

COMPLETE BIRCH BAY WATER AND SEWER COMPREHENSIVE **WATER** SYSTEM PLAN UPDATE CAN BE FOUND AS FOLLOWS:

Water Plan – without appendices: <https://chs.egnyte.com/dl/058Elyhbuy>

Water Plan – appendices A-D only: <https://chs.egnyte.com/dl/azR0BuGcBg>

Water Plan – appendices E-J only: <https://chs.egnyte.com/dl/GMNhABre0t>

WATER SYSTEM PLAN UPDATE EXECUTIVE SUMMARY

COMPREHENSIVE
WATER SYSTEM PLAN



June 2019
Revised June 2020



Birch Bay Water and Sewer District

Comprehensive Water System Plan

EXECUTIVE SUMMARY

INTRODUCTION

This *Comprehensive Water System Plan Update* for Birch Bay Water and Sewer District presents an evaluation of existing facilities, system operation, water quality, projected water demands, and existing and future capital and operational requirements. The culmination of the plan is the update of the District's water system Capital Improvement Plan (CIP). This plan has been prepared in accordance with the requirements of the Washington Administrative Code (WAC) 246-290-100, as revised pursuant to the 2003 "Municipal Water Law", the April 1997 Washington Department of Health (DOH) *Water System Planning Handbook*, and the December 2009 DOH *Water System Design Manual*, and in the context of the following planning documents:

- September 2004 (revised May 2009) *Whatcom County Birch Bay Community Plan* (BBCP)
- *Whatcom County Population and Employment Projection and Urban Growth Area Allocations Phase I Technical Report* (revised November 1, 2013, BERK)
- *2016 Whatcom County Coordinated Water System Plan*
- *Whatcom County Comprehensive Plan* (updated 2017)
- November 2015 *Whatcom County 2016 Comprehensive Plan and Development Regulations Update and Urban Growth Areas Review Environmental Impact Statement*
- *Whatcom County Comprehensive Plan* (2016)¹

Birch Bay Water and Sewer District, formerly Whatcom County Water District No. 8, is a municipal special purpose district formed in 1968. The District is located in northwest Whatcom County and the boundary includes approximately 6,570 acres. The District services the area around Birch Bay, including Point Whitehorn and Birch Point, immediately south of the City of Blaine, in unincorporated Whatcom County.

EXISTING SYSTEM

The District purchased the Birch Bay Water Company water system in 1970, and merged with Whatcom County Water District No. 6 in 1987. Over the past 48 years, the District has expanded and improved the system, with District projects and developer extensions, to include two wells, three reservoirs, four booster pump stations and nearly

¹ The 2016 and 2017 versions of the County Comprehensive Plan were current at the time this section of the WSP was prepared and are the basis for the information presented herein. The County Comprehensive Plan was subsequently updated in 2018.

82 miles of water mains. The District's water source is the City of Blaine (wells). In 2002, the District negotiated a new water supply contract with Blaine. The contract was amended in 2008, 2010, 2013, and 2016. The contract provides for up to 3.73 million gallons per day (mgd). The contract term is 40 years, with option for renewal of up to 20 additional years.

The District's water system is a Group A Community System (DOH System No. 95904U) serving approximately 5,292 connections or 7,649 residential customer equivalents (as of 12/31/2018).

The District also has an emergency supply intertie with Bell Bay Jackson Water Association.

The current water service area has an irregular boundary generally described as the Blaine City Limits to the north, Bell Bay Jackson Water Association to the east and the southern limit of the Birch Bay urban growth area to the south (see Figure 1.3). The land use within the service area is predominately residential, with some commercial and rural areas. The estimated population for the District's water service area, based on County estimates for year-end 2013, is approximately 8,810. The latest District-specific population estimate was completed by the County for year-end 2013. The District added service for 154 equivalent living units from 2013 through 2017. At approximately 1.17 persons per equivalent living unit, the population at the end of 2017 is estimated to be approximately 8,990.

Annual water usage (not including distribution system leakage, as Average Day Demand or ADD, in mgd) from 2009 to 2017 is shown in Table 1. The breakdown of water demand by customer type is indicated in Table 2. An Equivalent Residential Unit (ERU) represents the amount of water consumed by a typical single-family residence in this system. For forecast purposes, the average water usage for a single-family residence was determined to be 120 gallons per day for Birch Bay's system. Actual use varied from 103 to 123 with an average of 110 gpd for years 2009-2017. The ratio of Maximum Day Demand (MDD) to ADD is forecast to be 2.19. The ratio of peak hour demand (PHD) to MDD is approximately 1.65.

Table 1. Historical Water Use - Average Day Demand

2009	2010	2011	2012	2013	2014	2015	2016	2017
0.861	0.768	0.724	0.724	0.719	0.733	0.733	0.749	0.738

(million gallons per day)

Table 2. Percentage of Annual Water Demand by Customer Type

Customer Type	Percentage
Single Family residential	68%
Multi-family residential	20%
Commercial	3%
Other	8%
Total	100%

Year end, 2017

FUTURE WATER DEMAND AND WATER CONSERVATION

Future water demands for the District were estimated by forecasting growth in customer classes. Water demands were calculated by estimating the number of future connections then multiplying that number by the water demand per ERU. Water demands were calculated for each customer type then combined for a total system demand. Residential population was forecast to increase at the rate of 2.3353% per year from 2013 through 2036, and 1% per year through 2038. The recent historical and projected annual distribution system leakage is 8% of the annual volume of water supply.

The projected total ADD and MDD (with allowance for distribution system leakage) are as indicated in Table 3 (without additional projected savings or conservation impacts) and Table 4 (with additional projected savings). Figure 2.2 presents a graph of historical and forecast water demand.

Table 3. Forecast Water Demands

	2018	2019	2020	2021	2022	2023	2024
ADD	0.89	0.91	0.94	0.96	0.99	1.02	1.04
MDD	1.86	1.91	1.96	2.02	2.08	2.13	2.19
PHD	2,127	2,185	2,244	2,305	2,367	2,431	2,497

	2025	2026	2027	2028	2033	2038
ADD	1.07	1.10	1.13	1.17	1.34	1.50
MDD	2.25	2.32	2.38	2.45	2.80	3.15
PHD	2,565	2,635	2,707	2,780	3,180	3,568

(MDD and ADD in million gallons per day, PHD in gallons per minute)

Table 4. Forecast Water Demands, with Additional Savings

	2018	2019	2020	2021	2022	2023	2024
ADD	0.86	0.87	0.90	0.92	0.94	0.97	0.99
MDD	1.80	1.84	1.88	1.93	1.98	2.03	2.08
PHD	2,057	2,099	2,152	2,205	2,261	2,317	2,375

	2025	2026	2027	2028	2033	2038
ADD	1.02	1.04	1.07	1.10	1.25	1.39
MDD	2.14	2.19	2.25	2.31	2.62	2.92
PHD	2,435	2,496	2,559	2,623	2,972	3,305

(MDD and ADD in million gallons per day, PHD in gallons per minute)

The District has had a water conservation program ongoing since 1992. In an effort to reduce the MDD, an aggressive conservation program, both in the District and with the City of Blaine, has been ongoing since 1998.

The District's first Water Use Efficiency (WUE) Program was prepared in January 2008 in accordance with the Municipal Water Law and DOH rules (WAC 246-290-800). The WUE Program identifies goals and measures for enhanced water conservation. The WUE Program was reviewed and updated in July 2014 and has also been updated as part of this plan. The goals of the 2019-2028 program at the District are to:

- Maintain 116 gpd per single family residence through 2019, and less than 120 gpd through 2028
- Meet Distribution System Leakage standard of 10% or less.

SYSTEM ANALYSIS AND CAPITAL IMPROVEMENT PROGRAM

The Blaine water supply contract is anticipated to provide adequate water supply through 2038. Additionally, the District may be able to use more than their contract demand amount, but such use would be subject to premium pricing and penalties per the City supply contract. However, supply upgrade projects will be necessary in both the Blaine and District systems over the 20-year planning period in order to supply the water to the District at adequate rate and pressure.

The City of Blaine is primarily responsible for the quality of water currently used by the District's customers. Blaine disinfects the water as necessary for system residual and no other treatment is necessary at this time. The District performs disinfectant residual and coliform bacteria testing at various points within its distribution system. The District has also completed lead and copper and asbestos testing as required to date. The District's water is in compliance with all the monitored water quality parameters. In accordance with the federal regulations requiring annual Consumer Confidence

Reports, the District publishes an annual Water Quality Report for distribution to its entire customer base. Copies of recent reports are included in Appendix H.

The District has adopted water system design and construction standards that are consistent with DOH requirements and the minimum standards in the Whatcom County *CWSP*. The standards, including standard details and technical specifications, are included in a separate document, the *BBWSD Developer Project Manual*, latest edition. Design criteria for storage tanks and booster pump stations will be developed in project reports for specific project applications, for review and approval by DOH.

The storage and transmission and distribution system was analyzed to determine its ability to provide for existing and forecast water demand, while providing appropriate service pressure to all customers.

The storage requirements are a function of operational parameters, water demand and fire flow requirements. Five elements of storage must be considered: Operational (OS), Standby (SB), Equalizing (ES), Fire Flow (FSS) and Dead (DS). With the approval of the fire marshal, the District may use the larger of SB or FSS. As a seismic risk mitigation measure, the District lowers the water level in each steel reservoir in the winter, thereby increasing the OS volume. The District presently has 3.126 million gallons of storage and a system-wide deficiency in storage capacity is forecast by year 2025. Additional supply projects will reduce the long-term deficiency forecast but replacement and additional reservoirs are recommended to increase storage capacity. A potential storage sharing solution has been identified to enhance the reliability of both the City of Blaine and District systems in the Birch Point area. Further evaluation is recommended.

The District's water system hydraulic model was used in the analysis for this Plan, for the following conditions, for current demand and forecast demand for PHD, MDD and MDD with fire flow, for even years through the year 2028 then again for years 2033 and 2038. The fire flow requirements range from zero to 2,500 gpm. The evaluation criteria were based on maintaining a minimum pressure of 30 psi in any point in the distribution system during PHD and MDD conditions, or 20 psi during MDD with fire flow conditions. Additionally, the analysis focused on avoiding reliance on storage to meet MDD.

The hydraulic analysis revealed deficiencies in the ability to meet MDD (hence reliance on storage) by 2022, in 2028 and again by 2038. Various solutions were considered to improve supply of water to the system, until a series of phased improvements was selected to address the hydraulic deficiencies.

System deficiencies are summarized in Section 3.4 and proposed improvements are discussed in Section 3.5 and Chapter 8. The primary projects necessary to address water system deficiencies are summarized in Table 5.

Table 5. Summary of 10-Year Capital Improvement Plan

ID	Project Description¹	Estimated Project Cost (2019)	Recommended Year of Completion
SU-1	Supply/Storage Pre-design study with Blaine (District share at 50%)	\$ 18,000	2019
SU-4	Annual Allowance for Water Rights and Source of Supply Efforts	\$ 200,000	2019-2028
ST-1	Seismic Analysis - Kickerville and Semiahmoo Reservoirs	\$ 125,000	2019
T-1a	Relocate meters and abandon parallel mains on Birch Bay Dr.	\$ 132,000	2019
T-1b	Relocate meters and abandon parallel mains on Birch Bay Dr.	\$ 46,000	2020
T-1c	Remove existing main from Loft Lane to Gemini St.	\$ 10,000	2020
T-2	Shintaffer Road 8" Main Extension	\$ 249,000	2020
T-3	10 year Water Main Upgrade Program	\$ 478,000	2019-2028
O-1	Complete AMR Program (not including District labor costs for installation)	\$ 1,500,000	2019-2022
O-3	Update Financial Management Policy	\$ 7,500	2019
O-5	Facility Gates Upgrade/Building Upgrades	\$ 29,000	2019
O-6	Digital Records Project	\$ 9,000	2019
O-7	Upgrade Phone System	\$ 15,000	2019
ST-2	Kickerville Reservoir seismic upgrades	\$ 260,000	2019-2020
ST-3	Semiahmoo Reservoir seismic upgrades (allowance)	\$ 162,000	2019-2020
T-4	Upgrade 225 lf 2.5" to 8" and replace meter and PRV with 8"	\$ 185,000	2020
O-4	Blaine Water Supply Contract Renewal	\$ 50,000	2021
O-8	Upgrade Vehicles	\$ 319,000	2019-2028
T-5	Connect Zone 2 to portion of Birch Bay Village, with PRVs	\$ 325,000	2022
Blaine	Additional Supply - equip PW-2 including treatment and 5,210 lf 12" and 8" pipeline	Blaine Project*	2023
SU-2	Add 1,400 gpm BPS (no generator) at Portal Way Intertie.	\$ 962,000	2023

T-6	Replace 1,000 lf 8" AC with DI pipe from PW BPS to Point Whitehorn Rd.	\$ 289,000	2023
SU-3	New Birch Point BPS with standby power, 250 gpm for District, joint with Blaine, serve Zone 2 and Blaine 330 Zone (District share at 50%)	\$ 440,000	2024
T-7	Integrate Zone 5 with Zone 2 with connection along Birch Point Road - 8" DI (7,300 lf)	\$ 2,110,000	2024
ST-4	Add Zone 3 Reservoir, 0.169 MG, ground level, with T-4 and T-5	\$ 375,000	2025
T-8	Upgrade BPS for lower supply HGL to increase Zone 3 HGL	\$ 176,000	2025
ST-5	Replace Birch Point Reservoir with 1.65 MG, ground level, share with Blaine (District share at 80%)	\$ 2,123,000	2028
T-9	Relocate WWTP supply meter and add PRV	\$ 57,000	2028
O-2	Comprehensive Water System Plan Update	\$ 150,000	2028
T-10	Booster pump station for close future high pressure zone	\$ 723,000	2027, with DE
T-11	Transmission main for redundancy - Alderson to DE 11-A (Church 14" extension north of Bay Rd) - 3,300 lf 12" DI	\$ 1,208,000	2027, with DE
Total		\$ 12,732,500	

1 - See Table 8.1 for detailed description.

OPERATION AND MAINTENANCE

The District General Manager is responsible for overall system management under the direction of the District's elected Board of Commissioners. The District Operations Manager and Water System Foreman operate the water system. The Water System Foreman is certified as a Water Distribution Manager 2, Water Distribution Specialist and Cross Connection Control Specialist. He is responsible for the day-to-day operation of the system. He is supported by two operators that are also meter readers and certified by the State as Water Distribution Specialists.

The water system operates automatically, with the option for manual override, via a telemetry system. The Operations Manager and Foreman have the ability to monitor and control operations of the system from a remote personal computer. Reservoir levels are continuously monitored and control operation of system supply pumps. Supply to separate pressure zones is automatic through pressure reducing valves, or

automated booster pump stations. The Water Department performs preventative maintenance and monitoring on a regular schedule, and stocks a moderate inventory of water system components for maintenance and/or repair as necessary. Water Department staff is responsible for implementation of the *Coliform Monitoring Plan* (see Appendix F).

The District's *Cross Connection Control Program* was previously approved by DOH in a separate document. The District's approach to cross connection control is premise-isolation. The District has adopted its *Cross Connection Control Program* by resolution (No. 648) and incorporated it into the District Code as Chapter 7.08.

The District has a vulnerability analysis and emergency response plan that were prepared and updated as a result of the Public Health Security and Bio-Terrorism Preparedness and Response Act (HR 3448). The District has adopted a *Water Shortage Response Plan* that identifies four different stages and procedures that are to be followed depending on the severity of a water shortage situation (see Appendix J).

Other recommendations for the operation and maintenance program include negotiate a reciprocal emergency intertie agreement with the City of Blaine and update the emergency intertie agreement with Bell Bay Jackson Water Association. Also identified were measures for the inspection of steel water storage tanks, fire hydrants, valves, flushing and leak detection.

FINANCIAL PLAN

Birch Bay Water and Sewer District is an independent special purpose district, assuming the duties of its own treasury from Whatcom County in 1988. The District has and continues to maintain a strong financial base. All previous debt (extensive water and sewer system improvements in the mid to late 1970s and in the 1990s) has been retired and current Public Works Trust Fund debt is backed by operating revenue and connection charge revenue.

The District relies on developer financing, revenue bonds and connection charges to fund capital improvements to the system. Grant and low-interest loans are used as available for certain projects. Water service charges support operation and maintenance of the water system, with some transfer to the construction and debt service funds. The District has developed a comprehensive financial model, updated annually to consider the impact of capital projects and operation and maintenance expenditures on District finances and rates. Water service charges are adjusted periodically to adequately support the revenue needs. The water connection charge will be adjusted following adoption of this plan.