Executive Summary

PURPOSE OF THE PLAN

The City of Stanwood's (City) water system is a major infrastructure, much of which is invisible to the customers that receive its water. The water system requires qualified staff to operate and maintain an ongoing capital improvement program to replace old components to meet the requirements mandated by federal and state laws. The primary purpose of the City of Stanwood Comprehensive Water System Plan (WSP) is to identify and schedule water system improvements that correct existing system deficiencies and ensure a safe and reliable supply of water to current and future customers. This WSP complies with Washington State Department of Health (DOH) regulations under Washington Administrative Code (WAC) 246-290-100, which requires water purveyors to update their water system plans every 6 years.

The City's previous WSP was prepared for the City in December 2009, revised in June 2010, and approved by DOH in November 2010. This updated 2015 WSP reflects Snohomish County's (County) 2035 population allocation to the City and the proposed revisions to the City's Urban Growth Area (UGA), which are consistent with the City and County 2015 Comprehensive Plan updates. The WSP also reflects improvements and changes to the water system since the completion of the 2010 WSP.

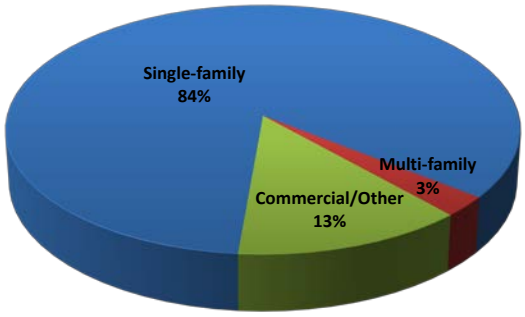
SUMMARY OF KEY ELEMENTS

This WSP presents a description of the existing water system and service area, a forecast of future water demands, policies and design criteria for water system operation and improvements, the operations and maintenance program, staffing requirements, a schedule of improvements, and a financial plan to accomplish the improvements. The WSP also includes several ancillary elements that include a water use efficiency plan, a water quality monitoring plan, a wellhead protection plan, and a cross-connection control program. A summary of the key issues related to these elements is provided in the following sections.

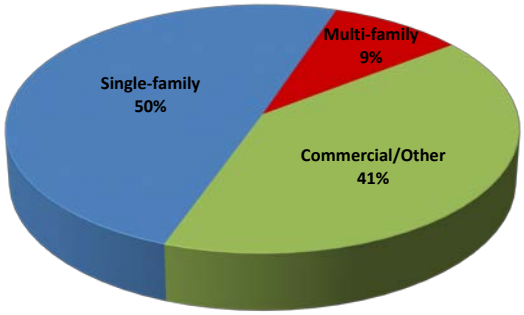
Water Service Area

The City provides water service to approximately 7,075 people throughout its water service area boundary, which extends beyond the City's corporate limits. The City is responsible for providing public water service, utility management, and water system development within this area. The City will provide new water service within the City limits and where there are existing water mains (i.e., the retail water service area). Requests for new water service outside of the City limits and where there are no existing water mains fronting the property will only be granted after the area is annexed to the City or upon completion of an annexation agreement.

In 2013, the City served 2,554 customer accounts, which were mainly comprised of single-family connections. Single-family connections represent approximately 84 percent of all accounts, but the single-family class only consumed 50 percent of all water supplied to the system in 2007.



2013 Water Connections



2013 Water Consumption

Existing Water System

The City's existing water system was originally established in 1911 by the Stanwood Water Company, which provided water supply to customers from Lake Ketchum. The City purchased the water system in 1986 and now serves its customers with water produced from Bryant Well No. 1 and the Cedarhome Well. In 2015, Bryant Well No. 3, which is the replacement well for Bryant Well No. 2, will be online to also serve customers. Hatt Slough Springs is offline due to mudslide damage to the access road. The Fure Well is an emergency source that is not used by the City and the water right for this source is expected to be transferred to the City's other active wells. A summary of these sources is shown in **Table ES-1**. All water sources supply the 297 Zone, except for the Hatt Slough Springs, which supplies the 125 Zone when it is active.

Table ES-1
Supply Facilities Summary

Well	Pressure Zone	Year Drilled	Use	Existing Pumping Capacity (gpm)	Well Depth (feet)	Well Diameter (inches)	Pump Type	Pump Motor Size (hp)	Water Treatment[2]	Control Facility
Hatt Slough Springs	125 Zone	1934	Temporarily Offline	260	n/a	n/a	Centrifugal	10	Cl_2	Continuous
Bryant Well No. 1	297 Zone	1948	Active	1,350	250	12	Turbine	75	Cl_2/Mn/H_2S/As	Knittle Tanks
Fure Well	297 Zone	1951	Emergency	100	157	12	n/a	n/a	n/a	n/a
Bryant Well No. 2	297 Zone	1966	Emergency	0	200	12	n/a	n/a	n/a	n/a
Cedarhome Well	297 Zone	2008	Active	600	490	12 & 16	Turbine	100	Cl_2	Knittle Tanks
Bryant Well No. 3[1]	297 Zone	2013	In Design	0	275	16	n/a	n/a	Cl_2/Mn/H_2S/As	Knittle Tanks

1 = Bryant Well No. 3 has been drilled and is expected to have a capacity of 1,000 gpm when completed.

2 = Cl_2: chlorination; Mn: manganese filtration; H_2S: hydrogen sulfide removal; As: arsenic removal.

The City's water system has two storage facilities that are located in the 125 Zone, two that are located in the 297 Zone, and one that is located in the 365 Zone. Details of the City's storage facilities are shown in **Table ES-2**.

Table ES-2
Storage Facilities Summary

Reservoir Name	Pressure Zone	Year Constructed	Material	Capacity (MG)	Diameter (feet)	Base Elevation (feet)	Overflow Elevation (feet)	Overall Height (feet)
Bailey No. 1	125 Zone	1989	Concrete	0.20	45	108.0	124.0	17.5
Bailey No. 2	125 Zone	1989	Concrete	0.20	45	108.0	124.0	17.5
Knittle No. 1	297 Zone	1990	Concrete	0.20	26	251.0	297.0	50.0
Knittle No. 2	297 Zone	1997	Steel	1.00	61	251.0	297.0	47.0
Cedarhome	365 Zone	2009	Composite	0.55	53	329.5	365.0	35.5

The City operates two booster pump stations that assist in the transfer of water between pressure zones, as shown in **Table ES-3**. The Cedarhome and Knittle Booster Pump Stations are utilized to fill the Cedarhome Reservoir.

Table ES-3
Booster Pump Station Facilities Summary

Booster Pump Station	Suction Pressure Zone	Discharge Pressure Zone	Year Constructed	Existing Pumping Capacity (gpm)	Number of Pumps	Pump Type	Pump Motor Size (hp)
Knittle BPS	297 Zone	365 Zone	1998	1,360	4	Centrifugal	(1) 3, (2) 5, (1) 50
Cedarhome BPS	297 Zone	365 Zone	2006	1,000	3	Centrifugal	(3) 20

More than 64 miles of water main ranging in size from less than 1 inch to 42 inches conveys water from these facilities to water system customers. As shown in **Table ES-4**, most of the water main (approximately one-third) within the service area is 8-inch diameter, and nearly 80 percent of all water main is 8-inch diameter or smaller.

Table ES-4
Water Main Diameter Inventory

Diameter (Inches)	Length (Feet)	% of Total
Larger than 16	1,281	0.4%
16	9,064	2.6%
10	11,654	3.4%
6	42,962	12.5%
12	53,910	15.7%
4 or smaller	104,609	30.5%
8	119,133	34.8%
Totals	**342,613**	**100%**

Past Water Usage

In general, the amount of water supplied to the City, or system-wide water demand, has remained relatively steady since the mid-1990s until approximately 2009, while population has more than doubled. This was most likely the result of water use efficiency (WUE) practices, including new buildings with low flow plumbing fixtures and the repair of water system leaks. In approximately 2010, Twin City Foods, the City's single largest historic water user, significantly reduced the use of water in its processing of fruits and vegetables resulting in an overall decrease in system-wide supply. The City's historical water supply is shown in **Table ES-5**.

Table ES-5
Historical Water Supply and System Demand

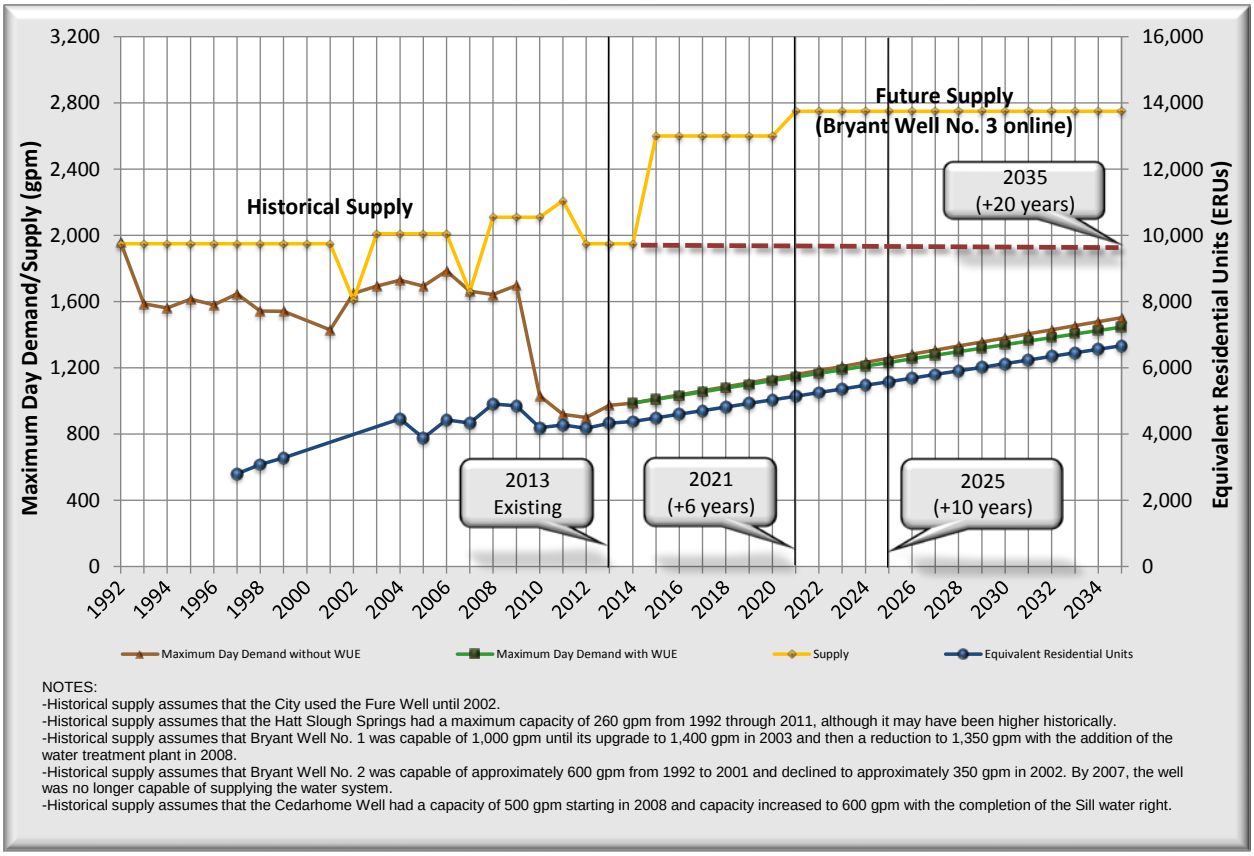
Year	Annual Supply (gallons)	Average Daily Demand (gpm)
1992	430,059,600	816
1993	347,541,950	661
1994	342,162,215	651
1995	353,665,000	673
1996	347,018,191	658
1997	360,709,473	686
1998	338,001,593	643
1999	337,599,296	642
2000[1]	---	---
2001	299,445,937	570
2002	345,569,337	657
2003	354,804,548	675
2004	363,152,529	689
2005	354,672,584	675
2006	373,942,267	711
2007	348,153,550	662
2008	344,998,534	655
2009	355,421,020	676
2010	320,462,009	610
2011	285,662,129	543
2012	280,534,000	532
2013	302,454,000	575

1 = Complete data for 2000 not available.

Future Water Demands and Water Supply

Overall water demand within the City's system is expected to increase to approximately 150 percent of 2013 demand by the end of the 20-year planning period. With Bryant Well No. 3 online and the Fure Well water right transferred to Bryant Well No. 3, the City will have sufficient water supply from its supply sources to meet the demand requirements of the system until at least 2035, as shown in **Chart ES-1**. The City plans to continue evaluating options for improving the utilization of Hatt Slough Springs or using the water right elsewhere to provide source of supply redundancy.

Chart ES-1
Future Water Demands and Water Supply



NOTES:
-Historical supply assumes that the City used the Fure Well until 2002.
-Historical supply assumes that the Hatt Slough Springs had a maximum capacity of 260 gpm from 1992 through 2011, although it may have been higher historically.
-Historical supply assumes that Bryant Well No. 1 was capable of 1,000 gpm until its upgrade to 1,400 gpm in 2003 and then a reduction to 1,350 gpm with the addition of the water treatment plant in 2008.
-Historical supply assumes that Bryant Well No. 2 was capable of approximately 600 gpm from 1992 to 2001 and declined to approximately 350 gpm in 2002. By 2007, the well was no longer capable of supplying the water system.
-Historical supply assumes that the Cedarhome Well had a capacity of 500 gpm starting in 2008 and capacity increased to 600 gpm with the completion of the Sill water right.

Water Source and Quality

The City's drinking water is supplied by groundwater wells and a groundwater spring source, when it is in service. The Bryant Well Field Treatment Facility currently treats Bryant Well No. 1 for arsenic, manganese, and hydrogen sulfide using an oxidation and filtration process. This facility will also treat the future Bryant Well No. 3, the replacement for Bryant Well No. 2.

The Cedarhome Well was constructed in 2008 and also provides chlorination treatment of the source water. Through the completion of the Bryant Well Field Treatment Facility and the Cedarhome Well, the City has implemented system-wide chlorination.

Groundwater is often fluoridated to assist in the prevention of tooth decay. The City has chosen not to fluoridate its water at this time.

Operations and Maintenance

The City's operations and maintenance organization is staffed by well qualified, technically trained personnel. City staff regularly participates in safety and training programs to keep abreast of the latest changes in the water industry and to ensure a smooth and safe operation of the water system. The current staff of supervisory personnel and field crew, in which many are responsible for the water system and other utilities, have effectively operated and maintained the water system in the

past. However, as the water system expands in the future, additional staff will be required. The City plans to add staff to meet the increased requirements from system expansion as the budget allows.

The City has taken several steps to prepare for emergency situations. A Vulnerability Assessment was developed in accordance with the Public Health Security and Bioterrorism Preparedness and Response Act of 2002. The Emergency Response Plan, which was updated as part of the Vulnerability Assessment, assesses the vulnerability of the major water system facilities during a number of emergency events and identifies follow-up procedures to be carried out. The Emergency Response Plan also includes emergency call-up lists and notification procedures.

Water System Evaluation

The existing water system was evaluated to determine its ability to meet the policies and design criteria of the City and those mandated by DOH. The results of the evaluation are summarized below.

- The City has sufficient water supply to meet the demands of existing and future customers until at least 2035, with Bryant Well No. 3 online.
- Additional storage will be required in the 297 Zone in the future to provide sufficient capacity for future customers.
- Recoating of Knittle Reservoir No. 2 and the Cedarhome Reservoir is necessary.
- The Bryant Well Treatment Facility needs a pilot study to verify the water quality associated with Bryant Well No. 3 and to accommodate the Fure Well water right transfer. The pilot study will determine if improvements are necessary at the Bryant Well Treatment Facility
- The need for Hatt Slough Springs as a source needs to be reevaluated on a regular basis to determine if rehabilitation of the source or transfer of the water right is necessary.
- The Fure Well and the Sill Well need to be decommissioned.
- The Knittle Booster Pump Station needs improvements to resolve general facility deficiencies.
- The Knittle and Cedarhome Booster Pump Stations both need to be equipped with emergency generators.
- Several areas of the system require water main replacements to resolve deficiencies related to low fire flows, aging water main and undesirable materials.
- Several pressure reducing stations operate to serve small pressure zones that lack sufficient supply redundancy. The independent zones need to be consolidated to improve fire flow and supply reliability.
- Various telemetry upgrades are needed to resolve system deficiencies.
- A long-term water supply study is necessary to evaluate alternatives for supply from neighboring water systems.

Proposed Water System Improvements and Financing Plan

Improvements to the water system are necessary, primarily to resolve existing system deficiencies, but also to accommodate the increase in water demands from future growth. Improvements identified for the first 6 years of the capital improvement program (2015 through 2020) are estimated to cost approximately $6,586,000, which results in an average expenditure of approximately $1,098,000 per year. Improvements in the following 5 years (2021 through 2025) are estimated to cost approximately $4,866,000, or approximately $974,000 per year. Improvements for 2026 through 2035 are estimated to cost approximately $9,958,000, or approximately $996,000 per year. The financial analysis is intended to illustrate the feasibility of funding the operation and maintenance and capital improvements recommended for the water system in the next 6 years.