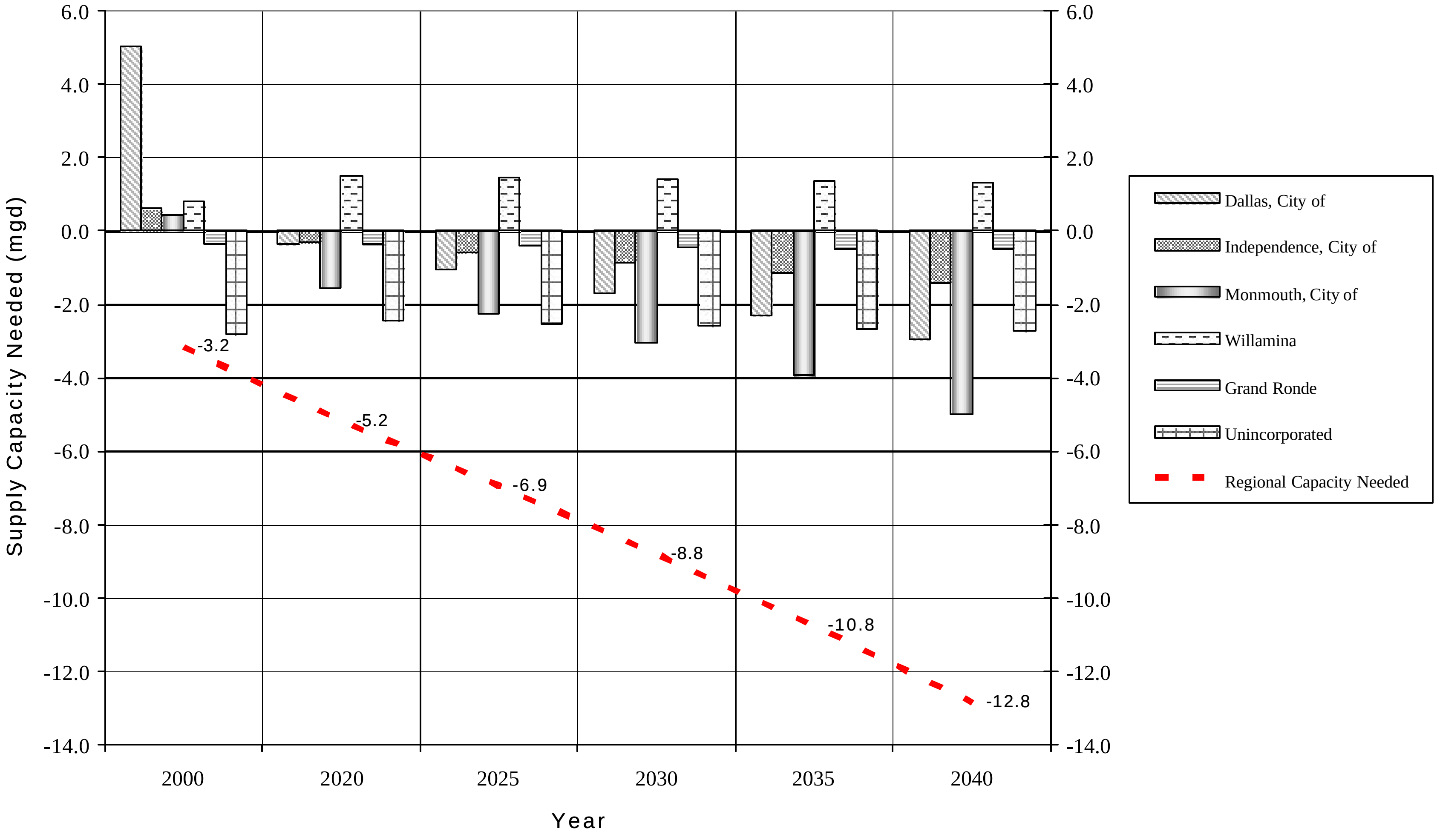
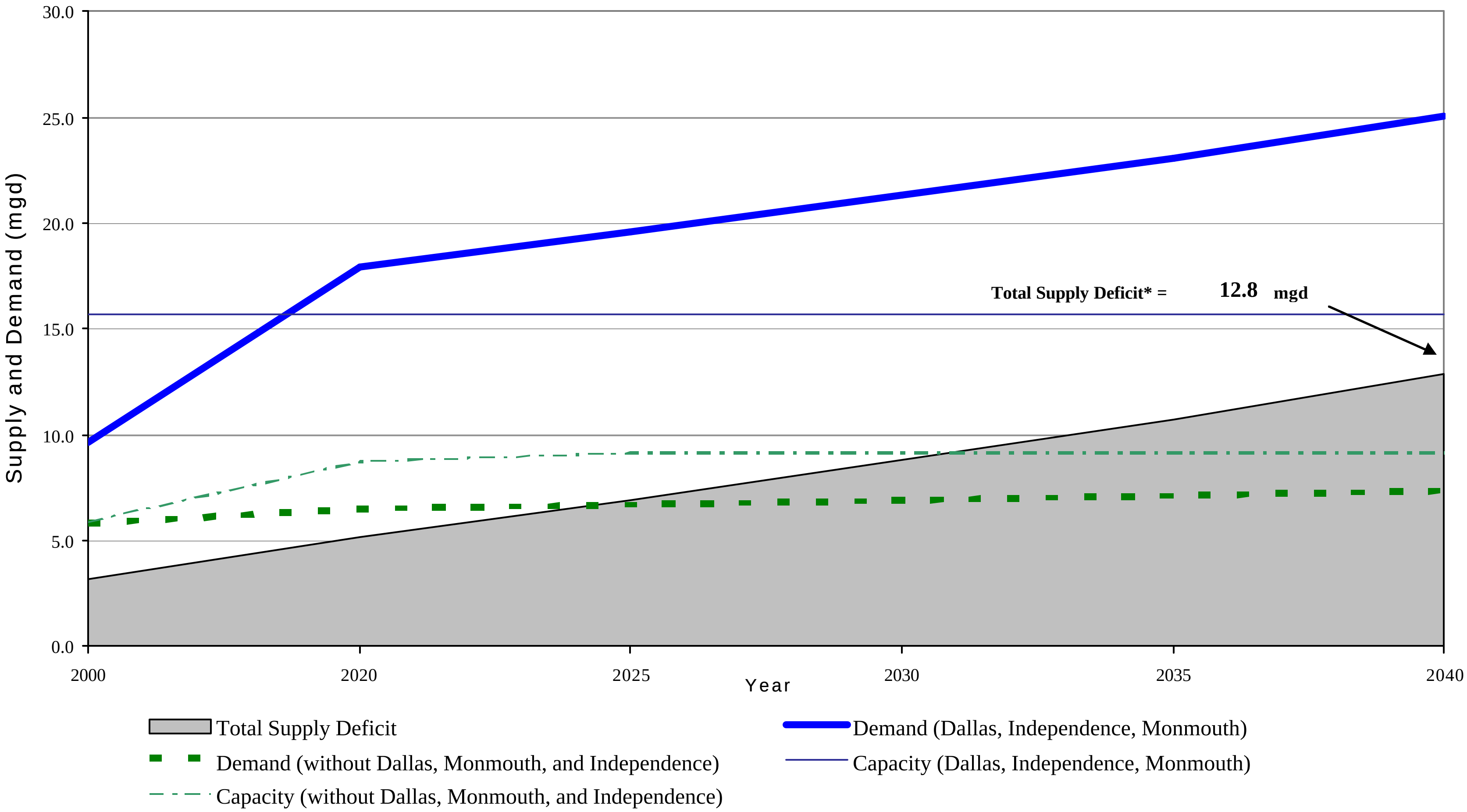
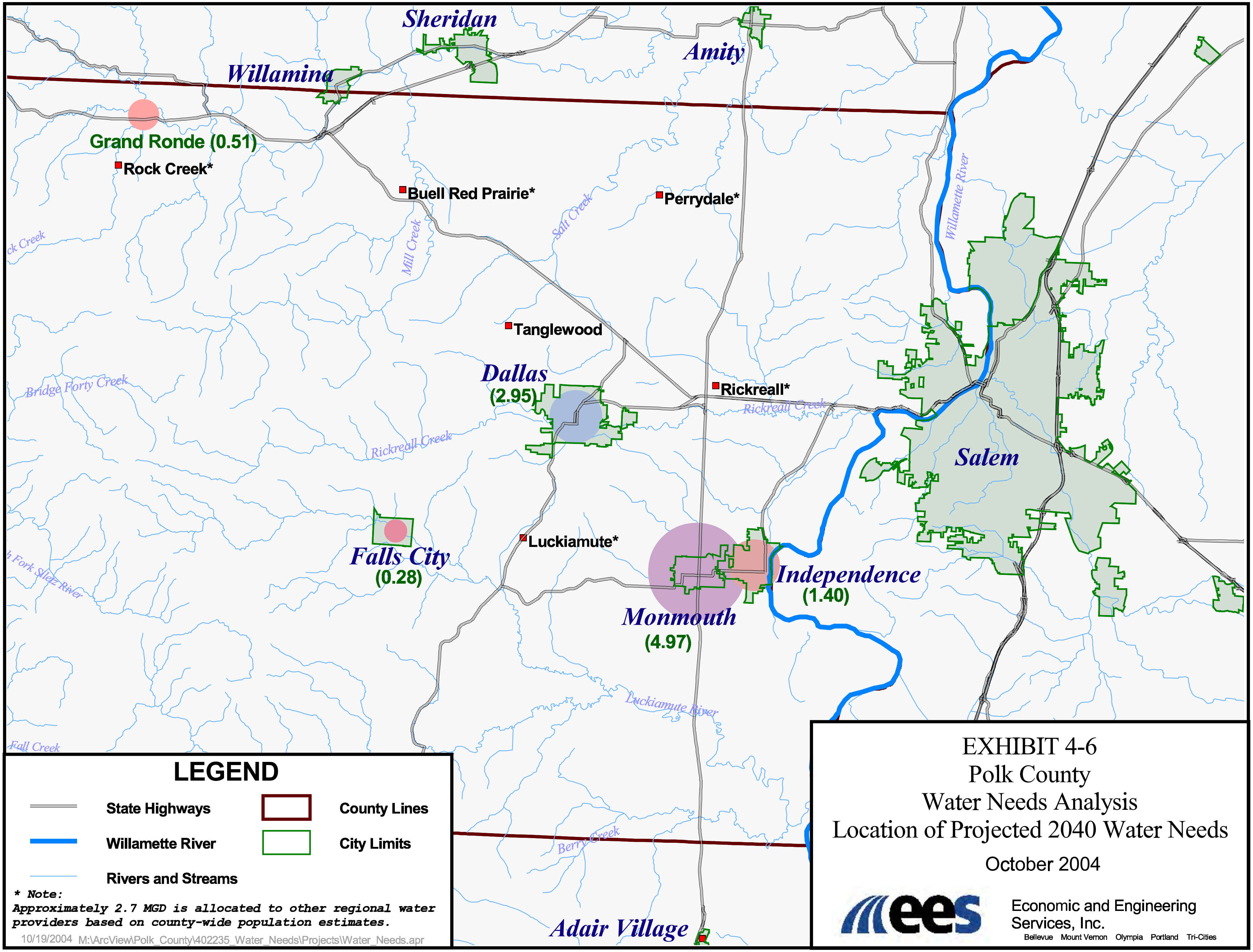


Exhibit 4-5
Polk County - Water Needs Analysis
Future Supply Capacity vs. Maximum Day Demands (Median Growth Assumption)



** Using median growth assumptions.*



LEGEND

═	State Highways	🟥	County Lines
━	Willamette River	🟩	City Limits
─	Rivers and Streams		

*** Note:**
Approximately 2.7 MGD is allocated to other regional water providers based on county-wide population estimates.

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EXHIBIT 4-6
Polk County
Water Needs Analysis
Location of Projected 2040 Water Needs

October 2004

ees Economic and Engineering Services, Inc.
Bellevue Mount Vernon Olympia Portland Tri-Cities

Section 5

Supply Strategies

5.1 Introduction

The objective of this section is to provide a summary of source water options and to propose a set of evaluation criteria with which to guide the future selection of preferred alternatives. In developing potential supply options, primary recognition was given the many studies that have already been conducted regarding possible source option for the area. From this information, five main categories of potential supply options were established that include: (1) use of the Willamette River; (2) development of off-stream (surface water) storage; (3) expansion of ground water withdrawals; (4) creation of aquifer storage and recovery (ASR) projects and (5) conservation and reuse. Within these categories, various sub-options have also been proposed that reflect a variety of uses or implementation strategies for a particular source. The details of the various options are outlined in the sub-section that follows below.

In addition, a set of evaluation criteria was developed for use in evaluating the various options and establishing a framework for conducting a comparative analysis among approved alternatives. The criteria are similar to those used in prior assessment of source options for the Portland Metropolitan Water Provider's Consortium - Regional Water Supply Plan and for the City of Salem's Water Management Plan. Details of those propose criteria are presented at the end of this section.

5.2 Water Supply Alternatives

5.2.1 General Water Supply Conditions

The major goal of the study participants is of course to identify a cost-effective, reliable, high-quality, long-term source of water for the region. In general, the various alternatives are essentially linked to either the expansion of surface water diversions or ground water withdrawals, or the creation of additional storage of off-peak season water. In competition, of course, are a growing need to protect threatened and endangered species, particularly those of anadromous fish, and to restore impaired or contaminated sections of stream or ground water reserves.

Complicating this picture is the hydrology of the area for which there is typically an abundance of surface water available in the winter and early spring and an over appropriation of that same resource during summer and fall. Moreover, ground water resources in Polk County are somewhat limited – the geology is such that the aquifers are not highly productive and surficial units are vulnerable to contamination from agriculture or urbanization. The physical setting of the region is such that precipitation follows surface or sub-surface pathways to streams resulting in rapid runoff and limited natural water storage (McCarthy 1997). The relatively small amounts of natural storage and low permeability of the region's aquifers contribute, in general, to a quick decline in streamflow once precipitation ceases. Moreover, recharge to the ground water system, especially the deeper confined units, is limited and withdrawals are often subject to rapid water level decline.

On the surface water side, Rickreall Creek as well as the Luckiamute, Yamhill, Siletz, and Willamette River basins are the principal drainage features within the region, along with the Willamette River situated along the east side of the County. In turn, the area's ground water reserves are marked by low aquifer permeability, resulting in wells and springs with relatively low yields. The only reliable ground water supplies in the region are located in the local alluvial deposits along the Willamette River. Consolidated rocks are exposed in over 70% of the region – most of which form limited ground water reserves with low yields and poor water quality (high iron and manganese, along with hydrogen sulfide in some areas).

The limited peak season capacity of sources, coupled with mounting environmental interest, pose considerable constraints into the future for expanding withdrawals or diversions during critical times of need. Possible source alternatives must look to provide a productive, high-quality, reliable source of water for decades to come. Moreover, any such source must be able to withstand the scrutiny of potential injury to senior water right holders and public interest in the restoration of fish and wildlife habitat, in-stream water quality and natural flows.

With these constraints in mind, a series of potential source alternatives has been developed that encompass the range of feasible alternatives. Detailed descriptions for each of the proposed alternatives are outlined in the sub-sections below. In addition, a map has been created for assisting in locating the alternatives within the County and is provided as Exhibit 5-1.

5.2.2 Willamette River

All options for securing a source of supply from a Willamette River point of diversion involve treatment and transmission of the finished water to areas with supply deficiencies. The location of this additional infrastructure should be similar under all options. Possible methods for securing Willamette River supplies involve using a portion of the Adair Village water right, purchase of uncontracted water from the Army Corps of Engineers, and application for a new water right and associated point of diversion. Each of the options mentioned above will have their own implications with regards to water availability, environmental impacts, capital and operating costs, and other criteria agreed upon by the TAC.

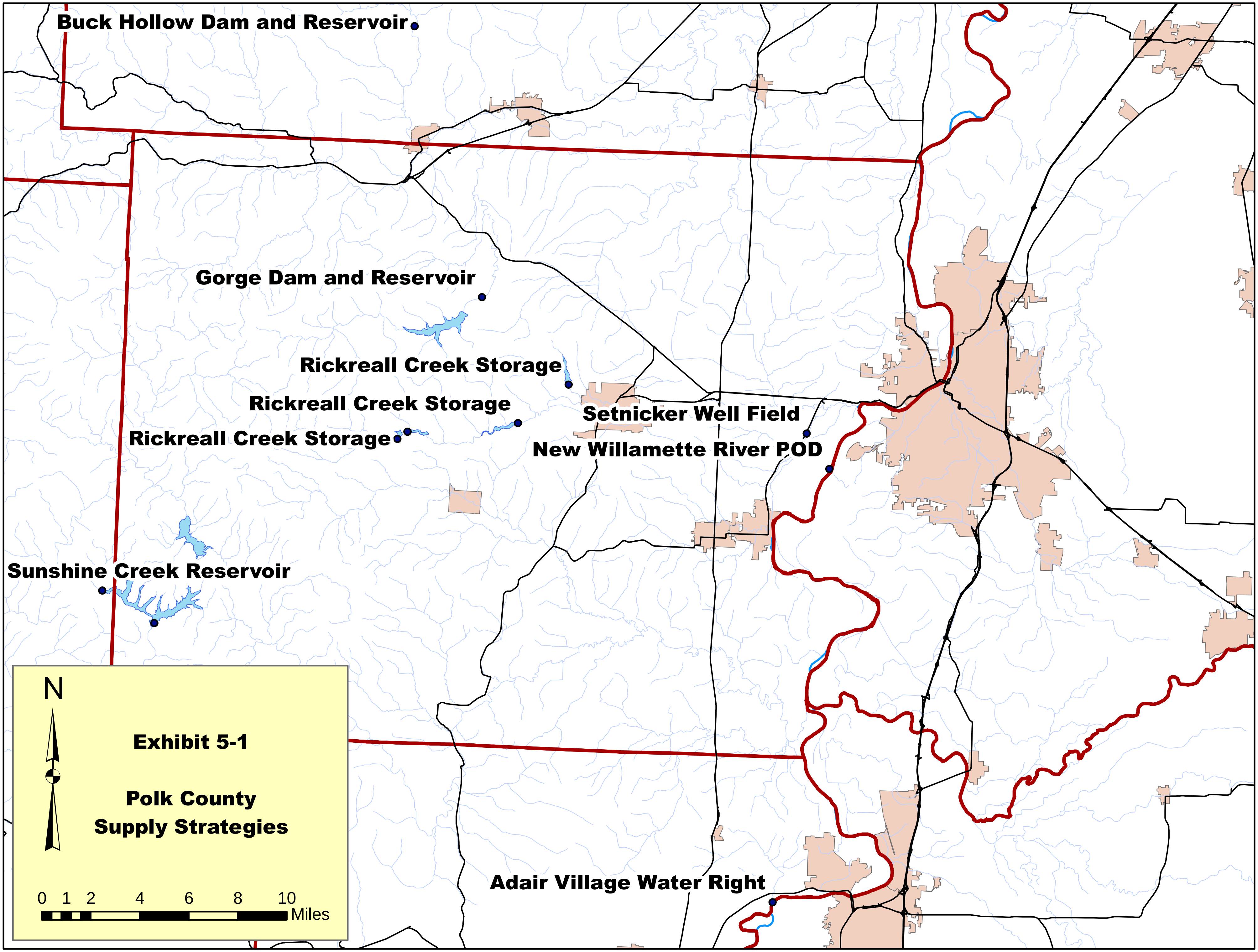


Exhibit 5-1

Polk County Supply Strategies

Willamette River Option #1 (WR-1)

The county has recently negotiated an agreement with the City of Adair Village to reserve an option on at least 50 cfs of water for a minimum three-year period. The county is committed to evaluating the feasibility of purchasing or transferring a portion of this right to a location suitable for the county's water providers. The Adair Village right (Permit S-35819) identifies the City of Adair Village and the City of Albany as places of use. In order for the county to be legally allowed access to this right a transfer application must be submitted pursuant to OAR 690-015-001. These regulations specify that any change in place of use, use, or point of diversion requires a formal water right transfer subject to public comment and administrative review. The county would need to submit a change in place of use and a secondary point of diversion closer to the county's major demand centers (i.e. the Cities of Dallas, Monmouth, and Independence).

This option, however, is intended to focus on the use of the existing City of Adair Village Willamette River diversion and treatment plant. This option would look to expand that plant under staged improvements that include an initial expansion to around 4 mgd and then a future expansion to 12 mgd or more. The initial expansion option was identified in a recent master planning effort conducted by the City of Adair Village. That report identifies a possible 4 mgd expansion for a $1 million budget. Although that cost estimate has been questioned, such an option affords a very economical means for achieving a 4 mgd capacity. However, because of the location of the City of Adair treatment facilities, this option also includes a substantial transmission component required to pump finished water to the major points of future demand.

Willamette River Option #2 (WR-2)

This option involves the use Willamette River under a point of diversion near the City of Independence which would be fed by a new water right on the river or a transferred component of the existing City of Adair Village water right(s). This option includes a new diversion and intake, treatment plant, transmission main, and pumping. At issue, however, is the level of treatment that may be required for a diversion downstream of the industrial discharges in the City of Albany. Although not formally a technical question, especially in meeting federal and state safe drinking water standards, the issues really center on social and political interest that may be attached to such a point of diversion, requiring an expanded level of treatment in order to satisfy public concern - such as that experienced during the City of Wilsonville's recent decision to build a new water treatment plant using the Willamette River.

Willamette River Option #3 (WR-3)

This option is really a modification of Option #2 above (but could also apply to Option #1, as well). Here, an element is added to the creation of a treatment plant, transmission main, and pumping that includes the purchase of contracted storage from the U.S. Army Corp of Engineers (USACE). The USACE owns and operates several dams and impoundments throughout the Willamette River basin. Entering into an agreement with the USACE to purchase of a portion of that storage would greatly increase the reliability of supply without acquisition of new water rights or transfer of the existing Adair Village right. Also, an agreement with USACE for stored water may be considered a more reliable source of supply than a newly acquired water right with a considerably junior priority date, since storage releases are not considered as part of live, natural stream flow. Corps of Engineers reservoirs in the Willamette River basin contain about 1.6 million acre-feet of uncontracted storage (USBR 1992).

5.2.3 Surface Water Storage

Various studies have already been conducted that focus on off-stream storage development throughout the County. The most prominent of these studies is a comprehensive examination of potential surface water storage options conducted by the U.S. Bureau of Reclamation (USBR) in 1992 and a more recent consulting report prepared for the cities of Dallas, Monmouth and Independence, completed in 2003. The most feasible of the supply alternatives outlined in those reports are described in their respective subsections below. In all cases, these options include not only the creation of a new dam and impoundment but also a new intake, treatment plant, transmission main, and pumping facilities (as outlined under option WR-2):

Storage Site #1 - Gorge Dam and Reservoir (R-1)

Storage site #1 is potential storage options in the Yamhill River Basin. Under an USBR report done in 1992, the two potential storage sites were the Gorge and Buck Hollow sites. The Buck Hollow site is located on Willamina Creek directly north of the City of Willamina. The Gorge site is located on Mill Creek directly south of State Highway 22. The USBR reported slightly higher construction and operations cost estimates for the Buck Hollow site. The Gorge site's costs were approximately 10% less on a per acre-feet basis. Under the study there were two alternatives, one which met only municipal, domestic and industrial (MD&I) needs and a second which met both MD&I and enhanced stream flows for anadromous fish. Since the Buck Hollow site is within Yamhill County and is unacceptably far from Polk County's demand centers, this report will only consider the Gorge Dam option within the Yamhill River basin. The Gorge site would provide a total of 4,600 acre-feet of storage for the Alternative 1 (MD&I only) a total of 19,500 acre-feet for Alternative 2 (MD&I and flow augmentation). Total estimated annual cost including construction, operations, and maintenance was identified as $2.10 million for Alternative 1 and $2.57 million for Alternative 2. These cost estimates are as identified in the USBR report and are based on January 1992 prices.

Storage Site #2 - Big Rock/Sunshine Creek Dam and Reservoir (R-2)

Storage site #2 is potential storage options on in Siletz River Basin. The two potential storage sites in the Siletz River Basin were the Big Rock Creek site and Sunshine Creek site. Estimated peak water inflow is 6,500 cfs at the Big Rock Creek site and 4,490 cfs at the Sunshine Creek site. The USBR report identified four alternatives, three of which listed Polk County's MD&I water needs as an objective. One alternative involves Big Rock Creek reservoir with up to 31,000 acre-feet of storage with a pumping plant and pipeline conveying water into the Luckiamute drainage basin for MD&I use only. A second alternative included the addition a reservoir on Sunshine Creek for a total storage of 41,600 acre-feet which would allow for flow augmentation for anadromous fish in both the Siletz and Luckiamute drainage basins. The first alternative had an annual cost, including construction, operations, and maintenance, of $1.91

million and $3.70 million for the second alternative (both Big Rock Creek and Sunshine Creek reservoirs).

Storage Site #3 – Rickreall Creek Storage (R-3)

Storage site #3 is one of five sites designed to store water in the Rickreall Creek drainage basin. Two sites are immediately upstream of the existing Mercer Reservoir site. The other three sties are on tributaries of Rickreall Creek. These sites would provide up to 2,200 acre-feet of stored water specifically for MD&I use (CH2MHill 2003). The five alternatives had construction costs ranging from $12.6 million to $17.9 million dollars.

5.2.4 Groundwater

The one major ground water supply alternative is centered around the Setnicker Well Field. This feature is an area of potentially high producing wells located in the lowlands near the Willamette River. This well field is situated near Rickreall Community Water Association's wells south of State Highway 22. These wells are completed into geologic region known as the American Bottom Area. This region consists of both old and young alluvium deposited by the Willamette River – comprised primarily of gravel, sand, and silts. The saturated thickness of the sand and gravel deposits vary from 10 to 35 feet (OWRD 1983).

This region may provide a potential source for development of high capacity wells to meet future water needs. However, the relatively small total saturated thickness and limited extent of the younger higher producing sands and gravels may provide serious constraints in terms of both availability and reliability as a future supply source. Currently, the majority of ground water supply in the region are drawn from these sand and gravel formations. The cities of Monmouth and Independence, along with the Luckiamute Domestic Water Cooperative, Perrydale Domestic Water Association, and Rickreall Community Water Association, all rely on these formations as a water supply source.

ASR Development

This option involves the development of aquifer storage and recovery wells for off-season storage of finished water. Raw water would be diverted from an intake at one of the area's streams or rivers, treated, and pumped to the ASR wells during the winter season. Therefore, during peak season months when surface water diversion would be limited, the ASR wells would meet the deficiency in demand.

5.2.5 Conservation and Reuse

Effective management of water resources includes an examination of the potential for conservation and reuse. The range of sub-options here includes traditional conservation, reuse of wastewater or industrial process water, and non-potable uses of identified source water. Although not intended to be a detailed analysis of the ability to meet supply needs and the expected costs of various conservation and reuses measures, this section does provide a general discussion of these types of water supply alternatives.

Conservation

Conservation covers a wide array of management and programmatic activities. Some of the more common activities include the use of low flush toilets and wash machines, pricing (rates), leak detection and repair, managed irrigation, alternative landscaping, and public education. It is generally accepted that a well-implemented conservation program could reduce water consumption by approximately 5% to 10%. Greater reduction in water use would be contingent on the customer base (i.e. percentage of commercial/industrial and residential accounts), the level of effort put forth on previous conservation measures, and other considerations that vary widely between different water systems.

The costs and benefits of these activities is wide ranging. Often, implementation requires a more detailed analysis of the tradeoffs for various programmatic options and technology deployment. Notwithstanding, recent new revisions regarding municipal water management and conservation planning under OAR 690-086 indicates that at a minimum water utilities should be aggressively pursuing at least:

- Full metering of customer use
- Meter testing and maintenance programs
- Leak Detection and Repair
- Annual water auditing
- Rate structures based on metered use
- Public education programs

Reuse

One of the more widely discussed reuse options is that of recycled municipal wastewater or commercial process water. Use in wide spread municipal application is often proven to be too costly in terms of other alternatives, largely because of health restrictions associated with the requirements for separating the distribution of “grey water sources.” However, there are a number of communities that have developed successful reuse programs. Certainly, one of the more widely known program on the West Coast is that operated by the City of San Diego – where hundreds of miles of “purple pipe” have been laid for distributing recycled water to golf courses, commercial applications and other non-potable uses. Closer to home, the City of Medford is embarking on the development of a fairly large project that would reuse wastewater effluent for irrigation of commercial agriculture. As time moves forward, so does the technology and feasibility for such options. In general, from a perspective of costs and feasibility, a reuse program lends itself to urban environments where large volumes of water usage and sales provide an economy of scale that are not typically experienced in more rural settings.

Non-Potable Source

Similar to reuse, the option here might target the use of the non-treated (raw) water for commercial or industrial application, such as irrigation or process operations in which a high, quality source water is not needed. As mentioned in the discussion of reuse, this type of alternative would be most economical in an environment with large water users and a relatively large percentage of commercial/industrial customers.

A summary of the proposed source alternatives is outlined in Table 5-1.

Table 5-1
Polk County
Proposed Water Supply Alternatives

Source Option	Description
Willamette River	
Willamette River #1 (WR-1) Adair Village Plant	This option involves the use of the existing surface water diversions on the Willamette River and upgrades to the Adair Village Plant.
Willamette River #2 (WR-2) Newly Acquired Water Rights	This option involves the use of a newly constructed plant on the Willamette River at a point of diversion agreed upon by the TAC near the City of Independence.
Willamette River #3 (WR-3) Existing Corps of Engineers Storage	Contracted storage is available in existing federal reservoirs located throughout the Willamette River basin. This source of water would be purchased through contract and diverted at a Willamette River point of diversion.
Storage Site #1 (R-1) Gorge Dam	Storage site #1 is Yamhill River basin storage along Mill Creek identified as the Gorge Dam and Reservoir site. This option involves a 4,600 acre-feet reservoir for a MD&I use for both Polk and Yamhill County or a 19,500 acre-feet reservoir for both Polk and Yamhill County MD&I use as well as streamflow augmentation in the Yamhill River basin.
Storage Site #2 (R-2) Big Rock Creek	Storage site #2 is Siletz River basin storage along either Big Rock Creek and Sunshine Creek. The Big Rock Creek proposed dam and reservoir would provide up to 31,000 acre-feet of storage for Lincoln and Polk County MD&I use and flow augmentation in the Siletz River. A two reservoir option involving two dams on Big Rock Creek and Sunshine Creek would create 41,600 acre-feet of storage and would provide MD&I use for both Lincoln and Polk Counties and streamflow augmentation in both the Siletz River and Luckiamute River basins.
Storage Site #4 (R-3) Rickreall Creek	Storage site #3 is one of five sites designed to store water in the Rickreall Creek drainage basin. Two sites are immediately upstream of the existing Mercer Reservoir site. The other three sties are on tributaries of Rickreall Creek. These sites would provide up to 2,200 acre-feet of stored water specifically for municipal, domestic, and industrial use (CH2M Hill 2003).
Groundwater	
Setniker Well Field (G-1)	The Setnicker Well Field is an area of potentially high producing wells in the low-lying areas near the Willamette River. This area is located in the northeast portion of the county directly northwest of the City of Salem.
ASR Development	
ASR Development (ASR-1)	This option involves the development of aquifer storage and recovery wells for off-season storage of finished water. Raw water would be diverted from an intake at one of the area's streams or rivers, treated, and pumped to the ASR wells during the winter season. Therefore, during peak season months when surface water diversion would be limited, the ASR wells would meet the deficiency in demand.

Table 5-1 (cont'd)
Polk County
Proposed Water Supply Alternatives

Source Option	Description
Conservation and Reuse	
Conservation	Conservation covers a wide array of management and programmatic activities. Some of the more common activities include the use of low flush toilets and wash machines, pricing (rates), leak detection and repair, managed irrigation, alternative landscaping, and public education.
Reuse	Activities targeted at the use of recycled municipal wastewater or commercial process water. Use in wide spread municipal application is often proven to be too costly in terms of other alternatives, largely because of health restrictions associated with the requirements for separating the distribution of "grey water sources." However, there are a number of communities that have developed successful reuse programs. As time moves forward, so does the technology and feasibility for such options.
Non-Potable Source	Similar to reuse, the option here might target the use of the non-treated (raw) water for commercial or industrial application, such as irrigation or process operations in which a high, quality source water is not needed.

5.2.6 Other Options

Through the analysis of options, three other alternatives were examined and then later excluded due to one or more fatal flaws. Those options included:

- Valsetz Dam and Reservoir
- Willamina Creek Storage
- Rickreall Creek Storage and Groundwater Development

The major reasons for exclusion of these options were owed to difficulty in delivery of source water to a regionally acceptable location, lack of sufficient supply capacity, and redundancy with regards to the other options already being considered.

5.3 Select Evaluation Criteria

The general approach to developing evaluation criteria is to develop a set of policy objectives, which in turn are used to develop the evaluation criteria. The policy objectives are used not only to evaluate the alternative resources, but also to design them. A collaborative process can be used to develop the policy objectives including public input.

The policy objectives are developed such that they faithfully reflected the issues important to the region and are useful to policymakers in distinguishing among alternative resource futures. The policy objectives are intended to serve as guiding principles in evaluating various resource supply strategies for the region. These policy objectives complement, compete, and/or conflict with one another in such a way as to provide a comparative framework for which various options could be analyzed. For this reason the policy objectives are not prioritized. Rather, they are used as key guidance for developing resource strategies that account for the uncertainties and tradeoffs that must be made among different, and often competing, objectives and interests.

These policy objectives are often developed as part of a public input process or as part of an open workshop conducted among water provider policy staff. As an aside, similar studies have already been conducted by several major water providers in the Portland metropolitan area. The associated policy objectives were developed in a lengthy public process and cover the range of needs identified in Polk County, as well. A summary of these policy objectives is listed in Table 5-2.

Table 5-2
Polk County Water Needs Assessment
Potential Policy Objectives for Source Options

Efficient Use of Water

- Maximize the efficient use of water resources, taking into account current and emerging conservation opportunities, availability of supplies, practicality, and relative cost-effectiveness of the options
- Make the best use of available supplies before developing new ones

Water Supply Reliability

- Minimize the frequency, magnitude and duration of water shortages through a variety of methods including development and operation of efficient water supply systems, watershed protection, and water conservation
- Ensure that the frequency, duration and magnitude of shortages can be managed
- Ensure that decision makers retain the flexibility to choose appropriate risk of peak event shortages given applicable future conditions, constraints, and community values

Water Quality

- Meet or surpass all current federal and state water quality standards for finished (tap) water
- Utilize sources with the highest raw water quality
- Maximize the ability to protect and enhance water quality in the future, including support and participation in watershed-protection and pollution prevention based approaches
- Maximize the ability to deal with aesthetic factors such as taste, color, hardness, and odor

Impacts of Catastrophic Events

- Minimize the magnitude, frequency, and duration of water service interruptions due to natural or human-caused events, such as earthquakes, landslides, volcanic eruptions, floods, spills, fires, sabotage, etc.

Economic Cost and Cost Equity

- Minimize the economic impact of capital and operating costs of new water resources on customers
- Ensure the ability to allocate capital and operating costs, e.g. rate impacts for new water supply, related infrastructure, and conservation water savings, among existing customers, future customers, and other customer groups, proportional to benefits derived by the respective customer group(s)
- Maximize cooperative partnerships to co-sponsor projects and programs that provide multiple benefits

Environmental Stewardship

- Minimize (i.e. avoid, reduce, and/or mitigate) the impact of water resource development on the natural and human environments
- Foster protection of environmental values through water source protection and enhancement efforts and conservation

Table 5-2 (cont'd) Polk County Water Needs Assessment Potential Policy Objectives for Source Options
Growth and Land Use Planning
▪ Be consistent with regional growth strategy and local land-use plans ▪ Facilitate and promote effective implementation through local and regional land use planning and growth management programs
Flexibility to Deal with Future Uncertainty
▪ Maximize the ability to anticipate and respond to unforeseen future events or changes in forecasted trends
Ease of Implementation
▪ Maximize the ability to address existing and future local, state, and federal legislative and regulatory requirements in a timely manner.
Operational Flexibility
▪ Maximize operational flexibility to best meet needs of region, including the ability to move water around the region and to rely on backup sources as necessary ▪ Ensure that the plan includes flexible strategies for meeting both sub-regional and regional water demands in the year 2000 and beyond

In addition, comparisons and analysis of tradeoffs among alternatives are facilitated by applying a set of measurable evaluation criteria. Ratings can be based on professional judgment or consolidate a large quantity of technical information. Each policy objective is associated with at least one evaluation criterion. In some instances, a single evaluation criterion is associated with more than one.

In an approach similar to that used to develop the associated policy objectives, a series of public tested evaluation criteria have been developed that include: water availability, environmental impacts, raw water quality, vulnerability to catastrophic events, ease of implementation, treatment requirements, and capital and operating costs. Descriptions of those evaluation criteria are outlined in Table 5-3.

Table 5-3
Water Supply Alternatives
Select Evaluation Criteria

Source Option Issue	Description
Water Availability	Consideration of hydrology, water rights, and storage operation; water availability described in terms of monthly yield exceedance probabilities
Environmental Impacts	Includes impacts to natural and human environments, extensive planning-level subjective analysis of ten environmental factors; an aggregated score was given to each source option; ▪ Natural environment includes: fish, geotechnical and natural hazards, threatened and endangered species, wetlands, wildlife and habitat ▪ Human environment includes: cultural resources, hazardous materials, land use, recreational resources, scenic resources

Table 5-3 (cont'd)
Water Supply Alternatives
Select Evaluation Criteria

Source Option Issue	Description
Raw Water Quality	Physical, inorganic, organic, and microbiological constituents, DO, and nutrients were reviewed; aesthetic aspects considered; assessment of ability to protect watershed and resulting vulnerability of raw water quality
Vulnerability to Catastrophic Events	Vulnerability to volcanic, fire, slide, and spill events
Ease of Implementation	Ability to implement with respect to legal or permitting requirements (subjective assessment)
Treatment Requirements	Treatment regime was developed based on raw water quality, used multiple barrier approach to exceed drinking water standards; all of the surface sources can readily be treated to meet or surpass safe drinking water standards
Capital and Operating Costs	Costs included intakes, raw water pipelines, treatment plants, pumping stations, finished water pipelines, and terminal reservoirs

This list of evaluation criteria represents a consensus among the TAC participants. As such, it will be used in the following analysis of the proposed supply alternatives.

5.4 Comparison of Supply Alternatives

5.4.1 Comparative Analysis

A comparison was conducted of the various supply alternatives using the select evaluation criteria from the previous section. Here, each alternative was rated against the criteria under a simple qualitative assessment as being "good", "fair", or "poor" in each category. A given rating was determined by information that was readily available in existing reports or plans and through subjective comparison among the various supply options. These ratings were then reviewed by the TAC and revised to satisfy the consensus of the group. The results of those ratings are presented in Table 5-4 (next page).

As a result of this analysis, several important conclusions were drawn. First, all the supply alternatives that centered on new or expanded surface water storage were very expensive. Moreover, the uncertainty in attempting to build a new dam or storage impoundment with regards to water availability and ease of implementation made those options less preferable. These issues were also compounded by the fact that in undertaking such an option required substantial construction costs in simply creating the source, which often times was located large distances from the point of intended use. These costs would end up being added to the already inherent need for treatment, transmission and pumping. For these reasons, these options were largely thought to be infeasible.

Table 5-4
Polk County
Evaluation of Water Supply Alternatives

◉ Favorable ○ Neutral ● Unfavorable

Evaluation Criteria

Supply Alternative	Description	Water Availability	Environmental Impacts	Raw Water Quality	Vulnerability to Catastrophic Events	Ease of Implementation	Cost
Willamette River							
WR-1** *Willamette River – Adair Village POD*	▪ Source – (J) Willamette River only – Adair Village ▪ RW/Treatment – (C) Willamette River POD with Regional WTP ▪ FW – (B) Finished water transmission from Regional WTP	◉	◉	○	○	○	○ to ● (See Footnote 1)
WR-2** *Willamette River – Independence POD (Regional WTP)*	▪ Source – (A) Willamette River only - Independence ▪ RW/Treatment – (C) Willamette River POD with Regional WTP ▪ FW – (B) Finished water transmission from Regional WTP	◉	◉	○	○	◉	◉ to ● (See Footnote 2)
WR-3** *Willamette River – Independence POD (Regional WTP – Supplemental Storage)*	▪ Source – (A) Willamette River with supplemental storage ▪ RW/Treatment – (C) Willamette River POD with Regional WTP ▪ FW – (B) Finished water transmission from Regional WTP	◉	◉	○	○	◉	○ to ● (See Footnote 2)
Raw Water Storage							
R-1 *Gorge Dam and Reservoir*	▪ Source – (D) Gorge Dam and Reservoir ▪ RW/Treatment – (A) Rickreall Creek POD with Dallas WTP ▪ FW – (A) Finished water transmission from Dallas WTP	○	●	◉	●	●	●
R-2 *Big Rock Creek/Sunshine Creek Dam and Reservoir*	▪ Source – (C) Big Rock Creek/Sunshine Creek Dam and Reservoir ▪ RW/Treatment – (C) Willamette River POD with Regional WTP ▪ FW – (B) Finished water transmission from Regional WTP	○	●	◉	●	●	●
R-3 *Rickreall Creek Storage*	▪ Source – (E) Rickreall Creek Storage ▪ RW/Treatment – (A) Rickreall Creek PD with Dallas WTP ▪ FW – (B) Finished water transmission from Dallas WTP	●	●	◉	●	●	●
Groundwater Development							
G-1** *Groundwater Development*	▪ Source – (I) Groundwater Development ▪ RW/Treatment – n/a ▪ FW – (C) Finished water transmission from proposed wellfield areas	○	◉	○ to ● (See Footnote 3)	○	◉	◉ to ○ (See Footnote 3)

** Selected Alternative (Polk County Water Resources Planning Committee – January 13, 2004

(1) Range of costs in reference to possible savings in rehabilitation of existing infrastructure

(2) Range of costs in reference to possible need for advanced treatment at this point of diversion

(3) Variability in water quality and cost associated with possible presence of nitrate contamination

Another potentially viable source is that of groundwater, especially that located near the Willamette River. The most abundant supplies there, however, are situated in relatively shallow aquifers. At present, there are several wells already located in that setting, serving both domestic and agricultural use – the latter being the larger in terms of current production capacity. One option includes the potential for purchasing various existing agricultural wells and converting them (i.e. through the water rights transfer process) to domestic and municipal use. By no means is that transfer process a given with regards to state or public approval. Other options also include the construction and operation of new wells. One of the major drawbacks to such a plan however surrounds the uncertainty in actual production capacity that may be achieved with any new well, especially given their costs. In addition, the productive aquifers along the river all also potentially impacted by nitrate contamination associated with area agricultural activities, domestic septic systems, and other sources.

Other areas for ground water development are not well-known. The abundance of productive aquifers in areas away from the Willamette River is sparse and subject to potentially poor water quality, including brackish and high iron contents, as well as other aesthetic impacts. In many areas of the county, ground water is limited to poor producing basalt wells and often not of sufficient capacity to meet the needs defined in this investigation. There are reports, however, of productive basalt wells which may yield useful quantities in areas interior to the county, including the City of Dallas where on-going investigations are being pursued regarding the potential for the development of an aquifer storage and recovery system. Details of those efforts were not available at the time of the creation of this report.

In discussions with the TAC and through evaluation of the alternatives, the most viable options for further consideration are those associated with withdrawals from the Willamette River, namely the rehabilitation and expansion of the City of Adair Village's water treatment plant or the construction of a new intake and treatment plant at a downstream diversion point near the City of Independence. The alternatives based on Willamette River supplies are essentially the least cost and most reliable. The only potentially cheaper option is that of ground water development but it suffers from both potential poorer quality and less capacity. However, the TAC wanted to preserve the option of examining potential ground water supplies, especially those along the Willamette River (owed to proximity) in serving as a secondary or emergency source of supply.

The option (WR-1) for expanding the City of Adair Village's existing facilities has both a number of advantages and disadvantages. The greatest advantage is the existence of an intake along the river and the current installed treatment infrastructure. A recent report prepared for the City indicates that the existing treatment plant may be expanded to around 4 mgd capacity for about $1 million. If this is true, this represents a very inexpensive expansion option for added treatment. If selected, this option would include a second expansion stage carried out later in time that would take the plant's capacity to between 12 and 15 mgd (as needed by demand). The downside to this option is its proximity to the major elements of future demand, namely the three major cities: Dallas, Monmouth and Independence. This option will require the construction of a lengthy transmission main extending from the City of Adair Village, north through the county, to points within each of the major cities. This transmission line requirement will add greatly to the option's overall cost. Moreover, the entire transmission capacity would likely have to be constructed as part of the first stage of improvements for the City of Adair Village's plant. A decision to defer a portion of that capacity would require the construction of a parallel line (or other expansion) which is simply too expensive. Having to build the entire transmission capacity up front adds to the financial issues associated with this option.

By contrast, the other option of interest is that of building a new river intake and treatment plant near the City of Independence (WR-2). This facility would be supported by a new water right from the Willamette River or by an amended permit from the City of Adair Village's water right. The closer proximity to the major demand nodes (i.e. major cities) eliminates the need for a lengthy and expensive transmission main. However, the new plant would be located downstream of the City of Albany – a potential source of concern regarding instream water quality. Whether perceived or not, public concern over the quality of the water in the Willamette River cannot be ignored. Recent experience of the City of Wilsonville saw public demand require extensive treatment technologies be put in place as part of a deal to use the Willamette River as a source of drinking water. A similar outcome may result in the placement of new treatment plant near the City of Independence. In this case, the cost of treatment may be raised 2-3 times that normally anticipated in a traditional treatment plant meeting state and federal safe drinking water standards. Hence, any savings in reduced transmission cost may be required as part of advanced treatment requirements. Thus, the actual cost between this option and that of expanding the City of Adair Village's plant may be equalized.

Before concluding this comparison, it is worthwhile to note that the City of Adair Village option may also create additional users in the area who are in need of future water. An examination is also needed of the potential for resource sharing with the Cities of Albany and Millersburg and their plans for a new treatment plant served by the South Santiam River. In addition, the most viable options for new supply described above largely center on the development of a new source of supply from the Willamette River. Several of the existing water providers in the County have traditionally relied on groundwater and any plans for a new source would be used to augment and support existing supplies. This means the resulting system would rely on a mix of ground and surface water sources in many areas, raising a variety of issues ranging from taste and odor aesthetics to continued regulatory compliance, especially with regards to corrosion control (i.e. lead and copper) within the various purveyor's distribution systems. Accordingly, the issue of blending sources will have to be addressed.

In any case, the use of the Willamette River may raise questions among the public as to the quality of that source and its long-term safety with regards to human health. From a technology and regulatory viewpoint the question is mute. Options such as those offered under conventional, membrane, or slow sand filtration (in combination with disinfection) are readily available and have a proven capacity for meeting all federal and state safe drinking water standards. Prominent examples include those of the City of Corvallis and Wilsonville. However, that may not be enough. Recent contention over the use of the Willamette River as a drinking water source came to prominence in the Portland metropolitan area – most notably for the City of Wilsonville. There, citizens demanded a higher level of protection than that called for under federal and state law, forcing the City to construct a plant that included several added advanced process steps to further ensure the quality of the water being delivered to its customers. So, while there seems to be acceptance of the Willamette River as a source, the public remains dutiful in its demand for safety and as a result may require more advanced treatment of this source than required under federal or state law. Such demands may easily raise the cost of treatment for the Willamette River to 2 or 3 times that normally thought needed for meeting the noted regulatory standards.

5.4.2 Summary of Cost Estimates

Among the various factors which dominate alternative selection, costs represent an important factor in the actual selection of a recommended alternative. Here, comprehensive preliminary cost estimates were generated for each supply option, documenting the estimated construction costs for required diversion or raw water storage, treatment, raw and finished water transmission, and pumping. Those cost estimates are summarized in Table 5-5 (following page), with details for each option being provided in Appendix B. Here, it is important to note that the option for diverting and treating the Willamette River downstream of the City of Albany (i.e. at or near the Town of Independence) has been separated into two sub-options – the first assume a low cost option for meeting current and anticipate federal and state drinking water standards and a second assuming the need for more advanced treatment, similar to that recently experienced at the City of Wilsonville.

Table 5-5
Polk County
Summary of Preliminary Cost Estimates

	Capital Costs ($1,000)				
Source Option	**Source Development**	**Raw Water**	**Treatment and Transmission**	**Total**	**Unit Cost ($/ccf)(1)**
Willamette River					
Adair Village Treatment Plant (WR-1) (2)	$ 225	$ 1,245	$ 60,011	$ 61,481	$ 2.57
Regional WTP (WR-2A) Low Cost Estimate (2)	$ 225	$ 727	$ 46,132	$ 47,084	$ 2.04
Regional WTP (WR-2B) High Cost Estimate (3)	$ 225	$ 727	$ 72,382	$ 73,334	$ 3.01
Regional WTP with Additional Supply (WR-3C) (2)	$ 3,370	$ 727	$ 46,132	$ 50,229	$ 2.16
Surface Water Storage					
Gorge Dam and Reservoir (R-1)	$ 39,460	$ 2,060	$ 44,537	$ 86,057	$ 3.48
Big Rock Reservoir (R-2)	$ 40,087	$ 727	$ 45,345	$ 86,159	$ 3.49
Rickreall Creek Storage (R-3)	$ 39,162	$ 2,031	$ 44,537	$ 85,730	$ 3.47
Groundwater					
Setniker Well Field (G-1)	$ 15,660	$ 0	$ 38,752	$ 54,412	$ 2.31

(1) Average unit cost including capital and operation and maintenance expense for the period 2004 to 2040.
(2) Assumes $1 million for first 4 mgd and $1.25 per gallon thereafter.
(3) Based on conventional treatment plant costs.
(4) Based on cost to develop Wilsonville plant.

5.5 Other Considerations

The following considerations are included as issues that were highlighted during discussions and various reviews with TAC members. These elements are included in an effort to summarize the key issues that were consistently identified during this analysis.

1. Conduct an extensive evaluation of the expandability of the City of Adair Village's water treatment plant. Need to confirm the potential cost for staged expansion, first to 4 mgd and then to 12 or 15 mgd.
    - *Section 6 (Phased Capital Plan and Pre-Design)*
    - *Appendix C (Adair Village WTP Evaluation)*

2. The development of conceptual design layouts for the infrastructure associated with the options for expanding the City of Adair Village's water treatment plant or a new intake and plant near the City of Independence. These conceptual designs would define treatment configurations and transmission main alignments, including digital base maps showing placement and alignment of needed water supply facilities in relation to existing landmark features. This step would also include refined cost estimates for each alternative. Included in these estimates, consideration should also be given to costs of security/vulnerability associated with the integration of multiple water systems.
    - *Section 6 (Phased Capital Plan and Pre-Design)*
    - *Appendix D (Adair Village WTP (Alternative WR-1) Pipeline Alignments)*
    - *Appendix E (Regional WTP (Alternative WR-2) Pipeline Alignments)*

3. A review of permitting requirements for each of the select alternatives. This step would identify potential permitting restrictions for the development of the conceptual designs, including a complete listing of the anticipated permits required, preliminary mitigation strategies (as needed), and anticipated schedule for permit approval for each project.
    - *Appendix F (Permitting Reconnaissance)*

4. Examination of the blending issues related to mixing existing groundwater supplies form the various water purveyors with a new treated source from the Willamette River.

5. The development of estimates for the wholesale cost of water from a potential future regional supply agency. This step would assume debt service, cash reserves and system development charge (SDC) funds for the new regional supply agency, along with planning level cost estimates for capital and O&M for the needed infrastructure, in creating estimates of the future wholesale rate for water. This step would include estimates of the cost differences in rates between the various participants based on separate capital costs (such as transmission) and operation and maintenance costs to serve individual participants.
    - *Section 7 (Wholesale Rate Estimate)*

6. A decision as to the preferred supply alternative and organizational structure deemed most appropriate in the formation of a new regional water supply entity.
    - *Section 8 (Administrative Options)*

Section 6

Phased Capital Plan and Pre-Design

6.1 Introduction

Polk County and its water providers have recently been concerned about future population growth and its impacts on future water supplies. As a result, the County has formed a planning group, referred to as the Technical Advisory Committee (TAC), consisting of members of the County's water providers. This committee is charged with assisting in regional water supply planning efforts. Last year the county solicited proposals for a planning and engineering analysis project focused on developing a projection of long term water need. The completion of this project resulted in an estimate of future water supply deficiencies across the county. In addition, the TAC was presented with an evaluation of various source development alternatives. From this evaluation two alternatives were selected for further consideration and analysis. The information provided in this section provides a Phased Capital Plan and Pre-Design summary of the two selected alternatives herein referred to as the Adair Village WTP (Alternative WR-1) and Regional WTP (Alternative WR-2) water supply alternatives. The objective is to develop a planning level schedule and cost estimate for construction of treatment, pumping, transmission, and storage facilities.

6.2 Incremental Supply Plan

The capital improvement projects have been staged to meet the required increments of supply as defined under the projected water demand forecast. The phased supply plan is shown in Exhibit 6-1. Under the proposed supply plan, the treatment and delivery infrastructure would be developed in four phases from 2005 through 2040 with an ultimate capacity of 16 MGD. The phases represent development of infrastructure that would provide the ability to deliver water in increments of 4 MGD. This incremental supply plan will form the basis for scheduling of design and construction of infrastructure for each of the proposed alternatives.

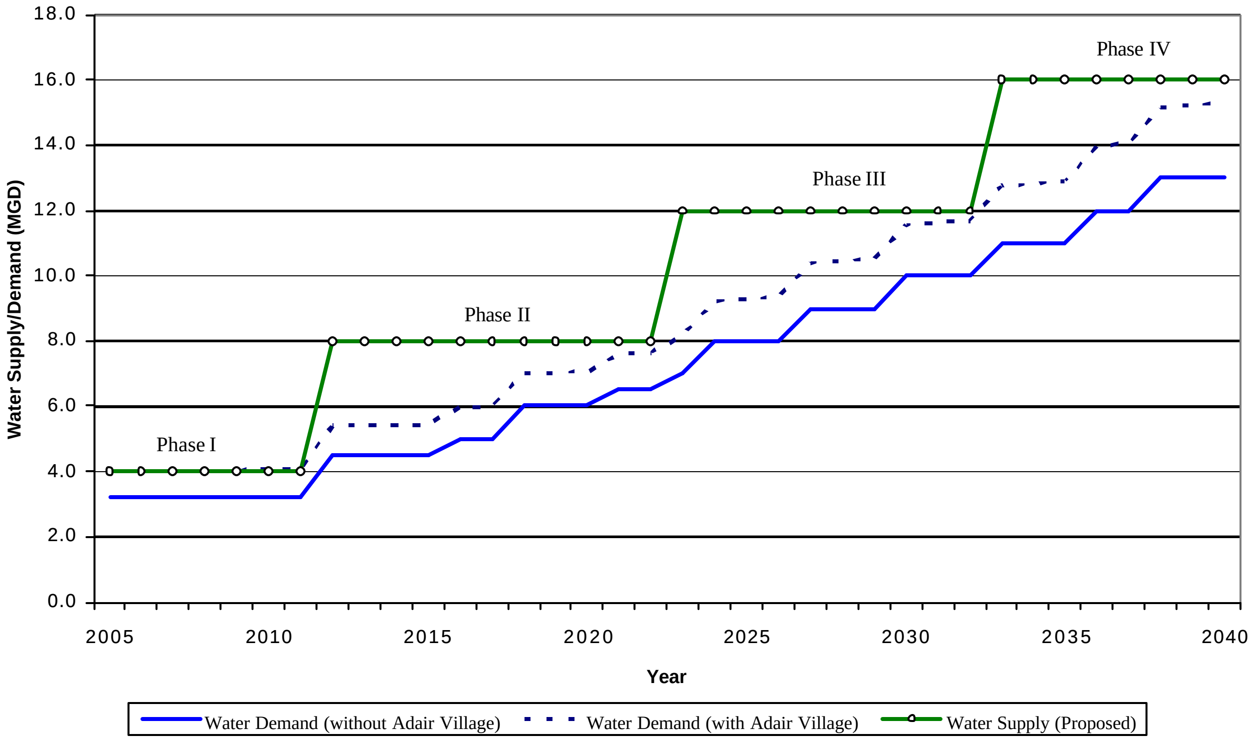


Exhibit 6-1
Proposed Incremental Supply Plan

6.3 Alternative WR-1 (Adair Village WTP)

6.3.1 Treatment

This proposed supply alternative includes the utilization of an existing treatment plant and intake on the Willamette River, currently used to serve the city of Adair Village. The plant would initially be upgraded to expand its production capacity from 2.3 MGD (as set by the Oregon Drinking Water Program due to the plant's current condition) to 4 MGD. The City of Adair Village currently treats 0.4 to 0.6 MGD to serve its existing customers and, based on existing per capita consumption and a projected 2040 population of 2,706, would have a 2040 demand of 2.3 MGD. The Adair Village WTP has a build-out capacity of 12 MGD. The proposed incremental supply plan would reach this amount by 2023. The last 4 MGD increment of supply would involve upgrading the existing plant's footprint and adding additional filter beds or other feasible technology (e.g. small membrane filter system) to meet required future treatment capacity of 16 MGD.

A detailed evaluation of the plant was conducted in July 2004 (see Appendix C) in order to develop a comprehensive cost estimate for upgrading the plant from its current condition and the long term feasibility of operating the plant over the 40-year planning horizon. A summary of the cost estimates developed through this evaluation and a proposed schedule of implementation are shown in Table 6-1.

Table 6-1
Adair Village WTP (Alternative WR-1)
Preliminary Treatment Cost Estimates

Project ID	Description	Unit	Ea.	Unit Cost	Cost
WTP-1	Adair Village WTP Upgrade (Phase I)	GPD	4	$1.63	$6,500,000
WTP-2	Adair Village WTP Upgrade (Phase II)	GPD	4	$0.31	$1,250,000
WTP-3	Adair Village WTP Upgrade (Phase III)	GPD	4	$0.31	$1,250,000
WTP-4	Adair Village WTP Expansion (Phase IV)	GPD	4	$1.50	$6,000,000
Total					$15,000,000

6.3.2 Raw Water Transmission

The Adair Village WTP has a 10-inch asbestos cement (AC) raw water transmission main extending approximately 1,080 feet from the intake to the plant. This piping was installed in 1958. Assuming a design velocity of 5 fps, the pipeline has a capacity of 1.76 MGD. The addition of a 24-inch raw water transmission main from the intake to the WTP would provide an additional capacity, meeting the 2040 maximum demand projection of slightly higher than 15 MGD. The proposed pipeline would approximately follow the same alignment as the existing 10-inch AC main. Planning level capital costs are shown in Table 6-2. Plan and profile views of the proposed alignment are presented in Appendix D.

Table 6-2
Adair Village WTP (Alternative WR-1)
Preliminary Raw Water Transmission Main Cost Estimates

Project ID	Description	Unit	Ea.	Unit Cost	Cost
P-3	30-inch D.I. Transmission Main (Willamette R. to Adair Village WTP)	lf	1,080	240	259,200

6.3.3 Finished Water Transmission

Adair Village also has an existing 10-inch AC finished water transmission main that extends to the Voss Reservoir to the north of the WTP. From the reservoir, a 10-inch transmission main travels to a booster pump station located on the outer city limits of Adair Village. A second 10-inch transmission main travels north towards Camp Adair Road. Construction of a 30-inch transmission main is proposed to supplement and provide the additional transmission capacity extending from the WTP to the north into Polk County. This transmission main would provide a capacity of 15.9 MGD, assuming a design velocity of 5 fps. The line would parallel the existing 10-inch main to Camp Adair Road where the pipeline would turn east towards Corvallis Road. From there, the alignment would follow Corvallis Road to the north. The section of line paralleling the existing Adair Village transmission main would be approximately 25,000 linear feet. From Camp Adair Road to the city of Monmouth, the proposed alignment would extend another 66,000 linear feet. Planning level capital costs are shown in Table 6-3. Plan and profile views of the proposed alignment are presented in Appendix D.

Table 6-3
Adair Village WTP (Alternative WR-1)
Preliminary Finished Water Transmission Main Cost Estimates

Project ID	Description	Unit	Ea.	Unit Cost	Cost
P-1	30-inch D.I. Transmission Main (Camp Adair Rd to City of Monmouth)	lf	66,274	240	15,905,760
P-2	30-inch D.I. Transmission Main (Adair Village WTP to Camp Adair Rd)	lf	25,000	240	6,000,000
Total					21,905,760

6.3.4 Pumping

For an analysis of pumping requirements, it was assumed that the raw water pumps had sufficient capacity to provide service for Adair Village only. As a result, all additional capacity required for service into Polk County would originate from newly constructed pump stations. Under these assumptions, a new raw water pump station with a capacity of 4 MGD would initially be built. The raw water pump station would have a total static lift of approximately 100 feet requiring approximately 100 hp to meet the 4 MGD capacity requirement. The pump station would be upgraded in four phases consistent with the proposed treatment plant upgrades.

The profile of the proposed 30-inch transmission main alignment displays an elevation of approximately 300 feet to Voss Reservoir at an approximate hydraulic grade of slightly over 400 feet. The alignment extends towards the Luckiamute River drainage basin at an average elevation of 200 feet. After crossing the Luckiamute River, the alignment crosses Johnson Hill which reaches an elevation of nearly 500 feet. Upon reaching the City of Monmouth, transmission main descends to an average elevation of 200 feet. For pump station sizing, the elevation profile of the transmission main requires a total dynamic head of 270 feet. The maximum elevation along the profile is 476 feet creating a required static lift of 186 feet. The pressure at the termination point of the transmission main (Station 662+67) would be greater than 100 psi. Assuming 270 feet of total dynamic head, a finished water pump station with 275 hp would be required to provide a flow of 4 MGD. With each incremental increase of flow through the 30-inch transmission main, more power is required to overcome the increasing energy loss due to friction. Therefore, the second, third, and fourth proposed pump station upgrades involve pump station upgrades of 300, 375, and 450 hp respectively. A summary of the proposed pumping projects are included in Table 6-4.

Table 6-4
Adair Village WTP (Alternative WR-1)
Preliminary Pump Station Cost Estimates

Project ID	Description	Unit	Ea.	Unit Cost	Cost
PS-1	Raw Water Pump Station (Phase I)	hp	100	$1,500	$150,000
PS-2	Finished Water Pump Station (Phase I)	hp	275	$1,500	$412,500
PS-3	Raw Water Pump Station (Phase II)	hp	100	$1,500	$150,000
PS-4	Finished Water Pump Station (Phase II)	hp	300	$1,500	$450,000
PS-5	Raw Water Pump Station (Phase III)	hp	100	$1,500	$150,000
PS-6	Finished Water Pump Station (Phase III)	hp	375	$1,500	$562,500
PS-7	Raw Water Pump Station (Phase IV)	hp	125	$1,500	$187,500
PS-8	Finished Water Pump Station (Phase IV)	hp	450	$1,500	$675,000
Total					$2,737,500

6.3.5 Storage

This alternative does not include any storage projects. It is assumed that each of the individual water suppliers would provide adequate storage within their systems to meet any operational, emergency, and fire suppression requirements.

6.3.6 Phased Capital Plan

Based on the proposed development of supply detailed in Exhibit 6-1, each of the treatment, transmission, and pumping projects have been scheduled to meet the projected demands. This schedule is provided in Exhibit 6-2.

Category	Project ID	Description	Construction Year	2005-2009	2010-2014	2015-2019	2020-2024	2025-2029	2030-2034	2035-2040
Finished Water	P-1	30-inch D.I. Transmission Main (Camp Adair Rd to City of Monmouth)	2006	$ 15,905,760	$ -	$ -	$ -	$ -	$ -	$ -
Transmission	P-2	30-inch D.I. Transmission Main (Adair Village WTP to Camp Adair Rd)	2006	$ 6,000,000	$ -	$ -	$ -	$ -	$ -	$ -
		Finished Water Transmission -- subtotals		$ 21,905,760	$ -	$ -	$ -	$ -	$ -	$ -
Raw Water	P-3	30-inch D.I. Transmission Main (Willamette R. to Adair Village WTP)	2006	$ 259,200	$ -	$ -	$ -	$ -	$ -	$ -
Transmission										
		Raw Water Transmission -- subtotals		$ 259,200	$ -	$ -	$ -	$ -	$ -	$ -
Pumping	PS-1	Raw Water Pump Station (Phase I)	2006	$ 150,000	$ -	$ -	$ -	$ -	$ -	$ -
	PS-2	Finished Water Pump Station (Phase I)	2006	$ 412,500	$ -	$ -	$ -	$ -	$ -	$ -
	PS-3	Raw Water Pump Station (Phase II)	2012	$ -	$ 150,000	$ -	$ -	$ -	$ -	$ -
	PS-4	Finished Water Pump Station (Phase II)	2012	$ -	$ 450,000	$ -	$ -	$ -	$ -	$ -
	PS-5	Raw Water Pump Station (Phase III)	2023	$ -	$ -	$ -	$ 150,000	$ -	$ -	$ -
	PS-6	Finished Water Pump Station (Phase III)	2023	$ -	$ -	$ -	$ 562,500	$ -	$ -	$ -
	PS-7	Raw Water Pump Station (Phase IV)	2033	$ -	$ -	$ -	$ -	$ -	$ 187,500	$ -
	PS-8	Finished Water Pump Station (Phase IV)	2033	$ -	$ -	$ -	$ -	$ -	$ 675,000	$ -
		Pumping -- subtotals		$ 562,500	$ 600,000	$ -	$ 712,500	$ -	$ 862,500	$ -
Treatment	WTP-1	Adair Village WTP Upgrade (Phase I)	2006	$ 6,500,000	$ -	$ -	$ -	$ -	$ -	$ -
	WTP-2	Adair Village WTP Upgrade (Phase II)	2012	$ -	$ 1,250,000	$ -	$ -	$ -	$ -	$ -
	WTP-3	Adair Village WTP Upgrade (Phase III)	2023	$ -	$ -	$ -	$ 1,250,000	$ -	$ -	$ -
	WTP-4	Adair Village WTP Expansion (Phase IV)	2033	$ -	$ -	$ -	$ -	$ -	$ 6,000,000	$ -
		Treatement -- subtotals		$ 6,500,000	$ 1,250,000	$ -	$ 1,250,000	$ -	$ 6,000,000	$ -
Storage Facilities										
		Storage Facilities -- subtotals		$ -	$ -	$ -	$ -	$ -	$ -	$ -
		Totals		$ 29,227,460	$ 1,850,000	$ -	$ 1,962,500	$ -	$ 6,862,500	$ -

Exhibit 6-2

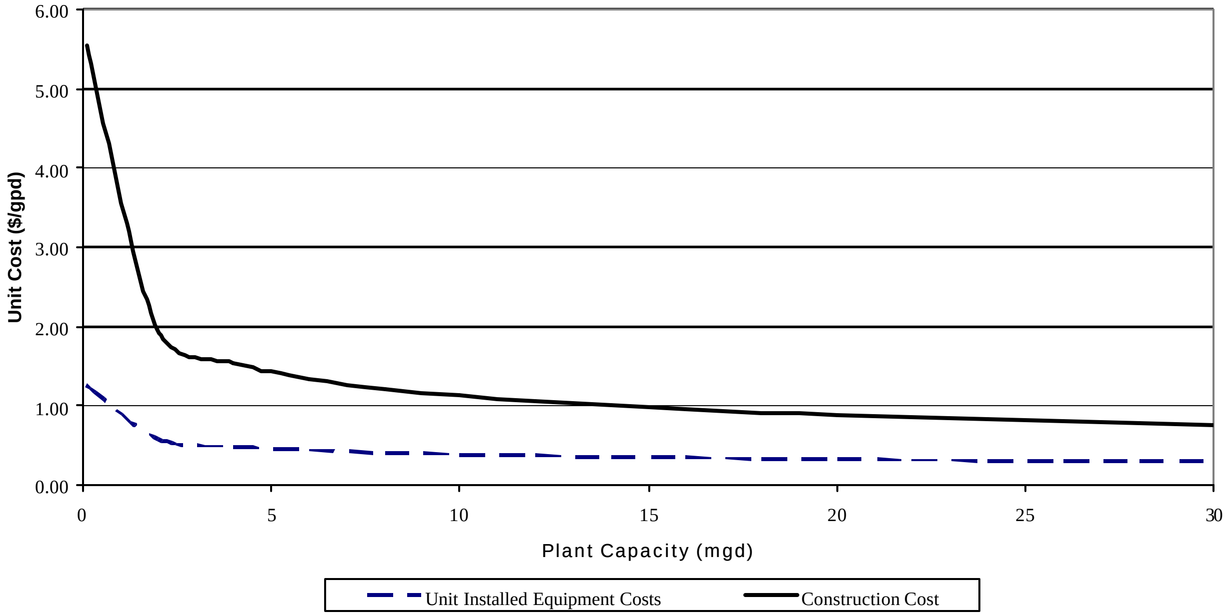
Adair Village WTP (Alternative WR-1)

Phased Capital Improvement Cost Estimates

6.4 Alternative WR-2 (Regional WTP)

6.4.1 Treatment

Exhibit 6-3 provides membrane filtration plant unit costs developed from a survey of membrane filtration plants constructed within the last 10 years. These unit cost curves for both construction cost and installed equipment cost provide an estimate of the typical economy of scale as measured by treatment capacity.



Source: Duranceau, Steven J., *Membrane Practices for Water Treatment*, 2001.

Exhibit 6-3
Membrane Filtration – Treatment Cost Curves

Meeting the water supply needs shown in Exhibit 6-1 will require that treatment capacity be staged in increments of 4 MGD. However, the first phase of construction will involve sizing of many of the plant's components for an ultimate build-out capacity of 16 MGD. These components include the site piping, valving, and intake on the Willamette River. For this reason, the initial unit cost per gallon of treatment capacity will be significantly more than subsequent phases. Table 6-5 presents planning level cost estimates for a proposed membrane filtration plant located near the City of Independence.

Table 6-5
Regional WTP (Alternative WR-2)
Preliminary Treatment Plant Cost Estimates

Project ID	Design Capacity	Unit Installed Equipment Cost		Construction Cost		Contingency	Planning Level Unit Cost	Planning Estimate
	(mgd)	($/gpd)	($)	($/gpd)	($)	(%)	($/gpd)	($)
WTP-5	4	$0.49	$1,960,000	$1.25	$5,000,000	240%	$3.00	$12,000,000
WTP-6	4	$0.49	$1,942,419	$0.85	$3,408,989	240%	$2.05	$8,196,000
WTP-7	3	$0.52	$1,569,146	$0.85	$2,556,742	240%	$2.05	$6,147,000
WTP-8	2	$0.58	$1,161,552	$0.85	$1,704,494	240%	$2.05	$4,098,000
Total					$12,670,225			$36,544,720

In addition, to account for the perception of Willamette River water quality downstream of key industrial sites near Albany, a significant contingency factor is included in these planning level estimates. The unit costs ranging from $3.00/gpd for the phase I project (WTP-5) and $2.05/gpd for subsequent phases are consistent with the City of Wilsonville’s experience in constructing a treatment facility on the Willamette River. The higher unit costs reflect the level of expanded treatment that may be required to satisfy social and political interests. Federal and state authorities dictate a minimum level of treatment under the various rules and regulations falling under the Safe Drinking Water Act. The Wilsonville treatment plant provides a level of treatment that is higher than federal and local authorities require, and as such, their cost per gallon of treated water is significantly higher than that reported across the county. This precedence may promote the public perception that a higher level of treatment is required downstream of industrial sites near Albany. These issues rooted more in perception than in sound engineering judgment make it extremely difficult to predict future costs and, at this stage, require higher than normal construction cost contingencies.

6.4.2 Raw Water Transmission

The raw water transmission main follows an alignment connecting the selected sites for an intake on the Willamette River and a regional water treatment plant. The alignment follows existing taxlot boundaries to facilitate the potential acquisition of right-of-way from neighboring landowners. This alignment is detailed in Appendix E. A 24-inch pipeline will provide the required capacity projected in the 40-year demand forecast. Table 6-6 provides a preliminary cost estimate for this proposed pipeline.

Table 6-6
Regional WTP (Alternative WR-2)
Preliminary Raw Water Transmission Main Cost Estimates

Project ID	Description	Unit	Ea.	Unit Cost	Cost
P-5	24-inch D.I. Transmission Main (Willamette R. to Regional WTP)	lf	2,897	$192	$556,224

6.4.3 Finished Water Transmission

The transmission main alignment extends from the proposed water treatment plant site to N. Main Street, makes a 90 degree bend following N. Polk Street, then follows Polk Street to Hoffman Road. The transmission main terminates near N. Gun Club Road. The transmission main would extend approximately 9,880 feet. A diameter of 30-inches will provide a design flow of nearly 16 MGD. Appendix E provides details of this proposed alignment. The preliminary cost estimate is shown below in Table 6-7. An overview map of the area is provided in Exhibit 3-5 and presents the alignment locations for each of the transmission mains.

Table 6-7
Regional WTP (Alternative WR-2)
Preliminary Finished Water Transmission Main Cost Estimates

Project ID	Description	Unit	Ea.	Unit Cost	Cost
P-4	30-inch D.I. Transmission Main (Regional WTP to City of Monmouth)	lf	9,882	$240	$2,371,680

6.4.4 Pumping

The pumping requirements are staged over the 40-year time horizon consistent with the incremental supply plan provided in Exhibit 6-1. The raw water transmission main extends from an elevation of approximately 130 feet to approximately 150 feet. Pumping requirements were calculated based on 20 feet of additional head required for plant operations and friction losses in the proposed 24-inch raw water pipeline. From these assumptions, a pump station of 50 hp would provide the necessary lift at a flow of 4 MGD. Subsequent expansions to meet the increases in capacity are 50, 100, and 225 hp. At build-out, the pump station would be sized at slightly less than 400 hp.

The finished water pump station was also staged over the 40-year planning horizon. The primary assumption for calculating finished water pumping requirements is the required pressure (i.e. hydraulic grade) at the termination of the proposed line. In this case, the design pressure was 80 psi. Under this constraint, the pump station would initially require approximately 225 hp, which provides a total dynamic head of 225 feet at 4 MGD flow capacity. Subsequent expansions would include staged additions of 225, 250, and 250 hp. The build-out pump station capacity would be slightly less than 950 hp.

Table 6-8
Regional WTP (Alternative WR-2)
Preliminary Finished Water Transmission Main Cost Estimates

Project ID	Description	Unit	Ea.	Unit Cost	Cost
PS-9	Raw Water Pump Station (Phase I)	hp	50	1,500	$75,000
PS-10	Finished Water Pump Station (Phase I)	hp	225	1,500	$337,500
PS-11	Raw Water Pump Station (Phase II)	hp	50	1,500	$75,000
PS-12	Finished Water Pump Station (Phase II)	hp	225	1,500	$337,500
PS-13	Raw Water Pump Station (Phase III)	hp	100	1,500	$150,000
PS-14	Finished Water Pump Station (Phase III)	hp	250	1,500	$375,000
PS-15	Raw Water Pump Station (Phase IV)	hp	225	1,500	$337,500
PS-16	Finished Water Pump Station (Phase IV)	hp	250	1,500	$375,000
Total					$2,062,500

6.4.5 Storage

This alternative does not include any storage projects. It is assumed that each of the individual water suppliers would provide adequate storage within their systems to meet any operational, emergency, and fire suppression requirements.

6.4.6 Phased Capital Plan

Based on the proposed development of supply detailed in Exhibit 3-1, each of the treatment, transmission, and pumping projects have been scheduled to meet the projected demands. This schedule is provided in Exhibit 6-4.

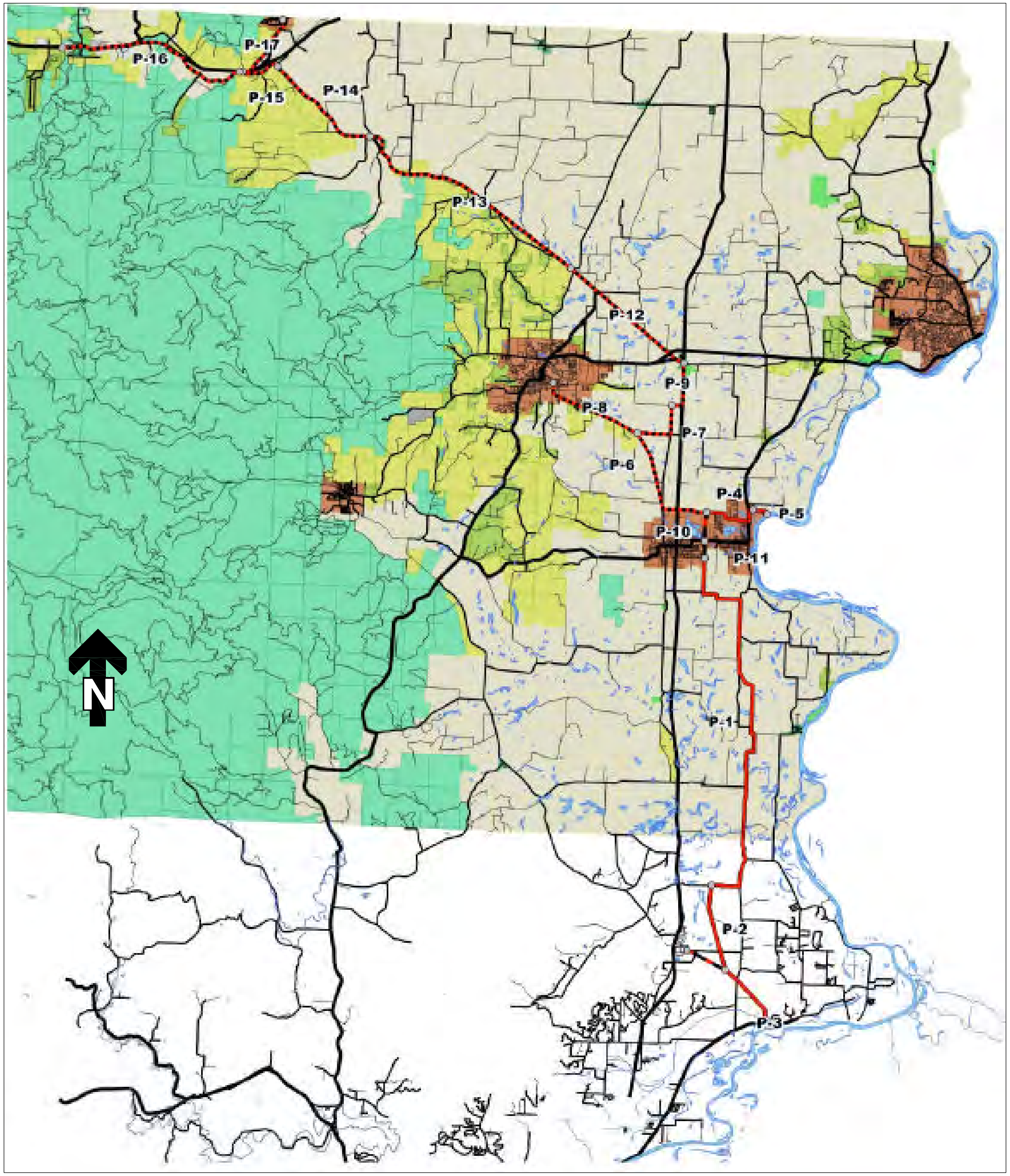
Category	Project ID	Description	Construction Year	2005-2009	2010-2014	2015-2019	2020-2024	2025-2029	2030-2034	2035-2040
Finished Water	P-4	30-inch D.I. Transmission Main (Regional WTP to City of Monmouth)	2006	$ 2,371,680	$ -	$ -	$ -	$ -	$ -	$ -
Transmission				$ -	$ -	$ -	$ -	$ -	$ -	$ -
		Finished Water Transmission --- subtotals		$ 2,371,680	$ -	$ -	$ -	$ -	$ -	$ -
Raw Water	P-5	24-inch D.I. Transmission Main (Willamette R. to Regional WTP)	2006	$ 556,224	$ -	$ -	$ -	$ -	$ -	$ -
Transmission										
		Raw Water Transmission -- subtotals		$ 556,224	$ -	$ -	$ -	$ -	$ -	$ -
Pumping	PS-9	Raw Water Pump Station (Phase I)	2006	$ 75,000	$ -	$ -	$ -	$ -	$ -	$ -
	PS-10	Finished Water Pump Station (Phase I)	2006	$ 337,500	$ -	$ -	$ -	$ -	$ -	$ -
	PS-11	Raw Water Pump Station (Phase II)	2012	$ -	$ 75,000	$ -	$ -	$ -	$ -	$ -
	PS-12	Finished Water Pump Station (Phase II)	2012	$ -	$ 337,500	$ -	$ -	$ -	$ -	$ -
	PS-13	Raw Water Pump Station (Phase III)	2023	$ -	$ -	$ -	$ 150,000	$ -	$ -	$ -
	PS-14	Finished Water Pump Station (Phase III)	2023	$ -	$ -	$ -	$ 375,000	$ -	$ -	$ -
	PS-15	Raw Water Pump Station (Phase IV)	2033	$ -	$ -	$ -	$ -	$ -	$ 337,500	$ -
	PS-16	Finished Water Pump Station (Phase IV)	2033	$ -	$ -	$ -	$ -	$ -	$ 375,000	$ -
		Pumping -- subtotals		$ 412,500	$ 412,500	$ -	$ 525,000	$ -	$ 712,500	$ -
Treatment	WTP-5	Regional WTP (Phase I)	2006	$ 12,000,000	$ -	$ -	$ -	$ -	$ -	$ -
	WTP-6	Regional WTP (Phase II)	2012	$ -	$ 8,196,000	$ -	$ -	$ -	$ -	$ -
	WTP-7	Regional WTP (Phase III)	2023	$ -	$ -	$ -	$ 6,147,000	$ -	$ -	$ -
	WTP-8	Regional WTP (Phase IV)	2033	$ -	$ -	$ -	$ -	$ -	$ 4,098,000	$ -
		Treatement -- subtotals		$ 12,000,000	$ 8,196,000	$ -	$ 6,147,000	$ -	$ 4,098,000	$ -
Storage Facilities										
		Storage Facilities -- subtotals		$ -	$ -	$ -	$ -	$ -	$ -	$ -
		Totals		$ 15,340,404	$ 8,608,500	$ -	$ 6,672,000	$ -	$ 4,810,500	$ -

Exhibit 6-4
Regional WTP (Alternative WR-2)
Phased Capital Plan

6.5 Distribution to Area Water Providers

6.5.1 Description

An overview map of the alignments of each of the pipelines identified in the two scenarios is presented in Exhibit 6-5. The projects identified under the two alternatives provide a detailed summary of infrastructure requirements “shared” by all water providers within the county, meaning that each entity would require a portion of the delivery and treatment capacity. In addition, a second grouping of costs associated with pipelines and pump stations required to deliver water from the “shared” transmission main to their subsequent systems will have a significant impact on the total cost to deliver water to each of the county’s systems. These infrastructure requirements are not dependent on the location of treatment and are similar under both alternatives. Exhibit 6-6 provides a breakdown of the proposed pipelines and the capacity required by each of the water providers. These capacity requirements provide an estimate of the total cost incurred by each water provider. Exhibit 6-7 provides a preliminary timeline and breakdown in cost by provider for each of the projects.



LEGEND

Alignments by Cost

Distributed
Other
Shared

Land Use

AGRICULTURE
COMMERCIAL
FARM - FOREST
FOREST
INDUSTRIAL
PUBLIC LANDS
RURAL LAND
URBAN RESERVE

Base

Rivers and Streams
Roads
STATEHWY

POLK COUNTY
Exhibit 6-5
Overview - Proposed Pipeline Alignments

January 2005

Economic and Engineering Services, Inc.
Bellevue Mount Vernon Olympia Portland Tri-Cities

<EES_PDX>:PLOT DATE: 01/06/05 TIME:10:43 <EES_PDX>C:\GIS\Projects\Polk_County\PhaseII\Exhibits\Ex_6-5.dwg

PipeLabel	ProviderID	Provider	Capacity (mgd)	Select Capacity (mgd)	(cfs)	Design Velocity (fps)	Required Area (sf)	Diameter (in)	Select Diameter	% Ownership
P-6	2	Dallas, City of	2.95	3.00	4.64	5.0	0.93			63%
	3	Rickreall	0.00	0.50	0.77	5.0	0.15			10%
	6	Perrydale	0.00	0.50	0.77	5.0	0.15			10%
	1	Buell Red Prairie	0.00	0.10	0.15	5.0	0.03			2%
	4	Grand Ronde	0.51	0.50	0.77	5.0	0.15			10%
	7	Rock Creek	0.07	0.10	0.15	5.0	0.03			2%
	16	Willamina	0.00	0.10	0.15	5.0	0.03			2%
		Total		4.80	7.43		1.49	16.50	18	100%
P-8	2	Dallas, City of	2.95	3.00	4.64	5.0	0.93			100%
		Total		3.00	4.64		0.93	13.05	18	100%
P-7	3	Rickreall	0.00	0.50	0.77	5.0	0.15			21%
	6	Perrydale	0.00	0.50	0.77	5.0	0.15			21%
	1	Buell Red Prairie	0.00	0.25	0.39	5.0	0.08			11%
	4	Grand Ronde	0.51	0.75	1.16	5.0	0.23			32%
	7	Rock Creek	0.07	0.10	0.15	5.0	0.03			4%
	16	Willamina	0.00	0.25	0.39	5.0	0.08			11%
		Total		2.35	3.64		0.73	11.55	12	100%
P-9	3	Rickreall	0.00	0.50	0.77	5.0	0.15			21%
	6	Perrydale	0.00	0.50	0.77	5.0	0.15			21%
	1	Buell Red Prairie	0.00	0.25	0.39	5.0	0.08			11%
	4	Grand Ronde	0.51	0.75	1.16	5.0	0.23			32%
	7	Rock Creek	0.07	0.10	0.15	5.0	0.03			4%
	16	Willamina	0.00	0.25	0.39	5.0	0.08			11%
		Total		2.35	3.64		0.73	11.55	12	100%
P-12	7	Rock Creek	0.07	0.10	0.15	5.0	0.03			5%
	6	Perrydale	0.00	0.50	0.77	5.0	0.15			27%
	1	Buell Red Prairie	0.00	0.25	0.39	5.0	0.08			14%
	4	Grand Ronde	0.51	0.75	1.16	5.0	0.23			41%
	16	Willamina	0.00	0.25	0.39	5.0	0.08			14%
				1.85	2.86		0.57	10.24	12	100%
P-13	7	Rock Creek	0.07	0.10	0.15	5.0	0.03			7%
	4	Grand Ronde	0.51	0.75	1.16	5.0	0.23			56%
	1	Buell Red Prairie	0.00	0.25	0.39	5.0	0.08			19%
	16	Willamina	0.00	0.25	0.39	5.0	0.08			19%
				1.35	2.09		0.42	8.75	10	100%
P-14,P-15	7	Rock Creek	0.07	0.10	0.15	5.0	0.03			9%
	4	Grand Ronde	0.51	0.75	1.16	5.0	0.23			68%
	16	Willamina	0.00	0.25	0.39	5.0	0.08			23%
				1.10	1.70		0.34	7.90	8	100%
P-17	16	Willamina	0.00	0.25	0.39	5.0	0.08			100%
				0.25	0.39		0.08	3.77	6	100%
P-16	7	Rock Creek	0.07	0.10	0.15	5.0	0.03			12%
	4	Grand Ronde	0.51	0.75	1.16	5.0	0.23			88%
				0.85	1.32		0.26	6.94	8	100%

Exhibit 6-6

Pipeline Sizing and Proposed Breakdown of Ownership

	Description	Construction Year	2005-2009	2010-2014	2015-2019	2020-2024	2025-2029	2030-2034	2035-2040	Total
Buell Red Prairie										
P-6	18-inch D.I. Transmission Main (Independence to Briedwell Rd)	2008	$ 60,653	$ -	$ -	$ -	$ -	$ -	$ -	$ 60,653
P-7	12-inch D.I. Transmission Main (Briedwell Rd to 99W)	2009	$ 102,817	$ -	$ -	$ -	$ -	$ -	$ -	$ 102,817
P-9	12-inch D.I. Transmission Main (99W to Rickreall)	2009	$ 87,364	$ -	$ -	$ -	$ -	$ -	$ -	$ 87,364
P-12	12-inch D.I. Transmission Main (Rickreall to Perrydale Rd)	2010	$ -	$ 307,234	$ -	$ -	$ -	$ -	$ -	$ 307,234
P-13	10-inch D.I. Transmission Main (Perrydale Rd to Buell)	2010	$ -	$ 609,070	$ -	$ -	$ -	$ -	$ -	$ 609,070
	subtotal -- Buell Red Prairie		$ 250,834	$ 916,305	$ -	$ -	$ -	$ -	$ -	$ 1,167,139
Dallas, City of										
P-6	18-inch D.I. Transmission Main (Independence to Briedwell Rd)	2008	$ 1,819,600	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,819,600
P-8	18-inch D.I. Transmission Main (Briedwell Rd to Dallas)	2008	$ 2,404,961	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,404,961
	subtotal -- Dallas, City of		$ 4,224,561	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,224,561
Rickreall			$ -	$ -	$ -	$ -	$ -	$ -	$ -	
P-6	18-inch D.I. Transmission Main (Independence to Briedwell Rd)	2008	$ 303,267	$ -	$ -	$ -	$ -	$ -	$ -	$ 303,267
P-7	12-inch D.I. Transmission Main (Briedwell Rd to 99W)	2009	$ 205,634	$ -	$ -	$ -	$ -	$ -	$ -	$ 205,634
P-9	12-inch D.I. Transmission Main (99W to Rickreall)	2009	$ 174,728	$ -	$ -	$ -	$ -	$ -	$ -	$ 174,728
	subtotal -- Rickreall		$ 683,629	$ -	$ -	$ -	$ -	$ -	$ -	$ 683,629
Grand Ronde										
P-6	18-inch D.I. Transmission Main (Independence to Briedwell Rd)	2008	$ 303,267	$ -	$ -	$ -	$ -	$ -	$ -	$ 303,267
P-7	12-inch D.I. Transmission Main (Briedwell Rd to 99W)	2009	$ 308,451	$ -	$ -	$ -	$ -	$ -	$ -	$ 308,451
P-9	12-inch D.I. Transmission Main (99W to Rickreall)	2009	$ 262,093	$ -	$ -	$ -	$ -	$ -	$ -	$ 262,093
P-12	12-inch D.I. Transmission Main (Rickreall to Perrydale Rd)	2010	$ -	$ 921,703	$ -	$ -	$ -	$ -	$ -	$ 921,703
P-13	10-inch D.I. Transmission Main (Perrydale Rd to Buell)	2010	$ -	$ 1,827,211	$ -	$ -	$ -	$ -	$ -	$ 1,827,211
P-14,P-15	8-inch D.I. Transmission Main (Buell to Wallace Bridge)	2010	$ -	$ 876,393	$ -	$ -	$ -	$ -	$ -	$ 876,393
P-16	8-inch D.I. Transmission Main (Willamina to Grand Ronde)	2012	$ -	$ 1,348,383	$ -	$ -	$ -	$ -	$ -	$ 1,348,383
	subtotal -- Grand Ronde		$ 873,810	$ 4,973,690	$ -	$ -	$ -	$ -	$ -	$ 5,847,500
Perrydale										
P-6	18-inch D.I. Transmission Main (Independence to Briedwell Rd)	2008	$ 303,267	$ -	$ -	$ -	$ -	$ -	$ -	$ 303,267
P-7	12-inch D.I. Transmission Main (Briedwell Rd to 99W)	2009	$ 205,634	$ -	$ -	$ -	$ -	$ -	$ -	$ 205,634
P-9	12-inch D.I. Transmission Main (99W to Rickreall)	2009	$ 174,728	$ -	$ -	$ -	$ -	$ -	$ -	$ 174,728
P-12	12-inch D.I. Transmission Main (Rickreall to Perrydale Rd)	2010	$ -	$ 614,469	$ -	$ -	$ -	$ -	$ -	$ 614,469
	subtotal -- Perrydale		$ 683,629	$ 614,469	$ -	$ -	$ -	$ -	$ -	$ 1,298,098
Rock Creek										
P-6	18-inch D.I. Transmission Main (Independence to Briedwell Rd)	2008	$ 60,653	$ -	$ -	$ -	$ -	$ -	$ -	$ 60,653
P-7	12-inch D.I. Transmission Main (Briedwell Rd to 99W)	2009	$ 41,127	$ -	$ -	$ -	$ -	$ -	$ -	$ 41,127
P-9	12-inch D.I. Transmission Main (99W to Rickreall)	2009	$ 34,946	$ -	$ -	$ -	$ -	$ -	$ -	$ 34,946
P-12	12-inch D.I. Transmission Main (Rickreall to Perrydale Rd)	2010	$ -	$ 122,894	$ -	$ -	$ -	$ -	$ -	$ 122,894
P-13	10-inch D.I. Transmission Main (Perrydale Rd to Buell)	2010	$ -	$ 243,628	$ -	$ -	$ -	$ -	$ -	$ 243,628
P-14,P-15	8-inch D.I. Transmission Main (Buell to Wallace Bridge)	2010	$ -	$ 116,852	$ -	$ -	$ -	$ -	$ -	$ 116,852
P-16	8-inch D.I. Transmission Main (Willamina to Grand Ronde)	2012	$ -	$ 179,784	$ -	$ -	$ -	$ -	$ -	$ 179,784
	subtotal -- Rock Creek		$ 136,726	$ 663,159	$ -	$ -	$ -	$ -	$ -	$ 799,885
Willamina										
P-6	18-inch D.I. Transmission Main (Independence to Briedwell Rd)	2008	$ 60,653	$ -	$ -	$ -	$ -	$ -	$ -	$ 60,653
P-7	12-inch D.I. Transmission Main (Briedwell Rd to 99W)	2009	$ 102,817	$ -	$ -	$ -	$ -	$ -	$ -	$ 102,817
P-9	12-inch D.I. Transmission Main (99W to Rickreall)	2009	$ 87,364	$ -	$ -	$ -	$ -	$ -	$ -	$ 87,364
P-12	12-inch D.I. Transmission Main (Rickreall to Perrydale Rd)	2010	$ -	$ 307,234	$ -	$ -	$ -	$ -	$ -	$ 307,234
P-13	10-inch D.I. Transmission Main (Perrydale Rd to Buell)	2010	$ -	$ 609,070	$ -	$ -	$ -	$ -	$ -	$ 609,070
P-14,P-15	8-inch D.I. Transmission Main (Buell to Wallace Bridge)	2010	$ -	$ 292,131	$ -	$ -	$ -	$ -	$ -	$ 292,131
P-17	6-inch D.I. Transmission Main (Wallace Bridge to Willamina)	2012	$ -	$ 415,500	$ -	$ -	$ -	$ -	$ -	$ 415,500
	subtotal -- Willamina		$ 250,834	$ 1,623,936	$ -	$ -	$ -	$ -	$ -	$ 1,874,770
Total			$ 7,104,024	$ 8,791,559	$ -	$ -	$ -	$ -	$ -	$ 15,895,582

Exhibit 6-7

Proposed Schedule and Cost Breakdown by Provider

6.5.2 Summary

The Adair Village WTP alternative has a total capital cost of $72.0 million dollars over a 40-year planning horizon. The Regional WTP alternative has a total of $67.3 million over the same time horizon. As such, from an analysis of total capital requirements the two alternatives are relatively similar as shown in Table 6-9.

Table 6-9
Total Capital Costs

	Alternative 1 Adair Village WTP	Alternative 2 Regional WTP
Shared Projects		
Transmission	$38,100,000	$18,900,000
Treatment	$15,000,000	$30,500,000
Pumping	$2,800,000	$2,100,000
Subtotal	$55,800,000	$51,400,000
Other Projects	$15,900,000	$15,900,000
Total	$72,000,000	$67,300,000

This preliminary capital improvement plan will be used to develop a financial model to examine potential wholesale cost of water from a future regional water supply agency. Considering that the driving factor in this process is financial feasibility, the financial models will help to refine the scheduling of projects and, depending on key financial assumptions such as the availability of grants and other means of debt financing, may force projects to be deferred in time and rescheduled in order to create a financially viable plan. In conclusion, the next step in this process will include development of up to two financial models that will include an optimized schedule of capital improvements consistent with anticipated revenue sources.

Section 7

Wholesale Rate Estimate

7.1 Introduction

As part of the Regional Water Supply Project for Polk County (Region), EES was asked to conduct a summary projection of the wholesale rates for each of the two supply alternatives – the Adair Village Water Treatment Plant upgrade with associated transmission facilities to Monmouth, and the Regional Water Treatment Plant which would be sited in the Monmouth area. Included in these projections, are the additional unit costs projected to be incurred by the individual entities based on their projected demand and costs of transmission infrastructure from the Monmouth area. The purpose of this study is to provide a general projection of the fiscal viability of the Region's municipalities with regards to the capital costs, related operation and maintenance, and debt service associated with the potential water supply infrastructure. Presented in this section are the following items:

- An Overview of the Rate Study Process;
- A discussion of the Principles Around Which Rates Should Be Set;
- A quick classification of the two main Types of Utilities;
- Methods of Accumulating Costs for Revenue Requirements;
- A discussion of the Assumptions utilized in our analyses;
- A discussion of the projected Debt Requirements under each alternative;
- A summary of the Projected Operating Results;
- A summary of Local Transmission Costs to individual entities;
- and a discussion of Other Issues related to the financing of the Phased Capital Plan.

Presented as exhibits to this section of the report are the detailed cash flow projections. The detailed projections for the Adair Village WTP are shown as Exhibits H-1 through H-4 in Appendix H. The detailed projections for the Regional WTP are shown as Exhibits I-1 through I-4 in Appendix I.

7.2 Overview of the Rate Study Process

User rates must be set at a level where a utility's operating and capital expenses are met with the revenues received from customers. This is an important point, as failure to achieve this objective may lead to insufficient funds to maintain system integrity. To evaluate the adequacy of existing rates, a comprehensive rate study is often performed.

A comprehensive rate study consists of three interrelated analyses. Table 7-1 provides an overview of these analyses.

Table 7-1
Overview of the Comprehensive Rate Analyses

Revenue Requirement Analysis	*Compares the sources of funds (revenues) to the expenses of the utility to determine the overall rate adjustment required*
Cost of Service Analysis	*Allocates the revenue requirements to the various customer classes of service in a "fair and equitable" manner*
Rate Design Analysis	*Considers both the level and structure of the rate design to collect the appropriate and targeted level of revenues*

For the purposes of this review, only a simple revenue requirement analysis was performed to provide a general projection of the fiscal impacts on the Region's municipalities with regards to the capital costs, related operation and maintenance, and debt service associated with the potential water supply infrastructure. This section will provide the Region with a general projection of the revenue requirements of the supply alternatives and associated transmission capital, so that the Region will have a gauge by which it can expect future margins, rate adjustments, and necessary bond issues for funding of capital improvements.

7.3 Global Principles around which Rates Should Be Set

As a practical matter, there should be a general set of principles around which rates will be set. These guiding principles may be items such as setting rates that are cost-based, etc. These types of principles may be referred to as "global principles" since they should be utilized in the development of rates.

Provided below is a brief listing of the global principles around which the Region should consider setting its utility rates:

- Rates should be cost based and equitable, and set at a level such that they meet the full revenue requirements of the utility.
- Rates should be easy to understand and administer.
- Rates and the process of allocating costs should conform to generally accepted rate setting techniques.
- Rates should be stable, in their ability to provide adequate revenues to meet the utility's financial, operation and regulatory requirements.

- Rate levels should be stable from year to year from the customer's perception.

These guiding principles will be utilized within this study to help develop unit costs, the basis and end result of the revenue requirements projections, which are cost-based and equitable.

7.4 Types of Utilities

Utilities are generally divided into two types - public and private utilities. Public utilities are usually owned by a city, county or special district, and theoretically operated at zero profit. A public utility is in essence locally owned since its customers are also its owners. In contrast to this, a private utility is a "for profit" enterprise and is owned by a private company and/or stockholders. A private utility is capitalized by issuing stock to the general public. As such, the shareholders are, in essence, the owners of the private utility. Therefore, the "owners" of a private utility may not be customers or local citizens, but rather numerous individuals or shareholders spread across the United States.

Given these two vastly different forms of utility ownership, their financial operations and considerations also vary significantly. Public utilities are capitalized or financed by issuing debt and soliciting funds from customers through direct capital contributions or user rates. These public or municipal utilities are exempt from state and federal income taxes. In addition, a publicly elected city council or board of trustees usually regulates public utilities. In contrast, private utilities are taxable entities. Given their "for profit" status, their rates and operational affairs are generally regulated by a state public utility commission or other regulatory body.

7.5 Methods of Accumulating Costs for Revenue Requirements

By virtue of these two entity's vastly different administrative and financial characteristics, their revenue requirements are based upon different elements. Most private utilities utilize what is known as a "utility or accrual" basis of setting rates. This convention calculates a utility's annual revenue requirement by aggregating a time period's operation and maintenance (O&M) expenses, taxes, depreciation expense and a "fair" return on investment. Operation and maintenance expenses include the materials, electricity, labor, supplies, etc., which are needed to keep the utility functioning. Depreciation expense is a means of recouping the cost of capital facilities over their useful lives and generating internal cash. Private utilities must pay state and federal income taxes, along with any applicable property, franchise, sales and other forms of revenue taxes. The return portion of this type of revenue requirement pays for the private utility's interest expense on indebtedness, provides funds for a return to the utilities' shareholders in the form of dividends, and leaves a balance for retained earnings and cash flow purposes.

Since public utilities do not have equity owners, *per se*, and are usually exempt from income taxes, a different method of determining their annual revenue requirement is commonly used. The convention used by most public utilities is called the "cash basis" approach of setting rates. As the name implies, a public utility aggregates its cash expenditures for a period of time to determine its required revenues from user rates and other forms of income. This methodology conforms nicely to most public utility budgetary requirements, and is a very straightforward and easily understood calculation. Operation and maintenance expenses are added to any applicable taxes or transfer payments to determine total operating expenses. Capital costs are calculated by adding debt service payments (principal and interest) to capital improvements financed with operating rate revenues. Depreciation expense is sometimes included in lieu of this latter item to stabilize annual revenue requirements. Under the cash basis of accounting, the sum of the capital and operating expense equals the utility's revenue requirement during any period of time. It should be noted that the two portions of the capital expense component (debt service and capital improvements financed from rates) are necessary under the cash basis approach because utilities generally cannot finance all of their capital facilities with long-term debt.

Table 7-2 may be helpful in summarizing and comparing the cash and utility basis methodologies.

Table 7-2
Cash vs. Utility Basis Comparison

	Utility (Accrual) Basis		Cash Basis
+	O&M Expense	+	O&M Expense
+	Taxes	+	Taxes or Transfer Payments
+	Depreciation Expense	+	Capital Additions Financed with Rate Revenues (≥ Depreciation Exp.)
+	Return on Investment	+	Debt Service (P+I)
=	Total Revenue Requirements	=	Total Revenue Requirements

7.6 Assumptions

Presented in this section are the assumptions utilized in the development of the pro-forma analyses for the Region. The basic assumptions utilized are as follows:

- Projected capital improvement plan information for each of the two supply alternatives was taken directly from the Region's Phased Capital Plan and Pre-Design, which was developed and provided in Section 6 of this report.
- The capital improvement plans were assumed to begin with a year 1 completion date of fiscal year ending (FYE) 2006. Given the possibility and/or likelihood that the capital projects schedule would not begin in FYE 2006, the capital and associated O&M costs would change due to the impacts of inflation.
- Operating expenses for FYE 2006 were assumed to be roughly equal to those incurred at the City of Wilsonville, except where noted, and escalated forward at 2.5% inflation. The assumed annual operations and maintenance expenses are provided in Table 7-3. The schedule of inflation and growth factors used in the pro-forma is provided in Table 7-4.

Table 7-3
Polk County
Phased Capital Plan & Pre-Design
Assumptions - Operations & Maintenance (1)

General Supplies	$69,000
Fuel & Chemicals	62,000
Natural Gas	5,000
Electricity	270,000
Garbage Collection	29,000
Telephone	4,000
Professional & Technical Svcs (2)	415,000
Repairs & Maintenance	55,000
Insurance	51,000
Fees, Dues, & Advertising	10,000
Meeting Expenses	1,000
Total	$971,000

(1) Costs were assumed to be roughly equal to those incurred at the City of Wilsonville, except where noted.

(2) Assumed three (3) full-time employees for plant operations.

Table 7-4
Polk County
Phased Capital Plan & Pre-Design
Assumptions (1)

Inflation	2.50%
Water Sales Growth (2)	3.92%
Expenses (3)	2.50%
Fuel & Chemicals	6.52%
Natural Gas	6.52%
Electricity	6.52%
Interest Rate (Interest Earnings)	2.00%
Interest on Debt (Interest Expense)	5.00%
Closing Costs on New Debt	5.00%
Term (Years) of New Debt	30
Debt Service Coverage Requirement	25.00%

(1) Financial projections include costs for delivery of finished water only. Costs of transmission to individual entities not included.

(2) Water Sales Growth factor calculated using current and projected (2040) Peak Day Demand figures Polk County.

(3) Costs for Renewals & Replacements were not included because they were assumed to be minimal in new plant.

- Fuel & chemicals, natural gas, and electricity were escalated at a different inflation rate than other operating expenses because the annual cost increase will be a factor of customer growth, as well as inflation.
- Transfers from the Water General Fund were projected to be executed as needed.
- The target ending fund balance for the Water General Fund was set at one-eighth (1/8) of total annual operating expenses, which represents about 45 days of cash-working capital.
- The target ending fund balance for the Construction Fund was set at $500,000 for year 1, assumed to be FYE 2006, and escalated at 2.5% inflation thereafter.

7.7 Summary of Projected Debt Requirements

The initial project cost for each of the two alternatives varies significantly. Therefore, the initial bond proceeds necessary to get the projects for each alternative under way vary to the same extent. Table 7-5 provides an estimate of the initial bond proceeds necessary for each alternative based on the capital costs established in Section 6 of this report. The construction costs for year 1 have been adjusted for inflation due to the assumption that year 1 is FYE 2006. To the extent that the timing of initial construction for each alternative changes, the initial bond issues would need to be adjusted for changes in timing and inflation.

Table 7-5
Polk County
Phased Capital Plan & Pre-Design
Sources and Uses of Funds for Initial Bonds by Alternative

Sources of Funds		
	Adair	**Regional**
2006 Bonds	$35,095,000	$18,650,000
Uses of Funds		
	Adair	**Regional**
Construction	$30,434,778	$16,117,012
IDC - Construction (1)	2,795,222	1,542,988
IDC - Issuance (1)	105,285	55,950
Issuance Costs	1,754,750	932,500
Additional Funds to Capital	4,965	1,550
Total Uses	$35,095,000	$18,650,000
Total IDC	$2,900,507	$1,598,938

(1) Interest During Construction was calculated into the initial bond issues.

Included in the sizing of the initial bond sale is interest during construction (IDC). Since the Region would have to borrow funds for construction prior to the sale of any water, it is assumed that the interest on the debt would not be collected from rates until water sales begin. Therefore, the interest payments are borrowed, which increases the size of the initial bond sale. As a policy matter, the participants could choose to front these funds as an initial equity investment, resulting in a smaller initial bond offering.

Subsequent borrowings will not include funding for IDC, because wholesale rate revenue will be collected from the start of service after initial construction. The schedule of borrowings under each alternative is provided in Table 7-6.

Table 7-6
Polk County
Phased Capital Plan & Pre-Design
Bond Proceeds by Year

Year	Adair	Regional
2006	$35,095,000	$18,650,000
2007	0	0
2008	5,230,000	5,790,000
2009	1,415,000	1,685,000
2010	7,505,000	7,760,000
2011	0	0
2012	3,720,000	12,585,000
2023	0	1,075,000
Totals	$52,965,000	$47,545,000

7.8 Summary of Results

Provided below in Table 7-7 is a summary of the revenue requirements and projected unit costs for the Adair Village WTP. Table 7-8 provides the same summary for the Regional WTP. More detailed projections for the Adair Village WTP are shown as Exhibits H-1 through H-4 in Appendix H. The detailed projections for the Regional WTP are shown as Exhibits I-1 through I-4 in Appendix I.

Table 7-7
Polk County
Summary of Revenue Requirements - Adair Village WTP

Fiscal Years Ending	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Operating Expenses	$971,000	$1,008,832	$1,048,495	$1,090,091	$1,133,730	$1,179,530	$1,227,613	$1,278,111	$1,331,163	$1,386,918	$1,445,534	$1,507,176
Debt Service												
Principle	$528,230	$554,642	$661,093	$712,046	$842,757	$886,034	$978,597	$1,029,277	$1,082,596	$1,138,693	$1,197,712	$1,259,807
Interest	1,754,750	1,728,338	1,962,106	2,013,952	2,428,471	2,385,194	2,562,885	2,512,204	2,458,885	2,402,789	2,343,769	2,281,674
Total Debt Service	$2,282,980	$2,282,980	$2,623,199	$2,725,997	$3,271,227	$3,271,227	$3,541,481	$3,541,481	$3,541,481	$3,541,481	$3,541,481	$3,541,481
Debt Service Coverage @ 25%	570,745	570,745	655,800	681,499	817,807	817,807	885,370	885,370	885,370	885,370	885,370	885,370
Total Debt Service	$2,853,725	$2,853,725	$3,278,999	$3,407,497	$4,089,034	$4,089,034	$4,426,852	$4,426,852	$4,426,852	$4,426,852	$4,426,852	$4,426,852
Total Revenue Requirement	$3,824,725	$3,862,557	$4,327,494	$4,497,588	$5,222,765	$5,268,564	$5,654,464	$5,704,962	$5,758,015	$5,813,770	$5,872,385	$5,934,028
Projected Sales (CCF) (1)	1,009,168	1,048,777	1,089,939	1,132,718	1,177,175	1,223,377	1,271,393	1,321,293	1,373,151	1,427,045	1,483,054	1,541,261
Unit Cost ($/CCF)	$3.79	$3.68	$3.97	$3.97	$4.44	$4.31	$4.45	$4.32	$4.19	$4.07	$3.96	$3.85

(1) Projected sales include sales to Adair Village.

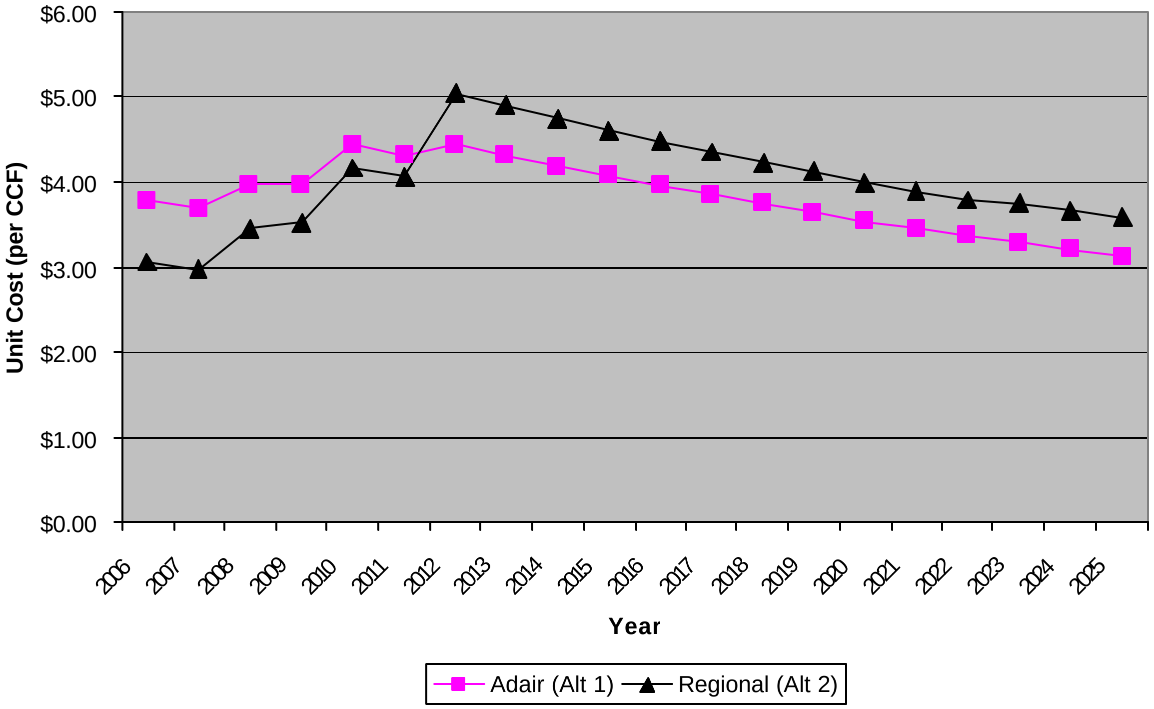
Table 7-8
Polk County
Summary of Revenue Requirements - Regional WTP

Fiscal Years Ending	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Operating Expenses	$971,000	$1,008,832	$1,048,495	$1,090,091	$1,133,730	$1,179,530	$1,227,613	$1,278,111	$1,331,163	$1,386,918	$1,445,534	$1,507,176
Debt Service												
Principle	$280,709	$294,745	$396,630	$437,775	$558,032	$587,141	$776,965	$818,762	$862,825	$909,279	$958,255	$1,009,890
Interest	932,500	918,465	1,193,227	1,274,496	1,717,994	1,688,885	2,413,348	2,371,551	2,327,487	2,281,033	2,232,057	2,180,422
Total Debt Service	$1,213,209	$1,213,209	$1,589,857	$1,712,270	$2,276,026	$2,276,026	$3,190,313	$3,190,313	$3,190,313	$3,190,313	$3,190,313	$3,190,313
Debt Service Coverage @ 25%	303,302	303,302	397,464	428,068	569,007	569,007	797,578	797,578	797,578	797,578	797,578	797,578
Total Debt Service	$1,516,512	$1,516,512	$1,987,321	$2,140,338	$2,845,033	$2,845,033	$3,987,891	$3,987,891	$3,987,891	$3,987,891	$3,987,891	$3,987,891
Total Revenue Requirement	$2,487,512	$2,525,344	$3,035,816	$3,230,429	$3,978,763	$4,024,562	$5,215,504	$5,266,002	$5,319,054	$5,374,809	$5,433,424	$5,495,067
Projected Sales (CCF) (1)	812,653	845,862	880,427	916,405	953,854	992,832	1,033,403	1,075,633	1,119,588	1,165,339	1,212,960	1,262,526
Unit Cost ($/CCF)	$3.06	$2.99	$3.45	$3.53	$4.17	$4.05	$5.05	$4.90	$4.75	$4.61	$4.48	$4.35

(1) Projected sales do not include sales to Adair Village.

As shown in Tables 7-7 and 7-8, the wholesale water rates under either scenario would be quite high. A discussion of how this would affect the retail rates to customers will follow. However, EES must first point out the similarity in unit cost trends over time between the two alternatives. Exhibit 7-1 is a chart that provides the annual unit cost projections for both alternatives for the first twenty years of supply service.

Exhibit 7-1
Annual Unit Costs by Alternative



As stated previously, you can see that the price curves for are very similar. The Regional WTP is slightly higher on a unit cost basis, but the trend is the same. The TAC expressed the value of having a source of supply located near the communities to be served, but concern over its location on the Willamette. Given that the projected price curves are so similar, EES believes that the question of which alternative to move forward with will be based on issues of policy and public perception, rather than cost.

Impacts on Retail Rates

The supply alternatives studied and presented in this report are designed to meet incremental supply needs. Each of the communities involved in the future supply regionalization regime currently has water supply to meet the needs of its existing customer base. The water purchased from the jointly-owned water treatment plant will be for the purpose of meeting future demand as the Region’s population grows and additional supply is needed. Given this scenario, the costs of the incremental water supply will affect each community’s retail rates only by the percentage of annual water sales supplied by the new source. Provided in Table 7-9 is an example which shows average retail rates based on different percentages of future wholesale supply versus existing retail. The estimates in the table are based on an assumed existing retail rate of $1.00 per CCF, and a future wholesale rate of $4.00 per CCF for incremental supply needs.

Table 7-9
Polk County
Phased Capital Plan & Pre-Design
Estimate of Impact on Retail Rates

Percentage of Annual Sales (1)		
Existing Retail	**Future Wholesale**	**Average Rate** (2)
100%	0%	$1.00
90%	10%	1.30
75%	25%	1.75
50%	50%	2.50
25%	75%	3.25
10%	90%	3.70
0%	100%	4.00

(1) Percent of total volume of water sold over a 1-year period.

(2) Assuming an Existing Retail rate of $1.00/ccf and a Future Wholesale rate of $4.00/ccf for incremental supply.

As mentioned previously, the table provides examples of how the high costs of the incremental supply will be diluted to each community’s existing customers due to existing supply that the entities currently own.

7.9 Local Transmission Costs

Seven communities that would be involved in the regionalization of water supply will need additional transmission facilities to get the new source water delivered from the Monmouth area, regardless of the supply alternative that will ultimately be selected. These additional facilities will come at additional expense to the Region, or to the individual entities being served by them. The additional capital projects are projected to be constructed beginning in year 3, which is equal to FYE 2008 in this financial section of the study. For a few of the communities, the local transmission facilities will be installed in two or even three phases, with final construction occurring in year 7, or FYE 2012. Provided in Table 7-10 is a schedule of future debt requirements for each of the entities in need of local transmission facilities from the Monmouth area.

Table 7-10
Polk County
Phased Capital Plan & Pre-Design
Annual Debt Requirements by Provider - Local Transmission (millions of dollars)

	2008	2009	2010	2011	2012	Totals
Buell Red Prairie	$1,175,000	$0	$1,650,000	$0	$0	$2,825,000
Dallas	5,000,000	0	0	0	0	5,000,000
Rickreall	1,175,000	0	0	0	0	1,175,000
Grand Ronde	1,300,000	0	2,700,000	0	1,425,000	5,425,000
Perrydale	2,000,000	0	0	0	0	2,000,000
Rock Creek	3,000,000	0	0	0	1,035,000	4,035,000
Willamina	2,195,000	0	0	0	535,000	2,730,000

Each community, along with the Region, has two options for getting its projects financed. The first would be to finance the local transmission projects individually. The second option is to finance the projects through the Region, and then establish separate rates for each community based on its local costs, or roll the costs into the regional wholesale rate.

The method for establishing the rates will be a policy issue for discussion by the Region's partners. However, the financing of the projects would be best served through the Region rather than individually. This is due mostly to the difference in size and credit ratings between the Region and some of the smaller communities. Individual entities, due to their smaller size, may not benefit from the more favorable interest rates available to the Region. Individual entities may not even have access to the same types of financing options. Therefore, it is recommended that projects be financed through the Region and establish rates as the Region finds most appropriate.

EES analyzed revenue requirements for each of the individual entities in need of local transmission. The basis for the unit costs is the debt service required to finance the local projects. EES did not include operations and maintenance expenses or renewals and replacements in the individual revenue requirements analyses because the projects consist of new transmission facilities only. Provided in Table 7-11 are unit cost projections by entity until year 8, or FYE 2013. Financing for all local transmission would cease at FYE 2012. From that point on, the unit costs will follow a downward curve similar to that seen for the regional supply alternatives shown in Exhibit 7-1. The unit costs shown would be in addition to the regional supply wholesale rates established in Section 7.7. A more detailed summary of the unit cost calculations is provided as Exhibit J-1 in Appendix J.

Table 7-11
Polk County
Phased Capital Plan & Pre-Design
Annual Unit Costs by Provider - Local Transmission ($/CCF)

	2006	2007	2008	2009	2010	2011	2012	2013
Buell Red Prairie (1)	$0.00	$0.00	$13.65	$13.55	$34.57	$34.33	$34.09	$33.85
Dallas	0.00	0.00	5.79	5.14	4.63	4.21	3.86	3.56
Rickreall (1)	0.00	0.00	6.22	6.18	6.14	6.10	6.05	6.01
Grand Ronde	0.00	0.00	0.61	0.61	2.02	2.02	2.75	2.74
Perrydale (1)	0.00	0.00	10.66	10.17	9.70	9.25	8.83	8.42
Rock Creek	0.00	0.00	8.47	8.31	8.15	7.99	10.87	10.67
Willamina	0.00	0.00	3.05	2.99	2.93	2.88	3.59	3.52

(1) EES assumed that these entities would purchase 20% of their future demand from the Region.

7.10 Other Issues

Although the high costs of water established in this section would only impact the individual entities to the extent that they use the regional supply, the cost will have a substantial impact on the retail rates of the region. The costs associated with the phased capital plan for supply and local transmission give rise to the need for grant funding. The regional participants should actively seek grants from various state and federal agencies in order to lower the cost of water. This should include involving local, state and federal representatives to assist in the grant funding process.

Also, as noted in the previous paragraph, and eluded to in the establishment of unit costs, the costs for regionally supplied water will be based on the sales volume of that water. The Region may consider using minimum purchase requirements or contracts as a way to effectively meet the revenue requirements of the new source, and accurately establish proper wholesale rates. The rates established in this section are dependent, in large part, on the projected sales to the Region, and to individual entities for local transmission. To the extent that actual sales do not meet projected sales, or even exceed projections, the wholesale rates would need to be adjusted.

Section 8

Administrative Options

8.1 Introduction

Beyond the technical elements of the various options, there are a variety of political and economic issues that also weigh heavily into the discussions. The sharing of resources among the participants will likely drive the need for the formation of a new agency to organize and administer the operations and financing of a regional supply entity. As such, the form of governance, financing and rate setting policies selected for that agency will have direct impacts on range of functions and ability to establish a secure financial framework.

In bringing together the various supply entities, it is important to recognize their current form of governance. Table 8-1 provides a listing of the participants and their type of legal entity.

Table 8-1
Polk County Regionalization Study
Member and Type of Legal Entity

Name	Type of Legal Entity
City of Dallas	City
City of Independence	City
City of Monmouth	City
City of Willamina	City
City of Falls City	City
Buell Red Prairie Water District	District
Rickreall Community Water Association	Association
Grand Ronde Community Water Association	Association
Grand Ronde Tribe	Tribe
Luckiamute Domestic Water Cooperative	Cooperative
Rock Creek Water District	District
Perrydale Domestic Water Association	Association
Tanglewood Water Cooperative	Cooperative
City of Adair Village	City

Presented in this section is a review of the various options that could be used in the operation of the regional entity. The options are reviewed by component in order to allow the participants to develop a business model that meets their needs and objectives. The reader in reviewing the various options should keep in mind that there is no right or wrong business model. Rather the model chosen needs to be developed to meet the needs of the participants. Given the number and diversity of the various participants, the final business model will most likely be developed through a consensus process that attempts to best meet the majority of each participant's needs and objectives.

This section is organized by components that would make up the general framework in the development of a business model. Namely: ownership options and rights, rate setting, financing options and organization options. Each one of these major components is further broken down by subcomponent, as required. A review and discussion of the each option is provided. The advantages and disadvantages of each option is then outlined in order to allow the reader to assess which option would best meet the needs and objectives of the participant. The listing of advantages and disadvantages is not intended to rank the options. Rather, the intent is to allow the participants to determine which option is best based on the advantages and disadvantages from that participant's policy perspective.

In the development of the business model the reader should be aware that some options are mutually exclusive. An example is a decision with respect to financing. The financing method chosen may preclude certain options with respect to rate setting or may make certain organizational options non viable from a risk management standpoint. An attempt is made to identify these exclusions where possible, but the magnitude of the matrix would make the review overwhelming and is best finalized in the consensus and implementation stage when the number of options being reviewed is more limited.

8.2 Ownership Options

The component piece of the business model dealing with ownership options has two subcomponents. These are what demands of the participants the regional entity serve and how is ownership in the entity defined and allowed. The options for serving demand are for the regional entity to serve all the demand needs of the participants or only new demands and current deficiencies. With respect to ownership participation, two options are available. The first option is that each participant owns a defined amount of capacity rights in the regional entity. The second option is that the regional entity is charged with meeting the demand needs of the participants without regard to ownership rights. It should be noted that the two subcomponents are not mutually exclusive to themselves, but the option chosen could impact rates, financing and organizational options.

8.2.1 Demand Serving Options

Presented in this section is a discussion of the options for serving the demands of the participants.

Regional Entity Serves all Demands – This option would require the regional entity to be responsible to meet all the demand needs of the participants. From a planning and operational standpoint, the regional entity would have the responsibility to meet the demand needs of the participants, not from an individual basis, but from the perspective of the participants as a whole. The system would be operated and developed in order to minimize overall system costs to the participants.

> ***Advantages*** – The advantage to this option is that it allows the regional entity to operate and develop the system in a manner that minimizes the overall costs to the region and not just

individual participants. From a regional economic standpoint, this results in the most efficient utilization of resources, since any current excess capacity would be utilized before the construction of new capacity and new capacity could be developed in a least cost manner. With respect to operations, the system could be run in a manner that minimizes operating costs, since least cost resources would be utilized first to serve demand and the highest cost resources used last.

Disadvantages – The disadvantage to this option is that it would require the sale or development of a compensation plan to the participants who contribute their existing assets to the regional entity. This may not be financially advantageous to participants who have developed low cost sources of supply. This option may also require the transfer of water rights that could impact the priority date of those water rights.

Impact on other Options – This option could impact the decision on ownership participation. While either option on ownership participation discussed below could be implemented, the decision to have set capacity ownership would require mechanisms for compensation to participants with excess capacity. This option could also impact decisions on rates and financing.

Regional Entity Serves New Demand and Current Deficiencies – This option would set a business model wherein the regional entity is charged with the development of new sources to meet the future and current deficiencies of the participants. From a planning standpoint, the regional entity would be responsible for the development of new sources only. This could be from the regional needs of the participants or from the individual needs of the participants. Operationally, the regional entity would only be charged with the operation and maintenance of new facilities developed by the regional entity.

Advantages – The advantage to this option is that it only deals with the development of new capacity and each participant is allowed to use their existing capacity to serve the needs of their system. This eliminates any potential issues with respect to the compensation for existing assets and transfer of water rights. It also allows new resources to be operated and developed in the most economically efficient manner.

Disadvantages – The disadvantage to this option is that it may not produce the most economically efficient utilization of resources within the region. To the extent that participants currently have excess capacity, new capacity could be constructed before all existing capacity is fully utilized. This could also be true from an operation standpoint; since the system would most likely not be operated in a manner with minimizes the overall cost of operation to the region.

Impact on other Options – This option could impact the decision on ownership participation. While either option on ownership participation discussed below could be implemented, the decision to have set capacity ownership could require mechanisms for compensation to participants with excess capacity.

8.2.2 Ownership Participation Options

Presented in this section are the options for ownership participation in a new regional entity.

Specific Ownership Percentages – This option would require each participant to own specific capacity amounts and rights in the regional entity. This option could be used for either of the demand serving options, but would be much easier if used for the new demand and current deficiency option.

> ***Advantages*** – The advantage to this option is that the responsibility for planning is at the participant level. The regional entity provides the platform for the development and operation of new facilities that takes advantage of economies of scale. This results in the development of resources that serve the region and individual at the lowest cost, but still maintains individual anatomy for planning.
>
> ***Disadvantages*** – The disadvantage to this approach in that it can result in the development of excess capacity due to the requirements of one or more participants. Most agreements under this option allow one or more participants to require expansion even though there may still be capacity in the plant. Often times buy-back provisions are put into the agreements which allow participants who did not initially invest in the expansion to buy-back to their ownership percentage within a specified time period. This results in an unstable planning horizon for the parties that trigger the expansion. These issues can be worked around, but require considerable consensus and compromise by the participants.
>
> ***Impact on other Options*** – This option can have an impact on the rate setting and financing options available to the participants.

No Defined Ownership – This option would eliminate any capacity ownership rights in the regional entity and require the regional entity to serve the demands of the participants. This would result in planning being done on a regional basis to serve the needs of the participants. This option would work under both the demand serving options. This option would most likely be a necessity for the all demand serving option.

> ***Advantages*** – The advantage to this option is that it puts the planning function responsibility with the regional entity. This could result in the greatest economic efficiency in the development of resources, since the development of new resources would be done to maximize the benefit to the region and not just meet the needs of individual participants.
>
> ***Disadvantages*** – The disadvantage to this option is that it eliminates local control and relies on the regional entity to meet the needs of the individual participants on a least cost basis. It also would most likely transfer the rate setting and financing aspects of the business model to the regional entity and potentially minimize (depending on the voting requirements and the organizational option) local control over those decisions.

Impact on other Options – This option could have an impact on the rate setting, financing and organizational options available to the participants.

8.3 Rate Setting Options

This component of the business model has a multitude of subcomponents and is the most politically sensitive issue after the determination of the organizational structure. Furthermore, while the organizational options need to be decided at the conception of the business model, the rate setting options continue through the life of the organization and therefore need to be thoroughly thought out and considered prior to implementation to assure that any future disagreements are minimized. The subcomponents of the rate setting options that need to be considered are the items that are included in the rates, the basis for assessing rates to individual participants and the collection and assessment of system development charges.

8.3.1 Components in Rates

This subcomponent of the rate setting options portion of the business model deals with which parts of the costs of operating a regional supply system are included in the rate charged to the participants and which part of the rate is the sole responsibility of the participant. The rate items that need to be considered are operation and maintenance expense, debt service, renewals and replacements and possibly future capacity costs. Some of the items will be driven by the option taken with respect to financing. If it is the decision of the group to issue debt through the regional entity, then the bond market will dictate that the regional entity collect rates equal to operation and maintenance expense, debt service, renewal and replacements and be required to show financial sufficiency to finance future capital needs through rates, system development charges and/or new debt.

As evidenced by the above discussion, the type of financing options chosen will have a direct impact on the components that are included in the rates. In fact, the bond market will dictate to the regional entity the components that must be included in rates. To the extent that the regional entity does not issue debt, then the components included in rates is more of a policy issue.

The options range from the minimum to the maximum. On the minimum spectrum is the collection of only operation and maintenance expense. Requirements for capital, for both renewal and replacement and future capacity expansion, would be the responsibility of the individual participants based on the percentage of capacity owned or some other formula. On the other end of the spectrum is the concept of the regional entity acting as an independent organization with its own financial requirements and setting rates to meet those requirements. An analogy to this option is that the participants would be very much like their current retail customers wherein a commodity is provided for at a price. The option of a position in the middle is also available wherein rates include operation and maintenance expense and an allowance for renewals and replacements.

This issue tends to be very policy driven and is also highly dependent on all the other options in the business model. For ease in discussion at this preliminary level, the advantages and disadvantages will focus on the two extremes that are only operation and maintenance expense or all costs required to operate the regional entity as a standalone business.

> ***Advantages*** – The advantage of only having a minimum charge of operation and maintenance expenses is that it provides the minimum rate to the participants and allows each participant to determine for itself how to finance the other aspects of the rate components including debt service, renewals and replacements and new capacity expansion requirements. This allows for more local control of financial planning options. The advantage of having the maximum charge is that it assures that adequate funding is available to assure continued operation of the regional entity and if proper financial planning is undertaken by the regional entity, assure the participants a predictable cash flow requirement under which they can plan for their local requirements.
>
> ***Disadvantages*** – The disadvantage to the minimum charge approach is that there is no assurance that the participants can provide the needed cash flow as it is required based on their own local conditions. This can result in decisions being made not based on the short and long term needs of the regional entity, but on the local cash flow circumstances of the participants. The disadvantage to the maximum charge approach is that the decision process is no longer a local decision, but rather a regional decision. These expenses become an operation and maintenance expense to the participant that must be paid before debt service and internal capital improvements.
>
> ***Impact on other Options*** – As was discussed previously, the impact of rates on the other options in the business model is not so much that the rates drive the other options, but more that the other options will drive the rate setting process and what is included in rates. The decisions made in the Ownership Options, Financing Options and Organization Options will have a direct bearing on the items that not only should, but also may be required to be included in rates.

8.3.2 Rate Setting Methods

This subcomponent of the rate setting options portion of the business model deals with the method used to set rates for each individual participant. There are basically two options: (1) uniform rates for all participants with the possibility of adjustments for transmission and pumping costs or (2) cost of service rates based on the costs required to service each participant and individual usage characteristics. Either option is viable and is really a policy decision. While other aspects of the business model may impact the chose, there influence is minor. An example is the option to only include operation and maintenance expense in the rate. The general practice is to charge a uniform rate to all participants on a $/ccf basis, this can be modified as agreed to by the participants.

> ***Advantages*** – The advantage to a single rate-setting concept is simplicity and ease of understanding. This is even true after adjustments for transmission and pumping costs. Since rates tend to be a very controversial issue, simplicity in the formula to set rates tends to minimize future disagreements. The advantage to cost of service-based rates is that they send the proper price signal to each participant as to the cost of water. This allows the

individual participants to make better-informed decisions as to the benefits of investments within their local system. An example is the decision to build additional storage or invest in conservations measures to minimize peaking charges. A cost of service-based rate would allow the participant to determine if the construction of additional storage or conservation measures is the most economical option(s) vs. paying peaking charges. These price signals help to maximize the efficient use of resources.

Disadvantages – The disadvantage to the use of a single rate-setting concept is the lack of price signals sent to individual participants as to the true economic cost of their usage patterns. This could result in chooses that are not the most economical long run decisions. The disadvantage to the use of cost of service-based rates is not one of economics, but one of policy and perception issue. It is often hard for people to understand why they are paying different rates for the basic same commodity (water) due to the way in which they use the system. Given this tendency, costs of service-based rates tend to be considerably more controversial and require a far great expenditure of time and money to implement. This controversy and expense can be minimized by a very detailed agreement on methodology in the initial agreement.

Impact on other Options – The impact on this subcomponent to the overall all business models are minimal or non-existent.

8.3.3 System Development Charges

This subcomponent of the rate setting process deals with the assessment of system development charges. The two options are to have the individual participants assess system development charges for the regional supply system or have the regional supply system assess a system development charge. The option chosen is highly dependent on the ownership options, rate components and financing option.

Advantages – The advantages and disadvantages of this option are highly correlated to the option on ownership participation and financing. To the extent that specific ownership percentages and financing by the individual participant's are the chosen options, then it is imperative that the individual participants collect the SDC. To the extent that a regional approach to ownership and financing is the given approach, then the regional entity must be the party that set and collects the SDC. The advantage to individual collection under certain options is that it will allow the participants to operate their financial plans in a manner that reflects their cash flow needs. The advantage to the collection as a regional entity, under certain organizational options, is that the regional entity can collect SDC based on growth and cash flow requirements.

Disadvantages – The disadvantage of trying to do something that is contrary to the ownership and financing options is that a disconnect will be created between the ownership and financing options and the collection of the SDC. The financing option may well drive the basis for the collection and the assessment of the SDC. The disadvantage to individual collection under certain options is that it will not allow the regional entity to operate its financial plan in a manner that reflects its cash flow needs. The disadvantage to the collection as a regional entity under certain options is that all local control is lost in the determination of the amount to be charged, regardless of what can be charged, based on local policy.

Impact on other Options – The impact on this subcomponent to the overall all business models is not a driving factor, but the option is more influenced by the business model chosen.

8.4 Financing Options

This component of the business model is rather simple compared to the other components of the business model. The options are for the individual participants to provide funds for the financing of capital improvements or for the regional entity to serve as the source of funding for capital improvements. The sources of funds for the regional entity would be rates, system development charges and debt. These same options would available to the individual participants, but the combination of sources would be a policy decision of the local participant and not driven by decision of the regional entity.

As can be seen, the options for financing will directly impact the decisions or be driven by the decisions on rate options, ownership options and risk management from an organizational option standpoint. The risk management and legal issues need to be thoroughly considered in determining which financing option to undertake.

Advantages – The advantage of individual financing under various business model options are that the local participant's can control the method used to finance capital improvements based on their particular circumstances in order to maximize the benefit to their customers. The advantage to using the regional entity as the financing vehicle under various business model options is that the regional entity can minimize rates to all the participants by developing a long term financial plan that best meets the overall objectives of all the participants.

Disadvantages – The disadvantage of individual financing is the ability of the individual participants to obtain financing at the best possible rates. A financing backed by the collective financial capability of all the participants, as part of a regional entity, would most likely result in more favorable financing rates. The disadvantage to this approach is the loss of local control in financing and the resulting costs becoming an operations and maintenance expense to the local participants. This could have the result, under various organization options, of subordinating the debt of the local participants to the debt of the regional entity, resulting in increased borrowing costs to the local participant.

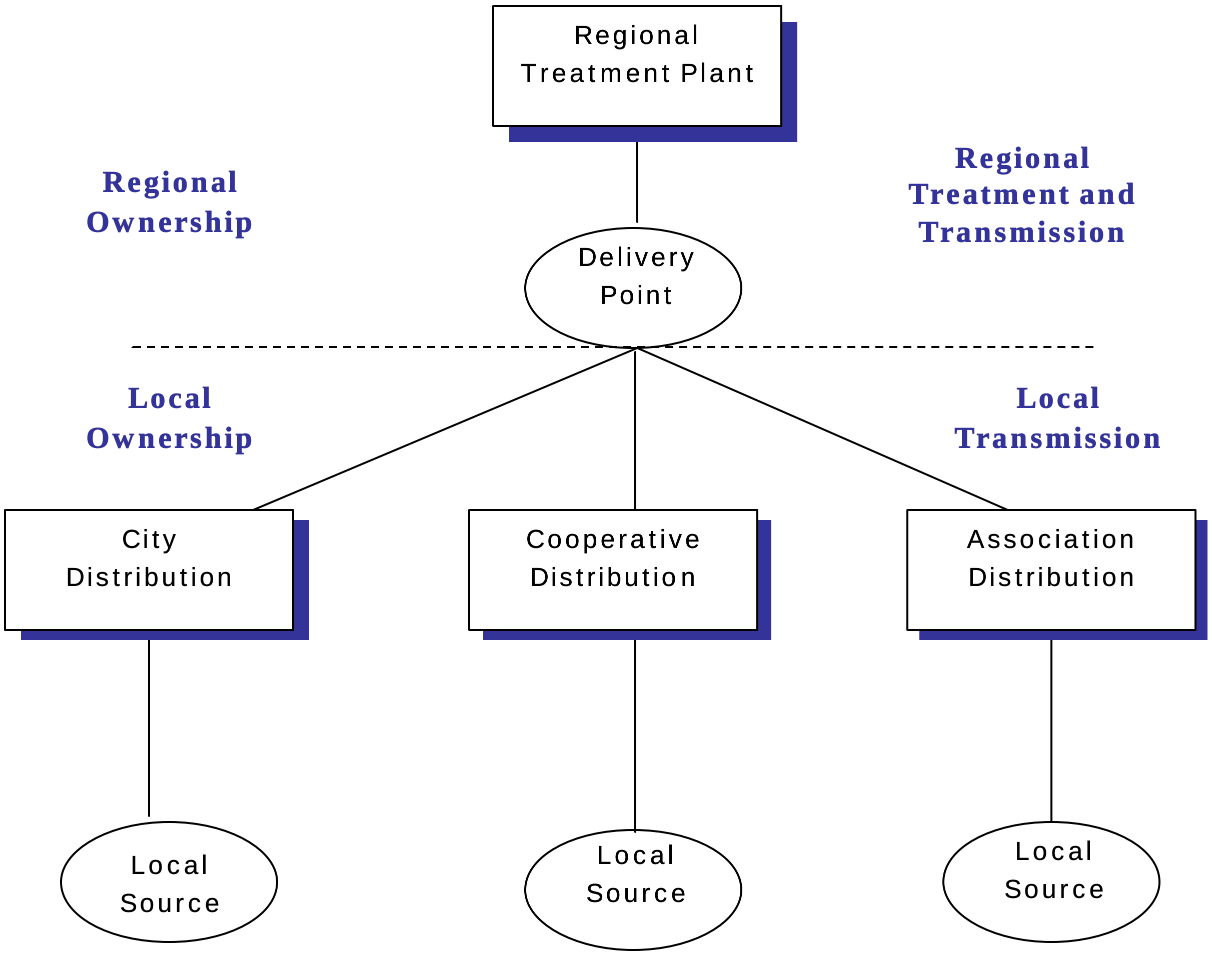
Impact on other Options – The impact on this component to the overall all business models can drastically effect the decisions made from the standpoint of rates, SDCs, ownership participation and organizational options. This component has the ability to be the driving factor in the other business model components or can be the result of the decisions made in the other business model components.

8.5 Business Relationship

By direction of study participants, it was clear that each agency would require continuance and preservation of their own facilities and customers. As a result, any new regional entity formed to construct and operate one of the preferred supply options would do so in a manner as to preserve the antimony of the original participating agencies.

The business relationship between the Regional Entity and the participants would be by contract or agreement for the purchase of wholesale water, depending on the type of organization formed under Oregon law. The Regional Entity would be responsible for treatment of incremental water and transmission to the main point of delivery. The participants would be responsible for the operation and maintenance of their currently owned sources of supply and distribution systems. The customers of the Regional Entity would be the participants and not the retail customers of the participants. This is illustrated in Exhibit 8-1.

Exhibit 8-1
Polk County Regionalization Study
Business Relationship



8.6 Organizational Options

This component of the business model deals with the organizational options available to the participants in the formation of a regional entity. A discussion of the various items and policy issues to consider in choosing an organizational structure for formation of a regional entity is provided. Next, a discussion of each of the regional entities is provided. Finally, a matrix of the various issues and rights associated with each of the options for formation of a legal entity is presented. The advantages and disadvantages of each entity, with respect to the various issues to consider, is provided as part of the discussion of the legal entities. The options available to the participants for formation of a regional entity are as follows:

- A water authority formed under ORS 450
- A water district formed under ORS 264
- A county service district formed under ORS 451
- A peoples utility district formed under ORS 261
- A intergovernmental agency formed under ORS 190

In addition to these current legal entities, which can be used to meet the needs of the participants under Oregon law, the participants should not preclude changes in legislation and formation of a new type of entity or modification of the provisions under one the above entities in order to meet the policy needs and objectives of the participants. While this option would take longer due to the need for legislative changes, the potential should not be ruled out at this stage.

The other option that the participants may wish to consider is the formation of a legal entity with one of the options set forth in this section with only a portion of the members. The other non-participating members could then enter into a long-term contract with the regional entity for the provision of potable water. This option may allow of the formation of the regional entity under current Oregon law and allow all the participants to meet their goals and objectives.

8.6.1 Issues to Consider in Organizational Options

In the determination of the best organizational option for the participants in the formation of a regional entity, a number of key items and policy decisions need to be considered. As with the majority of the options available in the formation of a business model for the regional entity, there is no right or wrong answer with respect to the option chosen, but it is a policy decision in the development of an organizational option which will meet the needs of the participants. The issues to consider include representation, voting rights of the members, financing available and financial liability to the individual participants and formational requirements.

The issue of representation has to do with the representatives of the regional entity and how they are chosen. Each of the various organizational options has difference requirements for election or appointment of representatives to the regional entity and the method under which those representatives are selected. The policy issue becomes one of local control by the individual participants in the regional entity versus non-local control by representatives who are either appointed by issue of law or elected from the general area served by the regional entity.

The issue of voting rights has to do with the basis under which the regional entity conducts business setting rates, rules and regulations for the regional entity. Under some of the organizational options the method for voting is driven by the requirements under state law. This issue has to do with local control of the regional entity. Under a number of the organizational options, voting is accomplished by a majority of the members and hence no recognization for size or investment is provided in the voting structure. Under other options, the participants can resolve this issue such that voting can be by majority, by a super majority or by another mechanism such as percentage ownership in the entity.

The issue with respect to financing and liability to the participants has to do with the methods available for financing of infrastructure through the various organizational options and the subsequent liability to the individual participants. All of the organizational options allow the entity to issue revenue bonds as a financing vehicle for capital improvements. However, only certain of the organizational options allow the issuance of general obligation debt, which carries a much lower interest rate, by vote of the people within the organization. The issue of liability and risk has to do with the responsibility of the participants in the event of a default on any debt issuance by the regional entity. Some of the organizational options allow the liability and risk to be minimized and only as specified in the terms and conditions of the contracts between the regional entity and the participants. Other organizational options provide for joint and severable liability of the participants to any financing undertaken by the regional entity. This could result in a large financial risk being passed on to participants given a default by the regional entity and subsequent default by other participants. Additionally, this joint and severable liability can cause problems with respect to the ability of the individual participants to issue debt due to the fact that the financial markets may view the debt issued by the individual participants as subordinated to the debt issued by the regional entity and hence the debt of the individual participants could be harder to find, come with more restrictive conveyance and/or carry a higher interest rates.

The issue with formation requirements has to do with the methods and requirements for formation of the various types of organizational options. The ability to form the regional entity may be extremely difficult if a vote of the people is required for the formation. Other options can be accomplished by ordinance of the various governmental entities to the regional entity or by a vote of the County Board of Commissioners.

Based on our initial research, it appears that there are no barriers to any of the options due to the fact that a number of the participants are cooperatives, associations and one is a sovereign tribal nation. It appears that Oregon law allows these types of organizations to be party to the various organizational options as set forth in this white paper. The issue of taxation over the Tribe would have to be worked out as part of the agreement in formation and would be a contractual in-lieu payment as opposed to payment of taxes. It is also recommended that the participants have the regional entities authority validated by the court prior to final finalization.

8.6.2 Water Authority formed under ORS 450

A water authority is a legal organization under Oregon law. The main purpose of water authorities has to do with combinations of districts and cities that preclude the cities from taking over the assets and customers of the districts upon annexation. The statutes allow for the formation of a wholesale water authority that would not impact the annexation issues at a retail level. However, it appears that the annexation statutes within the ORS 450 would require a city annexing into a districts service territory to continue to buy wholesale water from the ORS 450 authority to serve those customers.

The representation for an ORS 450 is five (5) to seven (7) members elected within the boundaries of the ORS 450. These can be elected at large or by zones based on population. Voting is by majority. The relationship between the participants and the water authority would be by contract for the sale of water.

The approval for an ORS 450 is by the County Commission. The statute requires certain tests and documentation to be filed showing that the ORS 450 is in the best interest of the various entities. Additionally, the statutes allows for protests by effected parties which include other water purveyors, mainly cities which are not part of the water authority but have service areas continuous to a member of the regional entity.

Oregon law also provides that a city or district may transfer their water right to the water authority with no impact on the priority date. The authority may also change the point of diversion of the water right with no impact on the priority date. Given the water supply options available to the regional entity, this may be a very beneficial advantage to the formation of a water authority.

8.6.3 Water District formed under ORS 264

This business model option would provide for the formation of a water district under ORS 264. The intent of the water district would be to hold and manage the assets of the regional entity and provide wholesale service to the various participants. This organizational option is very similar to the options under ORS 450, however the annexation issues do not come into play. That is, if a city annexes the service area of one of the participants, not only would the distribution system be taken over by the city, the city would be under no obligation to purchase water at a wholesale level to serve the customers of the annexed area. The provisions under ORS 264 do not provide for the transference of water rights to the entity and the ability to move the point of diversions of those water rights.

The election of representatives for an ORS 264 is five (5) members at large for four (4) year terms. The relationship of the participants to the district would be via contract.

The formation of a water district is approval by the County Commissioners or can be formed by a petition requiring a vote of the people for formation. Furthermore, the statutes allow for the decision of the County Commissioners to be put to a vote of the people provided signature requirements are met per Oregon law.

With respect to financing aspects under ORS 264, the entity has the ability to provide for independent financing either through revenue bonds or a vote of the people for issuance of general obligation bonds. From a liability and risk issue, the various participants would not be at risk for the debts of the district except to the extent that their contracts require them to pay all costs of the district. The basic business relationship between the participants and the regional entity would be one of a pure contractual matter.

8.6.4 County Service District formed under ORS 451

A county service district is an entity that can provide potable water service to the areas within the county service district. It appears that the service territory could include cities, districts, cooperatives, associations and the Tribe.

The representatives of a county service district are the County Commissioners. Therefore, since all members of the county have the ability to elect these officials, all members of the county service district would provide for election of representation. Voting is by majority rule of the County Commission.

The formation of a county service district is by approval by the County Commissioners. The relationship between the participants and the county service district would be by contract.

With respect to financing, a county service district has the ability to issue revenue bonds as well as general obligation bonds as approved by a vote of the people. The debts of the county service districts are not liabilities of the various participants except to the extent that their contracts between the county service district and the participants require payment of all costs and expenses associated with the county service district.

8.6.5 Peoples Utility District formed under ORS 261

A Peoples Utility District is a legal entity that can provide potable water service to participants within the service area. It is unclear whether or not this can be solely a retail entity or can serve as a wholesale entity to the participants.

The representation of a Peoples Utility District is five (5) members elected by zone within the boundaries of the Peoples Utility District. The zones are formed by population area with the intent of equal population within each zone. Voting is by majority.

The formation requirements for a Peoples Utility District are by vote of the people. The statutes require that a majority of the people voting approve the formation of the Peoples Utility District.

A Peoples Utility District has the ability to issue revenue bonds and general obligation bonds by a vote of the people. The debt liabilities of the Peoples Utility District would not be debt liabilities of the participants. Rather, the liability would be through contract requirements between the participants and the Peoples Utility District.

8.6.6 Intergovernmental Agency formed under ORS 190

An ORS 190 organization is an intergovernmental agency organization created by an intergovernmental agreement between the various participants. This option provides the maximum flexibility in the formation of the business model. However, the risk factors associated with financing are the greatest under all of the organizational options.

The voting requirements and membership to an intergovernmental agency are determined by the parties to the intergovernmental agreement and would be part of the agreement forming the intergovernmental agency. Examples for voting requirements that are used other entities in the State of Oregon, include a majority, a majority of the members provided that an affirmative vote is received from each one of the members and based on participation in the entity.

The formation of an intergovernmental agency is done by the development of the agreement that sets forth the basis under which the entity will operate and is approved by ordinance by the various entities that are participants to entity

The statutes allow for issuance of revenue bonds through the ORS 190. However, the ORS 190 has no taxing authority and cannot issue general obligation bonds. From a risk standpoint, the debts and liabilities of the ORS 190 are debts and liabilities of the entities. The statute requires that debt is a joint and severable liability of the parties unless otherwise specified in the formation of the organization. While different types of liability responsibilities could be provided in the agreement, anything other than joint and severable liability may cause difficulty in the financial markets. This is a concern to the extent that this could cause some problems with the debt issuance by the individual participants. This is due to the fact that debt from the intergovernmental agency could be considered an operation and maintenance expense to the various participants and is hence be viewed as senior debt to the entities own debt. This could result in higher interest rates, more stringent covenanted for issuance of debt by the individual participants and changes in the revenue stream pledge for the individual participants.

8.6.7 Summary of the Options

Presented in Table 8-2 is a summary of the various issues and the provisions under each one of the organizational options as presented in this subsection.

Table 8-2
Polk County Regionalization Study
Organization Options

Organization	Representation	Voting	Water Rights Transfer Required	Formation Requirements	Financing		
					Revenue Bonds	General Obligation Bonds	Risk
Water Authority Under ORS 450	5 or 7 members at large or by population zone	Majority vote	No	By vote of County Commissioners	Yes	Yes By vote	Limited to contracts
Water District Under ORS 264	5 members at large	Majority vote	Yes	By vote of County Commissioners	Yes	Yes By Vote	Limited to contracts
County Service District Under ORS 451	County Commissioners	Majority vote	Yes	By a majority vote of the people or by the County Commissioners	Yes	Yes By vote	Limited to contracts
Peoples Utility District Under ORS 261	5 members by population zone	Majority vote	Yes	By a vote of the people	Yes	Yes By Vote	Limited to contracts
Intergovernmental Agency Under ORS 190	Open	Open	Yes	By ordinance of members	Yes	No	Joint and Severable (1)

(1) For cities this could extend to the General Fund.

8.6 Next Steps

The discussion presented here was intended to serve as an informational resource in contrasting and comparing the various governance strategies available in potentially creating a new regional supply agency. The essential elements included components for ownership participation, rate setting practices, financing options and organizational options. This discussion was presented in a manner to allow the various participants to determine the impact of the various options on their operations.

The next step in this process would be to narrow down the options and develop the framework of the business model. This is best done through a consensus process of the various participants. Once the basic business model framework and principals have been developed, then the next phase of the process is the actual drafting of the agreements. It is best to first provide for a conceptual framework in the business model in order to help provide guidance in the detailed implementation phase, while assuring that an actual agreement can be developed which meets the needs and objectives of all the participants.

City of Monmouth. The City of Monmouth is located just west of the City of Independence along State Highway 51. The City has an estimated current population of 7,700. The City's largest employer is Western Oregon University with 656 employees. Like Independence, agriculture makes up the majority of the City's industrial base. The City exclusively receives its water from three individual groundwater wells. The City's latest water master plan reported a combined reliable yield from these wells of approximately 1,500 gpm (2.77 cfs).

City of Willamina. The City of Willamina is located in the northwestern portion of Polk County and first established a water supply system in 1911. The City currently serves a population of approximately 716 and recently built a water treatment plant with two 350gpm treatment units operated in parallel. The City has access to water rights on Willamina Creek which total 2.8 cfs.

City of Falls City. Falls City is a small community located in the forest-covered Coastal Range. The City was established by pioneers and became a center for the logging and sawmill industries. The City has an estimated current population of 966. The water system's source of supply is from surface water rights on Glaze Creek, Teal Creak, and the Little Luckiamute River totaling 5.26 cfs. Two cfs of these water rights are drawn from senior certificated rights with priority dates no later than 1939.

Buell Red Prairie Water District. The district was formed in 1979 as a private non-profit association and currently serves a population numbering over 1,000 customers. The district boundaries run from the foothills of the coastal range at an elevation of approximately 1,000 feet above sea level to the Yamhill River valley at about 300 feet elevation covering an area of approximately 50 square miles. The majority of the district's service area is located in Township 6 South and Range 6 West of the public land survey system. The district receives its water from a combination of surface water diversions from a man-made lake on Gooseneck Creek and wells that are supplemented by wet-season recharge from their surface water source.

Rickreall Community Water Association. The association was established in 1971 by a group of developers and homeowners in the vicinity of unincorporated areas of Rickreall, Clow Corner, and Oak Grove. Currently, the association serves a population of approximately 1,200 and includes agricultural, industrial, and public users. The commercial customers are primarily related to the food production, concrete pipe manufacturing, and wine bottling industries. The service area extends from the City of Dallas eastward along highway 22 and serves residences between 730 to 130 feet mean sea level. The association currently has a total of six wells with active permits totaling 3.72 cfs.

Grand Ronde Community Water Association. The Grand Ronde Community Water Association is a non-profit cooperative formed under ORS Chapter 62. As of 1998 the association served a total of 660 connections and extends from the Grand Ronde community east along state highway 18 to the town of Willamina. The association covers approximately 23 square miles of Polk County and borders the Rock Creek and Buell Red Prairie Water Districts. The association has a total of 1.54 cfs of permitted water from rights on a spring field and a 0.36 cfs right on Cow Creek a tributary of Rock Creek.

Luckiamute Domestic Water Cooperative. The Luckiamute Domestic Water Cooperative is a privately owned cooperative established in 1966. The cooperative serves an estimated population of 2,310 and covers an approximate service area of 165 square miles in the southeast corner of Polk County. The cooperative provides service to the unincorporated communities of Airlie, Suver, Pedee, and Buena Vista. The cooperative currently has a total of 6 cfs of permitted water authorizing water use from a series of wells within its service boundaries.

Rock Creek Water District. The Rock Creek Water District was originally formed as the Rock Creek Hideout Water Department in 1960. The Department was reformed into the Rock Creek Water District in 1998 in an effort to collect funds to subsidize a treatment plant and other improvements required by state regulations and the federal Safe Drinking Water Act. The district is located in the southern portion of Grand Ronde, Oregon along state highway 18. The district currently serves a total of 94 connections with an approximate population of 370. The district maintains a right to store and divert up to 0.19 cfs of water from the Rock Creek Hideout Reservoir. The reservoir's source of water is a tributary of Rock Creek.

Perrydale Domestic Water Association. Perrydale Domestic Water Association was incorporated as a non-profit corporation in 1970. The association serves approximately 1,625 customers (over 600 residences) in the unincorporated portions of northeast Polk County. The primary source of supply is a series of wells with a permitted maximum withdrawal rate of approximately 4.5 cfs.

Tanglewood Water Cooperative. The Tanglewood Area currently does not have access to its own source of supply. However, due to water use limitations and an increasing demand for water, the group has continued to explore possible options for gaining access to a long range viable water supply. The service area would include approximately 72 residences for an estimated total population of 180. The area is located to the northwest of the City of Dallas.

City of Adair Village. The City of Adair Village is located approximately 8 miles north of the City of Corvallis along State Highway 99W in Benton County. Over 70% of the City's area is zoned as residential, 28% as public/educational, and a small amount of commercial/industry at 1.3%. The current population is approximately 825. The City receives its water from a point of diversion on the Willamette River. The City holds two water rights at this location, one for a total of 3 cfs and a second for a total of 82 cfs. The City produces its own water from a conventional treatment plant originally constructed by the U.S. Army in 1942. The plant is currently limited to a capacity of 3.56 cfs.

Appendix B

Supply Options Cost Analysis

Exhibit Number	Supply Option	Supply Option Description
Exhibit B-1	WR-1	Adair Village WTP
Exhibit B-2	WR-2A	Regional WTP #1
Exhibit B-3	WR-2B	Regional WTP #2
Exhibit B-4	WR-3	Regional WTP with Additional Supply
Exhibit B-5	R-1	Gorge Dam and Reservoir
Exhibit B-6	R-2	Big Rock Creek Reservoir
Exhibit B-7	R-3	Rickreall Creek Storage
Exhibit B-8	R-4	Valsetz Storage
Exhibit B-9	G-1	Groundwater Development
Exhibit B-10	RG-1	Rickreall Storage/Groundwater Development

Exhibit B-1

Source Option

Adair Village Treatment Plant (WR-1)

WR-1: Adair Village Treatment Plant

Source Development	J - Willamette River Development, Adair Village
Raw Water Transmission	D - Willamette River POD - Adair Village
Treatment and Finished Water Transmission	D - Adair Village WTP

Source Development Option SD-J (Willamette River Development - Adair Village)

Project #	Project Type	Description	Unit	$/Unit	Qty	Total	Notes
I-6	Intake	Intake on Willamette River (Adair Village)	MGD	$10,000	18	$180,000	Note 1
R-1	Storage	Purchase storage from USACOE, 50% of summer season demand	ac-ft	$1,700	0	$0	
		Contingency			25%	$45,000	
			subtotal			$225,000	

Raw Water Transmission Option RW-D (Willamette River POD - Adair Village WTP)

Project #	Project Type	Description	Supply Deficit (mgd)	Capacity Needs (mgd)	Unit	Diameter (in)	$/Unit	Qty	Total	Notes
RW-7	Pipeline	Raw Water Pipeline from Willamette R. to Adair Village	12	14	ft	30	$240	1,336	$320,640	Note 2
PS-3	Pump Station	Pump Station at Willamette River Intake	--	--	hp	--	$1,500	450	$675,000	Note 3
		Contingency						25%	$248,910	
			subtotal						$1,244,550	

Treatment and Finished Water Transmission Option FW-D (Adair Village WTP)

	Project Type	Description	Supply Deficit (mgd)	Capacity Needs (mgd)	Unit	Diameter (in)	$/Unit	Qty	Total	Notes
WTP-3	Treatment	Upgrade and retrofit Adair Village WTP	12	12	MGD	--	--	12	$11,000,000	Note 5
FW-17	Pipeline	Finished Water Pipeline from Adair Village to Voss Reservoir	12.25	12.25	MGD	30	$240	11,202	$2,688,480	Note 2
FW-18	Pipeline	Finished Water Pipeline from Voss Reservoir to Monmouth	12.25	12.25	MGD	30	$240	46,392	$11,134,080	Note 2
FW-7	Pipeline	Finished Water Pipeline from FW-6 to City of Monmouth	3.75	4.00	MGD	18	$144	6,825	$982,728	Note 2
FW-12	Pipeline	Finished Water Pipeline form north of City of Monmouth to "Point A"	3.75	4.00	MGD	18	$144	13,958	$2,009,880	Note 2
FW-10	Pipeline	Finished Water Pipeline to Buell Red Prairie	0.25	0.25	MGD	4	$32	20,707	$662,616	Note 3
FW-11	Pipeline	Finished Water from Buell Red Prairie to GRCWA	0.25	0.25	MGD	4	$32	58,439	$1,870,056	Note 2
FW-13	Pipeline	Finished Water Pipeline from "Point A" to City of Dallas	3.00	3.00	MGD	18	$144	20,725	$2,984,400	Note 2
FW-14	Pipeline	Finished Water Pipeline from "Point A" to Rickreall	1.00	1.00	MGD	8	$64	38,531	$2,466,000	Note 2
FW-4	Pipeline	Finished Water Pipeline from the City of Monmouth to Luckiamute	0.50	0.50	MGD	6	$48	17,397	$835,056	Note 2
FW-7	Pipeline	Finished Water Pipeline from FW-6 to City of Monmouth	3.75	4.00	MGD	18	$144	6,825	$982,728	Note 2
FW-9	Pipeline	Finished Water Pipeline from Rickreall to Perrydale	1.00	1.00	MGD	8	$64	21,889	$1,400,896	Note 2
PS-9	Pump Station	Dallas - Monmouth Booster Pump Station	--	--	hp	--	$1,500	4,900	$7,350,000	Note 4
PS-13	Pump Station	Adair Village WTP to Monmouth - Booster Pump Station	--	--	hp	--	$2,000	500	$1,000,000	
		Contingency						25%	$11,841,730	
			subtotal						$59,208,650	

Summary

Source Development	$225,000
Raw Transmission	$1,244,550
Treatment and Finished Water Transmission	
Transmission/Booster Pumping - Dallas, Monmouth, Independence	$46,034,730
Transmission - All Others	***$13,173,920***
Total - Treatment and Finished Water Transmission	$59,208,650
Total	**$60,678,200**

Estimate of cost/ccf

Average Annual Demand (2003-2040) (mgd)	4.13
Average Annual Sales (2003-2040) (ccf)	2,016,648

Time Period (yrs)	25
Interest Rate	5.5%
Total Capital Cost	$60,678,200
Annualized Cost	$4,523,521
Average Unit Costs (2005-2040)[6]	
Capital Cost ($/ccf)	$2.24
Operations and Maintenance Costs ($/ccf)	$0.30
Total ---Average Unit Cost ($/ccf)	$2.54

Notes

1. Intake cost estimate from Willamette River WTP, Wilsonville, OR construction cost of $350,000 for 70 MGD intake ($5,000/MGD). Assume $10,000/MGD to account for economy of scale.
2. Pipelines sized for a velocity of 5 fps at peak day demand.
3. Pumping capacity based on peak day demands.
4. Pump station size taken from Regional Water Supply Project, CH2MHill February 6, 2003.
5. Original Adair Village plant was designed for 8 MGD in 1942. Treatment will initially consist of approximately $1,000,000 dollars to retrofit the plant for 4 MGD production.
   The subsequent 8 MGD in treatment production is assumed to cost $1.25 million per MGD. Therefore, the total lifetime treatment costs are estimated to be $1 million + 8 MGD * $1.25 million = $11 million.
6. Average Unit costs are shown for relative comparison purposes only. Actual unit cost at startup will be greater due to smaller volume of sales and differing operations and maintenance costs.
   For example, assuming startup annual sales of 2 MGD and reduced O&M costs ($0.18/ccf) from lower labor and chemical expenditures, startup average unit costs could be as high as $5.45/ccf.

Exhibit B-2

Source Option

Regional WTP #1 (WR-2A)

WR-2A: Regional WTP (low range of treatment costs)

Source Development	A - Willamette River Development - No Additional Storage
Raw Water Transmission	C - Willamette River POD - Regional WTP
Treatment and Finished Water Transmission	B - Regional WTP

Source Development Option SD-A (Willamette River Development - No Purchase of Contracted Storage)

Project #	Project Type	Description	Unit	$/Unit	Qty	Total	Notes
I-1	Intake	Intake on Willamette River	MGD	$10,000	18	$180,000	Note 1
		Contingency			25%	$45,000	
		subtotal				$225,000	

Raw Water Transmission Option RW-C (Willamette River POD - Regional WTP)

Project #	Project Type	Description	Supply Deficit (mgd)	Capacity Needs (mgd)	Unit	Diameter (in)	$/Unit	Qty	Total	Notes
RW-2	Pipeline	Raw Water Pipeline from Willamette R. to Regional WTP	12	14	ft	30	$240	1,487	$356,880	Note 2
PS-3	Pump Station	Pump Station at Willamette River Intake	--	--	hp		$1,500	150	$225,000	Note 3
		Contingency						25%	$145,470	
			subtotal						$727,350	

Treatment and Finished Water Transmission Option FW-B (Regional WTP)

	Project Type	Description	Supply Deficit (mgd)	Capacity Needs (mgd)	Unit	Diameter (in)	$/Unit	Qty	Total	Notes
WTP-2	Treatment	Construct new regoinal Water Treatment Plant	12	12	MGD	Low	$1,250,000	12	$15,000,000	Note 5
FW-12	Pipeline	Finished Water Pipeline form north of City of Monmouth to "Point A"	3.75	4.00	MGD	18	$144	13,957	$2,009,878	Note 2
FW-13	Pipeline	Finished Water Pipeline from "Point A" to City of Dallas	3.00	3.00	MGD	18	$144	20,725	$2,984,373	Note 2
FW-6	Pipeline	Finished Water Pipeline from Regional WTP to north of City of Monmouth	12.25	12.25	MGD	30	$240	19,546	$4,690,956	Note 2
FW-7	Pipeline	Finished Water Pipeline from FW-6 to City of Monmouth	4.00	4.00	MGD	18	$144	6,824	$982,723	Note 2
PS-8	Pump Stations	Regional WTP to Dallas Booster Pump Station	--	--	hp	--	$1,800	1,800	$3,240,000	Note 3
FW-10	Pipeline	Finished Water Pipeline to Buell Red Prairie	0.25	0.25	MGD	4	$32	20,707	$662,611	Note 2
FW-11	Pipeline	Finished Water from Buell Red Prairie to GRCWA	0.25	0.25	MGD	4	$32	58,439	$1,870,052	Note 2
FW-14	Pipeline	Finished Water Pipeline from "Point A" to Rickreall	1.00	1.00	MGD	8	$64	38,531	$2,465,993	Note 2
FW-4	Pipeline	Finished Water Pipeline from the City of Monmouth to Luckiamute	0.50	0.50	MGD	6	$48	17,397	$835,044	Note 2
FW-9	Pipeline	Finished Water Pipeline from Rickreall to Perrydale	1.00	1.00	MGD	8	$64	21,889	$1,400,889	Note 2
		Contingency						25%	$9,035,630	
			subtotal						$45,178,150	

Summary

Source Development	$225,000
Raw Transmission	$727,350
Treatment and Finished Water Transmission	
Transmission/Booster Pumping - Dallas, Monmouth, Independence	***$36,134,914***
Transmission - All Others	***$9,043,236***
Total - Treatment and Finished Water Transmission	$45,178,150
Total	**$46,130,500**

Estimate of cost/ccf

Average Annual Demand (2005-2040) (mgd)	4.13
Average Annual Sales (2005-2040) (ccf)	2,016,648

Time Period (yrs)	25
Interest Rate	5.5%
Total Capital Cost	$46,130,500
Annualized Cost	$3,438,999
Average Unit Costs (2005-2040)[4]	
Capital Cost ($/ccf)	$1.71
Operations and Maintenance Costs ($/ccf)	$0.30
Total --Average Unit Cost ($/ccf)	$2.01

Notes

1. Intake cost estimate from Willamette River WTP, Wilsonville, OR construction cost of $350,000 for 70 MGD intake ($5,000/MGD). Assume $10,000/MGD to account for economy of scale.
2. Pipelines sized for a velocity of 5 fps at peak day demand.
3. Pumping capacity based on peak day demands.
4. Average Unit costs are shown for relative comparison purposes only. Actual unit cost at startup will be greater due to smaller volume of sales and differing operations and maintenance costs. For example, assuming startup annual sales of 2 MGD and reduced O&M costs ($0.18/ccf) from lower labor and chemical expenditures, startup average unit costs could be as high as $3.78/ccf.
5. Planning level treatment costs are typically $1.25 per gallon of production per day. However, the Wilsonville Water Treatment plant, the most recent treatment plant on the Willamette River downstream of Albany, had a construction cost of approximately $3.00 per gallon. As a result, it is assumed that for Willamette River treatment, costs will range from $1.25 per gallon to $3.00 per gallon.

Exhibit B-3
Source Option
Regional WTP #2 (WR-2B)

WR-2B: Regional WTP (high range of treatment costs)

Source Development	A - Willamette River Development - No Additional Storage
Raw Water Transmission	C - Willamette River POD - Regional WTP
Treatment and Finished Water Transmission	B - Regional WTP

Source Development Option SD-A (Willamette River Development - No Purchase of Contracted Storage)

Project #	Project Type	Description	Unit	$/Unit	Qty	Total	Notes
I-1	Intake	Intake on Willamette River	MGD	$10,000	18	$180,000	Note 1
		Contingency			25%	$45,000	
		subtotal				$225,000	

Raw Water Transmission Option RW-C (Willamette River POD - Regional WTP)

Project #	Project Type	Description	Supply Deficit (mgd)	Capacity Needs (mgd)	Unit	Diameter (in)	$/Unit	Qty	Total	Notes
RW-2	Pipeline	Raw Water Pipeline from Willamette R. to Regional WTP	12	14	ft	30	$240	1,487	$356,880	Note 2
PS-3	Pump Station	Pump Station at Willamette River Intake	--	--	hp		$1,500	150	$225,000	Note 3
		Contingency						25%	$145,470	
			subtotal						$727,350	

Treatment and Finished Water Transmission Option FW-B (Regional WTP)

	Project Type	Description	Supply Deficit (mgd)	Capacity Needs (mgd)	Unit	Diameter (in)	$/Unit	Qty	Total	Notes
WTP-2	Treatment	Construct new regoinal Water Treatment Plant	12	12	MGD	High	$3,000,000	12	$36,000,000	Note 5
FW-12	Pipeline	Finished Water Pipeline form north of City of Monmouth to "Point A"	3.75	4.00	MGD	18	$144	13,957	$2,009,878	Note 2
FW-13	Pipeline	Finished Water Pipeline from "Point A" to City of Dallas	3.00	3.00	MGD	18	$144	20,725	$2,984,373	Note 2
FW-6	Pipeline	Finished Water Pipeline from Regional WTP to north of City of Monmouth	12.25	12.25	MGD	30	$240	19,546	$4,690,956	Note 2
FW-7	Pipeline	Finished Water Pipeline from FW-6 to City of Monmouth	4.00	4.00	MGD	18	$144	6,824	$982,723	Note 2
PS-8	Pump Stations	Regional WTP to Dallas Booster Pump Station	--	--	hp	--	$1,800	1,800	$3,240,000	Note 3
FW-10	Pipeline	Finished Water Pipeline to Buell Red Prairie	0.25	0.25	MGD	4	$32	20,707	$662,611	Note 2
FW-11	Pipeline	Finished Water from Buell Red Prairie to GRCWA	0.25	0.25	MGD	4	$32	58,439	$1,870,052	Note 2
FW-14	Pipeline	Finished Water Pipeline from "Point A" to Rickreall	1.00	1.00	MGD	8	$64	38,531	$2,465,993	Note 2
FW-4	Pipeline	Finished Water Pipeline from the City of Monmouth to Luckiamute	0.50	0.50	MGD	6	$48	17,397	$835,044	Note 2
FW-9	Pipeline	Finished Water Pipeline from Rickreall to Perrydale	1.00	1.00	MGD	8	$64	21,889	$1,400,889	Note 2
		Contingency						25%	$14,285,630	
			subtotal						$71,428,150	

Summary

Source Development	$225,000
Raw Transmission	$727,350
Treatment and Finished Water Transmission	
Transmission/Booster Pumping - Dallas, Monmouth, Independence	***$62,384,914***
Transmission - All Others	***$9,043,236***
Total - Treatment and Finished Water Transmission	$71,428,150
Total	**$72,380,500**

Estimate of cost/ccf

Average Annual Demand (2005-2040) (mgd)	4.13
Average Annual Sales (2005-2040) (ccf)	2,016,648

Time Period (yrs)	25
Interest Rate	5.5%
Total Capital Cost	$72,380,500
Annualized Cost	$5,395,919
Average Unit Costs (2005-2040)[4]	
Capital Cost ($/ccf)	$2.68
Operations and Maintenance Costs ($/ccf)	$0.30
Total --Average Unit Cost ($/ccf)	$2.98

Notes

1. Intake cost estimate from Willamette River WTP, Wilsonville, OR construction cost of $350,000 for 70 MGD intake ($5,000/MGD). Assume $10,000/MGD to account for economy of scale.
2. Pipelines sized for a velocity of 5 fps at peak day demand.
3. Pumping capacity based on peak day demands.
4. Average Unit costs are shown for relative comparison purposes only. Actual unit cost at startup will be greater due to smaller volume of sales and differing operations and maintenance costs.
   For example, assuming startup annual sales of 2 MGD and reduced O&M costs ($0.18/ccf) from lower labor and chemical expenditures, startup average unit costs could be as high as $3.78/ccf.
5. Planning level treatment costs are typically $1.25 per gallon of production per day. However, the Wilsonville Water Treatment plant, the most recent treatment plant on the Willamette River downstream of Albany, had a construction cost of approximately $3.00 per gallon. As a result, it is assumed that for Willamette River treatment, costs will range from $1.25 per gallon to $3.00 per gallon.

Exhibit B-4

Source Option

Regional WTP with Additional Supply (WR-3)

WR-3: Regional WTP with Addtiional Supply (low range of treatment costs)

Source Development	B - Willamette River Development, With Additional Storage
Raw Water Transmission	C - Willamette River POD - Regional WTP
Treatment and Finished Water Transmission	B - Regional WTP

Source Development Option SD-B (Willamette River Development - With Supplemental Storage)

Project #	Project Type	Description	Unit	$/Unit	Qty	Total	Notes
I-1	Intake	Intake on Willamette River	MGD	$10,000	18	$180,000	Note 1
R-1	Storage	Purchase storage from USACOE, 50% of summer season demand	ac-ft	$1,700	1,850	$3,145,000	
		Contingency			25%	$45,000	
		subtotal				$3,370,000	

Raw Water Transmission Option RW-C (Willamette River POD - Regional WTP)

Project #	Project Type	Description	Supply Deficit (mgd)	Capacity Needs (mgd)	Unit	Diameter (in)	$/Unit	Qty	Total	Notes
RW-2	Pipeline	Raw Water Pipeline from Willamette R. to Regional WTP	12	14	ft	30	$240	1,487	$356,880	Note 2
PS-3	Pump Station	Pump Station at Willamette River Intake	--	--	hp	--	$1,500	150	$225,000	Note 3
		Contingency						25%	$145,470	
		subtotal							$727,350	

Treatment and Finished Water Transmission Option FW-B (Regional WTP)

	Project Type	Description	Supply Deficit (mgd)	Capacity Needs (mgd)	Unit	Diameter (in)	$/Unit	Qty	Total	Notes
WTP-2	Treatment	Construct new regoinal Water Treatment Plant	12	12	MGD	--	$1,250,000	12	$15,000,000	Note 5
FW-12	Pipeline	Finished Water Pipeline form north of City of Monmouth to "Point A"	3.75	4.00	MGD	18	$144	13,957	$2,009,878	Note 2
FW-13	Pipeline	Finished Water Pipeline from "Point A" to City of Dallas	3.00	3.00	MGD	18	$144	20,725	$2,984,373	Note 2
FW-6	Pipeline	Finished Water Pipeline from Regional WTP to north of City of Monmouth	12.25	12.25	MGD	30	$240	19,546	$4,690,956	Note 2
FW-7	Pipeline	Finished Water Pipeline from FW-6 to City of Monmouth	4.00	4.00	MGD	18	$144	6,824	$982,723	Note 2
PS-8	Pump Stations	Regional WTP to Dallas Booster Pump Station	--	--	hp	--	$1,800	1,800	$3,240,000	Note 3
FW-10	Pipeline	Finished Water Pipeline to Buell Red Prairie	0.25	0.25	MGD	4	$32	20,707	$662,611	Note 2
FW-11	Pipeline	Finished Water from Buell Red Prairie to GRCWA	0.25	0.25	MGD	4	$32	58,439	$1,870,052	Note 2
FW-14	Pipeline	Finished Water Pipeline from "Point A" to Rickreall	1.00	1.00	MGD	8	$64	38,531	$2,465,993	Note 2
FW-4	Pipeline	Finished Water Pipeline from the City of Monmouth to Luckiamute	0.50	0.50	MGD	6	$48	17,397	$835,044	Note 2
FW-9	Pipeline	Finished Water Pipeline from Rickreall to Perrydale	1.00	1.00	MGD	8	$64	21,889	$1,400,889	Note 2
		Contingency						25%	$9,035,630	
		subtotal							$45,178,150	

Summary

Source Development	$3,370,000
Raw Transmission	$727,350
Treatment and Finished Water Transmission	
Transmission/Booster Pumping - Dallas, Monmouth, Independence	***$36,134,914***
Transmission - All Others	***$9,043,236***
Total - Treatment and Finished Water Transmission	$45,178,150
Total	**$49,275,500**

Estimate of cost/ccf

Average Annual Demand (2003-2040) (mgd)	4.13
Average Annual Sales (2003-2040) (ccf)	2,016,648

Time Period (yrs)	25
Interest Rate	5.5%
Total Capital Cost	$49,275,500
Annualized Cost	$3,673,457
Average Unit Costs (2005-2040)[4]	
Capital Cost ($/ccf)	$1.82
Operations and Maintenance Costs ($/ccf)	$0.30
Total ---Average Unit Cost ($/ccf)	$2.12

Notes

1. Intake cost estimate from Willamette River WTP, Wilsonville, OR construction cost of $350,000 for 70 MGD intake ($5,000/MGD). Assume $10,000/MGD to account for economy of scale.
2. Pipelines sized for a velocity of 5 fps at peak day demand.
3. Pumping capacity based on peak day demands.
4. Average Unit costs are shown for relative comparison purposes only. Actual unit cost at startup will be greater due to smaller volume of sales and differing operations and maintenance costs.
   For example, assuming startup annual sales of 2 MGD and reduced O&M costs ($0.18/ccf) from lower labor and chemical expenditures, startup average unit costs could be as high as $4.02/ccf.
5. Planning level treatment costs are typically $1.25 per gallon of production per day. However, the Wilsonville Water Treatment plant, the most recent treatment plant on the Willamette River downstream of Albany, had a construction cost of approximately $3.00 per gallon. As a result, it is assumed that for Willamette River treatment, costs will range from $1.25 per gallon to $3.00 per gallon.

Exhibit B-5

Source Option

Gorge Dam and Reservoir (R-1)

R-1: Gorge Dam and Reservoir - Dallas WTP Upgrade

Source Development	D - Gorge Dam and Reservoir
Raw Water Transmission	A - POD on Rickreall Creek - Dallas WTP
Treatment and Finished Water Transmission	A - Dallas WTP Upgrade

Source Development Option SD-D (Gorge Dam and Reservoir)

Project #	Project Type	Description	Unit	$/Unit	Qty	Total	Notes
I-3	Intake	Intake at Gorge Dam and Reservoir Site	MGD	$10,000	18	$180,000	Note 1
R-3	Storage	Construct Dam, Reservoir, Environmental Mitigation	ac-ft	$6,058	3,700	$22,414,100	Note 2
RW-4	Pipeline	Raw Water Pipeline from Reservoir to Rickreall Creek Tributary	ft	$240	17,391	$4,173,840	
PS-5	Pump Stations	Raw Water Pump Station from Reservoir to Rickreall Creek Tributary	hp	$1,500	3,200	$4,800,000	
		Contingency			25%	$7,891,985	
		subtotal				$39,459,925	

Raw Water Transmission Option RW-A (POD on Rickreall Creek - Dallas WTP)

Project #	Project Type	Description	Supply Deficit (mgd)	Capacity Needs (mgd)	Unit	Diameter (in)	$/Unit	Qty	Total	Notes
RW-5	Pipeline	Raw Water Pipeline from Rickreall Creek to Dallas WTP	12	14	ft	30	$240	2,082	$499,680	Note 3
PS-6	Pump Station	Raw Water Pump Station from Rickreall Creek to Dallas WTP	--	--	hp	--	$1,500	750	$1,125,000	Note 4
		Contingency						25%	$406,170	
		subtotal							$2,030,850	

Treatment and Finished Water Transmission Option FW-A (Dallas WTP Upgrade)

	Project Type	Description	Supply Deficit (mgd)	Capacity Needs (mgd)	Unit	Diameter (in)	$/Unit	Qty	Total	Notes
WTP-1	Treatment	Upgrade Existing Dallas WTP	12	12	MGD	--	$1,000,000	12	$12,000,000	Note 5
FW-1	Pipeline	Finished Water Pipeline from Dallas WTP to the City of Dallas	12.25	12.25	MGD	30	$240	11,011	$2,642,617	Note 3
FW-2	Pipeline	Finished Water Pipeline from the City of Dallas to the City of Monmouth (Dallas WTP)	5.75	6.00	MGD	18	$144	41,513	$5,977,810	Note 3
FW-3	Pipeline	Finished Water Pipeline from the City of Monmouth to the City of Independence	2.00	2.00	MGD	12	$96	16,505	$1,584,497	Note 3
PS-2	Pump Stations	Dallas - Monmouth Booster Pump Station	--	--	hp	--	$1,500	4,900	$7,350,000	Note 6
FW-10	Pipeline	Finished Water Pipeline to Buell Red Prairie	0.25	0.25	MGD	4	$32	20,707	$662,611	Note 3
FW-11	Pipeline	Finished Water from Buell Red Prairie to GRCWA	0.25	0.25	MGD	4	$32	58,439	$1,870,052	Note 3
FW-4	Pipeline	Finished Water Pipeline from the City of Monmouth to Luckiamute	0.50	0.50	MGD	6	$48	17,397	$835,044	Note 3
FW-8	Pipeline	Finished Water Pipeline from Dallas to Rickreall	1.00	1.00	MGD	8	$64	20,413	$1,306,403	Note 3
FW-9	Pipeline	Finished Water Pipeline from Rickreall to Perrydale	1.00	1.00	MGD	8	$64	21,889	$1,400,889	Note 3
		Contingency						25%	$8,907,481	
		subtotal							$44,537,404	

Summary

Source Development	$39,459,925
Raw Transmission	$2,030,850
Treatment and Finished Water Transmission	
Transmission/Booster Pumping - Dallas, Monmouth, Independence	***$36,943,655***
Transmission - All Others	***$7,593,749***
Total - Treatment and Finished Water Transmission	$44,537,404
Total	**$86,028,178**

Estimate of cost/ccf

Average Annual Demand (2003-2040) (mgd)	4.13
Average Annual Sales (2003-2040) (ccf)	2,016,648

Time Period (yrs)	25
Interest Rate	5.5%
Total Capital Cost	$86,028,178
Annualized Cost	$6,413,345
Average Unit Costs (2005-2040)[4]	
Capital Cost ($/ccf)	$3.18
Operations and Maintenance Costs ($/ccf)	$0.30
Total ---Average Unit Cost ($/ccf)	$3.48

Notes

1. Intake cost estimate from Willamette River WTP, Wilsonville, OR construction cost of $350,000 for 70 MGD intake ($5,000/MGD). Assume $10,000/MGD to account for economy of scale.
2. Storage costs taken from 1992 USBOR Report. Construction costs adjusted using ENR 20 Cities construction cost indices.
3. Pipelines sized for a velocity of 5 fps at peak day demand.
4. Pumping capacity based on peak day demands.
5. Assumes no excess capacity in Dallas WTP
6. Pump station size taken from Regional Water Supply Project, CH2MHill February 6, 2003.

Exhibit B-6

Source Option

Big Rock Creek Reservoir (R-2)

R-2: Big Rock Creek Reservoir - Regional WTP (low range of treatment costs)

Source Development	C - Big Rock Creek/Sunshine Creek Dam and Reservoir
Raw Water Transmission	C - POD on Willamette River - Regional WTP
Treatment and Finished Water Transmissior	B - Regional WTP

Source Development Option SD-C (Big Rock Creek/Sunshine Creek Dam and Reservoir)

Project #	Project Type	Description	Unit	$/Unit	Qty	Total	Notes
I-2	Intake	Intake at Big Rock Creek/Sunshine Creek Dam and Reservoir Site	MGD	$10,000	18	$180,000	Note 1
R-2	Storage	Construct Dam, Reservoir, Environmental Mitigation	ac-ft	$8,000	3,700	$29,600,000	Note 2
RW-3	Pipeline	Raw Water Pipeline from Reservoir to Luckiamute R. Tributary	ft	$240	7,353	$1,764,720	
PS-4	Pump Stations	Raw Water Pump Station from Reservoir to Luckiamute R. Tributary	hp	$1,500	350	$525,000	
		Contingency			25%	$8,017,430	
		subtotal				$40,087,150	

Raw Water Transmission Option RW-C (POD on Willamette River - Regional WTP)

Project #	Project Type	Description	Supply Deficit (mgd)	Capacity Needs (mgd)	Unit	Diameter (in)	$/Unit	Qty	Total	Notes
RW-2	Pipeline	Raw Water Pipeline from Willamette R. to Regional WTP	12	14	ft	30	$240	1,487	$356,880	Note 3
PS-3	Pump Station	Pump Station at Willamette River Intake	--	--	hp	--	$1,500	150	$225,000	Note 4
		Contingency						25%	$145,470	
			subtotal						$727,350	

Treatment and Finished Water Transmission Option FW-B (Regional WTP)

	Project Type	Description	Supply Deficit (mgd)	Capacity Needs (mgd)	Unit	Diameter (in)	$/Unit	Qty	Total	Notes
WTP-2	Treatment	Construct new regional Water Treatment Plant	12	12	MGD	--	$1,250,000	12	$15,000,000	Note 5
FW-12	Pipeline	Finished Water Pipeline form north of City of Monmouth to "Point A"	3.75	4.00	MGD	$18	$144	13,957	$2,009,878	Note 3
FW-13	Pipeline	Finished Water Pipeline from "Point A" to City of Dallas	3.00	3.00	MGD	$18	$144	20,725	$2,984,373	Note 3
FW-6	Pipeline	Finished Water Pipeline from Regional WTP to north of City of Monmouth	12.25	12.25	MGD	$30	$240	19,546	$4,690,956	Note 3
FW-7	Pipeline	Finished Water Pipeline from FW-6 to City of Monmouth	4.00	4.00	MGD	$18	$144	6,824	$982,723	Note 3
PS-8	Pump Stations	Regional WTP to Dallas Booster Pump Station	--	--	hp	--	$1,500	1,800	$2,700,000	Note 4
FW-10	Pipeline	Finished Water Pipeline to Buell Red Prairie	0.25	0.25	MGD	$4	$32	20,707	$662,611	Note 3
FW-11	Pipeline	Finished Water from Buell Red Prairie to GRCWA	0.25	0.25	MGD	$4	$32	58,439	$1,870,052	Note 3
FW-14	Pipeline	Finished Water Pipeline from "Point A" to Rickreall	1.00	1.00	MGD	$8	$64	38,531	$2,465,993	Note 3
FW-4	Pipeline	Finished Water Pipeline from the City of Monmouth to Luckiamute	0.50	0.50	MGD	$6	$48	17,397	$835,044	Note 3
FW-9	Pipeline	Finished Water Pipeline from Rickreall to Perrydale	1.00	1.00	MGD	$8	$64	21,889	$1,400,889	Note 3
		Contingency						25%	$8,900,630	
			subtotal						$44,503,150	

Summary

Source Development	$40,087,150
Raw Transmission	$727,350
Treatment and Finished Water Transmission	
Transmission/Booster Pumping - Dallas, Monmouth, Independence	***$35,459,914***
Transmission - All Others	***$9,043,236***
Total - Treatment and Finished Water Transmission	$44,503,150
Total	**$85,317,650**

Estimate of cost/ccf

Average Annual Demand (2003-2040) (mgd)	4.13
Average Annual Sales (2003-2040) (ccf)	2,016,648

Time Period (yrs)	25
Interest Rate	5.5%
Total Capital Cost	$85,317,650
Annualized Cost	$6,360,376
Average Unit Costs (2005-2040)[4]	
Capital Cost ($/ccf)	$3.15
Operations and Maintenance Costs ($/ccf)	$0.30
Total ---Average Unit Cost ($/ccf	$3.45

Notes

1. Intake cost estimate from Willamette River WTP, Wilsonville, OR construction cost of $350,000 for 70 MGD intake ($5,000/MGD). Assume $10,000/MGD to account for economy of scale.
2. Storage costs taken from 1992 USBOR Report. Construction costs adjusted using ENR 20 Cities construction cost indices.
3. Pipelines sized for a velocity of 5 fps at peak day demand.
4. Pumping capacity based on peak day demands.
5. Planning level treatment costs are typically $1.25 per gallon of production per day. However, the Wilsonville Water Treatment plant, the most recent treatment plant on the Willamette River downstream of Albany, had a construction cost of approximately $3.00 per gallon. As a result, it is assumed that for Willamette River treatment, costs will range from $1.25 per gallon to $3.00 per gallon.

Exhibit B-7

Source Option

Rickreall Creek Storage (R-3)

R-3: Rickreall Creek Storage - Dallas WTP Upgrade

Source Development	E - Rickreall Creek Storage
Raw Water Transmission	A - POD on Rickreall Creek - Upgrade Dallas WTP
Treatment and Finished Water Transmission	A - Dallas WTP Upgrade

Source Development Option SD-E (Rickreall Creek Storage)

Project #	Project Type	Description	Unit	$/Unit	Qty	Total	Notes
I-4	Intake	Intake on Rickreall Creek	MGD	$10,000	18	$180,000	Note 1,2
R-4	Storage	Construct Dam, Reservoir, Environmental Mitigation	ac-ft	$8,000	3,700	$29,600,000	
RW-5	Pipeline	Raw Water Pipeline from Rickreall Creek to Dallas WTP	ft	$240	2,082	$499,680	
PS-6	Pump Stations	Raw Water Pump Station from Rickreall Creek to Dallas WTP	hp	$1,500	700	$1,050,000	
		Contingency			25%	$7,832,420	
		subtotal				$39,162,100	

Raw Water Transmission Option RW-A (POD on Rickreall Creek - Upgrade Dallas WTP)

Project #	Project Type	Description	Supply Deficit (mgd)	Capacity Needs (mgd)	Unit	Diameter (in)	$/Unit	Qty	Total	Notes
RW-2	Pipeline	Raw Water Pipeline from Rickreall Creek to Dallas WTP	12	14	ft	30	$240	2,082	$499,680	Note 3
PS-6	Pump Station	Raw Water Pump Station from Rickreall Creek to Dallas WTP	--	--	hp	--	$1,500	750	$1,125,000	Note 4
		Contingency						25%	$406,170	
			subtotal						$2,030,850	

Treatment and Finished Water Transmission Option FW-A (Upgrade Dallas WTP)

	Project Type	Description	Supply Deficit (mgd)	Capacity Needs (mgd)	Unit	Diameter (in)	$/Unit	Qty	Total	Notes
WTP-1	Treatment	Upgrade Existing Dallas WTP	12	12	MGD	--	$1,000,000	12	$12,000,000	Note 5
FW-1	Pipeline	Finished Water Pipeline from Dallas WTP to the City of Dallas	12.25	12.25	MGD	30	$240	11,011	$2,642,617	Note 3
FW-2	Pipeline	Finished Water Pipeline from the City of Dallas to the City of Monmouth (Dallas WTP)	5.75	6.00	MGD	18	$144	41,513	$5,977,810	Note 3
FW-3	Pipeline	Finished Water Pipeline from the City of Monmouth to the City of Independence	2.00	2.00	MGD	12	$96	16,505	$1,584,497	Note 3
PS-2	Pump Stations	Dallas - Monmouth Booster Pump Station	--	--	hp	--	$1,500	4,900	$7,350,000	Note 6
FW-10	Pipeline	Finished Water Pipeline to Buell Red Prairie	0.25	0.25	MGD	4	$32	20,707	$662,611	Note 3
FW-11	Pipeline	Finished Water from Buell Red Prairie to GRCWA	0.25	0.25	MGD	4	$32	58,439	$1,870,052	Note 3
FW-4	Pipeline	Finished Water Pipeline from the City of Monmouth to Luckiamute	0.50	0.50	MGD	6	$48	17,397	$835,044	Note 3
FW-8	Pipeline	Finished Water Pipeline from Dallas to Rickreall	1.00	1.00	MGD	8	$64	20,413	$1,306,403	Note 3
FW-9	Pipeline	Finished Water Pipeline from Rickreall to Perrydale	1.00	1.00	MGD	8	$64	21,889	$1,400,889	Note 3
		Contingency						25%	$8,907,481	
			subtotal						$44,537,404	

Summary

Source Development	$39,162,100
Raw Transmission	$2,030,850
Treatment and Finished Water Transmission	
Transmission/Booster Pumping - Dallas, Monmouth, Independence	***$36,943,655***
Transmission - All Others	***$7,593,749***
Total - Treatment and Finished Water Transmission	$44,537,404
Total	**$85,730,354**

Estimate of cost/ccf

Average Annual Demand (2003-2040) (mgd)	4.13
Average Annual Sales (2003-2040) (ccf)	2,016,648

Time Period (yrs)	25
Interest Rate	5.5%
Total Capital Cost	$85,730,354
Annualized Cost	$6,391,142
Average Unit Costs (2005-2040)[4]	
Capital Cost ($/ccf)	$3.17
Operations and Maintenance Costs ($/ccf)	$0.30
Total ---Average Unit Cost ($/ccf)	$3.47

Notes

1. Intake cost estimate from Willamette River WTP, Wilsonville, OR construction cost of $350,000 for 70 MGD intake ($5,000/MGD). Assume $10,000/MGD to account for economy of scale.
2. Assumes no excess capacity at existing intake structure.
3. Pipelines sized for a velocity of 5 fps at peak day demand.
4. Pumping capacity based on peak day demands.
5. Assumes no excess capacity in Dallas WTP
6. Pump station size taken from Regional Water Supply Project, CH2MHill February 6, 2003.

Exhibit B-8

Source Option

Valsetz Storage (R-4)

R-4: Valsetz Storage - Regional WTP

Source Development	F - Valsetz Reservoir
Raw Water Transmission	C - POD on Willamette River - Regional WTP
Treatment and Finished Water Transmission	B - Regional WTP

Source Development Option SD-F (Valsetz Reservoir)

Project #	Project Type	Description	Unit	$/Unit	Qty	Total	Notes
I-5	Intake	Intake at Valsetz Storage Site	MGD	$10,000	18	$180,000	Note 1,2
R-5	Storage	Construct Dam, Reservoir, Environmental Mitigation	ac-ft	$5,000	3,700	$18,500,000	
RW-6	Pipeline	Raw Water Pipeline from Valsetz Storage to Luckiamute R. Tributary	ft	$240	26,378	$6,330,720	
PS-7	Pump Stations	Raw Water Pump Station from Valsetz Storage to Luckiamute R. Tributary	hp	$1,500	6,300	$9,450,000	
		Contingency			25%	$8,615,180	
		subtotal				$43,075,900	

Raw Water Transmission Option RW-C (POD on Willamette River - Regional WTP]

Project #	Project Type	Description	Supply Deficit (mgd)	Capacity Needs (mgd)	Unit	Diameter (in)	$/Unit	Qty	Total	Notes
RW-2	Pipeline	Raw Water Pipeline from Willamette R. to Regional WTP	12	14	ft	30	$240	1,487	$356,880	Note 3
PS-3	Pump Station	Pump Station at Willamette River Intake	--	--	hp	--	$1,500	150	$225,000	Note 4
		Contingency						25%	$145,470	
			subtotal						$727,350	

Treatment and Finished Water Transmission Option FW-B (Regional WTP)

	Project Type	Description	Supply Deficit (mgd)	Capacity Needs (mgd)	Unit	Diameter (in)	$/Unit	Qty	Total	Notes
WTP-2	Treatment	Construct new regional Water Treatment Plant	12	12	MGD	--	$1,250,000	12	$15,000,000	Note 5
FW-12	Pipeline	Finished Water Pipeline form north of City of Monmouth to "Point A"	3.75	4.00	MGD	18	$144	13,957	$2,009,878	Note 3
FW-13	Pipeline	Finished Water Pipeline from "Point A" to City of Dallas	3.00	3.00	MGD	18	$144	20,725	$2,984,373	Note 3
FW-6	Pipeline	Finished Water Pipeline from Regional WTP to north of City of Monmouth	12.25	12.25	MGD	30	$240	19,546	$4,690,956	Note 3
FW-7	Pipeline	Finished Water Pipeline from FW-6 to City of Monmouth	4.00	4.00	MGD	18	$144	6,824	$982,723	Note 3
PS-8	Pump Stations	Regional WTP to Dallas Booster Pump Station	--	--	hp	--	$1,500	1,800	$2,700,000	Note 4
FW-10	Pipeline	Finished Water Pipeline to Buell Red Prairie	0.25	0.25	MGD	4	$32	20,707	$662,611	Note 3
FW-11	Pipeline	Finished Water from Buell Red Prairie to GRCWA	0.25	0.25	MGD	4	$32	58,439	$1,870,052	Note 3
FW-14	Pipeline	Finished Water Pipeline from "Point A" to Rickreall	1.00	1.00	MGD	8	$64	38,531	$2,465,993	Note 3
FW-4	Pipeline	Finished Water Pipeline from the City of Monmouth to Luckiamute	0.50	0.50	MGD	6	$48	17,397	$835,044	Note 3
FW-9	Pipeline	Finished Water Pipeline from Rickreall to Perrydale	1.00	1.00	MGD	8	$64	21,889	$1,400,889	Note 3
		Contingency						25%	$8,900,630	
			subtotal						$44,503,150	

Summary

Source Development	$43,075,900
Raw Transmission	$727,350
Treatment and Finished Water Transmission	
Transmission/Booster Pumping - Dallas, Monmouth, Independence	***$35,459,914***
Transmission - All Others	***$9,043,236***
Total - Treatment and Finished Water Transmission	$44,503,150
Total	**$88,306,400**

Estimate of cost/ccf

Average Annual Demand (2003-2040) (mgd)	4.13
Average Annual Sales (2003-2040) (ccf)	2,016,648

Time Period (yrs)	25
Interest Rate	5.5%
Total Capital Cost	$88,306,400
Annualized Cost	$6,583,185
Average Unit Costs (2005-2040)[4]	
Capital Cost ($/ccf)	$3.26
Operations and Maintenance Costs ($/ccf)	$0.30
Total ---Average Unit Cost ($/ccf)	$3.56

Notes

1. Intake cost estimate from Willamette River WTP, Wilsonville, OR construction cost of $350,000 for 70 MGD intake ($5,000/MGD). Assume $10,000/MGD to account for economy of scale.
2. Assumes no excess capacity at existing intake structure.
3. Pipelines sized for a velocity of 5 fps at peak day demand.
4. Pumping capacity based on peak day demands.
5. Planning level treatment costs are typically $1.25 per gallon of production per day. However, the Wilsonville Water Treatment plant, the most recent treatment plant on the Willamette River downstream of Albany, had a construction cost of approximately $3.00 per gallon. As a result, it is assumed that for Willamette River treatment, costs will range from $1.25 per gallon to $3.00 per gallon.

Exhibit B-9
Source Option
Groundwater Development (G-1)

G-1: Groundwater Development Only

Source Development	I - Groundwater Development
Raw Water Transmission	n/a
Treatment and Finished Water Transmission	C - Groundwater Development

Source Development Option SD-I (Groundwater Development)

Project #	Project Type	Description	Unit	$/Unit	Qty	Total	Notes
G-1	Well Development	Upgrade Marion County Well	gpm	$1,200	300	$360,000	Note 1
G-2	Well Development	American Bottom Well	gpm	$1,200	700	$840,000	Note 1
G-3	Well Development	Setnicker Well Field	gpm	$1,200	7,700	$9,240,000	Note 1
		Contingency			50%	$5,220,000	
		subtotal				$15,660,000	

Raw Water Transmission (Not Applicable)

Project #	Project Type	Description	Supply Deficit (mgd)	Capacity Needs (mgd)	Unit	Diameter (in)	$/Unit	Qty	Total	Notes
		Contingency						25%	$0	
			subtotal						$0	

Treatment and Finished Water Transmission Option FW-C (Groundwater Development)

	Project Type	Description	Supply Deficit (mgd)	Capacity Needs (mgd)	Unit	Diameter (in)	$/Unit	Qty	Total	Notes
FW-16	Pipeline	Finished Water Pipeline from Setnicker Area to Dallas - Monmouth Pipeline	12.00	12.00	MGD	30	$240	21,867	$5,248,080	Note 2
FW-15	Pipeline	American Bottom Wellfield Regional Transmission Line	4.00	4.00	MGD	18	$144	17,690	$2,547,360	Note 2
FW-12	Pipeline	Finished Water Pipeline form north of City of Monmouth to "Point A"	3.75	4.00	MGD	18	$144	13,957	$2,009,878	Note 2
FW-13	Pipeline	Finished Water Pipeline from "Point A" to City of Dallas	3.00	3.00	MGD	18	$144	20,725	$2,984,373	Note 2
FW-6	Pipeline	Finished Water Pipeline from Regional WTP to north of City of Monmouth	12.25	12.25	MGD	30	$240	19,546	$4,690,956	Note 2
FW-7	Pipeline	Finished Water Pipeline from FW-6 to City of Monmouth	4.00	4.00	MGD	18	$144	6,824	$982,723	Note 2
PS-10	Pump Stations	Finished Water Pump Station from Setnicker Wells	--	--	hp	--	$1,800	1,800	$3,240,000	Note 3
PS-11	Pump Stations	Finished Water Pump Station from American Bottom Wells	--	--	hp	--	$2,000	650	$1,300,000	Note 3
FW-10	Pipeline	Finished Water Pipeline to Buell Red Prairie	0.25	0.25	MGD	4	$32	20,707	$662,611	Note 2
FW-11	Pipeline	Finished Water from Buell Red Prairie to GRCWA	0.25	0.25	MGD	4	$32	58,439	$1,870,052	Note 2
FW-14	Pipeline	Finished Water Pipeline from "Point A" to Rickreall	1.00	1.00	MGD	8	$64	38,531	$2,465,993	Note 2
FW-4	Pipeline	Finished Water Pipeline from the City of Monmouth to Luckiamute	0.50	0.50	MGD	6	$48	17,397	$835,044	Note 2
FW-9	Pipeline	Finished Water Pipeline from Rickreall to Perrydale	1.00	1.00	MGD	8	$64	21,889	$1,400,889	Note 2
		Contingency						25%	$7,559,490	
			subtotal						$37,797,450	

Summary

Source Development	$15,660,000
Raw Transmission	$0
Treatment and Finished Water Transmission	
Transmission/Booster Pumping - Dallas, Monmouth, Independence	***$28,754,214***
Transmission - All Others	***$9,043,236***
Total - Treatment and Finished Water Transmission	$37,797,450
Total	**$53,457,450**

Estimate of cost/ccf

Average Annual Demand (2005-2040) (mgd)	4.13
Average Annual Sales (2005-2040) (ccf)	2,016,648

Time Period (yrs)	25
Interest Rate	5.5%
Total Capital Cost	$53,457,450
Annualized Cost	$3,985,218
Average Unit Costs (2005-2040)[4]	
Capital Cost ($/ccf)	$1.98
Operations and Maintenance Costs ($/ccf)	$0.30
Total --Average Unit Cost ($/ccf)	$2.28

Notes

1. Well development estimated at $1,200 / gpm (accounts for drilling, well head facility, treatment, and pump installation)
2. Pipelines sized for a velocity of 5 fps at peak day demand.
3. Pumping capacity based on peak day demands.
4. Average Unit costs are shown for relative comparison purposes only. Actual unit cost at startup will be greater due to smaller volume of sales and differing operations and maintenance costs.
   For example, assuming startup annual sales of 2 MGD and reduced O&M costs ($0.18/ccf) from lower labor and chemical expenditures, startup average unit costs could be as high as $4.34/ccf.

Exhibit B-10

Source Option

Rickreall Storage/Groundwater (RG-1)

RG-1: Rickreall Creek Storage / Groundwater Development

Source Development	G - Rickreall Storage and Groundwater Development
Raw Water Transmission	A - POD on Rickreall Creek - Upgrade Dallas WTP
Treatment and Finished Water Transmission	C - Dallas WTP Upgrade / American Bottom Wellfield

Source Development Option SD-G (Rickreall Creek Storage/Groundwater Development)

Project #	Project Type	Description	Unit	$/Unit	Qty	Total	Notes
I-4	Intake	Intake on Rickreall Creek	MGD	$10,000	18	$180,000	Note 1,2
R-4	Storage	Construct Dam, Reservoir, Environmental Mitigation	ac-ft	$8,000	2,200	$17,600,000	
G-1	Well Development	Upgrade Marion County Well	gpm	$1,200	300	$360,000	Note 7
G-2	Well Development	American Bottom Well	gpm	$1,200	700	$840,000	Note 7
		Contingency			25%	$4,745,000	
		subtotal				$23,725,000	

Raw Water Transmission Option RW-A (POD on Rickreall Creek - Upgrade Dallas WTP)

Project #	Project Type	Description	Supply Deficit (mgd)	Capacity Needs (mgd)	Unit	Diameter (in)	$/Unit	Qty	Total	Notes
RW-2	Pipeline	Raw Water Pipeline from Rickreall Creek to Dallas WTP	12	14	ft	30	$240	2,082	$499,680	Note 3
PS-6	Pump Station	Raw Water Pump Station from Rickreall Creek to Dallas WTP	--	--	hp	--	$1,500	750	$1,125,000	Note 4
		Contingency						25%	$406,170	
		subtotal							$2,030,850	

Treatment and Finished Water Transmission Option FW-C (Groundwater Development - Dallas WTP Upgrade / American Bottom Wellfield)

	Project Type	Description	Supply Deficit (mgd)	Capacity Needs (mgd)	Unit	Diameter (in)	$/Unit	Qty	Total	Notes
WTP-1	Treatment	Upgrade Existing Dallas WTP	12	12	MGD	--	$1,000,000	12	$12,000,000	Note 5
FW-1	Pipeline	Finished Water Pipeline from Dallas WTP to the City of Dallas	12.25	12.25	MGD	30	$240	11,011	$2,642,617	Note 3
FW-2	Pipeline	Finished Water Pipeline from the City of Dallas to the City of Monmouth (Dallas WTP)	5.75	6.00	MGD	18	$144	41,513	$5,977,810	Note 3
FW-3	Pipeline	Finished Water Pipeline from the City of Monmouth to the City of Independence	2.00	2.00	MGD	12	$96	16,505	$1,584,497	Note 3
FW-15	Pipeline	American Bottom Wellfield Regional Transmission Line	4.00	4.00	MGD	4	$144	17,690	$2,547,360	Note 3
PS-2	Pump Stations	Dallas - Monmouth Booster Pump Station	--	--	hp	--	$1,500	4,900	$7,350,000	Note 6
PS-9	Pump Stations	Monmouth - Dallas Booster Pump Station	--	--	hp	--	$1,500	1,600	$2,400,000	Note 6
FW-10	Pipeline	Finished Water Pipeline to Buell Red Prairie	0.25	0.25	MGD	4	$32	20,707	$662,611	Note 3
FW-11	Pipeline	Finished Water from Buell Red Prairie to GRCWA	0.25	0.25	MGD	4	$32	58,439	$1,870,052	Note 3
FW-4	Pipeline	Finished Water Pipeline from the City of Monmouth to Luckiamute	0.50	0.50	MGD	6	$48	17,397	$835,044	Note 3
FW-8	Pipeline	Finished Water Pipeline from Dallas to Rickreall	1.00	1.00	MGD	8	$64	20,413	$1,306,403	Note 3
FW-9	Pipeline	Finished Water Pipeline from Rickreall to Perrydale	1.00	1.00	MGD	8	$64	21,889	$1,400,889	Note 3
		Contingency						25%	$10,144,321	
		subtotal							$50,721,604	

Summary

Source Development	$23,725,000
Raw Transmission	$2,030,850
Treatment and Finished Water Transmission	
Transmission/Booster Pumping - Dallas, Monmouth, Independence	***$43,127,855***
Transmission - All Others	***$7,593,749***
Total - Treatment and Finished Water Transmission	$50,721,604
Total	**$76,477,454**

Estimate of cost/ccf

Average Annual Demand (2003-2040) (mgd)	4.13
Average Annual Sales (2003-2040) (ccf)	2,016,648

Time Period (yrs)	25
Interest Rate	5.5%
Total Capital Cost	$76,477,454
Annualized Cost	$5,701,345
Average Unit Costs (2005-2040)^4	
Capital Cost ($/ccf)	$2.83
Operations and Maintenance Costs ($/ccf)	$0.30
Total ---Average Unit Cost ($/ccf)	$3.13

Notes

1. Intake cost estimate from Willamette River WTP, Wilsonville, OR construction cost of $350,000 for 70 MGD intake ($5,000/MGD). Assume $10,000/MGD to account for economy of scale.
2. Assumes no excess capacity at existing intake structure.
3. Pipelines sized for a velocity of 5 fps at peak day demand.
4. Pumping capacity based on peak day demands.
5. Assumes no excess capacity in Dallas WTP
6. Pump station size taken from Regional Water Supply Project, CH2MHill February 6, 2003.
7. Well development estimated at $1,200 / gpm (accounts for drilling, well head facility, treatment, and pump installation)

Appendix C

Adair Village WTP Evaluation

CITY OF ADAIR VILLAGE
WATER TREATMENT PLANT EVALUATION

EXECUTIVE SUMMARY

Provided by Lee Engineering, Inc.

Introduction

The intent of this evaluation was to determine if the existing 60 year-old Adair Water Treatment Plant is capable structurally and process-wise of being expanded to 12 to 15 MGD. The plant is currently producing approximately 500,000 gallons in an 8-hour shift while being operated manually. The plant provides conventional treatment with multiple mechanical flocculators, two large plug flow sedimentation basins, and four double bay filters. The filters use sand only media with support gravel and pipe lateral underdrains. The total filter area is 1,728 square feet.

Findings

A brief site recon indicated that the existing structures are basically sound, but in need of repair. From a process point of view, the existing structures appear to be capable of producing at least 12 MGD after rehabilitation.

Cost Estimates

After finding that the basic structures were sound, the intent was to determine the cost of expanding the plant to 4 MGD, and then to determine what could be done for approximately $1,000,000.

During our evaluations, it became apparent that significant improvements would be required to this 60 year-old plant for repairs and to bring it up to current standards. In addition, there appear to be too many repairs required to make a significant impact by spending only $1,000,000. For example, upgrading the intake alone will require more than that amount.

Costs for expanding the plant to 4 MGD are estimated at $6,590,938.
Additional costs for expanding the plant to 12 MGD are estimated at $2,745,625.

The initial cost of expanding the plant to 4 MGD is relatively high due to the necessary replacement of electrical equipment, repair of old equipment, and automating the plant. Most of these tasks need to be completed regardless of any increase in size. As a result, the incremental costs to expand the plant to 12 MGD are relatively low.

The costs shown for expanding to 4 MGD include some tasks in preparation for expanding the plant to 12 MGD in the future. For example, most of the electrical improvements for the plant are included in the 4MGD option. The costs could be reduced slightly if there were no plans to increase the plant capacity beyond 12 MGD.

Although the costs for expanding the plant to 4 MGD are high, a new plant and intake would probably cost approximately $8,000,000, which is somewhat higher than that for upgrading the plant. On the other hand, it would be very cost effective if the plant were to be expanded to 12 MGD.

Expansion Decision

One of the first decisions that must be made in the rehabilitation process is whether or not to expand to just 4 MGD or to make allowance for the future expansion to 12 MGD. A major factor in that decision will be the estimated time frame for each of those events to occur. If the two events are too far apart, it may be desirable to only do those tasks required for expansion to 4 MGD.

CITY OF ADAIR VILLAGE
WATER TREATMENT PLANT EVALUATION

I. INTRODUCTION

Lee Engineering, Inc. (LEI) was retained by Economic and Engineering Services, Inc. (EES) to conduct a preliminary evaluation of the expansion options and costs for the Adair Water Treatment Plant. The objective of this evaluation was to review structural integrity of plant facilities, hydraulic capacity of the water treatment plant, filtration and sedimentation needs, disinfection and CT demands, and sludge handling operations related to planned expansion. Our evaluation considers the need for structural and mechanical repairs, process upgrades, and includes a review of future compliance issues related to federal and state water quality regulations.

On June 15, 2004, Mark Nelson and Phil Beverly of LEI visited the water treatment plant and conducted a visual reconnaissance. The plant was determined to be basically sound structurally. The concrete construction appeared to be in generally good condition. The basic building structures should provide adequate service as long as no extra loadings are imposed. For example, the upstairs area should not be used for heavy storage, as the structure is probably not adequate for lateral seismic loadings. Some structural repairs are required – refer to Sections XIII and XIV for details.

The Adair Water Treatment Plant was built with large structures which were intended to be operated slowly. As a result, it is our opinion that the plant can be rehabilitated to operate at a capacity of at least 12 MGD by using more modern components. Cost estimates are provided to upgrade the plant to 4 MGD and then to 12 MGD in the future. Expanding the plant beyond 12 MGD would have to be the subject of an additional investigation.

II. INTAKE

A. Description

The intake for the water treatment plant is located on the bank of the Willamette River, in Hyak Park, across the highway from the water treatment plant. It consists of a large concrete structure with a framed upper level and composition roof.

The intake has space for four line shaft vertical turbine pumps, but only two are in place. They are relatively new pumps, one with a capacity of 790 gallons per minute, and 890 gallons per minute for the other. If operated together, they provide a capacity somewhat less than 2.4 MGD. However, plant personnel currently use either one or the other, not both together due to low demand.

Columns with shafts are present for the other two pump locations, which indicates that they may have been used in the past.

B. Recommendations to Expand the Intake to 4 MGD

1. Pumps

In order for the intake to produce 4 MGD, a third pump with a minimum capacity of 1,100 to 1,200 gpm would be required. If it is planned to upgrade the plant capacity to 12 MGD or more in the near future, the third pump should probably be sized at 2,100 gpm now.

Estimated pump costs: $30,000 to $40,000

2. Electrical Service

The electrical service and switchgear for the two existing pumps are relatively new, but do not appear to have excess capacity. A whole new electrical service will probably be required to produce an intake flow of 4 MGD. If it is desired to upgrade the plant again in the near future to 12 MGD or more, then we recommend that the electrical service be upgraded to that capacity when expanding the plant to 4 MGD.

Estimated electrical costs: $75,000

3. Intake Screen

The intake to the pump station wet well is submerged. A trash rack is provided with no other apparent screening device visible. Approximately 50 to 100 fish were observed swimming in the plant sedimentation basin. As a result, the intake must to be modified to meet current regulations regarding screen size and velocity. The new intake screen should probably be designed for the ultimate capacity of the plant of 12 to 15 MGD.

Estimated intake screen costs: $500,000
(Highly variable, dependent on need)

4. Roof/Siding Repair

It is our opinion that the roofing material and sheeting on the intake should be removed and replaced, along with any damaged rafters. New gutters should then be provided. The paint on the siding is very old and should be redone. In addition, the four access doors to the structure should be replaced due to their age and condition.

For the purposes of this evaluation, we are assuming that no concrete repairs will be required for the intake structure. The structure appears sound, but its seismic design is unknown.

Estimated costs for roofing/siding repair and door replacements: $29,000

5. Raw Water Pipeline

The raw water pipeline from the intake to the plant appears to be 10” asbestos cement (AC) pipe. As a result, the intake and therefore the plant probably never operated at more than 2 to 3 MGD. The intake pipeline will have to be replaced with a recommended 16” pipeline in order to achieve 4 MGD. If the plant is to be expanded to 12 MGD or more in the near future, the raw water pipeline should probably be expanded to a 24” pipe size as part of the initial upgrade to 4 MGD.

Estimated 16” raw water pipeline costs: $300,000

Estimated 24” raw water pipeline costs: $400,000

6. Instrumentation and Control

A new telemetry system should be provided to monitor instrumentation and control the operation of the intake, including pump start/stop selection, pump diagnostics, river level indication, on-screen operation, pump well level indication, raw water turbidity, and flow.

Telemetry to control these functions will be necessary to keep manpower costs low when the plant is expanded to 4 MGD. In fact, it would improve the operation of the plant now.

Telemetry costs: $40,000

C. Recommendations to Expand the Intake to 12 MGD

If the intake screen, raw water pipeline, and electrical service were previously upsized to handle the ultimate capacity of 12 MGD, including installation of one 2,100 gpm pump (3 MGD), the only other cost to increase the capacity to 12 MGD would be for the addition of three more 2,100 gpm pumps and their associated switchgear.

Estimated cost to expand the capacity to 12 MGD:
Pumps: $90,000 to $120,000
Electrical: $75,000

III. Chemicals

A. Description

The chemicals used at the Adair treatment plant currently consist of a non-ionic polymer, which is mixing intensive; powdered alum, which is labor intensive; and soda ash, which is also labor intensive.

In order to expand to 4 MGD, we recommend that a number of changes to the chemicals be made as noted below. These changes will make the transition to 12 MGD much simpler.

B. Expansion to 4 MGD

1. Non-Ionic Polymer

Provide a separate mix tank, transfer pump, and day tank to allow mixing of the polymer to take place without interrupting operation of the plant. The extra equipment recommended should also make the plant easier to operate.

Estimated cost: $20,000

2. Alum

Alum is now mixed manually by emptying bags of dry chemical into a tank, which is very operator intensive. We recommend that a bulk liquid alum storage tank be provided of approximately 7,000 gallons capacity. Liquid alum can then be delivered by truck and pumped directly into the tank, with no other operator time required.

The bulk liquid alum tank could be insulated and installed outside on a concrete pad, or installed inside a new building constructed for the purpose. In either case, it must be separate from the existing building for seismic reasons. The existing building does not have adequate space to install such a tank inside. Even if it did, there is no easy way to determine if the existing structure is adequately stressed to handle that weight, since the clearwell is below the plant operating floor.

A separate building for a bulk liquid alum tank should be close to the existing plant building for operational purposes. In that case, the footings for the alum building will have to be deep because of the below grade clearwell.

Estimated cost for building, tank, pumps, plumbing, and electrical: $130,000

3. Polyaluminum Chloride (PAC)

It may be desirable to convert to polyaluminum chloride (PAC) as the primary coagulant instead of alum, since it is not pH sensitive. Many plants that use PAC do not have to use soda ash, which reduces the operational requirements. Although PAC is much more expensive than alum, much less is normally required, which makes it cost competitive. If soda ash can be cut down or eliminated it will also result in additional savings in operation and maintenance.

Estimated cost for converting to PAC: Minimal

4. Soda Ash

If a bulk liquid alum or PAC tank is provided elsewhere, a second tank could be provided for the additional capacity of soda ash which may be required for plant expansion.

Estimated cost to expand to 4 MGD: $5,000

C. Expand to 12MGD

To expand the chemical systems to 12 MGD or more will require larger chemical feed pumps. However, bulk liquid alum or a PAC storage tank and modifications to the non-ionic polymer system recommended for 4 MGD, should otherwise be adequate. The biggest change will be in pH adjustment.

If liquid alum is kept, a volumetric dry powder feeder should probably be installed for soda ash similar to the original equipment provided for using lime. Soda ash storage could be on the top floor, as used originally, and a hopper would be provided for a volumetric feeder located on the lower floor. However, in order to do that, a seismic analysis will be required to determine if the structure meets current codes.

As an alternative, the plant could be converted to liquid caustic, which might have to be installed in an enlarged building with the alum tank.

If PAC is used instead of liquid alum, then it may be possible to stay with the soda ash modifications recommended for 4 MGD.

Estimated cost to expand the chemical system to 12 MGD: $50,000

Please note that the existing chemical feed pumps are relatively new and apparently in good working order.

IV. Flocculation Basins

The raw water is chemically treated before it enters the plant, then introduced into the first of multiple stages of mechanical flocculation. Whether the expansion is to 4 or to 12 MGD, a new larger entry point for the raw water into the flocculation chambers may be required. The existing 10” raw water pipe comes in underneath the building and is not accessible.

The existing flocculators consist of horizontal paddles with underwater bearings. The drive shaft penetrates the outside wall of the basin, where a chain mechanism drives all the flocculators from a common drive unit. The hydraulic capacity of the flocculators is unknown. However, the compartments are large and we are assuming they will be adequate for the purposes of this report.

There are a number of leaks and cracks in the concrete in the flocculator area. Refer to the section on General Concrete and Structure Repair for recommendations on those issues.

We recommend that the existing horizontal flocculator drives be completely dismantled and removed, and the wall penetrations plugged and sealed. Vertical flocculator drives could then be installed on overhead bridges above each flocculation chamber. Such an arrangement will provide for much better operation and easier maintenance.

A. Expand the Flocculators to 4 MGD

To upgrade the plant to a capacity of 4 MGD, at least two of the flocculation basins should be repaired and modified as described above. In addition, the entry point for the raw water may have to be modified as discussed previously.

Estimated cost to replace flocculators for 4 MGD: $20,000

B. Expand the Flocculators to 12 MGD

For a flow of 12 MGD or more, the rest of the flocculator drives should be modified as described. In addition, the point of entry of the raw water must be changed if not already completed.

Estimated cost of flocculators for 12 MGD: $40,000

V. Sedimentation Basins

There are two large sedimentation basins, with a total of approximately 5,600 square feet of surface area. They currently operate in “plug flow” mode, which should be adequate for the present, considering the low plant flow rate currently being used.

The other significant feature is that there are no automatic sludge removal mechanisms. The basins must be drained several times a year to remove sludge, which is a very maintenance and operation-intensive process.

A. Expand the Sedimentation Basins to 4 MGD

At a rate of 4 MGD, the sedimentation basins would have a surface overflow rate of approximately 0.5 gpm/ft^2. In order to maintain filter efficiency, we recommend that collection troughs be added across both basins to improve settling efficiency. Troughs should be installed approximately 6 feet apart, with a collector trough at the end of each basin or along the sidewall. In addition, two to three siphon/sludge collectors should be installed in each basin to allow automatic removal of sludge.

These recommendations will not only improve the operation of the plant, but will reduce the overall maintenance and operational requirements.

Estimated cost for troughs and sludge removal: $270,000

B. Expand the Sedimentation Basins to 12 MGD

At a flow of 12 MGD, the settling basins would be operating at a rate of approximately 1.5 gpm/ft.^{2}. At that rate, settling tubes *or additional basins* would be needed to maintain solids removal efficiency in the basins.

As an option, the settling tubes could be provided when the 4 MGD expansion is made, which would result in higher first costs for that project, but better operation now and lower overall costs when the plant is expanded to 12 MGD.

Estimated cost for settling tubes for 12 MGD: $85,000

VI. Filters

The plant has four dual bay filters, totaling 1,728 ft^2 of surface area. Two of the filters (designated No. 1 and 2) are currently in operation, while two have been emptied of media (Nos. 3 and 4). Pipe lateral underdrains were originally provided, and the existing media consists of support gravel and a single layer of filter sand. The media in Filters No. 1 and 2 is currently in very poor condition, but they are being operated at a very low rate, which is the only reason they are making good water. We anticipate that it may not be long before the effluent quality of these filters deteriorates.

The filters have surface wash with concrete troughs and gullet walls that divide the two cells in each filter. The division of each filter into cells allows each cell to be backwashed separately, thereby lowering the backwash flow rate required.

A. Expand the Filters to Produce 4 MGD

The existing two filters, No. 1 and 2 are currently being operated at slightly less than 1 gpm/ft.^{2}. In order for the plant to operate at 4 MGD, we recommend that Filters 3 and 4 be rehabilitated and then operated at a rate of approximately 3.25 gpm/ft.^{2}, which is a significant increase in flow from that currently being practiced. Filters No. 1 and 2 could then be taken off line or kept in reserve for emergencies. In order for that to occur, we recommend the following procedure.

- Remove the existing pipe lateral underdrain system.
- Demolish and remove the existing concrete troughs.

- Raise and reinforce the gullet walls and raise the cutout for the troughs.
- Install new fiberglass troughs.
- Install a grout fill to create a flume in the filter.
- Install a modern air scour dual parallel lateral underdrain with porous plate cap.
- Install a dual-media design consisting of anthracite and silica sand.

Due to the addition of anthracite, the backwash flow rate will need to be increased to a minimum of 18 gpm/ft.^{2}, or approximately 3,900 gpm.

The higher backwash rate will result in the requirement for a larger backwash pump and result in a higher than normal velocity in the existing backwash piping, but there is no other reasonable option. Modifications to the existing backwash waste piping may also be needed. Piping issues will be discussed in the Pipe Gallery section to follow.

Addition of the modern air scour dual parallel lateral underdrain described above will require the addition of an air scour blower, which will allow abandonment of the existing surface wash system.

Estimated cost to rehabilitate Filters 3 and 4 to operate at 4 MGD: $250,000

B. Expand the Filters to Produce 12 MGD

To achieve a flow rate of 12 MGD, Filters 1 and 2 will need to be rebuilt in a similar manner as described above for Filters 3 and 4. The filters will then all be operating at a rate of approximately 5 gpm/ft.^{2}, which is acceptable in conventional treatment with the modifications previously described for the sedimentation basins.

Estimated cost for rebuilding Filters 1 and 2: $200,000

VII. Pipe Gallery

In recent years, a number of gate valves, check valves, and piping restrictions have been installed in the pipe gallery. Most of the gate valves are the wrong type, and some are in the wrong place. We see no purpose whatever for the check valves. The piping restrictions only serve to limit the flow through the filters. As a result, many of the valves in the pipe gallery will have to be removed and some new valves added. We recommend that all the valves (new and old) be automated with new electric actuators, which will allow the plant to operate automatically. See also the discussion on Controls to follow.

Filter-to-waste piping has been installed, but has no air gap, which is required by the Department of Human Services – Drinking Water Program. Therefore, the filter-to-waste piping will have to be redone, regardless of any other modifications to the plant. Since the filter-to-waste piping is connected directly to the backwash waste, a completely separate system may be required.

Provision of an underdrain system with air scour capability will require another set of valves and piping in the pipe gallery. The blower for that system may have to be installed outside.

A. Expand the Pipe Gallery to Produce 4 MGD

As a part of the design effort, an investigation will have to be made to determine if the influent piping and flumes are large enough for the higher flows. In addition, the waste piping will have to be evaluated to determine if it is capable of handling the higher flow rates associated with the recommended new media designs and higher backwash flow rates. A significant repiping effort will also be required in the pipe gallery, as noted previously.

Estimated cost of pipe gallery modifications for 4 MGD: $170,000

B. Expand the Pipe Gallery to Produce 12 MGD

If the influent piping is not modified as noted above for 4 MGD, it will undoubtedly have to be modified for operation at 12 MGD. Modifications of the piping for all four filters will also be required for 12 MGD. In addition, all other improvements recommended for 4 MGD as noted above will have to be in place before the pipe gallery can be functional at 12 MGD.

Estimated additional cost for modifying the pipe gallery to operate at 12MGD: $150,000 each

VIII. Process Pumps

There are three final effluent distribution pumps and one backwash pump included in this section. Of these, the backwash pump and two of the distribution pumps appear to be original units. The current distribution pump in use is a vertical line shaft turbine pump, which appears to be relatively new.

A. Backwash Pump

The backwash pump is a 40 HP horizontal split case unit manufactured by Goulds. According to the old flow meter, its capability is less than will be required for the filter modifications mentioned previously. Therefore, an investigation will have to be made to determine if the existing pump can be modified for the higher flow rate if a larger motor were provided.

B. Main Distribution Pump

The only distribution pump currently in operation is a vertical line shaft turbine, manufactured by American Turbine, Model HH-25, with a 75 HP General Electric motor operating at 1,775 rpm. The main distribution pump appears to be approximately 10 years old, and there is no current operating backup for this pump.

C. 100 HP Distribution Pump

The motor runs on this unit, but the pump will not prime. The pump is a horizontal split case unit similar to the backwash pump, only larger. It is possible that the suction pipe to the clearwell may need to be replaced for this unit to operate. In either case, the pump will need major rehabilitation.

D. 125 HP Distribution Pump

The third distribution pump is also a horizontal split case unit, with a 125 HP U.S. motor operating at 1,800 rpm. Although the exact details are not known, this pump is not operational and will require a major rehabilitation.

E. Expand the Process Pumps to Operate at 4 MGD

In order for the plant to operate at 4 MGD, the existing final effluent pump will have to be kept in operation, and one of the other two backup units will have to be rehabilitated and put on line.

Estimated cost for a new backwash pump and major rehabilitation of one of the backup distribution pumps: $80,000

F. Expand the Process Pumps to Operate at 12 MGD

For a plant rate of 12 MGD, the third final distribution pump will have to be rehabilitated and put on line. Depending on the total capacity of all these pumps (currently unknown), a fourth pump may also have to be added to develop the total capacity.

Estimated cost for additional final distribution pumps: $40,000

IX. Distribution Pipe Manifold

As noted previously, the raw water pipe from the intake to the treatment plant is 10” in diameter. In addition, the final effluent pipe from the plant to town also appears to be a 10” pipe. For these reasons, we doubt that the plant was ever run at a rate faster than 2.5 to 3 MGD.

A. Expand the Pipe Manifold to Operate at 4 MGD

In order for the plant to operate at 4 MGD, the distribution pipe manifold in the treatment plant will have to be upsized to approximately 16” or 20” in size.

Estimated cost for pipe manifold sized for 4 MGD: $50,000

B. Expand the Pipe Manifold to Operate at 12 MGD

As with many other items at the plant, if it is desired to expand the plant to 12 MGD in the reasonably near future, the distribution pipe manifold in the plant should be upsized to the full 12 MGD rate now. The pipe would then be in the range of 24” to 30” in diameter. Due to the complexity of this issue, we recommend that the pipe be upsized to 24” to 30” in the initial expansion to 4 MGD.

Estimated Cost for Pipe Manifold Sized for 12 MGD: included above

(Please note that piping costs to town are not included in this analysis.)

X. Disinfection

Chlorine gas is currently used as the disinfectant at this WTP. As the plant capacity is expanded and the disinfection system is modified, it will be necessary to modify the disinfection system. As current safety regulations make keeping, expanding, and operating gas systems more expensive, a lot of plants are converting to sodium hypocholorite systems, either purchased or generated on-site. For purposes of discussion, we have assumed replacement of the existing chlorine gas system with a sodium hypochorite generation system.

Estimated Cost for 4 MGD: **$50,000**

Estimated Cost for 12 MGD: **200,000**

XI. Plant Controls

This water treatment plant appears to be considerably oversized for the current needs of the City of Adair Village. As a result, it is difficult to operate efficiently and at the same time maintain the equipment and the building properly with minimal staffing. If the plant is increased to a higher flow rate, it is our opinion that automatic controls will assist the operations staff in operating the plant more efficiently by automating control and data acquisition processes.

Automatic controls would include additional instrumentation such as level probes and headloss transmitters, automatic valve actuators, a computerized control system with automatic data logging and report generation. Also included would be communication to the intake pump station with diagnostics discussed previously, the ability to read the level in the reservoir in town, and most particularly, remote control capability for more efficient operation. The remote control capability is particularly important due to the remote location from the rest of town.

A. Estimated Cost to Include Plant Controls for 4 MGD

Estimated Control Costs for 4 MGD: **$385,000**

B. Estimated Plant Control Costs for 12 MGD

The bulk of the costs of an automatic control system will occur in the first rehabilitation to expand the plant to 4 MGD. Control costs for expanding to 12 MGD will include valves and actuators for Filters No. 1 and 2, along with instruments, wiring, and some programming.

Additional controls cost estimate for 12 MGD: **$185,000**

XII. Electrical Switchgear

It is our understanding that the Adair Water Treatment Plant was originally built by the Army during World War II. In the experience of our electrical engineer, the Army was typically not good at adhering to normal electrical codes, which may especially be the case for a plant built during World War II. From a brief inspection, it appears that the wiring and electrical switchgear of the plant date back to that period and may not have been rehabilitated or upgraded since. Electrical equipment that old may be difficult to maintain and could even be dangerous to work on. Additional information will be developed during the design stage.

A. Estimated Costs for Replacing the Electrical Service and Switchgear for 4 MGD

Because of the age of the plant, most of the switchgear and other electrical equipment will probably have to be replaced.

Furthermore, due to the small raw water and final distribution piping, it is doubtful that many of the pumps have been operating at the same time. Therefore, an evaluation will need to be made about the incoming service to determine its adequacy.

Estimated cost for completely replacing the electrical service equipment for 4 MGD: $1,500,000

B. Estimated Additional Electrical Costs for 12 MGD

Estimated cost for additional switchgear and wiring for new pumps and flocculator motors: $200,000

These costs are consistent for a plant of this size. However, because of the high cost of replacing the entire electrical service, it should be one of the primary focuses of a preliminary engineering report, which should be generated prior to designing any of the improvements.

XIII. Backwash Wastewater

Backwash wastewater from the plant is currently discharged to a small pond at the bottom of the hill next to the railroad tracks. The existing pond appears to be considerably less than is necessary and it is our opinion that it is probably not meeting the normal discharge limits required by DEQ for a plant of this type. City staff needs to verify that there is a discharge permit for wastewater from this plant.

For the plant as is, not to mention additional capacity considerations, there should be at least two large backwash waste ponds. In addition, an area for drying sludge would also be beneficial. A preliminary report prior to design will determine the desired size of the backwash basins. In the interim, we recommend that City staff determine if as much as one to two acres of additional space are available in that location for disposal of backwash wastewater.

Estimated cost for 4 MGD:	**$200,000**
Estimated additional cost for 12 MGD:	**$100,000**

XIV. Building Structure

The plant building will require similar rehabilitation to that required for the intake building. Roofing material and sheeting should be removed and replaced on the roof, and new gutters should then be provided, along with repairing or replacing any damaged rafters. At this time, we are not including an allowance for painting the building as it appears to be in reasonable condition, but that could easily be done. Our estimate also includes repairing or replacing all the windows and doors.

As stated previously, the concrete construction of the building appears to be in generally good condition and the basic structure should provide adequate service as long as no additional loadings are imposed.

As a part of this work, we plan to abandon the existing compressor building, since a compressor will not be required for the type of instrumentation and valves we propose to use. It appears as though the compressor building foundation is failing anyway.

The existing bathroom area is much too small, and a new space, including a shower, is planned to be provided in the new alum building, discussed previously. For that work, we are assuming that the existing drainfield is reusable. We are also assuming that no concrete repairs or modifications will be required for the plant building.

Estimated cost for repairing the plant building structure: $100,000

XV. Basic Water-Bearing Structure Rehabilitation

During a brief field reconnaissance, the basic water-bearing concrete structures appeared to be in reasonable condition. There are some minor cracks on the outside of the filter areas and in the channel above the flocculator drives. Some spalling is visible on top of the walls. However, there is no obvious major deterioration or failure apparent other than surface erosion as discussed previously.

The structures may or may not meet current seismic codes, but there is no simple way to tell, since there are no drawings to show how the plant was built. Therefore, we must assume that it does not meet current codes. However, the repairs proposed herein should be acceptable as long as significant additional loadings are not added to the structure.

The high pH in new concrete typically protects reinforcing bar in the concrete from moisture seeping through. However, with old concrete such as at this plant, the pH changes over time and the reinforcing steel is more susceptible to corrosion. Therefore, our repair procedure will include pressure washing followed by spraying a corrosion inhibitor over all of the wetted surfaces, followed by a surface coating on the cement to prevent moisture intrusion and protect the reinforcing steel. In addition, the areas with cracking will be epoxy-injected to seal them and the penetrations for the flocculator shafting will be sealed.

We have also included an allowance for demolition of the flocculator drives, the filter underdrains, and troughs in Filters 3 and 4.

Estimated costs for water-bearing structure rehabilitation for 4 MGD: $300,000 (preliminary)

Estimated costs for filters 1 and 2 for 12 MGD: $50,000

XVI. Cost Estimates

The costs contained herein are order of magnitude only, as suggested by our experience. The costs for expanding the plant to 4 MGD also include preparation for expanding the plant to 12 MGD in the future. Some cost savings could be realized by only providing for expansion to 4 MGD. The purpose of these cost estimates is to help the decision-making process for future water supplies. More detailed evaluations will be required to refine the costs, and a preliminary design effort is suggested for that purpose.

XVII. Summary

The plant has evidently been designed to be operated at a very low rate, which is fortunate. It has resulted in a plant that was built large enough to allow for the desired future capacity discussed in this report. The filters are relatively shallow, which requires special consideration, but the existing structure is capable of meeting the ultimate capacity of 12 MGD.

A. Repairs and Modifications Required

Since the plant is approximately 60 years old, there are a number of tasks that should be done, whether or not the plant is ever expanded. These items include the following:

- Provide an appropriate intake screen
- Repair the intake building
- Provide a bulk alum storage tank
- Repair and replace the flocculators
- Replace the media in Filters No. 1 and 2
- Repair the building
- Repair the process pumps

The above necessary repairs will result in a considerable cost without increasing the capacity of the plant. However, even if these repairs are made, the City will still have a plant that is maintenance-intensive to operate, is in need of submerged concrete repair, has an antiquated electrical system, an antiquated filter underdrain system, and is operated manually.

B. Recommended Additional Repairs

To reduce operational and maintenance requirements and extend the life of the plant, a number of additional tasks should be accomplished, including the following:

- Provide automatic sludge removal in the sedimentation basins
- Repair the submerged concrete
- Provide an all-new electrical system
- Replace the filter underdrain
- Provide instrumentation and equipment suitable for automatic control of the system, including the capability of operating remotely

If these additional items were accomplished, the life of the plant would be extended and it would be easier to operate. However, those costs will then approach the costs shown herein for rehabilitating the plant to operate at an increased capacity of at least 4 MGD.

C. CT Time

The disinfection contact time for the plant is currently unknown. For delivery to town, the long pipeline may produce adequate disinfection contact time for current use (with the exception of the WTP). However, the disinfection contact time available for future use is unknown and should be investigated as part of the preliminary design effort.

D. Preliminary Design Report

As stated previously, the cost estimates contained herein are order of magnitude only. Due to the high cost of several of the tasks, we recommend a preliminary design report be prepared to fine-tune the cost estimates prior to beginning design.

A very important component of the recommended preliminary design report will be to develop as-builts of the plant. The current plant information is almost non-existent.

Exhibit C-1

Polk County Water Needs Analysis
City of Adair Village WTP Expansion Feasibility Analysis
Preliminary Project Cost Estimate for Expansion to 4.0 MGD and 12.0 MGD

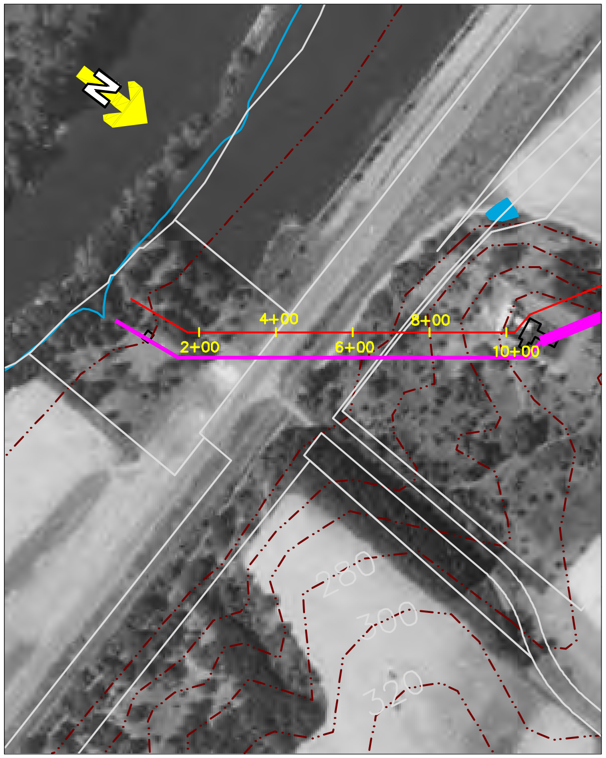
Prepared by Lee Engineering, Inc. for Economic and Engineering Services, Inc.

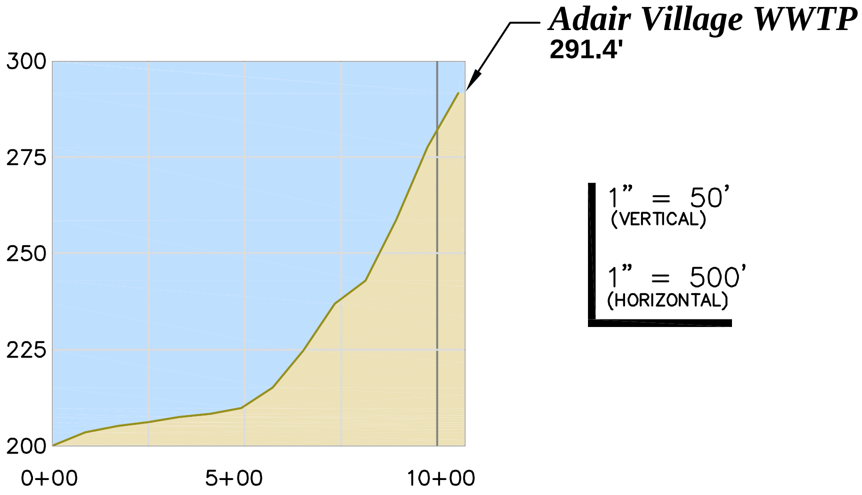
2-Jul-04

Item	Estimated Cost		Comments
	4 MGD	12 MGD	
A. Intake			
Structural Improvements	$ 30,000	$ -	
Electrical Improvements	$ 75,000	$ 75,000	*does not include standby power*
Instrumentation & Control	$ 40,000	$ 15,000	
Pumps	$ 40,000	$ 120,000	
Transmission Piping to WTP	$ 300,000	$ 400,000	*16" for 4 mgd; 24" for 12 mgd*
Screening of Intake	$ 500,000	$ -	*highly variable and will require separate study*
Sub-total	*$ 985,000*	*$ 610,000*	
B. WTP			
Chemical Feed Systems	$ 155,000	$ 50,000	
Flash Mixing	$ 30,000	$ -	
Flocculation	$ 20,000	$ 40,000	
Sedimentation	$ 270,000	$ 85,000	
Filtration	$ 250,000	$ 200,000	*2 filters now; 2 filters future*
Pipe Gallery	$ 170,000	$ 150,000	
Instrumentation & Control	$ 385,000	$ 185,000	
Backwash System			
Pump	$ 40,000	$ -	
Waste Handling	$ 200,000	$ 100,000	
Disinfection	$ 50,000	$ 200,000	
Repair Building Structure	$ 100,000		
Distribution Pumps	$ 80,000	$ 40,000	
Pump Manifold	$ 50,000	$ -	
Electrical System	$ 1,500,000	$ 200,000	
Structural Improvements	$ 300,000	$ 50,000	*General facility updates only. No space additions incl.*
Sub-total	*$ 3,600,000*	*$ 1,300,000*	
Total Construction Cost Est.	*$ 4,585,000*	*$ 1,910,000*	
Engineering @ 25%	$ 1,146,250	$ 477,500	
Contingincies @15%	$ 859,688	$ 358,125	
Total Estimated Project Cost	***$ 6,590,938***	***$ 2,745,625***	***$ 9,336,563***

Appendix D

Adair Village WTP (Alternative WR-1) Pipeline Alignments





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1" = 500'
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POLK COUNTY
Exhibit D-1
Adair Village WTP (Alternative 1)
Finished Water
Transmission Main Alignment

Octobert 2004

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Bellevue Mount Vernon Olympia Portland Tri-Cities

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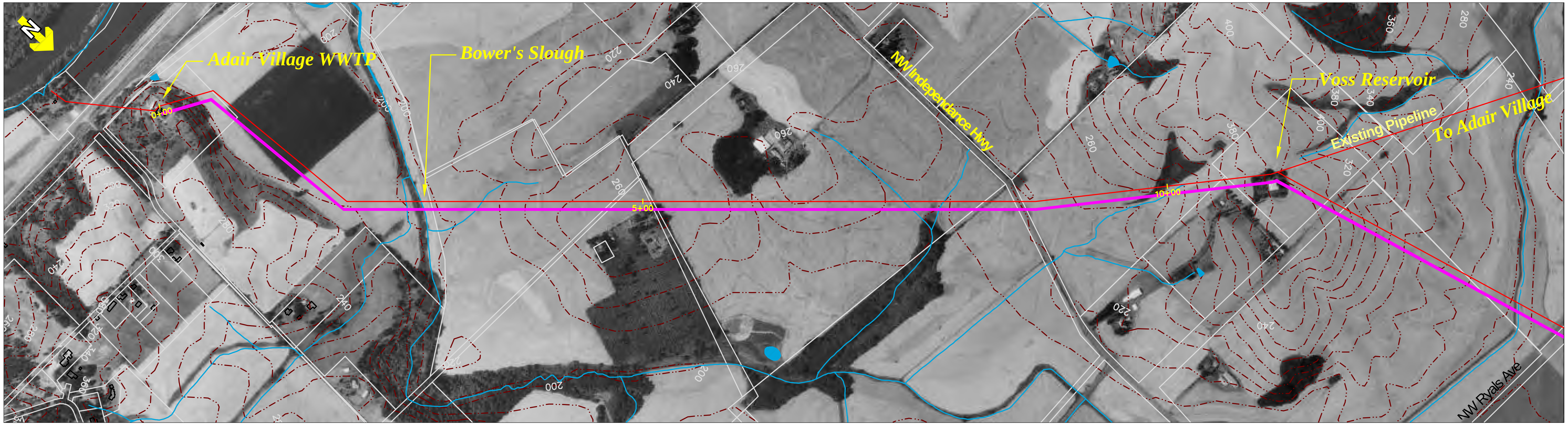

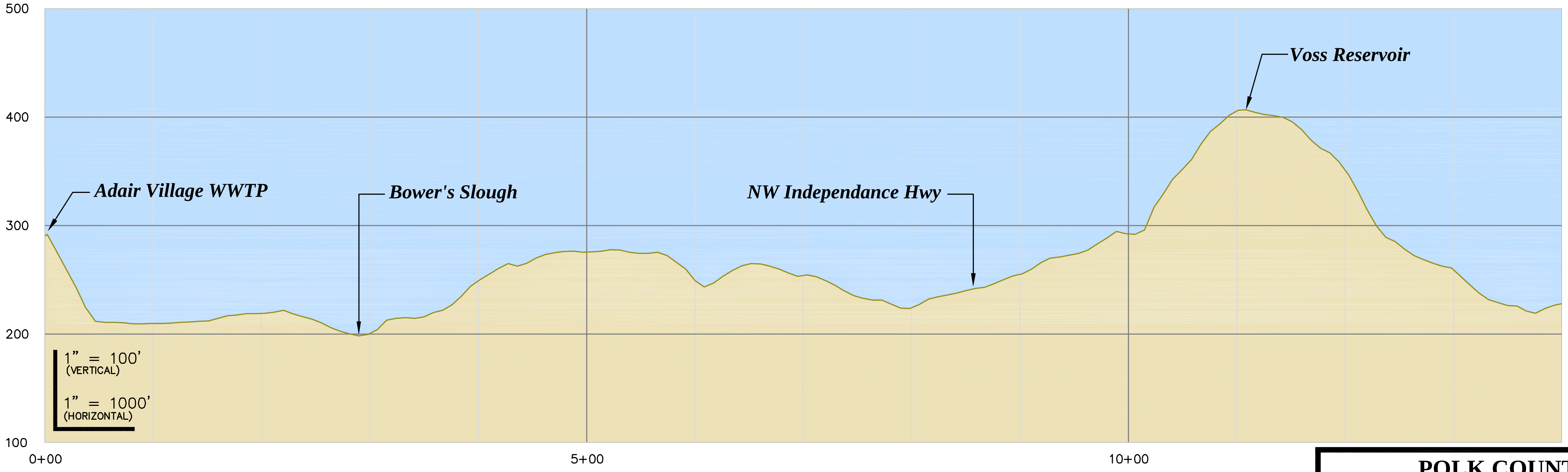

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Exhibit D-2

Adair Village WTP (Alternative 1)
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Transmission Main Alignment

October 2004

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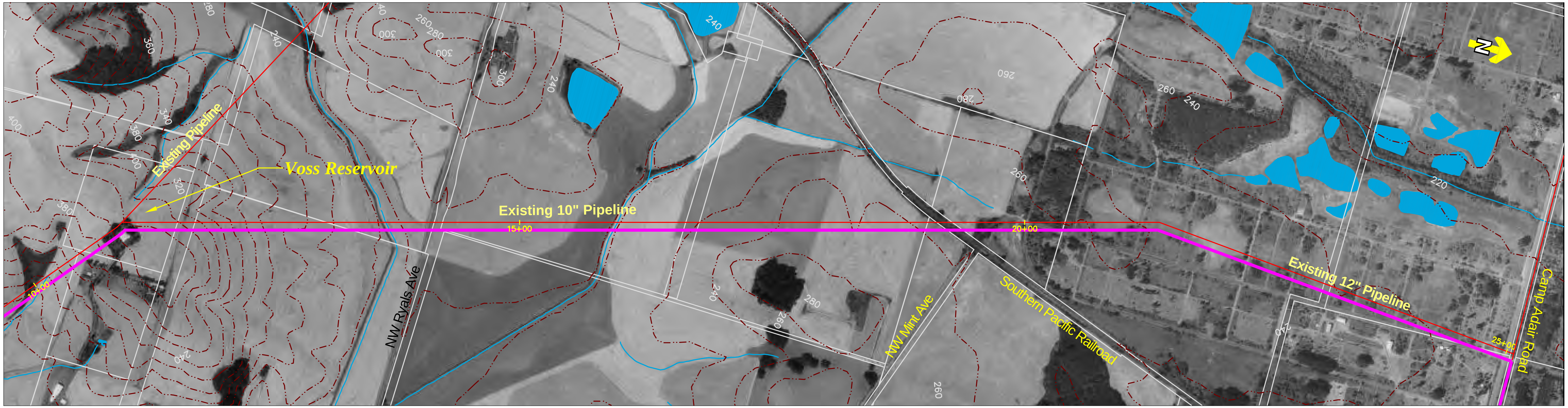

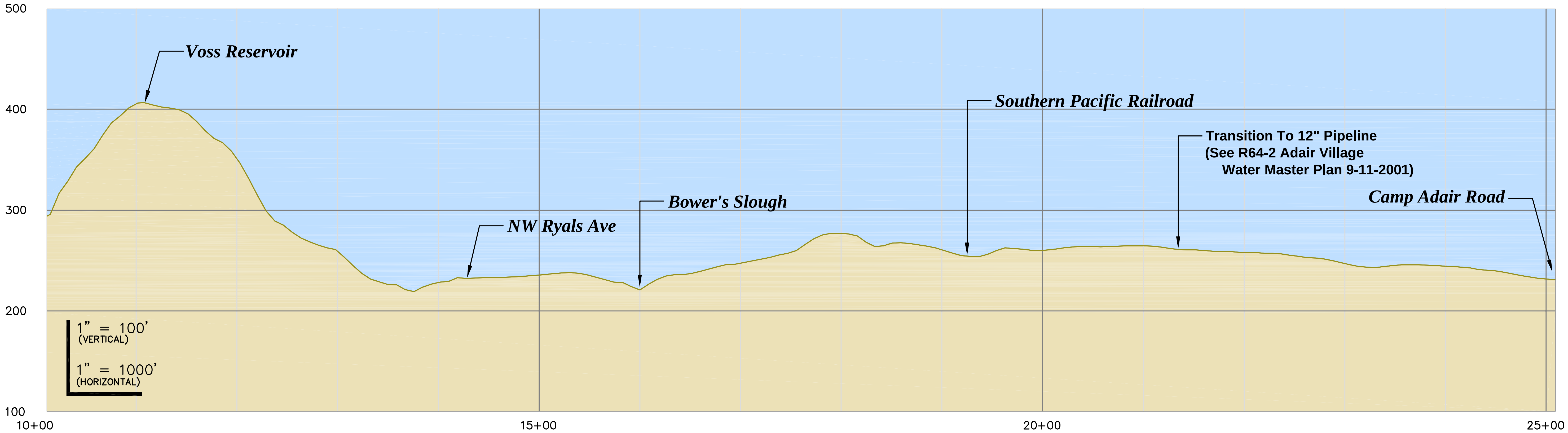

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POLK COUNTY

Exhibit D-3

Adair Village WTP (Alternative 1)
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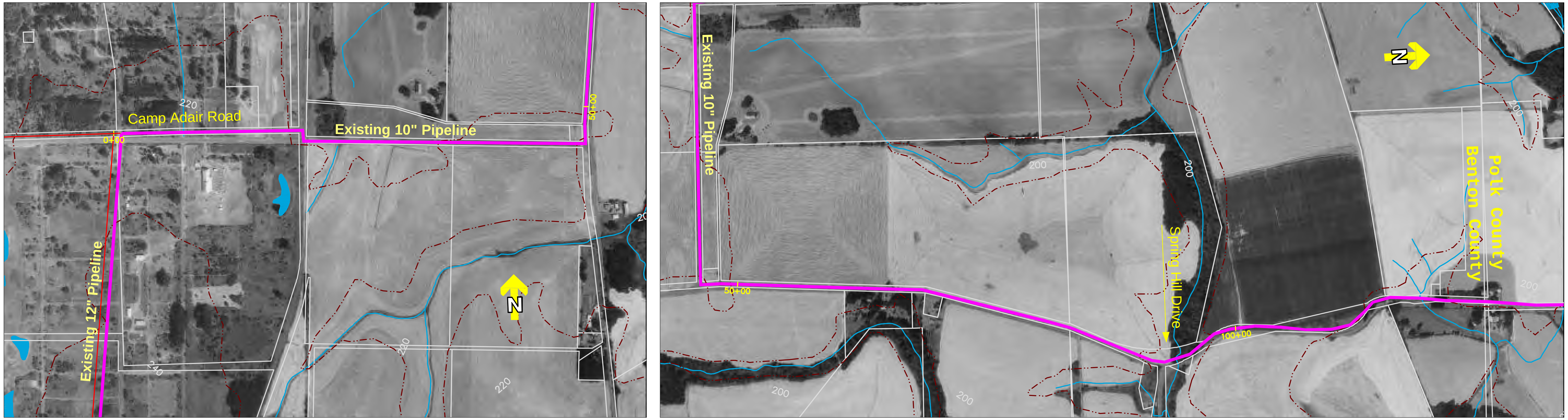

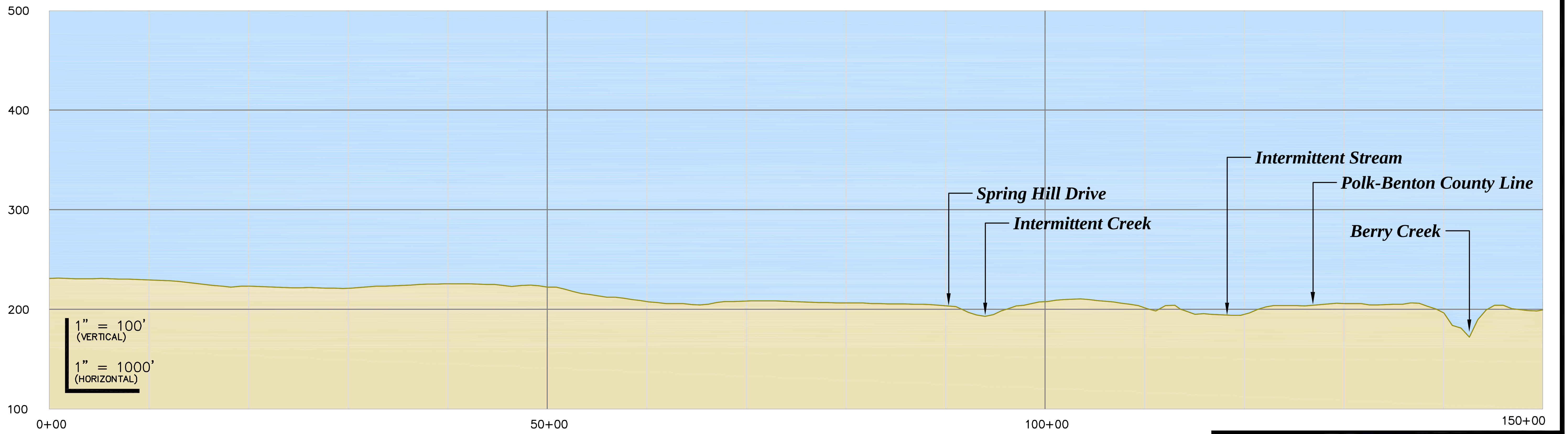

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Exhibit D-4
Adair Village WTP (Alternative 1)
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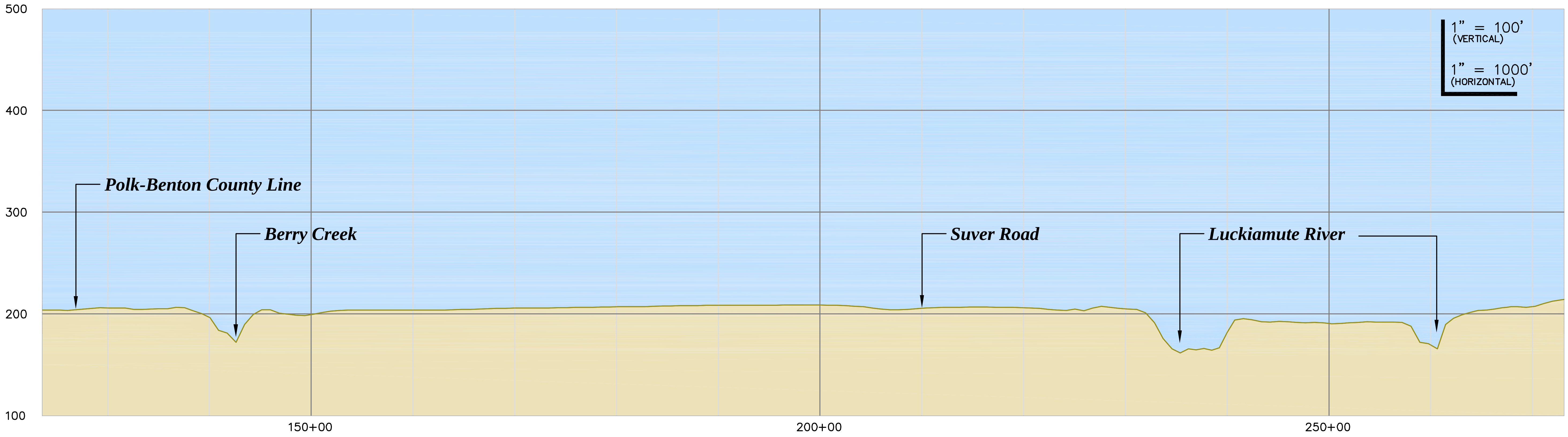

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Exhibit D-5
Adair Village WTP (Alternative 1)
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Transmission Main Alignment
October 2004

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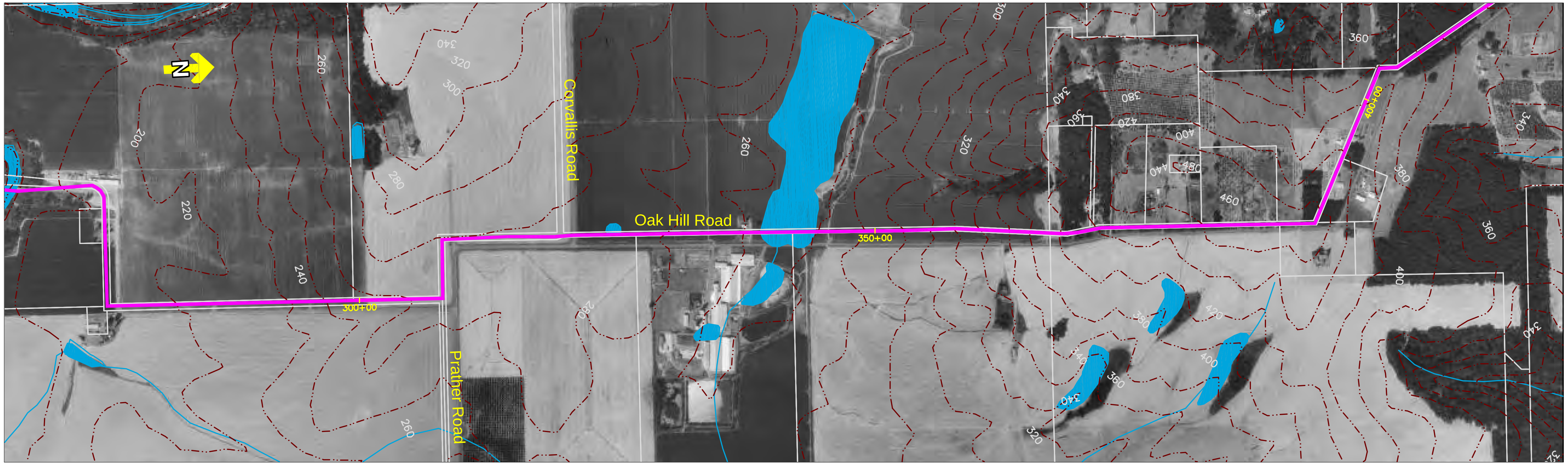

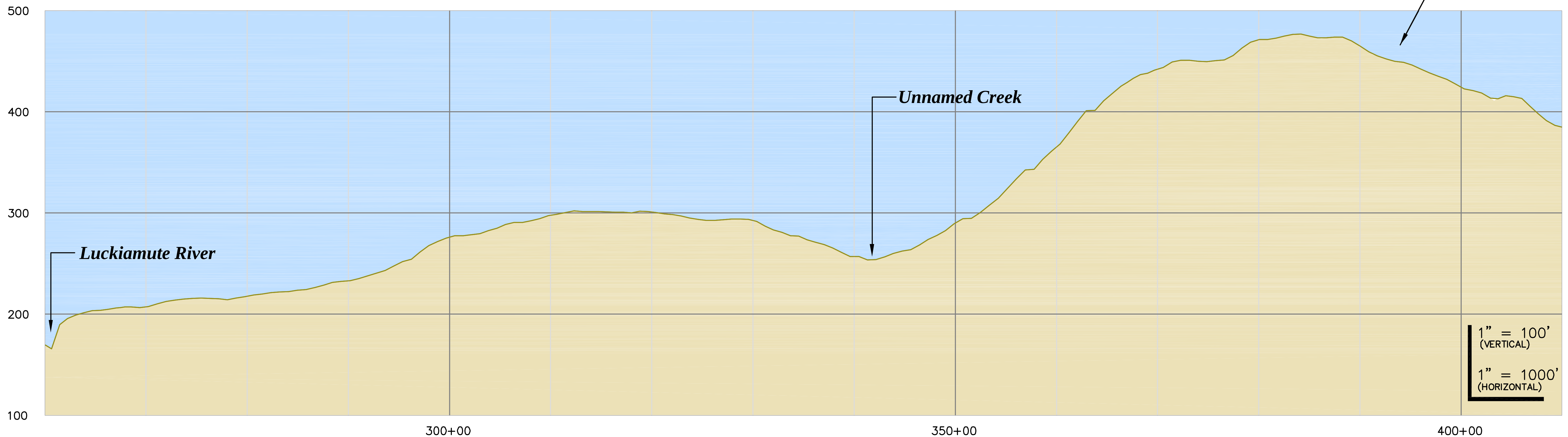

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Exhibit D-6

Adair Village WTP (Alternative 1)
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Transmission Main Alignment

October 2004

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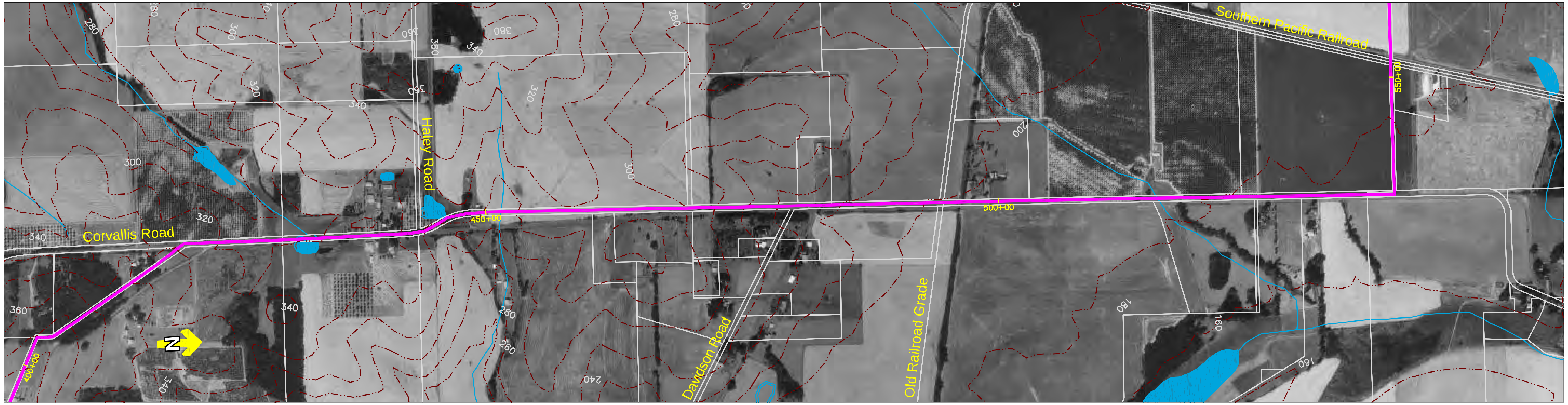

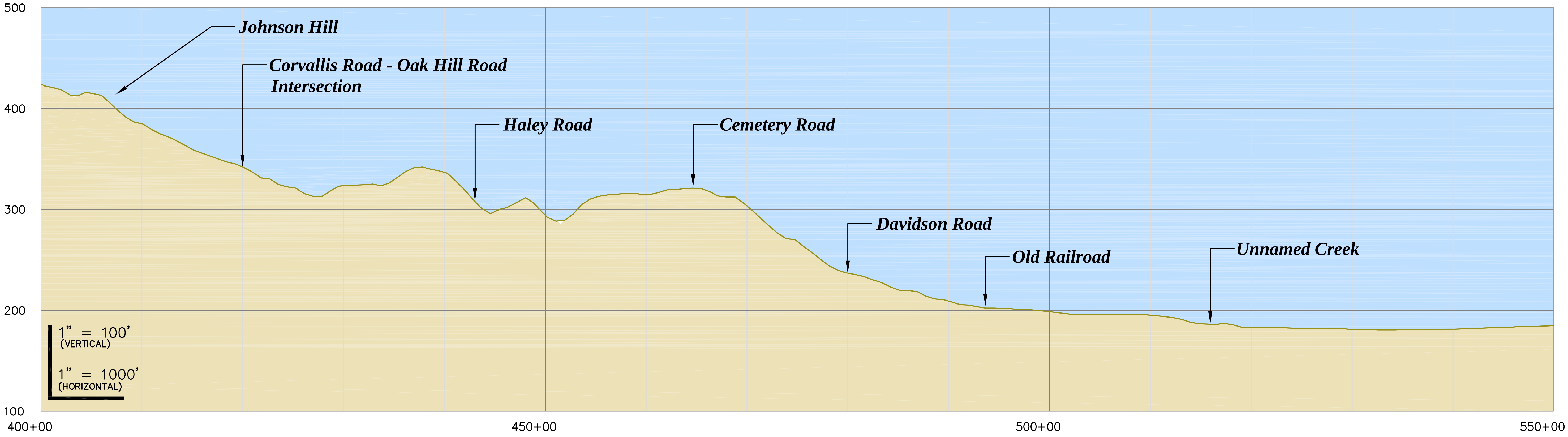

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Exhibit D-7

Adair Village WTP (Alternative 1)
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Transmission Main Alignment

October 2004

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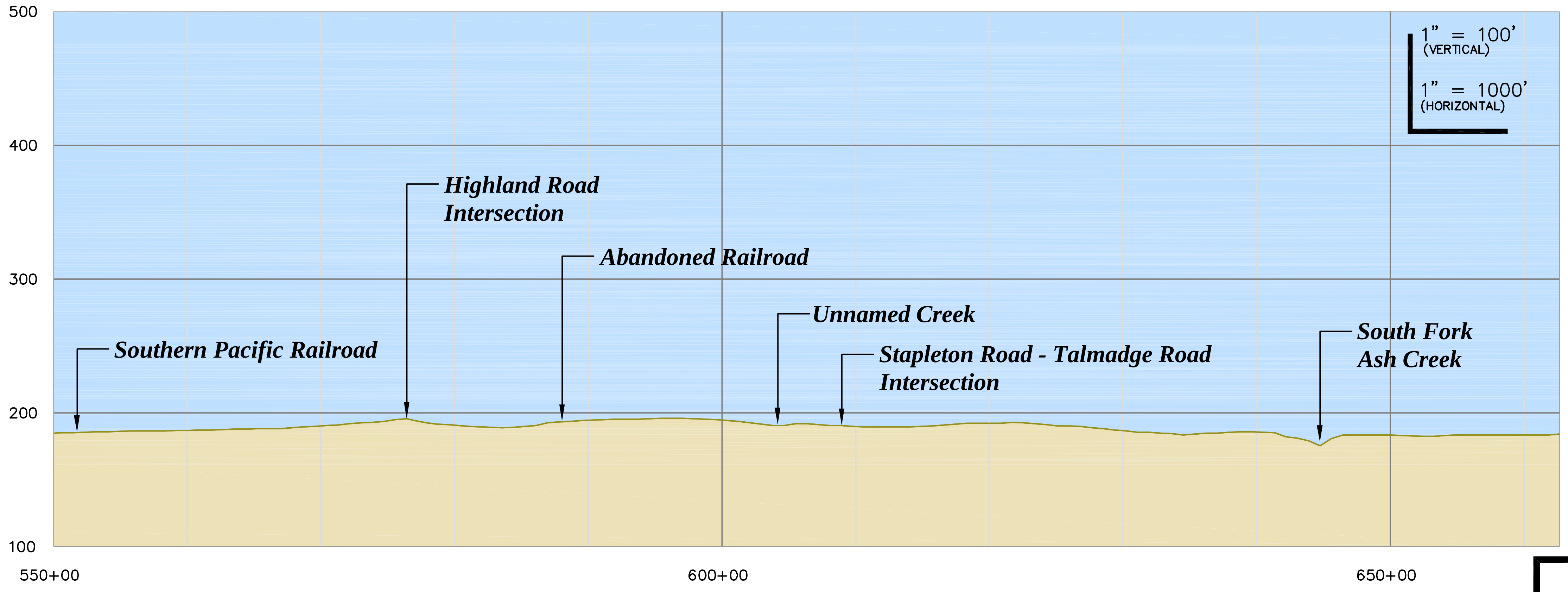

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Exhibit D-8
Adair Village WTP (Alternative 1)
Finished Water
Transmission Main Alignment
October 2004

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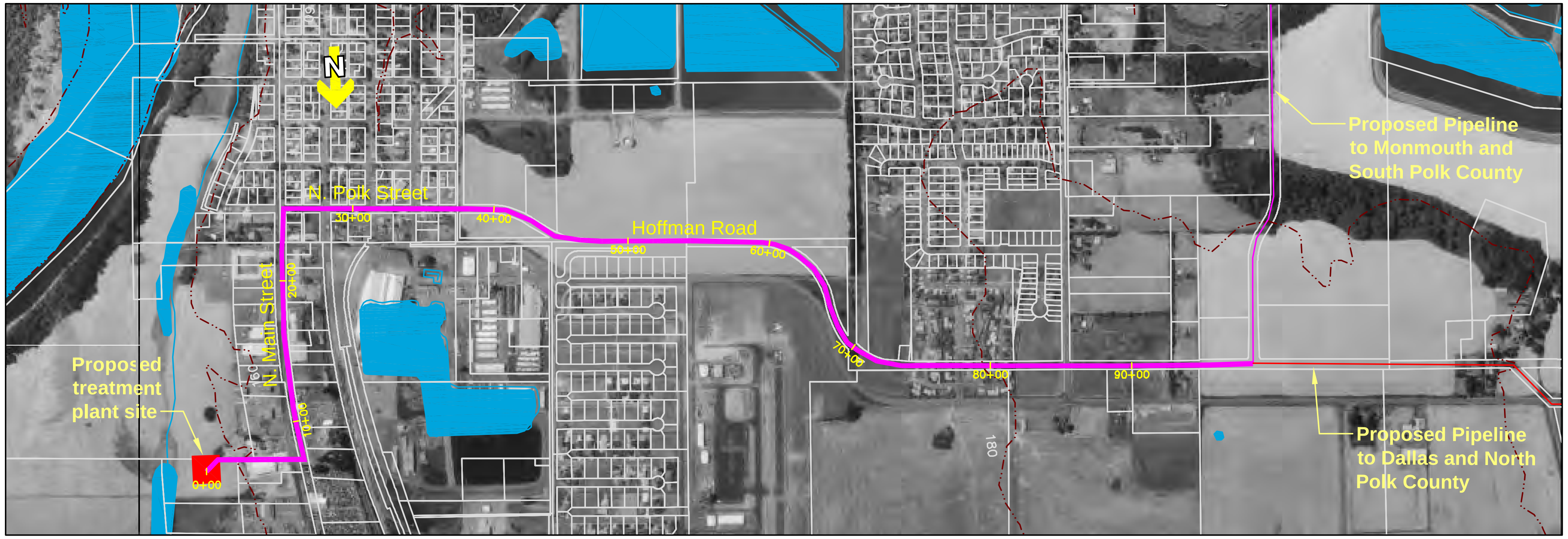
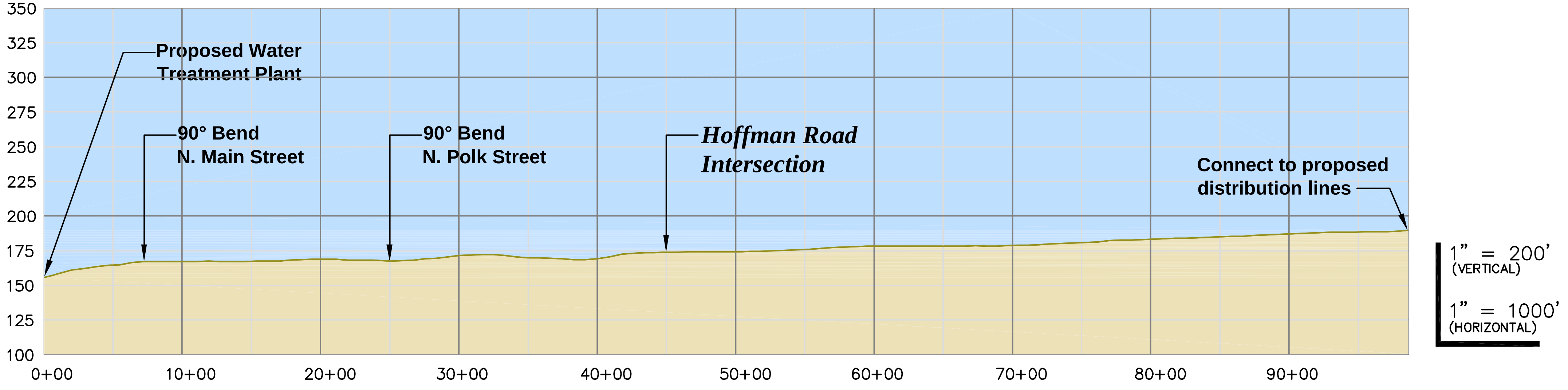
Appendix E

Regional WTP (Alternative WR-2) Pipeline Alignments





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POLK COUNTY
Exhibit E-1
Regional WTP (Alternative 2)
Finished Water
Transmission Main Alignment
October 2004

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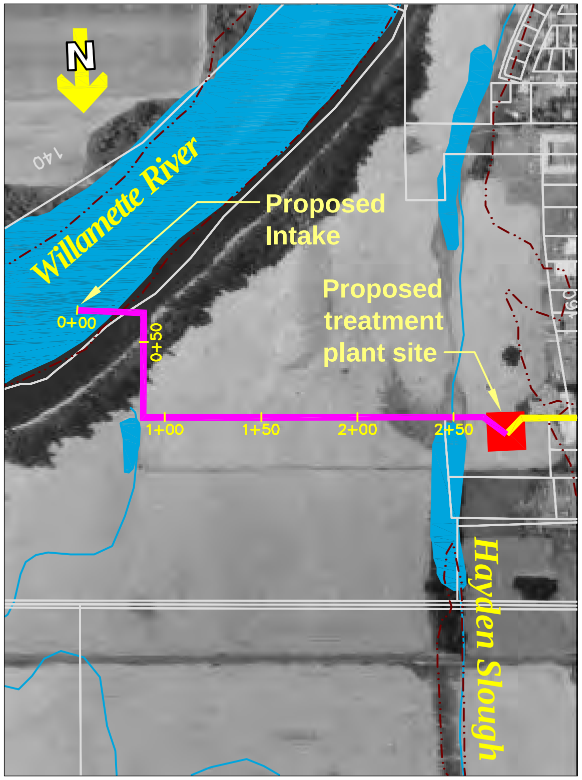

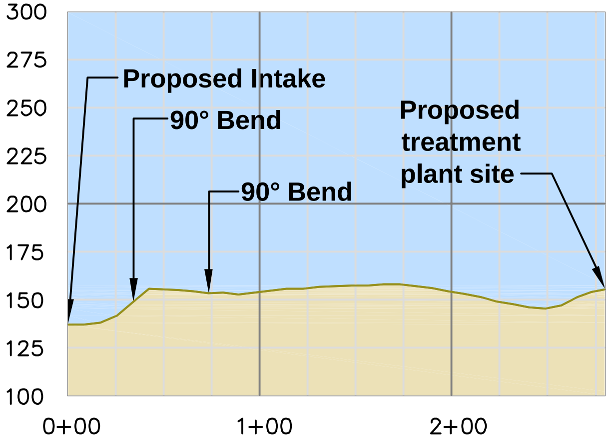

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POLK COUNTY

Exhibit E-2
Regional WTP (Alternative 2)
Finished Water
Transmission Main Alignment

October 2004

Economic and Engineering Services, Inc.
Bellevue Mount Vernon Olympia Portland Tri-Cities

Appendix F

Permitting Reconnaissance

Environmental Science & Assessment, LLC

MEMORANDUM

DATE: September 9, 2004

TO: Ryan Beaver (Economic and Engineering Services)

FROM: Wallace Leake

RE: Polk County Regional Water Supply Planning Study: Natural Resource Reconnaissance Findings and Permit Analysis.

Introduction

This memo includes an analysis pf permitting requirements and documentation needs for future construction of a 30-inch water transmission line in Benton and Polk Counties. The analysis is based on the results of a reconnaissance of natural resources conducted by ES&A staff along a 17-mile alignment that extends from approximately the Adair Villager Water Treatment Plant to the City of Independence. The majority of the alignment is located within existing roadways.

Natural resources evaluated during the August 18, 2004 reconnaissance consisted typically of constructed or natural drainageways in the immediate vicinity of roadway crossings. Disturbances to these resources would require authorizations from various local, state and federal agencies, which in turn would require that these resources be documented according to agency rules.

Resource Reconnaissance

After reviewing available GIS information, 24 areas within the alignment corridor were identified as likely to contain regulated natural resources. Each of these 24 locations was evaluated in the field during the August 18 reconnaissance and characterized as to type of resource, resource value and whether the resource was subject to regulatory agency jurisdiction.

Among the 24 sites evaluated, 17 were determined to contain regulated natural resources. Significant resources observed included the Willamette and Luckiamute Rivers, Berry Creek, Ash Creek and a number of smaller drainageways. The site of the proposed new intake in the Willamette River near Independence (Alternative 2) was not evaluated.

Maps identifying the locations of each of the resource sites are included in Appendix 1. Summary findings of the natural resource reconnaissance are included in Appendix 2. Photographs of the resource sites are included in Appendix 3.

Permit Analysis

State and Federal Permits

Disturbances to wetlands and streams will require authorization from the US Army Corps of Engineers (USACE) and/or the Oregon Department of State Lands (DSL). Resources that could be disturbed from construction of the transmission line include the Willamette River during upgrading of the existing intake near Adair Village or construction of a new intake in the river near Independence. Other resources that may be disturbed by construction include numerous smaller drainageways crossed by the alignment corridor and their associated wetlands.

In addition to wetlands and streams, both USACE and DSL require compliance with the Endangered Species Act (ESA), which provides protection for certain sensitive plant and animal species, and the National Historic Preservation Act (NHPA), which protects historic and archaeological resources.

Required documentation would include the following:

Wetlands and Streams

Drainages and their associated wetlands along the alignment corridor would need to be delineated and mapped. Field data would need to be compiled in a Wetland Delineation Report prepared according to USACE and DSL rules. The report would require agency review and concurrence.

Threatened and Endangered Species

The Willamette and Luckiamute Rivers each contain anadromous fish species listed as Threatened under the federal ESA. Upgrading the existing intake structure near Adair Village, constructing a new intake in the Willamette at Independence, or impacting the area below the top of bank of the Luckiamute River may require that a NOAA Fisheries Biological Assessment (NOAA BA) be prepared for the project. A survey of fisheries habitat in these rivers in the vicinity of the transmission line corridor should be conducted to support the NOAA BA.

Plant species listed under the federal ESA are known to occur in the vicinity of the transmission line corridor. At a minimum, a survey should be conducted to determine if protected plant species or suitable habitat for these species is present. Depending on the results of the survey, a US Fish and Wildlife Service Biological Assessment may need to be prepared.

Cultural Resources

There are many known archaeological sites located along the Luckiamute River. Camp Adair may also have some historical significance. Impacts to these resources are regulated under NHPA. A reconnaissance level cultural resource survey would need to be conducted in areas where these sites may be located.

Land Use

Land use authorizations from Polk and Benton Counties would be required to construct the transmission line. An authorization from the City of Independence would also be needed if Alternative 2 were constructed. The bulk of the alignment is located in land zoned as Exclusive Farm Use (EFU), where construction of a pipeline is apparently a permitted use.

Willamette Greenway and other sensitive area restrictions would also apply to those parts of the project located in and near the Willamette River. County planning staff indicated that the documentation prepared to satisfy the requirements of USACE and DSL would likely be adequate to address any county sensitive area rules.

Union Pacific Railroad

The proposed pipeline corridor crosses an active rail alignment at two locations. Union Pacific Railroad requires that Encroachment and Utility Survey permits be obtained for survey and construction of new pipelines on UPRR property. License fees are based on property values, and cannot be determined before an application is submitted.

Summary

No “fatal flaws” in the proposed waterline alignment due to the presence of protected natural resources were identified. However, high value resources such as the Willamette and Luckiamute Rivers and forested wetlands exist within the alignment corridor. The methods proposed to construct the transmission line in the vicinity of these resources will receive close agency scrutiny, and Polk County will be required to show that it has minimized any resource impact to the greatest practicable extent.

A summary of required documents and permits, approximate approval timelines and costs is given in Table 1.

References

Jim Ellen, Planner, Polk County Community Development Department, Dallas, Oregon. Personal communication, August 23, 2004.

Peter Idema, Community Development Director, Benton County Community Development Department, Corvallis, Oregon. Personal communication, August 23, 2004.

Table 1. Polk County Regional Water Supply Planning Study
Transmission Line Alternatives 1 and 2
Regulatory Compliance Matrix

Permit, Task or Document Required	Timeline	Cost	Comments
US Army Corps of Engineers (USACE) Section 404 (Permit)	Prepare: @30% Design Review: 90-150 Days	$5,000	A number of additional studies/documents will be needed to obtain this permit, including a wetland delineation, Biological Assessments, fisheries habitat survey, etc. (see below).
Oregon Department of State Lands (DSL) Removal Fill (Permit)	Prepare: @30% Design Review: 90 Days	Joint Application with USACE	Joint application with USACE.
Land Use (Permits)	Prepare: 30 Days Review: 90 Days	$5,000	Land use approvals will be required fro Benton and Polk Counties and the City of Monmouth.
Union Pacific RR (Encroachment Permits)	Prepare: 30 Days Review: 120 Days	$3,500	The alignment crosses active rail lines at locations. Encroachment permits will be required.
Biological Assessments (USFWS and NOAA Fisheries) (Documents)	Prepare: 30 Days Review: 90 Days	$12,000	Intake (re)construction in the Willamette River will be key resource agency issue. ESA listed fish and plants are present in the vicinity of the alignment
Wetland Delineation and Report (Field study/Document)	Prepare: 45 Days Review: 90 Days	$10,000	Wetlands and waterways within the proposed disturbance area need to be delineated. Report submitted to USACE and DSL for concurrence.
Fisheries Habitat Survey (Field study/Document)	Prepare: 30 Days	$5,000	Habitat for ESA listed fish at the intake location will need to be surveyed to support BA's and USACE/DSL permits.
Rare Plant Survey (Field study/Document)	Prepare: 30 Days	$1,500	Habitat for ESA listed plants along the alignment will need to be surveyed to support BA's and USACE/DSL permits.
Cultural Resources Survey (Field study/Document)	Prepare: 30 Days	$3,500	A reconnaissance level cultural resources survey and records search is required to support USACE/DSL permits.
Wetland Restoration Plans (Document)	Prepare: 30 Days	$5,000	A wetland mitigation plan including planting plans will need to be prepared to address disturbances to jurisdictional wetlands.

Total Estimated Cost	**$50,500**
Estimated Time to Complete	**6 months after 30% design**

1/6/2005

Polk County Regional Water Supply Planning Study
Natural Resource Reconnaissance
Summary Findings

Site ID: 1
Station: 00
Feature: Willamette River Jurisdictional Resource? Yes

Summary:

At Hyak Park. Old intake structure and pump station. River channel approximately 150 feet wide, steep banks. Bedrock. Riparian forest habitat consists of willow, cottonwood, maple.

Site ID: 2
Station: 30+00
Feature: Bower's Slough Jurisdictional Resource? Yes

Summary:

Well-developed wetland/riparian forest, some benches, water in channel. Well defined, steep banks.

Site ID: 3
Station: 75+00
Feature: Drainage Ditches Jurisdictional Resource? No

Summary:

Two shallow drainage ditches. No apparent wetland. Vegetation predominately blackberry.

Site ID: 4
Station: 100+00
Feature: Drainage ditches Jurisdictional Resource? No

Summary:

Shallow drainage ditch. Little vegetation. No apparent wetland.

Site ID: 5
Station: 135+00
Feature: Drainage Ditch Jurisdictional Resource? Yes

Summary:

Shallow, narrow drainage ditch. Much reed canary grass. Wetland.

Site ID: 6
Station: 160+00
Feature: Drainage ditch/slough Jurisdictional Resource? Yes

Summary:

Large drainage ditch, some flow. Glyceria, reed canarygrass. Possible Sidalcea (ESA listed plant) habitat. Wetland.

Site ID: 7
Station: 190+00
Feature: Rail Line/Large Drainage Jurisdictional Resource? Yes

Summary:

Rail alignment located within large constructed (?) drainage. Drainage approximately 50 feet wide. Standing water. Reed canarygrass, cattails. Wetland.

Site ID: 8
Station: 20+00
Feature: Forested Wetland Jurisdictional Resource? Yes

Summary:

Ash forest. Wetland north of roadway.

Site ID: 9
Station: 95+00
Feature: Forested Wetland/Spring Hill Drive Jurisdictional Resource? Yes

Summary:

Ash forest/wetland. Some flow in well-defined channel. Culvert crossing. Extensive forest to west of road. Smaller forested area to east.

Site ID: 10
Station: 120+00
Feature: Drainage Ditch Jurisdictional Resource? No

Summary:

Dry drainage. No vegetation. No wetland.

Site ID: 11
Station: 133+00
Feature: No feature Jurisdictional Resource? No

Summary:

No features present.

Site ID: 12
Station: 143+00
Feature: Berry Creek Jurisdictional Resource? Yes

Summary:

Steel, well defined channel banks. Channel plus riparian zone approximately 100 feet wide. Ash forest/wetland. Pipe located on bridge.

Site ID: 13
Station: 207+00
Feature: Drainage Ditch/Suver Road Jurisdictional Resource? Yes

Summary:

Ditch has well-defined banks. Some vegetation. Apparent wetland. Channel is approximately 10 feet wide.

Site ID: 14
Station: 235+00
Feature: Forested Wetland Jurisdictional Resource? Yes

Summary:

Luckiamute River is located west of roadway. Extensive forested wetlands east of roadway.

Site ID: 15
Station: 260+00
Feature: Luckiamute River Jurisdictional Resource? Yes

Summary:

Well developed forested wetland both sides of roadway. Steep banks. Wetland extends approximately 200 feet along roadway. Pipe on bridge. Possible staging area on southeast bank.

Site ID: 16
Station: 342+00
Feature: Shrub Wetland Jurisdictional Resource? Yes

Summary:

Shrub and emergent wetland on east side of roadway. Wetland extends several hundred feet along east side of road. Some ash, apple, reed canarygrass.

Site ID: 17, 18, 19
Station: 433+00, 448+00, 452+00
Feature: Drainage Ditches Jurisdictional Resource? No

Summary:

Drainages are dry. No wetland.

Site ID: 20
Station: 515+00
Feature: Drainage Ditch Jurisdictional Resource? Yes

Summary:

Constructed ditch. Channel approximately 6 feet wide. Reed canarygrass to west of roadway. Larger vegetation (small cottonwood, rose) to east.

Site ID: 21
Station: 551+00
Feature: Rail Crossing/Ditches Jurisdictional Resource? No

Summary:

At grade crossing. Ditches are dry. No wetland.

Site ID: 22
Station: 605+00
Feature: Channelized Drainage Jurisdictional Resource? Yes

Summary:

Approximately 8-foot wide drainage contains degraded forested wetland. Some emergent wetland present.

Site ID: 23
Station: 617+00
Feature: Drainage Ditch Jurisdictional Resource? No

Summary:

Constructed ditch. Culvert crossing. Channel approximately 3 feet wide. No vegetation. No wetland.

Site ID: 24
Station: 643+00
Feature: South Fork Ash Creek Jurisdictional Resource? Yes

Summary:

Well-defined channel, approximately 50 feet wide. Some willow/shrub/emergent wetland. Pipe on bridge.

Site 1: Existing intake structure at Hyak Park (Station 00).

Site 1: Willamette River shoreline at existing intake structure.

Site 2: Bower’s Slough (Station 30+00).

Site 3: Drainage ditch (Station 75+00).

Site 4: Drainage ditch (Station 100+00).

Site 5: Drainage ditch near NW Ryals Avenue (Station 135+00).

Site 6: Drainage ditch/slough (Station 160+00).

Site 7: Large drainage at SP Railroad crossing (Station 100+00).

Site 8: Forested wetland at culvert crossing on Camp Adair Road
(Station 20+00).

Site 9: Ash forest/wetland at Spring Hill Drive (Station 95+00).

Site 12: Berry Creek bridge crossing (Station 143+00).

Site 13: Drainage ditch at Suver Road (Station 210+00).

Site 14: Forested wetlands adjacent to Luckiamute River (Station 235+00).

Site 15: Bridge crossing at the Luckiamute River (Station 260+00).

Site 16: Drainage ditch culvert crossing (Station (342+00).

Site 20: Drainage ditch/emergent wetland at culvert crossing (Station 515+00).

Site 21: SP Railroad crossing (Station 551+00).

Site 22: Unnamed creek crossing near Stapleton Road (Station (605+00).

Site 23: Drainage ditch at culvert crossing (Station 617+00).

Site 24: South Fork Ash Creek (Station 643+00).

Appendix G

Water Rights Application

Appendix H

Adair Village WTP Wholesale Rate Estimate - Exhibits

Polk County - Alternative 1
Exhibit H-1
Water Fund
Data Assumptions
(For Fiscal Years Ending)

Escalation Factors	**2006**	**2007**	**2008**	**2009**	**2010**
Expenses					
General Supplies	Projected	2.50%	2.50%	2.50%	2.50%
Fuel & Chemicals	Projected	2.50%	2.50%	2.50%	2.50%
Natural Gas	Projected	2.50%	2.50%	2.50%	2.50%
Electricity	Projected	2.50%	2.50%	2.50%	2.50%
Stormwater Charge	Projected	2.50%	2.50%	2.50%	2.50%
Garbage Collection	Projected	2.50%	2.50%	2.50%	2.50%
Telephone	Projected	2.50%	2.50%	2.50%	2.50%
Professional & Technical Svcs	Projected	2.50%	2.50%	2.50%	2.50%
Repairs & Maintenance	Projected	2.50%	2.50%	2.50%	2.50%
Insurance	Projected	2.50%	2.50%	2.50%	2.50%
Fees, Dues, & Advertising	Projected	2.50%	2.50%	2.50%	2.50%
Meeting Expenses	Projected	2.50%	2.50%	2.50%	2.50%
Interest Rate (Interest Earnings)	2.00%	2.00%	2.00%	2.00%	2.00%
Interest on Debt (Interest Expense)	5.00%	5.00%	5.00%	6.00%	6.00%
Closing Costs on New Debt	5.00%	5.00%	5.00%	5.00%	5.00%
Term (Years) of New Debt	30	30	30	30	30
Debt Service Coverage Requirement	25.00%	25.00%	25.00%	25.00%	25.00%
Inflation	2.50%	2.50%	2.50%	2.50%	2.50%
Water Sales Growth (1)	3.92%	3.92%	3.92%	3.92%	3.92%

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(1) Water Sales Growth factor calculated using current and projected (2040) Peak Day Demand figures Polk County.

Polk County - Alternative 1
Exhibit H-2
Water Fund
Revenue Requirements

(For Fiscal Years Ending)	**2006**	**2007**	**2008**	**2009**	**2010**
Applications of Funds					
Operating Expenses					
General Supplies	$69,000	$70,725	$72,493	$74,305	$76,163
Fuel & Chemicals	62,000	66,044	70,352	74,941	79,830
Natural Gas	5,000	5,326	5,674	6,044	6,438
Electricity	270,000	287,612	306,373	326,357	347,645
Stormwater Charge	0	0	0	0	0
Garbage Collection	29,000	29,725	30,468	31,230	32,011
Telephone	4,000	4,100	4,203	4,308	4,415
Professional & Technical Svcs	415,000	425,375	436,009	446,910	458,082
Repairs & Maintenance	55,000	56,375	57,784	59,229	60,710
Insurance	51,000	52,275	53,582	54,921	56,294
Fees, Dues, & Advertising	10,000	10,250	10,506	10,769	11,038
Meeting Expenses	1,000	1,025	1,051	1,077	1,104
Total Operating Expenses	$971,000	$1,008,832	$1,048,495	$1,090,091	$1,133,730
Debt Service					
Principle	$528,230	$554,642	$661,093	$712,046	$842,757
Interest	1,754,750	1,728,338	1,962,106	2,013,952	2,428,471
Total Debt Service	$2,282,980	$2,282,980	$2,623,199	$2,725,997	$3,271,227
Debt Service Coverage @ 25%	570,745	570,745	655,800	681,499	817,807
Total Debt Service	$2,853,725	$2,853,725	$3,278,999	$3,407,497	$4,089,034
Total Applications of Funds	$3,824,725	$3,862,557	$4,327,494	$4,497,588	$5,222,765
Total Revenue Requirement	$3,824,725	$3,862,557	$4,327,494	$4,497,588	$5,222,765
Projected Sales (CCF)	1,009,168	1,048,777	1,089,939	1,132,718	1,177,175
Unit Cost ($/CCF)	$3.79	$3.68	$3.97	$3.97	$4.44

Polk County - Alternative 1
Exhibit H-3
Water Fund
General Fund

(For Fiscal Years Ending)	**2006**	**2007**	**2008**	**2009**	**2010**
Beginning Balance	$0	$121,965	$130,232	$133,670	$137,885
Sources of Funds					
Regional Sales	$3,824,725	$3,862,557	$4,327,494	$4,497,588	$5,222,765
Interest Earnings	1,220	2,522	2,639	2,716	2,814
Total Sources of Funds	$3,825,945	$3,987,044	$4,460,364	$4,633,974	$5,363,464
Applications of Funds					
Transfers Out					
Total Operating Expenses	$971,000	$1,008,832	$1,048,495	$1,090,091	$1,133,730
Total Debt Service	2,282,980	2,282,980	2,623,199	2,725,997	3,271,227
Transfer to Construction Fund	450,000	565,000	655,000	680,000	815,000
Total Applications of Funds	$3,703,980	$3,856,812	$4,326,694	$4,496,088	$5,219,958
Ending Balance	$121,965	$130,232	$133,670	$137,885	$143,506
Target Ending Fund Balance	$121,375	$126,104	$131,062	$136,261	$141,716

Polk County - Alternative 1
Exhibit H-4
Water Fund
Construction Fund

(For Fiscal Years Ending)	**2006**	**2007**	**2008**	**2009**	**2010**
Beginning Balance	$0	$184,488	$758,922	$527,058	$539,351
Sources of Funds					
Transfer from General Fund	$450,000	$565,000	$655,000	$680,000	$815,000
System Development Charges	0	0	0	0	0
Bond Proceeds	35,095,000	0	5,230,000	1,415,000	7,505,000
Capital Contributions	0	0	0	0	0
Interest Earnings	1,845	9,434	12,860	10,664	10,929
Total Sources of Funds	$35,546,845	$758,922	$6,656,782	$2,632,722	$8,870,280
Applications of Funds					
Closing Costs	$1,754,750	$0	$261,500	$70,750	$375,250
Capital Improvement Plan					
Regional Water Treatment Plant					
P-1	$16,710,989	$0	$0	$0	$0
P-2	6,303,750	0	0	0	0
P-6	0	0	3,213,597	0	0
P-7	0	0	0	1,093,482	0
P-8	0	0	2,654,627	0	0
P-9	0	0	0	929,140	0
P-12	0	0	0	0	2,636,603
P-13	0	0	0	0	3,814,208
P-14,P-15	0	0	0	0	1,490,643
P-17	0	0	0	0	0
P-16	0	0	0	0	0
P-3	272,322	0	0	0	0
PS-1	157,594	0	0	0	0
PS-2	433,383	0	0	0	0
PS-3	0	0	0	0	0
PS-4	0	0	0	0	0
PS-5	0	0	0	0	0
PS-6	0	0	0	0	0
PS-7	0	0	0	0	0
PS-8	0	0	0	0	0
WTP-1	6,829,063	0	0	0	0
WTP-2	0	0	0	0	0
WTP-3	0	0	0	0	0
WTP-4	0	0	0	0	0
Interest During Construction	2,900,507				
Total Capital Projects	$33,607,607	$0	$5,868,224	$2,022,621	$7,941,454
Total Applications of Funds	$35,362,357	$0	$6,129,724	$2,093,371	$8,316,704
Ending Balance	$184,488	$758,922	$527,058	$539,351	$553,576
Target Ending Fund Balance	$500,000	$512,500	$525,313	$538,445	$551,906

Polk County - Alternative 1
Exhibit H-1
Water Fund
Data Assumptions
(For Fiscal Years Ending)

Escalation Factors	**2011**	**2012**	**2013**	**2014**	**2015**
Expenses					
General Supplies	2.50%	2.50%	2.50%	2.50%	2.50%
Fuel & Chemicals	2.50%	2.50%	2.50%	2.50%	2.50%
Natural Gas	2.50%	2.50%	2.50%	2.50%	2.50%
Electricity	2.50%	2.50%	2.50%	2.50%	2.50%
Stormwater Charge	2.50%	2.50%	2.50%	2.50%	2.50%
Garbage Collection	2.50%	2.50%	2.50%	2.50%	2.50%
Telephone	2.50%	2.50%	2.50%	2.50%	2.50%
Professional & Technical Svcs	2.50%	2.50%	2.50%	2.50%	2.50%
Repairs & Maintenance	2.50%	2.50%	2.50%	2.50%	2.50%
Insurance	2.50%	2.50%	2.50%	2.50%	2.50%
Fees, Dues, & Advertising	2.50%	2.50%	2.50%	2.50%	2.50%
Meeting Expenses	2.50%	2.50%	2.50%	2.50%	2.50%
Interest Rate (Interest Earnings)	2.00%	2.00%	2.00%	2.00%	2.00%
Interest on Debt (Interest Expense)	6.00%	6.00%	6.00%	6.00%	6.00%
Closing Costs on New Debt	5.00%	5.00%	5.00%	5.00%	5.00%
Term (Years) of New Debt	30	30	30	30	30
Debt Service Coverage Requirement	25.00%	25.00%	25.00%	25.00%	25.00%
Inflation	2.50%	2.50%	2.50%	2.50%	2.50%
Water Sales Growth (1)	3.92%	3.92%	3.92%	3.92%	3.92%

(1) Water Sales Growth factor calculated using current and projected (2040) Peak Day Demand figures Polk County.

Polk County - Alternative 1
Exhibit H-2
Water Fund
Revenue Requirements

(For Fiscal Years Ending)	2011	2012	2013	2014	2015
Applications of Funds					
Operating Expenses					
General Supplies	$78,067	$80,019	$82,019	$84,070	$86,172
Fuel & Chemicals	85,037	90,584	96,493	102,787	109,492
Natural Gas	6,858	7,305	7,782	8,289	8,830
Electricity	370,322	394,478	420,210	447,620	476,818
Stormwater Charge	0	0	0	0	0
Garbage Collection	32,811	33,631	34,472	35,334	36,217
Telephone	4,526	4,639	4,755	4,874	4,995
Professional & Technical Svcs	469,534	481,273	493,305	505,637	518,278
Repairs & Maintenance	62,227	63,783	65,378	67,012	68,687
Insurance	57,702	59,144	60,623	62,139	63,692
Fees, Dues, & Advertising	11,314	11,597	11,887	12,184	12,489
Meeting Expenses	1,131	1,160	1,189	1,218	1,249
Total Operating Expenses	$1,179,530	$1,227,613	$1,278,111	$1,331,163	$1,386,918
Debt Service					
Principle	$886,034	$978,597	$1,029,277	$1,082,596	$1,138,693
Interest	2,385,194	2,562,885	2,512,204	2,458,885	2,402,789
Total Debt Service	$3,271,227	$3,541,481	$3,541,481	$3,541,481	$3,541,481
Debt Service Coverage @ 25%	817,807	885,370	885,370	885,370	885,370
Total Debt Service	$4,089,034	$4,426,852	$4,426,852	$4,426,852	$4,426,852
Total Applications of Funds	$5,268,564	$5,654,464	$5,704,962	$5,758,015	$5,813,770
Total Revenue Requirement	$5,268,564	$5,654,464	$5,704,962	$5,758,015	$5,813,770
Projected Sales (CCF)	1,223,377	1,271,393	1,321,293	1,373,151	1,427,045
Unit Cost ($/CCF)	$4.31	$4.45	$4.32	$4.19	$4.07

Polk County - Alternative 1
Exhibit H-3
Water Fund
General Fund

(For Fiscal Years Ending)	**2011**	**2012**	**2013**	**2014**	**2015**
Beginning Balance	$143,506	$149,240	$157,680	$161,240	$169,921
Sources of Funds					
Regional Sales	$5,268,564	$5,654,464	$5,704,962	$5,758,015	$5,813,770
Interest Earnings	2,927	3,069	3,189	3,312	3,436
Total Sources of Funds	$5,414,998	$5,806,774	$5,865,832	$5,922,566	$5,987,128
Applications of Funds					
Transfers Out					
Total Operating Expenses	$1,179,530	$1,227,613	$1,278,111	$1,331,163	$1,386,918
Total Debt Service	3,271,227	3,541,481	3,541,481	3,541,481	3,541,481
Transfer to Construction Fund	815,000	880,000	885,000	880,000	885,000
Total Applications of Funds	$5,265,757	$5,649,094	$5,704,592	$5,752,645	$5,813,400
Ending Balance	$149,240	$157,680	$161,240	$169,921	$173,728
Target Ending Fund Balance	$147,441	$153,452	$159,764	$166,395	$173,365

Polk County - Alternative 1
Exhibit H-4
Water Fund
Construction Fund

(For Fiscal Years Ending)	2011	2012	2013	2014	2015
Beginning Balance	$553,576	$1,387,992	$584,383	$1,490,129	$2,409,121
Sources of Funds					
Transfer from General Fund	$815,000	$880,000	$885,000	$880,000	$885,000
System Development Charges	0	0	0	0	0
Bond Proceeds	0	3,720,000	0	0	0
Capital Contributions	0	0	0	0	0
Interest Earnings	19,416	19,724	20,745	38,992	57,609
Total Sources of Funds	$1,387,992	$6,007,715	$1,490,129	$2,409,121	$3,351,730
Applications of Funds					
Closing Costs	$0	$186,000	$0	$0	$0
Capital Improvement Plan					
Regional Water Treatment Plant					
P-1	$0	$0	$0	$0	$0
P-2	0	0	0	0	0
P-6	0	0	0	0	0
P-7	0	0	0	0	0
P-8	0	0	0	0	0
P-9	0	0	0	0	0
P-12	0	0	0	0	0
P-13	0	0	0	0	0
P-14,P-15	0	0	0	0	0
P-17	0	506,247	0	0	0
P-16	0	2,327,405	0	0	0
P-3	0	0	0	0	0
PS-1	0	0	0	0	0
PS-2	0	0	0	0	0
PS-3	0	182,760	0	0	0
PS-4	0	548,281	0	0	0
PS-5	0	0	0	0	0
PS-6	0	0	0	0	0
PS-7	0	0	0	0	0
PS-8	0	0	0	0	0
WTP-1	0	0	0	0	0
WTP-2	0	1,672,639	0	0	0
WTP-3	0	0	0	0	0
WTP-4	0	0	0	0	0
Interest During Construction					
Total Capital Projects	$0	$5,237,332	$0	$0	$0
Total Applications of Funds	$0	$5,423,332	$0	$0	$0
Ending Balance	$1,387,992	$584,383	$1,490,129	$2,409,121	$3,351,730
Target Ending Fund Balance	$565,704	$579,847	$594,343	$609,201	$624,431

Polk County - Alternative 1
Exhibit H-1
Water Fund
Data Assumptions
(For Fiscal Years Ending)

Escalation Factors	**2016**	**2017**	**2018**	**2019**	**2020**
Expenses					
General Supplies	2.50%	2.50%	2.50%	2.50%	2.50%
Fuel & Chemicals	2.50%	2.50%	2.50%	2.50%	2.50%
Natural Gas	2.50%	2.50%	2.50%	2.50%	2.50%
Electricity	2.50%	2.50%	2.50%	2.50%	2.50%
Stormwater Charge	2.50%	2.50%	2.50%	2.50%	2.50%
Garbage Collection	2.50%	2.50%	2.50%	2.50%	2.50%
Telephone	2.50%	2.50%	2.50%	2.50%	2.50%
Professional & Technical Svcs	2.50%	2.50%	2.50%	2.50%	2.50%
Repairs & Maintenance	2.50%	2.50%	2.50%	2.50%	2.50%
Insurance	2.50%	2.50%	2.50%	2.50%	2.50%
Fees, Dues, & Advertising	2.50%	2.50%	2.50%	2.50%	2.50%
Meeting Expenses	2.50%	2.50%	2.50%	2.50%	2.50%
Interest Rate (Interest Earnings)	2.00%	2.00%	2.00%	2.00%	2.00%
Interest on Debt (Interest Expense)	6.00%	6.00%	6.00%	6.00%	6.00%
Closing Costs on New Debt	5.00%	5.00%	5.00%	5.00%	5.00%
Term (Years) of New Debt	30	30	30	30	30
Debt Service Coverage Requirement	25.00%	25.00%	25.00%	25.00%	25.00%
Inflation	2.50%	2.50%	2.50%	2.50%	2.50%
Water Sales Growth (1)	3.92%	3.92%	3.92%	3.92%	3.92%

(1) Water Sales Growth factor calculated using current and projected (2040) Peak Day Demand figures Polk County.

Polk County - Alternative 1
Exhibit H-2
Water Fund
Revenue Requirements

(For Fiscal Years Ending)	2016	2017	2018	2019	2020
Applications of Funds					
Operating Expenses					
General Supplies	$88,326	$90,534	$92,797	$95,117	$97,495
Fuel & Chemicals	116,634	124,242	132,346	140,979	150,175
Natural Gas	9,406	10,019	10,673	11,369	12,111
Electricity	507,920	541,052	576,344	613,939	653,986
Stormwater Charge	0	0	0	0	0
Garbage Collection	37,122	38,051	39,002	39,977	40,976
Telephone	5,120	5,248	5,380	5,514	5,652
Professional & Technical Svcs	531,235	544,516	558,129	572,082	586,384
Repairs & Maintenance	70,405	72,165	73,969	75,818	77,714
Insurance	65,284	66,916	68,589	70,304	72,062
Fees, Dues, & Advertising	12,801	13,121	13,449	13,785	14,130
Meeting Expenses	1,280	1,312	1,345	1,379	1,413
Total Operating Expenses	$1,445,534	$1,507,176	$1,572,023	$1,640,263	$1,712,097
Debt Service					
Principle	$1,197,712	$1,259,807	$1,325,140	$1,393,880	$1,466,206
Interest	2,343,769	2,281,674	2,216,341	2,147,601	2,075,276
Total Debt Service	$3,541,481	$3,541,481	$3,541,481	$3,541,481	$3,541,481
Debt Service Coverage @ 25%	885,370	885,370	885,370	885,370	885,370
Total Debt Service	$4,426,852	$4,426,852	$4,426,852	$4,426,852	$4,426,852
Total Applications of Funds	$5,872,385	$5,934,028	$5,998,874	$6,067,115	$6,138,949
Total Revenue Requirement	$5,872,385	$5,934,028	$5,998,874	$6,067,115	$6,138,949
Projected Sales (CCF)	1,483,054	1,541,261	1,601,753	1,664,619	1,729,953
Unit Cost ($/CCF)	$3.96	$3.85	$3.75	$3.64	$3.55

Polk County - Alternative 1
Exhibit H-3
Water Fund
General Fund

(For Fiscal Years Ending)	**2016**	**2017**	**2018**	**2019**	**2020**
Beginning Balance	$173,728	$182,663	$191,777	$201,075	$205,509
Sources of Funds					
Regional Sales	$5,872,385	$5,934,028	$5,998,874	$6,067,115	$6,138,949
Interest Earnings	3,564	3,744	3,929	4,066	4,206
Total Sources of Funds	$6,049,678	$6,120,435	$6,194,580	$6,272,256	$6,348,664
Applications of Funds					
Transfers Out					
Total Operating Expenses	$1,445,534	$1,507,176	$1,572,023	$1,640,263	$1,712,097
Total Debt Service	3,541,481	3,541,481	3,541,481	3,541,481	3,541,481
Transfer to Construction Fund	880,000	880,000	880,000	885,000	880,000
Total Applications of Funds	$5,867,015	$5,928,657	$5,993,505	$6,066,746	$6,133,581
Ending Balance	$182,663	$191,777	$201,075	$205,509	$215,083
Target Ending Fund Balance	$180,692	$188,397	$196,503	$205,033	$214,012

Polk County - Alternative 1
Exhibit H-4
Water Fund
Construction Fund

(For Fiscal Years Ending)	**2016**	**2017**	**2018**	**2019**	**2020**
Beginning Balance	$3,351,730	$4,308,330	$5,284,256	$6,279,898	$7,300,704
Sources of Funds					
Transfer from General Fund	$880,000	$880,000	$880,000	$885,000	$880,000
System Development Charges	0	0	0	0	0
Bond Proceeds	0	0	0	0	0
Capital Contributions	0	0	0	0	0
Interest Earnings	76,601	95,926	115,642	135,806	156,378
Total Sources of Funds	$4,308,330	$5,284,256	$6,279,898	$7,300,704	$8,337,081
Applications of Funds					
Closing Costs	$0	$0	$0	$0	$0
Capital Improvement Plan					
Regional Water Treatment Plant					
P-1	$0	$0	$0	$0	$0
P-2	0	0	0	0	0
P-6	0	0	0	0	0
P-7	0	0	0	0	0
P-8	0	0	0	0	0
P-9	0	0	0	0	0
P-12	0	0	0	0	0
P-13	0	0	0	0	0
P-14,P-15	0	0	0	0	0
P-17	0	0	0	0	0
P-16	0	0	0	0	0
P-3	0	0	0	0	0
PS-1	0	0	0	0	0
PS-2	0	0	0	0	0
PS-3	0	0	0	0	0
PS-4	0	0	0	0	0
PS-5	0	0	0	0	0
PS-6	0	0	0	0	0
PS-7	0	0	0	0	0
PS-8	0	0	0	0	0
WTP-1	0	0	0	0	0
WTP-2	0	0	0	0	0
WTP-3	0	0	0	0	0
WTP-4	0	0	0	0	0
Interest During Construction					
Total Capital Projects	$0	$0	$0	$0	$0
Total Applications of Funds	$0	$0	$0	$0	$0
Ending Balance	$4,308,330	$5,284,256	$6,279,898	$7,300,704	$8,337,081
Target Ending Fund Balance	$640,042	$656,043	$672,444	$689,256	$706,487

Polk County - Alternative 1
Exhibit H-1
Water Fund
Data Assumptions
(For Fiscal Years Ending)

Escalation Factors	**2021**	**2022**	**2023**	**2024**	**2025**
Expenses					
General Supplies	2.50%	2.50%	2.50%	2.50%	2.50%
Fuel & Chemicals	2.50%	2.50%	2.50%	2.50%	2.50%
Natural Gas	2.50%	2.50%	2.50%	2.50%	2.50%
Electricity	2.50%	2.50%	2.50%	2.50%	2.50%
Stormwater Charge	2.50%	2.50%	2.50%	2.50%	2.50%
Garbage Collection	2.50%	2.50%	2.50%	2.50%	2.50%
Telephone	2.50%	2.50%	2.50%	2.50%	2.50%
Professional & Technical Svcs	2.50%	2.50%	2.50%	2.50%	2.50%
Repairs & Maintenance	2.50%	2.50%	2.50%	2.50%	2.50%
Insurance	2.50%	2.50%	2.50%	2.50%	2.50%
Fees, Dues, & Advertising	2.50%	2.50%	2.50%	2.50%	2.50%
Meeting Expenses	2.50%	2.50%	2.50%	2.50%	2.50%
Interest Rate (Interest Earnings)	2.00%	2.00%	2.00%	2.00%	2.00%
Interest on Debt (Interest Expense)	6.00%	6.00%	6.00%	6.00%	6.00%
Closing Costs on New Debt	5.00%	5.00%	5.00%	5.00%	5.00%
Term (Years) of New Debt	30	30	30	30	30
Debt Service Coverage Requirement	25.00%	25.00%	25.00%	25.00%	25.00%
Inflation	2.50%	2.50%	2.50%	2.50%	2.50%
Water Sales Growth (1)	3.92%	3.92%	3.92%	3.92%	3.92%

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(1) Water Sales Growth factor calculated using current and projected (2040) Peak Day Demand figures Polk County.

Polk County - Alternative 1
Exhibit H-2
Water Fund
Revenue Requirements

(For Fiscal Years Ending)	2021	2022	2023	2024	2025
Applications of Funds					
Operating Expenses					
General Supplies	$99,933	$102,431	$104,992	$107,616	$110,307
Fuel & Chemicals	159,970	170,405	181,521	193,361	205,974
Natural Gas	12,901	13,742	14,639	15,594	16,611
Electricity	696,645	742,087	790,493	842,057	896,984
Stormwater Charge	0	0	0	0	0
Garbage Collection	42,001	43,051	44,127	45,230	46,361
Telephone	5,793	5,938	6,086	6,239	6,395
Professional & Technical Svcs	601,044	616,070	631,472	647,258	663,440
Repairs & Maintenance	79,656	81,648	83,689	85,781	87,926
Insurance	73,863	75,710	77,603	79,543	81,531
Fees, Dues, & Advertising	14,483	14,845	15,216	15,597	15,987
Meeting Expenses	1,448	1,485	1,522	1,560	1,599
Total Operating Expenses	$1,787,738	$1,867,411	$1,951,358	$2,039,835	$2,133,113
Debt Service					
Principle	$1,542,306	$1,622,378	$1,706,632	$1,795,286	$1,888,573
Interest	1,999,175	1,919,103	1,834,849	1,746,195	1,652,909
Total Debt Service	$3,541,481	$3,541,481	$3,541,481	$3,541,481	$3,541,481
Debt Service Coverage @ 25%	885,370	885,370	885,370	885,370	885,370
Total Debt Service	$4,426,852	$4,426,852	$4,426,852	$4,426,852	$4,426,852
Total Applications of Funds	$6,214,589	$6,294,263	$6,378,210	$6,466,687	$6,559,964
Total Revenue Requirement	$6,214,589	$6,294,263	$6,378,210	$6,466,687	$6,559,964
Projected Sales (CCF)	1,797,851	1,868,413	1,941,745	2,017,956	2,097,157
Unit Cost ($/CCF)	$3.46	$3.37	$3.28	$3.20	$3.13

Polk County - Alternative 1
Exhibit H-3
Water Fund
General Fund

(For Fiscal Years Ending)	2021	2022	2023	2024	2025
Beginning Balance	$215,083	$224,848	$234,810	$244,972	$255,339
Sources of Funds					
Regional Sales	$6,214,589	$6,294,263	$6,378,210	$6,466,687	$6,559,964
Interest Earnings	4,399	4,597	4,798	5,003	5,263
Total Sources of Funds	$6,434,071	$6,523,708	$6,617,818	$6,716,662	$6,820,566
Applications of Funds					
Transfers Out					
Total Operating Expenses	$1,787,738	$1,867,411	$1,951,358	$2,039,835	$2,133,113
Total Debt Service	3,541,481	3,541,481	3,541,481	3,541,481	3,541,481
Transfer to Construction Fund	880,000	880,000	880,000	880,000	875,000
Total Applications of Funds	$6,209,223	$6,288,898	$6,372,846	$6,461,323	$6,549,602
Ending Balance	$224,848	$234,810	$244,972	$255,339	$270,964
Target Ending Fund Balance	$223,467	$233,426	$243,920	$254,979	$266,639

Polk County - Alternative 1
Exhibit H-4
Water Fund
Construction Fund

(For Fiscal Years Ending)	**2021**	**2022**	**2023**	**2024**	**2025**
Beginning Balance	$8,337,081	$9,394,396	$10,473,071	$8,206,178	$9,260,848
Sources of Funds					
Transfer from General Fund	$880,000	$880,000	$880,000	$880,000	$875,000
System Development Charges	0	0	0	0	0
Bond Proceeds	0	0	0	0	0
Capital Contributions	0	0	0	0	0
Interest Earnings	177,315	198,675	186,792	174,670	195,926
Total Sources of Funds	$9,394,396	$10,473,071	$11,539,863	$9,260,848	$10,331,775
Applications of Funds					
Closing Costs	$0	$0	$0	$0	$0
Capital Improvement Plan					
Regional Water Treatment Plant					
P-1	$0	$0	$0	$0	$0
P-2	0	0	0	0	0
P-6	0	0	0	0	0
P-7	0	0	0	0	0
P-8	0	0	0	0	0
P-9	0	0	0	0	0
P-12	0	0	0	0	0
P-13	0	0	0	0	0
P-14,P-15	0	0	0	0	0
P-17	0	0	0	0	0
P-16	0	0	0	0	0
P-3	0	0	0	0	0
PS-1	0	0	0	0	0
PS-2	0	0	0	0	0
PS-3	0	0	0	0	0
PS-4	0	0	0	0	0
PS-5	0	0	239,798	0	0
PS-6	0	0	899,241	0	0
PS-7	0	0	0	0	0
PS-8	0	0	0	0	0
WTP-1	0	0	0	0	0
WTP-2	0	0	0	0	0
WTP-3	0	0	2,194,647	0	0
WTP-4	0	0	0	0	0
Interest During Construction					
Total Capital Projects	$0	$0	$3,333,685	$0	$0
Total Applications of Funds	$0	$0	$3,333,685	$0	$0
Ending Balance	$9,394,396	$10,473,071	$8,206,178	$9,260,848	$10,331,775
Target Ending Fund Balance	$724,149	$742,253	$760,809	$779,829	$799,325

Appendix I

Regional WTP Wholesale Rate Estimate - Exhibits

Polk County - Alternative 2
Exhibit I-1
Water Fund
Data Assumptions
(For Fiscal Years Ending)

Escalation Factors	**2006**	**2007**	**2008**	**2009**	**2010**
Expenses					
General Supplies	Projected	2.50%	2.50%	2.50%	2.50%
Fuel & Chemicals	Projected	2.50%	2.50%	2.50%	2.50%
Natural Gas	Projected	2.50%	2.50%	2.50%	2.50%
Electricity	Projected	2.50%	2.50%	2.50%	2.50%
Stormwater Charge	Projected	2.50%	2.50%	2.50%	2.50%
Garbage Collection	Projected	2.50%	2.50%	2.50%	2.50%
Telephone	Projected	2.50%	2.50%	2.50%	2.50%
Professional & Technical Svcs	Projected	2.50%	2.50%	2.50%	2.50%
Repairs & Maintenance	Projected	2.50%	2.50%	2.50%	2.50%
Insurance	Projected	2.50%	2.50%	2.50%	2.50%
Fees, Dues, & Advertising	Projected	2.50%	2.50%	2.50%	2.50%
Meeting Expenses	Projected	2.50%	2.50%	2.50%	2.50%
Interest Rate (Interest Earnings)	2.00%	2.00%	2.00%	2.00%	2.00%
Interest on Debt (Interest Expense)	5.00%	5.00%	5.00%	6.00%	6.00%
Closing Costs on New Debt	5.00%	5.00%	5.00%	5.00%	5.00%
Term (Years) of New Debt	30	30	30	30	30
Debt Service Coverage Requirement	25.00%	25.00%	25.00%	25.00%	25.00%
Inflation	2.50%	2.50%	2.50%	2.50%	2.50%
Water Sales Growth (1)	3.92%	3.92%	3.92%	3.92%	3.92%

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(1) Water Sales Growth factor calculated using current and projected (2040) Peak Day Demand figures Polk County.

Polk County - Alternative 2
Exhibit I-2
Water Fund
Revenue Requirements

(For Fiscal Years Ending)	2006	2007	2008	2009	2010
Applications of Funds					
Operating Expenses					
General Supplies	$69,000	$70,725	$72,493	$74,305	$76,163
Fuel & Chemicals	62,000	66,044	70,352	74,941	79,830
Natural Gas	5,000	5,326	5,674	6,044	6,438
Electricity	270,000	287,612	306,373	326,357	347,645
Stormwater Charge	0	0	0	0	0
Garbage Collection	29,000	29,725	30,468	31,230	32,011
Telephone	4,000	4,100	4,203	4,308	4,415
Professional & Technical Svcs	415,000	425,375	436,009	446,910	458,082
Repairs & Maintenance	55,000	56,375	57,784	59,229	60,710
Insurance	51,000	52,275	53,582	54,921	56,294
Fees, Dues, & Advertising	10,000	10,250	10,506	10,769	11,038
Meeting Expenses	1,000	1,025	1,051	1,077	1,104
Total Operating Expenses	$971,000	$1,008,832	$1,048,495	$1,090,091	$1,133,730
Debt Service					
Principle	$280,709	$294,745	$396,630	$437,775	$558,032
Interest	932,500	918,465	1,193,227	1,274,496	1,717,994
Total Debt Service	$1,213,209	$1,213,209	$1,589,857	$1,712,270	$2,276,026
Debt Service Coverage @ 25%	303,302	303,302	397,464	428,068	569,007
Total Debt Service	$1,516,512	$1,516,512	$1,987,321	$2,140,338	$2,845,033
Total Applications of Funds	$2,487,512	$2,525,344	$3,035,816	$3,230,429	$3,978,763
Total Revenue Requirement	$2,487,512	$2,525,344	$3,035,816	$3,230,429	$3,978,763
Projected Sales (CCF)	812,653	845,862	880,427	916,405	953,854
Unit Cost ($/CCF)	$3.06	$2.99	$3.45	$3.53	$4.17

Polk County - Alternative 2
Exhibit I-3
Water Fund
General Fund

(For Fiscal Years Ending)	**2006**	**2007**	**2008**	**2009**	**2010**
Beginning Balance	$0	$124,548	$130,400	$135,523	$141,360
Sources of Funds					
Regional Sales	$2,487,512	$2,525,344	$3,035,816	$3,230,429	$3,978,763
Interest Earnings	1,245	2,549	2,659	2,769	2,846
Total Sources of Funds	$2,488,757	$2,652,441	$3,168,875	$3,368,721	$4,122,968
Applications of Funds					
Transfers Out					
Total Operating Expenses	$971,000	$1,008,832	$1,048,495	$1,090,091	$1,133,730
Total Debt Service	1,213,209	1,213,209	1,589,857	1,712,270	2,276,026
Transfer to Construction Fund	180,000	300,000	395,000	425,000	570,000
Total Applications of Funds	$2,364,209	$2,522,042	$3,033,352	$3,227,361	$3,979,756
Ending Balance	$124,548	$130,400	$135,523	$141,360	$143,212
Target Ending Fund Balance	$121,375	$126,104	$131,062	$136,261	$141,716

Polk County - Alternative 2
Exhibit I-4
Water Fund
Construction Fund

(For Fiscal Years Ending)	2006	2007	2008	2009	2010
Beginning Balance	$0	$183,384	$490,119	$527,572	$541,390
Sources of Funds					
Transfer from General Fund	$180,000	$300,000	$395,000	$425,000	$570,000
System Development Charges	0	0	0	0	0
Bond Proceeds	18,650,000	0	5,790,000	1,685,000	7,760,000
Capital Contributions	0	0	0	0	0
Interest Earnings	1,834	6,735	10,177	10,690	10,943
Total Sources of Funds	$18,831,834	$490,119	$6,685,296	$2,648,262	$8,882,333
Applications of Funds					
Closing Costs	$932,500	$0	$289,500	$84,250	$388,000
Capital Improvement Plan					
Regional Water Treatment Plant					
P-4	$2,491,746	$0	$0	$0	$0
P-6	0	0	3,213,597	0	0
P-7	0	0	0	1,093,482	0
P-8	0	0	2,654,627	0	0
P-9	0	0	0	929,140	0
P-12	0	0	0	0	2,636,603
P-13	0	0	0	0	3,814,208
P-14,P-15	0	0	0	0	1,490,643
P-17	0	0	0	0	0
P-16	0	0	0	0	0
P-5	584,383	0	0	0	0
PS-9	78,797	0	0	0	0
PS-10	354,586	0	0	0	0
PS-11	0	0	0	0	0
PS-12	0	0	0	0	0
PS-13	0	0	0	0	0
PS-14	0	0	0	0	0
PS-15	0	0	0	0	0
PS-16	0	0	0	0	0
WTP-5	12,607,500	0	0	0	0
WTP-6	0	0	0	0	0
WTP-7	0	0	0	0	0
WTP-8	0	0	0	0	0
Interest During Construction	1,598,938				
Total Capital Projects	$17,715,950	$0	$5,868,224	$2,022,621	$7,941,454
Renewals & Replacements					
Transmission	$46,142	$46,142	$134,165	$164,505	$283,626
Treatment	252,150	252,150	252,150	252,150	252,150
Total Renewals & Replacements	$298,292	$298,292	$386,315	$416,655	$535,776
Total Applications of Funds	$18,648,450	$0	$6,157,724	$2,106,871	$8,329,454
Ending Balance	$183,384	$490,119	$527,572	$541,390	$552,879
Target Ending Fund Balance	$500,000	$512,500	$525,313	$538,445	$551,906

Polk County - Alternative 2
Exhibit I-1
Water Fund
Data Assumptions
(For Fiscal Years Ending)

Escalation Factors	**2011**	**2012**	**2013**	**2014**	**2015**
Expenses					
General Supplies	2.50%	2.50%	2.50%	2.50%	2.50%
Fuel & Chemicals	2.50%	2.50%	2.50%	2.50%	2.50%
Natural Gas	2.50%	2.50%	2.50%	2.50%	2.50%
Electricity	2.50%	2.50%	2.50%	2.50%	2.50%
Stormwater Charge	2.50%	2.50%	2.50%	2.50%	2.50%
Garbage Collection	2.50%	2.50%	2.50%	2.50%	2.50%
Telephone	2.50%	2.50%	2.50%	2.50%	2.50%
Professional & Technical Svcs	2.50%	2.50%	2.50%	2.50%	2.50%
Repairs & Maintenance	2.50%	2.50%	2.50%	2.50%	2.50%
Insurance	2.50%	2.50%	2.50%	2.50%	2.50%
Fees, Dues, & Advertising	2.50%	2.50%	2.50%	2.50%	2.50%
Meeting Expenses	2.50%	2.50%	2.50%	2.50%	2.50%
Interest Rate (Interest Earnings)	2.00%	2.00%	2.00%	2.00%	2.00%
Interest on Debt (Interest Expense)	6.00%	6.00%	6.00%	6.00%	6.00%
Closing Costs on New Debt	5.00%	5.00%	5.00%	5.00%	5.00%
Term (Years) of New Debt	30	30	30	30	30
Debt Service Coverage Requirement	25.00%	25.00%	25.00%	25.00%	25.00%
Inflation	2.50%	2.50%	2.50%	2.50%	2.50%
Water Sales Growth (1)	3.92%	3.92%	3.92%	3.92%	3.92%

(1) Water Sales Growth factor calculated using current and projected (2040) Peak Day Demand figures Polk County.

Polk County - Alternative 2
Exhibit I-2
Water Fund
Revenue Requirements

(For Fiscal Years Ending)	2011	2012	2013	2014	2015
Applications of Funds					
Operating Expenses					
General Supplies	$78,067	$80,019	$82,019	$84,070	$86,172
Fuel & Chemicals	85,037	90,584	96,493	102,787	109,492
Natural Gas	6,858	7,305	7,782	8,289	8,830
Electricity	370,322	394,478	420,210	447,620	476,818
Stormwater Charge	0	0	0	0	0
Garbage Collection	32,811	33,631	34,472	35,334	36,217
Telephone	4,526	4,639	4,755	4,874	4,995
Professional & Technical Svcs	469,534	481,273	493,305	505,637	518,278
Repairs & Maintenance	62,227	63,783	65,378	67,012	68,687
Insurance	57,702	59,144	60,623	62,139	63,692
Fees, Dues, & Advertising	11,314	11,597	11,887	12,184	12,489
Meeting Expenses	1,131	1,160	1,189	1,218	1,249
Total Operating Expenses	$1,179,530	$1,227,613	$1,278,111	$1,331,163	$1,386,918
Debt Service					
Principle	$587,141	$776,965	$818,762	$862,825	$909,279
Interest	1,688,885	2,413,348	2,371,551	2,327,487	2,281,033
Total Debt Service	$2,276,026	$3,190,313	$3,190,313	$3,190,313	$3,190,313
Debt Service Coverage @ 25%	569,007	797,578	797,578	797,578	797,578
Total Debt Service	$2,845,033	$3,987,891	$3,987,891	$3,987,891	$3,987,891
Total Applications of Funds	$4,024,562	$5,215,504	$5,266,002	$5,319,054	$5,374,809
Total Revenue Requirement	$4,024,562	$5,215,504	$5,266,002	$5,319,054	$5,374,809
Projected Sales (CCF)	992,832	1,033,403	1,075,633	1,119,588	1,165,339
Unit Cost ($/CCF)	$4.05	$5.05	$4.90	$4.75	$4.61

Polk County - Alternative 2
Exhibit I-3
Water Fund
General Fund

(For Fiscal Years Ending)	2011	2012	2013	2014	2015
Beginning Balance	$143,212	$150,152	$155,789	$161,541	$167,409
Sources of Funds					
Regional Sales	$4,024,562	$5,215,504	$5,266,002	$5,319,054	$5,374,809
Interest Earnings	2,934	3,059	3,173	3,289	3,408
Total Sources of Funds	$4,170,708	$5,368,715	$5,424,964	$5,483,884	$5,545,626
Applications of Funds					
Transfers Out					
Total Operating Expenses	$1,179,530	$1,227,613	$1,278,111	$1,331,163	$1,386,918
Total Debt Service	2,276,026	3,190,313	3,190,313	3,190,313	3,190,313
Transfer to Construction Fund	565,000	795,000	795,000	795,000	795,000
Total Applications of Funds	$4,020,556	$5,212,925	$5,263,423	$5,316,476	$5,372,231
Ending Balance	$150,152	$155,789	$161,541	$167,409	$173,395
Target Ending Fund Balance	$147,441	$153,452	$159,764	$166,395	$173,365

Polk County - Alternative 2
Exhibit I-4
Water Fund
Construction Fund

(For Fiscal Years Ending)	2011	2012	2013	2014	2015
Beginning Balance	$552,879	$1,134,755	$580,384	$1,395,139	$2,226,354
Sources of Funds					
Transfer from General Fund	$565,000	$795,000	$795,000	$795,000	$795,000
System Development Charges	0	0	0	0	0
Bond Proceeds	0	12,585,000	0	0	0
Capital Contributions	0	0	0	0	0
Interest Earnings	16,876	17,151	19,755	36,215	53,007
Total Sources of Funds	$1,134,755	$14,531,907	$1,395,139	$2,226,354	$3,074,361
Applications of Funds					
Closing Costs	$0	$629,250	$0	$0	$0
Capital Improvement Plan					
Regional Water Treatment Plant					
P-4	$0	$0	$0	$0	$0
P-6	0	0	0	0	0
P-7	0	0	0	0	0
P-8	0	0	0	0	0
P-9	0	0	0	0	0
P-12	0	0	0	0	0
P-13	0	0	0	0	0
P-14,P-15	0	0	0	0	0
P-17	0	506,247	0	0	0
P-16	0	2,327,405	0	0	0
P-5	0	0	0	0	0
PS-9	0	0	0	0	0
PS-10	0	0	0	0	0
PS-11	0	91,380	0	0	0
PS-12	0	411,211	0	0	0
PS-13	0	0	0	0	0
PS-14	0	0	0	0	0
PS-15	0	0	0	0	0
PS-16	0	0	0	0	0
WTP-5	0	0	0	0	0
WTP-6	0	9,986,030	0	0	0
WTP-7	0	0	0	0	0
WTP-8	0	0	0	0	0
Interest During Construction					
Total Capital Projects	$0	$13,322,273	$0	$0	$0
Renewals & Replacements					
Transmission	$283,626	$326,131	$326,131	$326,131	$326,131
Treatment	252,150	451,871	451,871	451,871	451,871
Total Renewals & Replacements	$535,776	$778,002	$778,002	$778,002	$778,002
Total Applications of Funds	$0	$13,951,523	$0	$0	$0
Ending Balance	$1,134,755	$580,384	$1,395,139	$2,226,354	$3,074,361
Target Ending Fund Balance	$565,704	$579,847	$594,343	$609,201	$624,431

Polk County - Alternative 2
Exhibit I-1
Water Fund
Data Assumptions
(For Fiscal Years Ending)

Escalation Factors	**2016**	**2017**	**2018**	**2019**	**2020**
Expenses					
General Supplies	2.50%	2.50%	2.50%	2.50%	2.50%
Fuel & Chemicals	2.50%	2.50%	2.50%	2.50%	2.50%
Natural Gas	2.50%	2.50%	2.50%	2.50%	2.50%
Electricity	2.50%	2.50%	2.50%	2.50%	2.50%
Stormwater Charge	2.50%	2.50%	2.50%	2.50%	2.50%
Garbage Collection	2.50%	2.50%	2.50%	2.50%	2.50%
Telephone	2.50%	2.50%	2.50%	2.50%	2.50%
Professional & Technical Svcs	2.50%	2.50%	2.50%	2.50%	2.50%
Repairs & Maintenance	2.50%	2.50%	2.50%	2.50%	2.50%
Insurance	2.50%	2.50%	2.50%	2.50%	2.50%
Fees, Dues, & Advertising	2.50%	2.50%	2.50%	2.50%	2.50%
Meeting Expenses	2.50%	2.50%	2.50%	2.50%	2.50%
Interest Rate (Interest Earnings)	2.00%	2.00%	2.00%	2.00%	2.00%
Interest on Debt (Interest Expense)	6.00%	6.00%	6.00%	6.00%	6.00%
Closing Costs on New Debt	5.00%	5.00%	5.00%	5.00%	5.00%
Term (Years) of New Debt	30	30	30	30	30
Debt Service Coverage Requirement	25.00%	25.00%	25.00%	25.00%	25.00%
Inflation	2.50%	2.50%	2.50%	2.50%	2.50%
Water Sales Growth (1)	3.92%	3.92%	3.92%	3.92%	3.92%

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(1) Water Sales Growth factor calculated using current and projected (2040) Peak Day Demand figures Polk County.

Polk County - Alternative 2
Exhibit I-2
Water Fund
Revenue Requirements

(For Fiscal Years Ending)	**2016**	**2017**	**2018**	**2019**	**2020**
Applications of Funds					
Operating Expenses					
General Supplies	$88,326	$90,534	$92,797	$95,117	$97,495
Fuel & Chemicals	116,634	124,242	132,346	140,979	150,175
Natural Gas	9,406	10,019	10,673	11,369	12,111
Electricity	507,920	541,052	576,344	613,939	653,986
Stormwater Charge	0	0	0	0	0
Garbage Collection	37,122	38,051	39,002	39,977	40,976
Telephone	5,120	5,248	5,380	5,514	5,652
Professional & Technical Svcs	531,235	544,516	558,129	572,082	586,384
Repairs & Maintenance	70,405	72,165	73,969	75,818	77,714
Insurance	65,284	66,916	68,589	70,304	72,062
Fees, Dues, & Advertising	12,801	13,121	13,449	13,785	14,130
Meeting Expenses	1,280	1,312	1,345	1,379	1,413
Total Operating Expenses	$1,445,534	$1,507,176	$1,572,023	$1,640,263	$1,712,097
Debt Service					
Principle	$958,255	$1,009,890	$1,064,331	$1,121,730	$1,182,250
Interest	2,232,057	2,180,422	2,125,982	2,068,583	2,008,062
Total Debt Service	$3,190,313	$3,190,313	$3,190,313	$3,190,313	$3,190,313
Debt Service Coverage @ 25%	797,578	797,578	797,578	797,578	797,578
Total Debt Service	$3,987,891	$3,987,891	$3,987,891	$3,987,891	$3,987,891
Total Applications of Funds	$5,433,424	$5,495,067	$5,559,913	$5,628,154	$5,699,988
Total Revenue Requirement	$5,433,424	$5,495,067	$5,559,913	$5,628,154	$5,699,988
Projected Sales (CCF)	1,212,960	1,262,526	1,314,118	1,367,819	1,423,714
Unit Cost ($/CCF)	$4.48	$4.35	$4.23	$4.11	$4.00

Polk County - Alternative 2
Exhibit I-3
Water Fund
General Fund

(For Fiscal Years Ending)	2016	2017	2018	2019	2020
Beginning Balance	$173,395	$184,552	$190,885	$197,344	$208,984
Sources of Funds					
Regional Sales	$5,433,424	$5,495,067	$5,559,913	$5,628,154	$5,699,988
Interest Earnings	3,579	3,754	3,882	4,063	4,248
Total Sources of Funds	$5,610,399	$5,683,373	$5,754,681	$5,829,561	$5,913,219
Applications of Funds					
Transfers Out					
Total Operating Expenses	$1,445,534	$1,507,176	$1,572,023	$1,640,263	$1,712,097
Total Debt Service	3,190,313	3,190,313	3,190,313	3,190,313	3,190,313
Transfer to Construction Fund	790,000	795,000	795,000	790,000	795,000
Total Applications of Funds	$5,425,846	$5,492,488	$5,557,336	$5,620,578	$5,697,412
Ending Balance	$184,552	$190,885	$197,344	$208,984	$215,807
Target Ending Fund Balance	$180,692	$188,397	$196,503	$205,033	$214,012

Polk County - Alternative 2
Exhibit I-4
Water Fund
Construction Fund

(For Fiscal Years Ending)	**2016**	**2017**	**2018**	**2019**	**2020**
Beginning Balance	$3,074,361	$3,934,449	$4,816,963	$5,717,306	$6,630,787
Sources of Funds					
Transfer from General Fund	$790,000	$795,000	$795,000	$790,000	$795,000
System Development Charges	0	0	0	0	0
Bond Proceeds	0	0	0	0	0
Capital Contributions	0	0	0	0	0
Interest Earnings	70,088	87,514	105,343	123,481	141,986
Total Sources of Funds	$3,934,449	$4,816,963	$5,717,306	$6,630,787	$7,567,773
Applications of Funds					
Closing Costs	$0	$0	$0	$0	$0
Capital Improvement Plan					
Regional Water Treatment Plant					
P-4	$0	$0	$0	$0	$0
P-6	0	0	0	0	0
P-7	0	0	0	0	0
P-8	0	0	0	0	0
P-9	0	0	0	0	0
P-12	0	0	0	0	0
P-13	0	0	0	0	0
P-14,P-15	0	0	0	0	0
P-17	0	0	0	0	0
P-16	0	0	0	0	0
P-5	0	0	0	0	0
PS-9	0	0	0	0	0
PS-10	0	0	0	0	0
PS-11	0	0	0	0	0
PS-12	0	0	0	0	0
PS-13	0	0	0	0	0
PS-14	0	0	0	0	0
PS-15	0	0	0	0	0
PS-16	0	0	0	0	0
WTP-5	0	0	0	0	0
WTP-6	0	0	0	0	0
WTP-7	0	0	0	0	0
WTP-8	0	0	0	0	0
Interest During Construction					
Total Capital Projects	$0	$0	$0	$0	$0
Renewals & Replacements					
Transmission	$326,131	$326,131	$326,131	$326,131	$326,131
Treatment	451,871	451,871	451,871	451,871	451,871
Total Renewals & Replacements	$778,002	$778,002	$778,002	$778,002	$778,002
Total Applications of Funds	$0	$0	$0	$0	$0
Ending Balance	$3,934,449	$4,816,963	$5,717,306	$6,630,787	$7,567,773
Target Ending Fund Balance	$640,042	$656,043	$672,444	$689,256	$706,487

Polk County - Alternative 2
Exhibit I-1
Water Fund
Data Assumptions
(For Fiscal Years Ending)

Escalation Factors	**2021**	**2022**	**2023**	**2024**	**2025**
Expenses					
General Supplies	2.50%	2.50%	2.50%	2.50%	2.50%
Fuel & Chemicals	2.50%	2.50%	2.50%	2.50%	2.50%
Natural Gas	2.50%	2.50%	2.50%	2.50%	2.50%
Electricity	2.50%	2.50%	2.50%	2.50%	2.50%
Stormwater Charge	2.50%	2.50%	2.50%	2.50%	2.50%
Garbage Collection	2.50%	2.50%	2.50%	2.50%	2.50%
Telephone	2.50%	2.50%	2.50%	2.50%	2.50%
Professional & Technical Svcs	2.50%	2.50%	2.50%	2.50%	2.50%
Repairs & Maintenance	2.50%	2.50%	2.50%	2.50%	2.50%
Insurance	2.50%	2.50%	2.50%	2.50%	2.50%
Fees, Dues, & Advertising	2.50%	2.50%	2.50%	2.50%	2.50%
Meeting Expenses	2.50%	2.50%	2.50%	2.50%	2.50%
Interest Rate (Interest Earnings)	2.00%	2.00%	2.00%	2.00%	2.00%
Interest on Debt (Interest Expense)	6.00%	6.00%	6.00%	6.00%	6.00%
Closing Costs on New Debt	5.00%	5.00%	5.00%	5.00%	5.00%
Term (Years) of New Debt	30	30	30	30	30
Debt Service Coverage Requirement	25.00%	25.00%	25.00%	25.00%	25.00%
Inflation	2.50%	2.50%	2.50%	2.50%	2.50%
Water Sales Growth (1)	3.92%	3.92%	3.92%	3.92%	3.92%

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(1) Water Sales Growth factor calculated using current and projected (2040) Peak Day Demand figures Polk County.

Polk County - Alternative 2
Exhibit I-2
Water Fund
Revenue Requirements

(For Fiscal Years Ending)	2021	2022	2023	2024	2025
Applications of Funds					
Operating Expenses					
General Supplies	$99,933	$102,431	$104,992	$107,616	$110,307
Fuel & Chemicals	159,970	170,405	181,521	193,361	205,974
Natural Gas	12,901	13,742	14,639	15,594	16,611
Electricity	696,645	742,087	790,493	842,057	896,984
Stormwater Charge	0	0	0	0	0
Garbage Collection	42,001	43,051	44,127	45,230	46,361
Telephone	5,793	5,938	6,086	6,239	6,395
Professional & Technical Svcs	601,044	616,070	631,472	647,258	663,440
Repairs & Maintenance	79,656	81,648	83,689	85,781	87,926
Insurance	73,863	75,710	77,603	79,543	81,531
Fees, Dues, & Advertising	14,483	14,845	15,216	15,597	15,987
Meeting Expenses	1,448	1,485	1,522	1,560	1,599
Total Operating Expenses	$1,787,738	$1,867,411	$1,951,358	$2,039,835	$2,133,113
Debt Service					
Principle	$1,246,062	$1,313,347	$1,397,892	$1,473,520	$1,553,274
Interest	1,944,250	1,876,966	1,870,518	1,794,890	1,715,137
Total Debt Service	$3,190,313	$3,190,313	$3,268,410	$3,268,410	$3,268,410
Debt Service Coverage @ 25%	797,578	797,578	817,103	817,103	817,103
Total Debt Service	$3,987,891	$3,987,891	$4,085,513	$4,085,513	$4,085,513
Total Applications of Funds	$5,775,628	$5,855,302	$6,036,871	$6,125,348	$6,218,625
Total Revenue Requirement	$5,775,628	$5,855,302	$6,036,871	$6,125,348	$6,218,625
Projected Sales (CCF)	1,481,893	1,542,449	1,605,480	1,671,087	1,739,375
Unit Cost (\$/CCF)	$3.90	$3.80	$3.76	$3.67	$3.58

Polk County - Alternative 2
Exhibit I-3
Water Fund
General Fund

(For Fiscal Years Ending)	2021	2022	2023	2024	2025
Beginning Balance	$215,807	$227,817	$235,019	$246,935	$259,091
Sources of Funds					
Regional Sales	$5,775,628	$5,855,302	$6,036,871	$6,125,348	$6,218,625
Interest Earnings	4,436	4,628	4,820	5,060	5,306
Total Sources of Funds	$5,995,871	$6,087,747	$6,276,709	$6,377,343	$6,483,022
Applications of Funds					
Transfers Out					
Total Operating Expenses	$1,787,738	$1,867,411	$1,951,358	$2,039,835	$2,133,113
Total Debt Service	3,190,313	3,190,313	3,268,410	3,268,410	3,268,410
Transfer to Construction Fund	790,000	795,000	810,000	810,000	810,000
Total Applications of Funds	$5,768,054	$5,852,729	$6,029,775	$6,118,252	$6,211,531
Ending Balance	$227,817	$235,019	$246,935	$259,091	$271,491
Target Ending Fund Balance	$223,467	$233,426	$243,920	$254,979	$266,639

Polk County - Alternative 2
Exhibit I-4
Water Fund
Construction Fund

(For Fiscal Years Ending)	**2021**	**2022**	**2023**	**2024**	**2025**
Beginning Balance	$7,567,773	$8,518,637	$9,493,761	$761,368	$1,594,931
Sources of Funds					
Transfer from General Fund	$790,000	$795,000	$810,000	$810,000	$810,000
System Development Charges	0	0	0	0	0
Bond Proceeds	0	0	1,075,000	0	0
Capital Contributions	0	0	0	0	0
Interest Earnings	160,864	180,124	102,551	23,563	40,403
Total Sources of Funds	$8,518,637	$9,493,761	$11,481,312	$1,594,931	$2,445,334
Applications of Funds					
Closing Costs	$0	$0	$53,750	$0	$0
Capital Improvement Plan					
Regional Water Treatment Plant					
P-4	$0	$0	$0	$0	$0
P-6	0	0	0	0	0
P-7	0	0	0	0	0
P-8	0	0	0	0	0
P-9	0	0	0	0	0
P-12	0	0	0	0	0
P-13	0	0	0	0	0
P-14,P-15	0	0	0	0	0
P-17	0	0	0	0	0
P-16	0	0	0	0	0
P-5	0	0	0	0	0
PS-9	0	0	0	0	0
PS-10	0	0	0	0	0
PS-11	0	0	0	0	0
PS-12	0	0	0	0	0
PS-13	0	0	239,798	0	0
PS-14	0	0	599,494	0	0
PS-15	0	0	0	0	0
PS-16	0	0	0	0	0
WTP-5	0	0	0	0	0
WTP-6	0	0	0	0	0
WTP-7	0	0	9,826,903	0	0
WTP-8	0	0	0	0	0
Interest During Construction					
Total Capital Projects	$0	$0	$10,666,194	$0	$0
Renewals & Replacements					
Transmission	$326,131	$326,131	$326,131	$326,131	$326,131
Treatment	451,871	451,871	648,409	648,409	648,409
Total Renewals & Replacements	$778,002	$778,002	$974,540	$974,540	$974,540
Total Applications of Funds	$0	$0	$10,719,944	$0	$0
Ending Balance	$8,518,637	$9,493,761	$761,368	$1,594,931	$2,445,334
Target Ending Fund Balance	$724,149	$742,253	$760,809	$779,829	$799,325

Appendix J

Local Transmission Wholesale Rate Summary

Exhibit J-1
Polk County
Phased Capital Plan & Pre-Design
Annual Unit Cost Calculations by Provider - Local Transmission ($/CCF)
(For Fiscal Years Ending)

	2008	2009	2010	2011	2012	2013
Revenue Requirements (1)						
Buell Red Prairie	$95,544	$95,544	$245,383	$245,383	$245,383	$245,383
Dallas	406,571	406,571	406,571	406,571	406,571	406,571
Rickreall	95,544	95,544	95,544	95,544	95,544	95,544
Grand Ronde	105,709	105,709	350,899	350,899	480,305	480,305
Perrydale	162,629	162,629	162,629	162,629	162,629	162,629
Rock Creek	243,943	243,943	243,943	243,943	337,932	337,932
Willamina	178,485	178,485	178,485	178,485	227,069	227,069
Projected Sales (CCF) (2)						
Buell Red Prairie	7,001	7,050	7,099	7,149	7,199	7,249
Dallas	70,267	79,051	87,834	96,618	105,401	114,184
Rickreall	15,350	15,458	15,566	15,675	15,785	15,895
Grand Ronde	172,421	172,991	173,561	174,131	174,701	175,271
Perrydale	15,259	15,995	16,767	17,576	18,424	19,313
Rock Creek	28,786	29,364	29,942	30,519	31,097	31,675
Willamina	58,497	59,665	60,857	62,072	63,311	64,576
Unit Costs ($/CCF)						
Buell Red Prairie	$13.65	$13.55	$34.57	$34.33	$34.09	$33.85
Dallas	5.79	5.14	4.63	4.21	3.86	3.56
Rickreall	6.22	6.18	6.14	6.10	6.05	6.01
Grand Ronde	0.61	0.61	2.02	2.02	2.75	2.74
Perrydale	10.66	10.17	9.70	9.25	8.83	8.42
Rock Creek	8.47	8.31	8.15	7.99	10.87	10.67
Willamina	3.05	2.99	2.93	2.88	3.59	3.52

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(1) Total Revenue Requirements consist of Debt Service and Debt Service Coverage only. EES did not include operations and maintenance expenses or renewals and replacements in the individual revenue requirements analyses because the projects consist of new transmission facilities only.

(2) Projected incremental sales from regional supply.