REGIONAL WATER PROVIDERS CONSORTIUM

REGIONAL TRANSMISSION AND STORAGE STRATEGY

FINAL REPORT

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EXECUTIVE SUMMARY

The Regional Water Provider's Consortium (Consortium) is seeking to develop a Regional Transmission and Storage Strategy (RTSS). This Strategy is an outgrowth of the regional cooperation that began with the development of the Regional Water Supply Plan (RWSP) and continues with the work of the Consortium. The purpose of this Strategy is to develop short and long-term visions for regional transmission and storage, and to identify the institutional arrangements that can facilitate these visions.

The Consortium determined at the outset of this process that the Strategy should identify ways that future planning could complement and integrate water supply improvements that are already happening in the region. The RTSS should also provide the information that water suppliers need in order to make informed decisions about future transmission and storage projects.

The Strategy was developed in coordination with the Consortium Technical Subcommittee (CTSC), and the Consortium Technical Committee (CTC). These groups provided regular input and direction for the development of this project. In addition, review, comment, and direction on work elements was received from the Consortium Board. Public and stakeholder input was received in two open houses held over the course of the project.

Montgomery Watson was selected to prepare the Regional Transmission and Storage Strategy by the Regional Water Providers Consortium in response to a request for proposals. A contract authorizing this work was signed and dated June 14, 1999. Major subconsultants for this work were Murray, Smith & Associates (MSA), Financial Solutions Consulting Group (FSCG), and Gary Fiske and Associates (GFA). A number of other consultants with experience in local regional planning acted as advisors and reviewers of work products on the project.

PROJECTED WATER DEMANDS

One of the most critical variables in determining the requirements for water infrastructure development are the water demands that must be satisfied. The Portland region as a whole developed a regional forecast of future water demands when it developed the Regional Water Supply Plan (RWSP) in 1996. Subsequent to the RWSP, a number of water systems continued to modify and develop their own water demand forecasts. Some of these forecasts were prepared as part of developing Water Master Plans to fulfill the requirements of the Oregon Health Division for water system planning. Other forecasts were developed to better represent the ongoing changes in water consumption and the impacts of conservation that have been observed since the RWSP forecast was prepared.

For this project, water demand information was provided by the member agencies of the Consortium. Because the demand numbers were obtained from a variety of different sources, they are not consistent with respect to the assumptions that are inherent in the forecast from each water provider, and comparisons in forecasts between water systems should be made carefully

The current water demands for peak day and average day consumption, as well as projected demands to the years 2020 and 2050, are shown in Table 2-1 (found in chapter 2). The source of the demand information for each water provider is also indicated in Table 2-1. Table 2-1 shows a total projected year 2020 peak day demand for the region of about 550 MGD. This rises to 660 MGD by the year 2050. The total projected regional average day demand in the year 2020 is about 260 MGD. This rises to about 315 MGD by the year 2050.

EXISTING SUPPLY, TRANSMISSION AND STORAGE FOR THE REGION

The metropolitan region is currently supplied, or will soon be supplied, by six major sources of water. Major sources are defined as those with a capacity of 10 mgd or greater. These major sources are:

- Portland's Bull Run supply
- Portland's Columbia South Shore Well Field
- The Joint Water Commission (JWC) Water Treatment Plant utilizing the Trask/Tualatin system
- The Clackamas River utilized by four water suppliers
- The Willamette River supply currently under design and construction
- Local groundwater.

Water in Portland's Bull Run watershed is stored in two main reservoirs with a total storage capacity of about 17 billion gallons. The Bull Run supply is then conveyed by gravity via three transmission pipelines (Conduits 2, 3 and 4) from the Headworks to a 50 MG reservoir on Powell Butte. Transmission capacity of the three conduits ranges from 205 to 210 mgd depending on hydraulic conditions. Portland's Columbia South Shore Well Field is located near the Columbia River between the Portland airport and Blue Lake Park. The firm emergency capacity of the Well Field is considered to be approximately 90 mgd. In addition to the transmission systems associated with these sources, the Portland system includes a major transmission pipeline from Powell Butte to eastern Washington County.

The Joint Water Commission treats water withdrawn from the Tualatin River (including stored releases from Barney Reservoir and Hagg Lake) at a Water Treatment Plant in Forest Grove, and pumps it to the 20 MG Fernhill Reservoir.

Clackamas River Water (30 mgd), the South Fork Water Board (20 mgd), the City of Lake Oswego (16 mgd) and North Clackamas County Water Commission (8.5 mgd) each have separate intakes and water treatment plants on the lower Clackamas River. Each facility has its own pumping, treatment, storage and transmission systems for delivery to its customers.

The Willamette River is currently being developed as a new source by the City of Wilsonville and the Tualatin Valley Water District. Other communities in southwest Washington County may also participate in the project. Anticipated initial capacity of the new water treatment plant is 10-15 mgd to serve Wilsonville, with an intake capacity of from 70 to 120 mgd. The initial project is scheduled to be completed in April 2002.

Several water purveyors currently rely on groundwater as their primary source of supply. Some of these are the cities of Milwaukie, Wood Village, Fairview, Wilsonville and Sherwood and the Damascus Water District. Many other providers also rely on local groundwater for emergency backup or to meet peaking needs.

The RWSP identified that most of these existing regional sources of supply have the potential of being expanded in the future should the need arise.

Supply from the Bull Run could be expanded through construction of small raises of existing dams or through construction of Bull Run Dam No. 3. A new supply conduit (Conduit 5) could be built to accompany Dam No. 3, or as a replacement and addition to the existing three Bull Run conduits. The Portland Water Bureau also completed a Master Plan for the Powell Butte site that would allow the construction of up to three new 50 MG reservoirs at the same elevation as the existing Powell Butte Reservoir (530 feet) and a 20 MG reservoir at an elevation of 600 feet. Expansion of the reliable capacity of the Columbia South Shore wellfield could be accomplished through drilling additional wells and/or aquifer storage and recovery using the Bull Run source. Expansion up to 120 mgd is being investigated.

The water treatment plant for the JWC Trask/Tualatin system is designed to be expanded to a 120 mgd peak day capacity and the planned future phases of the second transmission pipeline from that source are sized to carry that capacity. The RWSP identified the Cooper Mountain area as a location for a future large (50 MG) storage reservoir at approximately the same elevation as the 530 feet Powell Butte reservoirs.

All four water suppliers using the Clackamas River as a source have the potential for expanding their water treatment, storage and transmission systems. The RWSP showed potential expansions of up to approximately 140 mgd from this source. Applications for additional water rights to expand the withdrawals from the Clackamas River further are currently in process. The RWSP also discussed a large storage reservoir (50 MG) along Forsythe Road on the south side of the Clackamas River.
The existing water rights of Wilsonville and the Tualatin Valley Water District on the Willamette River would support an ultimate 120 mgd capacity from this source. To utilize this water, transmission capacity would have to be built to the north, to the proposed

Cooper Mountain Reservoir, to the City of Tigard's 10 MG reservoir, or to other reservoir locations within the area served by the source.

In the RWSP, the region was considered to essentially contain three main nodes – East, West and South. For purposes of this analysis, these primary demand nodes roughly correspond to Multnomah, Washington and Clackamas counties. The combined year 2050 peak day demands for these three nodes utilizing the demand numbers from Table 2-1 are shown in Table ES-2. Also shown in Table ES-2 are the major sources in those nodes and a rough approximation of their current or anticipated development capacities.

As indicated in Table ES-2, each node is in approximate balance between demand and sources within the node to the year 2050, assuming that these sources are developed and utilized as planned over time. Currently, about half of the demand in the West node is served not by sources within that node, but by the Portland system.

Table ES-2
Peak Day Demands by Node

NODE	YEAR 2050 PEAK DAY DEMAND (MGD)	MAJOR SOURCES LOCATED IN ZONE	SOURCE PEAK DAY CAPACITIES (MGD)
EAST: Portland and Eastside	227	Bull Run CoSS GW	210 92
WEST: Washington Co.	253	Tualatin/Trask Willamette	120 120
SOUTH: Clackamas Co.	184	Clackamas	139

Every water provider should have the capability of obtaining an emergency source of water in case its primary source is unavailable for any reason. The capacity of this emergency source should meet average annual demand. This would provide water for typical domestic, commercial and industrial use even during the emergency. Other levels of emergency supply (such as minimum winter demands, seasonal demands, or some fraction of average annual demand) are possible and should be evaluated on a project-specific basis if desired.

Most water providers in the region currently have access to some emergency backup supply, with some exceptions. Most of these exceptions would be eliminated if the Willamette River Water Treatment Plant and an interconnection between water treatment plants in the Clackamas Basin were completed.

Use of some of these emergency sources is based upon interties between water systems. The main existing interties that are currently active between water systems in the region that are not used routinely as water supply connections are:

- CRW – PWB: 4 mgd
- Milwaukie – PWB: 2 mgd (not active)
- Milwaukie – CRW: 2 mgd
- Milwaukie - Oak Lodge WD: 2 mgd (not active)
- Lake Oswego – PWB: 1mgd
- Lake Oswego – West Linn (SFWB) –5 mgd
- Beaverton- PWB: 2 – 4 mgd
- Beaverton – TVWD – 4 mgd
- Beaverton – Tigard – 1-2 mgd
- Tigard – Lake Oswego: 4- 8 mgd
- Tigard – TVWD: 2 mgd

Although most providers in the region have access to some emergency source of water, there are limitations on these emergency connections. In some cases, (such as for those providers on the Portland system), the capacity of the emergency source may not meet current annual average demands. For others, such as the suppliers in the Clackamas Basin, the emergency supply is simply another supplier using the Clackamas River. Thus, if the Clackamas River is lost as a source for any reason, emergency supplies would not be available. ASR systems being developed in Portland, Washington County and Clackamas County will improve provide additional emergency supplies, and provide a resource similar to local groundwater.

Table ES-3
Annual Average Demands (Emergency Demands) by Node

NODE	**CURRENT AVERAGE ANNUAL (EMERGENCY) DEMAND (MGD)**	**CURRENT EMERGENCY SOURCE FOR NODE**	**CURRENT EMERGENCY SOURCE CAPACITY (MGD)**
EAST: Portland and Eastside	95	CoSS GW	92
WEST: Washington Co.	60	Local GW and Surface Water	15
SOUTH: Clackamas Co.	33	Local GW and Surface Water	10

An approach to strengthening emergency connections in the region would be to require that every water provider have access to both a primary source of supply that is one of the six major regional sources, and to a secondary source of supply that is another of the six major regional sources of supply. Table ES-3 summarizes how the region currently looks from this perspective on the general nodal basis. Table ES-3 shows that the emergency demand for the East Node is slightly greater than the existing capacity of the Columbia South Shore wellfield and both the West Node and South Node should consider improved emergency connections.

EVALUATION CRITERIA

There are a number of potential visions for regional transmission and storage. In order to select among these potential visions, criteria by which the options can be compared are needed. Several previous regional planning efforts have considered criteria for evaluating the options for regional water projects. These previous planning efforts were reviewed as a basis for identifying issues and developing the evaluation criteria for this project. From these past efforts, a draft list of criteria was developed. The criteria were reviewed by the Consortium Technical Subcommittee (CTSC) and the Consortium Technical Committee (CTC). Final draft versions of the criteria were reviewed by the Consortium Board. The final version of the key issues and evaluation criteria are given below. It is recognized that some of these goals may be mutually exclusive, and therefore, transmission and storage options may do better at satisfying some than they do others, or that compromises that provide only partial benefits may be needed.

Efficiency. Maximize the use of current supplies before developing new ones.

"Weather-driven" reliability. Minimize future daily and seasonal shortages, including their magnitude, frequency, duration, and number of agencies affected, that result from existing supplies and infrastructure not being able to serve demands.

Emergency reliability. Minimize future shortages, including their magnitude, frequency, duration, and the number of agencies affected, that result from unexpected failure of supplies or facilities due either to catastrophic events or other causes.

Water quality. Meet regulatory drinking water standards for all water delivered to all providers. Maximize the ability of individual providers to choose the source(s) of delivered waters. Maximize consistency among providers and over time of delivered water quality. Minimize adverse water quality impacts within the transmission and storage system.

Transmission and Storage Cost. Minimize cost to the region of developing transmission and storage facilities. Maximize the perceived fairness of the manner in which costs are shared among the region's water providers.

Source Cost. Minimize the cost of source development.

Transmission and Storage Environmental Impact. Minimize adverse environmental impacts due to construction and long-term operation of the facilities. Maximize environmental benefits.

Source Environmental Impact. Minimize adverse environmental impacts of source development. Maximize the environmental benefits.

Regional operating flexibility. Maximize the ability to use water from various sources in order to meet demands throughout the region.

Long-term system development. Minimize the foreclosure of long-term supply and infrastructure options due to near-term actions.

Ability to meet immediate local needs. Minimize limitations on local agencies' abilities to meet their short-term needs.

Legal/regulatory feasibility. Minimize legal and regulatory hurdles. Facilitate regional growth goals, standards, and requirements.

Institutional/financial feasibility. Minimize the magnitude and difficulty of required institutional changes. Minimize the difficulty of reaching agreement on regional/local control issues.

PRELIMINARY SCENARIOS

Four basic scenarios were developed to represent a broad range of visions for regional

transmission and storage. In addition to the four scenarios, a "base case" representing the existing situation was included for comparison purposes. Projected water demands to the year 2050 formed the basis for facility sizing under each scenario The transmission pipeline routes shown in this Executive Summary are considered to be the primary routes. Various alternative routings that can be considered are shown in the full Report. The scenarios are:

Base Case: The Base Case includes not only the existing transmission system, but also several transmission facilities that various water providers in the region have already committed to building in the future. While some of these projects may not be constructed for a long time, they are nevertheless considered as "givens" from the point of view that planning for additional facilities should consider these facilities as if they were certain to happen. These projects include currently planned transmission improvements of a new 72-inch diameter line from the Joint Water Commission to the Tualatin Valley Water District, a new 96-inch diameter Conduit 5 for the City of Portland, a 60/54-inch diameter Willamette transmission line north from Wilsonville to Tualatin, and a 24-inch interconnection between some of the water treatment plants on the Clackamas River.

Scenario 1 - Holistic. Scenario 1 reflects the concepts developed as part of the RWSP. This concept envisioned major regional water supply sources connected to regional storage facilities through a transmission system which allowed each local provider to ultimately use one or more of all of the supply sources to meet peak season and peak day demands. The model for this approach is the electrical power grid system, whereby a transmission network is established that allows various source generation facilities to be utilized by customers. It allows any potential excess capacity from any source within the region to be brought to where demand is needed.

Major elements include a 96-inch diameter transmission main from Powell Butte to the Clackamas Basin area, a 60-inch diameter transmission main from Clackamas to Tualatin and transmission pipelines to carry 120 mgd of water north from a Willamette River water treatment plant in Wilsonville. This scenario also assumes that new regional storage reservoirs would be built in Washington and Clackamas Counties in order to smooth operation of the regional system. Estimated cost of this scenario is approximately $350 million.

Scenario 2 - Emergency Interconnections. This scenario reflects a primary and emergency source approach where each local provider develops or selects its own primary water supply source from one of the regions six major sources. Each provider also independently or jointly develops emergency average day demand backup supplies from a second, separate source that is another of the region's six major sources. The Powell Butte to Clackamas connection is built at a smaller diameter, 54-inch, than in Scenario 1, the Willamette transmission pipeline is only sized for 60 mgd, and the Clackamas to Tualatin pipeline is not constructed under this scenario. Estimated cost of this scenario is approximately $100 million.

Scenario 3 - Zonal. Scenario 3 reflects the development and use of regional storage and transmission facilities to serve zonal supply sources developed to their maximum capacity. The regional transmission and storage facilities are sized to serve two specific geographic areas, east and west, from these sources. The east zone is served from the Portland and Clackamas River supplies and the west zone is served from the Joint Water Commission and Willamette River supplies. The dividing line between the east and west zones is the west slope of the West Hills that run south from Portland through Lake Oswego and West Linn. It allows for each of the major sources in each zone to be transmitted as needed within the zone and provides a small intertie between the zones. Estimated cost of this scenario is approximately $250 million.

Scenario 4 - Subregional Interconnected. This scenario reflects the ultimate development of existing sources and supplies to serve expanding water demand needs. Included under this scenario is the further interconnection of City of Portland, Trask/Tualatin and Clackamas Rivers supplies as well as an east to west connection of existing Clackamas River supplies. It assumes that the Willamette source does not expand service beyond Wilsonville and perhaps Sherwood. Estimated cost of this scenario is approximately $200 million.

INSTITUTIONAL AND FINANCIAL CONCEPTS

Development of a regional transmission and storage strategy may require the creation or expansion of governance institutions, and can entail new financial commitments by the participating water providers. Selection of an appropriate institutional model and a sound financial structure are linked to the selection of a desired transmission/storage scenario. Some institutional and financial approaches are best suited to specific scenarios; others are relatively flexible and universally applicable to any favored scenario.

Several different institutional models were reviewed for application to the regional transmission and storage scenarios that were considered in this project. The use of Intergovernmental Agreements was found to offer the greatest flexibility and opportunity for regional consensus building. This study also examined several financing instruments including volume charges, capacity charges, membership dues, buy-ins/buy-outs, regional SDCs, local SDCs, and capacity leasing. All of these options have the capability of being utilized in developing regional transmission and storage projects. The exact ones that are utilized should be selected as part of the Intergovernmental Agreements that are formed.

EVALUATION OF SCENARIOS AGAINST THE PROJECT CRITERIA

Each of the preliminary regional transmission and storage scenarios, including the Base Case, was considered against each of the evaluation criteria identified above. Rating of the scenarios against the criteria was qualitative, that is, numerical ratings were not assigned. Scenario ratings were reviewed by the CTSC, the CTC and the Consortium Board. Some observations can be made about each scenario based on the evaluation.

Scenario 1 - Holistic. This scenario consistently ranks highest for the criteria that relate to the benefits that the regional transmission system generates. These benefits are factors such as reliability, flexibility, efficiency, and the ability to take advantage of environmental benefits. At the same time, this scenario consistently ranks the lowest for criteria such as cost, legal and regulatory feasibility, and institutional and financial feasibility - all indications of how difficult it will be to actually build this vision of regional transmission. It also ranks lower on the ratings of implications for source development, because it creates an unconstrained market for source that could result in overbuilding of source facilities.

Scenario 2 - Emergency Backup. This scenario provides moderate benefits in terms of improving regional reliability, but does not allow much benefit in terms of environmental enhancement or efficiency. However, it has the lowest cost of all the scenarios (except the Base Case) and would be the easiest to implement.

Scenario 3 - Zonal. This scenario provides the same types of benefits as the Holistic scenario in terms of reliability, environmental impact, efficiency and flexibility, but not quite to the same level as the Holistic scenario (perhaps 80% of the benefits obtained in Scenario 1 are obtained in Scenario 3). However, the cost of Scenario 3 is only two-thirds the amount of Scenario 1 and it will be considerably easier to implement. Also, it is less likely to lead to overbuilding of sources, because supply and demands are more matched at the subregional level.

Scenario 4 - Interconnected Subregional. This scenario has a cost that is a bit lower than Scenario 3 due to exclusion of storage reservoirs, but does not attain the same level of benefits for the region as Scenario 3. The main reason is that this scenario does not include any substantial development of the Willamette River as a supply. Because the Willamette is the surface source most resistant to drought of those involved, and because it is the least susceptible to impacts from the Endangered Species Act, having it as part of the regional mix adds flexibility and reliability that cannot be achieved without it. Scenario 4 also will be more difficult to implement than Scenario 3, although not as difficult as Scenario 1.

Base Case. The Base Case does not achieve enhancements of reliability, efficiency, flexibility, or environmental benefit. Its cost is of course the lowest, and since it is the "do nothing" alternative, it is the easiest to achieve.

PUBLIC INFORMATION AND INVOLVEMENT AND CONSORTIUM INPUT

Public information in the RTSS planning process has been provided directly via public information brochures, and indirectly via newspaper stories. Staff for the Consortium prepared an information brochure concerning the project and mailed it to a 3,800-name project mailing list. This mailing list included individuals that expressed interest in past regional water planning activities as well as environmental groups, large water users, regulatory agencies, water suppliers and others in the region. Consortium staff also provided

a briefing on the project to the City of Portland's Water Quality Advisory Committee. A number of articles concerning the project have also appeared in *The Oregonian* newspaper.

The first Public Workshop on the project was held on November 9, 1999 at the Oregon Institute of Technology Conference Center in Milwaukie, Oregon. Approximately 20 people attended the Workshop. The Workshop covered the project evaluation criteria, scenarios and financial and institutional options. Comments received at the workshop indicated that participants were in agreement with the evaluation criteria that were being utilized. They also felt that the scenarios that were being proposed represented an adequately broad range of options for discussion.

A second Public Workshop was held on April 3, 2000 at the offices of the Tualatin Valley Water District. As with the first workshop, the complete project mailing list was sent a notice of the meeting and a paid advertisement was placed in the Metro section of *The Oregonian* prior to the meeting. Again, approximately 20 people attended the Workshop. This Workshop reviewed the draft recommended plan. The substantive comments that were expressed in these forums by those who participated were:

- Aquifer Storage and Recovery (ASR) should be utilized more in the recommended plan.
- The pipeline connecting Clackamas County to southwest Washington County should take the most southerly route option following Interstate-205 to more easily bring Clackamas River water to the Wilsonville area.
- The Willamette River should not be considered as one of the major sources in the region that should be connected via regional transmission.
- Further expansion of storage reservoirs in the Portland Bull Run supply should be included in the recommended plan over the next five years.

One of the options for a pipeline from Clackamas County to the west that is shown in this Report is the route that follows the Interstate-205 corridor. However, this route was not the preferred route in the Regional Water Supply Plan, which investigated all the routing options in some detail, for several reasons that remain valid. Much of this route lies outside the Urban Growth Boundary, raising land use questions. The route also traverses a relatively large area that would require pipeline installation in rock, which would raise the cost for the project by up to twenty percent. Therefore, the primary route shown in this report is the route suggested in the Regional Water Supply Plan.

Based on the comments of the City of Wilsonville (see below), the Willamette River remains as one of the major sources in the region. However, if this source is not developed as currently planned by the City of Wilsonville, it would not impact the recommended Regional Transmission and Storage Strategy. A connection between Wilsonville and the north would still be required as shown in the Strategy, only to serve Wilsonville instead of to bring water from Wilsonville to the north.

No additional detail on potential development of new reservoirs in the Bull Run watershed was included in the final report. Such development would be a source, not transmission or storage issue, and is therefore not part of the scope of this report. However, if such new reservoirs were to be constructed, the Strategy recommended in this report would be adequate to take advantage of this new source development.

The Consortium Board has provided input and direction for the development of the draft RTSS. At the Board's September 1999 meeting, the evaluation criteria and scenarios were discussed. Modifications to the evaluation criteria were made to address Board comments. The Board commented that the range of scenarios being presented represented a good range of options for further evaluation.

The December 1999 meeting of the Consortium Board considered the draft evaluation of the scenarios. Board members identified which of the policies represented by the evaluation criteria for the project were rated as "most important" for the RTSS. The criteria that Board members rated the criteria as most important were:

- Emergency reliability
- Water Quality
- Cost

Discussion at the meeting indicated that the Board members felt that the vision for the RTSS should not be constrained by issues of legal, regulatory and institution feasibility, short-term needs, or environmental issues. These concerns would be represented in the higher projected costs for some scenarios or could presumably be overcome with the appropriate level of effort. This was why those criteria did not rate higher.

In the discussion of the scenario evaluations, Board members expressed three major points. These were:

- Improved emergency interconnections (such as the Emergency Scenario 2) between and among water systems in the region are vital. These interconnections would improve regional reliability and improve access to emergency supplies of water when there were problems with an individual source or system.

- The costs of a transmission system that allows very large quantities of water to be moved throughout the region (such as the Holistic Scenario 1) does not appear to justify whatever added benefits this approach would achieve, compared to less ambitious regional interconnections.
- The long-term network should be consistent with the decisions that communities make that are now looking for new sources of supply and should be phased and built from the nearer-term improvements. The uncertainty concerning which sources in the region will ultimately be utilized has a serious impact on any commitment to a large transmission system. The most appropriate transmission network might look different depending on

the source that Tigard, Sherwood and others in southern Washington County that are looking for water, chose as their primary supply during the next few years. If the source for these communities becomes the Willamette River, then perhaps the Zonal Scenario (Scenario 3) would be most appropriate. But, if the Portland system or the Clackamas River becomes the source, Scenario 4 may be more appropriate. The RTSS should be phased in a manner that allows nearer-term improvements to be made to improve emergency interconnections, but then allows the longer-term network to be consistent with source decisions as they are made.

These three key points become the primary drivers for the recommended Regional Transmission and Storage Strategy presented below.

The Board also reviewed the draft recommended plan at its March 1, 2000 meeting. At this meeting the Board felt that the draft recommended plan represented the goals and desires of the Board and was a good strategy for the region.

At the request of the Consortium Board, member agencies of the Consortium were asked to provide comments on the draft recommended Regional Transmission and Storage Strategy. Agencies were asked to respond to three specific questions:

1. Whether the agency agreed that the policy values shown in the draft Strategy were the most important.
2. Whether the agency agreed with the near and long term strategies identified in the draft report.
3. What changes the agency would recommend considering in the final Regional Transmission and Storage Strategy.

Comments were received from eight Consortium member agencies. All of the agencies that commented supported the priorities of the policy values expressed in the Strategy. Most agencies emphasized the importance of improved reliability as the single most important policy value. All of the agencies that commented also supported the near and long term strategies in the recommended plan. A few of the agencies expressed concern that they will not benefit sufficiently from some of the specific recommended improvements to justify the costs of participating in them. They emphasized that as shown in the Strategy, project participation would be on a voluntary basis using intergovernmental agreements among participants. Several agencies also provided detailed comments on the report and suggested technical clarifications. Among these detailed comments was the City of Wilsonville's input that, contrary to the public input at the April 3rd Workshop, the Willamette River should be considered as a source because the City of Wilsonville is developing this source. All the comments of Consortium members were evaluated and incorporated into the final report.

REGIONAL TRANSMISSION AND STORAGE STRATEGY

Based on all the above information, the recommended Regional Transmission and Storage Strategy is:

Build interconnections between and among individual water systems within the region to increase the reliability of supply to individual communities and to the region as a whole.

In the long-term, develop either a Zonal or Interconnected Subregional transmission and storage system, depending on the source(s) that the communities in southern Washington County that currently need water, develop for their primary supply.

Develop these projects through intergovernmental agreements (IGA's) among those agencies which choose to participate in the individual projects.

Specific elements of the Strategy should include:

- **Each community in the region should have access to both a primary supply and an adequate emergency source of water.**

- **The primary supply should be one of the six major sources in the region (Bull Run River, Columbia South Shore Wellfield, Clackamas River, Trask/Tualatin River, Willamette River, local groundwater).**

- **The emergency supply should be sized to meet at least the annual average demand of the community and should be a separate source from the primary supply. Preferably, the emergency source would be one of the six major sources in the region (Bull Run River, Columbia South Shore Wellfield, Clackamas River, Trask/Tualatin River, Willamette River, or local groundwater) that is not the community's primary supply.**

- **The sizing of interconnections between water systems should consider future potential peak season and peak day supply needs as well as emergency needs. The level of demand that should be met in an emergency (for example, 85 percent vs. 100 percent of average annual demand) should also be considered when sizing these interconnections. Sizing of each specific project should be reviewed and modified at the time the project is actually designed and constructed. Interconnections should also consider the effects of mixing source waters on blended water quality characteristics.**

- **If a new east-west transmission connection is made to connect Portland and Washington County, it should be via a route that also connects the Clackamas basin to this transmission line.**

- **While the primary elevation for the transmission connections should be set based on the existing major storage reservoirs in the region (Portland's Powell Butte Reservoir at around 530' elevation and JWC's Fernwood Reservoir at around 520' elevation), not all of the transmission system flow need go to this elevation. Much of the service territory in the region can be served at elevations in the 450' to 490' range. Pumping costs from the river system water treatment plants can be reduced substantially if a portion of the flow goes to the lower elevations. Similarly, there are portions of the region that require higher elevations for service. As specific storage and transmission projects are designed and constructed, both these higher and lower elevation issues should be considered. Pipeline design, should be based upon the pressures of the 530' elevation at a minimum to reduce potential limitations in the utility of the transmission pipelines.**

- **The timing for construction of each project in the Strategy should be determined through negotiations among the project participants that are interested in building the project. Costs should be allocated among participating agencies, and those agencies that do not participate should not be assessed any costs for these projects.**

The benefits of putting this regional transmission strategy into place include:

- Improved protection against loss of any water source for any reason.

- Improved ability to bring available water supplies to communities that may need water.

- Improved flexibility to respond to environment concerns in source waters.

- Ability to utilize lower cost water sources in the winter when water is plentiful and to close higher cost sources during those periods.

- Improved ability to utilize surface sources as part of aquifer storage and recover projects.

The institutional model that is recommended for implementing the elements of the short-term strategy is Intergovernmental Agreements (IGA's) organized under ORS 190. This institutional arrangement offers the greatest array of options for developing detailed system guidelines. It allows relatively easy "evolution" to accommodate future changes in institutional scope or mission. It retains local representation and control while entering into the regional strategy. For each of the projects under RTSS, IGA's could be developed between the project participants to identify cost allocations, operating responsibilities and other obligations and requirements.

There are several projects that are currently already in the adopted Capital Improvement Programs (CIP's) of various water providers in the region. These projects should be

considered as consistent with and as components of, this recommended Regional Transmission and Storage Strategy. These projects are shown in Figure ES-1 and Table ES-4, and include:

- The second transmission line from the Joint Water Commission water treatment plant in Forest Grove that would connect to the Tualatin Valley Water District (TVWD) and the transmission improvements in the TVWD system to bring this water to its storage reservoir.

- The transmission line from the City of Wilsonville's new water treatment plant using the Willamette River as a source, north to its termination point. This termination point is currently assumed to be within the City of Wilsonville, but may extend further north depending on upcoming decisions of other communities.

- An interconnection between the water treatment plants using the Clackamas River as a source.

- The downstream portion of Bull Run Conduit 5.

- A second reservoir on Powell Butte.
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Figure ES-1 withheld for security purposes pursuant to ORS 192.502 (22) and (23).

Table ES-4
RTSS Projects

Project	Sizing (inches in diameter) or (million gallons)
Projects in Planning	
JWC Supply II	72"
JWC/TVWD Intertie	48"
Willamette Supply	63/54"
Clackamas WTP's Intertie	24"
Conduit 5 – Phase I	84"
Powell Butte Reservoir II	50 MG
Recommended Additional Projects	
Powell Butte / Clackamas Basin Intertie	60"
JWC/WCSL Intertie	60"
JWC/Willamette Intertie	60/54"
Possible Other Projects	
Clackamas / Wash. Co Intertie	60"
Conduit 5 – Phase II	84"
Conduit 5 – Phase III	84"
Cooper Mountain Reservoir	50 MG
Powell Butte Reservoir III	50 MG
Powell Butte 600' Reservoir	20 MG

Several other major projects are recommended for further exploration consistent with this strategy and are also shown in Figure ES-1 and Table ES-4. These are:

- An intertie between the Joint Water Commission and the Portland system.

- An intertie between the Portland system and water sources in the Clackamas basin.

- An intertie between the terminus of the Willamette transmission pipeline and the Joint Water Commission pipeline.

Also shown in Table ES-4 are several possible other projects that depend on future decisions about the regional water supply network.

The routes shown in Figure ES-1 are representative of the general corridor that the transmission pipeline would take. As discussed in Section 5, there are multiple alternative routings for each pipeline. The specific routing for each pipeline should be determined through more detailed study of options and negotiations among those water providers participating in actual project construction.

If the communities in southern Washington County that are currently looking for a long-term source of water (Tigard and Sherwood) decide to use either the Clackamas basin supplies or the Portland system, then a pipeline from the Clackamas basin to those communities should be constructed. If those communities decide to use the Willamette River as their source of supply, then the Willamette transmission pipeline should be sized larger and the connection to the JWC system completed earlier. If those communities decide to use the JWC source as their supply, then the JWC interties to the Portland and Willamette systems should be sized larger and these connections completed earlier.

Other local connections or improvements in connections between individual water providers should also be undertaken as part of the Regional Transmission and Storage Strategy. Examples of these may include:

- Capacity increases of the existing intertie between Clackamas River Water and the Portland system,

- Reactivation of an inactive connection between the Portland system and the Oak Lodge Water District,

- Improved connections between Portland and Lake Oswego, and Portland and Milwaukie, and

- A connection between Fairview, Wood Village and the Portland system.

While these connections may not be of regional significance by themselves, the cumulative effect of the sum total of many of these improvements could be of regional significance.

ASR projects are currently being developed in Portland, Washington County and Clackamas County systems to improve supply reliability. As the capabilities of these ASR systems become better known, they may impact the sizing and timing of some of the transmission and storage facilities recommended in the Strategy.

SECTION 1 – INTRODUCTION

PROJECT BACKGROUND

In this report, the Regional Water Provider's Consortium (Consortium) has conducted planning to develop a Regional Transmission and Storage Strategy (RTSS). The purpose of this Strategy is to develop short and long-term visions for regional transmission and storage, and to identify the institutional arrangements that can facilitate these visions.

The Consortium determined at the outset of this process that the RTSS should identify ways that future planning could complement and integrate water supply improvements that are already happening in the region. The RTSS should also provide the information that water suppliers need in order to make informed decisions about future transmission and storage projects.

This RTSS is an outgrowth of the regional cooperation that began with the development of the Regional Water Supply Plan (RWSP) and continues with the work of the Consortium. The RWSP contained an extensive investigation of potential transmission routes and storage sites. The transmission corridors adopted in 1996 in the final RWSP, were based on the concept of interconnecting the region's sources using the existing City of Portland Powell Butte Reservoir, and new storage reservoirs on Cooper Mountain in Washington County and Forsythe Road in Clackamas County. All of these reservoirs would be located at an elevation of approximately 530 feet, creating a uniform hydraulic gradeline in the regional system. The focus of the regional transmission network in the RWSP was source-centered. That is, it was primarily conceived to allowed various sources in the region to bring water to the demand locations to satisfy peak season and peak day demands.

The RTSS has been developed using the strong foundation of the RWSP. A number of scenarios with different transmission and storage concepts have been created building upon the RWSP investigations. Base data and cost information used in developing the RTSS have been taken from the RWSP where available.

The remainder of this Section provides additional background on previous long-range system planning efforts related to the RTSS that have been undertaken in the region. This Section also discusses more recent planning and construction efforts that have occurred since the completion of the RWSP in 1996. This information provides the context for an analysis of future regional transmission and storage needs.

HISTORICAL LONG-RANGE TRANSMISSION SYSTEM PLANNING

Regional Water Supply Plan - Phase 1

Phase I of the Regional Water Supply Plan was completed in 1992 and included a Water System Demand Study, a Water Source Options Study and a Conservation Study as well as the Tri-County Pipeline (TCP) System Conceptual Study. The study developed a preliminary Facilities Plan for a regional pipeline, storage and pumping system which would integrate the region's sources to achieve a reliable and cost effective regional water supply. In addition to providing water throughout the region, the TCP would be able to transmit a secondary water source during unplanned or planned events such as shutdown of one of the region's water treatment plants, loss of a supply source, or outage of a major transmission system component. This system would increase the reliability of all interconnected systems from east to west, north to south.

The TCP included implementation of terminal reservoirs at Powell Butte (existing and new) and at Cooper Mountain on the east and west sides respectively, each with similar overflow elevations (530 feet). Various "demand centers" were established at locations between the two terminal reservoirs to establish a planned transmission pipeline corridor. These planned demand centers included:

- Powell Butte (input from Bull Run and Columbia River sources)
- Damascus/Boring
- Milwaukie
- Clackamas (input from Clackamas River sources)
- Canby
- Tualatin (input from Willamette River source)
- Tigard
- Cooper Mountain

The TCP did not consider the Joint Water Commission supply from the Tualatin/Trask Rivers as a source providing input to the Cooper Mountain reservoir. Rather, the TCP assumed that future major supply sources included Bull Run, Columbia River, Clackamas River and Willamette River. The Columbia South Shore Well Field was not considered as a source either.

Three major pumping stations (PS) were also assumed for the TCP including those at Powell Butte, Clackamas and Cooper Mountain. The Powell Butte PS would supply water from the existing Powell Butte reservoir at 530 feet overflow elevation to a new Powell Butte reservoir at 610 feet overflow elevation. The Clackamas PS would supply water from CRW's Mather Road reservoir at 292 feet overflow elevation to the proposed Cooper Mountain reservoir at approximate overflow elevation 535 feet. The third PS was proposed to supply emergency water from the proposed Cooper Mountain reservoir to the Powell Butte reservoir. Other

pumping stations which would supply water into the system from existing and proposed new sources were not analyzed.

REGIONAL WATER SUPPLY PLAN - PHASE 2

The Phase 2 Regional Water Supply Plan (RWSP), completed in 1996, built upon the information developed during Phase I. It explored in more detail selected source options including the Columbia River, Willamette River, and ASR as well as expansions of existing systems including Bull Run, Clackamas River and Tualatin River/Trask River (JWC source). Regional transmission and storage options were also evaluated as part of the Phase 2 RWSP. The evaluation included the identification and evaluation of representative reservoir locations, transmission corridors, the development of project cost estimates and the development of tabulated cost and capacity data for use in the Integrated Resource Plan (IRP) model that formed the basis for decision making in the RWSP.

Terminal storage facilities were considered in various parts of the region in anticipation of ultimately connecting the major sources of supply to a transmission network that would increase reliability and redundancy of supplies. Three major terminal reservoir sites were considered including Powell Butte (expansion of existing 50 MG capacity), Forsythe Road in northern Clackamas County, and Cooper Mountain in eastern Washington County.

Based on the location of storage and supplies, nine transmission corridors were evaluated under criteria that included headlosses, alignment topography, distance between terminal points, geology and environmental considerations. The transmission corridors identified and evaluated included the following:

- Lusted Hill/Powell Butte
- Columbia River/Powell Butte
- Powell Butte/Clackamas
- Powell Butte/Beaverton
- Clackamas/Tualatin
- Clackamas/Forsythe Road
- Willamette River/Tualatin
- Tualatin/Beaverton
- Cooper Mountain/Beaverton

Cost estimates were developed which included allowances for alignments through urbanized areas, areas requiring rock excavation, specialty construction considerations, surface restoration, interties and isolation valves. The tabulated cost and capacity data also included provisions for facilities required for connections to local terminal facilities.

RECENT TRANSMISSION SYSTEM PLANNING AND IMPLEMENTATION EFFORTS

Many water providers throughout the region have been planning and implementing transmission system improvements to continue to meet the demands of existing and potential new customers. The following paragraphs briefly discuss the major efforts conducted to date. Figure 1-1 (located after page 5-1) indicates both the existing and planned transmission system and storage elements for the region. A description of the existing transmission and storage system is given in Section 3.

JOINT WATER COMMISSION SYSTEM

The Cities of Hillsboro, Beaverton and Forest Grove along with the Tualatin Valley Water District (TVWD) own and operate the Joint Water Commission (JWQ supply system. This system includes Barney Reservoir (located in the coast range), storage in Hagg Lake (Scoggins Reservoir), an intake and raw water pumping station on the Tualatin River near Forest Grove, a water treatment plant (WTP) and high service pumping station (located near the intake), a 20 MG reservoir along Fernhill Ridge with an overflow elevation of 520 feet, and an extensive transmission pipeline system which delivers water to each participant.

JWC has completed Phase I of a large transmission system expansion project to increase the delivery capacity to Hillsboro and TVWD. The Phase I transmission pipeline project provides for a maximum delivery capacity of 60 mgd from the WTP (6 mgd to Forest Grove and 54 mgd to the other participants). Phase 2 of the transmission system expansion project will expand the delivery capacity to above 120 mgd from the WTP site. The JWC WTP was recently expanded to increase treatment capacity to 40 mgd firm capacity and 70 mgd nominal capacity.

Figure 1-1 indicates the main features of the JWC supply and transmission system. The Phase I transmission system improvements are shown as well as the options for Phase 2 improvements. Phase I included a connection to the existing 45-inch transmission pipeline east of Fernhill Reservoir, approximately 20,000 feet of 42-inch and 72-inch diameter pipe running north through Hillsboro to Evergreen Road, and another 26,000 feet of 66-inch diameter pipe running east along Evergreen Road to Cornelius Pass Road at the TVWD service area. TVWD is currently installing a 42-inch diameter pipeline from Cornelius Pass Road to its 10 MG Springville reservoir. The capital costs to construct the Phase I pipeline were approximately $14 million. Current planning indicates the Phase 2 project (72-inch diameter pipeline) will be completed by the year 2002 with a capital cost of $23 million.

WILLAMETTE RIVER SUPPLY PLANNING

The City of Wilsonville is proceeding with design and construction of a new water treatment plant on the Willamette River. Other water providers in the area, including the cities of

Sherwood, Tualatin, Tigard and the TVWD are currently considering their options in participating in the project. The Willamette River Supply System would include an intake and raw water pumping station, a water treatment plant (WTP), a high service pumping station and a finished water transmission pipeline. The WTP, pumping stations and the initial length of the transmission pipeline is located on property within the City of Wilsonville adjacent to the river.

The initial phase of the transmission pipeline route would run north from the WTP site to Wilsonville Road. The planned capacity of this segment is 70 mgd. The capacity of the pipeline north through and beyond Wilsonville will depend on whether other communities besides Wilsonville participate in the project and the timing of their participation. This initial pipeline capacity could range from 20 to 70 mgd. The desired initial pipeline capacity would serve the participants' water supply needs for the next 50 years. Figure 1-1 indicates the preliminary alignment of the proposed transmission pipeline to the northern portion of Wilsonville, as this is the only segment that, at this time, is certain to be built in the next several years. A proposed alignment for a large diameter pipeline all the way north to Tigard was identified in a 1998 Study after a review of various alignment options.

CONDUIT 5 FROM BULL RUN SUPPLY

The Portland Water Bureau has been planning for the addition of a new transmission pipeline(s) from the Bull Run Headworks area to increase the capacity and reliability of the Bull Run supply. Currently, the existing three conduits (Conduit 2 = 44-inch/52-inch, Conduit 3 = 50inch/58-inch and Conduit 4 = 52-inch/66-inch) have a combined maximum delivery capacity of 205 - 210 mgd to the Powell Butte 50 MG reservoir. The planned new transmission pipeline is referred to as Conduit 5.

The distance between the Headworks and Powell Butte Reservoir is approximately 21 miles and the approximate hydraulic grade line (HGL) at Headworks is 745 feet. Preliminary planning for the new conduit has the delivery capacity between 120 mgd and 250 mgd depending on the selected pipeline diameter. The total delivery capacity from Headworks will then depend on the selected pipeline diameter, and whether Conduit 2 (the oldest of the existing conduits) is replaced or remains in service. Pipeline diameters between 84-inch and 120-inch are being considered. If the Bureau decides to install the 120-inch diameter pipeline as Conduit 5 initially, then there may be no need to construct another conduit (Conduit 6) in the future. The Bureau has a preliminary right-of way for Conduit 5 that parallels the existing conduit route to some degree.

The new pipeline could be constructed in segments depending on the timing and need for increased transmission capacity from Headworks. One scenario that has been considered is to construct the portion of new Conduit 5 from Powell Butte Reservoir east to Gresham. This would initially increase the maximum delivery capacity to approximately 250 mgd. Figure 1-1 indicates the existing Bull Run conduit alignments as well as the planned future

Conduit 5 routing. The preliminary project cost for a new 84-inch diameter pipeline from Headworks to Powell Butte is approximately $158 million.

POWELL BUTTE MASTER PLAN

The Portland Water Bureau recently completed a Master Plan of its Powell Butte reservoir site to allow future water facilities to be constructed if necessary. Currently, the site has a 50 MG terminal reservoir (overflow elevation = 530 feet) which serves as the main delivery point for the Bull Run supply via Conduits 2, 3 and 4. Water from this reservoir is then distributed to Portland and non-City customers via additional pipelines including the Washington County Supply Line (WCSL) which delivers water to west-side customers.

Potential future water facilities that were included in the Master Plan are:

- Three additional 50 MG reservoirs with overflow elevation = 530 feet. One 20 MG reservoir with an overflow elevation = 600 feet.
- A water treatment plant (WTP) with an ultimate capacity of 500 mgd.
- A large-diameter conduit(s) (approx. 84-inch) to deliver water to the reservoir complex.
- A regional transmission pipeline (approx. 66-inch diameter) to serve users to the south (Southern Intertie) with connections to both the 530 foot and 600 foot reservoirs

The planned 20 MG reservoir with a 600-foot overflow elevation, which would have to be filled by pumping during portions of the year, would be used as a regional facility and would serve multiple purposes including:

- Provide gravity service to certain areas around the Butte which currently cannot be served by gravity.
- Provide the ability to increase the delivery capacity through the existing Washington County Supply Line (WCSL) by increasing the driving head.
- Provide the ability to supply potential future users to the south and southwest of Powell Butte**,** including the Clackamas Basin, as part of a Regional Transmission System.

WASHINGTON COUNTY SUPPLY LINE

The existing Washington County Supply Pipeline delivers Bull Run water from Powell Butte Reservoir under the Willamette River to west side customers including TVWD and the City of Tualatin. The pipeline ranges in size from 84-inch to 36-inch and has a maximum delivery capacity of approximately 60 mgd.

Recently, studies have been conducted to evaluate options for increasing the delivery capacity of the WCSL, specifically to serve the Cities of Tigard and Wilsonville. The Washington County Supply Line System analysis determined that, under maximum daily flow conditions, the Supply Line System is constrained by a topographical high point near

the intersection of SW Capitol Hwy and Beaverton Hillsdale Hwy and the need to maintain an adequate hydraulic grade line at the City of Tualatin's supply connection south of the Tualatin River. The analysis investigated options for increasing flows to the south from the terminus of the pipeline in the range of 5 to 20 mgd. These flows would serve short term supply needs and could potentially serve as part of a longer-term water supply facility.

CLACKAMAS RIVER WATER TRANSMISSION SYSTEM EXPANSION

CRW is increasing its transmission system capacity to deliver in excess of 40 mgd from its WTP and High Service Pumping Station. Previously, the WTP and HSPS capacity was limited to approximately 30 mgd. Approximately 1,800 linear feet of 36-inch diameter pipeline is being connected to the HSPS discharge piping to increase the water supply available to CRW's wholesale and retail customers. The line will be in service by the end of 2000. The WTP capacity, including the intake and PS from the Clackamas River, must then be expanded to the 40 mgd capacity.

CLACKAMAS COUNTY INTERTIES

Four major sources of supply now exist in the northern Clackamas County basin including:

- Clackamas River Water (CRW) WTP (30 mgd) serving CRW-North and Gladstone
- South Fork Water Board (SFWB) WTP (20 mgd) serving Oregon City, West Linn and CRW South
- City of Lake Oswego WTP (16 mgd)
- North Clackamas County Water Commission (NCCWC) Slow-Sand Filter Plant (8.5 mgd) serving Oak Lodge Water District, Mt. Scott Water District and Damascus Water District

Various smaller interties currently exist between these agencies and also with the City of Portland. Recently, CRW, SFWB and NCCWC have been planning an intertie pipeline between their 3 sources of supply such that water can be transferred between any of these providers for increased source and system reliability. The pipeline would be 24-inch or capable of delivering in the range of 15 mgd.

Two routing options for this intertie pipeline have been identified:

- From the NCCWC Slow-Sand Filter Plant across Clackamas River Drive, up the hill and then connecting to the SFWB transmission pipeline downstream of the VVTP, or
- Connect to City of Gladstone's 27-inch diameter transmission pipeline, across the 82nd Street footbridge, and connect to SFWB's transmission pipeline downstream of the WTP.

CLACKAMAS SUPPLY PIPELINE TO WILSONVILLE

As part of its recent Water Supply Study, the City of Wilsonville investigated numerous long term supply options including the Clackamas River via SFWB and/or CRW. To deliver this water to Wilsonville, treated water would have to be pumped via a 36-inch diameter transmission pipeline (sized to deliver 20 mgd) that would parallel 1-205 starting in the West Linn area, and then deliver water to Wilsonville's reservoirs either from the east along Stafford Road or from the north paralleling I-5.

ISSUES RAISED BY RECENT PLANNING EFFORTS

The previous discussion of the regional transmission and storage planning and implementation that has taken place since the adoption of the RWSP raises several issues concerning a regional transmission and storage strategy.

The RWSP envisioned that a regional transmission system would be centered on the concept of major regional reservoirs. These reservoirs would provide operational flexibility for existing or proposed regional water sources and would provide emergency regional storage. The City of Portland's existing Powell Butte Reservoir, with 50 mg of storage at an elevation of approximately 530 feet, was the model for these reservoirs and set the HGL for the transmission system. However, there has been little movement towards developing these reservoirs other than at Powell Butte.

The Forsythe Road reservoir in unincorporated Clackamas County was envisioned as a large storage reservoir for the Clackamas River source. The four major water suppliers using the Clackamas River as a source have not moved towards construction of this reservoir. Instead, a pipeline intertie between the three Clackamas River treatment plants on the east side (CRW, SFWB and NCCWC) is planned to increase source and system reliability for the Clackamas supply. The current main operating hydraulic grade line for all the Clackamas River sources is lower than the 530 foot level, and thus there may be reluctance to locate major new storage at this elevation and thereby incur increased operating costs for pumping.

The Cooper Mountain site in unincorporated Washington County west of Beaverton was envisioned as the regional reservoir site for Washington County. The Cooper Mountain site was hydraulically positioned to serve the major demand centers in Washington County, at an overflow elevation between 515 and 530 feet. As on the east side of the region, the current operating hydraulic grade line for the systems on the west side of the region is lower than the 535 foot level. Existing interties between systems are based upon these lower grade lines. Some of the west side systems are considering a major new storage reservoir, but these plans are still tentative and may be centered on reservoirs at lower elevations.

While a transmission corridor between Powell Butte and the Clackamas River systems was identified in the RWSP, there are a number of potential alignments for this pipeline. Some of these potential alignments have the potential to better serve the Damascus area, which is

projected to have large amounts of long-term growth in water demand. Others better serve the areas with relatively high demand currently. The discrepancy in hydraulic grade line between the Powell Butte reservoirs and the reservoirs in water systems in the Clackamas basin, makes the operating costs for serving water from the Clackamas River north more expensive than serving water from Powell Butte to the south.

Two potential corridors were been evaluated in the RWSP for a possible connection between the Clackamas area and eastern Washington County. Both routes connect near Durham. One alignment crossed the Willamette River at West Linn, then angled north along the west bank of the Willamette to Lake Oswego, travelling west through Lake Oswego. This alignment was recommended in the RWSP. A second potential corridor crossed the Willamette River in the general vicinity of Oregon City/West Linn, paralleled the 1-205 freeway and crosses the Tualatin River at Stafford Road. In addition, an east-west route through Portland paralleling Portland's existing Washington County Supply Line has been considered as the main east-west connection route. Which of these routes is desirable will be strongly influenced by which sources might be utilized and by whom, in the short-term, as these decisions will likely determine what new transmission line will be built soon.

PROJECT SCOPE OF WORK

Given the planning and design efforts that have occurred subsequent to the RWSP, the Consortium recognized that a strategy for regional transmission and storage must build upon, reflect and incorporate previous planning efforts. The RTSS must also consider the transmission and storage decisions that are already being implemented in the region. The RTSS must create a pathway from what is happening now to what the region wants in the future. It must identify the opportunities that are present, and illustrate how those opportunities can be best utilized.

Based on these objectives, the scope of work for this project consisted of the following major elements:

- Develop consensus on the major benefits that are desired from the system.
- Develop criteria for the evaluation of alternative strategies.
- Develop alternative scenarios for future transmission and storage in the region.
- Identify potential partnerships, institutional arrangements and financial programs that could be associated with each of the alternative scenarios.
- Evaluate scenarios and their associated financial and institutional arrangements.
- Prepare a recommended action plan.

The Strategy was developed in coordination with the Consortium Technical Subcommittee (CTSC), and the Consortium Technical Committee (CTC). These groups provided regular input and direction for the development of work products described in this Scope of Work. In addition, review, comment, and direction on work elements was received from the Consortium Board. Public and stakeholder input was received in two open houses held over the course of the project. Information on the public involvement process and Consortium Board direction is contained in Section 8 of this report.

AUTHORIZATION

Montgomery Watson was selected to prepare the Regional Transmission and Storage Strategy by the Regional Water Providers Consortium in response to a request for proposals from the City of Portland Bureau of Water Works dated March 15, 1999. A contract authorizing this work was signed and dated June 14, 1999. Major subconsultants for this work were Murray, Smith & Associates (MSA), Financial Solutions Consulting Group (FSCG), and Gary Fiske and Associates (GFA). A number of other consultants with experience in local regional planning acted as advisors and reviewers of work products on the project.

SECTION 2 – PROJECTED WATER DEMANDS FOR REGIONAL PROVIDERS

BASIS OF THE DEMAND ESTIMATES

Updated water demand information was provided by the member agencies of the Consortium. This information was used to estimate future transmission and storage facility capacity requirements.

Current demands, as well as projected demands to the years 2020 and 2050 are shown in Table 2-1, for peak day and average day consumption. The sources of these demand estimates are from recently completed master plans, water management plans, the Portland Water Bureau's 1999 demand model and original RWSP projections. Sources of demand information for each water provider are indicated in Table 2-1.

PROJECTED DEMAND AND SUPPLY TO 2050

In the Regional Water Supply Plan, the region was considered to essentially contain three main nodes – East, West and South. For purposes of this analysis, the primary demand nodes roughly corresponding to Multnomah, Washington and Clackamas counties. The combined year 2050 peak day demands for these three nodes utilizing the demand numbers in the attached spreadsheet prepared for this project are shown in Table 2-2. Also shown in this Table are the major sources in those nodes and a rough approximation of their capacities. Several qualifiers are necessary on these source capacities:

- The capacity shown for the Bull Run is with current Conduits and Dams. The addition of Dam 3 and Conduit 5 would substantially increase the capacity from this source.
- The capacity for the Portland wellfield is the current, short-term reliable capacity. Improvements in the wellfield and ASR would increase this capacity.
- The current capacity of the Tualatin/Trask is about 70 MGD. The 120 MGD capacity shown is the build-out peak day capacity. Peak season buildout capacity is currently around 70 MGD on this source.
- The Willamette River capacity assumes full build-out of existing water rights of TVWD and Wilsonville.
- The Clackamas River capacity includes 89 MGD current capacity and 50 MGD future development, as shown in the RWSP. Other water right applications in process would increase this available capacity beyond that shown in the Table.

Local groundwater and small surface sources are also available in the region. These have not been included in source capacity estimates.

Table 2 - 1
Summary of Existing Water Demand Information
October, 1999

LOCATION	ESTIMATE	2000		2020		2050	
		PEAK DAY	AVERAGE ANNUAL	PEAK DAY	AVERAGE ANNUAL	PEAK DAY	AVERAGE ANNUAL
PORTLAND							
Portland #1	PWB	0.8	0.4	3.4	1.7	3.5	1.8
Portland #2	PWB	9.4	4.8	10.0	5.2	10.5	5.4
Portland #3	PWB	73.2	37.9	73.9	38.5	78.2	40.5
Portland #4	PWB	36.3	18.8	39.0	20.3	41.3	21.4
Portland #5	PWB	18.1	9.4	19.1	10.0	20.2	10.5
Portland #6	PWB	1.7	0.9	1.8	1.0	2.0	1.0
TOTAL PORTLAND		**139.5**	**72.3**	**147.2**	**76.6**	**155.6**	**80.7**
EASTSIDE							
Lusted area districts	PWB	0.4	0.2	0.4	0.2	1.8	0.9
Gresham	PWB	15.5	8.0	20.4	10.7	21.3	11.0
Rockwood	PWB	14.8	7.7	15.7	8.2	16.0	8.3
Powell Valley&Lorna	PWB	10.8	5.7	12.0	6.2	12.5	6.5
Wood Village	RWSP	0.8	0.5	1.0	0.6	1.4	1.0
Fairview	RWSP	0.9	0.6	2.5	1.7	13.9	9.0
East URA	PWB	0.3	0.1	4.3	2.3	5.3	2.7
TOTAL EASTSIDE		**43.4**	**22.9**	**56.3**	**29.8**	**72.1**	**39.4**
CLACKAMAS							
Lake Oswego	MP(LO)	16.0	6.0	24.0	11.4	27.0	13.0
West Linn(SFWB)	MP (WL)	7.8	3.1	11.2	4.6	12.7	9.8
Oregon City(SFWB)	MP (SFWB)	8.7	3.7	13.4	5.7	20.3	8.6
Oak Lodge WD	RWSP	9.3	3.5	9.7	3.5	11.3	4.5
Mt. Scott WD	MP (MSD)	6.2	2.4	18.5	7.1	30.0	11.5
Damascas WD	MP (MSD)	2.4	0.9	17.1	6.6	27.0	10.2
Clackamas River Water	MP (CRW)	16.0	7.0	25.4	11.4	31.9	14.3
Gladstone	MP (CRW)	2.6	1.2	2.6	1.2	2.6	1.2
Milwaukie	RWSP	9.0	3.5	9.5	3.5	12.0	5.0
Canby	RWSP	4.6	1.5	6.0	2.0	9.3	3.5
TOTAL CLACKAMAS		**82.6**	**32.8**	**137.4**	**57.0**	**184.1**	**81.6**
WEST SIDE							
West Slope, VV,Bur,PH	PWB	4.1	2.1	4.4	2.3	4.6	2.4
Lake Grove	PWB	1.0	0.5	1.2	0.6	1.2	0.6
TVWD (Wolfcreek)	PWB	38.1	19.3	64.4	32.9	69.8	35.2
TVWD (Metzger)	PWB	6.1	3.1	7.3	3.7	7.8	4.0
Tigard	MSA	13.8	6.0	18.0	7.1	19.4	7.6
Raleigh	PWB	1.2	0.6	1.4	0.7	1.6	0.8
Tualatin	PWB	11.7	4.6	13.5	5.4	16.2	6.7
Sherwood	PWB	2.3	1.2	7.1	3.7	8.8	4.5
Wilsonville	RWSP	7.4	2.7	10.7	3.9	18.5	6.8
Beaverton	WMP/RWSP	19.5	7.8	25.8	10.3	25.8	10.3
Forest Grove	WMP/RWSP	6.0	2.3	8.0	2.8	12.0	4.2
Hillsboro	MP(Hills)	21.3	9.6	50.3	20.9	67.5	31.0
TOTAL WESTSIDE		**132.5**	**59.9**	**211.9**	**94.4**	**253.2**	**114.0**

Notes:
peak day - maximum of daily demands (mgd) for June through September
average annual - average day demand (mgd) for January through December

Basis of Demand Estimate

PWB:	Portland Water Bureau 1999 Demand Model with conservation
RWSP:	Regional Water Supply Plan
MP:	Water Master Plans
WMP:	JWC Water Management Plan

As indicated in Table 2-2, each node is in approximate balance between demand and sources within the node to the year 2050, assuming that these sources are developed and utilized as planned over time. Currently, much of the demand in the West node is served not by sources within that node, but by the Portland system.

Table 2-2
Demands by Node

NODE	**YEAR 2050 PEAK DAY DEMAND (MGD)**	**MAJOR SOURCES**	**SOURCE PEAK DAY CAPACITIES (MGD)**
EAST: Portland and Eastside	227	Bull Run CoSS GW	210 92
WEST: Washington Co.	253	Tualatin/Trask Willamette	120 120
SOUTH: Clackamas Co.	184	Clackamas	139

EMERGENCY SUPPLY AVAILABILITY

Table 2-3 identifies primary and emergency sources of supply for each provider. Most providers in the region currently have access to some emergency backup supply, with some exceptions. Most of these exceptions would be eliminated if the Willamette River Water Treatment Plant and the interconnection between water treatment plants in the Clackamas Basin are completed. However, the emergency supplies to most of the Clackamas Basin suppliers are other Clackamas River sources. Thus, if the Clackamas River is lost as a source for any reason, emergency supplies within the Clackamas Basin will be difficult to provide. Similarly, the emergency demand for the East Node in the year 2050 of about 120 MGD (annual average demand in the year 2050) is greater than the 90 MGD capacity of the Portland wellfield. Increased wellfield capacity or a connection to the Clackamas suppliers would alleviate this shortfall. In the West Node, a strengthened connection to the Portland system or development of the Willamette source would eliminate any future emergency backup shortfalls.

Section 3 – Description of Existing Systems provides more detail on interties and connections between systems.

Table 2-3
Summary of Existing Source Information

Entity	Current Primary Source	Primary Source Current Peak Day Capacity (mgd)	Current Emergency Source	Assumed Available Emergency Capacity (mgd)
PORTLAND	Bull Run	210	CoSS GW	92
EASTSIDE				
Lusted area districts	PWB	incl w/PWB	CoSS GW	
Gresham	PWB	incl w/PWB	CoSS GW	
Rockwood	PWB	incl w/PWB	CoSS GW	
Powell Valley & Lorna	PWB	incl w/PWB	CoSS GW & GW	
Wood Village	Local GW	?	none	
Fairview	Local GW	1.9	none	
East URA	PWB	incl w/PWB	CoSS GW	
CLACKAMAS				
Lake Oswego	Clackamas River	16	PWB/SFWB	
West Linn (SFWB)	SFWB-Clackamas River	20	LO	
Oregon City (SFWB)	SFWB-Clackamas River	incl w/ West Linn	LO	
Oak Lodge WD	NCC-Clackamas River	8.5	none	
Mt. Scott WD	NCC-Clackamas River/CRW	incl. W/CRW	GW	2.1
Damascus WD	Local GW/NCC-Clackamas River	3.2	Mt. Scott	1.0
Clackamas River Water	Clackamas River	30	PWB	6.0-8.0
Gladstone	CRW	include w/ CRW	none	
Milwaukie	Local GW	6.7	CRW & Portland	
Canby	Molalla River	4	none	
WEST SIDE				
West Slope, VV,Bur,PH	PWB	incl w/PWB	CoSS GW/JWC	
Lake Grove	Bull Run/Local GW	incl w/PWB	CoSS GW	
TVWD (Wolfcreek)	PWB	incl w/PWB	JWC/CoSS	6
TVWD (Metzger)	PWB	incl w/PWB	CoSS	
Tigard	PWB	incl w/PWB	Lake Oswego	2-4
Raleigh	PWB	incl w/PWB	CoSS GW	
Tualatin	PWB	incl w/ PWB	CoSS GW	
Sherwood	Local GW	3	PWB	
Wilsonville	Local GW	5	none	
Beaverton	JWC	incl w/ JWC	PWB	
Forest Grove	JWC	incl w/ JWC	Clear Creek	2
Hillsboro	JWC	70	CG Slow Sand	3.5

SECTION 3 – DESCRIPTION OF THE REGIONAL SYSTEM

The metropolitan region is currently supplied, or will soon be supplied, by six major sources of water. Major sources are defined as those with a capacity of 10 mgd or greater. These major sources are:

- Portland's Bull Run supply;
- Portland's Columbia South Shore Well Field;
- The Joint Water Commission (JWC) Water Treatment Plant utilizing the Trask/Tualatin system;
- The Clackamas River utilized by four water suppliers (74.5 mgd existing treatment capacity);
- The Willamette River, currently under design and construction; and
- Local groundwater.

These sources, and the transmission and storage facilities that accompany them are shown in Figure 1-1, and are briefly summarized below.

EXISTING SUPPLY, TRANSMISSION AND STORAGE FOR THE REGION

Water in Portland's Bull Run watershed is stored in two main reservoirs with a total storage capacity of about 17 billion gallons. The Bull Run supply is then conveyed by gravity via three transmission pipelines (Conduits 2, 3 and 4) from the Headworks to a 50 MG reservoir on Powell Butte. The Conduits range in diameter from 44-inches to 66-inches. Transmission capacity of the three conduits ranges from 205 to 210 mgd depending on hydraulic conditions.

Portland's Columbia South Shore Well Field is located near the Columbia River between the Portland airport and Blue Lake Park. The firm emergency capacity of the Well Field is considered to be approximately 90 mgd. Water from each of the over 20 wells that make up the well field is pumped to a central Groundwater Pump Station. From there it is pumped to the Powell Butte Reservoir via a 60-inch diameter pipeline, where it can be blended with Bull Run water. The Well Field has historically been used by Portland only as an emergency supply when the Bull Run system is unavailable, and as peaking supply to meet summer demands on hot days or over a hot season.

The Joint Water Commission treats water withdrawn from the Tualatin River (including stored releases from Barney Reservoir and Hagg Lake) at a Water Treatment Plant in Forest Grove, and pumps it to the 20 MG Fernhill Reservoir. The existing capacity of the Water Treatment Plant is approximately 70 mgd. Water flows by gravity to Hillsboro, Beaverton,

Forest Grove and the Tualatin Valley Water District through a transmission system that ranges from 45-inch to 36-inch in diameter. JWC recently completed the first phase of a second transmission pipeline. This new transmission pipeline ranges from 72-inch to 66-inch in diameter and brings water more northerly than the existing transmission pipeline into the Tualatin Valley Water District system. It currently connects into the first JWC transmission pipeline in Hillsboro.

Clackamas River Water (30 mgd), the South Fork Water Board (20 mgd), the City of Lake Oswego (16 mgd) and North Clackamas County Water Commission (8.5 mgd) each have separate intakes and water treatment plants on the lower Clackamas River. Each facility has its own pumping, treatment, storage and transmission systems for delivery to its customers.

The Willamette River is currently being developed as a new source by the City of Wilsonville and the Tualatin Valley Water District. Other communities in southwest Washington County may also participate in the project. Anticipated initial capacity of the new water treatment plant is 10-15 mgd to serve Wilsonville, with an intake capacity of from 70 to 120 mgd. The initial project is scheduled to be completed in April 2002. If only the City of Wilsonville takes water from the plant initially, the initial transmission system may terminate within the City of Wilsonville near the water treatment plant. It is sized for 70 mgd. If other communities also decide to take water from the plant, a transmission line may be built further north.

Several water purveyors currently rely on groundwater as their primary source of supply. Some of these are the cities of Milwaukie, Wood Village, Fairview, Wilsonville and Sherwood and the Damascus Water District. Many other providers also rely on local groundwater for emergency backup or to meet peaking needs.

In addition to the transmission systems associated with these sources, the Portland system includes a major transmission pipeline from Powell Butte to eastern Washington County. This existing Washington County Supply Pipeline delivers Bull Run water from Powell Butte Reservoir under the Willamette River to west side customers including the Tualatin Valley Water District and the City of Tualatin.

POTENTIAL REGIONAL SYSTEM EXPANSIONS

The RWSP identified that most of the existing regional sources of supply have the potential of being expanded in the future should the need arise. However, it is not anticipated that local groundwater use will expand significantly. In fact, several of the communities utilizing local groundwater are under pressure to reduce water consumption from these sources by the Oregon Water Resources Department due to excessive drawdown in the aquifers from which they draw. This is why Wilsonville is moving to develop the Willamette River as a new water source.

Supply from the Bull Run could be expanded through construction of small raises of the existing dams or through construction of Bull Run Dam No. 3. This dam would double the storage capacity of the Bull Run system. A new supply conduit (Conduit 5) could be built to accompany Dam No. 3, or as a replacement and addition to the existing three Bull Run conduits. If constructed, Conduit 5 is likely to sized somewhere in the range from 150 to 500 mgd. The Portland Water Bureau also completed a Master Plan for the Powell Butte site that would allow the construction of up to three new 50 MG reservoirs at the same elevation as the existing Powell Butte Reservoir (530 feet) and a 20 MG reservoir at an elevation of 600 feet.

The Portland Water Bureau is currently in the process of investigating the expansion of the Columbia South Shore wellfield. Expansion of reliable capacity could be accomplished through drilling additional wells and/or aquifer storage and recovery using the Bull Run source. Expansion up to 120 mgd is being investigated.

The water treatment plant for the JWC Trask/Tualatin system is designed to be expanded to a 120 mgd peak day capacity and the planned future phases of the second transmission pipeline from that source are sized to carry that capacity. Anticipated ultimate peak season capacity of the JWC source is 70 mgd. The RWSP identified the Cooper Mountain area as a location for a future large (50 MG) storage reservoir at approximately the same elevation as the 530 feet Powell Butte reservoirs. Supply from the JWC system could be brought to this future reservoir.

All four water suppliers using the Clackamas River as a source have the potential for expanding their water treatment, storage and transmission systems. The RWSP showed potential expansions of up to approximately 140 mgd from this source. Applications for additional water rights to expand the withdrawals from the Clackamas River further are currently in process. Discussions are also underway about transmission interties between these Clackamas River suppliers. The RWSP also discussed a large storage reservoir (50 MG) along Forsythe Road on the south side of the Clackamas River. This location matched the elevation requirements of the 530 feet Powell Butte Reservoir. Other, lower elevation, reservoir sites have been discussed and are being explored among Clackamas providers. These reservoirs have been typically in the 10 to 20 MG range.

The existing water rights of Wilsonville and the Tualatin Valley Water District on the Willamette River would support an ultimate 120 mgd capacity from this source. To utilize this water, transmission capacity would have to be built to the north, to the proposed Cooper Mountain Reservoir, to the City of Tigard's 10 MG reservoir, or to other reservoir locations within the area served by the source.

The RWSP also identified other possible major supply sources not currently being used in the region. These were the Columbia River and Aquifer Storage and Recovery (ASR) using existing surface sources.

An intake, treatment plant, pumps and transmission pipeline could be constructed for the Columbia River near Troutdale to deliver water to parts of the region. Preliminary studies have recommended that this supply deliver its water south to Powell Butte Reservoir for service to potential consumers.

ASR systems have been studied in various sites around the region. ASR would be used as a peaking source during the summer months to supplement existing supplies. One major potential ASR system would be located in the Powell Valley area. Bull Run water would be the source for injection/extraction. A second major area could be located in the Cooper/Bull Mountain area. Both the JWC Trask/Tualatin and the Portland Bull Run sources could potentially serve this system for injection/extraction.

COMPARISON OF DEMAND TO SUPPLY

In the RWSP, the region was considered to essentially contain three main nodes – East, West and South. For purposes of this analysis, these primary demand nodes roughly correspond to Multnomah, Washington and Clackamas counties. The combined year 2050 peak day demands for these three nodes utilizing the demand numbers from Table 2-1 are shown in Table 3-1. Also shown in Table 3-1 are the major sources in those nodes and a rough approximation of their capacities. Several qualifiers are necessary on these source capacities:

- The capacity shown for the Bull Run is with current Conduits and Dams. The addition of Dam 3 and Conduit 5 would substantially increase the capacity from this source.

- The capacity for the Portland wellfield is the current, short-term reliable capacity. Improvements in the wellfield and aquifer storage and recovery (ASR) would increase this capacity.

- The current capacity of the Tualatin/Trask system is about 70 MGD. The 120 MGD capacity shown is the build-out peak day capacity. Peak season buildout capacity is currently around 70 MGD on this source.
- The Willamette River capacity assumes full build-out of existing water rights of the Tualatin Valley Water District and the City of Wilsonville.

- The Clackamas River capacity includes 89 MGD current capacity and 50 MGD future development, as shown in the RWSP. Other water right applications in process would increase this available capacity beyond that shown in Table 3-1.

- Local groundwater and small surface sources are also available in the region. These have not been included in source capacity estimates. ASR is currently being developed in Washington County and in Clackamas County and will increase the quantity of locally available groundwater.

As indicated in Table 3-1, each node is in approximate balance between demand and sources within the node to the year 2050, assuming that these sources are developed and utilized as planned over time. Currently, about half of the demand in the West node is served not by sources within that node, but by the Portland system.

Table 3-1
Peak Day Demands by Node

NODE	**YEAR 2050 PEAK DAY DEMAND (MGD)**	**MAJOR SOURCES WITHIN ZONE**	**SOURCE PEAK DAY CAPACITIES (MGD)**
EAST: Portland and Eastside	227	Bull Run CoSS GW	210 92
WEST: Washington Co.	253	Tualatin/Trask Willamette	120 120
SOUTH: Clackamas Co.	184	Clackamas	139

EMERGENCY SUPPLIES

For the purposes of this project, it is assumed that every water provider should have the capability of obtaining an emergency source of water in case its primary source is unavailable for any reason. The capacity of this emergency source should meet average annual demand. This would provide water for typical domestic, commercial and industrial use even during the emergency. Other levels of emergency supply (such as minimum winter demands, seasonal demands, or some fraction of average annual demand) are possible and should be evaluated on a project-specific basis if desired.

Table 3-2 identifies the primary and emergency sources of supply for each water provider in the region. Most providers in the region currently have access to some emergency backup supply, with some exceptions. Most of these exceptions would be eliminated if the Willamette River Water Treatment Plant and an interconnection between water treatment plants in the Clackamas Basin were completed.

Use of some of these emergency sources shown in Table 2-3 is based upon interties between water systems. The main existing interties that are currently active between water systems in the region that are not used routinely as water supply connections are:

- CRW – PWB: 4 mgd

- Milwaukie – PWB: 2 mgd (inactive)
- Milwaukie – CRW: 2 mgd
- Milwaukie - Oak Lodge WD: 2 mgd (inactive)
- Lake Oswego – PWB: 1 mgd
- Lake Oswego – West Linn (SFWB) – 5 mgd
- Beaverton- PWB: 2 – 4 mgd
- Beaverton – TVWD – 4 mgd
- Beaverton – Tigard – 1-2 mgd
- Tigard – Lake Oswego: 4- 8 mgd
- Tigard – TVWD: 2 mgd

Although most providers in the region have access to some emergency source of water, there are limitations on these emergency connections. In some cases, (such as for those providers on the Portland system), the capacity of the emergency source may not meet current annual average demands. For others, such as the suppliers in the Clackamas Basin, the emergency supply is simply another supplier using the Clackamas River. Thus, if the Clackamas River is lost as a source for any reason, emergency supplies would not be available.

An approach to strengthening emergency connections in the region would be to assure that every water provider has access to both a primary source of supply that is one of the six major regional sources, and to a secondary source of supply that is another of the six major regional sources of supply. Table 3-3 summarizes how the region currently looks from this perspective on the general nodal basis utilized in Table 3-1. Several comments on Table 3-3 are appropriate:

- It is assumed that the type of emergency events that is likely to interrupt supply from the Bull Run watershed is not likely to interrupt supply from the Columbia South Shore wellfield, and visa versa. This assumption has recently been verified by the Portland Water Bureau in a System Vulnerability Study.

- Because there is currently no connection planned between the JWC Trask/Tualatin system and the new Willamette River system, these sources currently will not provide emergency backup to each other. Connecting these sources would provide that backup.

- Planned interconnections of Clackamas Basin water systems would improve reliability of systems, but would still not provide water in case there was a spill or other problem that prevented the Clackamas River to be utilized as a source.

- ASR systems being developed in Portland, Washington County and Clackamas County will improve provide additional emergency supplies similar to local groundwater.

Table 3-3
Annual Average Demands (Emergency Demands) by Node

NODE	CURRENT AVERAGE ANNUAL (EMERGENCY) DEMAND (MGD)	CURRENT EMERGENCY SOURCE FOR NODE	CURRENT EMERGENCY SOURCE CAPACITY (MGD)
EAST: Portland and Eastside	95	CoSS GW	92
WEST: Washington Co.	60	Local GW and Surface Water	15
SOUTH: Clackamas Co.	33	Local GW and Surface Water	10

Table 3-3 shows that the emergency demand for the East Node is slightly greater than the existing capacity of the Columbia South Shore wellfield. This shortfall will increase over time. Increased wellfield capacity or a connection to the Clackamas suppliers would alleviate this shortfall. In the West Node, a strengthened connection to the Portland system or development of the Willamette source and interconnection between the JWC and Willamette system would eliminate any emergency backup shortfalls. In the South Node, a connection would be required to either the Portland system or to the West Node supplies in order to meet the criteria of a separate emergency source for the node.

However, requiring the emergency source to a completely separate source from the primary source may be too stringent of a criterion. This criterion could be relaxed to also allowed connections to some other water supplier with its own source capacity, even if that source capacity was on the same source. Then, the shortfalls in emergency supplies would be

eliminated in the South Node through an interconnection of the water treatment plants in that basin.

SECTION 4 – EVALUATION CRITERIA

BASIS OF THE EVALUATION CRITERIA

Material from the RWSP, the Portland Water Bureau's Infrastructure Master Plan project (*Stakeholder Interviews and Values Assessment* and final criteria), and the November 1998 Regional Transmission Workshop was reviewed for information relating to issues and applicable evaluation criteria. Issues were identified from these materials ("potential benefits", "criteria", "messages", "information necessary for decision making", etc.) that could form the basis of evaluation criteria and desired outcomes for the Transmission and Storage Strategy.

Table 4-1 summarizes the issues gleaned from these planning processes, and indicates the source from which they were extracted. Note that an 'x' in the table only indicates some mention of the issue in the document reviewed. In the initial screening of issues, no attempt was made to discern the relative importance of each issue within the planing process.

It is interesting to note which issues were mentioned most frequently. The two dimensions of reliability were mentioned in all four planning efforts. The issues of efficiency, water quality, cost, and operating flexibility were mentioned in three of these projects. This is an indication of the importance of these issues to water supply planning.

KEY EVALUATION CRITERIA

From the draft list of criteria shown in Table 4-1, a list of thirteen potential issues and criteria was developed. A brief explanation of each criterion was developed by the Project Team and was reviewed by the CTSC and the CTC. Final draft versions of the criteria were reviewed by the SPC and the Consortium Board.

A final version of the key issues and evaluation criteria is given below.

Efficiency. Maximize the use of current supplies before developing new ones.

"Weather-driven" reliability. Minimize future daily and seasonal shortages, including their magnitude, frequency, duration, and number of agencies affected, that result from existing supplies and infrastructure not being able to serve demands.

Emergency reliability. Minimize future shortages, including their magnitude, frequency, duration, and the number of agencies affected, that result from unexpected failure of supplies or facilities due either to catastrophic events or other causes.

Water quality. Meet regulatory drinking water standards for all water delivered to all providers. Maximize the ability of individual providers to choose the source(s) of delivered waters. Maximize consistency among providers and over time of delivered water quality. Minimize adverse water quality impacts within the transmission and storage system.

Transmission and Storage Cost. Minimize cost to the region. Maximize the perceived fairness of the manner in which costs are shared among the region's water providers.

Source Cost. Minimize the cost of source development.

Transmission and Storage Environmental Impact. Minimize adverse environmental impacts due to construction and long-term operation of the facilities. Maximize environmental benefits.

Source Environmental Impact. Minimize adverse environmental impacts of source development. Maximize the environmental benefits.

Regional operating flexibility. Maximize the ability to use water from various sources in order to meet demands throughout the region.

Long-term system development. Minimize the foreclosure of long-term supply and infrastructure options due to near-term actions.

Ability to meet immediate local needs. Minimize limitations on local agencies' abilities to meet their short-term needs.

Legal/regulatory feasibility. Minimize legal and regulatory hurdles. Facilitate regional growth goals, standards, and requirements.

Institutional/financial feasibility. Minimize the magnitude and difficulty of required institutional changes. Minimize the difficulty of reaching agreement on regional/local control issues.

Table 4-1
Key Issues Cited in Prior Planning Efforts

Issue	RWSP	IMP Stakeholder Interviews & Values Assessment	IMP Criteria	Reg. Trans. Workshop
Efficiency	x		x	x
"Weather-driven" Reliability	x	x	x	x
Emergency Reliability	x	x	x	x
Water Quality	x	x	x	
Cost	x		x	x
Environment	x		x	
Regional Operating Flexibility	x		x	x
Regional System Development Flexibility	x			x
Ability to Meet Immediate Local Needs				x
Technical Feasibility			x	
Legal/Regulatory Feasibility	x		x	
Institutional/Financial Feasibility			x	x

SECTION 5 – PRELIMINARY STORAGE AND TRANSMISSION SCENARIOS

This section presents the preliminary scenarios that have been developed for future regional transmission and storage alternatives. Four basic scenarios were developed. They were selected to represent a broad range of various options that each has a different vision for regional transmission and storage. In addition to the four scenarios, a "base case" representing the existing situation is included for comparison purposes. Projected water demands to the year 2050 form the basis for facility sizing under each scenario. These demand estimates have been presented in Section 2.

TRANSMISSION SYSTEM SIZING CRITERIA

Transmission main sizing criteria were developed as part of Phase 2 of the Regional Water Supply Plan (RWSP). These criteria have been used to size alternative transmission system elements. These criteria assume friction losses of 1 foot per 1,000 feet using a Hazen-Williams roughness coefficient, or C-factor of 130. Table 5-1 summarizes the relationship between pipe diameter and capacity. A description of transmission main sizing for each scenario is also given below.

For many of the pipelines discussed in this Section, there are multiple potential routes for actual pipeline construction. Some of these alternative routes are shown on the Figures in this section. The specific routing for each pipeline should be determined through more detailed study of options and negotiations among those water providers participating in actual project construction.

PRELIMINARY SCENARIOS

THE BASE CASE

Alternative scenarios are compared against the current transmission system, here called the Base Case. The Base Case includes major supply from the Bull Run and Columbia South Shore Wellfield in Multnomah County, from the Joint Water Commission in Washington County, and from the Clackamas River from four water providers. The Base Case is illustrated in Figure 5-1. The Base Case includes not only the existing transmission system, but also several transmission facilities that various water providers in the region have already committed to building in the future. While some of these projects may not be constructed for a long time, they are nevertheless considered as "givens" from the point of view that planning for additional facilities should consider these facilities as if they were certain to happen. These planned facilities are:

Figure 1-1 withheld for security purposes pursuant to ORS 192.502 (22) and (23).

Figure 5-1 withheld for security purposes pursuant to ORS 192.502 (22) and (23).

- a new 72-inch diameter line from the Joint Water Commission to the Tualatin Valley Water District (TVWD),
- a new 96-inch diameter Conduit from the Bull Run to the City of Portland,
- a 60/54-inch diameter Willamette transmission line north from Wilsonville to Tualatin, and
- a 24-inch interconnection between some of the water treatment plants on the Clackamas River.

SCENARIO 1 - HOLISTIC APPROACH

Scenario 1 reflects the concepts developed as part of the RWSP, which envisioned major regional water supply sources connected to regional storage facilities, through a transmission system which allowed each local provider to ultimately use one or more of all of the supply sources to meet peak season and peak day demands. The model for this approach is the electrical power grid system, whereby a transmission network is established that allows various source generation facilities to be utilized by customers. Transmission system components are sized to deliver excess source capacity throughout the region. Figure 5-2 illustrates transmission main routes and sizes for Scenario 1. Shown in this Figure and in subsequent Figures in this Section, is the transmission pipeline route that is considered the primary route, along with various secondary options that have been suggested.

Estimated costs for this scenario are shown in Table 5-2.

Figure 5-2 withheld for security purposes pursuant to ORS 192.502 (22) and (23).

Table 5-1
Transmission Main Capacity and Diameter Summary

Pipeline Capacity (Million Gallons Per Day)	Pipeline Diameter (Inches)
0.9	12
1.8	16
2.5	18
3.3	20
5	24
10	30
15	36
25	42
35	48
45	54
60	60
75	66
95	72
145	84
200	96
280	108
365	120
470	132
590	144

Table 5-2
Estimated Costs for Scenario 1

Transmission Main Segment Description	Length (feet)	Transmission Main Diameter (inches)	Unit Cost ($/diam in/ft)	Unit Cost ($/lf)	Total Project Cost
Powell Butte/Clackamas Corridor	55,000	96	14.90	$1,430	$78,670,000
Clackamas/Tualatin Corridor	60,000	60	16.46	$988	$59,262,000
Tigard/Cooper Mt. Corridor	36,000	48	12.52	$601	$21,626,000
Willamette River/Cooper Mt. Corrid	90,000	60	15.02	$901	$81,081,000
TV Hwy/Cooper Mt. Corridor	26,000	60	13.55	$813	$21,140,000
Cornelius Pass Road Corridor	21,000	60	13.55	$813	$17,075,000
TV Highway Corridor	16,000	60	15.54	$932	$14,914,000
Washington Co. Reservoir	1	50 MG	0.50/gal		$25,000,000
Clackamas Co. Reservoir	1	50 MG	0.50/gal		$25,000,000
Total					**$343,768,000**

These costs are of planning-level accuracy, and include construction, engineering, and administrative costs and contingencies. They are based upon information from the RWSP concerning costs for constructing pipelines in corridors in the region.

Major transmission main elements are sized as follows:

- *Powell Butte to Clackamas* - Transmission piping is sized to deliver approximately 270 million gallons per day (mgd) of capacity from the City of Portland's water system to the region via the Clackamas Basin area. Based on the sizing criteria presented in Table 5-1 a 108-inch diameter transmission main is needed to transmit this flow. Allowing for favorable hydraulic conditions from the 530-foot elevation Powell Butte Reservoir to lower reservoirs in Clackamas and Washington County, a 96-inch diameter transmission main is assumed for this connection.

- *Clackamas to Tualatin* - Transmission piping is sized to serve Portland water or Clackamas water to the west. With available supplies of approximately 86 mgd, which is the difference of Portland's available supply of approximately 270 mgd less the Clackamas providers year 2050 peak day demand of approximately 184 mgd, a 60-inch diameter transmission main is assumed for this corridor. This size results in higher headlosses than 1 foot per 1,000 feet, however, it also allows for potentially favorable hydraulic conditions.

- *Willamette River Water Supply* - Transmission piping is sized to deliver a Willamette River water treatment plant capacity of approximately 120 mgd to the region. Specific transmission main sizes were developed as part of the Willamette River Water Supply System Preliminary Engineering Report.

This scenario assumes that new regional storage reservoirs would be built in Washington and Clackamas Counties in order to smooth operation of the regional system It also assumes that interconnections between Clackamas basin water treatment plants are available to handle the quantities of water transferred under this scenario.

SCENARIO 2 - PRIMARY SOURCE WITH EMERGENCY BACKUP

This scenario reflects a primary and emergency source approach where each local provider develops or selects its own primary water supply source from one of the region's six major sources. Each provider also independently or jointly develops emergency average day demand backup supplies from a second, separate source that is another of the region's six major sources. Transmission system components are sized to deliver these primary and emergency backup supplies. Figure 5-3 illustrates transmission main routes and sizes for Scenario 2. Specific transmission main elements are sized as follows:

Powell Butte to Clackamas - Transmission piping is sized to deliver approximately 60 mgd of emergency backup capacity needs from north to south. This capacity is equal to the Clackamas area users year 2050 average day demands without Lake Oswego, Canby and Milwaukie, all of whom have other emergency backup supplies. Favorable hydraulic conditions allow a reduction of the transmission main size to 54 inches in diameter to transmit the 60 mgd flow. This scenario assumes that interconnections between Clackamas basin water treatment plants are available to handle the quantities of water transferred under this scenario.

- *Willamette River Water Supply* - Transmission piping is sized to deliver a treatment plant capacity of approximately 60 mgd from south to north. West-side average daily demands are approximately 114 mgd in the year 2050. The west side can be supplied with approximately 60 mgd from Joint Water Commission facilities and with approximately 60 mgd through the Washington County Supply Line. An additional 60 mgd of transmission capacity from a Willamette River supply, combined with local

Figure 5-3 withheld for security purposes pursuant to ORS 192.502 (22) and (23).

transmission system interconnections, will provide primary and emergency supplies to this area's water providers.

Estimated costs for this scenario are shown in Table 5-3.

Table 5-3
Estimated Costs for Scenario 2

Transmission Main Segment Description	Length (feet)	Transmission Main Diameter (inches)	Unit Cost ($/diam in/ft)	Unit Cost ($/lf)	Total Project Cost
Powell Butte/Clackamas Corridor	55,000	54	12.63	$682	$37,506,000
Tigard/TVWD Corridor	30,000	48	13.34	$640	$19,204,000
TV Highway Corridor	16,000	54	15.22	$822	$13,149,000
Cornelius Pass Road Corridor	21,000	60	13.55	$813	$17,075,000
Total					**$86,934,000**

These costs are planning level accuracy costs that include construction, engineering, and administrative costs and contingencies. They are based upon information from the RWSP concerning costs for constructing pipelines in corridors in the region.

SCENARIO 3 - ZONAL SOURCE

Scenario 3 reflects the development and use of regional storage and transmission facilities to serve zonal supply sources developed to their maximum capacity. The regional transmission and storage facilities are sized to serve two specific geographic areas, east and west, from these sources. The east zone is served from the Portland and Clackamas River supplies and the west zone is served from the Joint Water Commission and Willamette River supplies. The dividing line between the east and west zones is the west slope of the West Hills that run south from Portland through Lake Oswego and West Linn. Transmission main routes and sizes are illustrated in Figure 5-4.

Estimated costs for Scenario 3 are shown in Table 5-4.

These costs are planning level accuracy costs that include construction, engineering, and administrative costs and contingencies. They are based upon information from the RWSP concerning costs for constructing pipelines in corridors in the region.

Specific transmission main elements are sized as follows:

- *Powell Butte to Clackamas* - Transmission piping is sized assuming that current capacities of existing Clackamas River supplies of approximately 90 mgd are maintained, and that meeting the area's 2050 peak day demand of approximately 184 mgd is provided by transmission from the north. The transmission system is therefore sized to provide the difference, or approximately 94 mgd. Based on assumed sizing criteria a 72-inch diameter main is required. Given favorable existing hydraulic conditions this diameter can be reduced to approximately 54 inches in diameter. This reduced transmission main size also anticipates that additional increments of treatment plant capacities will be developed by the Clackamas area water providers by the year 2050.

- *Willamette River Water Supply* - Year 2050 west side peak day demands are estimated at approximately 253 mgd. Anticipating that the Joint Water Commission will deliver approximately 120 mgd to the west side providers and that the Willamette River supply system would also be developed to deliver approximately 120 mgd results in a need for approximately 13 mgd of additional supplies. It is anticipated that this additional 13 mgd of capacity can be provided through existing or future east to west interconnections.

This scenario assumes that new regional storage reservoirs would be built in Washington and Clackamas Counties in order to smooth operation of the regional system. It also assumes that interconnections between Clackamas basin water treatment plants are available to handle the quantities of water transferred under this scenario.

Figure 5-4 withheld for security purposes pursuant to ORS 192.502 (22) and (23).

Table 5-4
Estimated Costs for Scenario 3

Transmission Main Segment Description	Length (feet)	Transmission Main Diameter (inches)	Unit Cost ($/diam in/ft)	Unit Cost ($/lf)	Total Project Cost
Powell Butte/Clackamas Corridor	55,000	54	12.63	$682	$37,505,600
Willamette River/Cooper Mt. Corridor	90,000	60	15.02	$901	$81,081,000
TV Hwy/Cooper Mt. Corridor	26,000	60	13.55	$813	$21,140,000
Cornelius Pass Road Corridor	21,000	60	13.55	$813	$17,075,000
Tigard/TVWD Corridor	30,000	60	15.54	$932	$27,963,000
TV Highway Corridor	16,000	60	15.54	$932	$14,914,000
Washington Co. Reservoir	1	50 MG	0.50/gal		$25,000,000
Clackamas Co. Reservoir	1	50 MG	0.50/gal		$25,000,000
Total					**$249,678,600**

SCENARIO 4 - INTERCONNECTED SUBREGIONAL SUPPLY

This scenario reflects the ultimate development of existing sources and supplies to serve expanding water demand needs. Included under this scenario is the further interconnection of City of Portland, Trask/Tualatin and Clackamas Rivers supplies as well as an east to west connection of existing Clackamas River supplies. This scenario assumes that interconnections between Clackamas basin water treatment plants are available to handle the quantities of water transferred under this scenario.
Figure 5-5 illustrates Scenario 4 transmission mains and sizes.

Specific transmission main elements are sized as follows:

- *Powell Butte to Clackamas* - Transmission piping is sized to deliver approximately 60 mgd to the Clackamas area and areas to the west. This capacity approach reflects the general assumptions developed by the City of Portland in its December 1998 proposal to serve west -side water providers.

Figure 5-5 withheld for security purposes pursuant to ORS 192.502 (22) and (23).

- *Willamette River Water Supply* - This scenario anticipates the development of a Willamette River water supply system that may have an initial treatment capacity capable of serving the needs of local water providers with the possibility of potential oversizing of certain supply system features. Local west-side interconnections are anticipated to transmit supplies from the east and/or south.

Estimated costs for Scenario 4 are shown in Table 5-5. These costs are planning level accuracy costs that include construction, engineering, and administrative costs and contingencies. They are based upon information from the RWSP concerning costs for constructing pipelines in corridors in the region.

Table 5-5
Estimated Costs for Scenario 4

Transmission Main Segment Description	Length (feet)	Transmission Main Diameter (inches)	Unit Cost ($/diam in/ft)	Unit Cost ($/lf)	Total Project Cost
Powell Butte/Clackamas Corridor	55,000	60	12.89	$774	$42,546,000
Clackamas/Tualatin Corridor	60,000	60	16.46	$988	$59,262,000
Willamette River/Tigard Corridor[1]	58,000	60/57/54/48	varies	varies	$41,321,000
Cornelius Pass Road Corridor	21,000	60	13.55	$813	$17,075,000
Tigard/TVWD Corridor	30,000	48	13.34	$640	$19,204,000
TV Highway Corridor	16,000	54	15.22	$822	$13,149,000
Total					**$192,557,000**

1. Option 1 from Table 3-17 of the Willamette River Water Supply System Preliminary Report.

SUMMARY OF REGIONAL PIPELINES AND RESERVOIRS

The RTSS planning process will evaluate four new transmission scenarios, in addition to the current, or base case. The base case describes the existing system, plus currently planned transmission improvements by the JWC, by the City of Portland and by the Willamette River users.

Table 5-6 summarizes the required sizes of pipeline segments under the base case and the four alternative scenarios. The Table also specifies the new regional storage facilities under each condition.

TABLE 5-6
SUMMARY OF PIPELINE DIAMETERS IN INCHES
AND REGIONAL RESERVOIRS

Pipeline Segment	Baseline	Scenario 1 Holistic	Scenario 2 Emergency Backup	Scenario 3 Zonal	Scenario 4 Interconnected Subregional
Conduit 5	96	96	96	96	96
Willamette Supply Phase I	60/54	60/54	60/54	60/54	36/39
JWC Supply II	72	72	72	72	72
JWC/TVWD Intertie	48	48	48	48	48
Powell Butte / Clackamas	none	96	54	54	60
Clackamas / Wash. Co	none	60	None	none	60
Willamette Supply Phase II	none	60	None	60	None
JWC/Willamette Intertie	none	60	48	60	48
JWC/WCSLI Intertie	none	60	54	60	54
Wash. Co Regional Storage	none	Yes	None	Yes	None
Clackamas Regional Storage	none	Yes	None	Yes	None

The potential scenarios under consideration span a spectrum of options, from the complete flexibility (and highest cost) offered by Scenario 1, to the more restrained vision of Scenario 2. Points in between these two ends of the spectrum are also considered in Scenarios 3 and 4.

SECTION 6 – INSTITUTIONAL AND FINANCING CONCEPTS

Development of a regional transmission and storage strategy may require the creation or expansion of governance institutions, and can entail new financial commitments by the participating water providers. Understanding the institutional and financial options available to facilitate a regional strategy is critical to the participants' collective decision on a preferred approach.

Selection of an appropriate institutional model and a sound financial structure are, of course, inextricably linked to the selection of a desired transmission/storage scenario. Some institutional and financial approaches are best suited to specific scenarios; others are relatively flexible and universally applicable to any favored scenario. Further, some institutional and financial alternatives complement one another, while other combinations may be unworkable for legal, economic, or political reasons. These interdependencies necessarily result in a number of "chicken-and-egg" relationships between service scenarios, institutional options, and financing structures.

This section of the report identifies the major institutional alternatives available for implementation of a regional transmission and storage strategy. The discussion includes the institutional options' relative applicability to the four scenarios identified in Section 5. Discussion then turns to the financial structure of the regional strategy, including an analysis of the rate and charge instruments available to pay for the regional transmission/storage strategy.

INSTITUTIONAL ALTERNATIVES

Creating a new regional water transmission/storage strategy will require establishing a management structure with the responsibility to operate and maintain system facilities and make decisions regarding system development and financing. Selection of an appropriate institutional structure is based on several criteria. Consortium participants considered the following factors for selection of a preferred governance structure:

Statutory Authority. Does the statutory authority exist to allow a governance option and provide necessary powers? If so, what process is necessary to implement that option?

Ownership and Control. Do participants in a regional strategy retain control of the new institution(s), if any? Do participants retain ownership rights of their own or collectively-owned regional transmission/storage assets?

System Expansion. Does the institutional structure provide a reasonable mechanism for future expansion? Can and/or should agencies be required to participate in future expansions, and under what terms or provisions?

Decision-Making Structure. Can a decision-making structure provide equitable representation to all participants?

Financing Capability. Does the institutional structure provide adequate capacity to finance necessary capital improvements? Does it offer the option of central or local financing of project costs? Does it allow for equitable recovery of operating and maintenance costs through rates and charges?

Bearing these criteria in mind, this study focused on five general institutional structures currently available under Oregon statutes:

1. Multi-Agency Intergovernmental Cooperative Agreement
2. Bilateral Intergovernmental Agreement
3. Independent Central Agency
4. County-Run Special Service District(s)
5. Metro

Each of these structures offers unique features, benefits and drawbacks. As indicated above, the relative appeal of each depends to a great extent on the transmission/storage scenario selected. The first alternative—a Multi-Agency Intergovernmental Cooperative Agreement—is recommended for further consideration as the Consortium continues planning the regional transmission/storage strategy. The reasons for this recommendation and descriptions of the other alternatives are laid out briefly below and in greater detail in tables 6-1 and 6-2.

Multi-Agency Intergovernmental Cooperative Agreement. Chartered under ORS 190, this option is relatively simple to implement. Under ORS 190, a new organization is formed by several participating agencies, but no separate legislation is required at the State level. This is the organizational model utilized by the Hillsboro, Beaverton, Forest Grove and Tualatin Valley Water District's "Joint Water Commission." It is also the structure contemplated for operation of the Willamette Regional Water Supply System.
Through interlocal agreements, this option has the flexibility needed to address virtually all of the concerns of the participating agencies. The partnered jurisdictions or joint agency can own assets, issue revenue bonds, hire staff, contract with private companies to operate and maintain its system, and can be expanded to include new partners as appropriate. An ORS 190 joint agency may impose rates and fees on its member agencies or directly on its members' retail customers. Joint agencies may not levy taxes nor issue General Obligation bonds, which means that these sources of low cost capital would not be available to the partnership or agency, except by way of individual partner funding mechanisms. Governance systems and procedures are established through the interlocal agreement that creates the joint agency. The only major restriction on governance under ORS 190 is that representatives from the participating agencies—not an independently elected body—must control the agency.

This option is appealing for the regional water transmission/ storage strategy because of its flexibility. As seen in table 6-2, the Multi-Agency Intergovernmental Cooperative Agreement is a viable institutional alternative under any of the four service scenarios. Table 6-4 shows that this option also allows for any of the financing instruments discussed in this report (discussed further, below). A consensus in favor of this institutional model developed through the RTSS planning process and discussions with Consortium members. It was generally agreed that this alternative offered the greatest array of options for developing detailed system guidelines. Moreover, this alternative allows relatively easy "evolution" to accommodate future changes in institutional scope or mission. Finally, Consortium members expressed a strong desire to retain local representation and control while entering into the regional strategy. An intergovernmental agreement organized under ORS 190 provides the best opportunity to balance these competing governance values.

Bilateral Intergovernmental Agreement. Also chartered under ORS 190, this option may be the simplest to implement of the five options addressed herein. Under this option, an individual agency would enter into a ORS 190 agreement with another agency when such cooperation is deemed mutually beneficial to the two partners. Individual jurisdictions could participate in a number of such agreements simultaneously, each with its own rules and authority defined in individual bilateral agreements. This alternative would not result in creation of a new agency, but rather would establish guidelines for cooperation between pairs of existing agencies. This institutional option may be effectively in place already for some Consortium members.

It is important to note that the difference between the Bilateral and Multi-Agency Intergovernmental Agreement options is not statutory (both are organized under ORS 190), but rather a difference in the content and membership of the agreement.

Bilateral agreements as defined here would be inappropriate for all but transmission Scenarios 2 and 4 (see Table 6-2), since the others generally require multi-agency cooperation and/or a central agency for implementation. However, a series of Bilateral Intergovernmental Agreements would be appropriate should the Consortium select service Scenario 4. Thus, this institutional structure is recommended for further consideration, but not necessarily recommended for adoption.

Independent Central Agency. "Independent Central Agency" is a generic term applied here to represent any institutional structure organized under ORS 261, 264, 450, or 552, the key feature of which is an independently elected governing body. An Independent Central Agency would have the authority to perform all planning, operating, maintenance, and investment functions of a municipal special service district. Such an entity could impose taxes, as well as rates and charges for services. It would also have the power to enter into its own ORS 190 Intergovernmental Agreements with other agencies.

An Independent Central Agency would offer at least two important advantages. First, such an agency could easily provide for central financing of system capital improvements.

Second, its status as an independently elected governing body would make regional transmission/storage an immediate regional priority, whose mission could also eventually widen to include water supply. However, creation of an Independent Central Agency necessarily would diminish the authority of existing local agencies to "control their own destinies" in the regional water transmission/ storage strategy.

One or more Independent Central Agencies would be most consistent with service Scenarios 1 or 3. These scenarios require more powerful central decision-making. An Independent Central Agency would be inappropriate for Scenarios 2 and 4 (see Table 6-2). This institutional alternative is recommended for further consideration corollary to service Scenarios 1 and 3, but not necessarily recommended for adoption.

County-Run Special Service Districts. ORS 451 allows for creation of a special district for water-related services to be governed by an existing County board of commissioners. This alternative is not recommended for further consideration because the Consortium's members lie within more than one county in Northwest Oregon. While ORS 451 allows for multi-county Special Service Districts, such an arrangement would require one or more counties to cede authority to another county commission. Fair representation for all stakeholders would be difficult—if not impossible—under such an arrangement.

Metro. The enabling legislation that created Metro (the Metropolitan Portland Service District) includes a provision that would allow Metro to become a regional water supply, storage and transmission authority. Under this alternative, individual agencies would cede ownership and/or control of regional storage and transmission facilities to Metro, which would become the effective regional authority for water transmission and storage. This alternative is not recommended for further consideration at this time because Metro's scope and mission may be too broad for most of the service scenarios under consideration. Representation in Metro's decision-making board may also be inconsistent with the service areas envisioned in this study.

FINANCIAL STRUCTURE

As noted in the introduction to this section, the most desirable financial structure for the regional transmission/storage strategy depends to a great extent on the service scenario and institutional structure selected. Recommending one or more financing instruments at this stage of the planning process would be premature. However, a general discussion of regional financing and the methods at the disposal of the Consortium is appropriate and useful.

Existing Facilities Capital Cost. Some immediate contribution of existing local capital facilities into a regional pool is a logical outcome of some of the service scenarios presented in Section 4. Under such a scheme, it is likely that member agencies' contributions will be unequal; that is, some agencies will have more to contribute than others will. Given this

condition, the Consortium should consider ways of "equalizing" members' value in the regional system, either through rate surcharges on "under-contributors" (discounts or credits for "over-contributors") or through cash buy-in charges for under-contributing agencies.

New Facilities Capital Cost Allocation Principals. The capital costs of the regional transmission/ storage system may be allocated to member agencies in a number of ways. Given the general water demand patterns in the region and the fact that regional transmission and storage are by nature needed during peak periods, we recommend that capital costs be allocated according to members' relative historical peak demands. Peak demands may be measured in terms of daily demand (millions of gallons per day), peak season volumes, or another similar metric.

Operation & Maintenance Cost Allocation Principals. The O&M costs of the regional transmission/storage system may be allocated to member agencies in a number of ways. Given that the O&M costs of transmission/storage facilities (as distinct from supply facilities) are relatively fixed, it is recommended that O&M costs be allocated similarly to the capital costs (see above).

Definition of Ownership and Capacity Interests. If the regional system is developed under an ORS 190 intergovernmental agreement, regional ownership rights provided to member agencies should be sufficiently robust to facilitate local debt issuance in support of needed capital improvements and/or local SDCs. If organized under a central agency, County Special Service District, or Metro, the regional system must establish clear and precise rules for transfer of asset ownership to the new regional authority.

Further, the regional system should provide member agencies with explicit capacity rights that define transmission/storage resources that they may rely upon for their individual water system planning. Depending on the institutional structure and service scenario selected, it may be appropriate to assign explicit shares of the regional system to specific member agencies. Alternatively, a strong central agency might choose to offer simple "open access" to all members; that is, the central agency would charge local agencies for actual use of the regional system on-demand, with no specific shares assigned to specific local agencies.

Latecomers. The regional transmission/storage strategy should include a mechanism for adding new members in the future. Adding new participants should require the approval of the regional system's governing body. Latecomers should not adversely impact existing regional system members and should be required to pay charges to compensate other system members for their risks in establishing the regional system.

Participation in System Expansions. The Consortium should establish clear processes to handle members' participation in investments when elements of the regional transmission/ storage system require expansion or improvement. In general, member agencies should not be "forced" to pay for expansions that they do not need. Members overutilizing their allocated capacity from the regional system should be "first in line" to contribute to system expansions. Simultaneously, member agencies that balk at paying for improvements only to

require additional capacity later should pay a significant premium for additional capacity burdens placed on the system.

Rate Design. A regional transmission/storage system would have a number of rate and charge instruments at its disposal under Oregon law. The legality and/or propriety of any charge or suite of charges will depend, of course, on the service scenario and institutional model adopted. The next subsection examines seven of the most likely financial instruments used to pay for the regional strategy.

RATES & CHARGES

Ideally, a rate and charge regime would recover from each user of the regional system exactly the costs necessary to operate, maintain, and develop the system for each individual user. In crafting rates and charges for regional transmission and storage, the Consortium should bear this ideal in mind and develop a package of rate instruments that best approaches the "true" cost of service. Simultaneously, the Consortium must bear in mind that some sources of revenue (e.g., system development charges) are relatively volatile and may subject a regional entity to financial instability if relied upon for major funding. Thus, the Consortium must balance the competing values of revenue stability against equity in cost recovery. It is likely that a mix of the several instruments discussed herein is the most favorable.

Bearing these criteria in mind, this study focused on seven general financing instruments currently available under Oregon statutes:

1. Volume Charges
2. Capacity Charges
3. Membership Dues
4. Buy-in & Buy-out
5. Regional System Development Charges
6. Local System Development Charges
7. Capacity Leasing

Each of these structures offers unique features, benefits and drawbacks. As indicated above, the relative appeal of each depends to a great extent on the transmission/storage scenario selected. Descriptions of these instruments are laid out briefly below and in greater detail in Tables 6-3 and 6-4.

Volume Charges. The term "volume charges" applies to any charge paid according to the volume of metered water delivered through the regional transmission/storage system to an individual member. Charges reflect actual—rather than theoretical—use of the regional resource, and can provide some conservation incentive. However, volume charges do not recognize costs associated with the *pattern* of use (i.e., peaking). Further, volume charges can be a volatile revenue base: during rainy summers the regional agency may collect very little in

volume charges. Volume charges are generally best for recovering costs that vary with volume use and for promoting conservation, but their volatility makes volume charges a relatively poor instrument for recovering capital and other fixed costs.

Volume charges could apply under any service scenario or institutional structure (see Table 6-4).

Capacity Charges. Members of a regional system would pay capacity charges that would entitle them to a "share" of regional capacity. Capacity charges could be based either on historical volume use or pattern of use of the transmission/storage system. Capacity charges also could apply to various customers according to the relative transmission burden (in terms of distance) that they place upon the regional system. That is, relatively far-off, isolated members might pay more than customers located close to the geographic "center" of a regional transmission/storage system. Charging this way reflects most utilities' generally fixed cost of service. Penalty charges would apply for use of the system beyond purchased capacity. Capacity charges provide a very stable revenue base, and can provide a conservation incentive when set according to members' peaking pattern. Capacity charges are best for collecting fixed costs, such as capital debt service and ordinary maintenance.

Capacity charges could apply under any service scenario or institutional structure (see Table 6-4).

Membership Dues. Membership dues apply on a "flat-rate" per member or according to each member's retail customer base. Dues are most equitable for recovering the general "overhead" administrative costs of a regional system, and are a very stable source of revenue. Membership dues are generally poor instruments for collecting the general costs of a utility, since membership usually bears little relationship to the overall costs of the system.
Membership dues could apply under any service scenario except Scenario 4. Either Multi-Agency Intergovernmental Agreements or Bilateral Intergovernmental agreements could also employ membership dues (see Table 6-4).

Buy-in & Buy-Out. A cash payment "Buy-in" or "Buy-out" can be appealing for an organization seeking to consolidate assets and operations from several constituent agencies into a single, unified entity. Put simply, individual agencies participating in a regional system "buy in" to a regional entity by contributing value in capital assets, depending on how much they are willing or able to contribute relative to other members. Agencies that lack sufficient capital assets to contribute a theoretical "full share" of value to the central entity pay a lump sum cash "Buy-in" instead. Conversely, agencies contributing more than their fair share of capital asset value may receive a lump sum cash "Buy-out" to compensate them for the difference between the value of their contributed assets and the value of their participation in/ownership of the regional system. There are several permutations of this approach, but the basic principle is that all members should be on a theoretical "equal footing" once all assets, Buy-ins and Buy-outs have occurred.

Buy-ins and Buy-outs could apply under any service scenario or institutional alternative contemplated herein, although the nature and scope of the payments would depend on the scenario and institutional model selected. (see Table 6-4).

Regional System Development Charges. System Development Charges (SDCs) are charges imposed upon new development as a condition of connecting to the water system. A regional SDC to help pay for regional transmission/storage improvements could be applied in addition to any local SDCs currently imposed. A regional SDC would be imposed uniformly across the entire region, with either the regional entity or local agencies actually collecting the charges. SDCs are useful financing tools inasmuch as they help ensure that "growth pays for growth" and that future customers pay for their fair share of the existing system infrastructure. However, SDCs are necessarily a volatile source of revenue since they rely upon customer base growth to drive revenues.
Regional SDCs could apply under any of the institutional options discussed in this section, but would be appropriate only under service Scenario One (see Table 6-4).

Local System Development Charges. Like regional SDCs, local SDCs are charges imposed upon new development as a condition of connecting to the water system. However, with local SDCs, no regional uniform SDC would apply. Rather, each individual member agency would establish its own SDC, consistent with its existing SDC principles, designed to recover the cost of participation in the regional transmission/storage strategy. In theory, the aggregate capital costs recovered through the local and regional SDCs should be the same, although the local SDCs could vary widely depending on the financial conditions of regional participation for each individual member agency.

Local SDCs could apply under any of the service scenarios except Scenario 1. Local SDCs also would be consistent with either of the intergovernmental agreement alternatives (Multi-Agency or Bilateral), but not under the other three options (see Table 6-4).

Capacity Leasing. The Consortium members intend a regional transmission/storage system that promotes efficient use of available capacity over constant development of new capacity. Pursuant to this end, the regional strategy should include provisions for brokering unused capacity under a defined pricing structure. If structured properly, no member should be required or allowed to expand the regional system's capacity until expansion is required due to *regional* demands. Further, no members should be able to withhold or arbitrarily price unused transmission or storage capacity needed by another regional Consortium member. This structure is effectively a "must lease" arrangement for regional transmission/storage capacity: a member with excess capacity must make it available at a premium and a member requiring capacity must lease capacity available under specified terms. Consortium members would negotiate precise terms for capacity leasing.

Capacity leasing provisions are useful because they guard against inefficient, unnecessary plant expansions and unfair "side deals" between members. Unfortunately, these provisions may encourage some members to "under-invest" in the short term, relying upon the

availability of others' excess capacity for lease rather than taking on increased up-front risk. Such risk-taking may cause capacity to be exhausted more rapidly.

Capacity leasing arrangements are available and appropriate to any of the service scenarios or institutional options (see Table 6-4).

CONCLUSIONS

The RTSS planning process included a review of several institutional models available for governance of a regional water transmission/storage strategy. Based on this effort and discussions with Consortium members, three institutional options emerged as candidates for further development as the planning process continues: a Multi-Agency Intergovernmental Agreement, one or more Bilateral Intergovernmental Agreements, or an Independent Central Agency. Of these three, the Multi-Agency Intergovernmental Agreement offers the greatest flexibility and opportunity for regional consensus building. Thus, it is recommended that future discussions focus on a Multi-Agency Intergovernmental Agreement organized under ORS 190 as the institutional model of choice, regardless of the transmission scenario selected.

This study also examined several financing instruments and corollary issues for the Consortium to consider in its ongoing planning efforts. Financial rate and charge instruments examined included volume charges, capacity charges, membership dues, buy-ins/buy-outs, regional SDCs, local SDCs, and capacity leasing. The exact rate features and other organizational/financial policies ultimately adopted should reflect the unique service scenario and governance option selected for the regional system.

Table 6-1
Institutional Options

Institutional Alternative	Statutory Authority & Description	Formation Requirements	Decision & Control	Recommended for Further Consideration?
Multi-Agency Intergovernmental Cooperative Agreement	ORS 190 (Intergovernmental Agreements). Multiple local governments may enter into a written agreement to perform any or all functions that a party to the agreement has authority to perform.	190 Intergovernmental agreements may be formed at any time with the consent of the several governing councils or boards of the participating agencies. No public vote is required for formation.	Decision and control mechanisms are determined by the details of the intergovernmental agreement.	***YES*** 190 agreements offer considerable flexibility with respect to mission, geographic scope, and representation.
Bilateral Intergovernmental Cooperative Agreement	ORS 190 (Intergovernmental Agreements). Two local governments may enter into a written agreement to perform any or all functions that a party to the agreement has authority to perform.	190 Intergovernmental agreements may be formed at any time with the consent of the two governing councils or boards of the participating agencies. No public vote is required for formation.	Decision and control mechanisms are determined by the details of the intergovernmental agreement.	***YES*** Multiple bilateral 190 agreements offer flexibility with respect to mission and representation; probably would be limited to service Scenario 4.
Independent Central Agency	ORS 264 (Domestic Water Supply Dist.), ORS 552 (Water Improvement Dist.), ORS 261 (People's Utility Dist.), ORS 450 (Joint Water Authority). Local governments cede authority for some or all regional storage and transmission to a single political entity with independently elected governing officials.	Formation procedures vary depending on the charter type. Generally, local agencies' councils or boards must decide to consolidate and the public must vote to form the new agency. Some charters allow existing entities to form special service districts without a public vote.	Governed by an independently-elected board of commissioners. Commissioners may be elected at-large or by geographic zone. The exact number of commissioners varies depending on the charter type. Effectively the new agency becomes an autonomous decision-maker.	***YES*** An independent central agency could offer flexibility with respect to mission and geographic scope and would become a significant regional player in water supply issues.
County-Run Special Service District(s)	ORS 451 (County Special Service Districts). Local governments cede authority for some or all regional storage and transmission to a special district governed by the county commissioners.	Existing cities and districts may form a County Special Service District with the cooperation of the affected county or counties without a public vote. Alternatively, a public petition process and vote may form a County Special Service District.	Governed by the county court of the principal county within the district. County court usually appoints a board to oversee operation and planning for the district.	***NO*** Multi-County nature of the region is more consistent with alternatives that offer broader representation.
Metro	ORS 268 (Metropolitan Portland Service District). The statute enabling the creation of Metro includes would allow Metro to become the regional water supply, storage, and transmission authority.	Metro involvement in regional water supply and/or transmission requires a public vote (ORS 268.312(a)).	Metro's seven-member council would assume decision-making authority for the system.	***NO*** Metro mission and scope may be too broad for scenarios under consideration, with representation potentially inconsistent with the service area envisioned.

Table 6-2
Advantages and Disadvantages of Institutional Options

Institutional Alternative	SCENARIO 1 Holistic Approach	SCENARIO 2 Primary Source w/ Emergency Backup	SCENARIO 3 Zonal Source	SCENARIO 4 Interconnected Subregional Supply
Multi-Agency Intergovernmental Cooperative Agreement	***YES*** A central agency formed through a 190 agreement could manage the regional storage and transmission systems, manage operations and set prices.	***YES*** A central agency formed through a 190 agreement could provide regional emergency supply arrangements for local utilities.	***YES*** Two agencies formed through 190 agreements could provide regional storage and transmission—or simply emergency supply—for their members.	***YES*** Multiple 190 agreements could govern multilateral agreements for storage and transmission between local utilities.
Bilateral Intergovernmental Cooperative Agreement	***NO*** This scenario would require multi-agency intergovernmental agreement(s) or central agency control.	***YES*** Bilateral 190 agreements could secure emergency water for pairs of agencies. Many agencies currently employ such structures.	***NO*** This scenario would require multi-agency agreement(s) or central agency control.	***YES*** Multiple 190 agreements could govern bilateral agreements for storage and transmission between local utilities.
Independent Central Agency	***YES*** A strong central, independent regional agency could manage the regional storage and transmission systems—and potentially supply, too—to create a true regional market for wholesale water.	***NO*** A strong central agency probably would be inappropriate under this scenario.	***YES*** Two strong independent regional agencies could manage regional storage and transmission systems—and potentially supply, too—to create two subregional wholesale water markets.	***NO*** A strong central agency probably would be inappropriate under this scenario.
County-Run Special Service District(s)	***YES*** A central, county-run agency could manage the regional storage and transmission systems—and potentially supply, too—to create a true regional market for wholesale water. ORS 451 allows for multi-county service districts, but only the "principal" county retains authority.	***NO*** A County Special Service District probably would be inappropriate under this scenario.	***YES*** Three separate County Service Districts—for Clackamas, Multnomah, and Washington counties—could manage subregional systems for their respective jurisdictions, with 190 intergovernmental agreements among the three.	***NO*** A County Special Service District probably would be inappropriate under this scenario.
Metro	***YES*** With its established regional administrative infrastructure, Metro could run the regional storage and transmission systems to create a true regional market for wholesale water.	***NO*** Metro probably would be an inappropriate governing agency under this scenario.	***NO*** Metro probably would be an inappropriate governing agency under this scenario.	***NO*** Metro probably would be an inappropriate governing agency under this scenario.

Table 6-3
Financing Mechanisms

Financing Mechanism	Description	Advantages	Disadvantages
Volume Charges	Member agencies pay according to metered volume of water taken from the collective/regional system.	Charges reflect actual—rather than theoretical—use of regional resources. Can provide some peak season conservation incentive.	Volatile revenue source, especially if flows occur only during peak periods.
Capacity Charges	Member agencies buy shares of regional capacity (i.e., the right to demand transmission or volume from storage). Charges apply whether or not customers draw on capacity. Penalty charges apply for use beyond a member's allotted share.	Stable revenue source. Enhances equality by discouraging "free-loading" on others' capacity. Provides some peak season conservation incentive.	Fixed charge creates incentive to rely on regional storage resources rather than developing independent resources.
Membership Dues	Member agencies pay flat-rate "dues" per member or according to the size of each member's customer base.	Stable revenue source. Best used to cover administrative / overhead costs of the regional system.	Membership generally bears little relationship to the primary costs to the system.
Buy-in & Buy-out	Member agencies pay an up-front lump sum amount of money to "buy in" to the collective system. Other members may receive an up-front lump sum amount in exchange for facilities or other advantages donated to or lost through regionalization.	Puts all members "on equal footing" at the system's outset. Compensates losses for donated facilities.	High buy-in cost may be insurmountable barrier to joining for some agencies.
Regional Systems Development Charge (SDC)	Central agency imposes a charge for each new retail connection to local water system. Regional SDCs may be collected by the central agency or by the local agencies.	Helps "growth pay for growth." Provides money for capital proj??ects in the near future.	Somewhat volatile revenue source.
Local Systems Development Charge (SDC)	Local agencies impose charges for each new retail connection to compensate for growth-related investments in regional or sub-regional capital.	Helps "growth pay for growth." Provides money for capital proj??ects in the near future.	Somewhat volatile revenue source.
Capacity Leasing	Cooperative agreement or central agency facilitates leasing of capacity among member agencies. Contracts may include "must lease" provisions that require members to lease slack capacity to other members before making capacity-increasing capital investments.	Guards against inefficient, unnecessary plant expansions and unfair "side deals" between members.	Capacity may be exhausted more rapidly. "Must lease" provisions may increase individual agencies' risk of short-term capacity shortfalls.

Table 6-4
Applicability of Financing Mechanisms to Scenarios and Governance

	SERVICE SCENARIOS				GOVERNANCE OPTIONS				
Financing Mechanism	**SCENARIO 1 Holistic Approach**	**SCENARIO 2 Primary Source & Emergency Backup**	**SCENARIO 3 Zonal Source**	**SCENARIO 4 Interconnected Subregional Supply**	**Multi-Agency Intergovernment Agreement**	**Bilateral Intergovernment Agreements**	**Independent Central Agency**	**County Special Service Dist.**	**Metro**
Volume Charges	***YES***	***YES***	***YES***	***YES***	***YES***	***YES***	***YES***	***YES***	***YES***
Capacity Charges	***YES***	***YES***	***YES***	***YES***	***YES***	***YES***	***YES***	***YES***	***YES***
Membership Dues	***YES***	***YES***	***YES***	***NO***	***YES***	***YES***	***NO***	***NO***	***NO***
Buy-in & Buy-out	***YES***	***YES***	***YES***	***YES***	***YES***	***YES***	***YES***	***YES***	***YES***
Regional SDC	***YES***	***NO***	***NO***	***NO***	***YES***	***YES***	***YES***	***YES***	***YES***
Local SDC	***NO***	***YES***	***YES***	***YES***	***YES***	***YES***	***NO***	***NO***	***NO***
Capacity Leasing	***YES***	***YES***	***YES***	***YES***	***YES***	***YES***	***YES***	***YES***	***YES***

SECTION 7 – PRELIMINARY EVALUATION OF STORAGE AND TRANSMISSION SCENARIOS

REVIEW OF SCENARIOS

Base Case: Currently planned transmission improvements of a new 72-inch diameter line from the Joint Water Commission to TVWD, a new 96-inch diameter Conduit 5 for the City of Portland, a 60/54-inch diameter Willamette transmission line north from Wilsonville to Tualatin, and a 30-inch interconnection of between some of the WTP's on the Clackamas River.

Scenario 1 - Holistic. Allows any potential excess capacity from any source within the region to be brought to where demand is needed. Modeled after the electric utility grid system.

Scenario 2 - Emergency Interconnections. Assures that every supplier has access to one of six primary supplies in the region (Bull Run, Columbia South Shore wellfield, Clackamas River, Tualatin/Trask River, Willamette River and local groundwater) and a secondary source that is different than the primary supply. The capacity of the secondary source access is at average day demand for emergency purposes.

Scenario 3 - Zonal. Divides the region into two zones, east and west, with the dividing line being the west slope of the West Hills. Allows for each of the major sources in each zone to be transmitted as needed within the zone and provide a small intertie between the zones.

Scenario 4 - Subregional Interconnected. Assumes that the Willamette source does not expand service beyond Wilsonville and Sherwood. Allows other sources in region to meet demands throughout the region.

EVALUATION OF SCENARIOS AGAINST THE PROJECT CRITERIA

Section 4 identified and discussed 13 different evaluation criteria for this project. Each of the scenarios, including the Base Case, was considered against each of the criteria. Rating of the scenarios against the criteria was qualitative, that is, numerical ratings were not assigned. Scenarios are listed below in relative order, from the most favorable scenario with respect to the criterion to the least favorable. Scenario ratings have been reviewed by the CTSC, the CTC and the Consortium Board. The following describes the rankings, as well as the assumptions and reasoning behind the rankings.

1. Weather-driven reliability.

Assumptions: The Willamette and Clackamas Rivers are less sensitive to droughts, and the Bull Run and JWC supply are the most weather sensitive. Therefore, those scenarios that provide the most access to the Willamette and Clackamas sources are the most reliable in drought events.

Ratings:

Scenario 1:	Everyone has access to all sources. Most favorable.
Scenario 3:	More access on west side to Willamette.
Scenario 2:	Portland relies on Bull Run. West side relies partly on JWC. Limited access to Willamette and Clackamas rivers for many.
Scenario 4:	Little west side access to Willamette, but some to Clackamas supply. More Portland access to Clackamas, but load on the Clackamas supply is high.
Base Case:	No access to Willamette or Clackamas for JWC or Portland users. Least favorable.

Note: Scenarios 2 and 4 are approximately equivalent with respect to this criterion.

2. Emergency Reliability

Assumptions: Access to multiple sources provides greater reliability in emergencies.

Ratings:

Scenario 1:	Everyone has access to all sources. Most favorable.
Scenario 3:	Both west side and east side have access to multiple backups within their zone, but only minor access is provided between west and east sides.
Scenario 4:	West side has access to Portland, with Clackamas supply as backup.
Scenario 2:	Everyone has access to one backup source.
Base Case:	Most systems have some emergency backup, but many are not on a separate source. Least favorable.

Note: Scenarios 3 and 4 are approximately equivalent with respect to this criterion.

3. Water Quality

Assumptions: All sources will meet drinking water standards. Assumes that river sources are all similar in character. Assumes that Portland system has slightly less consistency over time due to seasonal fluctuations in unfiltered Bull Run.

Ratings:

Scenario 2:	Sources consistent over time and among providers.

Scenario 3: Sources consistent over time and among providers.
Scenario 4: Sources consistent over time and among providers.
Base Case: Sources consistent over time and among providers.
Scenario 1: With access to many sources, providers might have more water quality variability over time.

Note: Scenarios 2,3,4 and the base case are equivalent with respect to this criterion. Scenario 1 ranks slightly lower.

4. Transmission Costs

Assumptions: Total preliminary planning level opinion of capital costs in each scenario for the pipelines is shown. Storage costs are not included in these numbers, but will be highest in Scenarios 1 and 3, next highest in Scenario 4 and lowest in Scenario 2. The ease with which costs and benefits can be clearly allocated to entities to maximize perceived fairness is somewhat subjective.

Ratings:
Base Case: No cost assigned, as base case improvements are common to all scenarios.
Scenario 2: $90 million. Lowest cost. Easiest scenario in which to tie cost and benefits together.
Scenario 3: $200 million. Easy to tie cost and benefits together.
Scenario 4: $200 million. A bit harder to tie costs and benefits together than in Scenario 3.
Scenario 1: $300 million. Largest pipe sizes and longest distances lead to highest costs. It is hardest to clearly identify beneficiaries of each element.

5. Transmission and Storage Environmental Impacts

Assumptions: If transmission facilitates moving water to minimize environmental impacts and to maximize environmental benefits, then this scenario rates higher. The greatest need to mitigate environmental issues are fish on the Bull Run system. The second greatest need for environmental mitigation is fish in Clackamas River. Instream water quality mitigation is an assumed need on the Tualatin River. The Willamette River is assumed to have the fewest environmental issues.

Ratings:
Scenario 1: Allows moving supplies around to minimize impacts and maximize benefits. Most favorable.
Scenario 3: Allows use of the Willamette supply to mitigate Tualatin River issues. Allows Bull Run and Clackamas to trade water.
Scenario 2: Some improved ability to adjust supplies to minimize impacts, but not a large improvement over the base case.

Scenario 4: Heaviest reliance on Bull Run and Clackamas, which have the most environmental issues.
Base Case: No ability to adjust to environmental needs. Least favorable.

Note: Scenarios 2 and 4 are approximately equivalent with respect to this criterion.

6. Efficiency

Assumptions: If the transmission system facilitates access to whatever supplies already exist, then rate this scenario higher.

Ratings:
Scenario 1: Allows access to any existing source. Most favorable.
Scenario 3: Allows access to supplies on a zonal basis.
Scenario 4: Allows access to Bull Run and Clackamas supplies.
Scenario 2: Some minor improvement in ability to bring excess supplies to areas of need through interties.
Base Case: No ability to bring current excess supplies to areas of need. Least favorable.

Note: Scenarios 3 and 4 are approximately equivalent with respect to this criterion.

7. Operating Flexibility

Assumptions: If the transmission system allows providers to choose sources, then the scenario rates higher.

Ratings:
Scenario 1: Allows access to any source. Most favorable.
Scenario 3: Allows access to supplies on a zonal basis.
Scenario 4: Greater reliance on east side sources.
Scenario 2: Some minor improvement in ability to choose source.
Base Case: No ability to choose source. Least favorable.

8. Long-term System Development

Assumptions: If the transmission system takes advantage of near-term improvements, then the scenario is rated higher.

Ratings:
Scenario 1: Takes advantage of near-term improvements.
Scenario 2: Takes advantage of near-term improvements.
Scenario 3: Takes advantage of near-term improvements.
Scenario 4: Takes advantage of near-term improvements.

Base Case: Takes advantage of near-term improvements

Note: There is no difference among the scenarios for this criteria. Therefore, this is not a useful criterion.

9. Short-term Local Needs

Assumptions: If the scenario is difficult to implement or will take a long time to put into place, then it is rated lower at being able to meet short-term local needs.

Ratings:

Scenario 2: Easiest to implement and has the shortest timeframe to make improvements. Development of the Willamette solves short-term needs. Most favorable.

Base Case: No impediment to solving short-term needs.

Scenario 3: Relatively easy to implement. Development of the Willamette solves short-term needs.

Scenario 1: Relatively difficult to implement and will take the longest to put into place. Development of the Willamette supply solves short-term needs.

Scenario 4: Relatively difficult to implement and will take a relatively long time to put into place. Can't solve short-term needs until long-term scenarios are in place. Least favorable.

Note: Scenario 2 and the base case are approximately equivalent with respect to this criterion.

10. Legal/Regulatory Feasibility

Assumptions: Scenarios that call for construction of a link between the Clackamas supply and the west side are assumed to be harder to construct due to issues associated with pipeline routing.

Ratings:

Base Case: No need for projects. Most favorable.

Scenario 2: Smallest construction program.

Scenario 3: Moderate construction program.

Scenario 4: Moderate construction program but includes Clackamas to west side crossing.

Scenario 1: Includes a Clackamas supply to west side crossing, with the largest construction program.

Note: Scenarios 4 and 1 are approximately equivalent with respect to this criterion.

11. Institutional/Financial Feasibility

Assumptions: Scenarios with more potential partners are harder to implement.

Ratings:

Base Case:	No need for agreements.
Scenario 2:	Easy to implement with bilateral agreements.
Scenario 3:	Zonal agreements required, but not regional.
Scenario 4:	Agreements among a number of providers required.
Scenario 1:	Many partners in projects, requires regional agreements.

Note: Scenarios 3 and 4 are approximately equivalent with respect to this criterion.

12. Source Cost

Assumptions: Ratings reflect a judgement of relative cost of each scenario. Ratings also reflect the ease with which costs and benefits can be clearly allocated to entities. Assumes Bull Run Dams 1 and 2 expansion is the least cost alternative, Tualatin/Trask and Clackamas source development are the next lowest cost, Willamette development is next highest, and Dam 3 is highest cost source development.

Ratings:

Scenario 2:	Includes Willamette, Tualatin/Trask and Clackamas development. Most favorable.
Scenario 3:	Willamette, Tualatin/Trask and Clackamas development.
Base Case:	Moderate source development program.
Scenario 1:	Constructs Dam 3 and other sources, but transmission system allows source development to be timed to minimize net present worth.
Scenario 4:	Dam 3 is required to be constructed earlier than in Scenario 1. Least favorable.

Note: Scenario 3 and the base case are approximately equivalent with respect to this criterion.

13. Source Environmental Impact

Assumptions: The greatest potential source environmental impact is in the Bull Run and next greatest is on the Clackamas River. Assumes Tualatin/Trask is next and the Willamette has least environmental impact.

Ratings:

Scenario 2:	Smallest source development program.
Scenario 3:	Moderate source development program.
Base Case:	Moderate source development program.

Scenario 4: Constructs Dam 3 and all other sources except the Willamette.
Scenario 1: Constructs Dam 3 and all other sources.

SUMMARY OF PRELIMINARY EVALUATIONS

In examining the above analysis of the scenarios against the evaluation criteria, some observations can be made about each scenario.

Scenario 1 - Holistic. This scenario consistently ranks highest for the criteria that relate to the benefits that the regional transmission system generates. These benefits are factors such as reliability, flexibility, efficiency, and the ability to take advantage of environmental benefits. At the same time, this scenario consistently ranks the lowest for criteria such as cost, legal and regulatory feasibility, and institutional and financial feasibility - all indications of how difficult it will be to actually build this vision of regional transmission. It also ranks lower on the ratings of implications for source development, because it creates an unconstrained market for source that could result in overbuilding of source facilities.

Scenario 2 - Emergency Backup. This scenario provides moderate benefits in terms of improving regional reliability, but does not allow much benefit in terms of environmental enhancement or efficiency. However, it has the lowest cost of all the scenarios (except the Base Case) and would be the easiest to implement. This scenario assumes that the Willamette source is developed up to a capacity of around 50-60 MGD and that it is piped far enough north to tie into the JWC and other west side systems. If the Willamette is only developed as in Scenario 4, as a smaller more local source, then additional pipeline costs would be needed to bring this source to the north, in order to obtain reliability and other benefits of the Willamette supply in the regional system.

Scenario 3 - Zonal. This scenario provides the same types of benefits as the Holistic scenario in terms of reliability, environmental impact, efficiency and flexibility, but not quite to the same level as the Holistic scenario (perhaps 80% of the benefits obtained in Scenario 1 are obtained in Scenario 3). However, the cost of Scenario 3 is only two-thirds the amount of Scenario 1 and it will be considerably easier to implement. Also, it is less likely to lead to overbuilding of sources, because supply and demands are more matched at the subregional level.

Scenario 4 - Interconnected Subregional. This scenario has a cost that is similar to Scenario 3, but does not attain the same level of benefits for the region as Scenario 3. The main reason is that this scenario does not include any substantial development of the Willamette River as a supply. Because the Willamette is the surface source most resistant to drought of those involved, and because it is the least susceptible to impacts from the Endangered Species Act, having it as part of the regional mix adds flexibility and reliability that cannot be achieved without it. Scenario 4 also will be more difficult to implement than Scenario 3, although not as difficult as Scenario 1.

Base Case. The Base Case does not achieve enhancements of reliability, efficiency, flexibility, or environmental benefit. It's cost is of course the lowest, and since it is the "do nothing" alternative, it is the easiest to achieve.

From this evaluation, the choice between the scenarios becomes a question of what things are most important, and how important they are relative to cost and feasibility. This leads to another important point when considering these scenarios. These scenarios do not need to be mutually exclusive. That is, a regional transmission strategy could be adopted that moves from one scenario to another over time. In the short-term (say the next 10-20 years), the projects contained in the Emergency Backup Scenario 2 could be built. This would add the Willamette to the regional system, and connect the Portland and Clackamas systems, the Portland and JWC systems, and Willamette and JWC systems. Then in the longer-term, a second Willamette pipeline could be added (the Zonal scenario) and/or a connection between the Portland/Clackamas systems and the west side (the Holistic scenario) could be built. This would permit a slow evolution of the regional transmission network without requiring substantial regional changes in the near-term. This strategy of an incremental approach to a longer-term regional vision should also be considered as a possible approach to the regional transmission strategy.

SECTION 8
SUMMARY OF PUBLIC INFORMATION AND INVOLVEMENT AND CONSORTIUM BOARD AND MEMBER INPUT

Public involvement in the development of the Regional Transmission and Storage Strategy (RTSS) has come from two main sources. The public has had the opportunity for direct involvement in the project through public workshops. The Consortium Board has also provided input and direction to the development of the Strategy at its open public meetings. A summary of these activities and inputs is provided below.

PUBLIC INFORMATION AND INVOLVEMENT

Public information in the RTSS planning process has been provided directly via public information brochures, and indirectly via newspaper stories. Staff for the Consortium prepared an information brochure concerning the project and mailed it to a 3,800-name project mailing list. This mailing list included individuals that expressed interest in past regional water planning activities, as well as environmental groups, large water users, regulatory agencies, water suppliers and others in the region. Consortium staff also provided a briefing on the project to the City of Portland's Water Quality Advisory Committee. A number of articles concerning the project have appeared in *The Oregonian* newspaper.

The first Public Workshop on the project was held on November 9, 1999 at the Oregon Institute of Technology Conference Center in Milwaukie, Oregon. Prior to the workshop the complete project mailing list was sent a notice of the meeting. A paid advertisement was also placed in the Metro section of *The Oregonian* on the Sunday prior to the meeting. Approximately 20 people attended the Workshop. The Workshop covered the project evaluation criteria, scenarios and financial and institutional options. Workshop format included displays and posters that could be discussed individually with project and consortium personnel, and a formal presentation and discussion period in a group setting. The presentation included handouts and a question and answer period. Comments received at the workshop indicated that participants were in agreement with the evaluation criteria that were being utilized. They also felt that the scenarios that were being proposed represented an adequately broad range of options for discussion.

The second Public Workshop was held on April 3, 2000 at the offices of the Tualatin Valley Water District. As with the first workshop, the complete project mailing list was sent a notice of the meeting and a paid advertisement was placed in the Metro section of *The Oregonian* prior to the meeting. Again, approximately 20 people attended the Workshop. This Workshop also included displays and posters that could be discussed individually with project and consortium personnel and a formal presentation, discussion, and question and answer period in a group setting. This Workshop reviewed the draft recommended plan. In addition to the input received at the Workshop, two written comments were received by Consortium staff concerning the draft recommended plan. The first was from Citizens

Interested in Bull Run, Inc. The second was a joint statement from Citizens for Safe Water groups in Tigard, Wilsonville, Tualatin and Sherwood. The substantive comments that were expressed in the public workshops by those who participated were:

- Aquifer Storage and Recovery (ASR) should be utilized more in the recommended plan.
- The pipeline connecting Clackamas County to southwest Washington County should take the most southerly route option following Interstate-205, in order to more easily bring Clackamas River water to the Wilsonville area.
- The Willamette River should not be considered as one of the major sources in the region that should be connected via regional transmission.
- Further expansion of storage reservoirs in the Portland Bull Run supply should be included in the recommended plan over the next five years.

The written statement by the Citizens for Safe Water groups requested that what they considered a new scenario, be considered by the Consortium Board. They suggested this scenario would be much like Scenario 4 in the draft report, but would include the following:

- A water conduit connecting the Tualatin area with a source of Clackamas River water be included (*Note: This conduit is already included in Scenario 4 as acknowledged in the Citizens for Safe Water statement*).
- No Willamette River water treatment plant construction with an assumed reduction in cost of $50 million to the cost of Scenario 4 as presented in the draft report. (*Note: No costs for source water development were included in any of the scenarios in the draft report. As shown in Table 5-4, no costs for a Willamette River treatment plant are included in the cost estimate of Scenario 4. Therefore, eliminating this project will not change the cost estimates presented in the report.*)
- A smaller water conduit (30-inch diameter) between Tualatin and Wilsonville that would flow water north to south, but not south to north. (*Note: The pipeline diameter shown in Scenario 4 is 36-inches between Tualatin and Wilsonville, based on the engineering sizing criteria shown in Section 5. This pipeline can bring water either north to south, or south to north*).
- Creating ASR systems in southwest areas.
- Modifying the estimated costs for all scenarios after allowing for the increased summer water supply provided by planned expansion of the City of Portland Columbia South Shore wellfield ASR plan. (*Note: As stated above, no costs for source development are included in the scenarios. The capacity of the Portland wellfield that has been utilized in the draft report already assumed that the current Portland wellfield expansion project has been completed. Therefore, no adjustment is necessary to the scenarios.*)

CONSORTIUM BOARD INPUT

The Consortium Board has provided input and direction for the development of the RTSS. At the Board's September 1999 meeting, the evaluation criteria and scenarios were discussed. Modifications to the evaluation criteria were made to address Board comments. The Board

commented that the range of scenarios being presented represented a good range of options for further evaluation.

The December 1999 meeting of the Consortium Board considered the draft evaluation of the scenarios presented in Section 7 of this report. To facilitate the discussion and to aid in providing direction to the project team, Board members were asked to identify which of the policies represented by the evaluation criteria for the project were rated as "most important" for the RTSS. The percent of Board members that rating the criteria as most important were:

High Priority:

Emergency reliability – 76%

Medium/High Priority:

Water Quality – 62%
Cost – 62%

Medium Priority:

Weather-driven reliability – 54%
Efficiency – 54%
Long-term System Development – 54%
Operating flexibility – 54%

Medium/Low Priority:

Environment – 38%

Low Priority:

Legal/Regulatory feasibility – 23%
Institutional/financial feasibility – 15%
Short-term needs – 8%

Discussion at the meeting indicated that the Board members felt that the vision for the RTSS should not be constrained by issues of legal, regulatory and institution feasibility, short-term needs, or environmental issues. These concerns would be represented in the higher projected costs for some scenarios or could presumably be overcome with the appropriate level of effort. These factors combined to lower the relative priorities of these criteria.

In the discussion of the scenario evaluations, Board members expressed three major points. These were:

- Improved emergency interconnections (such as the Emergency Scenario 2) between and among water systems in the region are vital. These interconnections would improve regional reliability and improve access to emergency supplies of water when there were problems with an individual source or system.

- The costs of a transmission system that allows very large quantities of water to be moved throughout the region (such as the Holistic Scenario 1) does not appear to justify whatever added benefits this approach would achieve, compared to less ambitious regional interconnections.

- The uncertainty concerning which sources in the region will ultimately be utilized has a serious impact on any commitment to a large transmission system. The most appropriate transmission network might look different depending on the source that Tigard, Sherwood and others in southern Washington County that are looking for water, choose as their primary supply during the next few years. If the source for these communities becomes the Willamette River, then perhaps the Zonal Scenario (Scenario 3) would be most appropriate. But, if the Portland system or the Clackamas River becomes the source, Scenario 4 may be more appropriate. The RTSS should be phased in a manner that allows nearer-term improvements to be made to improve emergency interconnections, but then allows the longer-term network to be consistent with source decisions as they are made.

These three key points became the primary drivers for the recommended RTSS presented in Section 9.

The Board also reviewed the draft recommended plan at its March 1, 2000 meeting. At this meeting the Board felt that the draft recommended plan represented the goals and desires of the Board and was a good strategy for the region. The Board also asked its members to take the draft plan back to their agencies for more detailed review of the draft plan individually, and to provide comments to the Consortium staff and the project team for preparation of the final strategy and report. This additional input from Consortium member agencies is identified below.

CONSORTIUM AGENCY INPUT

At the request of the Consortium Board, member agencies were asked to provide comments on the draft recommended Regional Transmission and Storage Strategy. Agencies were asked to respond to three specific questions:

1. Whether the agency agreed that the policy values shown in the draft Strategy were the most important.
2. Whether the agency agreed with the near and long term strategies identified in the draft report.
3. What changes the agency would recommend considering in the final Regional Transmission and Storage Strategy.

Comments were received from nine Consortium member agencies. The full text of their written comments are provided in the Appendix. These agencies were:

- Clackamas River Water
- City of Damascus
- City of Gresham
- City of Lake Oswego
- City of Portland
- South Fork Water Board
- Tualatin Valley Water District
- West Slope Water District
- City of Wilsonville

All of the agencies that commented supported the priorities of the policy values expressed in the Strategy. Most agencies emphasized the importance of improved reliability as the single most important policy value. One agency suggested dropping the policy value of consistency with long-term system development because all the scenarios that were evaluated equally met this value and therefore it was not useful in distinguishing between options. This agency suggested elevating the priority of institutional and financial feasibility.

All of the agencies that commented also supported the near and long term strategies in the recommended plan. A few of the agencies expressed concern that they will not benefit sufficiently from some of the specific recommended improvements to justify the costs of participating in them. They emphasized that as shown in the Strategy, project participation would be on a voluntary basis using intergovernmental agreements among participants. One agency suggested that improvements that are needed within the City of Portland's transmission to more reliably serve its wholesale customers should be identified as part of the Regional Transmission and Storage Strategy. Another agency commented that ASR should be incorporated into the Strategy. This agency also suggested that it would be useful to investigate costs for providing alternative amounts of water during emergencies instead of the annual average demands assumed in the draft report. One agency suggested that it should be clear that the water quality impacts of mixing sources together should be considered when interconnections between sources are established. Several agencies also provided detailed comments on the report and suggested technical clarifications. Among these detailed comments was the City of Wilsonville's input that, contrary to the public input

at the April 3rd Workshop, the Willamette River should be considered as a source because the City of Wilsonville is proceeding with development of this source.

RESPONSE TO COMMENTS

All the comments of both Consortium member agencies and the public were evaluated for the final report. Language was added in the report to identify the implications of ASR on transmission and storage. The participation of agencies in the specific projects in the recommended plan was reviewed and corrected and language added to emphasize that not all agencies may participate in these projects. Language was added to clarify that the level of demand that would be met in an emergency is one of the factors that must be considered by participating agencies when actually building the recommended projects. The detailed comments and technical clarifications of Consortium member agencies were also incorporated into the final report.

One of the options for a pipeline from Clackamas County to the west that is shown in this Report is the route that follows the Interstate-205 corridor. However, this route was not the preferred route in the Regional Water Supply Plan, which investigated all the routing options in some detail, for several reasons that remain valid. Much of this route lies outside the Urban Growth Boundary, raising land use questions. The route also traverses a relatively large area that would require pipeline installation in rock, which would raise the cost for the project by up to twenty percent. Therefore, the primary route shown in this report is the route suggested in the Regional Water Supply Plan.

Based on the comments of the City of Wilsonville, the Willamette River remains as one of the major sources in the region. However, if this source is not developed as currently planned by the City of Wilsonville, it would not impact the recommended Regional Transmission and Storage Strategy. A connection between Wilsonville and the north would still be required as shown in the Strategy, only under this scenario water would primarily flow from the north to Wilsonville instead of being available to bring water in either direction.

No additional detail on potential development of new reservoirs in the Bull Run watershed was included in the final report. Such development would be a source, not transmission or storage issue, and is therefore not part of the scope of this report. However, if such new reservoirs were to be constructed, the Strategy recommended in this report would be adequate to take advantage of this new source development. In particular Conduit 5 would be utilized to bring water from new reservoirs to demand centers.

City of Portland system improvements that connect to other systems and to sources have been included in this Strategy. However, improvements internal to the City's system that are needed to more reliably serve its wholesale customers are not included in the Regional Transmission and Storage Strategy. The City of Portland is evaluating these internal storage and transmission issues in separate studies (the Infrastructure Master Plan, the System

Vulnerability Assessment, and the Open Reservoir Study) that will be completed this year. Portland also intends to then begin evaluating its distribution system to determine additional needed reliability improvements.

SECTION 9 – RECOMMENDED REGIONAL TRANSMISSION AND STORAGE STRATEGY

The purpose of this project is to develop short and long-term visions for regional transmission and storage. A number of scenarios representing a broad range of potential visions were developed. These scenarios were evaluated against a number of criteria that represent the various issues and values that have been expressed in regional planning efforts. The recommended Regional Transmission and Storage Strategy (RTSS) is based upon this evaluation of scenarios and upon the direction (discussed in Section 8) that the Consortium Board provided at its December 1999 review of the scenario evaluation. Two critical policy objectives expressed by the Consortium Board form the foundation of the recommended Strategy:

- Improved emergency interconnections between and among water systems in the region are vital and should be pursued.

- The long-term network should be consistent with the decisions that communities make that are now looking for new sources of supply. The long-term network should be phased and built from the nearer-term improvements.

The recommended strategies are described in this section. Also discussed are the potential benefits and costs of these strategies to water providers in the region.

REGIONAL TRANSMISSION AND STORAGE STRATEGY

The recommended Regional Transmission and Storage Strategy is:

Build interconnections between and among individual water systems within the region to increase the reliability of supply to individual communities and to the region as a whole.

In the long-term, develop either a Zonal or Interconnected Subregional transmission and storage system, depending on the source(s) that the communities in southern Washington County that currently need water, develop for their primary supply.

Develop these projects through intergovernmental agreements (IGA's) among those agencies which choose to participate in the individual projects.

Specific elements of the Strategy should include:

- **Each community in the region should have access to both a primary supply and an adequate emergency source of water.**

- **The primary supply should be one of the six major sources in the region (Bull Run River, Columbia South Shore Wellfield, Clackamas River, Trask/Tualatin River, Willamette River, local groundwater).**

- **The emergency supply should be sized to meet at least the annual average demand of the community and should be a separate source from the primary supply. Preferably, the emergency source would be one of the six major sources in the region (Bull Run River, Columbia South Shore Wellfield, Clackamas River, Trask/Tualatin River, Willamette River, or local groundwater) that is not the community's primary supply.**

- **The sizing of interconnections between water systems should consider future potential peak season and peak day supply needs as well as emergency needs. The level of demand that should be met in an emergency (for example, 85 percent vs. 100 percent of average annual demand) should also be considered when sizing these interconnections. Sizing of each specific project should be reviewed and modified at the time the project is actually designed and constructed. Interconnections should also consider the effects of mixing source waters on blended water quality characteristics.**

- **If a new east-west transmission connection is made to connect Portland and Washington County, it should be via a route that also connects the Clackamas basin to this transmission line. Alternative routes shown in Section 5 should be evaluated in more detail prior to construction, but the primary route is based on the Regional Water Supply Plan.**

- **While the primary elevation for the transmission connections should be set based on the existing major storage reservoirs in the region (Portland's Powell Butte Reservoir at around 530' elevation and JWC's Fernwood Reservoir at around 520' elevation), not all of the transmission system flow need go to this elevation. Much of the service territory in the region can be served at elevations in the 450' to 490' range. Pumping costs from the river system water treatment plants can be reduced substantially if a portion of the flow goes to the lower elevations. Similarly, there are portions of the region that require higher elevations for service. As specific storage and transmission projects are designed and constructed, both these lower and higher elevation issues should be considered. Pipeline design, should be based upon the pressures of the 530' elevation at a minimum to reduce potential limitations in the utility of the transmission pipelines.**

- **The timing for construction of each project in the Strategy should be determined through negotiations among the project participants that are interested in building the project. Costs should be allocated among participating agencies, and those agencies that do not participate should not be assessed any costs for these projects.**

The benefits of putting this regional transmission strategy into place include:

- Improved protection against loss of any water source for any reason.
- Improved ability to bring available water supplies to communities that may need water.
- Improved flexibility to respond to environment concerns in source waters.
- Ability to utilize lower cost water sources in the winter when water is plentiful and close
- Improved ability to utilize surface sources as part of aquifer storage and recover projects.

The institutional model that is recommended for implementing the elements of the short-term strategy is Intergovernmental Agreements (IGA's) organized under ORS 190. This institutional arrangement offers the greatest array of options for developing detailed system guidelines. It allows relatively easy "evolution" to accommodate future changes in institutional scope or mission. It retains local representation and control while entering into the regional strategy. For each of the projects under RTSS, IGA's could be developed between the project participants to identify cost allocations, operating responsibilities and other obligations and requirements.

There are several projects that were included in the Base Case Scenario (Section 5) that are currently already in the adopted Capital Improvement Programs (CIP's) of various water providers in the region. These projects should be considered as consistent with and as components of, this recommended Regional Transmission and Storage Strategy. These projects are shown in Figure 9-1 and in Table 9-1:

- The second transmission line from the Joint Water Commission water treatment plant in Forest Grove that would connect to the Tualatin Valley Water District (TVWD) and the transmission improvements in the TVWD system to bring this water to its storage reservoir.
- The transmission line from the City of Wilsonville's new water treatment plant using the Willamette River as a source, north to its termination point. This termination point is currently assumed to be within the City of Wilsonville, but may extend further north depending on upcoming decisions of other communities.

- An interconnection between the water treatment plants using the Clackamas River as a source.

- The downstream portion of Bull Run Conduit 5.

- A second reservoir on Powell Butte.

Figure 9-1 withheld for security purposes pursuant to ORS 192.502 (22) and (23).

Table 9-1
RTSS Projects

Project	Sizing (inches in diameter) or (million gallons)
Projects in Planning	
JWC Supply II	72"
JWC/TVWD Intertie	48"
Willamette Supply	63/54"
Clackamas WTP's Intertie	24"
Conduit 5 – Phase I	84"
Powell Butte Reservoir II	50 MG
Recommended Additional Projects	
Powell Butte / Clackamas Basin Intertie	60"
JWC/WCSLI Intertie	60"
JWC/Willamette Intertie	60/54"
Possible Other Projects	
Clackamas / Wash. Co Intertie	60"
Conduit 5 – Phase II	84"
Conduit 5 – Phase III	84"
Cooper Mountain Reservoir	50 MG
Powell Butte Reservoir III	50 MG
Powell Butte 600' Reservoir	20 MG

Several other major projects are recommended for further exploration consistent with this strategy and are also shown in Figure 9-1 and Table 9-1. These are:

- An intertie between the Joint Water Commission and the Portland system.

- An intertie between the Portland system and water sources in the Clackamas basin.

- An intertie between the terminus of the Willamette transmission pipeline and the Joint Water Commission pipeline.

Also shown in Table 9-1 are several possible other projects that depend on future decisions about the regional water supply network.

The routes shown in Figure 9-1 are representative of the general corridor that the transmission pipeline would take. As discussed in Section 5, there are multiple alternative routings for each pipeline. The specific routing for each pipeline should be determined through more detailed study of options and negotiations among those water providers participating in actual project construction.

If the communities in southern Washington County that are currently looking for a long-term source of water (Tigard and Sherwood) decide to use either the Clackamas basin supplies or the Portland system, then a pipeline from the Clackamas basin to those communities should be constructed. If those communities decide to use the Willamette River as their source of supply, then the Willamette transmission pipeline should be sized larger and the connection to the JWC system completed earlier. If those communities decide to use the JWC source as their supply, then the JWC interties to the Portland and Willamette systems should be sized larger and these connections completed earlier.

Section 3 identified a number of more local connections that currently exist between individual water suppliers in the region. Other, similar, local connections or improvements in connection between individual water providers should also be undertaken as part of the Regional Transmission and Storage Strategy. Examples of these may include:

- Capacity increases of the existing intertie between Clackamas River Water and the Portland system,

- Reactivation of an inactive connection between the Portland system and the Oak Lodge Water District,

- Improved connections between Portland and Lake Oswego, and Portland and Milwaukie, and

- A connection between Fairview, Wood Village and the Portland system.

While these connections may not be of regional significance by themselves, the cumulative effect of the sum total of many of these improvements could be of regional significance.

ASR projects are currently being developed in Portland, Washington County and Clackamas County systems to improve supply reliability. As the capabilities of these ASR systems

become better known, they may impact the sizing and timing of some of the transmission and storage facilities recommended in the Strategy.

COST ALLOCATIONS FOR RECOMMENDED ADDITIONAL PROJECTS

Several of the projects in the recommended Regional Transmission and Storage Strategy shown in Table 9-1 are already in the planning and development stages. Project objectives, capacity definitions, cost estimates, institutional arrangements, cost allocation methodologies, financing mechanisms, and other details associated with these projects have either already been developed or are being developed by the parties involved in the projects. No attempt will be made in this report to review these arrangements.

However, for the three additional projects that are recommended for development, an example of the cost allocations of potential project costs has been developed and is shown in Table 9-2. This cost allocation assumes that costs would be apportioned on the basis of projected year 2050 average day demands among all those water providers that are shown in the Table as potentially participating in the project. If fewer water providers participate, cost allocations would go up for the remaining participants. In some cases, water providers may not participate directly, but instead might participate as a wholesale customer of another provider. This could be the case, for example, for providers that use the Portland system as their main source of supply. Also, there may be more participants in some projects than are shown in Table 9-2. For example, a JWC/Willamette intertie could also benefit users in the Clackamas basin if the pipeline from Clackamas to Tigard is built.

It must be recognized that the most accurate formula for determining costs is much more complex than the scheme shown here. In particular, any of these projects could to be used in order to meet peak day needs, as well as average annual requirements. Thus, cost allocations must be determined based on combinations of peaking and base supply needs.

While a general formula can be developed to distribute costs, it is not possible at this time to develop such a formula to ascribe the benefits of individual projects to each water provider. Quantification of the benefits to each participant will require a more detailed analysis. The benefits identified above of improved reliability, increased access to alternative supplies for low cost winter water, and other benefits would apply to greater or lesser degrees to all participants. The specific benefits to each participant would have to be determined by them at the time of participation in the project. Project benefits will depend on the specific project under consideration, the specific mix of participants, and each participant's objectives and requirements under the project.

TABLE 9 - 2
EXAMPLE COST ALLOCATION FOR NEW RTSS PROJECTS

LOCATION	2050 AVERAGE ANNUAL DEMAND (mgd)	PROJECT					
		Powell Butte / Clackamas Intertie (60") $42,500,000		JWC/WCSL Intertie (60") $32,000,000		JWC/WILLAMETTE (Tigard) Intertie (60") $28,000,000	
PORTLAND	80.7	X	$18,574,605	X	$12,338,767		
Lusted area districts	0.9						
Gresham	11.0	X	$2,542,538	X	$1,688,961		
Rockwood	8.3	X	$1,904,601	X	$1,265,191		
Powell Valley&Lorna	6.5	X	$1,493,943	X	$992,399		
Wood Village	1.0						
Fairview	9.0						
East URA	2.7						
Lake Oswego	13.0	X	$2,993,931				
West Linn(SFWB)	9.8	X	$2,256,963				
Oregon City(SFWB)	8.6	X	$1,980,600				
Oak Lodge WD	4.5	X	$1,036,361				
Mt. Scott WD	11.5	X	$2,648,477				
Damascas WD	10.2	X	$2,346,781				
Clackamas River Water	14.3	X	$3,293,324				
Gladstone	1.2	X	$276,363				
Milwaukie	5.0	X	$1,151,512				
Canby	3.5						
West Slope, VV,Bur,PH	2.4			X	$364,106		
Lake Grove	0.6			X	$93,321		
TVWD (Wolfcreek)	35.2			X	$5,391,213	X	$8,951,465
TVWD (Metzger)	4.0			X	$604,293	X	$1,003,357
Tigard	7.6			X	$1,162,691	X	$1,930,509
Raleigh	0.8			X	$120,859		
Tualatin	6.7			X	$1,017,354	X	$1,689,195
Sherwood	4.5					X	$1,137,984
Wilsonville	6.8					X	$1,729,838
Beaverton	10.3			X	$1,575,752	X	$2,616,348
Forest Grove	4.2			X	$642,540	X	$1,066,860
Hillsboro	31.0			X	$4,742,554	X	$7,874,444
TOTAL DEMAND	**315.7**	**184.5**	**$42,500,000**	**209.2**	**$32,000,000**	**110.2**	**$28,000,000**

APPENDIX

Tualatin Valley Water District

1850 SW 170th Ave. • P.O. Box 745 • Beaverton, Oregon 97075 • 503/642-1511 • FAX: 503/649-2733

Lorna Stickel
Water Provider of Portland Metropolitan Region
C/O City of Portland Water Bureau
1120 SW Fifth Ave., Suite 601
Portland, OR 97204-1926

Dear Lorna,

As requested we have reviewed the draft Regional Transmission and Storage Plan. The TVWD Board met on Wednesday, March 15th and have answered the three questions posed. Our comments are as follows:

1. The Board identified highest priority policy values for the transmission strategy at their December 1, 1999 meeting and included emergency reliability, water quality, cost, efficiency, and long term system development consistency. Do you agree that these are the most important policy values to consider in identifying the appropriate strategy for regional transmission and storage, both for your jurisdiction and the region as a whole?

Yes, we believe that these values are the most important. We believe that these values should and do provide the flexibility required in providing water to the various regions in the Portland region.

2. Do you agree with the near and long term strategies identified in Section 9 of the draft Transmission and Storage Strategy?

We agree with the near and long term strategies identified.

3. What changes, if any, would you recommend that we consider in the final Regional transmission and Storage Strategy for the Board to consider adopting in June 2000?

We would suggest the following changes:

a. ASR as a possible source for summer or emergency supply is not mentioned. We would like to see it included, particularly as it relates to the above parameters. As you know several of us are developing ASR sites that could provide emergency supply or be used to augment summer needs.

have called out as peaking supply - for emergency

- page 3-7 revised

Not sure I get this one.

b. We are concerned that average annual day is an appropriate amount for the emergency supply as it depends on the nature and duration of the emergency. We believe it would be prudent to investigate the cost of constructing a pipe to supply 100% of average annual day vs. 85% or 90%. It may be that the cost is small and the small increment is worth spending at this time.

- add to p. 9-2 p 3-5

c. We feel the capping of the head as that of Powell Butte is an issue. I know that it was not our intent to cap the head at the Powell Butte/JWC grade but rather that a normal grade be established for the region. The report addresses lower elevations and we would suggest that language be added regarding higher elevations.

OK slightly strengthened in Sec 9.

d. Although we agree with the strategy that every provider have access to some emergency source of water we cannot agree with the language on page 3-6, fourth paragraph that states, "An approach to strengthening emergency connections in the region would be to require that every water provider have access to both a primary source of supply that is one of the six major regional sources, and to a secondary source of supply that is another of the six major regional sources of supply." The TVWD Board does not agree with the word "require", and the commitment of this Board or future Boards to this language. Rather we think the language should be a guideline, and we would propose the word "require" be eliminated. Our proposed sentence would read as follows:

"An approach to strengthening emergency connections in the region would be that every water provider have access to both a primary source of ....."

OK

Thank you for the opportunity to comment. We believe that this is a good document to help guide us in our effects of providing adequate water for our region. Should you have any questions, please call me at 848-3032.

Sincerely,

Gregory E. DiLoreto
General Manager

cc: TVWD Board of Commissioners

City of WILSONVILLE in OREGON

30000 SW Town Center Loop E
Wilsonville, Oregon 97070
(503) 682-1011
(503) 682-1015 Fax
(503) 682-0843 TDD

MEMORANDUM

DATE: APRIL 14, 2000

TO: LORNA STICKEL,
REGIONAL WATER PROVIDERS CONSORTIUM

FROM: JEFF BAUMAN,
PUBLIC WORKS DIRECTOR

CC: MAYOR CHARLOTTE LEHAN
COUNCIL PRESIDENT JOHN HELSER

RE: REGIONAL TRANSMISSION / STORAGE STRAGEGY

I am responding to the request for comments on the draft report. I've followed the format of the three questions that were distributed with the draft report.

1) We agree that emergency reliability, water quality, cost, efficiency, and long-term system development consistency are priority policy values to consider in evaluating regional transmission and storage alternatives.

2) We agree with the recommendations described on pages 9-1 and 9-2 of the draft report. We suggest clarifications to two of the items listed on page 9-2.
   - The third element states in part: "Preferably, the emergency source would be one of the six major sources in the region that is not the community's primary supply." In Wilsonville's case, our primary supply will be the Willamette River and we intend to maintain our wells as an emergency back-up supply. On a smaller scale, this is analogous to Portland's use of groundwater as their back-up supply. We do not want the Regional Transmission and Storage Strategy to be interpreted to mean Wilsonville should not rely on our local wellfield as an emergency source.
   - The fifth element states in part that a new "east-west transmission connection . . . should be via a route that allows connection of the supplies from the Clackamas basin to be to both the Portland system and Washington County." A connection between the Clackamas basin and the Portland system does not necessitate an east-west connection. The intent of this element should be made more clear.

- Sentence added to p. 9-2

See 9 changed

3) We have no further changes to suggest at this time.

At the Consortium Board meeting on March 1st, Citizens Interested in Bull Run (CIIBRI) objected to a Willamette water treatment facility being included in the base case scenario. We believe the report correctly identifies the Willamette water treatment plant in the base case scenario. The Regional Water Supply Plan, endorsed by all members of the Consortium, states in part: " . . . certain localities in the region are facing more imminent needs than others. Examples of those entities which are likely to need new resource capacity prior to 2000 include the cities of Wilsonville, Tigard, Sherwood, Canby, and possibly the Damascus Water District. . . Seemingly plausible source options (due to availability of existing systems, proximity to alternative sources, and water rights availability) include . . . construction of first phase supply facilities on the Willamette River."

For years, Wilsonville has studied the Willamette and other source options. Extensive public information and discussion was involved in this lengthy planning effort. In the meantime, peak season supplies dwindled. Mandatory water curtailment is now a way of life each summer in Wilsonville. But even conservation has not been enough. Wilsonville instituted a 2-year moratorium on approval of new development, and is currently operating under a Public Facilities Water Strategy which limits development to available supply. In June, 1999, the City Council unanimously approved the Willamette River as Wilsonville's primary source for future water supply. The location of the water treatment plant is essentially the same site identified in the Regional Water Supply Plan. In September 1999, voters in Wilsonville approved a ballot measure authorizing the City to issue up to $25 million in revenue bonds for the purpose of building such a water treatment facility. In addition to these funds, the Tualatin Valley Water District is partnering with Wilsonville in this facility and will be contributing as much as $15 million for their share of the infrastructure capacity for the future. In addition, the State Department of Corrections has earmarked $10 million toward water supply for the prison being constructed in Wilsonville. A significant portion of this funding is also available for construction of Wilsonville's water treatment plant. Whether or not other jurisdictions choose to join this project, work is already under way (and funding has been authorized) for the design and imminent construction of a Willamette water treatment plant, with an initial capacity of 15 million gallons per day.

For these reasons, the Willamette water treatment plant properly belongs in the base case scenario. It will enable Wilsonville to meet our water supply needs, but does not restrict or impose upon or interfere in any way with other jurisdictions' evaluation and ultimate selection among the regional transmission and storage scenarios described in the draft report.

Clackamas River Water

P.O. Box 2439
Clackamas, Oregon 97015-2439

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Fax (503) 656-7086

16770 SE 82nd Drive, Clackamas
customerservice@crwater.com

April 13, 2000

Ms. Lorna Stickel
Regional Water Providers Consortium
c/o Portland Water Bureau
1001 SW 5th Avenue, Suite 450
Portland, OR 97204

Re: Regional Transmission and Storage Strategy

Dear Lorna:

The consortium board has asked that its members comment on the draft Regional Transmission and Storage Strategy, focusing on three questions that have been posed to the participants. We appreciate the work that has gone into creating this draft strategy, and are happy to comment on it.

We will address each of the questions as presented.

1. Having had the opportunity to participate in the selection of the main evaluation criteria, we support that approach. We completely agree with two of the top five policy values: emergency reliability and efficiency. Long-term system development consistency should be dropped from the list as it is not distinguishing among the alternatives. We advocate substituting → move to high priority institutional/financial feasibility in its place. Particularly, the financial aspect of this could improve when a larger number of entities participate in the interconnection of systems. This also addresses the cost issue (as it relates to individual entities), which appeared to be important to several consortium members, although we maintain that if other criteria are closely evaluated, cost could be addressed by sizing, phasing, timing, etc. That said, the value described in our response to question 2., below, would tend to overshadow applicability of policy values other than emergency reliability and operational flexibility.
2. Yes, we believe the strategies reasonably satisfy the criteria laid out for this project. Also, they reflect the guiding principle expressed during the consortium board meetings as 'emergency interties oversized for more than average day demands'.

3. The final strategy should correct table 9-1, where projects in planning includes a 30" Intertie among the Clackamas WTPs. Currently, that is planned as a 24". Further, it may be advisable to include a larger – perhaps 36" – future intertie among those plants in the strategy.

– OK changed table 9-1

Thank you for this opportunity to comment on the draft regional transmission strategy. We look forward to completing this analysis and anxiously await implementation of its first elements.

Sincerely,

Bruce Fontaine
CRW Consortium Board Representative

380 "A" AVENUE
POST OFFICE BOX 369
LAKE OSWEGO,
OREGON 97034
(503) 635-0213
FAX (503) 697-6594

April 7, 2000

Ms. Lorna Stickel
Regional Water Providers Consortium
C/O Portland Water Bureau
1001 SW 5th Avenue, Suite 450
Portland OR 97204

Re : Formal Response to the Draft Regional Transmission and Storage Strategy (RTSS)

Dear Ms. Stickel:

The City Council of Lake Oswego appreciates being given the opportunity to respond to the Consortium's request for a response to the questions regarding the draft RTSS. As you know, Lake Oswego played an active role in the development and subsequent endorsement of the Regional Water Supply Plan and continues to be an active participant in the activities of the Consortium. In accordance with your request, we hereby submit our responses for consideration by the Consortium Board and hopefully for the benefit of the final RTSS. Our responses to your questions in the order asked are as follows:

Question #1 - The City Council of Lake Oswego agrees that the policy values of emergency reliability, water quality, cost, efficiency, and long-term system development consistency are the most important values to consider in identifying an appropriate strategy for the RTSS.

Question #2 - The City Council of Lake Oswego agrees with the near and long-term strategies identified in Section 9 of the draft RTSS and recommends they be retained in their present form in the final RTSS.

Question #3 - The City Council of Lake Oswego recommends deleting Lake Oswego's cost allocation for the "JWC/WCSL Intertie" as shown in Table 9-2 of the draft report for the following reasons:

- The potential benefit to Lake Oswego for this project is tenuous at best and is based on the assumption that the project would result in excess capacity in the Washington County Supply Line (WCSL); excess capacity which could potentially be made available to Lake Oswego. However, it is unlikely the timing of Lake Oswego's need for this excess capacity would complement the timing of other participant's needs that might jointly construct such a project. It is also unlikely that the participants in such a project would allow excess capacity in the WCSL to remain in reserve for Lake Oswego when the timing and size of our need is uncertain.

changed table 4-2

- The estimated costs of this project do not include costs for constructing intersystem connections between Lake Oswego and Portland necessary to access this potential excess capacity.

Again, we appreciate the opportunity to comment on the draft RTSS and sincerely hope the above responses facilitate the timely completion of the final RTSS.

Sincerely,

W.K. Klammer
Mayor

WKK/sms

PURE WATER SINCE 1915

SOUTH FORK WATER BOARD

COMBINED WATER OPERATIONS OF OREGON CITY AND WEST LINN, OREGON

PO BOX 351
OREGON CITY, OR 97045
BUSINESS OFFICE (503) 657-0891
FILTER PLANT (503) 657-5030

April 21, 2000

DRAFT

Post-it® Fax Note 7671	Date 4/13/00	# of pages ▶ 2
To LORNA STICKEL	From DAN BRADLEY	
Co./Dept. FYI. I DON'T	Co.	
Phone # EXPECT MUCH OF	Phone #	
Fax # A CHANGE IN THIS	Fax #	

Regional Water Providers Consortium
c/o Portland Water Bureau
Attn: Lorna Stickel
1001 SW 5th Avenue
Portland, OR 97204

Dear Ms. Stickel:

The South Fork Water Board (SFWB) , an ORS 190 Entity consisting of the Cities of West Linn and Oregon City, discussed the Regional Transmission and Storage Strategy at their April 20, 2000, Board Meeting. The SFWB offers the following responses to the Strategy.

1. The SFWB agrees with the priority policies as discussed at the December 1, 1999, Consortium meeting. Emergency reliability, insuring water quality, consideration of cost and rate impacts, making sure interties are efficient and looking to long term regional interconnections are all important items.

It is our opinion that reliability/redundancy and protecting our rate payers from excessive costs are our top priorities.

2. The near term strategies of interconnecting systems is already taking place in our system. On February 29, 2000, the SFWB entered into a transmission construction and water supply agreement with the North Clackamas County Water Commission (NCCWC). This agreement provides for the construction of a 24" transmission line that will connect the SFWB plant with the NCCWC plant. Construction of this line is anticipated to be complete by December of this year.

SFWB is also preparing to do an in-depth study that may potentially include agreements with the Cities of Lake Oswego and Tigard. A consulting team has been selected to perform the work and is in the process of finalizing the scope of work for approval by the Board and Council's.

The long term strategies run head on with the cost considerations. The sizes and routing of the transmission lines are appropriate, however, even with several jurisdictions contributing to the installations the costs are extremely high. In the case of South Fork the costs appear prohibitive.

added language on sec 9

The SFWB is not suggesting the plan be changed only that our ability to participate financially would be dubious at best.

3. South Fork has no proposed changes to the Regional Transmission and Storage Strategy. Our staff has participated in its development and our Consortium representatives have been well informed at the Consortium meetings. Our priorities are included in the group that the entire Consortium Board accepted.

We would like to commend the Consortium staff for their efforts in managing this study. It is our opinion these are the types of projects that the Consortium was formed to implement and congratulate the Consortium staff for seeing this project to fruition. We plan to actively participate in future Consortium projects.

If you have any questions please contact Dan Bradley, General Manager, at 722-8646 at your earliest convenience.

Sincerely,

John F. Williams, Jr.
SFWB Chair, Oregon City Mayor

March 27, 2000

West Slope Water District
3105 SW 89th Avenue
P.O. Box 25140
Portland, Oregon 97298-0140

Office 503 292-2777

Fax 503 297-1179

Lorna Stickel
Regional Water Providers Consortium
c/o Portland Water Bureau
1001 SW 5th Av, Ste 450
Portland OR 97204

Dear Ms Stickel,

Subject: Regional Transmission and Storage Strategy Review

The Board of Commissioners of the West Slope Water District reviewed the draft of the Regional Transmission and Storage Strategy at the regularly scheduled Board meeting on March 13, 2000. I've been asked to share the following comments:

1. The Board of Commissioners agrees with the Consortium Board that the highest priority should include emergency reliability, water quality, cost, efficiency and long term system development consistency.

2. The Board of Commissioners reviewed Section 9 of the draft Transmission and Storage Strategy and agrees with the near and long term strategies identified.

3. As you know, the West Slope Water District is not served by the Washington County Supply Line and probably would not benefit directly from a transmission line to the south. Our concern is West Slope (as well as other wholesalers) is served by the City's "pumped transmission system" and we believe that it is important to identify major near term and long term system improvements within the City that will affect our emergency reliability, water quality, cost, and efficiency as part of the Regional Strategy.

   added para in Sec 9

   We raised the same concern at the Consortium meeting on Wednesday, March 1, 2000.

   The District's staff and engineer would be willing to meet with the consultants to discuss our concern and suggestions.

Please call District Manager Jerry Arnold if you have any questions.

Sincerely,

Arthur K Holmen

Arthur K. Holmen
Board Chair

c. WSWD Board of Commissioners

City of Gresham

Mayor Charles J. Becker

1333 N.W. Eastman Parkway
Gresham, Oregon 97030-3813
(503) 618-2306
Fax (503) 665-7692

April 12, 2000

Regional Water Providers Consortium Staff
c/o Portland Water Bureau
1001 SW Fifth Avenue, Suite 450
Portland, OR 97204

Subject: Regional Transmission and Storage Strategy (RTSS) for Water

As requested, following are the City of Gresham's comments regarding RTSS.

Priority Policies:
We are in agreement with the priority policy values as established in the RTSS that identify Emergency Reliability, Water Quality, and Cost, as the most important policy values to consider for our jurisdiction, and the region as a whole, with Emergency Reliability being the most important. Improved emergency interconnections between, and among, water systems in the region are vital.

Near and Long Term Strategies:
The near and long term strategies that are identified in the RTSS appear reasonable. For the short term, it is important to complete identified CIP projects and develop and build interconnection between regional water systems through intergovernmental agreements (IGAs). In the long term, development of an interconnected regional transmission and storage system would insure regional water needs are met, and will improve the region's ability to respond to environmental concerns regarding our water sources.

Changes to the RTSS:
At this time we are not proposing any changes to the RTSS. However we reserve the right to make decisions at the local level that effect our ability to provide water within our jurisdiction.

Ok - added some lang in sec 9

Charles J. Becker
Mayor

David S. Rouse
Environmental Services Director

CJB:se

c: Bonnie R. Kraft, City Manager
Gresham City Council

Statement to the Regional Water Consortium

May 11, 2000

To the members of the Water Consortium Board,

We, the members of the four Citizens for Safe Water (CFSW) organizations submit this statement to speak on behalf of the concerned citizens of Tigard, Wilsonville, Tualatin, Sherwood, and the unincorporated areas of the southwestern region of the Portland metropolitan area. In this statement we offer (A) Our background concerns, (B) your proposal, and (C) our amendments for the future source of water for us ... the people who will be drinking it.

A. OUR BACKGROUND CONCERNS

In the process to develop a regional water source, there have been many affairs that have either been ignored or disregarded for the sake of political reasoning. Thus, it is here that we demand that our concerns for what has happened in previous studies, permit applications, legal ramifications, and evidence portrayals be addressed. Nonetheless, in the interest of keeping the focus on a permanent water source, our complaints about a Willamette source will be held to just a few crucial points. All denunciations are fully documented.

1. First and foremost, there are many discrepancies in the Willamette River treatment plant application which are yet to be resolved. These include obtaining an access road to the property, sludge testing, endangered species act compliance, approval of discharges into an adjacent creek. The project violates the city of Wilsonville's own requirements that it not be located in a "natural hazard nor a geologic hazard area".

The project site (according to the latest map of the Natural Hazards in the City of Wilsonville from Metro Regional Services, dated 1999 No. 10382-GMS covering earthquake areas of concern in Wilsonville's Water Treatment Plant proposed location, Metro Regional Services) is listed in the area of highest concern.

The DEQ requires the toxicity of the produced sludge of the plant must be tested (40 CFR 261.24). This category includes eight heavy metals and thirty-two organic chemicals, including ten pesticides. It appears that the sludge will be determined to be hazardous, and must therefore be handled and disposed of accordingly. At full plant production capacity, this will involve numerous truckloads of sludge removal each day. On-site personnel who handle the sludge will have to be trained according to the DEQ requirements for handling hazardous waste.

The Oregon Health Division requires the applicant to provide an updated master plan for the water treatment plant, required by OAR 333-061-0050. This is a twenty-year projection of numerous required information and data collection based on city needs for twenty years into the future. This is a separate master plan from their previous well field master plan and is required prior to construction.

The proposed treatment plant's "action area" includes an area extending 12.5 miles downstream from the plant location. The permit review has not covered the entire 12.5 mile area for all required documentation for the environmental impacts (EIS & ESA) that might cause harm to the environment and human populations downstream from the plant.

The construction of a 109 foot bridge across Arrowhead Creek which is in Bonneville Power's easement is prohibited by Bonneville Power unless the City has a written authorization from Bonneville Power agency.

2. Since the same engineering firm, Montgomery Watson, was awarded the "design-build" contract for the Wilsonville treatment plant **and** was also commissioned to do the Regional Transmission and Storage Strategy (RTSS), we feel that bias has tainted the entire project planning. An independent study conducted by the consulting firm FISHER, SHEEHAN & COLTON , and commissioned by Tigard and Wilsonville CFSW concluded that the two cities are being "maneuvered into a bad situation", and that each city should have their own consultant, instead of all cities using the same firm - Montgomery Watson. The Executive Summary of this study is attached.

3. Third and most important, the desires of the consumers of the water (the residents in the southwest metropolitan area) have not been considered in the decision making process. The consumers' health concerns are reinforced by the increasing scientific evidence that small amounts of chemical compounds which are not removed by the treatment process do in fact accumulate in certain organs of the human body, potentially causing health problems.

However we believe that (hypothetically speaking) even if in the future treated Willamette River water is determined to be safe to drink, that the consumers of that water should have a voice in deciding their water source, especially since they will be required to pay for, bathe in, and drink the water. There is a very strong resistance to Willamette River water, due to the "stigma" of the polluted river. We believe that on this basis alone, that the purchasers and users of the water should have a voice in their water source.

The citizens of Tigard and Sherwood have defeated measures to use Willamette River water by over 80%, and we fully expect the outcome of the May 16th election in Tualatin to yield similar results.

The results of a mail in survey conducted by CFSW of those residents served by the Tigard water system but living in King City, Durham, and the unincorporated areas showed that over 90% prefer Bull Run water over the Willamette.

As for Wilsonville, a complaint was filed by Wilsonville Citizens for Safe Water in August 1999 to the Elections Division of the Secretary of State, documenting "electioneering" by the City of Wilsonville in promoting their revenue bond measure to fund the treatment plant. In addition, a complaint was also filed to the same agency by Jim Hansen, claiming that the Wilsonville based organization H2OK - which was the sole financial contributor to the Wilsonville PAC "LAWN", (and also the sole financial contributor to the Tigard PAC "Citizens for the Safest Water") both of which supported the Willamette treatment plant, was illegal since it had not registered as a PAC. The results of these complaints are still pending.

In addition, the Wilsonville Citizens for Safe Water have filed a lawsuit against the City of Wilsonville, demanding that the City comply with their City Charter in allowing a future vote of the citizens of Wilsonville before introducing Willamette River water to their water system. We believe that, if the court allows a vote by the citizens of Wilsonville, and the citizens are given an accurate representation of the water options available to them, that they will vote against the Willamette River for their drinking water.

Any of the above situations could stop the construction of the Willamette River treatment plant. **Because of this, plus the fact that the citizen inputs and desires are so resoundingly clear, it is here that we hope that you, the members of the Regional Water Providers Consortium (RWPC), will take our concerns, expertise, and wishes into the highest consideration in your decision making process.**

B. YOUR PROPOSAL

As we of the southwestern cities perceive it, any permanent solution in a future water source has at least two parts to it. This idea concurs with the Base Case Scenario outlined by the Regional Transmission and Storage Strategy (RTSS) report. While the dynamics of which water source backs up other water sources has possible conflicts of interest, the idea itself is sound, and we are not in opposition to it. However, the only issue undecided is which of the four possible (RTSS) scenarios are to be implemented. The following paragraph on page E-11 in the RTSS report states; "*The most appropriate transmission network might look different depending on the source that Tigard, Sherwood, and others in Southern Washington County that are looking for water, chose as their primary source during the next few years. If the source becomes the Willamette River, then perhaps*

the Zonal Scenario (Scenario 3) might be most appropriate. ***But, if the Portland system or Clackamas River becomes the source, Scenario 4 may be more appropriate.*** " (emphasis added).

However, while the words of the report direct the action of you, the members of the Regional Water Consortium Board, to option #4, we feel that this is inadequate in several distinct ways. One of these inadequacies is the fact that ***Scenario 4 does not provide the City of Wilsonville with a water source in the event the Wilsonville citizens are successful in defeating the Willamette River as a water source.*** Therefore, we ask that a ***Scenario 5*** be studied independently, and consist of these concepts:

C. OUR AMENDMENTS: In essence, we are satisfied with the major components of Scenario 4, but we would like to have a fifth Scenario, which would include the following changes:

1. A water conduit connecting the Tualatin area with a source of Clackamas River Water (this is already included in Scenario four, but we believe that no matter what scenario is selected it should be included). is recommended Scenario 4 Scenario 4

2. No Willamette River treatment plant construction, which would save approximately 50 million dollars (approximate initial construction cost) off of the unacceptable $200 million Scenario 4 price tag.

3. A smaller water conduit (30 inch) between Tualatin and Wilsonville that would flow North to South, not South to North.

4. Creating aquifer storage and recovery systems in the SW areas, an idea absent in this study, which would reduce the cost of the overall water system improvements.

We would also like to see the estimated cost (in year 2000 dollars) of all five scenarios adjusted after allowing for the increased summer water supply provided by the planned Portland Columbia Southshore Wellfield ASR plan.

CONCLUSION: The conclusion of this statement is threefold.

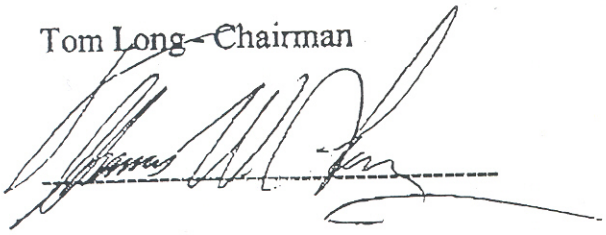
First, the most desired and viable source of water for the greater part of Southwestern Washington County is not the Willamette River. The vote of the people in these cities confirms this. We don't want it. **Second**, because the people have spoken so resoundingly against the Willamette, we are led to follow the conclusion of the RTSS Scenario four, which has Portland, Clackamas, and Trask water interconnections. However Scenario four does not allow for the possibility that Wilsonville residents will win in their fight against Willamette River water and does not provide a water source for Wilsonville other than the Willamette River. It is contradictory action to obey the will of the people and maintain validity in the RTSS report unless another option presents itself.

Our **third** and final point is simple. Throughout the whole process of examining future sources of water, there have been missed or ignored regulations, inappropriate and misleading tactics, and special interests catered to. Despite all of this interference, we, Citizens for Safe Water, have prepared this statement to illustrate how committed we are to a correct decision being passed. We offer a solution. We ask in return that you, the Regional Water Providers Consortium Board, who is representing us - the water consumers in your respective geographical areas - respect our years of effort, and the people's wishes.

Submitted by:

Tigard Citizens for Safe Water,

Tom Long - Chairman

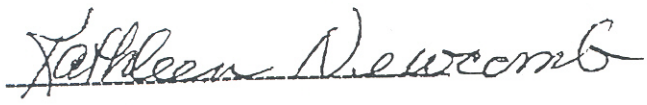


Wilsonville Citizens for Safe Water,

Dolores Scott - Chairman

Tualatin Citizens for Safe Water,

Kathleen Newcomb - Coordinator



Sherwood Citizens for Safe Water,

Glen Brostrom - Chairman