EXECUTIVE SUMMARY

Yamhill County is taking a long-term, strategic approach to meet the increasing demands for water as a result of significant growth occurring in the county. To that end, the County Board of Commissioners formed a Water Task Force comprised of representatives from the ten cities in the county to study the water supply issues and the need to secure more reliable supply for municipal use. The mission statement of the Water Task Force is as follows:

Mission Statement: *The mission of the Yamhill County Water Task Force is to work as a facilitating group to ensure adequate future water supply for its communities*[1].

Possible strategies to accomplish the mission include but are not limited to:

- Raise awareness of the need for and support acquisition of additional water source(s) and treatment for the Yamhill-Chehalem basin.
- Support the development of a county wide transmission system throughout the basin.
- Ensure a locally driven and environmentally sound process.
- Foster cooperation among members on current and future water needs.
- Engage the state and federal governments in the process of reaching our goals.
- Identify funding mechanisms for short, intermediate and long-term aspirations.

This report documents Phase 1 of a water supply study to identify water supply alternatives to meet these needs. The recommended strategy and supply alternatives from this phase will be advanced in Phase 2 of the study, where more detailed technical feasibility and an implementation plan will be developed.

Objectives

The objective of this study is to provide an analysis of future municipal water supply needs in Yamhill County and to develop recommended supply alternatives and strategy to meet those needs to a 2050 planning horizon. Elements of this study include:

- Estimate the County's future needs for water (municipal)
- Identify the most viable long-term drinking water source(s)
- Evaluate supply alternatives and recommend a strategy for further development
- Discuss potential administrative options required for financing, governing and operation

The Water Task Force (and Technical Advisory Committee) provided input on data sources, feedback on the approach used, and reviewed the findings and recommendations developed by the consultant on the project.

Water Needs Analysis

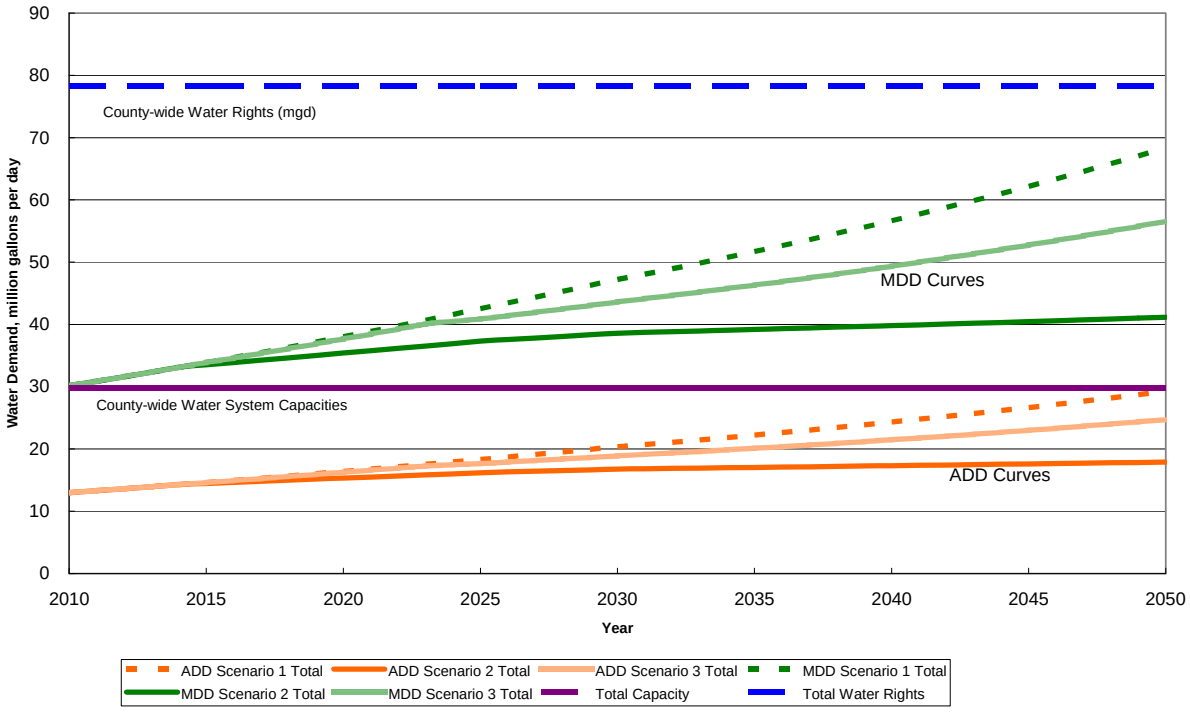
The first step in the water needs analysis is to develop a water demand forecast. The demand forecast is based on the most recent planning data provided by the participating water providers through their water master plans and other planning studies. The demand forecast is based on population estimates and per capita water use for each city to forecast average day and maximum day demands. To account for the uncertainty in demand forecasting, three different scenarios are considered that account for different assumptions in how build-out is addressed by the cities. The three growth scenarios considered include:

[1] *Note: It is not the intent of the Yamhill County Water Task Force to set up regional government for the basin or constitute a give-a-way program for or from any member. The intent is to facilitate efforts to determine how to best accomplish "synergy" - benefit from the strength of us all working to support each other to mutual benefit*

- *Scenario 1 - No build-out constraints:* assumes growth rates derived from the census data and water master plans continue unimpeded through the entire planning period, unless information from master plans indicate explicitly that build-out is achieved within the planning period (i.e. for the cases of Dundee, Lafayette, Sheridan and Yamhill).
- *Scenario 2 - UGB expansion not allowed:* assumes the UGB is not expanded within the planning period. Generally assumes that UGB constraints reduce the growth rates to *half* of the rate derived from the census data between 2015 and 2025, and further by half between 2025 and 2050 for communities without explicit build-out information from the master plans. This applies to Amity, Carlton, Dayton, McMinnville, Newberg and Willamina.
- *Scenario 3 - UGB expansion allowed:* generally assumes that UGB constraints reduce the growth rates to half of the rate derived from the census data between 2015 and 2025. By 2025 it is assumed that a UGB expansion occurs and that growth rates continue at the pre-2015 growth rates derived from the census data and master plans. This applies to Amity, Carlton, Dayton, McMinnville, Newberg and Willamina.

The demand forecast is then used to assess whether there are deficiencies in existing water rights and reliable source capacity to meet the projected demands. Maximum day demand (MDD) is used as the basis for the comparison. The following are key findings in the water needs analysis. **Figure ES-1** illustrates the comparison of water demand to available water rights and reliable source capacity for all of the water providers combined. Details on the deficiencies for individual water providers are presented in **Section 4** of this report.

Figure ES-1. Comparison of Projected Water Demands to Reliable Source Capacity and Water Rights



Water Rights

Figure ES-2 (4-1) (next page) summarizes water rights surplus and deficits based on the maximum day demands for each provider. Most of the providers currently have enough water rights to meet their projected maximum day demands through the planning period (2050). The exceptions are Dayton, Lafayette, McMinnville Water and Light (MWL), and Yamhill:

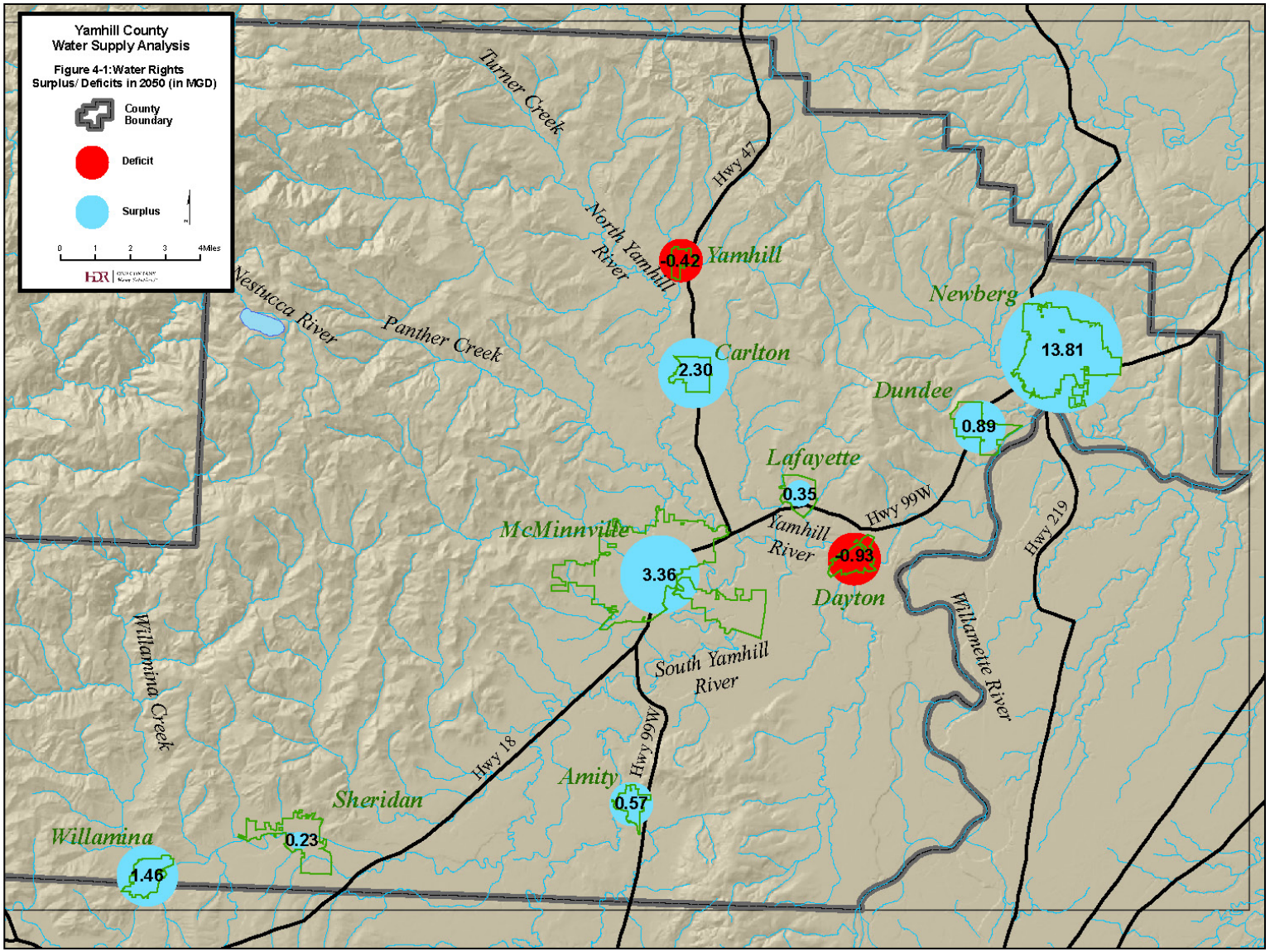
- MWL only has water rights deficiencies under Scenario 1, which is the most aggressive growth projection for these communities. Projections for MWL indicate a deficit in 2031, which grows to over 12 mgd in 2050 under Scenario 1 (no build-out constraints) conditions. The need for MWL to pursue additional water rights depends significantly on how much growth is allowed within their service area and whether MWL pursues a regional role in providing water.
- Lafayette only has water rights deficiencies under Scenario 1, which is the most aggressive growth projection for these communities. The deficit at 2050 is relatively small at 0.07 mgd.
- Dayton has water rights deficiencies under the two more aggressive growth scenarios (Scenario 1 – no build-out constraints and Scenario 3 – UGB expansion allowed). Under Scenario 1, Dayton is projected to exceed its current water rights in 2035, growing to a deficit of ~1.5 mgd in 2050. Under Scenario 3 (UGB expansion allowed), Dayton's demands are projected to exceed available rights in 2040 and growing to a deficit of almost 1.0 mgd in 2050.
- Dayton and Lafayette have the potential to share water rights (as they currently do with one of their groundwater rights). However, by ~2040 under Scenario 1 and ~2047 under Scenario 3 the total demands between the two would exceed their combined water rights. At that point, the two water providers would have to consider adding new water rights or accessing water from other providers or sources.
- Yamhill is projected to exceed its current water rights in 2021, growing to a deficit of ~0.5 mgd in 2050 under Scenario 1. Under Scenario 3, Yamhill's demands are projected to exceed available rights in 2026, growing to a deficit of 0.42 mgd in 2050. Carlton, the closest provider to Yamhill, has surplus water rights adequate to offset the deficits of Yamhill under all of the scenarios considered. However, water availability limitations may preclude further developing those water rights.

Reliable Source Capacity

The amount of water actually available in terms of reliable, high quality water is typically less than the permitted water rights due to factors including natural limits of the source, raw water quality, installed infrastructure and interference from multiple points of withdrawal. The reliable source capacity was defined based on interviews with operational staff or through reviews of documented capacities in planning or engineering reports. These were then compared to the forecasted demands.

Figure ES-3 (4-2) (next page) summarizes reliable source capacity surplus and deficits based on the maximum day demands. Reliable source capacity is projected to present more of a problem than water rights to meeting long-term maximum day demands. Treatment capacity or source production capacity is already a limiting factor for meeting MDD in the near-term (2010) for most providers.

- Treatment plant limitations will prevent Amity, Newberg, McMinnville, Sheridan and Yamhill to meet maximum day demands without upgrades or expansion.
- Dayton, Dundee, Lafayette, and Willamina are limited by their source production or diversion capacity.
- Surplus water rights for some of the water providers indicates that there are opportunities for infrastructure improvements and expansions to reduce or eliminate the source capacity deficiencies identified; however in many instances, water availability limitations preclude developing these water rights further.


Yamhill County
Water Supply Analysis
Figure 4-1:Water Rights
Surplus/ Deficits in 2050 (in MGD)
County Boundary
Deficit
Surplus
0 1 2 3 4Miles
Turner Creek
North Yamhill River
Hwy 47
Yamhill
-0.42
Newberg
13.81
Nestucca River
Panther Creek
Carlton
2.30
Dundee
0.89
Lafayette
0.35
Hwy 99W
McMinnville
3.36
Yamhill River
-0.93
Dayton
Hwy 219
Willamina Creek
South Yamhill River
Willamette River
Hwy 18
Hwy 99W
Amity
0.57
Sheridan
0.23
Willamina
1.46

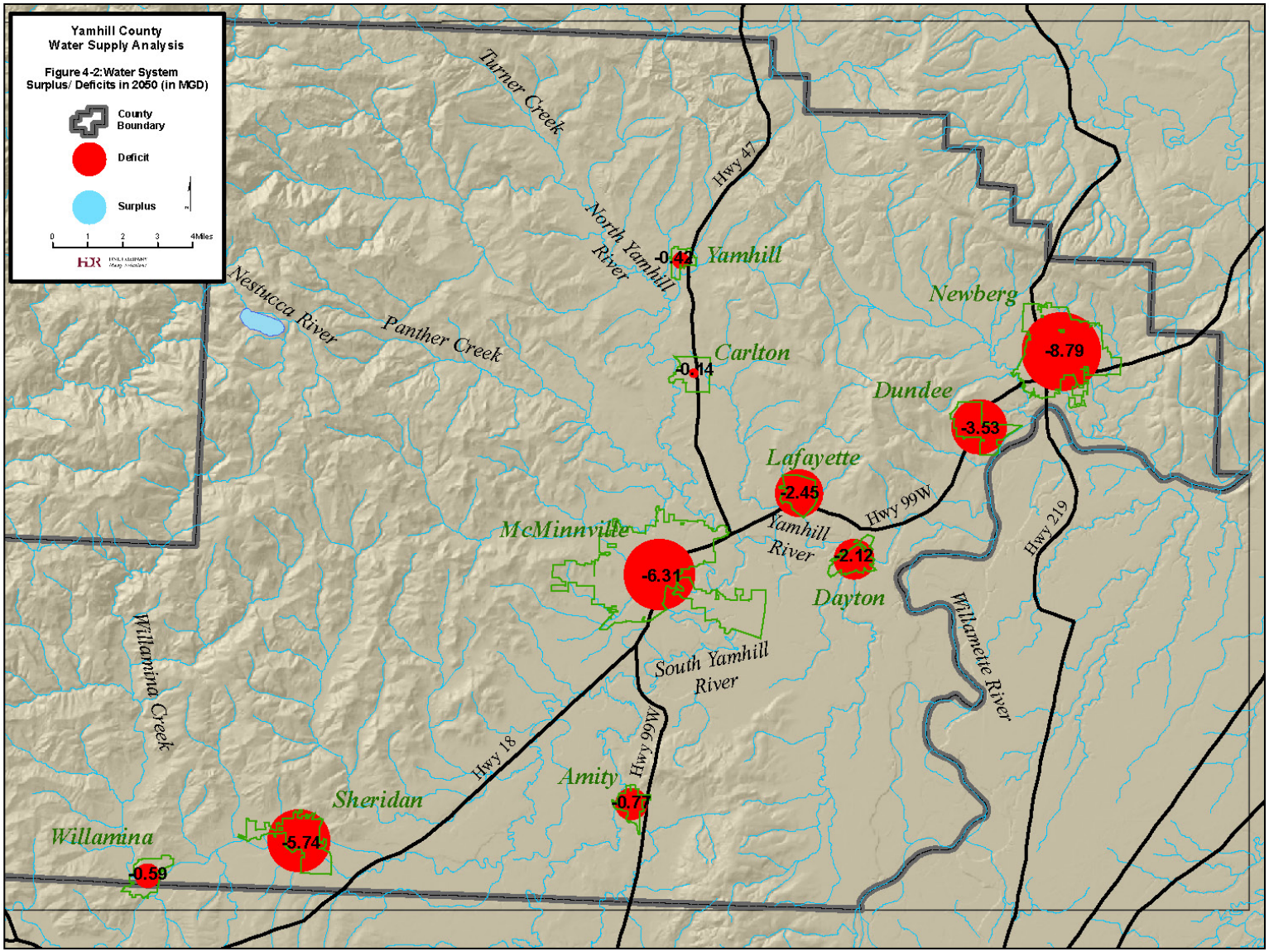

Yamhill County
Water Supply Analysis
Figure 4-2:Water System
Surplus/ Deficits in 2050 (in MGD)
County Boundary
Deficit
Surplus
0 1 2 3 4Miles
Turner Creek
North Yamhill River
Hwy 47
Yamhill
-0.42
Nestucca River
Panther Creek
Carlton
-0.14
Newberg
-8.79
Dundee
-3.53
Lafayette
-2.45
Hwy 99W
Yamhill River
McMinnville
-6.31
-2.12
Dayton
Hwy 219
Willamette River
Willamina Creek
South Yamhill River
Hwy 18
Hwy 99W
Amity
-0.77
Sheridan
-5.74
Willamina
-0.59

Table ES-1 summarizes the source of supply needs for each water provider.

Table ES-1. Summary of Surplus/Deficiencies to Meet Projected Demands					
Water Provider	Current Developable Water Rights	2050 Water Rights Surplus (mgd)	2050 Source Production Surplus (mgd)	Likelihood of expanding water rights (new application)	Year when Maximum Day Demand Exceeds Available Water Rights or Reliable Capacity
Amity	SW – 0.085 mgd GW – 0.19 mgd	0.57	-0.77 (treatment limited)	▪ Not likely able to develop significant production from S. Yamhill River	▪ No water rights deficit
Carlton	SW – None GW – None	2.30	-0.14 (treatment limited)	▪ Not likely able to develop *additional significant production* from Panther Creek.	▪ No water rights deficit
Dayton	SW – 0.16 mgd GW – 1.03 mgd	-0.93 (deficit)	-2.12 (source capacity limited)	▪ Not likely able to develop *significant new* ground water production from existing wells.	▪ Water rights deficit beyond 2030 ▪ GW pumping capacity deficit by 2010
Dundee	SW – 3.1 mgd GW – 1.32 mgd	0.89	-3.53 (source capacity limited)	▪ Not likely able to develop *significant new* ground water production.	▪ No water rights deficit ▪ GW pumping capacity deficit by 2010
Lafayette	SW – 0.91 mgd GW – 1.89 mgd	0.35	-2.45 (source capacity limited)	▪ Not likely able to develop *significant new* ground water production from existing wells.	▪ No water rights deficit ▪ GW pumping capacity deficit by 2010
McMinnville	SW – 2.13 mgd GW – NA	3.36	-6.31 (treatment limited)	▪ McGuire Res. recently expanded ▪ Unlikely to expand reservoirs again within the planning period.	▪ WR deficit beyond 2030 (for instream rights); however, storage rights can address peak demands; ▪ WTP capacity deficit by 2010
Newberg	SW – 16.7 mgd GW – 5.33 mgd	13.81	-8.79 (treatment limited)	▪ Ground water yield expected to provide adequate production in the near term (for most recent new wells). ▪ Not likely able to develop *significant new* ground water production from existing wells. ▪ Springs production has been on the decline and is not expected to be a reliable future source.	▪ No water rights deficit ▪ GW pumping capacity deficit by 2010 ▪ WTP capacity deficit by 2030
Sheridan	SW – 5.1 mgd GW – 0.32 mgd	0.23	-5.74 (treatment limited)	▪ Not likely able to develop significant production from Willamina Creek and other tributaries, except in conjunction with storage.	▪ No water rights deficit ▪ SW/GW pumping capacity deficit by 2010 ▪ WTP capacity deficit by 2010

Table ES-1. Summary of Surplus/Deficiencies to Meet Projected Demands					
Water Provider	Current Developable Water Rights	2050 Water Rights Surplus (mgd)	2050 Source Production Surplus (mgd)	Likelihood of expanding water rights (new application)	Year when Maximum Day Demand Exceeds Available Water Rights or Reliable Capacity
Willamina	SW – 2.05 mgd GW – NA	1.46	-0.59 (source capacity limited)	▪ Not likely able to develop significant production from Willamina Creek	▪ No water rights deficit ▪ SW pumping capacity deficit by 2010; ▪ WTP capacity deficit by 2025
Yamhill	SW – None GW – NA	-0.42	-0.42 (source capacity limited)	▪ Not likely able to develop significant production from Turner Creek, except in conjunction with storage.	▪ Water rights deficit by 2020 ▪ SW pumping capacity deficit beyond 2020 ▪ WTP capacity beyond 2030

Source Options and Supply Alternatives

Source options considered include those that could be developed by the individual water providers ("local options"), as well as those that are regional in nature ("regional options"). The approach used in this assessment is to consider which water supply deficits can be addressed through management of existing supplies (conservation, reuse, water rights transfers and interties) and where new sources are needed because of the scale of the deficit. While water conservation, reuse, and water transfers can offset or delay the need to develop new sources, in many cases new sources of supply are needed.

Local Source Options

Local source options available for each water provider were identified under the following six categories:

- *Surface water source* – includes increasing diversion rate (capacity) from existing points of diversion under existing water rights or developing a new water right under the same source (stream/spring). These options only consider streams/springs that are currently used as sources of supply. It is assumed that available flows from other tributaries not already being used as a source are too low to be a practical municipal source of supply.
- *Ground water source* – includes construction of additional wells under existing water rights or developing a new water right within the same aquifer source. In general, it is assumed that only those water providers that are currently using ground water as a municipal source would pursue additional ground water supply. In general, ground water levels have been declining in some areas and there appears to be an aquifer yield limitation that could limit addition of significantly more production from wells, especially in other areas within the ground water limited areas in the County.
- *Storage/reservoir* – includes on-stream and off-stream storage options for those water providers who already have a storage right or have noted plans for storage or conducted feasibility studies. Analysis to identify other storage sites was not included in this scope.
- *Water conservation* – water conservation is considered an option for each of the water providers. Specific activities have not been identified, except to note those providers who have indicated that water management and conservation plans are being developed. The rate of water savings is not estimated, but it is generally assumed that water conservation alone will not fully address source deficiencies. The effect of conservation would be to delay the need for developing new supply.
- *Water Reuse* – reuse is considered an option available for each of the water providers but specific opportunities have not been identified. It is generally assumed at this point that, like conservation, water reuse alone will not fully address source deficiencies.

- *Intertie* – identifies opportunities to connect water systems among one or more providers to share sources of supply. Interties in this case refers to sharing existing sources, and are distinguished from "transmission" associated with transporting regional water from diverse sources regionally.

Table 5-3 in **Section 5** of this report includes a summary of the local options available to each water provider under these categories.

Regional Source Options

Regional source options include sources that have the potential to provide significant quantities of water to meet the projected demands. With the exception of the Willamette River, the streams and tributaries in Yamhill County generally do not have year-round water availability. The other streams and tributaries do have stream flows available during the winter season, which can be diverted for storage and used during peak demand periods. Ground water availability in the basin is generally limited, and as a result large production wells applicable for use in a regional setting is not considered viable. Ground water wells for local development may continue to be developed (including the Dayton-Lafayette and Newberg wellfields). Based on these constraints, the main regional options available to Yamhill County include use of the Willamette River and developing storage reservoirs (in-stream or off-stream). Seven "regional" source options were identified and reviewed for this study (refer to **Figure ES-4 [5-1]** for general locations of the regional source options):

- Option 1 – Individual Sources: existing and expanded sources developed and managed by each individual provider, including smaller local sources such as ground water well development and aquifer storage and recovery (no regional action)
- Option 2 – McGuire Reservoir as regional source
- Option 3 – McGuire Reservoir + Walker Reservoir
- Option 4 – Willamette River natural flow
- Option 5 – U.S. Corps of Engineers Stored Water (diverted from Willamette River)
- Option 6 – Upper Willamina Creek Reservoir
- Option 7 – Gorge (Mill Creek) Reservoir

A set of evaluation criteria was approved by the Technical Advisory Committee to compare the source options. The series of publicly-tested evaluation criteria adopted for this study include: water availability, environmental impacts, raw water quality, vulnerability to catastrophic events, ease of implementation, treatment requirements, and capital and operating costs. Several general conclusions can be made for the source options with respect to the evaluation criteria.

- *Option 2 – McGuire Reservoir:* water availability is considered unfavorable *in relative terms* since no new source of water would be developed for the region if this source option were the only one pursued. Vulnerability to catastrophic events is considered unfavorable for the McGuire Reservoir because the development of the other source options would provide some other primary regional source as a redundancy.
- *Option 3 – McGuire Reservoir + Walker Reservoir:* provides favorable water availability, but the obvious obstacle of building the reservoir on the Wild and Scenic-designated Walker Creek presents high environmental impacts and a difficult implementation process.
- *Option 3 – McGuire Reservoir + Walker Reservoir; Option 6 – Upper Willamina Creek Reservoir; and Option 7- Gorge Reservoir:* provides high quality water, but receives unfavorable marks for environmental impacts, cost and ease of implementation criteria.

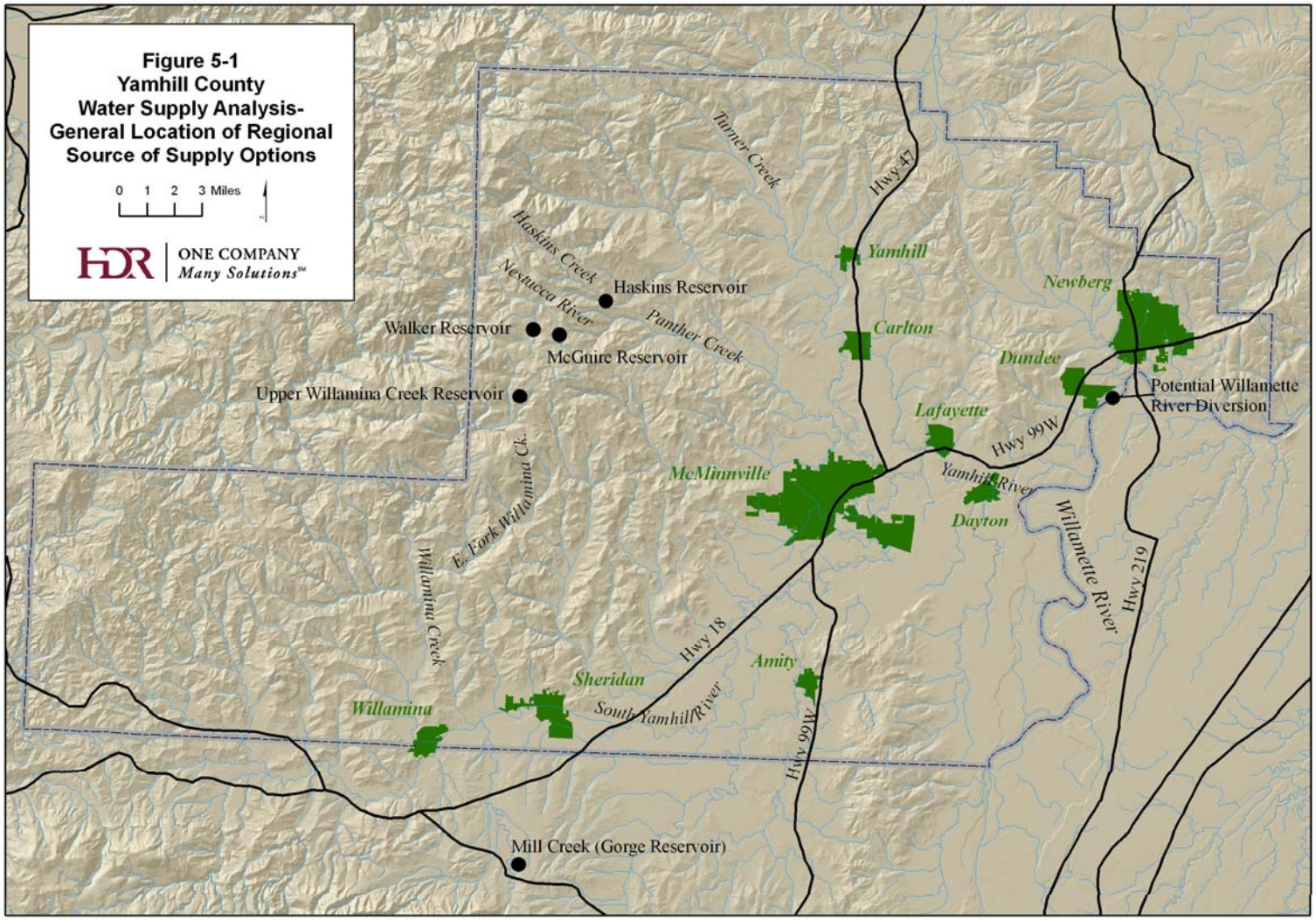


Figure 5-1
Yamhill County
Water Supply Analysis-
General Location of Regional
Source of Supply Options
0 1 2 3 Miles
HDR | ONE COMPANY Many Solutions
Turner Creek
Hwy 47
Haskins Creek
Nestucca River
Haskins Reservoir
Walker Reservoir
McGuire Reservoir
Panther Creek
Upper Willamina Creek Reservoir
Yamhill
Newberg
Carlton
Dundee
Potential Willamette River Diversion
Lafayette
Hwy 99W
McMinnville
Yamhill River
Dayton
E. Fork Willamina Ck.
Willamina Creek
Willamette River
Hwy 219
Hwy 18
Amity
Sheridan
South Yamhill River
Willamina
Hwy 99W
Mill Creek (Gorge Reservoir)

•

- *Option 4 – Willamette River natural flow and Option 5 – U.S. Corps of Engineers Stored Water:* presents problems in regards to water quality. The Willamette River has a TMDL for temperature, among other parameters, which may inhibit securing additional water rights. Public perception of the Willamette River as a supply source is generally negative, although more recent developments such as the Wilsonville water treatment plant and Tualatin Valley Water District's interest in the Willamette River improves the perception. If water rights to the Willamette River can be secured, the public will need to be reassured of its quality through an extensive treatment process, which could add to the overall cost for these options.
- *Option 5 – U.S. Corps of Engineers Stored Water:* Uncontracted water available from the COE reservoirs upstream on the Willamette River would provide good water availability, but negotiations with COE, OWRD, ODFW and other agencies for municipal purposes could be a long process. The cost for the water is highly uncertain, but could be very restrictive also. The uncontracted water purchased could be priced as if a new storage facility holding the same volume of water would be constructed. The same negative public perception of using the Willamette River's water would still need to be overcome.
- *Option 3 and Option 7:* compare similarly because they are both instream storage projects. Environmental impacts, ease of implementation and cost are rated unfavorably, but are not distinguished at this level of assessment.

Evaluation of Supply Alternatives

Based on the local and regional options, water supply alternatives were developed. The water supply alternatives take into consideration transmission requirements and the "geographic distribution" of water supply deficiencies. As part of the evaluation of supply alternatives, several sub-regions were defined based on geographic proximity of the communities. The supply needs for each sub-region was then defined using the combined demand projections of the communities. The sub-regions were defined as follows:

- City of McMinnville (MWL service area)
- Dayton-Lafayette
- Dundee-Newberg
- Yamhill-Carlton
- Sheridan-Willamina-Amity

Using the source options identified, several supply alternatives were developed based on meeting the demands of the region as a whole or in the sub-regions defined above. Four "categories" of source alternatives were developed:

- McMinnville Water and Light Reservoir Alternatives (MWL): Source alternatives associated with the MWL reservoirs including McGuire Reservoir and the potential for constructing Walker Reservoir.
    - MWL-1 – Use of McGuire and Walker Reservoirs to serve the entire region.
    - MWL-2 – Use of McGuire Reservoir to serve McMinnville, Yamhill-Carlton.
    - MWL-3 – Use of McGuire Reservoir to serve McMinnville, Yamhill-Carlton, and Dayton-Lafayette.
- Willamette River Alternatives (WIL): source alternatives associated with using a combination of Willamette River natural flows and stored water from existing COE reservoirs. The COE reservoir water is used to the extent that the permitted natural flows would not be able to meet the demands.
    - WIL-1 – Use of Willamette River natural flows and COE stored water to serve the entire region
    - WIL-2 – Use of Willamette River natural flows and COE stored water to serve Dundee-Newberg.

  - WIL-3 – Use of Willamette River natural flows and COE stored water to serve Dundee-Newberg and Dayton-Lafayette.

- Upper Willamina Creek Reservoir Alternatives (UWC): source alternatives associate with constructing the Upper Willamina Creek Reservoir as documented in the feasibility study.
  - UWC-1 – Use of Upper Willamina Creek Reservoir to serve the entire region.
  - UWC-2 – Use of Upper Willamina Creek Reservoir to serve Sheridan-Willamina-Amity.
- Gorge (Mill Creek) Reservoir Alternatives (GRC): source alternatives associate with constructing the Gorge Creek Reservoir as documented in the feasibility study.
  - GRC-1 – Use of Gorge Reservoir to serve the entire region.
  - GRC-2 – Use of Gorge Reservoir to serve Sheridan-Willamina-Amity.

The same evaluation criteria used for the individual source options were applied to the supply alternatives. Furthermore, another criteria was added to assess how each alternative is able to "address regional needs." **Table 6-4** in **Section 6** of this report presents a summary of the qualitative ratings given to each alternative. General conclusions from the evaluation screening include:

- Generally, the alternatives that serve the entire region (MWL-1, UWC-1 and GRC-1) rate lower than the sub-regional alternatives primarily because of the cost and ease of implementation factors. The regional alternatives were rated lower than the other alternatives for these two factors because of the challenges of having to build new reservoirs as well as the significant amount of transmission needed.
- Although the smaller sub-regional alternatives (MWL-2, WIL-2. UWC-2 and GRC-2) had more favorable ratings for most of the criteria, they are not able to completely address the entire needs of the region individually. If these sub-regional alternatives are developed individually in order to meet the total demands of the region, the combined impacts to the environment and the total costs could ultimately be the same as if one of the larger regional alternatives were developed.
- The WIL-3 alternative where the Willamette River diversion and treatment plant would be used to serve Dundee, Newberg, Dayton, and Lafayette has the advantage of addressesing the needs of four of the major service areas in the region. If the WIL-3 alternative is pursued, a smaller storage reservoir for Upper Willamina Creek Reservoir or Gorge Reservoir could be developed. In addition, the Yamhill-Carlton area would also need to consider developing some intertie over the long-term to meet their needs.
- As noted previously, the Upper Willamina Creek Reservoir and Gorge Reservoir compare similarly as source options. The advantage of Gorge Reservoir is the ability to use S. Yamhill River to transmit water centrally to the other demand areas (McMinnville). If the service areas are limited to Sheridan, Willamina and Amity, the Gorge Reservoir does not appear to have a distinct advantage over Willamina Creek. A more detailed feasibility study is needed to compare the environmental and other feasibility issues to identify a preferred alternative between the two.
- Although the regional source options can meet the long-term (2050) demands projected for Yamhill County, significant implementation and cost constraints make their development challenging. The smaller, sub-regional source alternatives appear to provide more favorable opportunities to meet the needs of the area. However, over the long-term additional (local) sources for other sub-regions not addressed by the smaller project(s) would need to be developed.
- The cost and reliability of the Willamette River option is directly dependent on how much uncontracted stored water can be released and the price per acre-foot that can be negotiated.

Table ES-2 summarizes the preliminary planning level cost estimates for the supply alternatives in terms of total capital costs, annualized cost, and capital cost per volume of water supply provided. The cost components (including source development, treatment, transmission, and mitigation/permitting) are summarized in **Tables 6-5 and 6-6** with details for each alternative provided in **Appendix E**.

It should be noted that operation and maintenance costs can add on the order of 10 to 15 percent more to the annualized unit costs shown in the table. Furthermore, one important consideration for the Willamette River options (WIL-1 , WIL-2 and WIL-3) are the annual purchase costs for the stored water from the Corps of Engineers reservoirs. For the purposes of this study, pricing for waters in the Willamette Basin is assumed to be on the order of $1,800 ac-ft or higher. If the annual costs of purchasing Willamette River water is included the average annual unit cost almost doubles for the Willamette River options.

Table ES-2. Summary of Planning Level Cost Estimates for Supply Alternatives (in $million)			
Supply Alternative	Total Capital Cost (in $million)	Annual Cost(1) per Acre-Feet	Annual Cost(1) per CCF
MWL Reservoir Alternatives			
WL-1 Regional	$230.7	$1,344	$3.09
MWL-2 McMinnville-Yamhill-Carlton	$123.0	$1,144	$2.63
MWL-3 McMinnville-Yamhill-Carlton-Dayton-Lafayette	$137.1	$1,095	$2.51
Willamette River Alternatives			
WIL-1 Regional	$349.5	$2,035(2)	$4.67(2)
WIL-2 Dundee-Newberg	$67.4	$1,827(2)	$4.19(2)
WIL-3 Dundee- Newberg-Dayton-Lafayette	$123.7	$2,029(2)	$4.66(2)
Upper Willamina Creek Reservoir Alternatives			
UWC-1 Regional	$264.0	$1,538	$3.53
UWC-2 Sheridan-Willamina-Amity	$44.8	$1,330	$3.05
Gorge Reservoir (Mill Creek) Alternatives			
GRC-1 Regional	$214.5	$1,249	$2.87
GRC-2 Sheridan-Willamina-Amity	$40.1	$1,192	$2.73

(1) Annual unit costs assumes 40-year life and 5.5% interest; costs are presented in 2007 dollars.

(2) Annual unit costs increase by 80-100% if assumed costs for stored water from the Corps of Engineers reservoirs are included. This cost was not explicitly shown because of the high level of uncertainty in cost per acre-foot of stored water from these reservoirs. This assumes pricing for waters in the Willamette Basin is assumed to be on the order of $1,800 ac-ft

(3) Operation and maintenance costs can add on the order of 10 to 15 percent more to the annualized unit costs shown.

Recommended Supply Strategy

The recommended supply strategy includes elements of both local and regional source of supply development. It is prudent to continue to implement smaller, local source options to address immediate source of supply needs while pursuing the long-term security of a larger, more reliable source, which takes considerable time and funding to develop.

Each of the regional supply alternatives evaluated has significant uncertainties. None of the alternatives has a clear advantage over the others. The storage alternatives provide positive benefits for reliability, but pose significant environmental impacts. The Willamette River alternatives, while also providing positive benefits for reliability, could require significant cost for the uncontracted stored water to meet the streamflow and supply needs. The regional use of MacGuire Reservoir limits the environmental impacts, but does not provide the same level of long-term reliability of supply because of McMinnville's own long-term needs to meet their growth.

Underlying these factors is the significant costs associated with developing a single, large regional source of supply and the network of transmission lines. The cost of building Upper Willamina Creek Reservoir or Gorge Reservoir to a size capable of serving the entire region could be cost-prohibitive. Cost advantages could exist over the Willamette River alternatives, if MacGuire Reservoir is used as a regional source in conjunction with Walker Reservoir or smaller design for Upper Willamina Creek Reservoir or Gorge Reservoir.

For the Willamette River source, the timeline for gaining access to the uncontracted water is highly uncertain, but in the end the feasibility of using the Willamette River as a source comes down to what the price of stored water is determined to be, and how much natural streamflow will be made available. In addition, it could also be cost prohibitive to rely solely on the Willamette River as the source for the region because of the potential enhanced treatment needed.

Based on these issues, the following recommendations are made regarding regional supply development:

- Develop the Upper Willamina Creek Reservoir or Gorge Reservoir to serve the Sheridan-Willamina-Amity sub-region. Developing a smaller project may be more feasible at this time and can be utilized by the sub-region furthest from the other communities. This also limits the extent of the environmental impact and is less cost-prohibitive to develop.
- Develop short-term leasing options with MWL to meet immediate or short-term needs where possible. A short-term leasing agreement will buy time while the larger regional alternatives are pursued. Carlton, Yamhill, Dayton and Lafayette would continue to develop their local sources and use the MWL supply for peaking or emergency purposes in the short-term, while a long-term regional supply is further considered.
    - As part of the leasing option, interties need to be constructed between McMinnville-Carlton-Yamhill and McMinnville-Dayton-Lafayette to increase supply reliability. These interties can also serve as the longer-term transmission infrastructure for a future regional source.
    - Interties and leasing options could be extended to Dundee and Newberg, as well.
- Develop the Willamette River to a smaller degree to serve primarily the Dundee-Newberg and perhaps the Dayton-Lafayette area. Depending on the feasibility of ASR, the Willamette River might also be used for this purpose to maximize use of the natural streamflow available. Over the longer-term the Willamette River source can be expanded as needed once the initial infrastructure and governing issues are developed and functional.
- Continue the development and management of local sources, including the appropriate levels of water conservation, as these sub-regional alternatives are advanced.

The overall water supply strategy is presented in terms of their near-term, mid-term, and long-term implementation as follows:

- *Near-term (less than 5 years)* – relatively easy to implement and relatively low cost; planning effort or action that would be implemented by the provider in any case, such as improving efficiency/production of existing infrastructure or implementing water conservation.
- *Mid-term (within 5-15 years)* – may require more extensive planning/studies or where new water rights applications are needed; or those projects that have gone through studies but require significant funding or time to construct.
- *Long-term (beyond 15 years)* – more complex options that are larger/regional-scale projects to meet the demands further in the future.

Using this time-scale, each community was examined for the local and regional source options available. **Table ES-3** summarizes the timeline of the strategy conceptually for each water provider. In all cases, it is recommended that each community should continue to pursue its local source options and implement the appropriate water conservation program to maximize use of existing supplies. While the strategy is not based on the least cost option (based on the planning level capital costs), it provides a tiered supply development process that in the end provides source redundancy and prevents catastrophic vulnerability.

Table ES-3. Summary of Recommended Water Supply Strategy for Yamhill County											
Time Frame	Supply Strategy	Amity	Carlton	Dayton	Dundee	Lafayette	McMinnville	Newberg	Sheridan	Willamina	Yamhill
Within 5 yrs.	Continue local source development/ rehabilitation (including ASR feasibility)	●	●	●		●	●	●	●	●	●
	Develop/ enhance water conservation program (to extent practicable)	●	●	●	●	●	●	●	●	●	●
	Plan and design interties/transmission with MWL		●	●		●	●				●
	Develop short-term leasing option with MWL (use of MacGuire Reservoir)		●	●	●	●	●	●			●
	Complete feasibility study for Willamette River diversion and WTP				●			●			
	Complete Feasibility Study for Upper Willamina Cr./ Gorge Reservoir	●							●	●	
5-15 yrs.	Construct interties/transmission with MWL (use of MacGuire Reservoir)		●	●		●	●				●
	Planning and design for Willamette River diversion and WTP(1)		○	○	●	○	○	●			●
	Planning and design for Upper Willamina Cr./Gorge Reservoir	●							●	●	
Beyond 15 yrs.	Construct Willamette River diversion and WTP(1)		○	○	●	○	○	●			●
	Construct Upper Willamina Cr./Gorge Reservoir	●							●	●	

Notes:
(1) Dundee and Newberg recommended to implement the Willamette River supply option; other water providers may participate in the regional use of the Willamette River source as their short-term leases with MWL end.
● – City/provider recommended to implement the supply strategy component
○ – Besides Dundee and Newberg this is optional for city/provider to implement the supply strategy component at this time – see Note (1)
ASR – aquifer storage and recovery
MWL – McMinnville Water and Light
WTP – water treatment plant; possible location is near Dundee

General costs to complete the proposed studies and strategy components are shown in **Table ES-4** below. The range of costs shown should be considered "ball park" figures and is dependent on the specific supply alternatives pursued. Furthermore, detailed costs to implement this strategy for each entity/provider are not developed for this Phase 1 study because additional work on administrative and governance options would be needed to determine cost-sharing options.

Table ES-4. Planning Level Costs Range for Water Supply Strategy Components		
Time Frame	Supply Strategy	Approximate Cost Range
<5 yrs.	Continue local source development/ rehabilitation (including ASR feasibility)	Specific to Entity(1)
	Develop/ enhance water conservation program	Specific to Entity(1)
	Plan and design interties/transmission with MWL	$1M - $3M(2)
	Develop short-term leasing option with MWL (use of MacGuire Reservoir)	$50K-$150K
	Complete feasibility study for Willamette River diversion and WTP	$1.5M - $3M(3)
	Complete Feasibility Study for Upper Willamina Cr./ Gorge Reservoir	$1M - $2M(3)
5-15 yrs.	Construct interties/transmission with MWL (use of MacGuire Reservoir)	$11 - $27M(4)
	Planning and design for Willamette River diversion and WTP(1)	$1.5M - $15M(2)
	Planning and design for Upper Willamina Cr./Gorge Reservoir and WTP	$2M - $13M(2)
> 15 yrs.	Construct Willamette River diversion and WTP(1)	$40M - $200M(4)
	Construct Upper Willamina Cr./Gorge Reservoir	$10M - $90M(4)

Notes:
Costs are presented in 2007 dollars
M – million; K - thousand

(1) Costs for local source development and water conservation programs were developed for this study. The costs are dependent on specific projects defined by each provider.
(2) Engineering and design based on 10% of capital costs estimates from this study.
(3) Feasibility study and Environmental Impact Study based on recent experience with preparing FS/EIS documents.
(4) Construction costs based on capital cost estimates from this study.

Administrative Options

An analysis of the organizational/business model is needed to determine how the source alternative (the regional/sub-regional component) will be financed, constructed and operated. A general overview of administrative options was prepared for this study to set the stage for the county and the Water Task Force to consider implementation issues in Phase 2 of the study. The type of business model includes the following components: ownership options and rights, rate setting, financing options and organization options. Driving the issues with ownership options are: (i) decisions with regards to whether a regional entity would serve all demands or be limited to new demands and existing/future deficiencies; and (ii) whether the individual partners would share in ownership or the regional entity would be the sole owner of any regionally based infrastructure. The issue of financing and rates are dependent on each other. With 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. Organization options are limited to five different governmental organizations as defined by Oregon statutes, each with their associated pros and cons. The five organization options include:

- Water Authority (ORS 450)
- Water District (ORS 264)
- County Service District (ORS 451)
- People's Utility District (ORS 261)
- Intergovernmental Agency (ORS 190)

The detailed discussion of these issues is presented in **Section 8** of this report.

Next Steps

The recommended supply strategy presented in this Phase 1 report will be further evaluated in a feasibility-level evaluation in Phase 2 of the study. As note above, Phase 2 will focus on refining the details of the strategy including additional technical feasibility level evaluation of transmission options and refinement of cost estimates, and development of an implementation plan with refined schedule. A key piece of the implementation plan will be to develop specific administrative and governance options, which involves agreeing to realistic options for leasing agreements, cost-sharing, and administration of supply and transmission infrastructure. Yamhill County already faces water supply deficiencies, as the findings of this study demonstrate. It is important for the county and stakeholders to move forward with Phase 2 of this study and begin project-specific feasibility and environmental impact studies as soon as possible. This process and the actual design phase take considerable time to complete before the project construction can actually begin.