

# **Cascade Water Alliance 2004 Transmission and Supply Plan**

September 29, 2005

Adopted by Resolution No. 2005-06

## **Cascade Water Alliance Members**

City of Bellevue

Covington Water District

City of Issaquah

City of Kirkland

City of Redmond

Sammamish Plateau Water & Sewer District

Skyway Water & Sewer District

City of Tukwila

## Executive Summary

The Cascade Water Alliance (Cascade) was formed through interlocal agreement by eight public water systems in King County, Washington. Cascade serves as a regional water supplier to its eight Members, which include:

- City of Bellevue
- Covington Water District (Covington)
- City of Issaquah
- City of Kirkland
- City of Redmond
- Sammamish Plateau Water and Sewer District (Sammamish Plateau)
- City of Tukwila
- Skyway Water and Sewer District (Skyway)

Cascade began delivering regional water supplies to its Members on January 1, 2004.

The Washington State Department of Health (DOH) requires public water systems to prepare and submit a water system plan every six years. This Transmission and Supply Plan (TSP) meets this requirement. It is the first plan of this nature Cascade has prepared. This TSP covers a 6-year planning period, 2004-2009, and the 20-year period, 2004-2023. Additional information is included through 2050 to provide a planning context for the capital facilities that Cascade plans to construct.

This TSP addresses water supply and transmission needs, rather than local distribution. Information on the local distribution systems of Cascade's eight Members can be found in their respective Water System Plans submitted separately to DOH.

### Description of Water System

Cascade is a public, non-profit corporation incorporated under the state's Interlocal Cooperation Act. It has authorities and responsibilities defined in the Interlocal Contract between its Members. Cascade is governed by a Board of Directors composed of one appointed representative from each Member.

Cascade's service area is an aggregate of its eight Members' water service areas. Since not all Members are adjacent to one another, this is a non-contiguous service area. Cascade serves solely as a regional supplier to its Members, which are independent water systems. Cascade does not serve water directly to the public, and does not plan to own or operate distribution facilities.

Cascade and its Members currently utilize a variety of water supply sources, including Members' independent supplies, wholesale water purchased by Cascade from Seattle Public Utilities (SPU), wholesale water purchased by Members from non-Member water purveyors, and a small amount of reclaimed water. Cascade has an Agreement with Tacoma Public Utilities (TPU) to obtain a substantial block of water from Tacoma's Second Supply Project (TSSP) and anticipates bringing this supply online by 2010. In the longer term, Cascade anticipates developing Lake Tapps, located in Pierce County, for municipal water supply. In addition, Cascade provides a regional conservation program to its Members.

### Key Agreements

Cascade has executed a number of agreements that provide a basis for the water supply program described in this TSP. Additional agreements are currently being negotiated. Executed and in-progress agreements are summarized in Table ES.1.

**Table ES.1 Cascade and Member Agreements**

Entity	Subject of Agreement	Status of Agreement
Members	Interlocal contract	Executed
	Supply contracts with non-Members	Executed
	Wheeling of water among Members	Executed
SPU	Water supply contract	Executed
	Wheeling of water	Negotiations in progress
TPU	Water supply contract	Executed
Puget Sound Energy	Exclusive agreement for acquisition of Lake Tapps water rights	Executed
Covington WD	Agreement to provide excess supply from TSSP to Cascade	Letter received from Covington
King County	Memorandum of Understanding (MOU) on water resource and supply planning	Executed
Puyallup Tribe of Indians	Settlement agreement regarding Lake Tapps water rights	Negotiations in progress
Muckleshoot Indian Tribe	Settlement agreement regarding Lake Tapps water rights	Negotiations pending

## Planning Data and Demand Forecast

Water use data for the eight Cascade Members from 1994 to 2004 was reviewed to provide a baseline for this TSP. Additional data on growth in Cascade Equivalent Residential Units (CERUs) was used to establish a projected demand in 2005. With 2005 serving as the base year, demand was then forecast through year 2050. Two forecasts were prepared:

- The Cascade Composite Forecast was developed from the forecasted rates of growth in demand in each of the eight Members' individual water system plans.
- The Financial Forecast uses a lower rate of growth in CERUs developed to provide a more conservative estimate of expected revenue. Together, these bracket the expected range of demands for the planning period.

Demand forecasts were prepared for Average Day Demand (ADD), Maximum Day Demand (MDD), and Maximum Week Demand (MWD). These figures are presented in Table ES.2. These forecasts incorporate projected savings from Cascade and Members' water conservation programs.

**Table ES.2 Projected Demand in Million Gallons per Day (MGD)**

	2004	2009	2023	2050
<b><i>Cascade Composite Forecast</i></b>				
Average Day Demand	40.9	48.7	61.1	74.6
Maximum Day Demand	86.3	105.5	134.3	163.0
Maximum Week Demand	82.0	100.2	127.5	154.9
<b><i>Financial Forecast</i></b>				
Average Day Demand	40.9	45.2	55.5	67.9
Maximum Day Demand	86.3	96.0	119.6	146.3
Maximum Week Demand	82.0	91.2	113.6	139.0

Notes:

1. Demands include water to be supplied by Members' independent supplies and wholesale contracts.
2. Forecasted demand for Tukwila excludes the west city area currently served by Water District 125. However, future demands with the Seattle Rendering Plant are included in these projections.
3. Covington WD's agreement with TPU for TSSP water provides a firm summer-only supply of 12.64 MGD from June through October. The agreement does not include supply of TSSP water during any other time period (i.e. winter).

## **Water Conservation**

Cascade provides a regional water conservation program to its Members. The program has been developed jointly through a Conservation Work Group composed of Cascade Members and Cascade staff, in consultation with Cascade's Board of Directors.

Cascade's Transition Water Conservation Program was adopted in May 2004 to allow the Cascade Membership to begin working together to develop regional conservation strategies. The Program is intended to supplement and complement existing conservation programs implemented individually by each Member. The regional Cascade Program includes public education, technical assistance, and a variety of incentives and other measures such as rebates for water efficient equipment, and irrigation audits. Individual Cascade Members offer additional program elements at the local level.

Cascade and its Members will continue to pursue cost-effective conservation efforts to reduce demand. The estimated savings from the combined Cascade and Member conservation program in 2009 is 2.11 MGD of Average Daily Demand. The demand forecast described above incorporates this level of water savings.

Cascade plans to perform a Conservation Potential Assessment (CPA) in 2005 to define optimum conservation activities at the regional level. The Conservation Plan presented in this TSP will be updated in 2006, based on the results of both the CPA and the new state Rule on water use efficiency expected to be adopted by DOH by the end of 2005.

## **Reclaimed Water**

Reclaimed water is highly treated wastewater effluent that can be reused for purposes such as irrigation or industrial processes. Cascade views reclaimed water as an alternative source of supply that can reduce its Members' needs for potable water. Cascade considers water reuse especially valuable because of its potential to offset peak season supply requirements. Therefore, this TSP evaluates opportunities for use of reclaimed water in Cascade's service area.

King County Wastewater Treatment Division (WTD) is the primary source of reclaimed water in the region. Currently WTD produces reclaimed water at its South Treatment Plant in Renton. Tukwila uses a portion of this supply and plans to increase use of this source in the future. WTD plans to construct the Brightwater Regional Treatment System, and this will provide an additional source of reclaimed water available in the northern part of the County. King County has also expressed interest in possible construction of satellite treatment plants that could also provide reclaimed water.

At this time, a range of implementation issues need to be addressed in order for substantial increases in reclaimed water to occur in the Cascade service area. Many of these issues need to be addressed by King County. Cascade will monitor developments in this arena and plan accordingly. For purposes of this TSP, Cascade has identified potential use of approximately 2.6 MGD of reclaimed water by 2023. This quantity is treated as one of the supply sources available to Cascade to meet its Members' needs.

## **Water Supply Strategy**

Under the Interlocal Contract, Cascade provides a Full Supply Commitment to each of its Members. This obligates Cascade to meet all current and future water supply needs of its Members, after accounting for the supply provided by a Member's independent sources. Cascade will actively plan for and acquire sources necessary to meet forecasted needs. If Cascade's sources are not sufficient at any given time to meet the full need of all Members, the Interlocal Contract specifies that the shortage will be shared by all the Members.

During the 20-year planning period, from 2004 to 2023, Cascade intends to satisfy Members' demands through a combination of Members' self-supplied sources and regional sources. Members' sources include local groundwater supplies, water purchased from adjacent water systems, and reclaimed water Tukwila purchases from King County WTD. In addition, Covington is a partner in the TSSP and has direct access to a portion of that supply. Regional sources contracted by Cascade include water purchased from SPU and to be purchased from TPU.

Figures ES.1 and ES.2 present Cascade's mix of water supplies for the average day and maximum week, respectively. Cascade's demand forecast is also shown. Cascade's current mix of supplies will be sufficient in most years based on the forecasted growth in demand. However, in some years near the end of each planning horizon (6-year and 20-year), additional steps need to be taken to ensure a balance between supply and demand. On the supply side, Cascade Members will need to maximize local production from their groundwater sources. In addition, Cascade may occasionally exceed Block Contract limits from SPU and incur additional water supply costs in years when this occurs<sup>1</sup>. On the demand side, Cascade and its Members are prepared to curtail water use during peak demand periods.

Beyond the 20-year planning horizon additional supplies will be required. Cascade's preferred option is the development of Lake Tapps into a long-term regional water source. The Washington State Department of Ecology issued a Report of Examination (ROE) to Puget Sound Energy (PSE) in 2003 approving PSE's application for a municipal water right for use of Lake Tapps. The ROE was appealed and has been remanded back to Ecology for further consideration. Cascade anticipates that Ecology will re-issue the ROE in 2005. Cascade is currently negotiating with PSE for the purchase of water rights and facilities related to Lake Tapps. Based on the demand forecast, the Lake Tapps supply will offer capacity sufficient to meet Cascade's needs beyond 2043.

Cascade is proceeding with permitting and environmental review for necessary capital improvements, assessment of engineering considerations for infrastructure development, financial planning, and other steps needed to develop the Lake Tapps facility. At the same time, in order to ensure a robust resource strategy, Cascade will continue to evaluate parallel supply alternatives besides Lake Tapps.

## **System Analysis, Infrastructure Needs, and Capital Improvement Program**

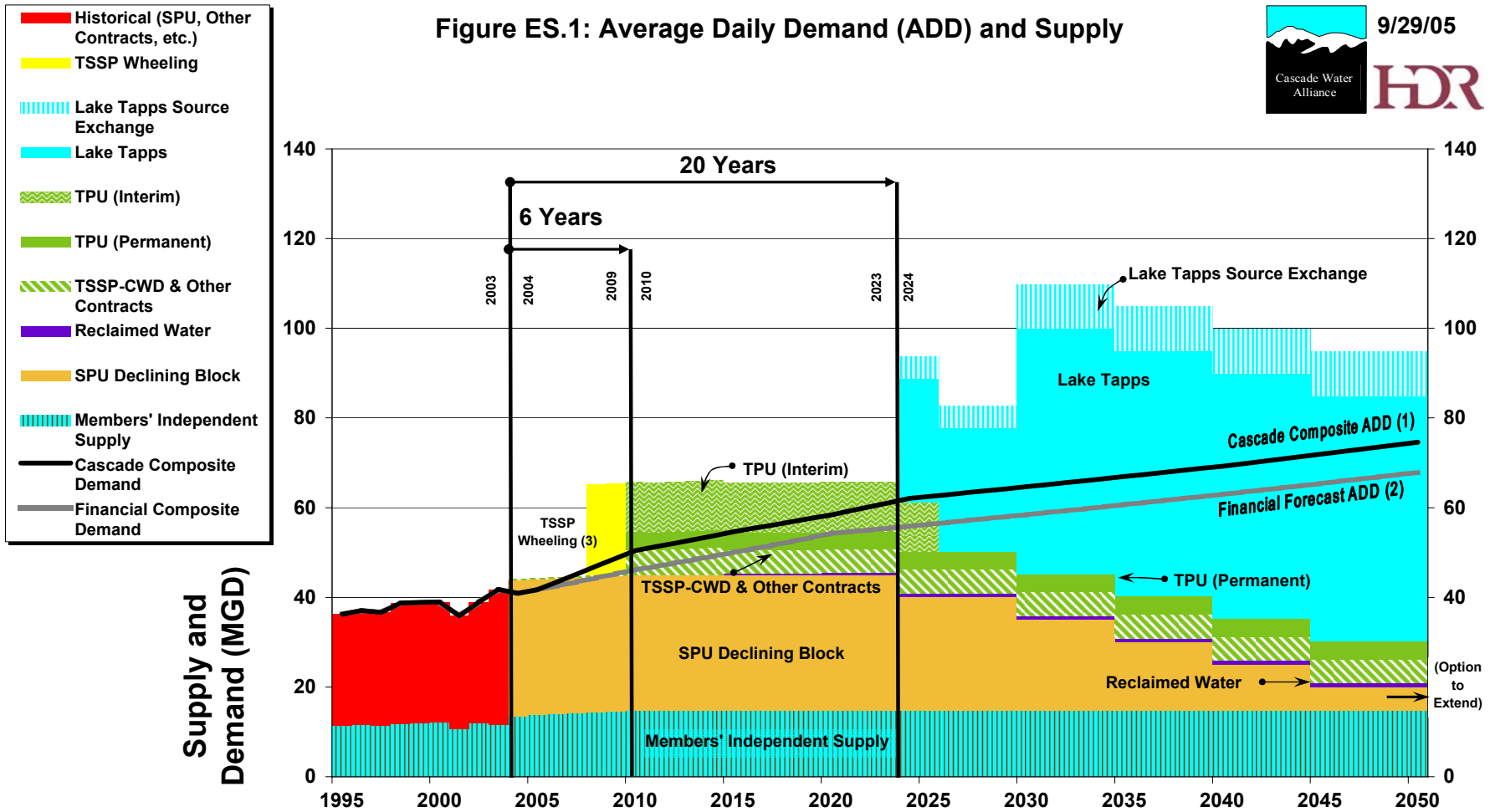
In order to deliver water from the sources described above to Cascade Members, a number of major capital projects are needed. The initial driver is the need to deliver water from the TSSP to Cascade Members, which requires construction of a regional transmission system.

In the long term, additional projects are needed to develop Lake Tapps as a source of supply and convey water from this source to Cascade Members. This TSP anticipates that water from Lake Tapps will be used first in year 2024, or beyond the 20-year planning horizon that is the main focus of this TSP. However, capital improvements associated with Lake Tapps are discussed for two reasons. First, the configuration of transmission infrastructure needed to deliver TSSP water is best understood in the context of anticipated projects needed later for Lake Tapps. Second, in order for Lake Tapps to be brought online in 2024, the required treatment and transmission infrastructure must be planned, permitted, and constructed prior to that time.

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<sup>1</sup> The Block Contract between SPU and Cascade does not require SPU to provide additional supplies to Cascade and SPU has the option to refuse Cascade's request for additional supply. However, if contract limits are exceeded, the contract specifies the penalties to be imposed by SPU on Cascade.

Figure ES.1: Average Daily Demand (ADD) and Supply



Notes: (1) Following 2005, the forecast of Cascade composite demand is based on growth rates from each Member's water system plan or updated forecast.

Following the final year of a Member's forecast, a 1% growth rate is applied through 2050.

(2) Financial Forecast ADD is based on the anticipated growth rates in CERUs by Member following the 2005 forecasted demand. CERU growth rates for the 2021 through 2050 period are based on a rate of 0.75 percent.

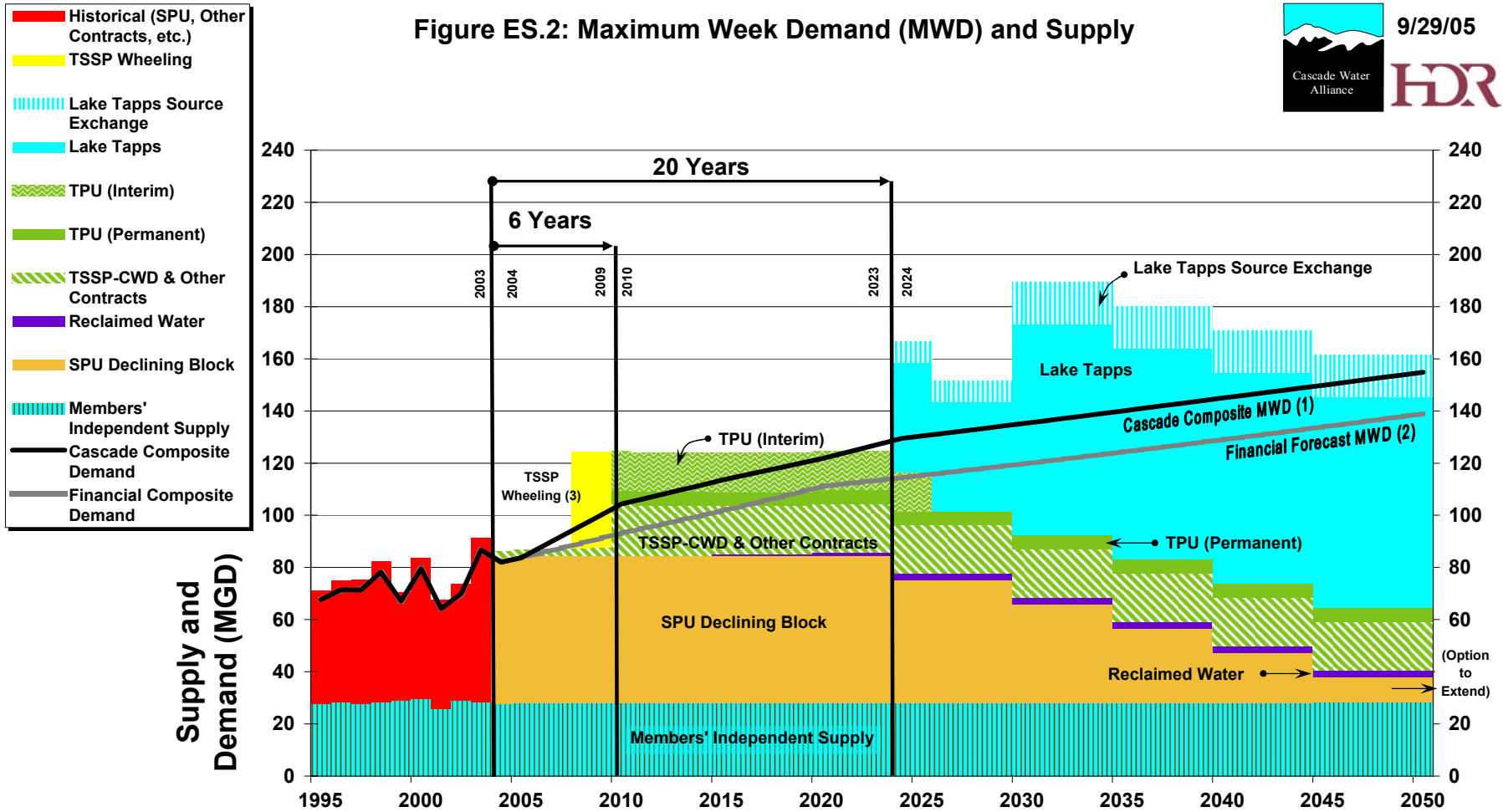
(3) TSSP water from TPU Interim, TPU Permanent, or Covington WD that is potentially available to Members through wheeling is depicted as a separate supply.

(4) Cascade demands include Members' self-supplied demand.

(5) Historical average day independent supply production for Sammamish Plateau, Redmond, and Covington were provided by the members. Issaquah's independent supply for 1995-2002 is based on 2003 production. Skyway WD (1995-1999) is calculated using a trend line based on 2000-2004 production.

(6) Covington WD's agreement with TPU for TSSP water provides a firm summer only supply of 12.64 MGD from June through October. The agreement does not include supply of TSSP water during any other period (i.e. winter)

Figure ES.2: Maximum Week Demand (MWD) and Supply



- Notes: (1) Following 2005, the forecast of Cascade composite demand is based on growth rates from each Member's water system plan or updated forecast. Following the final year of a Member's forecast, a 1% growth rate is applied through 2050.  
 (2) Financial Forecast MWD is based on the anticipated growth rates in CERUs by Member following the 2005 forecasted demand. CERU growth rates for the 2021 through 2050 period are based on a rate of 0.75 percent.  
 (3) TSSP water from TPU Interim, TPU Permanent, or Covington WD that is potentially available to Members through wheeling is depicted as a separate supply.  
 (4) Cascade demands include Members' self-supplied demand.  
 (5) Historical Maximum Week Independent Supply: Estimated using historical average day for 1995-2002 and the ratio of "average daily yield" to "maximum production" for 2003 or provided by member.

Cascade is now conducting a study to determine the sizing and routing of the proposed transmission pipelines. The results of this study will determine the pipe diameters and potential routes for different segments of the transmission system. The following facilities have been identified based on current information, and form the basis for the Capital Improvement Program (CIP) and financial program described in this TSP:

- The Central Segment pipeline of the Regional Water Supply System between TSSP and SPU’s Control Works,
- The North Segment pipeline of the Regional Water Supply System connecting the Central Segment to the existing Bellevue-Issaquah Pipeline (BIP),
- A regional storage reservoir with 20 million gallons of storage capacity,
- Phase 1 of the Lake Tapps Water Treatment Plant,
- The South Segment pipeline of the Regional Water Supply System and a booster pump station,
- If needed, a pipeline parallel to the BIP, and
- A portion of a Bellevue-Kirkland-Redmond Extension pipeline, initially reaching northern Bellevue.

Cost ranges are presented in Table ES.3. These facilities are shown in Figure ES.3.

<b>Table ES.3 Cascade Regional Water Supply System</b>			
<b>Phase / Project</b>	<b>Projected Online Date <sup>1</sup></b>	<b>Cost Range<sup>2</sup></b>	
Transmission Line – Central Segment-1	2008	\$57,000,000	\$76,000,000
Transmission Line – North Segment-West	2010	\$65,000,000	\$87,000,000
BIP Parallel Line	2021	\$14,000,000	\$21,000,000
Reservoir - 20 million gallons	2021	\$20,000,000	\$22,000,000
Lake Tapps Water Right Acquisition	2024	\$37,000,000	\$37,000,000
Phase 1 Lake Tapps Treatment Plant	2024	\$110,000,000	\$130,000,000
Transmission Line – South Segment	2024	\$65,000,000	\$70,000,000
Booster Pump Station	2024	\$20,000,000	\$22,000,000
Bellevue-Kirkland-Redmond extension - North Bellevue Phase	2019	\$14,000,000	\$16,000,000
<b>Total CIP Costs to 2024</b>		<b>\$402,000,000</b>	<b>\$481,000,000</b>

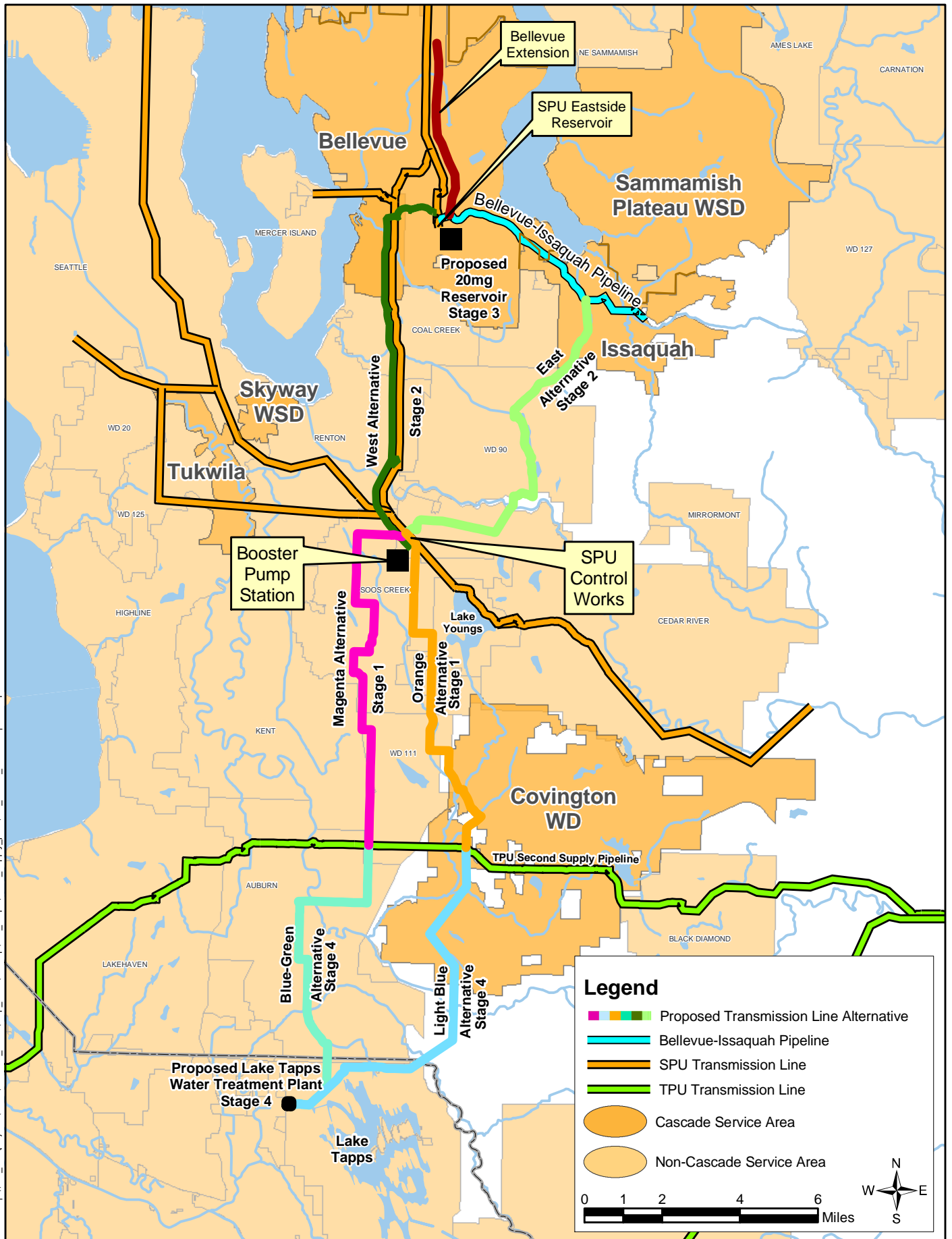
Notes:

1. Dates shown are for a non-wheeling scenario for one alternative and option. Other scenarios, options, and alternatives may have different dates for specific activities.
2. Costs are presented in 2004 dollars. Where applicable, costs were inflated to 2004 dollars using the *Engineering News and Review* Construction Cost Index.

## Source Water Protection Program

At this time, Cascade purchases water from SPU, and plans to purchase water from TPU. Cascade does not currently own or operate its own source of supply. This TSP summarizes SPU and TPU source water protection programs designed to protect raw water quality. As Cascade looks ahead to development of the Lake Tapps supply, a source water protection program for that source will be developed. This TSP outlines an approach to meet that need.

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**Proposed Alternative Transmission Lines and Related Features**

**FIGURE ES.3**

## Water Quality Maintenance and Monitoring

Cascade's current operations involve purchase of water from SPU and eventually TPU and delivery of that water to its eight Members. The Members themselves then distribute water to their customers. Therefore, while Cascade has a responsibility to ensure its supplies meet state and federal drinking water standards, this responsibility is exercised largely through coordination with SPU, TPU, and Cascade Members. This TSP describes how Cascade will interact with SPU, TPU, and its Members to ensure that water quality requirements are met.

## Operation and Maintenance Program

In the near term, Cascade envisions providing Operation and Maintenance (O&M) services primarily through contracted services. These contracts will be with SPU and TPU as wholesale suppliers and also with Member agencies. Additional contracts may also be established with non-Member agencies or with outside contractors where appropriate. Cascade's approach to system O&M will transition over time as Cascade shifts its sources of supply from water that is purchased from existing wholesale supply systems to providing water through facilities that will be owned and operated by Cascade. Cascade does not envision adding staff to perform operations and maintenance activities until such time in the future when Cascade owns and operates facilities that warrant this addition.

## Financial Program

Table ES.4 shows the capital funding strategy anticipated for the capital projects laid out in this plan over the next 6 years. Costs are shown for two options that are under consideration in the pipeline routing study, bracketing a range from the low end to the high end of estimated costs.

<b>Table ES.4 Capital Funding Strategy (2004-2009, Millions of Dollars)</b>		
	<b>Option IA</b>	<b>Option IIA</b>
<b>Capital Costs</b>		
Capital Project Costs (2004-2009) <sup>1</sup>	\$186.6	\$231.0
Sammamish Plateau Loan Payment <sup>2</sup>	10.0	10.0
<b>Total Capital Costs</b>	<b>\$196.6</b>	<b>\$241.0</b>
<b>Capital Funding (2004-2009)</b>		
RCFCs	\$ 53.9	\$ 58.2
Use of Reserves	6.3	6.7
Sammamish Plateau Loan	10.0	10.0
Revenue Bonds	126.4	166.0
<b>Total Funding</b>	<b>\$196.6</b>	<b>\$241.0</b>

Notes:

1. Adjusted for construction cost inflation (assumed to be three percent per year).
2. This loan was used to execute the purchase of the Bellevue-Issaquah Pipeline, which occurred in late 2004.

Cascade will use a combination of funding sources to meet the capital requirements needed to implement this TSP. These include:

- State and federal grants or loans
- Revenue bonds
- Member charges
- Regional capital facilities charges

Figure ES.4 summarizes the revenue requirement forecast through year 2025. The figure depicts different strategies for implementing necessary supply and transmission projects. The financial analysis considers the financial impacts of each of these options, providing a range of impacts by comparing the most expensive and least expensive scenarios (identified as Options IA and IIA).

Since Cascade’s rate structure focuses on Demand Shares, a statistic based on peak season demand, Figure ES.4 is shown in terms of an average cost per peak season MGD. The forecast shown in Figure ES.4 does not incorporate any refinement for rate smoothing.

The relative cost of the two options shown will later converge in the early 2030s, as the parallel pipeline is constructed in Option IA. Though Option IA is generally less expensive than Option IIA through 2025, it becomes more expensive in future years due to the second phase of construction required.

**Figure ES.4 Average Cost of Cascade Water Per Peak Season MGD (2004-2025)**

