2013 Water System Plan
Plan Summary

Seattle Public Utilities (SPU) manages and operates the water system serving Seattle retail customers and wholesale customers in nearby cities and water districts. This *2013 Water System Plan* describes how SPU meets current and future water demands, ensures high quality drinking water, and invests in and maintains its water system at the lowest life-cycle cost. While the plan focuses on the 2013-2018 time period, longer term outlooks to 2040 and beyond are also discussed.

SPU prepared the plan under regulations adopted by the Washington State Department of Health (WDOH) for public drinking water suppliers. The plan is also consistent with the WDOH Water Use Efficiency Rule, requirements of the Growth Management Act, and local and regional land use plans.

Key findings and implementation actions are highlighted below, with more detail provided in the chapters that correspond to the headings.

DRINKING WATER SYSTEM

- SPU provides drinking water to a service area population of 1.3 million within the greater Seattle metropolitan region of King County and portions of southern Snohomish County. See map of SPU's service area on page S-9.
- Recent surveys of residential and commercial customers indicate that SPU's retail customers continue to be very satisfied with water system reliability and drinking water quality.

WATER RESOURCES

SPU's water supply system consists of surface water reservoirs on the Cedar River and South Fork Tolt River and two wellfields providing groundwater. The system is operated primarily for water supply and protection of instream flows, but also used for hydroelectric power generation and flood management.

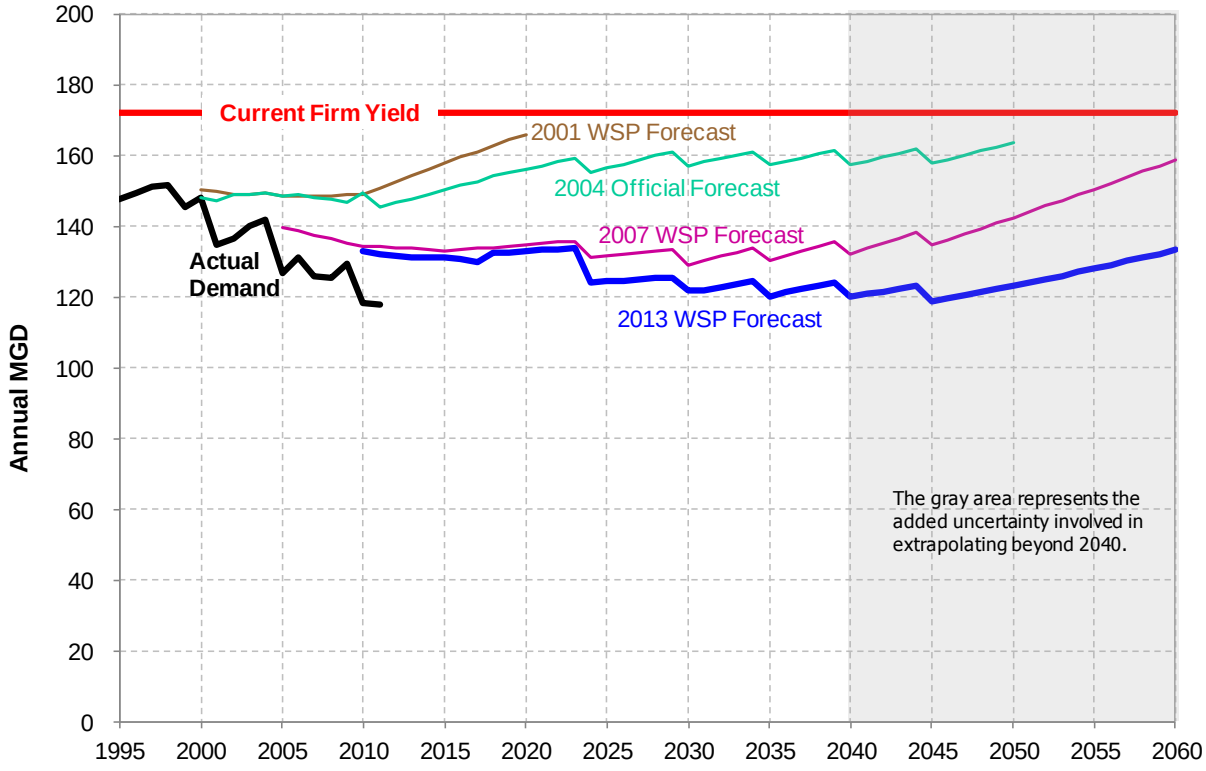
Water Use

- Approximately one-half of SPU's water is used by SPU's retail customers and one-half is sold through wholesale contracts to 19 municipalities and special purpose districts, plus Cascade

Water Alliance, who in turn provide the water to their own retail customers.

- Since 1990, consumption has decreased about 30 percent while population has increased by 15 percent.
- From 2010 to 2040, population is forecast to increase by 21 percent in SPU's retail service area and by 25 percent in the service area of SPU's full and partial wholesale water contract holders. Employment is forecast to grow by 54 and 46 percent, respectively, over the same period.
- Total average annual demand is forecast to remain at or below current levels of approximately 133 million gallons per day through 2060, significantly lower than what was forecasted in the *2007 Water System Plan*. See graph below.
- The primary factors that influence the demand forecast consist of the declining block contract with Cascade Water Alliance and continued reductions in water use by customers.

SPU's Official Water Demand Forecast



Conservation

- SPU achieved a greater than 30 million gallons per day (mgd), or 20 percent, reduction in water use on an average annual basis from 2000 through 2010 from the combined effect of the Regional 1% Conservation Program, SPU's "Everyone Can Conserve" Program, system operation improvements, and other changes in water use by customers due to rates and codes.
- This plan sets a goal to reduce per capita water use from current levels so that total average annual retail water use of members of the Saving Water Partnership[1] is less than 105 mgd from 2013 through 2018 despite forecasted population growth.

Water Supply

- The current firm yield estimate for SPU's water supply system is 172 mgd, which is an increase of one mgd reflecting recent demand patterns and a recently approved higher refill level in Chester Morse Lake.
- Through this plan, SPU is modifying its service area for its water rights place of use so as to clarify that the service area includes small areas in Snohomish County currently served by Northshore Utility District, the City of Woodinville, and the City of Bothell, as well as potential service area additions proposed by Water District 119. For these areas, see the map on page S-9.
- Given the new demand forecast and current firm yield estimate for SPU's existing supply resources, no new source of supply is needed before 2060.

Climate Change and Future Supply Outlook

- Updated analyses indicate that under the warmest climate change scenario analyzed, available supply is estimated to be reduced by as much as 4 percent in 2025, 6 percent in 2050, and 13 percent in 2075. Even so, the reduced supply would exceed climate-impacted demands for all years except 2075, in which demand would exceed supply by approximately 3 percent. Low or no cost system modifications could be made to meet demands in this case.

[1] Members of the Saving Water Partnership include Seattle, Northshore Utility District and SPU's 17 full and partial wholesale water contract holders.

Planned Infrastructure and Operational Improvements

- SPU identified infrastructure improvement needs for the water supply system that include Morse Lake Pump Plant, Overflow Dike Replacement, and Landsburg Dam Flood Passage Improvements projects.
- SPU plans to complete investigations that support water resources operations including refill of Chester Morse Lake to elevation 1566 feet, potential impact on water quality that could be caused by failure of Lake Youngs Cascades Dam, and potential additional drawdown of South Fork Tolt Reservoir.

WATER QUALITY AND TREATMENT

SPU's water system includes state-of-the-art water treatment facilities for the Cedar and South Fork Tolt source waters, in-town disinfection facilities at reservoirs and well sites, and a state-certified water quality laboratory.

Drinking Water Quality

- SPU continues to meet drinking water quality regulations and other aesthetic criteria (i.e., taste and odor).
- SPU's source protection practices, water treatment facilities, and distribution system practices have provided excellent quality water that ensures compliance with current and future regulations.
- Results of testing in 2008 for pharmaceuticals and personal care products (PPCPs) and endocrine disrupting compounds (EDCs) in SPU's source water confirms the absence of these emerging contaminants of concern.
- SPU plans to review distribution system flushing practices and the level of resources allocated to flushing of the distribution system through fire hydrants.
- SPU will conduct a risk-cost analysis of public access on the Kerriston Road to determine if additional land acquisition is the preferred approach for mitigating the risk of impairing Cedar source water quality.
- SPU will continue to monitor and characterize limnological conditions in Lake Youngs as it affects Cedar supply operations and treated water quality.
- SPU will operate the water supply system to bypass Lake Youngs to avoid problematic algae from entering the water system.

- SPU will continue efforts to prevent aquatic nuisance and invasive species from being introduced into SPU's drinking water supplies.

Reservoir Covering/Burying

- SPU has covered eight of the ten reservoirs that were previously uncovered, with six of these buried to increase security and create new public open space opportunities.
- The plan for the remaining two open reservoirs is to test-decommission Roosevelt Reservoir and Volunteer Reservoir.
- In about 2020, the floating covers on Bitter Lake and Lake Forest Park Reservoirs will be evaluated for their remaining service life and possible replacement.

Water Treatment Facilities

- SPU will be evaluating contract extension options for the Tolt and Cedar Water Treatment Facilities that are in long-term Design-Build-Operate (DBO) contracts.
- SPU plans to replace the existing gas chlorine feed system at Landsburg with sodium hypochlorite to reduce safety risks.

WATER TRANSMISSION SYSTEM

The regional and sub-regional water transmission systems include approximately 193 miles of pipeline, seven covered reservoirs, 15 pump stations, six elevated tanks and standpipes, and 129 wholesale customer taps with meters.

Transmission Infrastructure

- SPU has met the wholesale contract requirements for pressure and flow, and there have been no unplanned outages of the transmission pipelines that have exceeded SPU's service level for maximum outage durations.
- SPU plans to mitigate the risk of pipe failure in the slide area between the Regulating Basin and Tolt Water Treatment Facility through continued slope monitoring, additional geotechnical data collection, periodic internal inspections, biannual leak testing, and by taking such actions as acquiring ownership of the land in the slide area and implementing pipeline stress relief measures when necessary.
- SPU will implement cost-effective cathodic protection projects as needed for the concrete cylinder and steel transmission

pipelines to protect these from corrosion and extend their service lives.

System Storage Level of Reliability

- SPU has defined its system storage level of reliability that is based on outage scenarios of major system components and of power supply. These scenarios form the basis for downsizing or retiring certain treated water reservoirs, for decommissioning certain tanks and standpipes, and for making targeted improvements to pump stations.

WATER DISTRIBUTION SYSTEM

The distribution system contains more than 1,680 miles of watermains, two open reservoirs, six covered reservoirs, 16 pump stations, six elevated tanks and standpipes, 21,000 valves, and 18,920 fire hydrants, as well as more than 188,000 service lines and meters serving individual residential and non-residential properties in the retail service area.

Service Delivery

- Since completion of the pressure improvement projects in early 2009, pressures at all retail service connections are greater than 20 pounds per square inch during normal operations.
- SPU consistently responded to reported distribution system problems within one hour more than 90 percent of the time.
- While SPU's distribution system leakage has increased from less than 3 percent in 2006 and 2007 to more than 6 percent in 2010 and 2011, the 3-year rolling average has remained below the WDOH standard of 10 percent.
- The rate of watermain leaks and breaks remains low, averaging less than 10 reported leaks or breaks per 100 miles per year in the distribution system.
- From 2006 through 2010, fewer than 2 percent of all retail customers experienced water service delivery outages of more than 4 hours per year from all planned and unplanned events.

Distribution Infrastructure

- SPU plans to assess, in a pilot effort, the condition of a portion of the most critical watermain segments and, if needed and supported by analysis, to repair, rehabilitate or replace the pipe prior to anticipated failure.

- SPU will improve operational response and customer service by using information from the watermain shutdown block analysis for project and emergency shutdown plans.
- SPU plans to complete the remaining seismic backbone upgrades in the Duwamish River Valley.
- SPU will consider the use of cleaning and cement-mortar lining as an alternative to replacement of deteriorated unlined, cast iron pipe to address pipeline life, fire flow, water quality, and pressure issues in the distribution system.
- SPU will continue to work with the Seattle Fire Department to improve fire hydrant maintenance and testing practices, to better coordinate communication between SFD and SPU's water system control center and emergency crews just prior to and during fire fighting, and to prioritize and implement fire flow improvement projects.
- SPU plans to use SPU's Watermain Replacement Opportunity Model to determine whether to protect or replace existing watermains impacted by transportation projects.
- SPU will continue working with developers where watermain replacements or upgrades in redevelopment areas are required to meet current fire flow requirements and watermain standards.

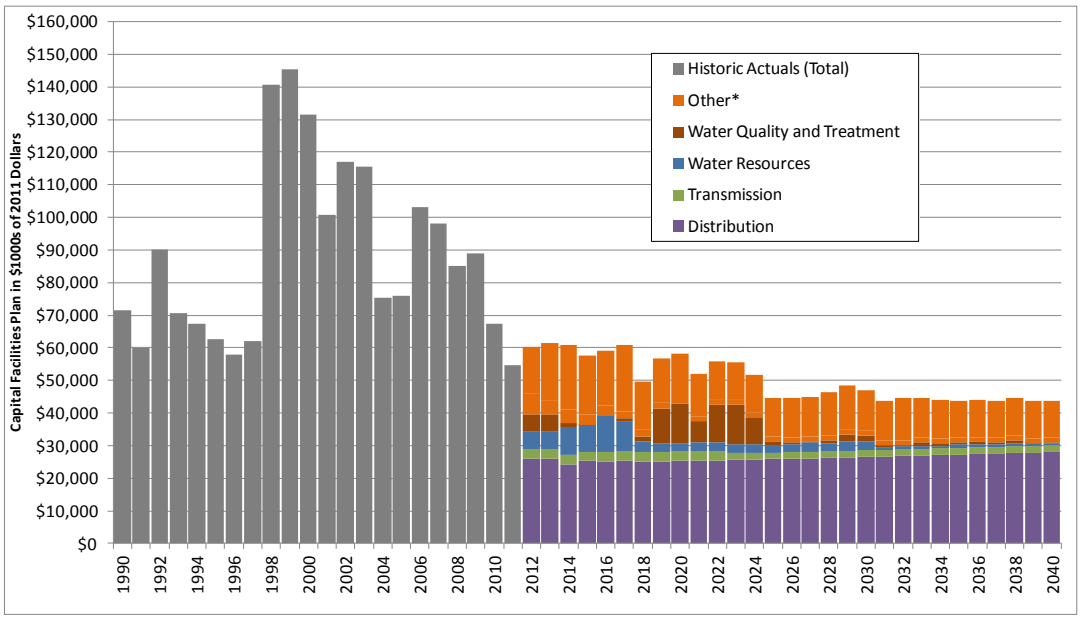
PLAN IMPLEMENTATION

Implementation of this plan requires completion of capital projects, programs, and operations and maintenance (O&M) activities.

Capital Facilities Budget

- Over the past decades, SPU has invested in several major new capital projects, including the two new water treatment facilities and Tolt Pipeline 2.
- SPU anticipates its capital improvement budget needs to be much lower than in the past decades, and will decline from $62 million in 2013 to less than $45 million by 2025, and remain at approximately that level through 2040 (in 2011 dollars). See the graph on page S-8 for historic and proposed capital expenditures.
- SPU's draft Capital Facilities Plan totals to $1.4 billion from 2013 through 2040, which is 64 percent of what was spent in the previous 28-year period (in 2011 dollars).

Historic and Proposed Capital Facilities Plan Spending through 2040 (2012-2017 Adopted CIP, plus 2018-2040 Estimates, in thousands of 2011 dollars)



* Other includes Major Watersheds, Fleets, Facilities, Security, Information Technology, SCADA and other miscellaneous projects.

CONCLUSION

SPU has been making, and continues to make, significant investments to protect public health, comply with federal and state regulations, and replace aging infrastructure. While SPU has invested in major regional facilities in the past decades, the need is now shifting to significant capital investments to rehabilitate and improve the distribution system. Implementation of this water system plan will help to ensure that SPU meets its mission to provide reliable, efficient and environmentally conscious water utility services to enhance the quality of life and livability in all communities we serve.


Mukilteo
Everett
Snohomish
Roosevelt
Snohomish PUD\Integrated
Puget Sound
Silver Lake
Sky Meadow
Monroe
Highland
Sultan
Startup
Goldbar
Snohomish PUD\May Creek
Lynnwood
Alderwood
Cross Valley
Edmonds
Mountlake Terrace
Brier
Olympic View
Snohomish County
King County
Lake Forest Park
Shoreline
Bothell
Woodinville
Northshore
Duvall
W.D.119
Seattle
South Fork Tolt River Watershed
Kirkland
Redmond
Union Hill
N.E. Sammamish
Ames Lake
Carnation
Elliott Bay
Lake Washington
Bellevue
Lake Sammamish
Sammamish Plateau
Fall City
Mercer Island
Spring Glen
Overdale
Issaquah
Coal Creek
W.D.123
Snoqualmie
W.D.45
Skyway
W.D.20
Upper Preston
North Bend
Renton
W.D.90
W.D.125
W.D.49
Tukwila
Mirrormont
Four Lakes
River Bend
Sallal
Wilderness Rim
Soos Creek
Lake Youngs
Cedar River
Highline
W.D.54
Kent
Chester Morse Lake
Kittitas County
W.D.111
Covington
Cedar River Watershed
Lakehaven
Auburn
Black Diamond
Algona
Pacific
Pierce County
Enumclaw
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2.5
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Miles
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S
Seattle Public Utilities Water Service Area
Service Area
Seattle Retail Service Area
Wholesale Customer
Cascade Water Alliance Member
Potential New Customer
Other
Urban Growth Boundary
County Boundary
Municipal Watershed
Service Area Boundary
Seattle City Limits
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Coordinate System: State Plane, NAD83-91, Washington North Zone
Vertical Datum: North American Vertical Datum of 1988 (NAVD88)
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June 13, 2012

The entire *2013 Water System Plan* may be found at:
www.seattle.gov/util/WaterSystemPlan