

2019 Water System 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 as shown on the map at the end of this summary. This *2019 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 next 10 years, longer term outlooks to 2040 and beyond are also discussed.

SPU prepared the plan under regulations adopted by the Washington State Department of Health for public drinking water suppliers. The plan is also consistent with the state's 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.

Water Resources



The SPU 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.

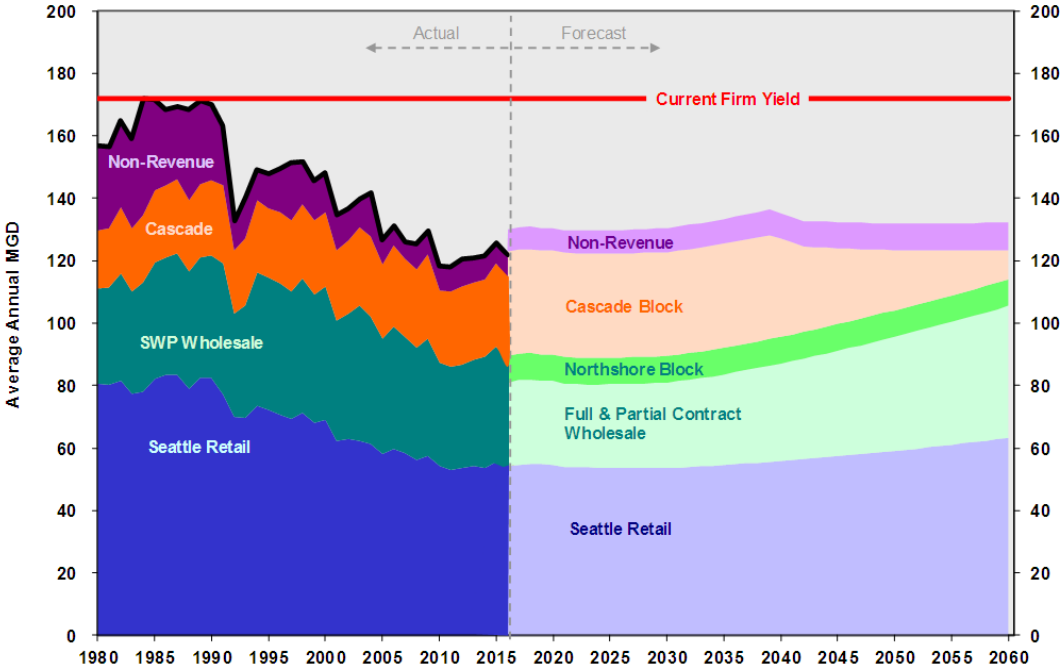
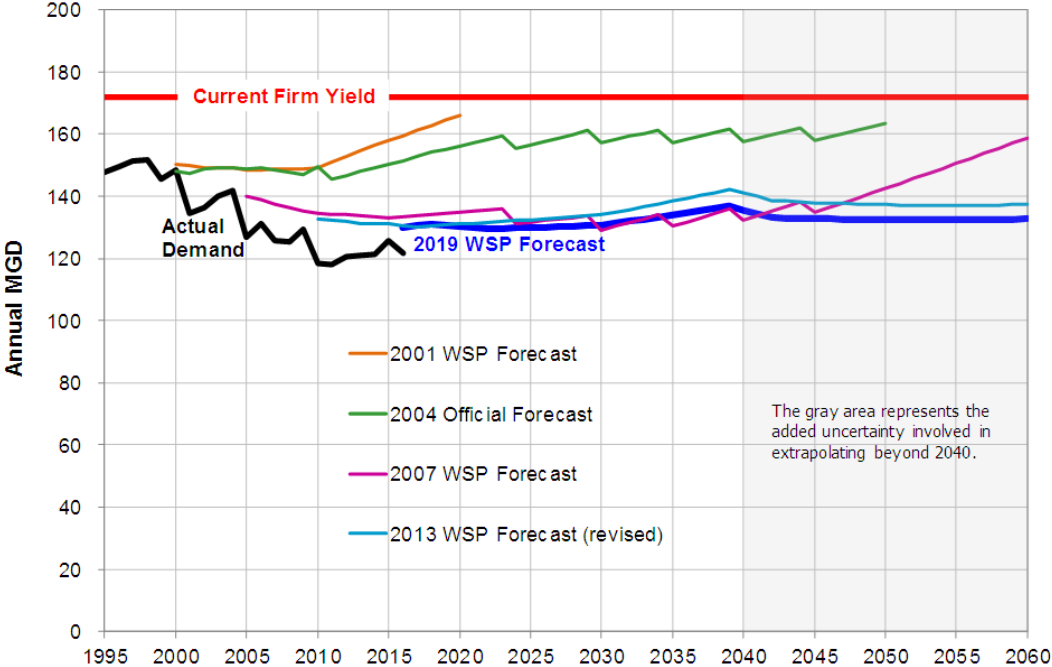
Water Use

- The total population currently served by SPU to its retail and wholesale customers in King and south Snohomish County is about 1.4 million.
- Approximately one-half of the water is sold to SPU 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, total water use has decreased by 28 percent while the number of people being served has increased by the same percentage.
- From 2016 to 2040, the number of households is forecast to increase by 18 percent in the SPU retail service area and by 29 percent in the service areas of SPU's full and partial wholesale water contract holders. Employment is forecast to grow by 29 and 43 percent, respectively, over the same period.
- Total demand is forecast to remain relatively flat through 2030 before rising gradually to a peak of 137 million gallons per day (mgd) in 2039. By 2060, total water demand

from SPU’s system is forecasted to have ramped back down to 133 mgd. See the graphs 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 Water Demand Forecast



Note: Forecast demand is higher than actual demand in 2016 because the forecast includes all block contract amounts, whereas the actual demand by Cascade and Northshore has been less than their block contract amounts.

Water Conservation

- This plan sets a goal to keep the total average annual retail water use of Saving Water Partnership¹ members under 110 mgd through 2028 despite forecasted population growth by reducing per capita water use.

Water Supply

- The Cedar River supplies approximately 60 to 70 percent of SPU’s customer demand for water, and the South Fork Tolt River provides the remainder.
- The current firm yield estimate for the SPU water supply system is 172 mgd, which meets SPU’s 98 percent reliability standard for 87.5 years of reconstructed historic inflows.
- 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.
- Based on lessons learned from the 2015 drought response, SPU updated its Water Shortage Contingency Plan to allow the SPU General Manager/CEO to authorize the Advisory Stage to begin planning and coordination activities in advance of requesting customer actions.

Climate Change and Future Supply Outlook

- Updated analysis shows that SPU’s water supply system will be increasingly vulnerable to climate change, and SPU identified several adaptation strategies and options to mitigate these impacts. There is a large degree of uncertainty in the timing and magnitude of climate impacts on supply vulnerability, but the trend and range of potential outcomes indicate that planning for increased system resiliency should remain a top priority in coming years.
- SPU will remain engaged in future research on climate change by conducting new assessments on a periodic basis to identify potential impacts and plan for adequate water supply while ensuring that decisions do not result in unnecessary or premature financial and environmental costs for the region.
- SPU also plans to continue investigations of climate adaptation strategies to increase resilience in the water supply watersheds to reduce the future risk of catastrophic wildfire in the face of potential effects of climate change.

Planned Infrastructure and Operational Improvements

- SPU identified infrastructure improvement needs for the water supply system that include Landsburg Dam Flood Passage Improvements and various dam safety studies and projects at the South Fork Tolt Dam and Lake Youngs Cascades Dam.
- SPU will complete analysis of options to improve water supply resiliency under climate change.

¹Since January 2012, Saving Water Partnership members have included SPU, Northshore Utility District, Cedar River W&SD, City of Bothell, City of Duvall, City of Mercer Island, City of Renton, Coal Creek Utility District, Highline W.D., Olympic View W&SD, North City W.D., Soos Creek W&SD, W.D. 20, W.D. 45, W.D. 49, W.D. 90, W.D. 119, W.D. 125, and Woodinville W.D.

Water Quality and Treatment



The SPU water system includes 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. SPU also manages a cross-connection control program to protect drinking water quality.

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 (including public ownership and restricted access to the watersheds), water treatment facilities, and distribution system practices have provided excellent quality water that ensures compliance with current and future regulations.
- SPU's corrosion control ensures that water delivered to customers meet lead and copper requirements, and plans to replace service lines with lead components through its service line replacement program.
- SPU will revisit the risk-cost analysis of public access on the Kerriston Road if there is an increase in trespass in the area 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 will evaluate the need to retain non-potable emergency storage at Roosevelt and Volunteer Reservoirs as part of SPU's water system seismic study.
- SPU will replace the floating covers on Bitter Lake and Lake Forest Park Reservoirs which are nearing the end of their useful life – in particular Lake Forest Park Reservoir.

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, and plan for upgrades as these facilities age.

Water Transmission System



The regional and sub-regional water transmission systems include approximately 193 miles of large-diameter pipes, seven covered reservoirs, 15 pump stations, seven elevated tanks and standpipes, and 131 wholesale customer taps with meters. These systems deliver water from the supply sources to the retail and wholesale service areas.

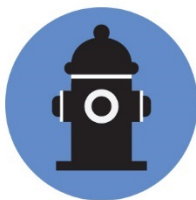
Service Delivery

- 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.

Transmission Infrastructure

- 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, and biannual leak testing, and by implementing additional capital improvements and pipeline stress relief measures when appropriate.
- SPU will continue to implement cost-effective cathodic protection projects for older steel transmission pipelines to protect them from corrosion and extend their service lives well into the future.
- SPU will perform internal video inspection of all lockbar pipelines, and develop a specific plan for their rehabilitation, slip-lining, or replacement, depending on pipeline condition, capacity, and seismic considerations.
- Based on the water system seismic vulnerability study, SPU will improve the overall water system's performance following a major earthquake.

Water Distribution System



The distribution system contains more than 1,630 miles of water mains, six covered reservoirs, two out-of-service open reservoirs, 16 pump stations, six elevated tanks and standpipes, 17,000 valves, and 19,000 fire hydrants, as well as more than 191,000 service lines and meters serving individual residential and non-residential properties in the retail service area.

Service Delivery

- SPU consistently responded to reported distribution system problems within one hour more than 90 percent of the time.
- SPU plans to improve operational response and customer service by using information from a water main shutdown block analysis in project and emergency shutdown plans.

- The average age of water mains is 71 years, but the rate of water main leaks and breaks remains low, averaging 9 reported leaks or breaks per 100 miles per year in the distribution system.
- While SPU’s distribution system leakage was 5.4 percent for 2014 through 2016, which is well below the state standard of 10 percent.

Distribution Infrastructure

- SPU will continue to proactively replace or rehabilitate water mains based on criticality and leak/break history.
- SPU will resume critical valve preventative maintenance and exercising program to ensure adequate and reliable control of the water distribution system grid.
- Based on the water system seismic vulnerability study, SPU will improve the overall water system’s performance following a major earthquake.
- SPU will continue to work with the Seattle Fire Department and Shoreline Fire Department to improve fire hydrant maintenance and testing practices, better coordinate communication, and prioritize fire flow improvement projects.
- SPU will continue working with developers where water main replacements or upgrades in redevelopment areas are required to meet current fire flow requirements and water main standards.
- Over the next decade, SPU will need to address impacts to the water system from transportation projects, particularly Move Seattle levy projects.

Capital Improvement Budget and Financial Program

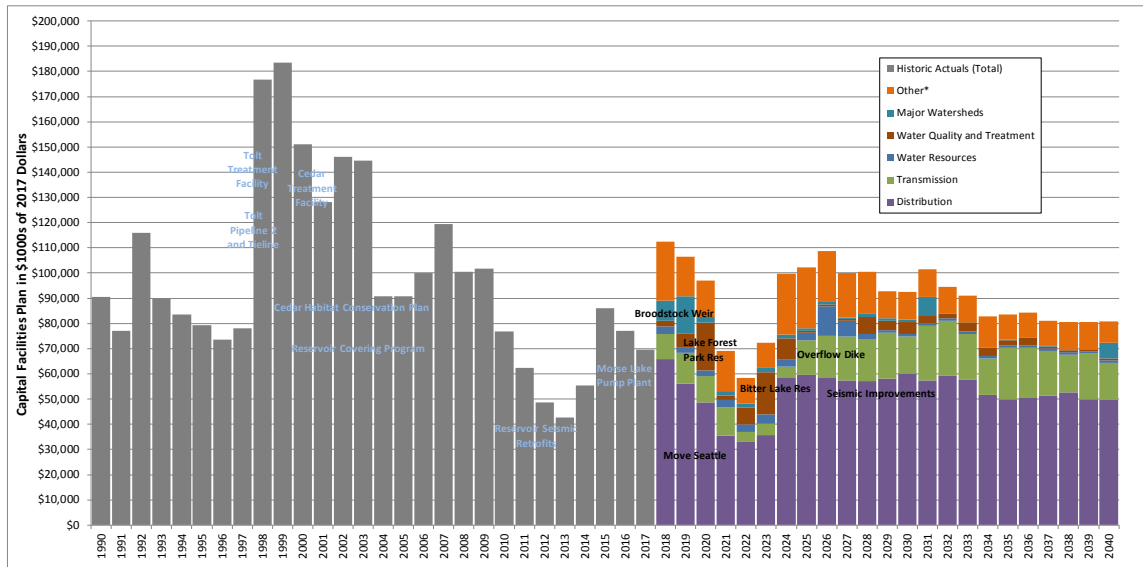


Implementation of this plan requires completion of capital projects, programs, and operations and maintenance activities. SPU uses an asset management approach in selecting which capital improvement projects go forward. The cost estimates presented in the plan are subject to change as the projects are further developed and analyzed, and ultimately require budget approval of the Seattle City Council.

Capital Facilities Plan

- SPU’s Capital Facilities Plan totals to almost \$2 billion from 2019 through 2040 (in 2017 dollars).
- Capital spending is expected to be highest in the earlier years, and on the order of what was spent in the late 2000s, due to significant expenditures associated with the Move Seattle transportation levy (Distribution). See graph below.
- Additional increases starting in 2024 are for watermain rehabilitation in the Distribution system and seismic improvements in the Transmission and Distribution systems.

Historic and Proposed Capital Facilities Plan Spending through 2040 (2018-2023 Adopted CIP, plus 2024-2040 Estimate, in thousands of 2017 dollars)

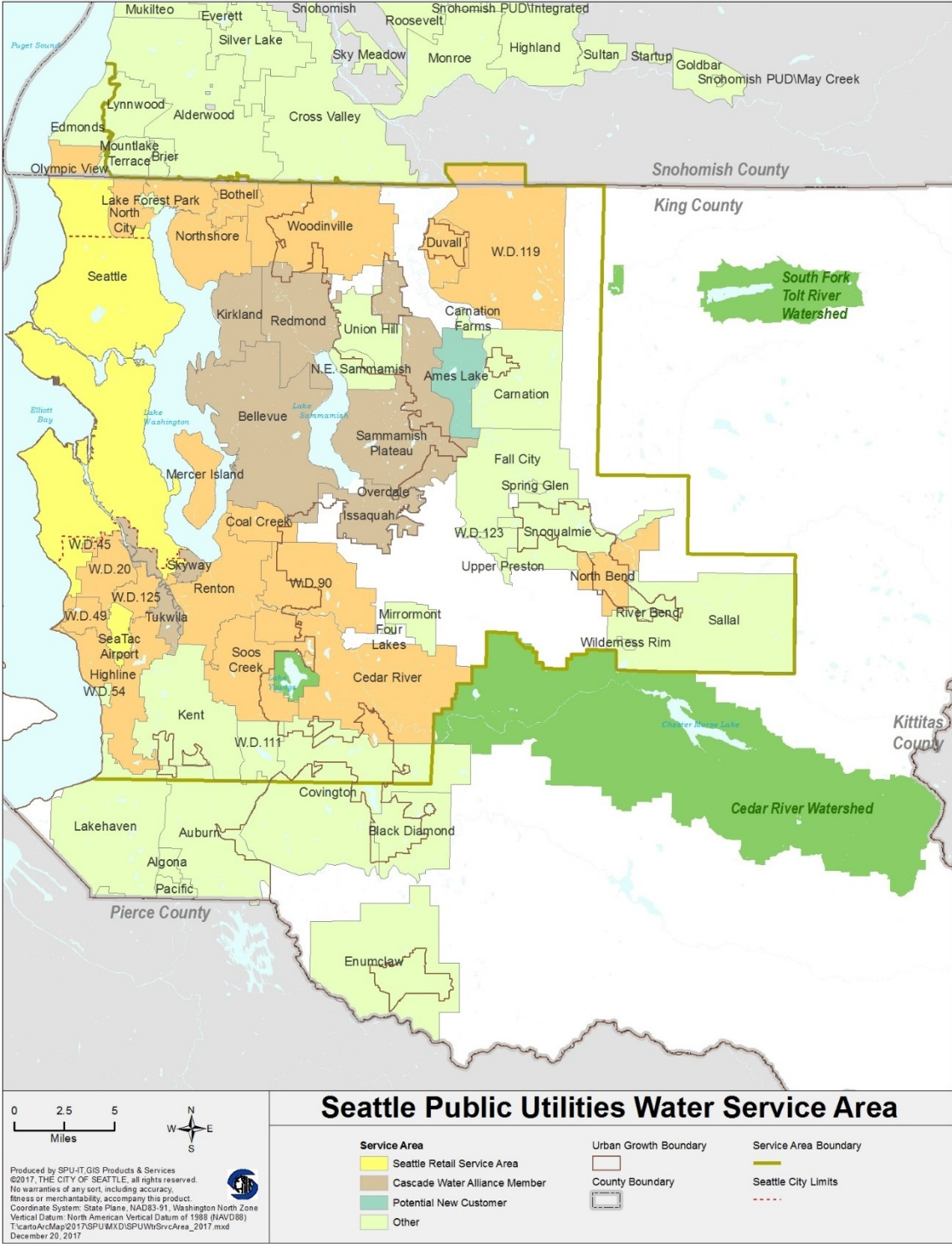


* Other includes Fleets, Facilities, Security, Information Technology, SCADA and other miscellaneous projects.

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 the distribution system and to improve system performance after an earthquake. Implementation of this water system plan will help to ensure that SPU meets its mission to provide efficient and forward-looking utility services that keep Seattle the best place to live and work for everyone.



The entire 2019 Water System Plan can be found at:
www.seattle.gov/util/WaterSystemPlan