Chapter 6 Water Quality

The City of Sumner must comply with water quality regulations on both the federal and state level. State regulations enforced by the Washington State DOH may be the same as or more stringent than the federal regulations. DOH regulates water quality of public water systems under the State Drinking Water Regulations, WAC 246-290-300 through 320. The DOH also has enforcement responsibility for federal regulations included in primacy agreements with the United States Environmental Protection Agency (EPA). Water quality regulations are currently evolving, and will continue to evolve, becoming more stringent due to implementation of the Safe Drinking Water Act and other state and federal legislation.

This chapter outlines the current water quality requirements within the City of Sumner and upcoming water quality regulations that may be applicable to the City's water system.

6.1 Current Regulations

Table 6-1 shows the current state-regulated chemical contaminants and physical properties applicable to the City of Sumner water system. As the table shows, the state has defined each contaminant as either a primary or secondary standard. Primary standards refer to those contaminants or physical properties associated with chronic, nonacute, or acute human health effects. Secondary standards refer to those contaminants or physical properties associated with problems other than health effects, such as the general aesthetic quality of the water.

Table 6-1
Primary and Secondary Maximum Contaminant Limits (MCL)

Parameter	Units	MCL	Detection Limit	Comments
Inorganics/Primary				
Antimony (Sb)	mg/L	0.006	0.002	
Arsenic (As)	mg/L	0.01	0.01	[a]
Asbestos	1 E^6 fibers/L	7 (> 10 um)		
Barium (Ba)	mg/L	2.0	0.1	
Beryllium (Be)	mg/L	0.004	0.002	
Cadmium (Cd)	mg/L	0.005	0.002	
Chromium (Cr)	mg/L	0.1	0.01	
Copper (Cu)	mg/L	[b]	0.2	[a]
Cyanide (HCN)	mg/L	0.2	0.05	
Fluoride (F)	mg/L	4.0	0.2	
Lead (Pb)	mg/L	[b]	0.002	[a]
Mercury (Hg)	mg/L	0.002	0.0005	
Nickel (Ni)	mg/L	0.1	0.04	
Nitrate (as N)	mg/L	10.0	0.2	
Nitrite (as N)	mg/L	1.0	0.2	
Selenium (Se)	mg/L	0.05	0.005	

Table 6-1
Primary and Secondary Maximum Contaminant Limits (MCL)

Parameter	Units	MCL	Detection Limit	Comments
Sodium (Na)	mg/L	[b]	5	[a]
Inorganics/Secondary				
Thallium (Tl)	mg/L	0.002	0.001	
Chloride (Cl)	mg/L	250.0	–	
Fluoride	mg/L	2.0	0.2	
Iron (Fe)	mg/L	0.3	0.03	
Manganese (Mn)	mg/L	0.05	0.01	
Silver (Ag)	mg/L	0.1	0.01	
Sulfate (SO_4)	mg/L	250.0	–	
Zinc (Zn)	mg/L	5.0	0.05	
Physical Characteristics/Secondary				
Color	Color Units	15	5.0[b]	At 25°C
Hardness	mg/L $CaCO_3$	None	N/A	
Specific Conductivity	µmhos/cm	700	–	
TDS	mg/L	500	–	[b]
Disinfection By-Products/Primary				
Total Trihalomethanes (TTHM)	mg/L	0.080	–	
Haloacetic Acids	mg/L	0.060	–	
Bromate	mg/L	0.010	-	
Chlorite	mg/L	1.0	-	
Pesticides				
Endrin	mg/L	0.0002	0.00001	
Lindane	mg/L	0.004	–	
Methozychlor	mg/L	0.1	0.0001	
Toxaphene	mg/L	0.005	0.001	
2, 4-D	mg/L	0.1	–	
2, 4, 5-TP Silvex	mg/L	0.01	–	
Radionuclides/Primary				
Uranium	µg/L	30.0		
Combined Radium–226 and Radium-228	PCi/L	5.0		
Gross Alpha Particle	PCi/L	15.0		
Beta/Photon Emitters	Mrem/yr	4.0		

Table 6-1
Primary and Secondary Maximum Contaminant Limits (MCL)

Parameter	Units	MCL	Detection Limit	Comments
Volatile Organic Chemicals/Primary				
Vinyl Chloride	mg/L	0.002	0.0005	
Benzene	mg/L	0.005	0.0005	
Carbon Tetrachloride	mg/L	0.005	0.0005	
1, 2-Dichloroethane	mg/L	0.005	0.0005	
Trichloroethylene	mg/L	0.005	0.0005	
Volatile Organic Chemicals/Primary				
Para-Dichlorobenzene	mg/L	0.075	0.0005	
1, 1-Dichloroethylene	mg/L	0.007	0.0005	
1, 1, 1-Trichloroethane	mg/L	0.2	0.0005	
Cis-1, 2-Dichloroethylene	mg/L	0.07	0.0005	
1, 2-Dichloropropane	mg/L	0.005	0.0005	
Ethylbenzene	mg/L	0.7	0.0005	
Monochlorobenzene	mg/L	0.1	0.0005	
o-Dichlorobenzene	mg/L	0.6	0.0005	
Styrene	mg/L	0.1	0.0005	
Tetrachloroethylene	mg/L	0.005	0.0005	
Toluene	mg/L	1	0.0005	
Trans-1, 2-Dichloroethylene	mg/L	0.1	0.0005	
Xylenes (total)	mg/L	10	0.0005	
Dichloromethane	mg/L	0.005	0.0005	
1, 2, 4-Trichlorobenzene	mg/L	0.07	0.0005	
1, 1, 2-Trichloroethane	mg/L	0.005	0.0005	
Synthetic Organic Compounds/Primary				
Alachlor	mg/L	0.002	0.0004	
Aldicarb	mg/L	0.003	0.001	
Aldicarb sulfoxide	mg/L	0.004	0.0018	
Aldicarb sulfone	mg/L	0.002	0.0007	
Atrazine	mg/L	0.003	0.0002	
Carbofuran	mg/L	0.04	0.002	
Chlordane	mg/L	0.002	0.0004	
Dibromochloropropane	mg/L	0.0002	–	
2, 4-D	mg/L	0.07	0.0002	
Ethylene dibromide	mg/L	0.00005	–	
Heptachlor	mg/L	0.0004	0.00008	

Table 6-1
Primary and Secondary Maximum Contaminant Limits (MCL)

Parameter	Units	MCL	Detection Limit	Comments
Heptachlor epoxide	mg/L	0.0002	0.00004	
Lindane	mg/L	0.0002	0.00004	
Methoxychlor	mg/L	0.04	0.0002	
Polychlorinated biphenyls	mg/L	0.0005	–	
Pentachlorophenol	mg/L	0.001	0.00008	
Toxaphene	mg/L	0.003	0.002	
2, 4, 5-TP	mg/L	0.05	0.0004	
Benzo[a]pyrene	mg/L	0.0002	0.00004	
Dalapon	mg/L	0.2	0.002	
Synthetic Organic Compounds/Primary				
Di (2-ethylhexyl) adipate	mg/L	0.4	0.0013	
Di (2-ethylhexyl) phthalate	mg/L	0.006	0.0013	
Dinoseb	mg/L	0.007	0.0004	
Diquat	mg/L	0.02	–	
Endothall	mg/L	0.1	–	
Endrin	mg/L	0.002	0.00004	
Glyphosate	mg/L	0.7	–	
Hexachlorobenzene	mg/L	0.001	0.0002	
Hexachlorocyclopentadiene	mg/L	0.05	0.0002	
Oxamyl (Vydate)	mg/L	0.2	0.004	
Picloram	mg/L	0.5	0.0002	
Simazine	mg/L	0.004	0.00015	
2, 3, 7, 8-TCDD (Dioxin)	mg/L	3E-8	–	

Notes:

a. Although the state board of health has not established MCLs for copper, lead, and sodium, there is sufficient public health significance connected with these elements to require inclusion in inorganic chemical and physical source monitoring. For lead and copper, EPA has established distribution system related levels at which a system is required to consider corrosion control. The levels, called “action levels,” are 0.015 mg/L for lead and 1.3 mg/L for copper and are applied to the highest concentration in 10 percent of all samples collected from the distribution system. EPA has also established a recommended level of 20 mg/L for sodium as a level of concern for those consumers with restricted diets of daily sodium intake.

b. Required only when specific conductivity exceeds 700 µmhos/cm.

Table 6-2 indicates the approximate locations and frequency for each type of water quality monitoring.

Table 6-2
Water Quality Monitoring Parameters

Sample Type	Sample Location	Frequency
Bacteriological	At representative points throughout the distribution system.	Monthly
Inorganic Chemical and Physical	At the source, after treatment, before entry to disinfection system.	Every 36 months[1]
Radionuclides	At the source.	Every 6 years
Volatile Organic Chemical (VOC)	At the source, after treatment, before entry to disinfection system.	Every 6 years
Synthetic Organic Chemical (SOC)	At the source, after treatment, before entry to disinfection system.	Every 36 months
Lead and Copper	At selected homes throughout the distribution system, at the source.	Every 36 months
Disinfection By-Products	At location within the distribution that represents the maximum residence time before mixing for source treatment plant.	Every 12 months
Disinfectant Residual	At bacteriological routine and repeat monitoring locations.	Monthly
Water Quality Parameters (Treated Source)	At the source.	Monthly

Notes:
1) This sampling frequency was required prior to the City's waiver from DOH allowing reduced monitoring. Reduced monitoring allows for one sample every 9 years. The next deadline for the City's reduced monitoring samples is December 2019.

6.1.1 Lead and Copper Rule

Lead is a highly toxic metal now banned for use in new public water system pipes, flux, and solder. Infants and pregnant women are especially susceptible to lead poisoning. Lead causes central and peripheral nervous system damage, hindering development in small children. The presence of lead in older facilities is a nationwide concern. All new pipes, fittings, solder, or flux used in the installation or repair of public water systems must now be lead-free (WAC 246-290-230). Lead-free is defined in the state regulations as no more than 8 percent lead in pipes and pipe fittings and no more than 0.2 percent lead in solder and flux.

Copper is both a primary and secondary drinking water standard. Copper is associated with stomach distress, Wilson's disease, and staining of porcelain.

The EPA lead and copper action levels are 0.015 mg/L and 1.3 mg/L, respectively. Lead and copper are being regulated through the Lead and Copper Rule, which is currently being implemented at the state level.

Monitoring

The City of Sumner has records dating back to 1992 for monitoring of lead and copper. Lead and copper monitoring is performed at the consumer's tap. In 1992, the City of Sumner was required to collect lead and copper samples from 40 locations within the distribution system

every 6 months. The DOH allowed Sumner to initiate a reduced monitoring program, requiring 20 samples once every year, in 1994 after all samples were below the Action Level for both lead and copper for four consecutive sampling periods. The City of Sumner is currently required to collect lead and copper samples from 20 locations within the water system every 3 years.

The City has continued to maintain compliance through 3-year monitoring cycles most recently performed in September of 2016.

Sample Sites

Each public water system must identify an available supply of targeted sampling sites that represent high-risk locations, such as homes with lead solder installed after 1982, homes with lead pipes, and homes with lead service lines. Sampling is voluntary, and the homeowners may later decide to discontinue participation.

Sample Collection

All samples for lead and copper are collected as first-drawn samples, consisting of one liter of water that has stood motionless within the plumbing system for at least 6 hours. Sampling is conducted at a cold-water interior tap that is typically drawn for consumption.

The system's staff may collect first-drawn samples, or the system may allow residents to collect samples after proper procedure instruction. However, if residents are allowed to collect samples, the system may not challenge the accuracy of sampling results based on alleged errors in sampling collection.

Action Level Exceedance

No samples have included lead and copper levels that exceed the action level. Both lead and copper levels exceed the state reporting level.

Rule Revisions

In October 2011, short term revisions to the Lead and Copper Rule (LTR-STR) went into effect. The monitoring plan and frequency of monitoring requirements were unchanged with the revisions, but additional framework was added that included:

- Water systems must provide notification of sample results to water users where lead and copper samples are collected. Sumner has complied with this requirement in the lead and copper testing cycles that have been completed since 2011.
- Systems must submit written documentation to DOH prior to the addition of a new source or any long-term treatment change. The documentation must include an evaluation of the potential impacts on the corrosivity of the finished water. DOH must review and approve any addition or change before implementation. This evaluation was performed and documented during the design phase of the City's new Central Well source, which has now been placed in production.
- The LCR-STR refines when compliance and monitoring periods begin and end. For systems monitoring annually or less frequently for lead and copper, the monitoring period is limited to the warmest time of the year between June and September. The LCR-STR also further defines the timing of actions following a lead or copper action level exceedance; the timing of monitoring activities related to reduced monitoring schedules; and reporting requirements. Sumner has not exceeded action levels but has complied with these revisions by performing monitoring between June and September.

- Systems must provide public education within 60 days after the monitoring period in which they exceed the lead action level. To date, Sumner has not had to initiate this required public education process. The revisions require all community water systems to provide information in their CCRs on lead in drinking water. Previously, only water systems that detected lead above the action level in more than five percent of the homes sampled had to include a short informational notice about lead in their CCR. Sumner has added this information.
- The new rule adds a requirement for utilities to reconsider previously "tested-out" lines when resuming lead service line replacement programs. Sumner has not had a lead service line replacement program.

6.1.2 Total Coliform Rule and Revised Total Coliform Rule

Coliform bacteria, though not necessarily disease-causing themselves, can be indicators of organisms that can cause gastroenteric infections, dysentery, hepatitis, typhoid fever, cholera, and other infectious diseases. Coliform bacteria reside in the intestinal tracts of warm-blooded mammals and are excreted in large numbers with feces. Fecal coliforms are a subset of total coliforms and are generally a better indicator of direct fecal contamination. *Escherichia coli* (*E. coli*) is a subset of fecal coliforms and is an even better indicator of fecal contamination. Coliforms can be found in sewage, soils, surface waters, and vegetation.

The numerical water quality standard criterion for coliform bacteria is based on the following arguments: The number of coliforms in domestic water supplies far outnumbers the number of pathogenic microorganisms, since fecal coliforms are contributed by the entire population, while pathogens are contributed only from persons with enteric illnesses. The die-off rate of pathogenic bacteria is greater than the death rate of coliforms outside the intestinal tract of animals; thus, exposure to treatment and residence in water reduce the number of pathogens relative to coliforms. Based on these premises, water that meets the state standards is, statistically speaking, safe for human consumption because of the improbability of ingesting pathogens. Unfortunately, comparable protection against viruses is unclear. Available information indicates that viruses can survive considerably longer than coliform bacteria outside the human host and that the infectious dose may be a very small number (Viessman and Hammer, 1985).

The Coliform Rule, WAC 246-290-310, is based on a presence/absence of total coliforms in routine samples. Revisions to the rule became effective in 2016, resulting in some changes to the way sampling and follow-up actions are to be performed. If coliforms are detected in a routine sample, the sample must be analyzed for E. coli and three repeat samples collected. The first repeat sample is collected at the site of the sample with coliform presence. The second repeat sample is collected within five active service connections upstream of the sample with coliform presence. The third repeat sample is collected within five active service connections downstream of the site with coliform presence. Other follow-up actions are stipulated in WAC 246-290-320, including department notification, public notification, and correction procedures.

The process of determining an *E. coli* MCL violation is as follows:

- If coliforms are detected in a routine sample, the sample must first be analyzed for *E. coli* and three repeat samples collected. The first repeat sample is collected at the site of the sample with coliform presence. The second repeat sample is collected within five active service connections upstream of the sample with coliform presence. The third

repeat sample is collected within five active service connections downstream of the site with coliform presence. Additionally, a raw water sample from each source that was operational on the day of the positive routine sample is collected and analyzed.

- An *E. coli* MCL violation of the RTCR occurs when:
  - A total coliform present repeat sample follows an *E. coli* present routine sample.
  - An *E. coli* present repeat sample follows a total coliform present routine sample.
  - The lab fails to test a total coliform present repeat sample for *E. coli*.
  - A system fails to take three repeat samples following a *E. coli* present routine sample.

The RTCR also identifies treatment technique triggers that require follow-up system assessments be performed within 30 days of the trigger occurrence. The assessment findings, and sanitary defects corrected, must be submitted to DOH within the same time frame. DOH provides templates to guide a water utility through the assessment process and record its findings and corrections.

Treatment technique triggers for a basic Level 1 Assessment include any of the following:

- Systems taking less than 40 samples during the month have more than one sample with coliform presence. (Sumner currently takes ten samples per month).
- Systems taking 40 or more routine samples per month have more than 5 percent with coliform presence in routine and repeat samples.
- Failure to collect three repeat samples for every coliform present routine sample.

Treatment technique triggers for a complex Level 2 Assessment include any of the following:

- An *E. coli* MCL violation.
- A second Level 1 treatment technique trigger occurring within a rolling 12-month period.

Table 6-3 includes a summary of bacteriological data between 2010 and 2016. All samples from the public system have been negative for coliform counts.

Table 6-3
Summary of Bacteriological Data

Year	Number of Distribution Samples Required per Month	Number of Samples Collected	Results
2010	10	120	Coliforms absent
2011	10	120	Coliforms absent
2012	10	120	Coliforms absent
2013	10	120	Coliforms absent
2014	10	120	Coliforms absent
2015	10	120	Coliforms absent
2016	10	120	Coliforms absent

Samples included for determining acute and nonacute compliance include routine samples and repeat samples. Samples not included in determining acute and nonacute compliance include special purpose samples and invalid samples. Circumstances invalidating a sample occur when:

- Presence/absence technique cultures are turbid in the absence of an acid reaction.
- Multiple tube technique cultures are turbid without appropriate gas production.
- There are confluent growth patterns or growth of too numerous to count (TNTC) colonies without a surface sheen using a membrane filter analytic technique.
- There is excess debris in the sample.
- The analyzing laboratory establishes that improper sample analysis occurred.
- DOH determines a domestic or nondistribution system problem is indicated by repeat samples collected at the same location that also have coliform presence, and all other samples in the set of repeat samples are free of coliform.
- The department determines a coliform presence is due to a circumstance or condition that does not reflect water quality in the distribution system.

6.1.3 Coliform Monitoring Plan

All public water systems are required to collect samples for coliform bacteria analysis by the State Board of Health Drinking Water Regulations (Chapter 246-290 WAC). For Group A systems, coliform bacteria sample collections are based upon a written monitoring plan. The sampling sites and monitoring frequency indicated in the plan represent the water throughout the distribution system. Coliform monitoring plans are subject to review and to revision as directed by the DOH. The plan is kept on file with the water system and made available to the DOH at the time of any routine Comprehensive System Evaluation or special site visit. The City collects ten samples at locations throughout the distribution system every month; results of the sampling are reported to and stored on the DOH database.

6.1.4 Groundwater Disinfection Rule

The purpose of disinfection is to destroy organisms that cause disease. Without appropriate disinfection, a water supply can be susceptible to contamination. Two types of disinfection (primary and secondary) are normally practiced. Primary disinfection is applied at the source. This is usually accomplished by maintaining a disinfectant residual in a tank for a period of time necessary to kill pathogenic organisms. Secondary disinfection is maintained in the distribution system. This is accomplished by assuring disinfectant residual remains after primary disinfection to kill pathogenic organisms that may be introduced after the source through cross connections, subsequent growth, etc. A secondary disinfection residual could also be used to trace contamination in the system, since any oxidizable substances would reduce or eliminate the disinfectant residual and could be easily measured.

Primary disinfection for the Sumner water system sources is provided by chlorine injection.

Per WAC 246-290-250, all non-GWI (groundwater under the influence of surface water) groundwater sources shall have continuous disinfection consistent with the following requirements:

- The combination of free chlorine residual concentration (Cmg/L) and chlorine contact time (Tminutes) CT product (C x T) shall be greater than or equal to 6 prior to the first water customer.
- A free chlorine residual, measured as total chlorine, combined chlorine, or chlorine dioxide, shall be detectable throughout all active portions of the distribution system (Note: A system with a heterotrophic plate count of 500 organisms/ml or less is considered to have a detectable chlorine residual).

The DOH may require increased chlorine residual concentrations, increased contact times, or additional treatment as necessary to protect public health.

6.1.5 Stage 2 Disinfectants and Disinfection By-Products Rule

Amendments to the SDWA in 1996 required the EPA to develop rules to balance the risks between microbial pathogens and disinfection by-products. In December 1998, EPA promulgated the Stage 1 Disinfectants and Disinfection By-Products Rules (Stage 1 D/DBPR) as one of the first set of rules under the 1996 SDWA amendments. In January 2006, Stage 2 D/DBPR was promulgated under the and remains the current regulation.

While effective in controlling many microorganisms, disinfecting chemicals commonly react with natural and organic matter in water to form disinfection by-products. Recent epidemiology studies have suggested a weak association between certain cancers and reproductive/development effects and exposure to chlorinated water. Further, disinfection by-products such as bromodichloromethane, bromoform, dichloroacetic acid, and bromate are shown to be carcinogenic in lab animals.

The Stage 2 D/DBPR updated and superseded the Stage 1 regulations, providing additional Maximum Contaminant Level Goals (MCLGs) that comprise the TTHM and HAA5 substances already defined under Stage 1. Most impactful, compliance was changed from meeting system-wide running annual average contaminant levels for all sampled locations to being compliant at every location.

The City of Sumner is a community water system utilizing chlorine to disinfect their groundwater and springs sources, and therefore was required to begin sampling for disinfection by-products and disinfectant residuals in the year 2004.

Disinfection By-Products

Water systems using only groundwater not under the direct influence of surface water, utilizing chemical disinfectant, and serving a population greater than 10,000, are required to collect one sample per “treatment plant” per quarter (40 CFR 141.132). Samples for each “treatment plant” need to be collected at the point in the system representing the maximum residence time for that particular plant. Per discussions with DOH personnel, systems are required to sample for disinfection by-products for each “treatment plant” if the source associated with that “treatment plant” is in operation at least 15 days during the calendar quarter.

The disinfection by-products to be sampled and their associated MCLs allowable and MCLGs are shown in Table 6-4.

Table 6-4
Disinfection By-Products

Disinfection By-Product	MCL (mg/L)	MCLG (mg/L)
Total Trihalomethanes (TTHMs)[1]	0.080	
Chloroform	–	0.070
Bromodichloromethane	–	Zero
Dibromochloromethane	–	0.060
Bromoform	–	Zero
Haloacetic Acids (five) (HAA5)[2]	0.060	–
Monochloroacetic Acid	–	0.070
Dichloroacetic Acid	–	Zero
Trichloroacetic Acid	–	0.2
Bromoacetic Acid	–	–
Dibromoacetic Acid	–	–

Notes:
1) Total trihalomethane is the sum of the concentrations of chloroform, bromodichloromethane, dibromochloromethane, and bromoform.
2) Haloacetic acids (five) are the sum of the concentrations of mono-, di-, and trichloroacetic acids and mono- and dibromoacetic acids.

Multiple sources that draw water from a single aquifer can be considered a single "treatment plant" in determining the minimum number of TTHM and HAA5 samples required to be collected.

TTMH/HAA5 MCL Compliance

Under the Stage 2 D/DBPR, systems conducted an evaluation of their distribution systems, known as an Initial Distribution System Evaluation (IDSE), to identify the locations with high disinfection byproduct concentrations. These locations were then established as the sampling sites for Stage 2 D/DBPR compliance monitoring. A system could fulfill the IDSE requirements by certifying that all individual TTHM and HAA5 monitoring results for compliance with the Stage 1 D/DBPR were less than or equal to 0.040 mg/L for TTHM and 0.030 mg/L for HAA5 during a prescribed 2-year time period. This is commonly known as "40/30 Certification." In addition, the system must not have had any Stage 1 D/DBPR monitoring violations for TTHM and HAA5 during the same period. The City's 40/30 certification was submitted in 2007 and 40/30 certification was approved in a letter from EPA on September 20, 2007. Monitoring under Stage 1 compliance continued until additional sampling under Stage 2 began in October 2013. The City has retained compliance under Stage 2 at individual monitoring locations, and is now under a reduced monitoring schedule that includes an annual sample taken at one distribution system location. Between 2013 and 2019, samples were taken to determine the disinfection byproduct concentrations in the system. The sample concentration of TTHM ranged from 0.001 to 0.00845 mg/L during this period. The sample concentration of HAA5 ranged from not detected (ND) to 0.00259 mg/L during this sampling period. Both ranges are well below the "40/30 Certification," mentioned above.

Disinfectant Residual

The City of Sumner uses both sodium hypochlorite and chlorine gas for disinfection. Therefore, in addition to the daily chlorine residual monitoring currently conducted by the City, compliance with Stage 2 D/DBPR requires that additional chlorine residual samples be collected at the same time and location as routine and repeat coliform sampling collection. The allowable MRDL and MRDLG for free chlorine residual are shown in Table 6-5.

Table 6-5
Disinfection Residuals

Disinfectant Residual	MRDL (mg/L)	MRDLG (mg/L)
Chlorine	4.0 as Cl_2	4

The City collects disinfection byproduct samples at locations throughout the distribution system. The City has remained compliant on all disinfectant residual levels.

6.1.6 Revised Radionuclides Rule

Radionuclides are compounds that emit radioactive particles, which essentially "destabilize" nearby cells. Resulting cell "destabilization" in humans and animals is thought to result in increased likelihood of cancer and/or birth defects.

The 1986 Safe Drinking Water Act (SDWA) Amendments required the EPA to promulgate a revised radionuclide rule by June 1989. EPA did not meet the Congress mandated deadline and consequently a lawsuit was filed against them, the result of which was that the EPA entered into a series of consent agreements that required them to issue non-radon radionuclides regulations by November 21, 2000. In 1991, the EPA proposed new regulations for uranium and revisions to the existing radionuclides regulations.

The revised Radionuclides Rule establishes an MCL for uranium while retaining the existing MCLs for combined radium-226/228, gross alpha particle, and beta particle/photon radioactivity listed under the EPA National Primary Drinking Water Regulations, establishing MCLG of zero for all ionizing radiation, and establishing new radionuclide monitoring requirements. The MCLs/MCLGs proposed in the revised rule are shown in Table 6-6.

Table 6-6
Revised Radionuclide Rule MCLs

Regulated Radionuclide	MCL	MCLG
Beta/Photon Emitters	4 mrem/yr	Zero
Gross Alpha Particle	15 pCi/L	Zero
Combined Radium-226–228	5 pCi/L	Zero
Uranium	30 ug/L	Zero

Systems determined initial compliance with the revised rule by collecting four consecutive quarterly samples at each entry point to the water distribution system. Compliance is determined based on the annual average of the quarterly samples. Systems exhibiting annual average radionuclide concentrations below the MCL will be eligible for reduced monitoring as follows:

- If an entry point's annual average concentration for gross alpha, uranium, and combined radium-226/228 is below the detection limit, the system will be allowed to reduce monitoring to one sample every 9 years at that entry point (40 CFR 141.26[a][3][i]).
- If an entry point's annual average concentration for gross alpha, uranium, and combined radium-226/228 is at or above the detection limit, but at or below one-half the MCL, the system will be allowed to reduce monitoring to one sample every 6 years at that entry point (40 CFR 141.26[a][3][ii]).
- If an entry point's annual average concentration for gross alpha, uranium, and combined radium-226/228 above one-half the MCL, but at or below the MCL, the system will be allowed to reduce monitoring to one sample every 3 years at that entry point (40 CFR 141.26[a][3][iii]).

Systems that exhibit an average radionuclide concentration exceeding the MCL will be required to continue sampling and coordinate with DOH to develop treatment strategies. Sumner is now under a reduced monitoring plan for all radionuclides.

6.1.7 Groundwater Rule

The SDWA 1996 amendments require the EPA to develop regulations requiring groundwater source disinfection as needed to protect public health. The Final Groundwater Rule (GWR) was published in the Federal Register on November 8, 2006, and GWR compliance was required on December 1, 2009.

The GWR is based on the need to protect against disease-causing microorganisms found in systems that serve groundwater as drinking water. The GWR establishes protective measures and target systems to identify water systems at high risk for contamination. The proposed GWR is based on the ideas of the following regulations:

- Total Coliform Rule (TCR).
- Surface Water Treatment Rule (SWTR).
- Interim Enhanced Surface Water Treatment Rule (IESWTR).
- Stage 1 Disinfectants and Disinfection Byproducts Rule (D/DBPR).
- Underground Injection Control Program.
- Source Water Assessment and Protection/Wellhead Protection Program.

The requirements of the GWR are outlined below. Each aspect of the rule is covered in greater detail in the following sections of this Plan:

- Regular sanitary surveys of the public water systems to look for significant deficiencies in key operational areas.
- Triggered source water monitoring when a system that does not sufficiently disinfect drinking water identifies a positive sample during its Total Coliform Rule monitoring and assessment monitoring (at the option of the state) targeted at high-risk systems.

- Implementation of corrective actions by groundwater systems with a significant deficiency or evidence of source water fecal contamination to reduce the risk of contamination.
- Compliance monitoring for systems that are sufficiently disinfecting drinking water to ensure that the treatment is effective at removing pathogens.

Sanitary Surveys

The state shall conduct sanitary surveys on all community water systems every 3 to 5 years. During the survey, the state will compile a list of observed system deficiencies to be provided to the system prior to 30 days following the survey completion. The codification of the groundwater rule will provide the state with the authority to enforce all corrective action required to remedy all system deficiencies defined during sanitary surveys.

A sanitary survey is a review conducted by the state that looks at critical components of a public water system. The sanitary survey provisions build on existing state programs established under the 1989 Total Coliform Rule and the Interim Enhanced Surface Water Treatment Rule and states the authority to define both outstanding performance and significant deficiencies. The groundwater rule defines eight specific components that must be reviewed during a survey (to the extent applicable to the individual water system being surveyed):

1. Source.
2. Treatment.
3. Distribution system.
4. Finished water storage.
5. Pumps, pump facilities, and controls.
6. Monitoring, reporting, and data verification.
7. System management and operation.
8. Operator compliance with state requirements.

The latest DOH Water System Sanitary Survey Report was completed in 2016 and is included in Appendix H.

Hydrological Sensitivity Assessment

The state shall perform a one-time assessment of sensitivity for all systems that are unable to maintain a minimum 4-log removal (virus inactivation through disinfection). A system that is determined to be hydrologically sensitive must be monitored monthly as outlined under “Source Water Monitoring.”

Source Water Monitoring

Groundwater systems that are determined to be located within sensitive aquifers shall conduct monthly sampling for fecal indicators. The sampling frequency may be reduced after a consecutive 12 months of negative results. Table 6-3 showed the results of the City’s history of coliform monitoring, which is a key indicator for fecal coliforms.

Additionally, if routine coliform sampling within the distribution system yields coliform-positive results, then the system shall, as a supplement to the additional sampling required in the TCR, collect a source water sample and monitor for fecal indicator.

A groundwater system is subject to **triggered source water monitoring** if it does not already provide treatment to reliably achieve at least 99.99 percent (4-log) inactivation or removal of viruses. If a system receives notice of a total coliform-positive distribution system sample collected under the Total Coliform Rule (TCR), it must take a source water sample within 24 hours. The system does not have to take a source water sample if the state can determine that the positive sample was due to an issue in the distribution system and not the source. If any initial triggered source water sample is fecal indicator-positive, the system must collect an additional five repeat source water samples over the next 24 hours for each of the sites that was initially fecal indicator-positive. States can also require immediate corrective action to address contamination at those sites.

The GWR also allows states to require systems that do not provide sufficient disinfection treatment to remove 99.99 percent of viruses to conduct **optional assessment source water monitoring** at any time and require systems to take corrective action. States may evaluate the need for assessment monitoring on a case-by-case basis. EPA recommends that the following risk factors be considered by states in targeting high-risk systems:

1. High population density combined with on-site wastewater treatment systems.
2. Aquifers with restricted geographic extent, such as barrier island sand aquifers.
3. Sensitive aquifers (e.g., karst, fractured bedrock and gravel).
4. Shallow unconfined aquifers.
5. Aquifers with thin or absent soil cover.
6. Wells previously identified as having been fecally contaminated.

For those systems that already treat drinking water to reliably achieve at least 99.99 percent (4-log) inactivation or removal of viruses, the rule requires **regular compliance monitoring** to ensure that the treatment technology installed is reliably removing contaminants.

Table 6-3 showed the results of the City's history of coliform monitoring, which is a key indicator for fecal coliforms. Sumner has maintained compliance with coliform monitoring at all groundwater sources.

Corrective Actions

If a system is notified by the state that a significant deficiency is present within the distribution system or that fecal indicator is present within the system, then corrective action must be taken within 90 days of notification. If corrective action includes treatment implementation or expansion, then the system must monitor to ensure that a 4-log inactivation is maintained.

When a system has a significant deficiency or a fecal indicator-positive groundwater source sample (either by the initial triggered sample, or positive repeat sample, as determined by the state), the groundwater system must implement one or more of the following corrective action options:

1. Correct all significant deficiencies (e.g., repairs to well pads and sanitary seals, repairs to piping tanks and treatment equipment, control of cross-connections);
2. Provide an alternate source of water (e.g., new well, connection to another PWS);

3. Eliminate the source of contamination (e.g., remove point sources, relocate pipelines and waste disposal, redirect drainage or run-off, provide or fix existing fencing or housing of the wellhead); or
4. Provide treatment that reliably achieves at least 4-log treatment of viruses (using inactivation, removal, or a state-approved combination of 4-log virus inactivation and removal).

These actions are presented formally in Section 10.4, Emergency Response Program.

Compliance Monitoring

Compliance monitoring applies to all water systems that disinfect as a corrective action or to avoid source water monitoring. As written, disinfection system monitoring must be conducted as outlined in Table 6-7 below.

Table 6-7
GWR Compliance Monitoring Requirements

System Size	Monitoring Frequency
<3,300	Daily disinfection treatment monitoring.
>3,300	Continuous disinfection treatment monitoring.

If said monitoring shows the disinfection concentrations within the distribution system to be below the required level, then the system must notify the state or restore the required disinfection level within 4 hours.

6.2 Upcoming Regulations

The SDWA of 1974 directs the United States Environmental Protection Agency (EPA) to establish minimum national drinking water standards, setting limitations on the amounts of various substances allowed in drinking water. In 1996, Congress passed a set of amendments expanding the protection provided by the SDWA. The authorization of the 1996 SDWA amendments requires the EPA to develop and implement several new health-related drinking water regulations.

Congress prefers that individual states take on the responsibility for implementation of the new programs. Washington State has the primary responsibility for implementing and enforcing the SDWA. The state DOH is the lead agency with authority to permit, regulate, and enforce the state water quality regulations. The proposed upcoming regulations, and their potential applicability to the City of Sumner, are discussed in the following sections.

6.2.1 Lead and Copper Rule Revisions

The EPA is considering a long-term revision counterpart to the short-term revisions that were made rule requirements in 2011. A National Drinking Water Advisory Council (NDWAC) Lead and Copper Rule (LCR) Working Group was convened beginning in March 2014 to provide advice to EPA in addressing the five issues listed below:

- Sample site selection criteria;
- Lead sampling protocols;

- Public education for copper;
- Measures to ensure optimal corrosion control treatment; and
- Lead service line replacement.

In December 2015, the NDWAC issued final recommendations for the long-term revisions to the LCR. A proposed implementation schedule has not yet been established, but the following is excerpted from the EPA webpage for the rule:

The following update on this proposed rule is taken from the United States Environmental Protection Agency's webpage for drinking water regulations under development or review:

"Section 1417 of the Safe Drinking Water Act (SDWA) establishes the definition for "lead free" as a weighted average of 0.25% lead calculated across the wetted surfaces of a pipe, pipe fitting, plumbing fitting, and fixture and 0.2% lead for solder and flux. The Act also provides a methodology for calculating the weighted average of wetted surfaces.

The Act prohibits the "use of any pipe, any pipe or plumbing fitting or fixture, any solder, or any flux, after June 1986, in the installation or repair of (i) any public water system; or (ii) any plumbing in a residential or non-residential facility providing water for human consumption, that is not lead free."

Additionally there is a prohibition on introducing a pipe, any pipe or plumbing fitting or fixture, any solder, or any flux that is not lead free into commerce; unless the use is for manufacturing or industrial purposes.

The SDWA includes several exemptions from the lead-free requirements, specifically for plumbing devices that are used exclusively for nonpotable services, as well as a list of specific products: toilets, bidets, urinals, fill valves, flushometer valves, fire hydrants, tub fillers, shower valves, service saddles, or water distribution main gate valves that are 2 inches in diameter or larger.

EPA proposes to make conforming changes to existing regulations based on the Reduction of Lead in Drinking Water Act (RLDWA) and the Community Fire Safety Act enacted by Congress. The proposed regulation would modify the definition of lead free plumbing products (e.g., pipes, fittings and fixtures) to conform to the statute enacted by Congress that prohibits a lead content level above 0.25%. The proposal also includes labeling requirements that will allow users of these products to identify plumbing devices that meet the new "lead free" definition. Labeling will reduce the likelihood that non-lead-free products are used in plumbing that is intended for drinking water use. Additionally, the proposal includes requirements for manufacturers to certify that they are meeting these new requirements. EPA requested comments on the proposal during the comment period which ended on May 17, 2017."

Depending on the details of this rule, if and when it is promulgated, modifications to Sumner's Development Standards might be required for new construction, which would be enforced through the Building Official.

6.2.2 Perchlorate

The following update on this proposed rule is taken from the EPA's webpage for drinking water regulations under development or review:

> *"Perchlorate is a naturally occurring and manufactured chemical anion that consists of one chlorine atom bonded to four oxygen atoms (ClO4-). Perchlorate is commonly used as an oxidizer in rocket propellants, munitions, fireworks, airbag initiators for vehicles, matches and signal flares. It is naturally occurring in some fertilizers.*
>
> *On February 11, 2011, EPA determined that perchlorate meets the Safe Drinking Water Act criteria for regulation as a contaminant. The Agency found that perchlorate may have an adverse effect on the health of persons and is known to occur in public drinking water systems with a frequency and at levels that present a public health concern. Since that time, EPA has been reviewing the best available scientific data on a range of issues related to perchlorate in drinking water including its health effects, occurrence, treatment technologies, analytical methods and the costs and benefits of potential standards."*

The rulemaking process is currently in a peer review period soliciting feedback on the proposed approach of establishing a MCLG for perchlorate. Various states where presence of perchlorate has been more predominant have already established screening values or cleanup goals for perchlorate in drinking water and groundwater, using these goals to discuss and implement cleanup actions with industries that might be traced as a source of the pollutant. Washington State has not established these values to date. Future impacts to Sumner that might result from the establishment of an MCL or MCLG would include the addition of perchlorate into required source water testing. Treatment and removal of perchlorate has proven to be an expensive endeavor in states where its history is more established, typically resulting in water utilities attempting to trace the sources to an industry that they may defer the cleanup and removal costs to.

6.2.3 Per- and Polyfluoroalkyl Substances (PFAs)

PFAs are a large group of chemicals that have been used since the 1950s in the manufacturing of consumer products such as food packaging, outdoor clothing, ski and snowboard waxes and carpets. Their role is to aid in the creation of stain and water resistant or non-stick surfaces. PFAs have also been used in some forms of firefighting foam. They do not easily break down within the environment, and have been detected in air, soil, water and food. Perfluorooctanoic acid (PFOA) and perfluorooctyl sulfonate (PFOS) are the most commonly known PFAS chemicals, and their use by manufacturers has been significantly curtailed over the last 15 years.

If ingested over periods of time, the accumulation of PFAs are suspected through human and animal studies to have the following potential health effects:

- Lower infant birth weight
- Increased cholesterol levels
- Immune suppression
- Liver and thyroid problems
- Increased risk of some types of cancer

No national drinking water standards or MCLs for PFAs currently exist. In 2016, EPA released health advisories for PFOA and PFOS, recommending that combined levels exceeding 70 parts per trillion (ppt) in drinking water was unsafe to consume. PFOA and PFOS were contaminants that were added to required water utility source testing in 2012 under the Unregulated Contaminant Monitoring Rule (UCMR3). The data developed from this testing will play a role in determining if EPA moves forward with the development of national primary drinking water regulation for PFAs.

At the state level, the Washington State Board of Health began a rulemaking process for PFAs regulation in late 2017. It is expected to be a two-year process, and that DOH will adopt this regulation for water utility compliance. Both the state Department of Ecology (DOE) and DOH have funded and initiated a testing programs, including the volunteer participation of representative Group A water systems. PFAs have been detected in aquifers around Sammamish and Issaquah, with the latter now providing treatment (activated carbon pressure filtration) to remove PFOS and PFOA to levels below the EPA advisories. During investigations, contaminated soils were found at the facilities of the local fire department.

If and when PFAs regulation is promulgated, Sumner will be required to test their source water and treat to below established MCLs. The City should actively be surveying local industry and fire department activities to identify and implement appropriate means of source control. Source water testing should also be commenced to develop a database and prepare for action on any sources that develop patterns of detection. As a note, the City's new Central Well treatment facility has implemented activated carbon filtration within its treatment process, primarily for taste and odor control. It might be anticipated that some level of PFOA and PFOS removal would occur from these filters if the contaminants were to be present within the well source.

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Chapter 7 Hydraulic Analysis

A computerized water system model was developed and used for analysis as part of this Water System Plan.

Computer simulations were performed to locate deficiencies in the existing pipe network and to size future transmission and distribution mains. The methodology, assumptions, scenarios modeled, and simulation results are presented in this chapter.

7.1 Hydraulic Model

The computer model is a useful tool for analyzing water systems, allowing many different demand conditions and system configurations to be simulated in a short timeframe. The computer program used for analysis of the Sumner water system is InfoWater Suite 12.3, a product owned and supported by Innovyze, Inc. The program uses the Hazen-Williams formula to calculate pipe head loss, flows, and velocities with associated node pressures. InfoWater offers additional modeling capabilities that allow analyzing efficiencies, including the following:

- Operates within a GIS framework, leveraging the use of the City's GIS datasets and County data such as Lidar-based topography.
- Changes system demands globally, by domain (group), or node by node for each customer class.
- By batch run, calculates available fire flows throughout a system when given specified minimum residual pressures.
- Allows simple addition, removal, replacement or deactivation of pipes, nodes, pumps, PRVs, reservoirs, and sources.
- Simulates changing operational conditions, such as shutting down sources, changing storage tank levels, valve closures, and fluctuating demands.

7.2 Performance and Design Criteria

Sources used to determine deficiencies in the City's water system include performance requirements and design criteria from the DOH *WSDM* guidelines, SMC, and WAC 246-290. These criteria are summarized as follows:

- System pressures shall not be less than 30 psi at all nodes during PHD scenarios.
- System pressures shall not be less than 20 psi at all nodes during MDD plus fire flow scenarios.
- Flow velocities in distribution system mains should not be more than 8 feet per second.
- Commercial, industrial, and apartment use districts have a maximum fire hydrant spacing of 400 feet.

Fire flow requirements were based on land use and guidance by the East Pierce Fire and Rescue Fire Marshal. In general, minimum fire flow rate requirements are summarized as follows:

- 1,000 gpm for 2 hours – Medium- and low-density residential
- 1,500 gpm for 2 hours – High-density residential and commercial
- 3,500 gpm for 3 hours – Light industrial

- 4,500 gpm for 4 hours – Heavy industrial and several existing buildings

The 2001 *Pierce County Coordinated Water System Plan* requires 1,500 gpm for high-density residential and commercial areas. Industrial areas require 3,500 gpm based on the Fire Marshal's recommendations for fire-resistant construction. The REI complex, which utilized fire-resistive construction, such as automatic fire suppression sprinklers, early warning detection, Type III-n noncombustible construction, and major setbacks from adjacent property lines, requires 3,750 gpm. The Fire Marshal has recommended 4,500 gpm fire flows for specific individual services located within City industrial areas. The required fire flows, designated within the system model by overlaying GIS land use data for each node and confirming source locations with high fire flow requirements, are illustrated in Figure 7-1.

7.3 Model Approach

The current hydraulic model was updated in June of 2017. The model reflects the most recent information available from the City's GIS and pipe network data. The hydraulic model was used to determine areas where system deficiencies exist, or are likely to develop, under various system demand and source of supply conditions. These deficiencies include areas of high or low pressure, areas with high flow velocities in pipelines, and areas with insufficient fire flow availability.

7.3.1 History

The water model was first created in 1993. The data for the 1993 Model was derived from existing City of Sumner water system maps showing pipe materials, diameters, and locations. The maps were digitized into AutoCAD to set up the 1993 model and to determine the lengths of each pipe section.

The model was then updated in 2004. Data used to update the water model was taken from as-built drawings for developments constructed between 1993 and 2004. The as-builts included road alignments, water line size and length, and spot elevations using the City datum. Ground elevations were assigned to each node using Pierce County Public Works Comprehensive Drainage Program maps, which show contours and spot elevations throughout the service area.

The model was updated for the City's previous WSP in 2009. Changes to the model were made based on updates to GIS data, flow tests, and general pipe updates provided by the City. Water system infrastructure was added to the model based on as-built drawings for developments constructed between 2004 and 2008. Ground elevations were assigned to each new node using existing model elevations and planimetric data from Sumner aerial photographs.

7.3.2 Setup

The model for the 2009 WSP used the WaterCAD Version 8 software platform, a Haestad product owned and supported by Bentley Systems, Inc. A model file from that planning effort was obtained from the previous consultant via a format exported to the public domain software EPANET. The current hydraulic model was created by importing the 2009 model from EPANET into InfoWater. The coordinates of every pipe and node in the EPANET file were globally edited to match the spatial coordinate system of the City's GIS data. The locations of the pipes and nodes in the model network were then matched to the locations of the GIS layer. Model configuration, substantially the same as the previous model, was updated based on a review of the physical layout by City Operations staff and consistency with current GIS data. Ground elevations for all nodes were interpolated from City contours (NAD83 HARN), generated from Pierce County Lidar data.

Legend

Junction

Fire Flow Demand

- 1,000 gpm
- 1,500 gpm
- 3,500 gpm
- 4,500 gpm

Sumner Water Service Area

Required Fire Flows

FLOW (GPM)

- 1,500 gpm Required Fire Flow
- 4,500 gpm Required Fire Flow
- 3,500 gpm Required Fire Flow
- 1,000 gpm Required Fire Flow

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Sumner Water System Required Fire Flows

Water Comprehensive Plan
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Figure **7-1**

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The pump curves for the well supply pumps and Viewpoint Booster Pump Station were imported from the previous model and checked against current supply records for accuracy. The design point of the South Well pump was adjusted to reflect the 700 gpm typical supply output. The Central Well pump was added to the model and assigned its design curve. No other changes were made to pump curves in the hydraulic model.

After physical components and operational settings were updated in the model, system demands were evenly distributed between nodes of like customer category within their respective pressure zones. Large individual demands were identified from City water use records and separately assigned to appropriate locations in the City. Separate demands scenarios were created for the Average Daily Demand (ADD), Maximum Daily Demand (MDD), and Peak Hour Demand (PHD) for each planning year. The total demands for each scenario for the City's main pressure zone were taken from Table 3-7 in Chapter 3. Total demands for the Sumner Viewpoint pressure zone were calculated and distributed in the model separately to reflect the higher consumption rate in the Viewpoint development.

7.3.3 Calibration

A hydrant flow testing plan was performed in the field as part of model calibration efforts in 2009. The field tests included measuring the static pressures and residual pressures from opened fire hydrants at five locations throughout the water system. The demands in the computer model were set so that the total demand equaled the actual source demand during the field tests. The model was determined to be calibrated when all of the computer model pressures were within 5 percent of the measured pressures.

As the current distribution system configuration remains largely the same as it was in 2009, and the well looped system network remains a predominantly simple single pressure zone (excluding the Viewpoint area), the calibrated parameters from the 2009 model were accepted as the starting point for the analysis performed within this plan. However, additional calibration checks were performed using hydrant flow test data accrued as part of availability requests made between 2012 and 2017. Flow tests used as part of the additional calibration checks are summarized as Table 7-1. Ideally, pressure drops between static and open hydrant residual conditions would have greater differential, but the degree of looped piping within the system makes this difficult at most locations. Consistency in comparative pressure drops between these two conditions in both field-measured and modeled simulations, however, lends confidence that the model is more than adequately calibrated for performing system analysis.

The modeled pressures were shown to be slightly lower than field measured pressures at a couple locations; minor increases were made to the Hazen-Williams coefficients for selected pipes in those areas to retain the same levels of accuracy achieved in 2009. Coefficients were also assigned to new pipes added to the water system since 2009. Table 7-2 summarizes the "C factor" friction coefficient ranges for existing pipes and the values used for new pipes within the model.

Table 7-1
Field Flow Tests Used for Model Calibration

Date	Location	Flow Rate (gpm)	Measured Pressure (psi)		Modeled Pressure (psi)	
			Static	Residual	Static	Residual
10/24/2012	132nd Ave. E & 16th St. E	1,455	72	70	74	71
4/23/2013	160th Ave. E & 64th St. E	1,325	68	66	69	66
4/23/2013	Zehnder St. & Steele Ave.	1,325	68	66	68	66
11/19/2013	6616 166th Ave. E	940	68	66	69	67
8/25/2015	Main St. & Graham Ave.	1,250	70	68	68	67

Table 7-2
Hazen-Williams Coefficients for Modeled Pipes

Pipe Material	2009 WSP Coefficient Range	Coefficient Range After Calibration	Coefficient for New Pipes
Asbestos Cement	108	117-130	140
Cast Iron	90	90-99	100
Ductile Iron Pipe	108-117	108-130	140
Polyvinyl Chloride (PVC)	117	117	150

7.4 Existing System Modeling

7.4.1 Assumptions

The following assumptions were made for the simulations of the existing system:

- The South Tank, North Tank, Sumner Springs Tank, County Springs Tank, Sumner Viewpoint Tank, Viewpoint Booster Pump Station, Central Well, and Dieringer Well were operational in accordance with Scenario A (peak months), as described in Chapter 5. Additionally, the West Well, Elhi Springs, and interties with Pacific and Puyallup were represented in the model but closed. The South Well remained out of service, recognizing the constraints of allowable instantaneous groundwater withdrawal between the Central, South, and West Wells under the temporary pumping regime approved by DOE (also discussed in Chapter 5).
- The PHD analysis was conducted with the equalizing storage volume depleted in all tanks. Consistent with the operational setpoints in the City's reservoirs that are used to turn on sources, one of the two Viewpoint Booster Pump Station pumps was turned on for this scenario, in addition to the Central Well and Dieringer Well.

- The MDD plus fire flow analysis was conducted with the fire suppression volume depleted assuming a 4-hour, 4,500 gpm fire flow scenario in the main pressure zone and a 2-hour, 1,000 gpm fire flow in the Viewpoint pressure zone. Consistent with the operational setpoints in the City's reservoirs that are used to turn on sources, one of the two Viewpoint Booster Pump Station pumps was turned on for this scenario in addition to the Central Well, Dieringer Well and the South Well (only in simulated years 2024 and 2038, when full groundwater rights are assumed).

7.4.2 System Demand Conditions Modeled

Two types of scenarios were modeled to test the performance of the existing system, both used to locate undersized pipes as determined by the maximum head loss and velocity criteria, as well as locate areas that fall below minimum pressure requirements as follows:

- Minimum of 30 psi to all services within the system under PHD conditions
- Minimum of 20 psi to all services within the system under MDD plus fire flow conditions

7.4.3 Results

Analysis results for the existing PHD scenario are illustrated in Figure 7-2. The analysis indicated no areas of deficient pressure or excessive flow velocity or pressure. The minimum system pressure under the existing PHD is approximately 44 psi at the first services downstream from the Viewpoint tank; this is above the 30-psi requirement. The maximum pressure in the Viewpoint pressure zone is 85 psi, and the typical pressure range is between 55 and 80 psi.

The minimum pressure in the main pressure zone is at the intake to the Valley Crest Maintenance Association's booster pump station serving the properties on 171st Avenue Court and is approximately 26 psi. However, these homes are served by a small booster pump that increases the pressure above the 30-psi requirement. The maximum pressure in the main pressure zone is 78 psi, and the typical pressure range is between 60 and 78 psi. Low pressures are also noted in Figure 7-2 in proximity to the South Tank. These pressures are associated with the water pipeline from the main pressure zone that feeds the tank by traversing up a hillside. No services exist along this final stretch of pipeline, and all City customers along the hillside in this vicinity are served off of the higher Viewpoint pressure zone.

Fire flow availability under existing MDD conditions is illustrated in Figure 7-3. The figure includes specific fire flow rates that could be delivered to node locations with a 20-psi residual, as well as general fire flow availability contours across the service area, based on 500 gpm intervals. The results show that there are fire flow deficiencies at dead-end/non-looped lines and at small diameter pipes less than 6 inches in diameter. Several of these deficiencies were identified in the 2009 WSP and are currently being addressed through an ongoing CIP project.

The results also show a deficiency in supplying fire flow to the 171st Avenue Court area. Though the booster pumps owned by the Valley Crest Maintenance Association would be relied on to provide adequate 20 psi pressure and downstream transmission capacity for a 1,000 gpm residential fire, Sumner's responsibility for providing adequate volume and pressure at that flow rate to the booster pump station for proper functioning is unclear.

Due to the decommissioning of the water reservoir at the Elhi Springs site and the fact that source is not typically utilized because of the water quality considerations, the 1,900 linear feet of 6-inch diameter water main from the lower valley floor to the 171st Avenue Court booster pump intake would be relied on to furnish all of the water supplied to the 171st Avenue Ct. booster pump. Flow rates that include fire protection quantities travelling up the side of the valley through this pipeline result in negative modeled pressures at the 171st Avenue Court homes. Elhi Springs, even if it were actively being used as a water source, does not have adequate volume or storage capacity to appreciably change the fire flow analysis.

Existing CIP projects from the previous WSP that have not been completed were combined with new capital improvement projects to correct all existing system deficiencies found in the model. The updated CIP is further detailed in Chapter 8.

7.5 Future System Modeling

7.5.1 Future System Setup

Several changes were made to the water system to best represent the system in planning years 2028 (10-year planning period under which this plan would be approved) and 2038. Demands were increased to match those projected in Chapter 3. Additionally, the following assumptions were made in modeling the future system:

- Anticipated future growth trends and associated system demand increases occur in a manner similar to the methodologies that are used for the basis of population and demand projections in Chapter 3. Large proportions of future flows were not dispersed to the outer limits of Sumner's distribution system, as much of the short-term City growth is anticipated to occur through redevelopment and increased densities within the downtown core area.
- The water system will operate under source of supply Scenario C as described in Chapter 5. This Scenario allows the Central Well to be fully operational at an expanded capacity, in addition to continued operation of Sumner Springs, County Springs, the South Well, and Dieringer Well. The West Well, Elhi Springs, interties with Pacific and Puyallup, and a future potential intertie with Mountain View-Edgewood remained closed for future modeling scenarios. The Central, South and West Wells were modeled to not exceed the instantaneous combined withdrawal rate of 2,250 gpm anticipated with full water right authorization.

7.5.2 Projected System Demand Conditions Modeled

Future planning years were modeled under the same scenarios as the existing hydraulic analysis. PHD and MDD/fire flow conditions were modeled to locate undersized pipes as determined by the head loss and velocity criteria, and areas were identified that fall below the minimum pressure requirements for each scenario. Nodes were tested at MDD in representative areas of similar building classes to find areas that do not meet the specified fire flow requirements.

7.5.3 Results

PHD system pressures and fire flow availability for years 2028 and 2038 are illustrated in Figure 7-4 through Figure 7-7. There were no additional system deficiencies created from these scenarios.

Legend

Junction

PRESSURE

- less than 30.00 psi
- 30.00 ~ 40.00 psi
- greater than 40.00 psi
- Sumner Water Service Area

Pipe

VELOCITY

- 0.00 fps
- 0.00 ~ 8.00 fps
- greater than 8.00 fps

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Existing Peak Hour Demand Hydraulic Analysis

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Figure **7-2**

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Legend

Sumner Water Service Area

EXISTINGMDD

<all other values>

Design Flow

- 0 gpm
- 500 gpm
- 1000 gpm
- 1500 gpm
- 2000 gpm
- 2500 gpm
- 3000 gpm
- 3500 gpm
- 4000 gpm
- 4500 gpm
- 5000 gpm

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Existing Max Day Demand Available Fire Flow Contours

Figure 7-3

Water Comprehensive Plan
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Junction

PRESSURE

- less than 30.00 psi
- 30.00 ~ 40.00 psi
- greater than 40.00 psi
- Sumner Water Service Area

Pipe

VELOCITY

- 0.00 fps
- 0.00 ~ 8.00 fps
- greater than 8.00 fps

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2028 Peak Hour Demand Hydraulic Analysis

Water Comprehensive Plan
City of Sumner
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Figure **7-4**

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Legend

Sumner Water Service Area

2028MDD

<all other values>

Design Flow

- 0 gpm
- 500 gpm
- 1000 gpm
- 1500 gpm
- 2000 gpm
- 2500 gpm
- 3000 gpm
- 3500 gpm
- 4000 gpm
- 4500 gpm
- 5000 gpm

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GIS Base: City of Sumner & Pierce County
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0 1,000 2,000 Feet

N

2028 Maximum Day Demand Available Fire Flow Contours

Water Comprehensive Plan
City of Sumner
November 2017

Figure 7-5

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Legend

Junction

PRESSURE

- less than 30.00 psi
- 30.00 ~ 40.00 psi
- greater than 40.00 psi
- Sumner Water Service Area

Pipe

VELOCITY

- 0.00 fps
- 0.00 ~ 8.00 fps
- greater than 8.00 fps

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GIS Base: City of Sumner & Pierce County
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2038 Peak Hour Demand Hydraulic Analysis

Water Comprehensive Plan
City of Sumner
November 2017

Figure **7-6**

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Sumner Water Service Area

2038MDD

<all other values>

Design Flow

- 0 gpm
- 500 gpm
- 1000 gpm
- 1500 gpm
- 2000 gpm
- 2500 gpm
- 3000 gpm
- 3500 gpm
- 4000 gpm
- 4500 gpm
- 5000 gpm

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N

2038 Maximum Day Demand Available Fire Flow Contours

Figure **7-7**

Water Comprehensive Plan
City of Sumner
November 2017

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7.6 Additional Modeling Scenarios

7.6.1 Town Center

The City is rezoning an area around Traffic Avenue and Maple Street known as the Town Center Area. The plan could potentially add an additional housing capacity of 2,000 units. Growth projections were established in the Comprehensive Plan and the Town Center Plan. Additional model runs were performed with demands from this potential redevelopment and results are summarized in Appendix I. A separate analysis for the redevelopment of the Red Apple Market site within this area was also performed and included in Appendix I.

7.6.2 No Central Well

A separate hydraulic analysis was conducted for years 2028 and 2038 with the Central Well supply turned off to model the potential scenarios that either the City's largest source is out of service, or the full combined water right for the Central, South and West Wells is not obtained by these years. Both PHD and MDD plus fire flow scenarios were modeled under this condition. The West Well and Elhi Springs were closed, while all other sources remained open. Though system sources of supply would become deficient under this supply scenario, no additional distribution system deficiencies were created under the different future year system demand scenarios. PHD system pressures and fire flow availability for this scenario are provided as Figure 7-8 through Figure 7-11.

7.6.3 No South Well

An additional hydraulic analysis was conducted for years 2028 and 2038 with the South Well supply turned off and the Central Well operating at full expanded capacity of 2,100 gpm. This scenario assumes the full water withdrawal authorization is in place, where the combined allowed withdrawal from the South, Central, and West Wells is 2,250 gpm. Both PHD and MDD plus fire flow projected demands were modeled under this condition with the West Well and Elhi Springs sources also closed. No additional distribution system deficiencies were created under this scenario. PHD system pressures and fire flow availability are provided as Figure 7-12 through Figure 7-15.

7.7 Summary

Overall, the water distribution system performs very well under existing and the proposed 2028 and 2038 conditions. There are a few locations in the existing system that cannot meet the fire flow requirements, in addition to the fire flow supply deficiency identified in the 171st Avenue Court area. Most of these deficiencies are minor and are either being actively addressed by City capital projects in progress or will be resolved by implementing other CIP recommendations. CIP projects to replace, upsize or loop existing infrastructure are identified in Chapter 8.

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Legend

Junction

PRESSURE

- less than 30.00 psi
- 30.00 ~ 40.00 psi
- greater than 40.00 psi
- Sumner Water Service Area

Pipe

VELOCITY

- 0.00 fps
- 0.00 ~ 8.00 fps
- greater than 8.00 fps

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N

2028 PHD: No Central Well Hydraulic Analysis

Water Comprehensive Plan
City of Sumner
November 2017

Figure **7-8**

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Legend

Sumner Water Service Area

2028MDD_NOCW

<all other values>

Design Flow

- 0 gpm
- 500 gpm
- 1000 gpm
- 1500 gpm
- 2000 gpm
- 2500 gpm
- 3000 gpm
- 3500 gpm
- 4000 gpm
- 4500 gpm
- 5000 gpm

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2028 MDD: No Central Well Available Fire Flow Contours

Water Comprehensive Plan
City of Sumner
November 2017

Figure **7-9**

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Legend

Junction

PRESSURE

- less than 30.00 psi
- 30.00 ~ 40.00 psi
- greater than 40.00 psi
- Sumner Water Service Area

Pipe

VELOCITY

- 0.00 fps
- 0.00 ~ 8.00 fps
- greater than 8.00 fps

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CITY OF SUMNER WASHINGTON

2038 PHD: No Central Well Hydraulic Analysis

Water Comprehensive Plan
City of Sumner
November 2017

Figure
7-10

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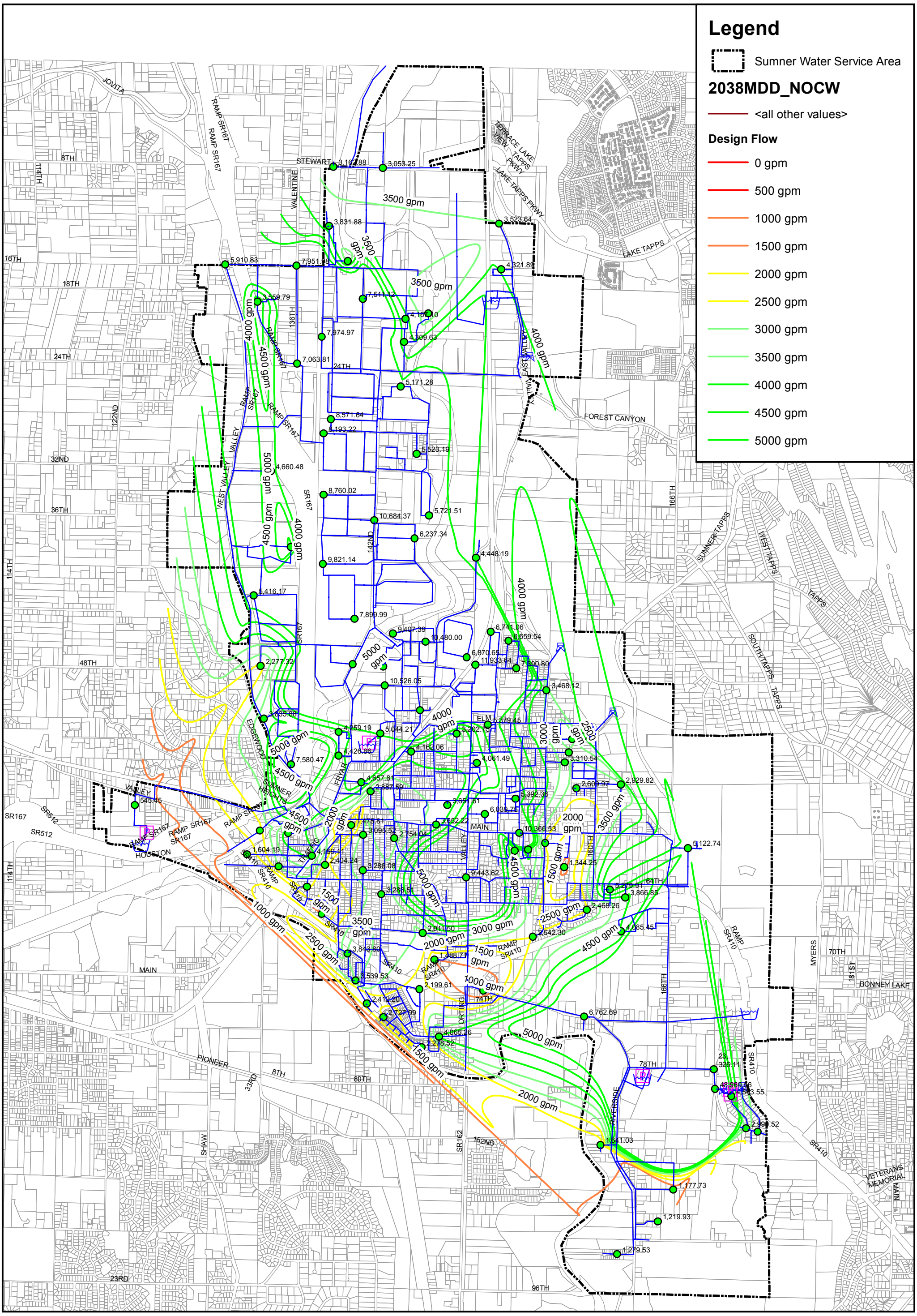

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N

2038 MDD: No Central Well Available Fire Flow Contours

Water Comprehensive Plan
City of Sumner
November 2017

Figure 7-11

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Legend

Junction

PRESSURE

- less than 30.00 psi
- 30.00 ~ 40.00 psi
- greater than 40.00 psi
- Sumner Water Service Area

Pipe

VELOCITY

- 0.00 fps
- 0.00 ~ 8.00 fps
- greater than 8.00 fps

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0 1,000 2,000 Feet

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CITY OF SUMNER WASHINGTON

2028 PHD: No South Well Hydraulic Analysis
Water Comprehensive Plan
City of Sumner
November 2017

Figure
7-12

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Sumner Water Service Area

2028_NOSW

<all other values>

Design Flow

- 0 gpm
- 500 gpm
- 1000 gpm
- 1500 gpm
- 2000 gpm
- 2500 gpm
- 3000 gpm
- 3500 gpm
- 4000 gpm
- 4500 gpm
- 5000 gpm

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2028 MDD: No South Well Available Fire Flow Contours

Figure **7-13**

Water Comprehensive Plan
City of Sumner
November 2017

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Junction

PRESSURE

- less than 30.00 psi
- 30.00 ~ 40.00 psi
- greater than 40.00 psi
- Sumner Water Service Area

Pipe

VELOCITY

- 0.00 fps
- 0.00 ~ 8.00 fps
- greater than 8.00 fps

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2038 PHD: No South Well Hydraulic Analysis

Water Comprehensive Plan
City of Sumner
November 2017

Figure **7-14**

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Sumner Water Service Area

2038MDD_NOSW

<all other values>

Design Flow

- 0 gpm
- 500 gpm
- 1000 gpm
- 1500 gpm
- 2000 gpm
- 2500 gpm
- 3000 gpm
- 3500 gpm
- 4000 gpm
- 4500 gpm
- 5000 gpm

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GIS Base: City of Sumner & Pierce County
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2038 MDD: No South Well Available Fire Flow Contours

Figure **7-15**

Water Comprehensive Plan
City of Sumner
November 2017

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Chapter 8 Capital Improvement Plan

8.1 Introduction

The Capital Improvement Plan (CIP) has been developed to plan for system-wide improvements. These projects have been selected to not only meet the anticipated needs of a growing system, but also to improve the infrastructure of the existing system. The locations of the projects are illustrated on Figure 8-1**Error! Reference source not found.** (located at the end of this chapter) summarizes the recommended CIP projects based on the type of project, the project cost, and the proposed implementation/construction schedule. Detailed project cost estimates for select capital improvements are included in Appendix I; some projects and costs were derived exclusively by the City and are more simply stated and relayed within this chapter. Cost estimates are prepared for each project in 2018 dollars and at the expected time of completion. The improvements are classified in the following manner:

- Distribution System (D Improvements).
- Source Improvements (S Improvements).
- Storage Improvements (ST Improvements).
- Operations and Maintenance Improvements (O&M Improvements).

8.2 Completed or In-Progress Improvements

The City has completed several projects from the 2009 CIP Schedule, summarized as follows:

- D2 – Rainier Street Replacement: Replaced approximately 370 linear feet of existing 2-inch diameter galvanized pipe on Rainier Street with 6-inch diameter ductile iron pipe.
- D4 – Thompson Street and Silver Street Loop: Replaced 2-inch galvanized water piping on Meade Avenue, Chervenka Avenue, and Boyd Avenue with 6-inch ductile iron. Pipe within Silver Street between Sumner Avenue and Boyd Avenue was also replaced.
- D5 – West Valley Highway: Installed approximately 510 linear feet of 12-inch diameter ductile iron pipe to loop the dead-end water mains on West Valley Highway.
- D11 – 8th Street East: Installed approximately 1,500 linear feet of 12-inch diameter ductile iron pipe from the intersection of 8th Street East and 142nd Avenue East towards East Valley Highway.
- S3, S7, S8 – Central Well: Successfully drilled a well into the deep aquifer hydrogeologic unit, constructed and commissioned production and treatment facilities to a capacity of 1,050 gpm, continued pursuit of modifying existing water rights to allow use of the new well, and pursuit of additional water rights for the well from the Cascade Water Alliance (water rights efforts are not yet finalized).
- ST2, ST3 – Reservoir Mixing and Seismic Retrofitting: These programs are ongoing, but seismic retrofitting and a water quality mixing system installation has been completed at the Sumner Springs Reservoir.
- O&M1 through O&M5 – Replacement and Upgrade Programs: These programs are ongoing, but the City has substantially completed service meter and hydrant replacement, source meter calibration, and telemetry upgrade projects. Additionally, the WUE program has recently been updated with actions to achieve the 10 percent DSL standard.

8.3 Distribution System Improvements

8.3.1 Deficiencies

The City plans to continue to expand the water system as development occurs. The City also has existing pipes that need replacement due to age, disrepair, or lack of capacity.

8.3.2 Needs

Growth in the northern portions of the City requires installation of additional water lines. Most of these lines will be installed at the developer's expense. Although most new water lines will be installed at the expense of either development or surrounding properties, existing lines within the city will be replaced as needed.

Many of the City's existing lines are made of asbestos concrete (AC) and have reached the end of their design life. These water lines are proposed to be replaced as significant repairs are made, leaks are found on a segment, in coordination with street improvements, or as needed due to inadequate sizing.

8.3.3 Proposed Distribution System Improvements

Project D1 – 8th Street East and East Valley Highway Loop

This project consists of installing approximately 1,100 linear feet of 12-inch diameter water main from the existing 12-inch diameter water main on 8th Street East to the existing 8-inch diameter water main extending north from 148th Avenue E and approximately 1,900 linear feet of 12-inch diameter ductile iron pipe from the termination of the existing 8-inch diameter main south paralleling BNSF right-of-way and then east to connect to the existing 12-inch diameter main on East Valley Highway. Completion of this project will complete a potable water infrastructure loop to the northeast of the White River to address currently deficient residual pressures during industrial fire flows in this area. Project costs included in Table 8-1 were developed and provided by the City.

Project D2 – Riverside Drive and 151st Avenue

Project D2 includes replacement of existing 4-inch diameter steel water mains along Riverside Drive and 151st Avenue East to facilitate better fire suppression flow in the area. This project will include installation of approximately 1,100 linear feet of 8-inch diameter water main and other associated improvements including two connections to nearby 12-inch diameter water main. This project will address currently deficient residual pressures and pipeline velocities during residential fire flows in the area. Project costs included in Table 8-1 were developed and provided by the City.

Project D3 – Autoclave Meters and Vault

Project D3 funds the installation of service meters to a commercial/industrial property at the southern portion of the water utility service area.

The proposed distribution main projects have been prioritized by anticipated growth and needs and are included in **Error! Reference source not found.**located at the end of this chapter. Project costs included in Table 8-1 were developed and provided by the City.

Project D4 – Viewpoint Tank to 171st Avenue Court East

Project D4 includes installation of approximately 1,950 linear feet of new 8-inch diameter ductile iron transmission main from the Sumner Viewpoint pressure zone along SR 410 to 171st Avenue Court East. This project would also include installation of a new PRV on the proposed transmission main to provide adequate delivered fire flow capacity to the Valley Crest Maintenance Association's system serving the residences on 171st Avenue Court.

An alternative project to address this deficiency would involve replacement of approximately 3,950 linear feet of existing 6-inch diameter asbestos concrete pipe along 75th Street East from Riverside Drive East to the existing Elhi Springs tank with new 12-inch diameter ductile iron water main. This project would also include upgrades to the existing Elhi Springs tank and treatment system to meet disinfection requirements before reaching the first customer. The opinion of probable project cost (OPPC) for this alternative is approximately $520,000 more expensive. It is not identified as the preferred solution to address this deficiency. Project costs included in Table 8-1 were developed and provided by the City.

Project D5 – Water Main Replacement Program

Project D6 does not consist of any one specific water main replacement or upgrade, but instead anticipates that existing aging water mains not identified in this CIP will be replaced in the future as part of street improvement projects, or as needed due to deterioration, failure or other emergency condition. This program includes all existing asbestos concrete and small steel pipes in the City's water system. A biennial allocation of $1,000,000 is included for utility planning and budgeting purposes. Project costs included in Table 8-1 were developed and provided by the City.

8.4 Distribution System Extensions

8.4.1 System Extensions

The City plans to continue to expand the water system to service areas not adequately served by the distribution system as currently constructed.

8.4.2 Proposed Distribution System Extensions

Project D7 – Extend from 149th Avenue to East Valley Highway

Project D7 consists of installing approximately 1,000 linear feet of 12-inch diameter ductile iron water main from the 12-inch diameter water main constructed in 149th Avenue East as part of the Mastro Development to the proposed 16-inch water main on East Valley Highway. This project will entail the installation of an encased pipeline beneath BNSF railroad tracks. The 12-inch water main constructed as part of the Mastro Development Park and completion of this project by the City will loop the system. Project costs included in Table 8-1 were developed and provided by the City.

Project D8 – East Valley Highway from Salmon Creek to CTI

Project D8 consists of installing approximately 5,280 linear feet of 16-inch ductile iron water main from the existing 16-inch water main on East Valley at the Salmon Creek Bridge to the southern limit of City Transfer Incorporated (CTI) property. Completion of this project will enable the City to provide service to parcels east of the BNSF and will improve flow to the northern portions of the City. Project costs included in Table 8-1 were developed and provided by the City.

8.5 Distribution System Improvements Constructed with City Projects

8.5.1 City Projects

As significant City projects are constructed, the opportunity exists to repair, replace, or expand water service in conjunction with the project in order to realize efficiencies. The following projects have been identified as having the possibility to have a water main component within the next 20 years.

8.5.2 City Projects with Water Utility Components

Project C1 – Bridge Street Bridge Replacement

Replacement of the water main on the Bridge Street Bridge in conjunction with the replacement of the existing bridge structure. Project costs included in Table 8-1 were developed and provided by the City.

Project C2 – Stewart Road Bridge Replacement

Replacement of existing water main on the Stewart Road Bridge in conjunction with the replacement of the existing bridge structure. Project costs included in Table 8-1 were developed and provided by the City.

Project C3 – Lower White River Restoration Project

Construction of this project is anticipated to serve as out of kind mitigation for the City's water right application. The larger project will require the relocation of the 12-inch diameter water main within the 24th Street right-of way beneath the White River. The reconstructed water main will be directionally drilled beneath the White River. Project costs included in Table 8-1 were developed and provided by the City.

Project C4 – 64th & Sumner Tapps Highway

Replacement of water mains in the vicinity of the intersection of 64th and Sumner-Lake Tapps Highway to be done in conjunction with the reconfiguration of this intersection. Project costs included in Table 8-1 were developed and provided by the City.

Project C5 – Operations Facility

The City anticipates constructing an operations facility to better accommodate City crews, equipment, and material storage. The water utility is anticipated to fund $1,750,000 or 1/3 of this facility. Project costs included in Table 8-1 were developed and provided by the City.

8.6 Source Improvements

8.6.1 Deficiencies

The proposed source and storage improvement projects address the reliability of the City's sources and storage facilities. The projects also address source and storage site improvements as summarized in Table 5-18 in Chapter 5.

8.6.2 Needs

The current operational source capacity under Scenario A is insufficient to meet the projected maximum day demands through the 20-year planning period as well as the criteria for source reliability as summarized in Chapter 5. The combination of alternative existing source improvements will be required to reliably meet future water demands for the City. Each of the sources will be evaluated for applicable health standards, quantity of available water, reliability, costs, benefits, environmental effects, flexibility for changes, implementation, life expectancy, and risks.

8.6.3 Proposed Source Improvements

Project S1 – Additional Water Rights Acquisition

The City of Sumner's existing source water rights capacity is sufficient to meet the projected MDD through 2038. The City has filed application G2-30534 to increase the approved combined withdrawal rate from the West, South, and Central Wells from 1,250 gpm to 2,250 gpm. Pending approval of this application by 2024, the City will have sufficient production capacity to meet the source reliability criteria summarized in Tables 5-2 through 5-7 in Chapter 5. This project includes coordination and assistance with City attorneys required during the application review and approval process. Project costs included in Table 8-1 were developed and provided by the City.

Project S2 – Central Well Treatment Capacity Expansion

The City plans to double the production capacity of the Central Well from 1,050 gpm to 2,100 gpm by expanding the existing treatment facilities at the Well site and upgrading well pumping capacity. This project is pending the acquisition of the additional water rights from application G2-30534, as detailed in Project S1.

Project S3 – South Well Improvements

The South Well has an instantaneous water right of 1,000 gpm. The City currently operates the well at a maximum capacity of 700 gpm to minimize the impacts of sand intrusion. Current deficiencies at the well include deteriorated structural, mechanical, electrical and chemical system condition, rigid piping connection between wellhouse and meter vault, lack of operational capacity flexibility to maximize water rights, and insufficient pipe manifolding to promote accurate meter readings. A new well house and metering vault, with upgraded mechanical and electrical systems to provide production capacity flexibility, is included with these improvements. The South Well could be evaluated for the ability to increase capacity to the full water right. If the well capacity was increased, approximately 230 linear feet of 36-inch-diameter pipe would need to be installed out of the south well to allow adequate disinfection before the first customer while maintaining a maximum free chlorine residual of 0.45 mg/L. A new well house and metering vault will also be constructed to address the deteriorated systems and operational flexibility, but tentatively not include enhanced capacity, as described in Table 5-18.

Project S4 – Dieringer Well Improvements

Project S4 involves improvements to the Dieringer Well facility to address current condition deficiencies as detailed in Table 5-16, including installation of a ball check valve on the treatment supply, modifications to the existing well building, and electrical system upgrades.

Project S5 – West Well Improvements

This project involves improvements to the West Well facility to address current condition deficiencies detailed in Table 5-16, including flushing and water quality testing and replacement of aging and deteriorating pipe and fittings in the well building. These improvements will provide the City with a more reliable seasonal source of supply for designated demand purposes.

Project S6 – Sumner Springs Improvements

This project includes installation of a new vent on the bypass discharge pipeline from the weir vault at Sumner Springs and installation of a chain-link fence around the perimeter of the complex. The new vent will eliminate the potential for creating a vacuum from the hydraulic jump when excess water is bypassing the metering vault. The fence will provide added security to the facility.

Project S7 – County Springs Improvements

This project includes installation of a permanent onsite generator at the County Springs treatment building and subsequent electrical improvements. This project will also include replacement of the existing building gutters that are aging.

8.7 Storage Improvements

8.7.1 Deficiencies and Needs

The City of Sumner has adequate storage capacity projected through 2038. Storage improvement projects detailed herein are not related to storage capacity, but address tank site and functionality improvements.

8.7.2 Proposed Storage Improvements

Project ST1 – Earthquake Control Valves and Foundation Improvements

The existing reservoirs may be subject to draining in the event of a large earthquake in the valley floor. This project is for the installation of a seismically actuated control valve at each of the South Tank and the Viewpoint Tank. The valve installations are scheduled to be completed in different planning years. Additionally, improvements to the foundation of the South Tank are included in this project. Foundation improvements will include strapping the existing steel tank to a new, reinforced concrete foundation. Reservoir recoating is also required as part of the foundation improvements.

Project ST2 – Viewpoint BPS Improvements

This project includes improvements to the Viewpoint BPS located on the South Tank site, including purchase of a spare booster pump, onsite backup generator, replacement of the existing automatic transfer switch (ATS), and upgrading the pump control panel to allow for installation of variable frequency drives (VFDs) for the pump motors. The cost for the VFDs are included in this project.

Project ST3 – North Tank Improvements

The City plans to retrofit the North Tank with a reservoir mixer. A PAX mixing system is recommended to mix the North Tank to eliminate stratification and short circuiting and help promote better quality water within the system. This project also includes replacement of the interior tank ladder, installation of an emergency generator onsite, and recalibration of the existing Cla-Val control valve on the tank supply pipe.

Project ST4 – Viewpoint Tank Detention Pond

Project ST3 includes construction of a detention pond at the daylight location of the Viewpoint Tank drain in order to provide erosion and sedimentation control in the event the tank must be drained. This project will likely involve modifications to the existing tank drain to be routed to the new detention pond.

Project ST5 – Springs Tank Improvements

Project ST3 includes the interior and exterior recoating of the Sumner Springs and County Springs reservoirs. Project costs included in Table 8-1 were developed and provided by the City.

8.8 Operations and Maintenance Improvements

8.8.1 Deficiencies

Although the City continues to operate and maintain the system, additional projects have been identified to increase the operational effectiveness of the system. The Water Use Efficiency Program also implements requirements for additional operations and maintenance projects.

8.8.2 Needs

In addition to anticipated expansion, the City's water system will continue to age and need continued maintenance and upkeep. The O&M improvements are intended to provide additional system reliability and provide a more efficient method to either reduce system costs or increase revenues through accurate meters.

8.8.3 Proposed Operation and Maintenance Projects

Project O&M1 – Hydrant and Isolation Valve Upgrades – 20 Years

Some of the City's existing fire hydrants are near the end of their useful life or are no longer compatible with City and fire district standards. The City plans to allocate a number of these hydrants for replacement per year. Valves identified as inoperable or damaged during exercising will be scheduled for replacement. Project costs included in Table 8-1 were developed and provided by the City.

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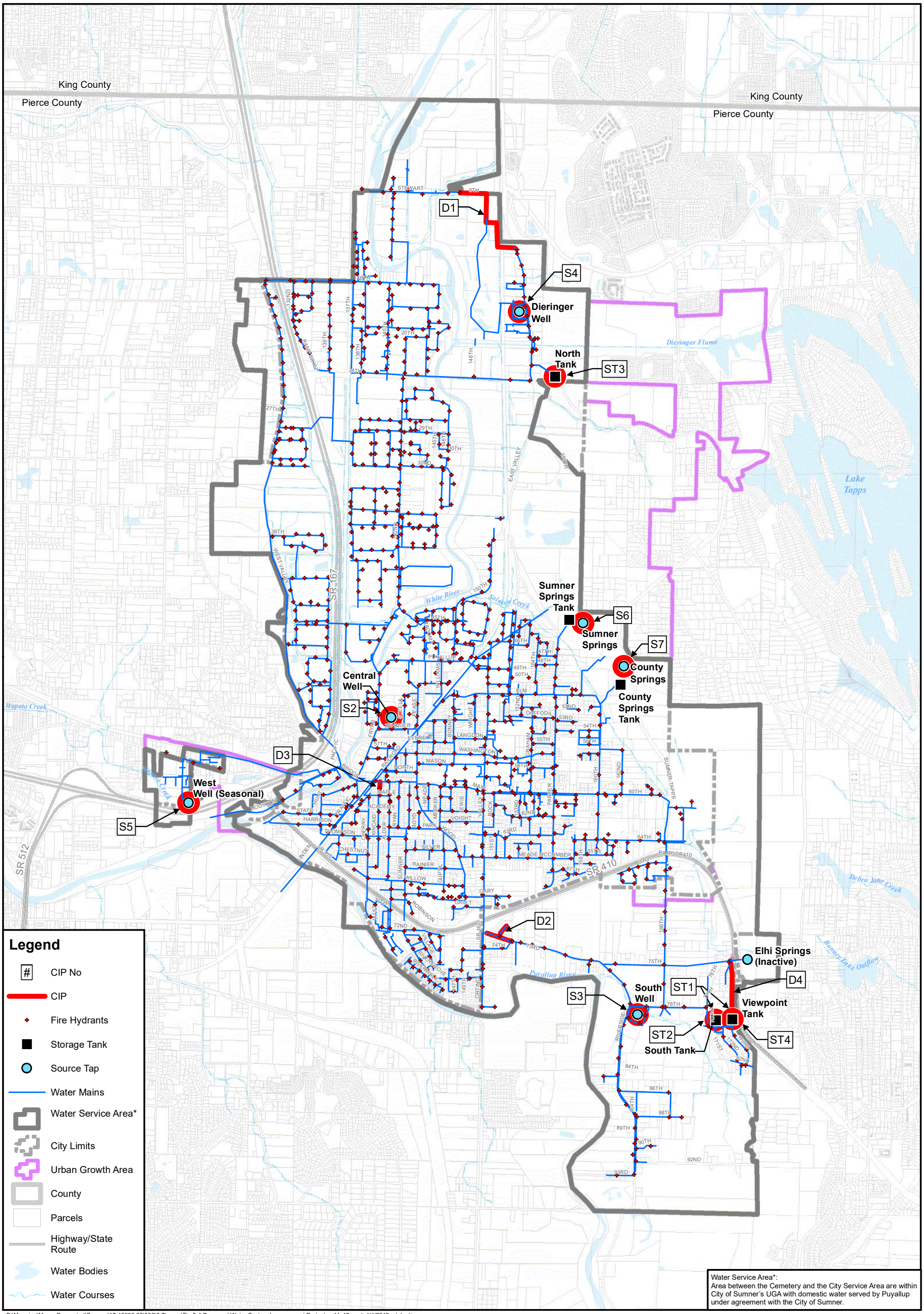
Table 8-1
Capital Improvement Plan Schedule [(1)]

Project Number - Description	Total Cost	Year of Completion											
		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029-2038
Distribution System Improvements													
D1 - 8th Street East and East Valley Highway Loop	**$600,000**		$600,000										
D2 - Riverside Drive and 151st Avenue	**$680,000**	$60,000	$620,000										
D3 – Autoclave Meters and Vault	**$100,000**		$100,000										
D4 - Viewpoint Tank to 171st Avenue Court East	**$1,040,000**							$150,000		$890,000			
D5 - Water Main Replacement Program	**$10,000,000**		$250,000	$750,000	$250,000	$750,000	$250,000	$750,000	$250,000	$750,000	$250,000	$750,000	$5,000,000
Subtotal	**$12,420,000**	**$60,000**	**$1,570,000**	**$750,000**	**$250,000**	**$750,000**	**$250,000**	**$900,000**	**$250,000**	**$1,640,000**	**$250,000**	**$750,000**	**$5,000,000**
Distribution System Extensions													
D7 – Extend from 149th Avenue to East Valley Highway	**$1,024,240**										$102,424	$409,696	$512,120
D8 – East Valley Highway from Salmon Creek to CTI	**$3,100,000**						1,550,000	1,550,000					
Subtotal	**$4,124,240**	**$0**	**$0**	**$0**	**$0**	**$0**	**$1,550,000**	**$1,550,000**	**$0**	**$0**	**$102,424**	**$409,696**	**$512,120**
Water Utility Construction with City Projects													
C1 – Bridge Street Bridge	**$256,780**	$206,780	$50,000										
C2 – Stewart Road Bridge	**$435,000**							$435,000					
C3 – Lower White River Restoration Project	**$550,000**		$125,000	$425,000									
C4 – 64th & Sumner Tapps Highway Intersection (Design Only)	**$50,000**		$50,000										
C5 – Operations Facility	**$1,750,000**		$500,000	$250,000	$250,000	$250,000	$250,000	$250,000					
Subtotal	**$3,041,780**	**$206,780**	**$725,000**	**$675,000**	**$250,000**	**$250,000**	**$250,000**	**$685,000**	**$0**	**$0**	**$0**	**$0**	**$0**
Source Improvements													
S1 - Additional Water Rights Acquisition	**$4,845,500**	$41,000	$200,000	$200,000	$744,000	$3,660,500							
S2 - Central Well Treatment Capacity Expansion	**$2,630,000**												$2,630,000
S3 - South Well Improvements	**$770,000**				$770,000								
S4 - Dieringer Well Improvements	**$100,000**												$100,000
S5 - West Well Improvements	**$16,000**									$16,000			
S6 - Sumner Springs Improvements	**$63,000**									$63,000			
S7 - County Springs Improvements	**$500,000**												$500,000
Subtotal	**$8,924,500**	**$41,000**	**$200,000**	**$200,000**	**$1,514,000**	**$3,660,500**	**$0**	**$0**	**$0**	**$79,000**	**$0**	**$0**	**$3,230,000**

Table 8-1
Capital Improvement Plan Schedule [(1)]

Project Number - Description	Total Cost	Year of Completion											
		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029-2038
Storage Improvements													
ST1 - Earthquake Control Valves and Foundation Improvements	**$2,400,000**		$270,000	$2,130,000									
ST2 - Viewpoint BPS Improvements	**$200,000**			$200,000									
ST3 - North Tank Improvements	**$400,000**						$400,000						
ST4 - Viewpoint Tank Detention Pond	**$550,000**									$550,000			
ST5 – Springs Tank Improvements	**$340,000**				$340,000								
Subtotal	**$3,890,000**	**$0**	**$270,000**	**$2,330,000**	**$340,000**	**$0**	**$400,000**	**$0**	**$0**	**$550,000**	**$0**	**$0**	$0
Operations and Maintenance Improvements													
O&M1 - Hydrant and Isolation Valve Upgrades - 20 Years	**$480,000**		$80,000	$80,000	$80,000	$80,000	$80,000	$80,000					
Subtotal	**$480,000**	$0	**$80,000**	**$80,000**	**$80,000**	**$80,000**	**$80,000**	**$80,000**	**$0**	**$0**	**$0**	**$0**	$0
TOTAL WATER FUND	**$32,880,520**	**$307,780**	**$3,060,000**	**$4,035,000**	**$2,434,000**	**$4,740,500**	**$2,530,000**	**$3,215,000**	**$250,000**	**$2,269,000**	**$352,424**	**$1,159,696**	**$8,742,120**

Notes:
1) All OPCCs shown are in 2018 dollars. ENR CCI 10939.



Legend

- CIP No
- CIP
- Fire Hydrants
- Storage Tank
- Source Tap
- Water Mains
- Water Service Area*
- City Limits
- Urban Growth Area
- County
- Parcels
- Highway/State Route
- Water Bodies
- Water Courses

P:\Mapping\Maps_Generated\Sumner\17-10500.00\002\2.7\maps\Fig 8-1 Proposed Water System Improvement Projects - 11x17.mxd 4/4/2018 ctolentino

BHC CONSULTANTS

GIS Data: City of Sumner & Pierce County
Data sources supplied may not reflect current or actual conditions. This map is a geographic representation based on information available. It does not represent survey data. No warranty is made concerning the accuracy, currency, or completeness of data depicted on this map.
BHC Consultants LLC., assumes no responsibility for the validity of any information presented herein, nor any responsibility for the use or misuse of the data.

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CITY OF SUMNER WASHINGTON

Proposed Water System Improvement Projects

Water Comprehensive Plan
City of Sumner

Figure **8-1**

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Chapter 9 Financial Analysis

9.1 Introduction

The financial analysis assesses the ability of the City's water utility to remain financially viable during the planning period, considering its recent historical performance as well as anticipated future needs. It also evaluates the affordability of the City's water rates, both at existing levels and with any rate increases needed to support the planned capital program.

9.2 Financial History

The City historically used the accrual basis of accounting for its enterprise funds, but switched to cash-based accounting beginning in 2009. Recognizing the difficulty in arriving at a true "apples-to-apples" comparison of numbers derived using different accounting methods, Table 9-1 summarizes the water utility's financial performance for the 2009 – 2017 time period (as documented in the "Statement of Fund Resources and Uses Arising from Cash Transactions" included in the City's Annual Financial Reports). Key findings from this analysis include:

- Charges for service increased by approximately 180% since 2009, primarily because the City increased water rates by 111% during that period. Other contributing factors include growth in the City's customer base.
- Operating expenses have increased by 82% since 2009. Excluding the cost of general government services, direct O&M costs have increased by 67% since 2009.
- The O&M coverage ratio, which summarizes the ability of operating revenues to cover operating expenses, varied between 1.32 and 2.53 during the 2009 – 2017 period. Values of 1.00 or greater indicate that the utility's operating revenues have been adequate to cover its cash operating expenses.
- During the 2009 – 2017 period, operating income was sufficient to cover operating expenditures but fell short of meeting the utility's total needs in 2009 – 2011. In these years, the net decreases in cash and investments were attributable to capital spending and the expenditures included as "other financing uses" in the City's financial reporting.
- The debt service coverage ratio, which provides a basis for evaluating financial performance in the context of the City's debt covenants, varied between 2.23 and 10.30 during the 2009 – 2017 period. The City's bond covenants require that the utilities' net revenues (combined for the water, sewer, and stormwater utilities) are equal to at least 1.25 times annual revenue bond debt service as a legal minimum. It is worth noting that the bond rating agencies have more recently expressed a preference for utilities to maintain coverage ratios at or above 2.00 times annual revenue bond debt service.

Table 9-1
Historical Financial Performance (2009 – 2017)

Beginning Cash and Investments ($000s)	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Reserved	$ -	$ -	$ 155	$ 6	$ -	$ -	($13)	$ -	$ 20
Unreserved	3,064	2,824	2,157	1,164	1,471	4,271	5,665	6,921	8,796
Total	**$3,064**	**$2,824**	**$2,313**	**$1,170**	**$1,471**	**$4,271**	**$5,652**	**$6,921**	**$8,816**
Revenues ($000s)									
Licenses and Permits	$ 12	$ 11	$ 14	$ 27	$ 38	$ 59	$ 92	$ 37	$ 27
Intergovernmental Revenues	4	0	0	276	530	2	0	837	0
Charges for Goods and Services	1,651	1,628	1,800	2,046	2,588	2,989	3,380	3,565	4,629
Miscellaneous Revenues	254	182	149	159	184	167	196	139	134
Total Revenues	**$1,921**	**$1,821**	**$1,964**	**$2,508**	**$3,339**	**$3,216**	**$3,668**	**$4,578**	**$4,790**
Expenditures ($000s)									
General Government	$ -	$ 15	$ -	$ -	$ 198	$ 215	$ 213	$ 231	$ 206
Utilities	1,384	1,370	1,223	1,304	1,304	1,408	1,468	1,578	2,315
Total Expenditures	**$1,384**	**$1,385**	**$1,223**	**$1,304**	**$1,502**	**$1,623**	**$1,682**	**$1,809**	**$2,521**
Operating Excess (Deficiency)	**$ 537**	**$ 436**	**$ 741**	**$1,204**	**$1,837**	**$1,594**	**$1,986**	**$2,769**	**$2,269**
Other Increases In Fund Resources ($000s)									
Other Financing Sources	$ 151	$ 103	$ 9	$1,213	$1,634	$ 568	$ 790	$ -	$ 4
Debt Proceeds		-	-	-	-	-	580	4,607	576
Custodial Activities		-	-	-	-	-	-	2	2
Total Other Increases In Fund Resources	**$ 151**	**$ 103**	**$ 9**	**$1,213**	**$1,634**	**$ 568**	**$1,370**	**$4,609**	**$582**
Other Decreases In Fund Resources ($000s)									
Other Financing Uses	$ 664	$ 405	$1,008	$ -	$ -	$ -	$1,000	$ -	$ -
Capital Expenditures	163	556	241	329	235	248	271	5,157	258
Debt Service	101	91	74	1,937	424	520	803	312	535
Custodial Activities	-	-	-	-	-	-	-	-	14
Transfers Out	-	-	-	120	12	13	13	14	13
Total Other Decreases In Fund Resources	**$ 928**	**$1,052**	**$1,324**	**$2,386**	**$ 671**	**$ 781**	**$2,086**	**$5,483**	**$821**
Prior Period Adjustments	**-**	**-**	**-**	**268**	**-**	**-**	**-**	**-**	**-**
Increase (Decrease) In Cash & Investments	**($240)**	**($512)**	**($574)**	**$300**	**$2,800**	**$1,381**	**$1,270**	**$1,895**	**$2,031**
Ending Cash and Investments ($000s)									
Reserved	$ -	$ -	$ 102	$ -	$ -	($13)	$ -	$ 20	$ 336
Unreserved	2,824	2,312	1,636	1,471	4,271	5,665	6,921	8,796	10,510
Total	**$2,824**	**$2,312**	**$1,738**	**$1,471**	**$4,271**	**$5,652**	**$6,921**	**$8,816**	**$10,847**
O&M Coverage Ratio	*1.39*	*1.32*	*1.61*	*1.92*	*2.22*	*1.98*	*2.18*	*2.53*	*1.90*
Debt Service Coverage Ratio	*2.57*	*2.23*	*2.97*	*5.79*	*10.30*	*6.91*	*9.53*	*8.69*	*8.37*

9.3 Capital Funding Resources

The City may fund the water CIP from a variety of sources, described in further detail below.

9.3.1 Government Programs

Historically, federal and state grant programs were available to local utilities for capital funding assistance. However, these assistance programs have been mostly eliminated, substantially reduced in scope and amount, or replaced by loan programs. Remaining miscellaneous grant programs are generally lightly funded and heavily subscribed. Nonetheless, the benefit of low-interest loans makes the effort of applying worthwhile. Funding programs for which the City might be eligible include:

- **Public Works Trust Fund (PWTF) Loan Program:** Cities, counties, special purpose districts, public utility districts, and quasi-municipal governments are eligible to receive loans from the PWTF. Eligible projects include repair, replacement, and construction of infrastructure for domestic water, sanitary wastewater, stormwater, solid waste, road, and bridge projects that improve public health and safety, respond to environmental issues, promote economic development, or upgrade system performance. Unfortunately, the Public Works Board is not currently accepting funding requests, but funding is expected to become available in the 2019-2021 Biennium.

  Information regarding the application process, status of the funding process, as well as rates and terms are posted on the PWTF website. Further detail is available at http://www.commerce.wa.gov/building-infrastructure/pwb-home-page/.

- **Drinking Water State Revolving Fund (DWSRF) Loan Program:** DWSRF funding historically targets protection of public health, compliance with drinking water regulations, and assistance for small and disadvantaged communities. Terms are up to 20 years, and in some cases, provide partial loan forgiveness. Applicants need an approved water system plan (or plan amendment) containing the DWSRF project prior to submitting an application. All public water systems that receive a DWSRF loan must undergo an environmental review, a cultural review, and an Investment-Grade Efficiency Audit (IGEA). The IGEA is an effort to apply energy efficiency to water systems and may be financed as part of the DWSRF loan. The current 2018 application cycle ran from October 1st through November 30th. Applications for 2019 are currently unavailable until the Capital Budget is passed.

  More information regarding the Drinking Water State Revolving Fund Loan Program can be found at http://www.doh.wa.gov, which leads you to the Washington State Department of Health's website.

- **Community Economic Revitalization Board (CERB) Grant and Loan Program:** CERB, a division of the Washington State Department of Commerce, was formed in 1982 to respond to local economic development issues in Washington communities. It provides funding to local governments and federally recognized tribes for public infrastructure (including water, stormwater, wastewater, public buildings, telecommunications, and port facilities) that supports private business growth. CERB generally provides funding through three programs:

  - Committed Private Partner Program: This program provides loans and grants to public agencies that have a commitment from the private sector to help fund the construction of infrastructure necessary for private business expansion. Applicants must submit evidence that private development is contingent on

CERB funding, and demonstrate that no other timely source of funding is available at terms comparable to what CERB offers.

- Planning Grant Program: This program provides limited funding for studies to evaluate high-priority economic development projects that target job growth and long-term economic prosperity.
- Prospective Development Program: This program loans and grants to rural communities for public infrastructure that facilitates future business development. It requires an economic feasibility study demonstrating that the project will lead to a significant level of job creation and private capital investment. Applicants must also show a need for CERB assistance and evidence that no other timely source of funding is available at terms comparable to what CERB offers.

The Board meets every two months to consider projects and make funding decisions. More information can be found at http://www.commerce.wa.gov/building-infrastructure/community-economic-revitalization-board.

- **Infrastructure Assistance Coordinating Council:** The Infrastructure Assistance Coordinating Council (Council) is comprised of state and local agencies whose function is to provide funding for infrastructure repair and development. Its purpose is to assist local governments in coordinating funding efforts for infrastructure improvements, and can be a valuable resource to provide awareness of any new funding opportunities. More information can be found at http://www.infrafunding.wa.gov/.

9.3.2 Bond Financing

Two types of municipal bonds are potentially available to fund the utility's capital needs:

- ***General Obligation Bonds*** – General Obligation (G.O.) bonds are bonds secured by the full faith and credit of the issuing agency, committing all available tax and revenue resources to debt repayment. With this high level of commitment, G.O. bonds have relatively low interest rates and few financial restrictions. However, the authority to issue G.O. bonds is restricted in terms of the amount and use of the funds, as defined by Washington constitution and statute. Specifically, the amount of debt that can be issued is linked to assessed valuation. RCW 39.36.020 states:

  "(ii) Counties, cities, and towns are limited to an indebtedness amount not exceeding one and one-half percent of the value of the taxable property in such counties, cities, or towns without the assent of three-fifths of the voters therein voting at an election held for that purpose.

  (b) In cases requiring such assent counties, cities, towns, and public hospital districts are limited to a total indebtedness of two and one-half percent of the value of the taxable property therein."

  While bonding capacity can limit availability of G.O. bonds for utility purposes, these can sometimes play a valuable role in project financing. A rate savings may be realized through two avenues: the lower interest rate and related bond costs, and the extension of repayment obligations to all tax-paying properties (not just developed properties) through the authorization of an ad valorem property tax levy.

- ***Revenue Bonds*** – Revenue bonds are commonly used to fund utility capital improvements. The debt is secured by the revenues of the issuing utility. With this limited commitment, revenue bonds typically bear higher interest rates than G.O. bonds and also require security conditions related to the maintenance of dedicated reserves (a

bond reserve) and financial performance standards (bond debt service coverage). The City agrees to satisfy these requirements by resolution as a condition of bond sale.

Revenue bonds can be issued in Washington without a public vote. There is no bonding limit, except perhaps the practical limit of the utility's ability to generate sufficient revenue to repay the debt and provide coverage. In some cases, poor credit might inhibit a utility's ability to issue bonds.

9.3.3 Cash Resources

Resources appropriate for funding capital needs include accumulated cash in the Water Fund, rate revenues designated for capital spending purposes, and capital-related charges such as the System Development Charge (SDC). The SDC is a one-time charge imposed on new customers as a condition of connecting to the water system. Authorized by Section 35.92.025 of the Revised Code of Washington (RCW), the SDC is based on a proportionate share of the cost of system infrastructure and is separate from meter installation fees and similar charges for the labor and materials used to make a physical connection. The SDC has two primary purposes: (1) promoting equity between new and existing customers and (2) providing a source of revenue to fund capital projects and related debt service. The City's current water SDC of $5,791 per equivalent residential unit (ERU) went into effect with the passing of City Ordinance No. 2660 in October 2018.

9.4 Financial Plan

The primary goal of the financial plan is to develop a multi-year rate strategy that generates enough revenue to cover the utility's operating and capital costs. It defines the amount of revenue needed to meet the utility's financial obligations, including:

- Operations and maintenance costs
- Administrative and overhead costs
- Policy-based needs (e.g. reserve funding)
- Capital costs
- Existing/new debt service obligations

As an enterprise fund, the water utility is responsible for covering all of its costs. The financial plan assesses the utility's ability to fund its capital improvement plan (CIP) and other financial needs while maintaining affordable water rates. It is a comprehensive analysis that includes both operating and capital elements:

- The capital funding plan establishes a strategy for funding the utility's total capital expenditures during the planning period. Resources available for this purpose include rate revenues, existing reserves, SDCs, debt financing, and any other identified special resources (e.g. grants, developer contributions, etc.). The capital funding plan impacts the overall financial plan through the use of debt financing (resulting in annual debt service) and any assumed use of rate revenue for capital funding.
- The revenue requirement analysis determines the amount of revenue necessary to fund the ongoing operation, maintenance, and administration of the water system on an annual basis. It includes a framework of fiscal policies intended to promote long-term financial stability and viability.

9.4.1 Financial Policies

The ensuing discussion summarizes the key financial policies used in this analysis.

- **Utility Reserves:** Reserves are a key component of any utility financial strategy, as they provide the flexibility to manage variations in costs and revenues that could otherwise have an adverse impact on ratepayers. For the purpose of this analysis, the utility's resources are separated into the following funds:
    - Operating Fund: This fund provides an unrestricted fund balance to accommodate short-term cycles of cash flow. It intends to address variations in revenues and expenses, whether anticipated (e.g. billing/receipt cycles, payroll cycles) or unanticipated (e.g. weather, economic conditions). This analysis assumes that the water utility maintains a minimum balance of 60 days (16.4%) of budgeted operating expenses, which is currently about $368,000.
    - Capital Fund: This fund provides a source of cash for unanticipated capital expenditures such as emergency asset replacements or capital project overruns. In the context of the financial analysis, it also enforces an appropriate segregation of resources restricted (or otherwise designated) for capital purposes. This analysis assumes a minimum balance equal to 1% of the cost of system assets, which is estimated to be approximately $264,000.
    - Bond Reserve: Provided for by the City's revenue bond covenants, the primary purpose of this reserve is to protect bondholders against default risk. The bond covenants for the water utility's outstanding revenue-bond debt establish a reserve requirement as the least of (a) maximum annual debt service, (b) 125% of average annual debt service, or (c) 10% of the original amount issued.
- **System Reinvestment:** System reinvestment funding promotes system integrity through reinvestment in the system. The specific benchmark used to set system reinvestment funding targets is a matter of policy that must balance various objectives including managing rate impacts, keeping long-term costs down, and promoting "generational equity" (i.e. not excessively burdening current customers with paying for facilities that will serve a larger group of customers in the future). This analysis assumes annual funding equal to annual depreciation expense, approximately $738,000 in 2018.
- **Capital Funding/Use of Debt:** The City has recently used a "pay-as-you-go" approach to fund the capital needs of its water utility, opting to limit its capital spending to the amount of cash resources available rather than issuing debt. Longer-term, it would be prudent for the City to consider policies related to the use of debt and the management of debt levels as part of a broader utility financial policy structure. For example, it may make sense to issue debt to fund capital projects that are both costly and urgent.
- **Financial Performance Standards:** The revenue requirement analysis uses a pair of sufficiency tests to establish the amount of revenue needed to meet the water utility's financial obligations on an annual basis:
    - Cash Flow Test: This test defines "sufficient revenue" as the amount needed to fund all known cash requirements including O&M expenses, debt service payments, system reinvestment funding (and other rate-funded capital outlays), and reserve funding.
    - Coverage Test: Intended to ensure compliance with the City's bond covenants, satisfying this test requires that "net revenue" (generally defined as system revenue net of operating expenses) is greater than or equal to 1.25 times annual

parity debt service. It is worth noting that the City's bond covenants establish a legal minimum level of coverage – targeting a higher coverage standard for rate-setting can help the City achieve a better credit rating and provide lower interest rates for future debt issues.

In determining the annual revenue requirement, both the cash and coverage sufficiency test must be met and the test with the greatest deficiency drives the level of needed rate increase in any given year.

9.4.2 Capital Funding Plan

The water utility's 2018 – 2028 CIP consists of $26.5 million in projects (in 2018 dollars). Beginning with the projected 2020 expenditures, the financial plan escalates these costs by 3.0% annually to the year of planned spending for financing projections. Table 9-2 provides the 10-year forecast of capital project expenditures.

As noted in the discussion of capital funding policies, this analysis assumes a "pay-as-you-go" approach to fund the projected expenditures. Key sources of revenue for this strategy include existing reserve balances, investment interest, system reinvestment, and SDCs. Table 9-3 provides a 10-year forecast of activity in the Capital Fund.

Table 9-2
Detailed Capital Plan ($000s)

Description	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	Total
Other Improvements - Operations Facility (1/3)	$ -	$ 500	$ 250	$ 250	$ 250	$ 250	$ 250	$ -	$ -	$ -	$ -	$1,750
Machinery & Equipment	-	83	33	-	-	-	-	-	-	-	-	116
Comprehensive Plan	-	-	-	-	-	75	-	-	-	-	200	275
S10 - Springs Source Improvements	22	-	-	-	-	-	-	-	-	-	-	22
Autoclave Meters and Vault	-	100	-	-	-	-	-	-	-	-	-	100
D1 - 8th Street East and East Valley Highway Loop	-	600	-	-	-	-	-	-	-	-	-	600
D2 - Riverside Drive and 151st Avenue	60	620	-	-	-	-	-	-	-	-	-	680
D4 - Thompson Street and Silver Street Loop	1,600	-	-	-	-	-	-	-	-	-	-	1,600
D5 - Viewpoint Tank to 171st Avenue Court East	-	-	-	-	-	-	150	-	890	-	-	1,040
D7 -Main Leak Repair at BNSF Crossing	20	215	-	-	-	-	-	-	-	-	-	235
D8 - Water Main Replacement Program	-	250	750	250	750	250	750	250	750	250	750	5,000
D9 - Extend from 149th Avenue to East Valley Highway	-	-	-	-	-	-	-	-	-	102	410	512
D10 - East Valley Highway from Salmon Creek to CTI	-	-	-	-	-	1,550	1,550	-	-	-	-	3,100
C1 - Bridge Street Bridge	207	50	-	-	-	-	-	-	-	-	-	257
C3 - Stewart Road Bridge	-	-	-	-	-	-	435	-	-	-	-	435
C5 - White River Restoration Main Lower	-	125	425	-	-	-	-	-	-	-	-	550
C6 - Golf Course Step	129	-	-	-	-	-	-	-	-	-	-	129
64th & Sumner Tapps Hwy - Design	-	50	-	-	-	-	-	-	-	-	-	50
S1 - Additional Water Rights Acquisition	41	200	200	744	3,661	-	-	-	-	-	-	4,846
S3 - South Well Improvements	-	-	-	770	-	-	-	-	-	-	-	770
S5 - West Well Improvements	-	-	-	-	-	-	-	-	16	-	-	16
S6 - Sumner Springs Improvements	-	-	-	-	-	-	-	-	63	-	-	63
Telemetry Improvements in '17-18	20	-	-	-	-	-	-	-	-	-	-	20
ST1 - Earthquake Control Valves and Foundation Improvements	-	270	2,130	-	-	-	-	-	-	-	-	2,400
ST2 - Viewpoint BPS Improvements	-	-	200	-	-	-	-	-	-	-	-	200
ST3 - North Tank Improvements	-	-	-	-	-	400	-	-	-	-	-	400
ST4 - Viewpoint Tank Detention Pond	-	-	-	-	-	-	-	-	550	-	-	550
ST5 - Springs Tank Improvements	-	-	-	340	-	-	-	-	-	-	-	340
O&M1 - Hydrant and Isolation Valve Upgrades - 20 Years	-	80	80	80	80	80	80	-	-	-	-	480
Total (2018 Dollars)	2,099	3,060	4,035	2,434	4,741	2,605	3,215	250	2,269	352	1,360	26,400
Plus: Adjustment for Inflation	0	0	115	133	416	296	472	49	522	94	414	2,510
Total Projected Expenditures	**$2,099**	**$3,060**	**$4,150**	**$2,567**	**$5,157**	**$2,901**	**$3,687**	**$299**	**$2,791**	**$446**	**$1,774**	**$28,930**

Table 9-3
Forecast of Capital Fund Activity ($000s)

Description	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	Total
Beginning Capital Fund Balance	$5,011	$4,720	$4,119	$2,852	$2,392	$510	$557	$710	$2,076	$1,027	$2,350	$5,011
Plus: Interest Earnings	8	7	6	5	4	1	1	1	3	2	4	42
Plus: System Reinvestment	738	804	889	940	1,043	1,101	1,175	1,181	1,237	1,245	1,331	11,684
Plus: Operating Fund Transfers	750	750	750	750	1,800	1,400	2,200	-	-	-	-	8,400
Plus: Grants/Donations/CIAC	-	600	875	-	-	-	-	-	-	-	-	1,475
Plus: System Development Charges	312	381	396	412	428	446	464	483	502	522	544	4,890
Less: Capital Expenditures	(2,099)	(3,143)	(4,183)	(2,567)	(5,157)	(2,901)	(3,687)	(299)	(2,791)	(446)	(1,774)	(29,046)
Ending Capital Fund Balance	$4,720	$4,119	$2,852	$2,392	$510	$557	$710	$2,076	$1,027	$2,350	$2,455	$2,455
Minimum Capital Fund Balance	*$264*	*$352*	*$394*	*$419*	*$471*	*$500*	*$537*	*$540*	*$568*	*$572*	*$590*	

9.4.3 Revenue Requirement

The revenue requirement analysis evaluates the City's ability to cover its projected costs under its currently adopted rates. In the event of any projected deficiencies, this analysis will serve as the basis for a strategy of recommended rate adjustments. The financial forecast is developed from the 2019 – 2020 Budget, as well as other key factors and assumptions to develop a complete portrayal of the City's annual financial obligations. The following is a list of the key assumptions used to develop the financial forecast:

- **Revenue:** The City has two general revenue sources: rate revenue from the City's retail customers and miscellaneous (non-rate) revenue. This analysis assumes that the City's retail rate revenue grows with the water customer base at a rate of 1.0% per year.
- **SDCs:** Consistent with City policy, this analysis adjusts the current SDC ($5,791 per ERU) for inflation each year beginning in 2020. Based on assumed growth of 65 – 72 ERUs per year, SDC revenue collections are projected to vary from $312,000 – $544,000 per year.
- **Expenses:** O&M expense projections are based on the 2019 – 2020 Budget, and are forecasted to increase with inflation at the following rates:
    - General Cost Inflation: 2.2 – 3.0% per year
    - Salary/Wage Cost Inflation: 4.0% per year
    - Medical Insurance Cost Inflation: 7.0 – 10.0% per year
    - Retirement Inflation: 1.1 – 9.0% per year
    - Dental Cost Inflation: 4.0 – 9.0% per year
    - Vision Cost Inflation: 2.0 – 9.0% per year

  Taxes are calculated based on forecasted revenues and prevailing tax rates.
- **Debt Service:** The water utility is currently responsible for paying for a portion of the annual payment due on two revenue bonds, one drinking water state revolving fund loan and one limited-tax general obligation (LTGO) bond. Based on the repayment schedules established for these debt obligations, the water utility's total annual payment is projected to be $523,000 in 2018 – this payment is expected to decrease to $373,000 in 2019 as the City pays off its outstanding revenue bond debt and accumulated interest on the revolving fund loan. As previously noted, this analysis does not assume any new debt issuance during the 10-year planning horizon.

Table 9-4 summarizes the forecast of annual revenue requirements.

Table 9-4
10-Year Financial Forecast ($000s)

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Revenue											
Rate Revenue at 2018 Rates	$3,813	$3,848	$3,883	$3,919	$3,955	$3,991	$4,027	$4,064	$4,102	$4,139	$4,177
Other Operating Revenue	$534	$408	$408	$407	$407	$405	$404	$401	$402	$403	$404
Total Revenues	$4,347	$4,256	$4,291	$4,326	$4,362	$4,396	$4,431	$4,465	$4,504	$4,542	$4,581
Expenses											
Cash Operating Expenses	$2,238	$2,784	$2,668	$2,757	$2,719	$2,814	$2,920	$3,032	$3,151	$3,275	$3,406
Debt Service	$385	$373	$365	$361	$357	$352	$348	$343	$339	$335	$330
System Reinvestment	$738	$804	$889	$940	$1,043	$1,101	$1,175	$1,181	$1,236	$1,245	$1,331
Total Expenses	$3,361	$3,961	$3,922	$4,058	$4,119	$4,267	$4,443	$4,556	$4,726	$4,855	$5,067
Net Operating Cash Flow	$986	$295	$369	$268	$243	$129	($12)	($91)	($222)	($313)	($486)
Annual Rate Adjustment		***2.50%***	***2.50%***	***2.50%***	***2.50%***	***2.50%***	***2.50%***	***2.50%***	***2.50%***	***2.50%***	***2.50%***
After Rate Increases											
Rate Revenues	$3,813	$3,944	$4,080	$4,220	$4,365	$4,515	$4,671	$4,831	$4,997	$5,169	$5,347
Net Operating Cash Flow	$986	$381	$544	$536	$609	$596	$561	$591	$575	$604	$555
Debt Service Coverage	16.70	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
Ending Operating Fund Balance	$5,735	$5,366	$5,159	$4,946	$3,754	$2,950	$1,311	$1,902	$2,477	$3,081	$3,635
Minimum Operating Fund Balance	*$368*	*$458*	*$439*	*$453*	*$447*	*$463*	*$480*	*$499*	*$518*	*$538*	*$560*

The financial forecast indicates the need for rate increases of 2.5% per year to keep up with rising operating costs. Table 9-4 shows the level of system reinvestment increasing as the water utility's existing debt obligations drop off.

9.4.4 Current and Projected Rates

The City's current rate structure consists of a fixed monthly charge based on meter size and a variable monthly charge per hundred cubic feet (ccf) for all use. Table 9-5 shows the existing and forecasted rate schedule, applying the rate adjustments shown in Table 9-4 above.

Affordability

The Washington State Department of Health and the Public Works Board have historically used an affordability index to prioritize low-cost loan awards. The typical threshold looks at whether a system's rates exceed 2.0% of median household income (MHI) for the demographic area – if monthly bills are below this level, they are generally considered affordable.

U.S. Census Bureau data indicates that the MHI in the City of Sumner was $56,991 in 2017 dollars. Table 9-6 summarizes the affordability evaluation of the City's rates.

Table 9-6 suggests that the City's rates are and will remain within the affordability threshold of 2.0% of median household income throughout the 2018 – 2028 time period. This finding does not appear to depend on any assumed increases to MHI.

9.5 Conclusion

The proposed financial plan contemplates inflationary rate increases to keep revenues in line with expenses while providing for ongoing infrastructure investment needs. Even with the projected water rate increases, the City will be able to maintain affordable rates during the ten-year planning period.

The City should regularly review and update the key underlying assumptions that compose the multi-year financial plan to ensure that the water utility's revenues remain adequate to meet its financial obligations.

Table 9-5
Water Rate Forecast

	Existing	*Proposed*		*Projected*							
	2018	**2019**	**2020**	***2021***	***2022***	***2023***	***2024***	***2025***	***2026***	***2027***	***2028***
Annual Rate Increase		**2.50%**	**2.50%**	**2.50%**	**2.50%**	**2.50%**	**2.50%**	**2.50%**	**2.50%**	**2.50%**	**2.50%**
Volumetric Charge											
1-10 ccf	$2.02	$2.07	$2.12	$2.17	$2.22	$2.28	$2.34	$2.40	$2.46	$2.52	$2.58
10-20 ccf	$2.64	$2.71	$2.78	$2.85	$2.92	$2.99	$3.06	$3.14	$3.22	$3.30	$3.38
20 ccf and above	$3.16	$3.24	$3.32	$3.40	$3.49	$3.58	$3.67	$3.76	$3.85	$3.95	$4.05
Fixed Charge											
3/4"	$23.01	$23.59	$24.18	$24.78	$25.40	$26.04	$26.69	$27.36	$28.04	$28.74	$29.46
1"	$55.73	$57.12	$58.55	$60.01	$61.51	$63.05	$64.63	$66.25	$67.91	$69.61	$71.35
1 1/2"	$111.43	$114.22	$117.08	$120.01	$123.01	$126.09	$129.24	$132.47	$135.78	$139.17	$142.65
2"	$178.24	$182.70	$187.27	$191.95	$196.75	$201.67	$206.71	$211.88	$217.18	$222.61	$228.18
3"	$334.26	$342.62	$351.19	$359.97	$368.96	$378.19	$387.64	$397.33	$407.26	$417.44	$427.88
4"	$557.05	$570.98	$585.25	$599.88	$614.88	$630.25	$646.01	$662.16	$678.71	$695.68	$713.07
6"	$1,142.82	$1,171.39	$1,200.67	$1,230.69	$1,261.46	$1,293.00	$1,325.33	$1,358.46	$1,392.42	$1,427.23	$1,462.91
8"	$1,782.60	$1,827.17	$1,872.85	$1,919.67	$1,967.66	$2,016.85	$2,067.27	$2,118.95	$2,171.92	$2,226.22	$2,281.88

Table 9-6
Affordability Evaluation

	Existing	*Proposed*		*Projected*							
	2018	**2019**	**2020**	***2021***	***2022***	***2023***	***2024***	***2025***	***2026***	***2027***	***2028***
Single-Family Bill @ 7 ccf/Mo.	$37.15	$38.08	$39.02	$39.97	$40.94	$42.00	$43.07	$44.16	$45.26	$46.38	$47.52
Median Household Income	$56,991	$56,991	$56,991	$56,991	$56,991	$56,991	$56,991	$56,991	$56,991	$56,991	$56,991
Annual SF Bill as % of MHI	0.8%	0.8%	0.8%	0.8%	0.9%	0.9%	0.9%	0.9%	1.0%	1.0%	1.0%

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Chapter 10 Operations Program

This chapter serves to satisfy the requirements for an operations program as outlined within the DOH Planning Handbook for Water System Plans and current Washington State Drinking Water Regulations (WAC 246-290-415). The City of Sumner has an established operations program, with staff and equipment to adequately manage and control the program, protect water quality, and provide a safe and reliable supply of drinking water to all customers.

This operations program is divided into five sections:

- Organization Structure/Responsibilities.
- System Operation and Control.
- Water Quality Monitoring.
- Emergency Response Program.
- Cross Connection Control Program.

Current practices for each component of the operations program are discussed and recommended improvements are identified.

10.1 Organization Structure/Responsibilities

The City of Sumner Water Utility is overseen by the Public Works Department, which is operated and maintained by the Public Works Director.

The City has a Development Services Department overseen by a Development Services Director. The Development Services division is tasked with ensuring private development within the City adheres to the standards established by the Sewer Utility.

Figure 10-1 on the following page shows the City of Sumner departmental organization chart. The Public Works staff includes many personnel that are flexible and can work on water system projects when the need arises due to emergencies, new construction, or increased monitoring. Currently, only the Water Field Supervisor and one operator have sole responsibilities to the water utility. Table 10-1 shows key responsibilities of water system staff.

Table 10-1
Key Responsibilities of Water System Staff

Responsibility	Staff Member
Normal Day-to-Day Operations	Operations Superintendent, Water Field Supervisor
Preventive Maintenance	Water Field Supervisor, Utility Operators
Field Engineering	Public Works Director, City Engineer
Water Quality Monitoring	Water Field Supervisor, Utility Operators
Troubleshooting	Water Field Supervisor, Utility Operators
Emergency Response	Public Works Director, Operations Superintendent, Water Field Supervisor, Utility Operators
Cross Connection Control	City Engineer, Engineering Technicians, Operations Superintendent, Development Services Specialist

Table 10-1 Key Responsibilities of Water System Staff	
Responsibility	**Staff Member**
Capital Improvement Development	Public Works Director, City Engineer
New Construction	City Engineer
System Upgrade and Expansion	City Engineer, Engineering Technicians
Budget Formulation	Public Works Director, approved by Mayor and City Council
Response to Complaints	Water Field Supervisor, Utility Operators
Public/Press Contact	Public Works Director

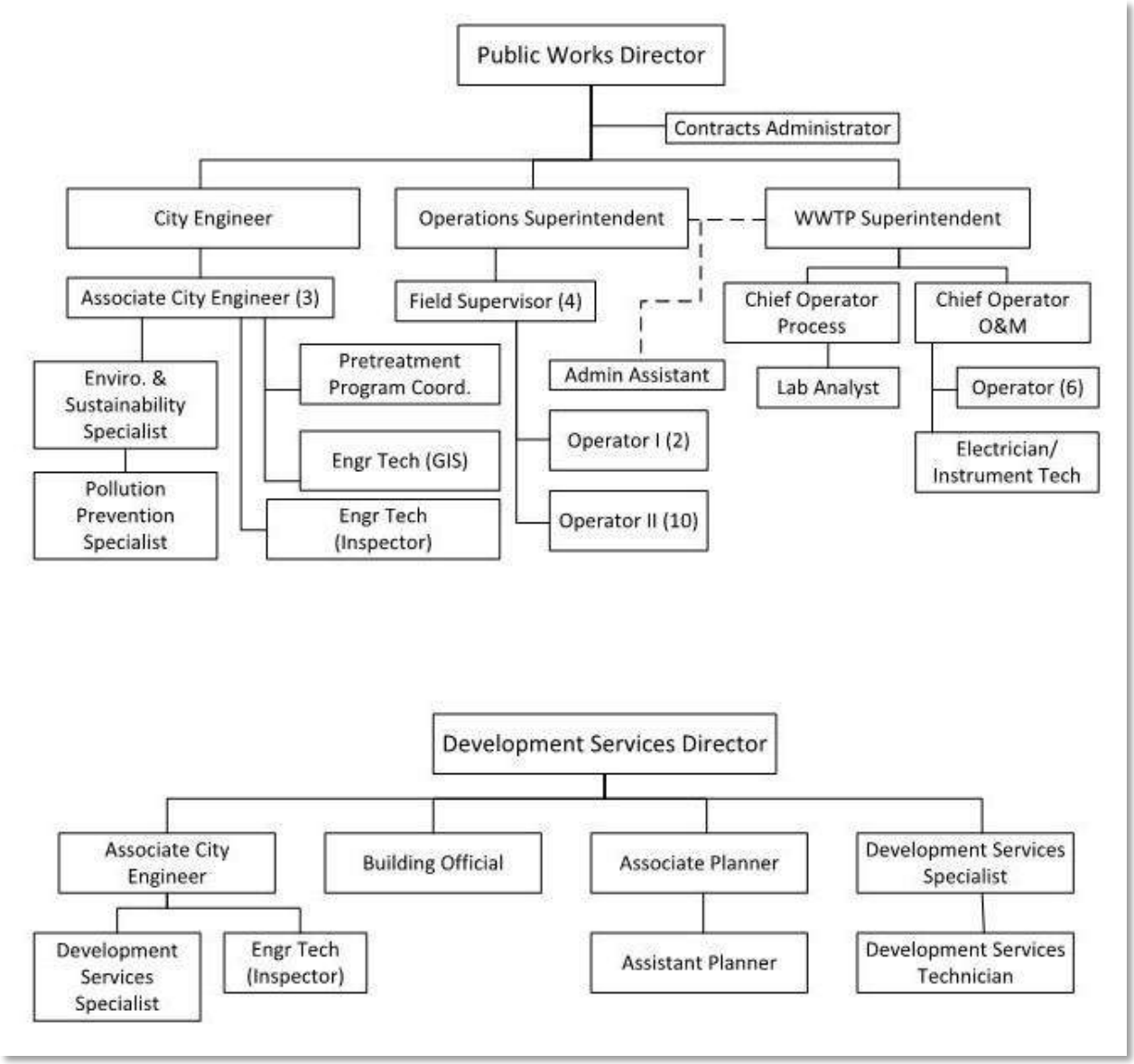

Figure 10-1 City of Sumner Organizational Chart

10.1.1 Certification

Chapters 70.119 RCW and 246-292 WAC require all community water systems to have a certified operator. In addition, specialty certification is required for treatment plant operation, backflow device testing, and asbestos cement pipe handling. Table 10-2 shows current certifications of the Public Works staff, including specialty licenses.

Table 10-2
Staff Certification List – Street/Utilities Division (2008)

Employee	Title	WDM	CCCS	BAT	AC Pipe Handling WISHA	WWC	Confined Space	CPR/FA
Pat Clerget	Operations Superintendent	IV	X		X	III	X	X
Gary Lucas	Field Supervisor	II			X	II	X	X
Daron Uphaus	Field Supervisor	II	X		X	III	X	X
John Wells	Field Supervisor	II			X	II	X	X
Darren Young	Operator II	II			X	II	X	X
Shaun Piper	Water Field Supervisor	II	X	X	X	II	X	X
Kevin Babic	Water Operator II	II	X	X	X	II	X	X
Dave Ellingson	Operator II	I			X	I	X	X
Lester Reedy	Operator II	II			X	I	X	X
Casey Stumpt	Operator II	I			X	I	X	X
Beau LaCrosse	Operator II	I			X	I	X	X
Monty Brant	Operator II	II		X	X	II	X	X
Darren Hoberg	Operator II	I			X	I	X	X
Josh Keller	Operator I				X			X
Kevin Mast	Operator I							
Hunter Hoberg	Operator I							
Brian Akana	Operator I							X

Table 10-2
Staff Certification List – Street/Utilities Division (2008) (Continued)

Employee	Pest/Herb License	Flagging Cert	Traffic Signal Tech IMSA	Sign Marking IMSA	CDL A License	ICS 100/700	WTPO	CESCL
Pat Clerget		X			X	X		X
Gary Lucas		X	II	I	X	X		
Daron Uphaus		X			X	X		X
John Wells	X	X			X	X		X
Darren Young		X			X	X		X
Shaun Piper		X			X	X	I	
Kevin Babic		X	I	II	X	X	I	
Dave Ellingson		X	I	I	X	X		
Lester Reedy		X		II	X	X		
Casey Stumpt		X			X	X		X
Beau LaCrosse		X			X			X
Monty Brant	X	X			X	X	I	X
Darren Hoberg	X	X			X			
Josh Keller		X				X		
Kevin Mast		X						
Hunter Hoberg								
Brian Akana		X						

Source	License	Agency
WDM I	Water Distribution Manager I	DOH
WDM II	Water Distribution Manager II	DOH
WDM III	Water Distribution Manager III	DOH
WDM IV	Water Distribution Manager IV	DOH
WWC I	Wastewater Collection I	WWCPA
WWC II	Wastewater Collection II	WWCPA
WWC III	Wastewater Collection III	WWCPA
WTPO I	Water Treatment Plant Operator I	DOH
CCCS I	Cross Connection Control Specialist I	DOH

Source	License	Agency
BAT	Backflow Assembly Tester	DOH
CDL "A"	Commercial Driver's License- Endorsement Class A	HLS
ICS	Incident Command System	DOE

DOE – Department of Ecology
DOH – Department of Health
HLS – Homeland Security
IMSA – International Municipal Signal Association
WISHA – Washington Industrial Safety and Health Act
WWCPA – WA Wastewater Collections Personnel Assoc

All operator certifications must be renewed annually. Evidence must be presented to the board that the operator has demonstrated continued professional growth in the field. Accumulation of three college credits or continuing education units every 3 years is considered satisfactory evidence of professional growth (WAC 246-292-095). The City of Sumner fosters professional growth and certification level advances. Staff members are hired in accordance with the City of Sumner Personnel Policies and Procedures Manual kept on file at the Public Works Department.

Water Distribution Manager Certification

Water Distribution Managers (WDMs) are responsible for the administration and operation of the water distribution system. Table 10-3 shows the required certification level for population ranges from WAC 246-292.

Table 10-3
Water Distribution System Certification Requirements

Certification Level	Population	City Status
Group S	Less than 251	–
Group I	251 to 1,500	–
Group II	1,501–15,000	Current through 2038
Group III	15,001–50,000	N/A
Group IV	Greater than 50,000	N/A

The City of Sumner is projected to serve a population of between 11,000 and 14,000 during the 20-year planning horizon of this plan, which requires a Group II certification level of the lead operator. There are one Group IV WDM, eight Group II WDMs, and four Group I WDMs in the City Public Works Department, satisfying current certification requirements.

Water Treatment Plant Operator Certification

Water Treatment Plant Operator (WTPO) certification is based on a total point scale per WAC 246-292-040 as follows:

Classification	Total Points Assigned	Certification Requirement
Group I	Less than 31	WTPO I
Group II	31 to 55	WTPO II
Group III	56 to 75	WTPO III
Group IV	Greater than 75	WTPO IV

Points are accumulated based on level of complexity in the treatment process and source water quality, as determined by the DOH ABC Purification Plant Criteria Worksheet. With the addition of a manganese treatment and removal system associated with the City's new Central Well source, more complexity has been added to the groundwater treatment process than has been practiced at other City well sources in the past. Project documentation associated with construction of the Central Well performed the ABC worksheet calculation and established a point total of 28 for this treatment facility at an ultimate capacity of 2100 gpm (its current

treatment capacity is 1050 gpm). Table 10-4 shows the breakdown of points for Sumner's two primary source facilities (Central Well and Springs), with point totals assessed to reflect anticipated facilities and service area growth through the 20-year planning period of 2038.

Table 10-4
Purification Plant Certification Level

Item	Central Well	Points Assigned	Springs Sources	Points Assigned
System Size				
Maximum Population Served		2		2
Peak Month Production (average day)	Ultimate Capacity = 2100 gpm	3	Largest Source = 799 gpm (Sumner Springs)	1.5
Water Supply Sources				
Type	Groundwater	0	Surface Water	10
Water Quality	Subject to Elevated Taste/Odor	3	Excellent	0
Chemical Treatment/Addition Process				
Chlorine Disinfection	Sodium Hypochlorite	5	Gaseous Chlorine	8
Filtration Process				
Pressure or Greensand Filtration	Tonka System	5	None	0
Taste and Odor Mitigation	GAC Pressure Filtration	3	None	0
Residuals Disposal				
Discharge to Sanitary Sewer	Yes	3	No	0
Facility Characteristics				
SCADA to provide data and moderate process control		4		4
	Total:	**28**		**25.5**
	Certification Level:	**Group I**		**Group I**

This analysis shows the required WTPO certification level for this planning period to be Group I. The City currently has three Group I WTPOs among operations personnel, satisfying certification requirements. Additionally, one of the City's licensed engineers within the Public Works department has a Group II WTPO certification.

Distribution System Specialists

Certification is also available on a voluntary basis to individuals interested in Water Distribution Specialist (WDS) and Cross Connection Control Specialist (CCCS). The WDS classification is recommended for any person engaged in a specialized phase of water works operation such as main repair, meter repair, pump maintenance, service installation, chlorination process operation, and watershed control. The City currently does not have a WDS, but may consider encouraging a staff member to seek certification.

The CCCS classification is required for those involved in the Cross-Connection Control Program. The City currently has four CCCSs (I's) within their operations department, as well as an Associate City Engineer who assists in administering and overseeing the program at City Hall. Three Certified Backflow Assembly Testers (BATs) are on staff within the public works department.

Asbestos Cement Pipe Handing

The Washington Industrial Safety and Health Act (WISHA) requires staff members exposed to asbestos cement (AC) pipe to have certification. A moderate portion of the Sumner transmission system contains AC pipe that must be handled and disposed of in an appropriate manner. Old AC pipe may be left in the trench when future improvements are made if properly backfilled. All personnel in the Public Works Maintenance Department are Certified AC Pipe Handlers.

10.1.2 Operating Permits and Fees

In 1991, the legislature passed a law that requires all Group A water systems to have an operating permit. The purpose of the law is to generate revenue to carry out state and local drinking water programs and to serve as a compliance tool. The operating permit must be renewed annually.

Operating permits are issued in four colors, as defined by WAC 246-294-040:

- *Green* designates substantial compliance with no conditions.
- *Yellow and Blue* designates substantial compliance with conditions.
- *Red* designates substantial noncompliance with conditions.

A permit may be withheld, or lower compliance ranking permit issued, for one or more of the following reasons:

- Failure to have approved construction documents.
- Work stoppage on system improvements.
- Failure to meet pressure requirements.
- Failure to meet water treatment requirements.
- Failure to have a certified operator.
- Failure to meet water quality MCLs.
- Violation of departmental order.
- Noncompliance with Water System Plan provisions.
- Failure to notify public of coliform and turbidity MCL exceedance.

- Noncompliance with coliform and inorganic chemical monitoring.
- Noncompliance with inorganic chemical and volatile organic chemical MCLs.

Due to expiration of the 2009 WSP, Sumner's water utility is currently in a *yellow* condition, but is anticipated to return to *green* with DOH approval of this document.

10.2 System Operation and Control

Non-emergency system operation and control is described in this section. Deficiencies in the current system and recommendations for improvements are given.

10.2.1 Reference Materials

The following reference materials supplement this operations program and are highly recommended for inclusion in the Public Works Department library.

- American Water Works Association. Denver, Colorado. 1980–2017. *Manuals of Water Supply Practices.*
- Pacific Northwest Section, American Water Works Association. Seventh Edition (2012). *Accepted Procedure and Practice in Cross Connection Control Manual.*
- Washington Administrative Codes, Department of Health.
    - WAC 246-290.*Group A Public Water Supplies.*
    - WAC 246-292. *Waterworks Operator Certification.*
    - WAC 246-294. *Drinking Water Operating Permits.*
- APHA - AWWA - WEF 23rd Edition. Washington, D.C., 2017. Standard Methods: For the Examination of Water and Wastewater.
- City of Sumner Public Works Department, Sumner, Washington 2011. *Development Specifications and Standard Details.*
- United States Environmental Protection Agency Second Revision 2010. *Revised Public Notification Handbook 816-R-09-013*.
- Washington State Department of Health Third Edition 2017. Water Use Efficiency Guidebook.
- City of Sumner Public Works Department. Updated continuously. *Water System Maps.*
- American Public Works Association, Washington State Chapter 20016. Standard Specifications for Road, Bridge, and Municipal Construction.

Operations and maintenance manuals for individual system components are kept at the chlorination buildings in the telemetry cabinet for most source facilities. For the Central Well, they are kept in the laboratory room. As-builts and another set of operation and maintenance manuals are kept at the City Shops.

10.2.2 System Overview

Chapter 4 of this WSP discusses and shows existing water system components, including spring collection works, wells, storage tanks, chlorination facilities, booster pump station, transmission and distribution facilities, hydrants, watersheds, and interties. The distribution system is shown in greater detail on the Water System Maps created by the Public Works Department. These maps are updated continuously by the City's GIS/CAD Analyst to illustrate the as-built water system including hydrants, pipe sizes, pipe material, and isolation valves.

The City of Sumner water system is supplied by four springs and four wells. The primary sources of water are Sumner and County Springs. Spring flow is chlorinated prior to entering storage facilities that serve the distribution system.

Central Well, South Well, Dieringer Well, and West Well are typically used only when maintenance and repairs interfere with normal supply from the springs and during peak demand season. As discussed in Chapter 5, due to the combined operational production rate of the Central, South, and West Wells being more than the current allowable instantaneous withdrawal rights shared between them, the South Well is the only groundwater source of the three that is brought on automatically during summer peak demand periods. The South and West Well would need to be turned on manually, and only after the Central Well is offline. Additionally, manual valve adjustment is necessary to allow the West Well, which has water quality concerns, to send produced water to the distribution system (it is currently configured solely to supply the cemetery irrigation system).

Currently, there are five storage tanks maintained in the Sumner water system. Four of the five tanks are at the same hydraulic grade. Sumner Springs and County Springs Tanks are gravity fed by their respective springs. County Springs Tank is used primarily for chlorine contact (0.068 mg). Sumner Springs' tank is used for chlorine contact and storage (1 mg). The North and South Tanks are floating reservoirs used for storage (2 mg each). The North Tank provides fire flow for the north end of the city. The fifth tank, at the Sumner Viewpoint development, is supplied by a booster pump station at the South Tank and has a capacity of 330,000 gallons. This tank operates at a higher hydraulic grade line than the other tanks and serves only the Sumner Viewpoint development.

10.2.3 Spring Collection Works

Routine Operations

Spring taps, collection boxes, plumbing, metering vaults, surface water diversion structures, and other spring collection works are shown in Chapter 4. Sumner and County Springs are gravity fed into metering vaults. From the metering vaults, the water is either diverted to a storage tank or allowed to overflow to Salmon Creek.

Alternate Operating Modes

Peak Use – During peak water use, all water is transferred from the metering vaults to the tanks with no diversion to Salmon Creek.

Source Bypass – Individual spring taps, or the entire Sumner and County Springs collection works, can be bypassed from the system by closing isolation valves and directly spilling to Salmon Creek. Elhi Springs may also be bypassed. Isolation valves are shown on figures included in Chapter 4.

Preventive Maintenance

Item	Frequency
Check Spring Flow	Daily
Check Meter Readings	Daily
Change Strip Charts, Pens	Daily as needed
Inspect Metering Vaults	Weekly
Inspect Spring Taps, Collection Boxes, and Plumbing; Check for Siltation, Surface Water Drainage, Evidence of Vandalism, Leaks, and Surface Films (requires walking along access road)	Biweekly
Exercise Spring Tap Isolation Valves	Biannually
Calibrate Flow Meters	Biannually
Clean Spring Tap Boxes and Repair as Needed	Annually

Evaluation

Any deficiencies in the system should be corrected immediately. Reduced maintenance can cause water quality impairment. Problems should be noted on damage report forms. Valve exercising and maintenance should be recorded on valve report forms or a maintenance schedule database.

10.2.4 Chlorination Facilities

Routine Operations

There are seven chlorination facilities in the system, one each at Sumner Springs, County Springs, Elhi Springs, Central Well, South Well, Dieringer Well, and West Well. A majority of the source chlorination facilities are equipped with dual dosing pumps for redundancy. Where chlorine gas is used for disinfection (Sumner Springs, County Springs, and South Well), chlorination buildings are separated into two rooms. Chlorine cylinders are housed separately from chlorinators and pumps.

Structural and mechanical relationships between the Sumner and County Springs chlorination facilities and spring collection works are shown on figures included in Chapter 4.

Chlorine dose at County and Sumner Springs is based on flow rate telemetry information from the metering vaults. The chlorine gas is metered in proportion to water flow, injected into solution, and fed to the transmission lines feeding the storage tanks. Liquid sodium hypochlorite at West Well, and Dieringer Well is injected directly into the well discharge lines in proportion to flow. Onsite liquid sodium hypochlorite, which is generated at the Central Well facility at a lower strength than that delivered to the other wells, plays a role as an oxidant in the treatment process and is fed both before the greensand/pyrolusite (IMAX) pressure filters that remove manganese and the GAC polishing filters that mitigate taste and odor potential. Dosing concentrations at the injection points are operationally established to facilitate appropriate oxidation of ammonia, as well as maintain adequate disinfectant residual concentrations within the distribution system (after the chlorine demand required by the treatment process is consumed).

Chlorine residuals are tested daily and used as a basis for any chlorine dosage adjustment. For all sources excluding Elhi Springs and South well, chlorine residual is typically kept in a range of 0.3 mg/ℓ to 0.45 mg/ℓ. The online chlorinator is rotated annually at each facility. Free chlorine residual concentration required at or before the first customer for each source is listed in Chapter 4, Table 4-4.

Equipment Failure

Since each facility contains redundant chlorination injection equipment, standby equipment is ready to use in case of on line system equipment failure.

Preventive Maintenance

Item	Frequency
Check Cylinder/Drum Depletion, Rotate as Needed	Daily
Inspect Chlorine Leak Detector	Daily
Check Injector Pump Pressure	Daily
Check mg/Dosage versus mg/Residual	Daily
Add Salt to Onsite Generation Tank	Weekly
Check/Clean/Replace Onsite Generation Cells and Other Equipment	Quarterly or as needed
Calibrate Chlorine Scales	Quarterly
Calibrate Residual Analyzers	Quarterly
Check Ultrasonic Flow Meters and Calibrate	Quarterly
Check Telemetry Instrumentation and Lubricate	Quarterly
Check or Test Fire Extinguisher, Shower, Leak Detector and Ventilation Fan	Quarterly
Change Electrolyte	As Needed
Rotate Chlorinators/Drums	Annually
Rebuild Chlorinators, Injectors, Injector Pumps, Alarm Panel, and Other Equipment	Annually or as needed

Evaluation

System performance is checked by comparing residual settings to the residuals maintained as determined by field monitoring.

Any safety deficiencies should be corrected immediately. Inside each gas chlorination building's control room doors are respirators, eye protection, and other personnel protection equipment to be used in case of a chlorine leak. If the alarm goes off, the chlorination building should not be entered until the room is well ventilated. Operators should be trained to handle a chlorine leak emergency. Contingency plans are discussed in the Emergency Response Plan.

10.2.5 Storage Tanks

Routine Operations

There are currently five storage tanks in the Sumner water system with a total storage capacity of 5.07 mg. Sumner and County Springs Tank dimensions and elevations are shown on figures included in Chapter 4.

Sumner Springs Tank (1 mg) is gravity fed by the Sumner Springs metering vault. County Springs Tank is gravity fed by the County Springs metering vault. The primary purpose of the County Springs Tank (68,000 gallons) is to provide chlorine contact. Disinfection performance for both Sumner and County Springs Tanks is discussed in Chapter 6, "Water Quality." During average day demands, Sumner and County Springs tanks are full to their overflow elevations (234 feet).

Normal operations of the South Tank (2 mg) and the North Tank (2 mg) are similar. Both are floating tanks with water levels riding up and down depending on system supply and demand.

The Sumner Viewpoint Tank (0.33 mg) is supplied by a booster pump station at the South Well. It operates at a higher hydraulic grade line than the rest of Sumner's water system. Disinfection at this tank can be accomplished via a chlorination facility built into the pump house.

Alternate Operating Modes

Peak Use

During peak water use, one-third of the storage at South Tank is allowed to deplete before the Central Well pump is automatically turned on. During recent drought conditions, the County Springs Tank was observed to lower more quickly than the Sumner Springs Tank. This may be in part due to the larger, shorter transmission pipe (18-inch diameter) from the County Springs tank versus the smaller, longer transmission pipe from Sumner Springs Tank (14-inch diameter). This condition should be recognized in calculating chlorine contact times.

Tank Cleaning

During periods of low demands, tanks may be drained and cleaned, provided chlorinated water is dechlorinated prior to entering Salmon Creek.

Preventive Maintenance

Item	Frequency
Check Water Level	Hourly
Check Overflow Pipe	Weekly
Check for Leaks	Weekly
Check for Surface Films	Weekly
Check Locks and Fence (South Tank)	Weekly
Check for Vandalism	Weekly
Check Accuracy of Level Gauges	Quarterly
Check Ladders	Quarterly
Check Access Hatches	Quarterly
Check Condition of Exterior and Interior Paint (look for deposits on walls and bottom)	Annually
Check Foundation and Structural Conditions	Annually
Operate all Valves	Annually
Clean Tank	Annually

Evaluation

Changes in water quality found to be attributed to the tank should be addressed immediately. Wall and floor deposits, structural corrosion, and painting should be addressed during the annual tank cleaning and inspection.

10.2.6 Wells

Routine Operations

The City of Sumner operates Central, South Well, Dieringer Well, and West Well. Typically, these wells are turned on only when system demand exceeds the production of the springs and storage tanks are drawn down by one-third. The South Well is automatically turned on by telemetry when tank level drops below predefined elevation. The Dieringer Well is operated based on the level of the North Tank. When the tanks are full or demand has decreased below spring production, the wells are shut off. The Central Well serves as the next standby to be called on when the South Well is off line or provides insufficient capacity during peak periods, and can be put in an automated call on mode if the South Well is anticipated to be off line for an extended period. The West Well is a seasonal source and is operated manually to irrigate the cemetery, or assist in distribution system demand during times of extremely high demand.

Well production is recorded by totalizers. The totalizer reading is relayed via telemetry to the City Shops.

Within the next several years, an expansion of production and treatment capacity at the Central Well facility is anticipated with additional water rights being sought. While operation of the well sources is likely to remain similar, the additional water rights might allow the City the latitude to place the South Well back into an automated call on mode, if preferred due to lower production and treatment costs.

Alternate Operating Modes

Spring Repairs/Shutdown

The South Well and Dieringer Well are automatically controlled to maintain water level(s) in the South Tank and North Tank, respectively. The Central Well would be the first standby groundwater source brought into operation if the South Well needed to be taken off line. The West Well is typically used for cemetery irrigation during the summer, and is not normally discharged to the distribution system unless the emergency is extreme.

Preventive Maintenance

Item	Frequency
Check Pump Equipment and Operation	Daily (when in use)
Check for Unusual Vibration, Noise, Temperature	Daily (when in use)
Record Meter Reading	Daily, Start–Up, and Shut Down (when in use)
Record Hours of Pump Operation	From Start-Up to Shut-Down
Record Suction and Discharge Pressure	Weekly
Inspect Gate, Locks, Doors	Weekly

Item	Frequency
Monitor Activities in Minimum Sanitary Radius (fill out Inspection Report)	Weekly
Backwash IMAX greensand removal filters (automated)	Multiple Weekly
Backwash GAC filters (automated)	Weekly
Check Activities in Wellhead Protection Zone (fill out Inspection Report)	Monthly
Record Well Water Level	Monthly
Grease Motor Bearings	Monthly
Check Oil Level in Motors	Monthly
Calibrate Flow Meter	Quarterly
Check Amperage Draw and Brake Horsepower	Annually
Clean pressure filters, recondition/replace filter media	Annually
Conduct Pump Drawdown Test (Pump until drawdown stabilizes, then record time to static water level recovery. Record water level at intervals during test.)	Annually

Evaluation

All manufacturer-recommended performance criteria should be met, including discharge head, amperage draw, temperature, and motor rpm. Well static and residual water levels should be tracked to determine any changes in aquifer replenishment. Unwarranted activities in the wellhead protection zone should be prohibited.

Any vandalism or equipment malfunction should be repaired as soon as possible, since it is unknown when the well may need to be put in operation. Well evaluation forms should be completed for each inspection, or inspection findings should be catalogued in a well maintenance database.

In case of power failure, all wells should have the ability to run off a portable generator. When well sources are used more often due to increasing demands, a telemetry link should be installed with necessary equipment to read chlorine residual, flow rate, and hours of operation.

10.2.7 Distribution Network

Routine Operations

The distribution network consists of approximately 90 miles of pipe ranging in size from 2 to 18 inches. Pipes vary in age and material. The City Shops are prepared to fix leaks as they occur and remove and repair short lengths of pipe. Dead-end mains are flushed regularly, and an annual main replacement program is in place to replace pipes that are either old or susceptible to failure.

Alternate Operating Modes

System Repairs

Isolation valves are shut to repair portions of the system.

Preventive Maintenance

Item	Frequency
Flush Dead-End Mains	Rotating Annual Schedule
Check Corrosion of Representative Pipes in the System (based on age and material)	Rotating Annual Schedule
Optimize Corrosion Control	As Needed
Conduct Leak Detection Tests	Annually

Evaluation

Results of leak detection tests should be used to assess the integrity of the system and any needed repairs. An accelerated rate of corrosion in pipes can be indicative of corrosive water. Dead-end mains should be flushed on a rotating schedule throughout the year. More isolation valves and looping are needed so disruption of service will be minimized when repairs are made.

10.2.8 Valves

Routine Operations

The system contains hundreds of isolation valves and three air release valves. All valves are assigned a number on the City's water system maps, which are kept on file at the City Shops and Public Works Department. Valve exercising is done on an annual basis and missing, buried, inoperable, or leaking valves are located and repaired or replaced by the City Shops. No maintenance on air-release valves takes place unless there is a problem.

Alternate Operating Modes

System Repairs

Isolation valves are shut when repairs are required on portions of the system.

Preventive Maintenance

Item	Frequency
Visually Inspect Each Valve Box	Rotating Annual Schedule
Clean Valve Box	Rotating Annual Schedule
Raise Valve Box to Grade as Needed	Rotating Annual Schedule
Replace Valve Box Lid as Needed	Rotating Annual Schedule
Operate Valve to Fully Closed and Back to Fully Open	Rotating Annual Schedule
Record Number of Turns to Fully Operate Valve	Rotating Annual Schedule
Record Depth to Valve Nut	Rotating Annual Schedule

Evaluation

The purpose of the inspection is to assure all valves can be operated in an emergency. This includes knowing the location of each valve, depth to nut, and number of turns necessary to fully engage the valve. Valve locations should be identified on the City GIS base maps. The GIS database should include information such as installation date, maintenance schedule, etc.

10.2.9 Meters

Routine Operations

There are two system meters located at the following locations:

- Upgradient of the Sumner Springs Tank.
- Upgradient of the County Springs Tank.

There are seven master meters at the following locations:

- Bottom of hill beneath Sumner Springs Tank.
- Bottom of hill beneath County Springs Tank.
- Within Elhi Springs Control Building after the chlorine contact tanks.
- Central Well.
- South Well.
- Dieringer Well.
- West Well.

Routine operations consist of daily system and master meter readings. An ongoing Individual service meter replacement program is allowing Sumner to take automated readings without visual recording by staff. Service meter readings are made every 2 months.

Alternate Operating Modes

Meters may fall out of calibration. Care should be taken to calibrate and read all meters correctly.

Preventive Maintenance

Item	**Frequency**
Calibrate System and Master Meters	Semiannually
Audit a Representative Sample of Service Meters	Rotating Annual Schedule

Evaluation

Meter function and accuracy is important for tracking system supply and demand. Installation and repair cards should be kept on file for all meters, or a database pertaining to meter repair should be maintained at the City Shops.

10.2.10 Hydrants

Routine Operations

Hydrants are checked for proper operation by the Fire Department, and problems are reported to the Public Works Department. Flow tests are conducted periodically by the Fire Department and kept on file at the Public Works Department. All hydrants are assigned a number on the City's water system maps, which are kept on file at the City Shops and Public Works Department.

Alternate Operating Modes

Fire

A separate hydrant should be opened for each 2,000 gpm required. In several locations, the hydrant spacing is too great for this allowance.

Routine Maintenance

Item	Frequency
Complete Hydrant Flow Test	Rotating Biannual Schedule
Lubricate Hydrant Ports	Biannually
Operate Hydrant Valve and Tee Valve	Biannually
Clear Vegetation Around Hydrants	As Needed
Paint Hydrants (color coding based on available flow)	Rotating 2-Year Schedule
Hydrant Replacement Program	Annually

Evaluation

Hydrants should be accessed easily and opened quickly to respond to fires. Hydrant maintenance records and flow test results should be compiled on a maintenance database maintained at the City Shops. Sumner is in the midst of an ongoing hydrant replacement program to replace older style hydrants that have inadequate port configurations for use by both the fire department and the City.

10.2.11 Watershed

Routine Operations

Northern and southern watersheds encompassing Sumner, County, and Elhi Springs are described in Chapter 5, "Water Resources." Routine operations involve inspecting gates and fences for signs of illegal entry or vandalism. However, not all activities in the watershed can be monitored since fencing is only complete along Sumner-Tapps Highway (Sumner and County Springs) and SR 410 (Elhi Springs) and fenced access points. Staff members routinely walk along the vehicle and foot trails paralleling the springs in the northern watershed. Vegetation is cleared periodically around spring collection works.

Alternate Operation Modes

Increased Surveillance

When evidence of vandalism or other unlawful entry to the watershed is observed, it may be necessary for the Police Department to patrol the area more frequently. Signs can be posted notifying trespassers of consequences.

Preventive Maintenance

Item	Frequency
Check All Fences, Gates, and Locks	Weekly
Examine Slope Stability Above Collection Works	Biweekly (more often during heavy rains)
Check Surface Water Drainage	During and After Large Storms
Channelize Surface Water Away from Spring Taps	As Needed
Look for Frequently Used Paths of Entry (human and animal); Post Warning Notices	Annually
Top Trees in Danger of Falling on Collection Works	Annually
Monitor Activities in Tributary Drainage Areas	Continuous

Evaluation

Potential sources of surface and groundwater contamination should be eliminated from the watershed and tributary drainage areas. Long-term slope movement should be recorded to aid in predicting slope failures. Watershed inspection report forms should be completed for the items identified above. Any changes to the watershed and other observations should be kept in a database on file at the Public Works Department.

10.2.12 Equipment, Supplies, and Chemical Inventory

The City Public Works Department stocks and maintains (in the City Shops) all equipment, supplies, and replacement parts necessary for continued operation of the water system. Most commonly used parts are kept on stock at the City Shops. Basic maintenance supplies including recording paper, pens, gaskets, pressure/vacuum regulator kits, and tubing for the chlorinators are kept in the chlorination buildings. Vehicles available for water system use include a backhoe, utility truck, and pickup trucks. Personnel protection equipment (including respirators and clothing) is kept at the City Shops and in the chlorination buildings.

The City uses 150-pound chlorine gas cylinders at the rate of 9 to 12 per year depending on system demand. There are five chlorine cylinders each at Sumner and County Springs, one cylinder at South Well, and two drums of 12.5 percent liquid sodium hypochlorite each at the Dieringer Well and West Well. Due to the low strength of the generated sodium hypochlorite at the West Well, health hazards associated with exposure to the stored solution do not exist. Two chlorine cylinders are on-line at any time at the springs, and three are held in reserve (chained to the wall). Chlorinator kits are not kept in stock, because the standby chlorinator at each station is operational and ready to use should the on-line chlorinator fail.

Table 10-5 lists the names and addresses of all regular suppliers and manufacturers of equipment supplies and chemicals used for water system operation and maintenance. Specific suppliers for individual components can be found in the equipment operations and maintenance manuals on file at the City Shops and chlorination facilities.

Table 10-5
Frequently Contacted Manufacturers and Suppliers

Item	Manufacturer and/or Supplier	
Chlorine Gas	Jones Chemicals, Inc. 1919 Marine View Drive Tacoma, WA 98422 (253) 274-0104	
Water Distribution Parts	H. D. Fowler, Inc. 1417 Thornton Ave SW Pacific, WA 98047 (253) 863-8600	U.S. Filter 602 Valley Avenue NE Puyallup, WA 98372 (253) 840-8558
Chlorination Repair Kits and Supplies	TMG Services 3216 E. Portland Avenue Tacoma, WA 98404 (800) 562-2310	
Central Well Tonka Filters	Beaver Equipment Company 1300 John Adams Street, Suite #108 Oregon City, Oregon 97045 (425) 398-8082	
Recorder Charts, Pens, and Parts	Johnson Yokogawa 4 Dart Road Shenandoah Industrial Park Newnan, GA Local Representative: Brett-Ross, Inc. (425) 576-9123	
Miscellaneous Parts and Supplies	Grainger 2808 Pacific Hwy. E Fife, WA 98242 (253) 922-2268	McLendon Hardware, Inc. 1111 Fryar Avenue Sumner, WA 98390 (253) 863-2264
Calibration of Sparling Meters and Miscellaneous Telemetry Equipment	S & B, Inc. 13200 A SE 30th Street Bellevue, WA 98005 (425) 644-1700	

10.2.13 Record Keeping

Table 10-6 lists records compiled and maintained by the City Public Works Department. These records should be supplemented with new information suggested in this operations program.

Table 10-6
Routine Operations and Maintenance Records on File

Item	Frequency of Data Collection
Sources	
Total Flow – County Springs	Continuous (Telemetry)
System Flow – County Springs	Continuous (Telemetry)
Bypass Flow – County Springs	Continuous (Telemetry)
Total Flow – Sumner Springs	Continuous (Telemetry)
System Flow – Sumner Springs	Continuous (Telemetry)
Bypass Flow – Sumner Springs	Continuous (Telemetry)
Master Meter – County Springs	Continuous (Telemetry)
Master Meter – Sumner Springs	Continuous (Telemetry)
Master Meter – South Well	Continuous (Telemetry)
Master Meter – Central Well	Continuous (Telemetry)
Master Meter – Dieringer Well	Continuous (Telemetry)
Master Meter – West Well	Daily (when is use) (Manually)
Master Meter – Elhi Springs	Daily (when is use) (Manually)
Chlorine Usage (All Sources When in Operation)	
Chlorine Dosage (lb/day)	Daily
Chlorine Dosage (mg/ℓ	Daily
Chlorine Residual (mg/ℓ)	Continuous (Telemetry)
Cylinder/Drum Weight	Daily
Injector Pump Pressure	Daily
Water Quality	
Coliform Monitoring Reports	10 Samples/Month
Lead and Copper	Every 36 Months
Primary and Secondary Inorganic Chemicals included with:	Every 36 Months a
▪ Groundwater Turbidity	
▪ Physical Characteristics (color, TDS, etc.)	
Pesticides	Every 36 Months or waiver
Volatile Organic Chemicals	Every 36 Months
Chlorine Residual	8 Samples/Month (with Coliform Sampling)
Disinfection By-Products	Every 36 Months
Hydrants	
Hydrant Flow Pressure Tests (on file with the Public Works Department)	Approximately Biannually or As Needed

In addition to the above records, inspection and repair reports for all system components are on file. It is recommended that the City standardize inspection and maintenance frequencies and all forms to create a uniform, low-maintenance database for the utility.

10.3 Water Quality

Federal and state regulations specify minimum water quality monitoring requirements for community water systems. The Washington State Department of Health has the responsibility for enforcing these regulations. The City of Sumner is responsible for collecting water samples, submitting samples to laboratories, and notifying the public of any water quality violations.

Water quality samples are collected by the utility foreman per DOH instructions and submitted to one of the following laboratories:

Tacoma-Pierce County Health Department
3629 South D Street
Tacoma, WA 98418
(253) 798-6470

Water Management Laboratory
1515 80th East
Tacoma, WA 98404
(253) 531-3121

Water Management Laboratory currently performs all lab work for the City. Water quality reports are kept on file at both the City Hall and City Shops.

Monitoring requirements, maximum allowable contaminant levels, and required actions for MCL exceedance are presented in this chapter. Interpretation of water quality analysis results, recommendations for improvement, and existing and upcoming regulations are discussed in Chapter 6, “Water Quality.”

10.3.1 Primary and Secondary Contaminants, Toxicants

Drinking water contaminants have been divided into several classifications. Primary contaminants are those that directly affect public health. Secondary contaminants affect aesthetic features of the water such as taste, color, and odor. Pesticides, polychlorinated biphenyls (PCBs), disinfection by-products, and volatile organic and other synthetic compounds are classified as primary contaminants.

10.3.2 Bacteria

On April 1, 2016, the City started required compliance with the Revised Total Coliform Rule (RTCR) that was published by the United States Environmental Protection Agency in 2014. This rule replaced the Total Coliform Rule of 1989. The revisions did not affect the number, location, and frequency of routine samples taken, but do change the protocol and actions for responding to a positive result that occurs during routine monitoring.

The process of determining an *E. coli* MCL violation is as follows:

- If coliforms are detected in a routine sample, the sample must first be analyzed for *E. coli* and three repeat samples collected. The first repeat sample is collected at the site of the sample with coliform presence. The second repeat sample is collected within five active service connections upstream of the sample with coliform presence. The third repeat sample is collected within five active service connections downstream of the site with coliform presence. Additionally, a raw water sample must be analyzed from each source that was in use during the day that the positive routine sample was collected.

- An *E. coli* MCL violation of the RTCR occurs when:
  - A total coliform present repeat sample follows an *E. coli* present routine sample.
  - An *E. coli* present repeat sample follows a total coliform present routine sample.
  - The lab fails to test a total coliform present repeat sample for *E. coli*.
  - A system fails to take three repeat samples following a *E. coli* present routine sample.

The RTCR also identifies treatment technique triggers that require follow-up system assessments be performed within 30 days of the trigger occurrence. The assessment findings, and sanitary defects corrected, must be submitted to DOH within the same time frame. DOH provides templates to guide a water utility through the assessment process and record its findings and corrections.

Treatment technique triggers for a basic Level 1 Assessment include any of the following:

- Systems taking less than 40 samples during the month have more than one sample with coliform presence. (Sumner currently takes ten samples per month.)
- Systems taking 40 or more routine samples per month have more than 5 percent with coliform presence in routine and repeat samples.
- Failure to collect three repeat samples for every coliform present routine sample.

Treatment technique triggers for a complex Level 2 Assessment include any of the following:

- An *E. coli* MCL violation.
- A second Level 1 treatment technique trigger occurring within a rolling 12-month period.

DOH has prepared templates for Level 1 and 2 Assessments for use by water utilities (Bulletins 331-569 and 331-570, respectively). Each assessment form guides the utility through a checklist review of sampling and operational procedures in place, along with inspection items to perform at the system's distribution, storage, treatment and source facilities. The Level 2 Assessment requires a more detailed and extensive review be performed at these facilities. An assessment summary and corrective action plan must also be completed for each.

10.3.3 Routine Procedures and Follow-Up Actions

Water quality sample collection points, monitoring frequencies, follow-up actions, reporting, and record keeping are summarized in Table 10-7. Source samples should be taken before chlorination or other treatment. Well samples should be taken after the pump discharge has reached a steady state.

Follow-up actions, including department notification, public notification, and correction procedures, are outlined in further detail in WAC 246-290. Public notification requirements are discussed below.

10.3.4 Public Notification

Public notification is mandated by the SDWA and WAC 246-290 whenever human health is at risk due to an MCL exceedance or failure to follow monitoring and testing procedures established by the state DOH. Public notification procedure is begun if one of the following six conditions occur:

- Failure to comply with a primary MCL.

- Failure to comply with a prescribed treatment technique.
- Failure to perform water quality monitoring as required by WAC 246-290.
- Failure to comply with testing procedures.
- Issuance of a variance or exemption from WAC 246-290.
- Failure to meet a variance or exemption schedule.

Because some violations are more serious than others, three tiers of public notification should be established in accordance with WAC 246-290, Part 7, Subpart A and the referenced 40 CFR Part 141, Subpart Q. The EPA Revised Public Notification Handbook (EPA Publication 816-R-09-013, March 2010) is recommended as a reference when creating public notices.

Table 10-7
Water Quality Monitoring Routine Procedure and Follow-Up Actions

Contaminant	Collection Point	Monitoring Frequency	MCL Exceedance Follow-Up Actions	Report to DOH [a]	Record Keeping [b]
Bacteriological (coliform, fecal coliform, enterococci coliform)	From representative points throughout collection system. See details of the City's current Coliform Monitoring Plan in Appendix P.	10 sampling points once a month. See details of the City's current Coliform Monitoring Plan in Appendix P..	▪ See Section 10.3.2.	▪ Coliform in Sample: 10 days. ▪ Acute MCL violation: within 24 hours. ▪ Level 1 or 2 assessment complete: within 30 days	5 years
Primary Inorganic Chemicals and Groundwater Turbidity	At sources after chlorination and before entry into distribution system (springs-metering vault)	One complete scan every 36 months [a]	▪ Collect three additional samples from the same source within 30 days. If the average of the four samples exceeds MCL, violation is confirmed. ▪ From nitrate, immediately take one additional sample from the same source, if the average of the two samples exceeds MCL, violation is confirmed.	▪ Violation of MCL: 48 hours ▪ Failure to Comply with Primary Standards: 48 hours ▪ Monitoring Failure: 48 hours	As long as system is in operation.
Secondary Inorganic Chemicals and Physical Characteristics	At source after chlorination and before entry into distribution system (springs-metering vault)	One complete scan every 36 months. a Sulfate and TDS monitoring required only if specific conductivity exceeds: *700 µmhos cm*	▪ Collect three additional samples from the same source within 30 days. If the average of the four samples exceeds MCL, violation is confirmed.	▪ Violation of MCL: 48 hours ▪ Monitoring Failure: 48 hours	As long as system is in operation.
Disinfection By Products	Point in system representing maximum residence time for source	Every 36 months.	▪ Notify public and DOH. ▪ Coordinate with DOH to develop compliance plan	▪ Violation of MCL: 48 hours	As long as system is in operation.
Chlorine Residual	Same time and location as coliform monitoring	Monthly.	▪ Notify public and DOH. ▪ Coordinate with DOH to develop compliance plan if required.	▪ Violation of MCL: 48 hours	As long as system is in operation.
Chlorine Residual	Source	Continuous.	▪ None	▪ None	As long as system is in operation.

Table 10-7
Water Quality Monitoring Routine Procedure and Follow-Up Actions

Contaminant	Collection Point	Monitoring Frequency	MCL Exceedance Follow-Up Actions	Report to DOH [a]	Record Keeping [b]
Pesticides	At source before treatment (spring-metering vault)	Every 36 months (collect when pesticide contamination is most likely to occur), or waiver.	▪ Although monitoring is not a requirement for groundwater sources, it is suggested to help determine groundwater under the influence of surface water (GWI). ▪ Take action as specified by DOH.	▪ Violation of MCL: 48 hours	As long as system is in operation.
Radionuclides	At source (spring-metering vault)	Once every 36 months.	▪ If results are <1/2 MCL, take a single sample once every 48 months. ▪ Take action as specified by DOH.	▪ Violation of MCL: 48 hours	As long as system is in operation.
Lead and Copper	Initially, at 40 high-risk sites with lead and copper solder or pipes. 20 Sites	Discontinued if optimum corrosion control is met. Action Levels met 3 consecutive years Monitoring reduced to once every 3-year period.	▪ Monitor for corrosion control parameters (pH, alkalinity, calcium, conductivity, and temperature). ▪ Water treatment for optimum corrosion control if violation continues.	▪ Action Level Exceedance: 7 days	As long as system is in operation.
Volatile Organic Chemicals	At source, after treatment and before entry points to distribution system (master meters).	Once every 36 months	▪ No VOCs have been detected in initial screening of springs. South well should have a comprehensive scan for List 1 and List 2 VOCs. ▪ Can composite up to five sources to reduce laboratory costs, restrictions apply – see WAC 246 290–300(d). ▪ Provide one-time notification to water users of availability of initial screening results (within 3 months). ▪ List 1 VOC > Detection Limit: Sample source once every 3 months for at least 3 years, and make lab results available to	▪ Initial Screening VOC. Samples: 90 days after DOH contact. ▪ List 1 VOC > MCL: 7 days. ▪ Running Total List 1 VOCs > MCL; 7 days. ▪ List 2 or 3 VOC > Detection Limit: 7 days. ▪ List 2 or 3 VOC > SAL: 7 days.	As long as system is in operation.

Table 10-7
Water Quality Monitoring Routine Procedure and Follow-Up Actions

Contaminant	Collection Point	Monitoring Frequency	MCL Exceedance Follow-Up Actions	Report to DOH [a]	Record Keeping [b]
			consumers within 3 months. ▪ List 1 VOC > MCL: Submit strategy for gathering additional data and informing public. Sample as above. ▪ Running Total List 1 VOC > MCL: Submit action plan according to WAC 246 290 320. Sample as above. Implement action plan. ▪ List 2 or List 3 VOC > Detection Limit: Sample as above. ▪ List 2 or List VOC > State Advisory Level (SAL): Sample as above. Submit strategy for gathering additional data and informing public (within 6 months).		

Notes:
a. All test measurements and analytic reports are to be given to DOH within the 10th day of the following month unless specified otherwise.
b. Other measurements should be kept at least 5 years, including Cℓ2 residual, quantity of chemicals used, and flow records. Records of action taken by system to correct violation of primary regulations and public notifications should be kept 3 years.

Content of Notices

Public Notices should be written in a clear, concise manner, emphasizing the following basic information:

- Who? (City of Sumner Water Utility: 253-863-8300)
- What? (Simple explanation of violation including discussion of potential adverse health effects and any segment of the population that may be at higher risk.)
- When? (The time of the violation or date when a variance and/or exemption was granted.)
- Consumer Actions. (List of steps the consumer should take, including advice on seeking an alternative water supply if necessary.)
- Purveyor Actions. (List of steps the purveyor has taken or is planning to take to remedy the situation.)
- Authority Involved. (EPA, DOH or Ecology, and Applicable Administrative Code)

Mandatory health effects information and language will also be required when a violation involves:

- A primary VOC MCL.
- Failure to complete a Level 1 or 2 assessment and repair system sanitary defects following a coliform Treatment Technique Trigger within 30 days.
- A nonacute MCL.
- Granting or continuation of exemption or variance.
- Failure to comply with a variance or exemption schedule.

Specific language is contained in the DOH guideline titled “Health Effects Language for Drinking Water Public Notification.” The City Engineer should be contacted prior to issuing notices. A copy of the completed notices should be sent to DOH.

Volatile Organic Compounds Notification

All those served by the water system, including wholesale buyers, should be notified of the availability of new VOC results. This notification is only required once. Notification should be provided in the first set of water bills or by direct mail after the receipt of results.

If a List 1 VOC (see WAC 246-290) is confirmed at a concentration greater than the MCL, or the department confirms that a List 2 or List 3 VOC is at a level greater than a State Advisory Level (SAL), then the consumer should be notified of the following:

- Name and level of VOC detected.
- Location where VOC was detected.
- Any health effects that the VOC could cause at its present concentration.
- Plans for follow-up activities.
- Phone number to call for further information.

10.4 Emergency Response Program

All water systems experience emergencies. Pipes break, hydrants rupture, and short-term power outages occur. These emergencies are anticipated by the utility and are handled by the Public Works staff without significant difficulty.

Less frequently, water utilities must deal with natural and man-made disasters of greater proportions. These include earthquakes, watershed fires, hazardous materials spills, vandalism, extended sub-zero weather, extended droughts, flooding, major power outages, and windstorms. Less extensive emergencies include chlorine leaks, injury of water system staff, and large mechanical failures. The City of Sumner Water Utility should be prepared for these types of disasters and be able to circumvent serious public health consequences and wide-scale disruption in water service and firefighting capabilities.

This chapter presents an emergency response plan to direct action for a variety of potential disasters. A contingency plan for various emergency situations is presented following a discussion of general emergency preparedness. Common to many contingency plans is the Water Shortage Response Plan, which is a step by-step approach for rationing water during emergency periods. Finally, at the end of the chapter, a Comprehensive Emergency Call-Up List is presented. This list should be readily available to all water system operations personnel.

As a measure to coordinate and share valuable water utility resources during an emergency, the City is a member of the Pierce County Regional Water Cooperative, members of which are in communication with each other via a reserved radio system. The City also participates in the Water/Wastewater Agency Response Network (WAWARN) allowing the City to request and receive assistance from other agencies within the State.

10.4.1 General Emergency Preparedness

Each disaster or emergency will have particular effects on different parts of the system depending on location, magnitude, and extent of disaster. Damage to one part of the system may have cascading affect other parts of the system; the combination which is impossible to predict.

The greatest single action the utility can take is preparedness even though it occurs well before the emergency situation presents itself. General emergency preparedness should be practiced by all personnel. .

The following subsections list activities and measures that should be undertaken to ensure adequate emergency preparedness is maintained. These include staff training, assuring repair material availability, routine inspections, hardening of facilities, and the development of action plans to respond to specific situations.

10.4.2 Preparedness Actions

Personnel Training and Preparation

Sumner's entire field operations staff should be trained in the operation of the City's water utility in case:

- An operator is absent or injured and unable to attend to his/her duties.
- A disaster does not fall into the prepared-for category.

- Additional staff members are needed for a response than initially anticipated.

The following mitigation measures are being implemented by City staff.

- Provide all personnel involved in the emergency response program with a copy of the Water System Staff and Emergency Call-Up Lists.
- Train all personnel for hazardous spill response and fundamentals in emergency water treatment. Water quality followed is the foremost concern in any emergency situation. Emergency water treatment includes substance detection, hazard isolation, and manual chlorine addition.
- Conduct mock emergencies to find flaws in the current Emergency Response Plan.
- Provide multiple communication technologies (cell phone and radio) should be available to all foremen.

Material Availability

- Keep extra fuel at City Shops for chainsaws, electric generators, and vehicles.
- Keep keys, bolt cutters, saws, axes, crowbars, water main shutoff wrenches, and other water system access parts in maintenance vehicles used in responding to incidents within the water system.
- Assure repair materials are available from local suppliers and merchants on short notice (see Emergency Call-Up List).
- Arrange with local suppliers for access to stored chemicals, tools, repair parts, etc., which may be required immediately after the emergency.
- Determine the need to relocate materials to outlying sites. As a suggestion:
    - Keep personnel protection equipment and operations and maintenance manuals at facilities where they will most likely be needed.
    - Keep all electrical parts needed to quickly set up an electric generator at all electric powered facilities.
    - Keep granular activated carbon, lime, and extra chlorine at all treatment facilities for emergency treatment.
    - Keep spare flashlights and radios at key locations for easy access.
    - Keep fire extinguishers in all buildings.

Routine Inspection

- Check automobiles, auxiliary electric power, and pumping units in periods of nonuse.
- Periodically check emergency communications equipment.
- Maintain emergency rations of food, water, and bedding at City Shops.

Facilities Hardening

- Keep alternate routes open to all water system facilities. Sumner and County Springs should have clear access roads from both the valley and the top of the hill.
- Keep all gates locked. Maintain fencing around facilities to deter unauthorized access to public works facilities.

- Monitor steep slopes in the watersheds that may be prone to slide. Stabilize and repair slopes areas as quickly as practicable.
- Facilities should be constructed to or retrofitted to meet current seismic code requirements. Buried facilities are anticipated to be able to better withstand most disasters.

10.4.3 Incident Command System

To establish an effective emergency response program, all Public Works, Police, and Fire Department staff must be trained and assigned specific duties. Assignments of duties in each type of emergency situation should be specific, but not so rigid that another member on the staff could not also perform the function.

City staff have been trained in the FEMA Incident Command System (ICS) methodology. This protocol is scalable and allows for a coordinated management of incidents. The City has an incident command center prepared at City hall along with provisions for a backup command center at Bonney Lake's Public Safety Building.

Emergency response duties will be assigned by the Incident Command. The following list of duties has been developed that should be accounted for during an incident response:

- Alerting personnel and assigning specific duties.
- Assessing overall water system damage.
- Coordinating and or directing Police and Fire Departments.
- Coordinating with the Department of Health.
- Testing the communication system.
- Informing public of health dangers or water shortages.
- Placing and starting auxiliary power supplies.
- Recruiting volunteers.
- Acquiring additional emergency repair equipment.
- Isolating damaged facilities from the system.
- Coordinating logistics and obtaining supplies from City Shops and local suppliers/merchants.
- Monitoring water quality.
- Applying treatment chemicals to water supply.
- Turning on pumps.
- Opening interties.
- Monitoring water tank levels.
- Monitoring fuel supplies in auxiliary power supplies.
- Monitoring chemical supplies.

10.4.4 Public Notification

In the event of an emergency, the public should be quickly and accurately notified to prevent adverse health effects. Immediate notification of localized hazards should be accomplished by the utility crew knocking on doors to inform residents. If the residents are not home, door hangers describing the nature and extent of the emergency are placed on the doorknobs.

Systemwide hazards and hazards requiring mass public communication through electronic publication or local media should be made through the City's designated communications officer.

Public notifications should contain the following types of information, depending on the seriousness and nature of the emergency:

- Water system components affected.
- Nature of threat to public health.
- Water utility and local agency efforts to restore water supply.
- Any curtailment measures or rationing imposed.
- Location of temporary water supply if needed:
  - Will bottled water be distributed?
  - Where can water suitable for domestic use be obtained?
- Treatment measures to make water suitable for human consumption (e.g., boiling, adsorption on activated carbon, adding bleach, etc.).

10.4.5 Contingency Plans

Contingency operation plans that can be implemented to continue providing safe reliable water in the event of a disaster are contained in Appendix L.

10.4.6 Water Shortage Response Plan

The Water Shortage Response Plan (WSRP) is a tool to manage a major water use reduction during extreme water-short periods. The WSRP is based on demand management techniques and conservation including voluntary restrictions, mandatory restrictions, water curtailment, and development of long-term water supply, storage, and distribution systems.

The WSRP is anticipated to be used under two different scenarios. A combination of an extended drought period causing high water demands, extreme firefighting events, and/or the failure of specific infrastructure components leading to a water shortage condition. A catastrophic event that disables multiple components of water system could require the City implement the water shortage response plan until the system can be restored to meet the system demand requirements.

The event triggers listed below are intended to be guidelines. The Public Works Director, as the designee of the mayor, may initiate the water shortage plan at any stage should it be determined that doing so will be necessary for the maintenance of minimum levels of service. (SMC 13.24.160 and 13.24.350.G.3)

Table 10-8 provides a summary of the Sumner Water Shortage Response Plan.

Table 10-8
Water Shortage Response Plan – Triggering Criteria [a]

Stage	Trigger Condition Minimum Tank Level[a, b]	Maximum Rebound[c]	Water Use Reduction Desired
1	10 below overflow	2 feet below overflow 3 consecutive days	5–10%
2	16 below overflow	5 feet below overflow 3 consecutive days	10–20%
3	23 below overflow	5 feet below overflow 3 consecutive days	20–30%

Notes:
a. If single large fire causes tanks to drop below fire storage level, take no action until observing overnight filling.
b. Feet below overflow elevation of 234 feet in the main pressure zone. Trigger conditions that may be necessary only within the Viewpoint Pressure Zone will be assessed on a case by case basis.
c. Level history only applicable to non-emergency situation.

Water Supply and Demand

A detailed analysis of the supply of water and the demand for water in the Sumner Service Area is presented in Chapter 3, "Water Demand Projections," and Chapter 5, "Water Resources." Sumner recognizes that deficiencies in long-term water supply exist and is undertaking an improvement program in an effort to rectify the projected water right, source, and storage deficiencies.

Sumner has an intertie agreement with the City of Pacific for emergency water supply.

City Policies

The City of Sumner has developed several policies that directly relate to this WSRP. These policies are described in the following paragraphs:

- Development of long-term supply adequate for projected demands. Sumner is dedicated to maintaining supply capability in excess of demand. To meet the increased demands, Sumner has developed additional source capacity (pending approval of permanent water right), negotiated an intertie agreement with the City of Pacific, and is committed to implementing conservation efforts.
- An ongoing leak detection and curtailment program will be an operational priority during all conditions of reduced water availability.
- Conservation and water use education is a continual process with general information routinely mailed to the customer and available at the Sumner City Hall. Specific information will be mailed to all customers during the early stages of a water shortage (see Example Public Announcements found later in this chapter).

- A rate structure designed to promote conservation by charging for the amount of water used has been implemented. Increased unit charges during times of water shortage may be considered by the City Council. The decision to utilize a rate change and size of rate change will be determined by the Council based on the estimated severity, potential longevity of the shortage, and the best interests of the customers.
- Residential and commercial customers will be treated alike, with restrictions placed on all customers without regard to classification.

Conservation Actions

Determination of Water Shortage Stage and specific actions to be taken depends on the anticipated longevity of the shortage. The City of Sumner will utilize the meeting of trigger criteria to begin specific actions outlined below as well as performing an analysis of the impacts of the deficit in water supply and how long it will be in place. The ability to place the city in a higher response level if additional water savings are required is an integral part of this WSRP.

Water Shortage Stage 1

- Water Shortage Condition: Minor.
- Consumption Reduction Goal: 5 to 10 percent.

Triggering Criteria

- Water level in storage tanks (i.e., tank used to control pumps) falls to a level 10 feet below overflow and returns overnight to a level no greater than 2 feet below overflow for 3 consecutive days.

Public Information Actions

- Publicly notify customers through the City's on-line resources.
- Prepare and distribute a letter mailed to all customers describing the water shortage condition.
- Make published technical conservation material available from DOH readily available to all customers. Locate copies in the City Hall.
- Prepare a press statement concerning the shortage. Example announcement is included in this WSRP.

City of Sumner Actions

- Public Works Director makes determination if cause for water shortage is long-term and will require savings in excess of 10 percent. If determination justifies greater savings, move to Water Shortage Stage 2.
- Fire hydrant use shall be limited to only during firefighting operations.
- Promote intensive leak detection and repair program.
- Perform no system maintenance that requires the use of extensive amounts of water such as tank maintenance requiring drainage and flushing of distribution lines.
- Notify DOH and Pierce County Health Department.

User Restrictions

- Implement voluntary user restrictions.

Enforcement

- None.

Pricing

- None.

Water Shortage Stage 2

- Water Shortage Condition: Moderate.
- Consumption Reduction Goal: 10 to 20 percent.

Triggering Criteria

- Water level in storage tank reaches a level 16 feet below overflow and returns overnight to a level no greater than 5 feet below overflow for 3 consecutive days.

Public Information Actions

- Continue public information program defined in Stage 1, with an additional letter mailed to all customers describing the nature of the water shortage and describing the restrictions to be imposed.

City of Sumner Actions

- Continue actions from Stage 1, including determination by Public Works Director of status of shortage.
- Evaluate the consumption of water on a customer-by-customer basis using the latest meter readings to identify high use customers.
- Begin consideration of buying water from other utilities through existing interties.
- Notify DOH and Pierce County Health Department.

User Restrictions

- Institute mandatory water conservation activities such as odd/even day watering.
- Institute ban on excessive exterior uses of water (car washing, driveway cleaning, etc.).

Enforcement

- Notify all customers who show use in excess of appropriate amounts that water use is to be decreased.
- Representative of Sumner to visit house if found in violation of restriction.

Pricing

- None.

Water Shortage Stage 3

- Water Shortage Condition: Severe.
- Consumption Reduction Goal: 20 to 40 percent.

Triggering Criteria

- Water level in storage tank falls to a level 23 feet below overflow and returns overnight to a level no greater than 5 feet below overflow for 3 consecutive days.
- Loss of multiple sources and/or storage tanks for greater than 24 hours.

Public Information Actions

- Continue public information program defined in Stage 1, with an additional letter mailed to all customers describing the nature of the water shortage and describing the restrictions to be imposed.

City of Sumner Actions

- Continue actions from Stage 2, including determination by Public Works Director of status of shortage.
- Notify DOH and Pierce County Health Department.
- Assign a "Water Cop" to tour the service area to look for violations of restrictions.
- Commission interties for everyday supply, if available.
- Inspect operation and settings on all pumps and instruments to verify efficient use.
- Institute personal customer contact and inspect houses for leaks.

User Restrictions

- Mandatory curtailment of all water usage except for domestic potable use.

Enforcement

- One warning for unnecessary water usage.
- Termination of service following repeat warning.
- Fine for excessive use.

Pricing

- Institute modified rate structure with higher unit prices. New prices and timing of increase to be determined by City Council.

Example Public Announcements

Every potential water shortage is unique; therefore, specific announcements prepared in advance are not a part of this WSRP. However, it is wise to have several example announcements available that can be modified to fit the circumstances. The following paragraphs list several example public announcements Sumner can use in the case of a water shortage.

Sample I – Stage 1 Water Shortage

The City of Sumner is experiencing unusually high water demand and is having difficulty maintaining adequate reservoir reserves. Drawdown of reservoirs during the day is not being offset by the overnight refilling capabilities. Residents of the city are requested to reduce water consumption and to avoid wasting water wherever possible. The problem is expected to be temporary in nature, and a public announcement will be made when normal water consumption can be resumed.

Sample II – Stage 1 Water Shortage

The City of Sumner is experiencing a major loss of its water production capacity. The City's customers are requested to reduce their water usage and to avoid wasting water. It would be particularly helpful if homeowners will make every effort to reduce lawn irrigation. The problem is expected to be temporary in nature, and a public announcement will be made when normal water consumption can be resumed.

Sample III – Stage 2 Water Shortage

The City of Sumner has experienced a major loss in water production and storage capacity, and, therefore, is unable to maintain normal water deliveries. It is mandatory that certain water usage activities be curtailed. This includes the imposition of alternate day lawn watering restrictions on all customers and a complete ban on other non-required outside uses of water such as car washing and driveway cleaning. Your cooperation is urgently requested. The City is doing everything possible to restore the water system to normal operations. You will be notified of any change in the situation.

Sample IV – Stage 3 Water Shortage

The City of Sumner has experienced a major loss of its water production capacity. Immediate mandatory curtailment of all water usage except for in-house domestic use is hereby imposed. Your cooperation is urgently requested. Failure to comply with the restrictions may result in termination of service with possible fines being imposed. The City is doing everything possible to restore the water system to normal operations. You will be notified of any change in the situation.

Supply Augmentation

A number of options are available to Sumner for the short-term augmentation of water supply. Sumner currently has interties with the City Pacific. Sumner has also recently added the Central Well as a new source. Potential existing source improvements that increase operational yield, and new sources/interties will continue to be evaluated as needed to meet future demands. A conservation and water use education program is in place.

Sumner is also involved in a long-term program to improve the efficiency of the existing facilities. The City participates in a continual program of leak detection and maintenance of pipes, wells, and storage facilities and is upgrading and adding new pipelines to enable more efficient distribution of the existing supplies.

Schedule and Funding

Sumner's public awareness program is under way. The City has prepared generic water shortage notices that can be used as a basis for public announcements if water shortages occur.

Sumner is actively undertaking a capital improvement program which includes acquisition of additional groundwater production rights to allow for increased source production. A financial plan for a variety of improvements is included in the Water System Plan and will be implemented through annual budget revisions. Sumner performs an annual review of water rates that considers the changing maintenance and operation costs as well as proposed improvement projects.

Monitoring Program

Sumner has several mechanisms already in place that can be used to monitor the effectiveness of this WSRP. The City maintains continuous readings on the flow from the springs and wells and the water level in the storage tanks. By utilizing this information, Sumner staff will be immediately informed of the available supply of water. Sumner meters all flow at two locations – the source and as it is discharged to user. Use of this information enables Sumner staff to identify and locate major leaks in a timely manner.

Sumner will periodically review this WSRP and upgrade it as needs arise. This WSRP reflects what Sumner feels to be a sound implementation WSRP based on fact, professional opinion, comparison with other programs, public expression, and future supply and demand.

10.4.7 Water Main Break/Localized Pressure Loss

In the event of a suspected water main break within Sumner's water distribution system, the City's response protocol will generally follow the procedures outlined within DOH publication 331-583 (a copy of which is included as Appendix M).

10.4.8 Emergency Call-Up List

The following pages provide emergency telephone numbers for easy access during an emergency. The Water System Personnel Priority Call-Up List is on file at the City Public Works Department and Fire Department.

CITY OF SUMNER EMERGENCY CALL UP LIST	
City of Sumner	
Water System Personnel Priority Call-Up List (Business Hours)	
City Hall	253-299-5700
Maintenance Facility	253-299-5740
Water System Personnel Priority Call Up List (After Hours – Police Department)	253-863-6384 or 911
Police Department	253-863-6384 or 911
East Pierce County Fire and Rescue	253-863-1800 or 911
Adjacent Water Purveyors	
Pierce County Public Works	253-798-4020
Pierce County Emergency/After Hours	253-798-7470
City of Puyallup Public Works	253-841-5505
City of Puyallup Water Superintendent	253-841-5503
City of Puyallup Emergency/After Hours	253-841-5415

CITY OF SUMNER EMERGENCY CALL UP LIST	
Adjacent Water Purveyors (Cont.)	
City of Bonney Lake Public Works	253-862-8602
Mt. View – Edgewood Water District	253-863-7348
Mt. View – Edgewood Emergency/After Hours	253-591-0613
Valley Water District	253-841-9698
City of Pacific	253-929-1110
Utilities	
Call Before You Dig	811
Puget Sound Energy	
New Construction, Repairs, Power Outage	888-321-7779
Underground Utilities Location Service	800-424-5555
Washington Natural Gas Co	206-622-6767
Department of Health	
State Office General Information	800-525-0127
(Drinking Water Information)	360-236-3100
Department of Health After Hours	1-877-481-4901
Pierce County Health Department	253-798-6500
Pierce County Emergency Management	253-798-6595
Northwest Regional Office	253-395-6750
Community Health Systems	800-236-2833
Hazardous Waste Information and Response	206-296-4692
Washington Emergency Management Division (24-Hour Regional Coordination); and Chemical Spills (State Duty Officer)	800-258-5990
DOH – Public Health Laboratory	206-418-5400
State/Federal Assistance Agencies	
Washington State Department of Ecology	425-649-7000
(24-Hour Emergency, Including Spill Response) (OIL ONLY)	800-645-7911
Washington Department of Fish and Wildlife (Olympia Office)	360-902-1000
Department of Natural Resources – Forest Fire Reports	800-562-6010
National Weather Service	206-526-6087
U.S. Army Corps of Engineers (Seattle)	206-764-3742

CITY OF SUMNER EMERGENCY CALL UP LIST	
Police Agencies/Civil Disorder	
Washington State Patrol	253-536-6210 or 911
Washington National Guard (Puyallup)	253-840-4686
Washington National Guard (Tacoma)	253-597-4150
Equipment Rental/Supplies	
Water Testing	
Water Management Laboratories	253-531-3121
Instrumentation and Controls	
Quality Controls Corporation	425-778-8280
Emergency Chemical Supplies (Chlorine Cylinders)	
Jones Chemical, Inc.	253-274-0104
Integra Chemical	253-479-7000
Water Works Equipment and Supplies	
H. D. Fowler, Inc. (Pacific)	253-863-8600
Core & Main (Puyallup)	253-840-8558
Safety Equipment and Clothing	
Excel Supply Co. (Fife)	253-896-1195
Western Fire and Safety Company, Inc. (Seattle)	206-782-7825
Leak Detection	
USA Leak Detection	877-585-5325
Chain Saws, Dewatering, Tools, Vehicles	
Bunce Rental, Inc. (Puyallup)	253-845-7527
Water Main Contractor	
Pivetta Brothers	253-862-7890
Ron Sprague	253-208-4843
Generators	
United Rentals (Tacoma)	253-383-1515
Sunbelt Rentals (Tacoma)	253-922-6995
Contractors' Equipment	
Aggreko, Inc. (Pacific)	206-498-2350
Star Rentals (Tacoma)	253-474-0577
Aaberg's Tool and Equipment Rental (Tacoma)	253-272-1138

CITY OF SUMNER EMERGENCY CALL UP LIST	
Federal Emergency Management Agency	
Regional Office	425-487-4600
Disaster Assistance Programs	800-621-3362
Flood Insurance Programs	800-427-4661
Natural and Technical Hazards	800-621-3362
News Desk	202-646-3272
Holidays, Weekends, and Evenings	800-621-3362
Radio Stations, Television Stations, Newspapers	
All media communications should be handled through the City's Communications Department.	

10.5 Cross Connection Control Program

The City of Sumner has a responsibility to protect its water system from contamination due to cross connections. Cooperation among all agencies involved in cross connection control is required, including the state Department of Health, the City's Public Works Department, City Attorney, the local health officer, the local plumbing and building code authority, and the Fire Department.

This chapter outlines a comprehensive cross connection control program for the City of Sumner. First, a generalized description of a cross connection is given, followed by a discussion of health hazard assessment and a description of cross connection control methods. Finally, an implementation program for the City of Sumner outlining present and recommended practices is given.

10.5.1 Regulatory Framework

Regulatory framework for cross connection control is through the Safe Drinking Water Act, whose intent is to assure safe, potable water for all U.S. citizens. State regulations pertaining to cross connection control are found in Washington State statutes and "State of Washington Drinking Water Regulations," Chapter 246-290-490 WAC.

The City may be held legally liable for adverse health effects caused by unprotected or inadequately protected cross connections including cost associated with disinfection and/or replacement of piping to remove toxic substances from the water supply system.

The most recently published edition of the *Manual of Cross Connection Control* (10th Edition 1993) must be used as a resource to establish:

- Minimum cross connection control operating policies.
- Backflow prevention assembly installation practices.
- Backflow prevention assembly testing procedures.
- Enforcement authority.

Several other manuals in addition to *Accepted Procedure and Practice in Cross Connection Control* and WAC 246-290-490 should be kept with the cross connection control program document library for ready reference. These include:

- AWWA 2004, Recommended Practice for Backflow Prevention and Cross Connection Control.
- DOH 2008 Backflow Prevention Assemblies Approved for Installation in Washington State.
- City of Sumner Ordinance 13.24.270, "Backflow Prevention Devices."
- The Operation Program Section of the Water System Plan.

These six documents and all records of inspection and testing are an integral part of the City of Sumner Cross Connection Control Program.

10.5.2 What is a Cross Connection?

A cross connection is any unprotected actual or potential connection or structural arrangement between a public or a consumer's potable water system and any other source or system through which it is possible to introduce into any part of the potable system any used water, industrial fluid, gas, or substance other than the intended potable water with which the system is supplied. Cross connections usually take the form of either back pressure or back siphonage.

Back Pressure

Back pressure can occur whenever a potable system is connected to a nonpotable supply operating under a higher pressure by means of a pump, boiler, elevation difference, air or steam pressure. There is a high risk that nonpotable water may be forced into the potable system whenever these interconnections are not properly protected.

Back Siphonage

Back siphonage can occur when there is a negative or reduced pressure in the supply piping. Under normal conditions, the pressure in the distribution system is sufficiently high to create a positive flow to all taps. However, if system pressures are reduced due to fire demands, pipe breakage, or other cause, water may flow from higher elevations into lower parts of the system or vacuum pressure may draw water from service connections. A cross connection occurs when nonpotable water is drawn back through the supply line. Elevated piping at a reduced pressure relative to the system at street level is especially susceptible. The suction side of booster pumps may also cause reduced pressures and create a higher backflow potential.

10.5.3 Classification of Risk

Cross connections are classified into health and nonhealth hazards. A health hazard is posed by any cross connection or potential cross connection involving any substance that could, if introduced to the water system, cause death, illness, spread of disease, or have a high probability of causing such effects. A nonhealth hazard is posed by any cross connection involving any substance that generally would not be a health hazard, but would constitute a nuisance, or be aesthetically objectionable, if introduced into the potable supply.

Classification of risk must consider the potential that piping may be changed, equipment may be used incorrectly, or negligence on the part of the consumer may result in a backflow condition. In general, risk increases both as a function of the hydraulic probability of backflow and the toxicity of the substance that may introduced into the potable supply. When choosing a backflow prevention method, the toxicity of the substance that may be introduced into the potable supply is the governing factor.

General health and nonhealth classifications of risk for various types of cross connection and facilities are presented in Table 10-9 and Table 10-10, reproduced here from *Recommended Practice for Backflow Prevention and Cross Connection Control* (AWWA 2004). Table 10-10 identifies the same severe and high health cross-connection hazard premises that are listed with Table 9 of WAC 246-290-490. Objectionable material and routes of contamination from a variety of commercial and industrial establishments are presented in *Recommended Practice for Backflow Prevention for Backflow Prevention and Cross Connection Control* (AWWA 2004).

Table 10-9
Assemblies for Internal Protection

Description of Cross Connection	Assessment of Hazard	Recommended Assembly at Fixture [a]
Aspirator (medical)	Health	AVB or PVB
Bedpan Washers	Health	AVB or PVB
Autoclaves	Health	RPBA
Specimen Tanks	Health	AVB or PVB
Sterilizers	Health	RPBA
Cuspidors	Health	AVB or PVB
Lab Bench Equipment	Health	AVB or PVB
Autopsy and Mortuary Equipment	Health	AVB or PVB
Sewage Pump	Health	AG
Sewage Ejectors	Health	AG
Fire-Fighting System (toxic liquid foam concentrates)	Health	RPBA
Connection to Sewer Pipe	Health	AG
Connection to Plating Tanks	Health	RPBA
Irrigation Systems with Chemical Additives or Agents	Health	RPBA
Connection to Saltwater Cooling System	Health	RPBA
Tank Vats or Other Vessels Containing Toxic Substances	Health	RPBA
Connection to Industrial Fluid Systems	Health	RPBA
Dye Vats or Machines	Health	RPBA
Cooling Towers with Chemical Additives	Health	RPBA
Trap Primer	Health	AG
Steam Generators	Nonhealth [b]	RPBA
Heating Equipment: Commercial	Nonhealth [b]	RPBA
Domestic	Nonhealth [b]	DCVA

Table 10-9
Assemblies for Internal Protection

Description of Cross Connection	Assessment of Hazard	Recommended Assembly at Fixture [a]
Irrigation Systems	Nonhealth [b]	DCVA, AVB, or PVB
Swimming Pools: Public	Nonhealth [b]	RPBA or AG
Private	Nonhealth [b]	PVB or AG
Vending Machines	Nonhealth [b]	RPBA or PVB
Ornamental Fountains	Nonhealth [b]	DCVA or AVB or PVB
Degreasing Equipment	Nonhealth [b]	DCVA
Lab Bench Equipment	Nonhealth [b]	AVB or PVB
Hose Bibs	Nonhealth [b]	AVB
Trap Primers	Nonhealth [b]	AG
Flexible Shower Heads	Nonhealth [b]	AVB or PVB
Steam Tables	Nonhealth [b]	AVB
Washing Equipment	Nonhealth [b]	AVB
Shampoo Basins	Nonhealth [b]	AVB
Kitchen Equipment	Nonhealth [b]	AVB
Aspirators	Nonhealth [b]	AVB
Domestic Space-Heating Boiler	Nonhealth [b]	RPBA

Notes:
AG = Air Gap; AVB = Atmospheric Vacuum Breaker; DCVA = Double Check Valve Backflow-Prevention Assembly; PVB = Pressure Vacuum Breaker; RPBA = Reduced-Pressure Principle Backflow-Prevention Assembly.

a. AVBs and PVBs may be used to isolate health hazards under certain conditions, that is, back siphonage situations. Additional area or premises isolation may be required.
b. Where a greater hazard exists (due to toxicity or other potential health impact), additional area protection with RPBAs is required.

Table 10-10
Assemblies for Premises Isolation

Description of Premises	Assessment of Hazard	Recommended Assembly on Water Service Pipe
Hospitals, mortuaries, clinics, laboratories	Health	RPBA
Plants using radioactive material	Health	RPBA
Petroleum processing or storage facilities	Health	RPBA
Premises where inspection is restricted	Health	RPBA
Sewage treatment plant	Health	RPBA
Sewage lift stations	Health	RPBA
Commercial laundry	Health	RPBA
Plating or chemical plants	Health	RPBA

Table 10-10
Assemblies for Premises Isolation

Description of Premises	Assessment of Hazard	Recommended Assembly on Water Service Pipe
Docks and dockside facilities	Health	RPBA
Food and beverage processing plants	Health	RPBA
Pleasure boat marina	Health	RPBA
Tall buildings (protection against excessive head of water)	Nonhealth	DCVA
Steam plants	Nonhealth	RPBA
Reclaimed water systems	Health	RPBA

Notes:
DCVA = Double check valve backflow-prevention assembly.
RPBA = Reduced-pressure principle backflow-prevention assembly.

10.5.4 Cross Connection Control Methods

When cross connections cannot in good faith be eliminated, several methods of cross connection control through approved backflow prevention devices are available. In general, the more serious the health hazard, the greater the complexity and cost of the required backflow prevention device. Discussed in this section are the five most commonly used devices for cross connection control. In general order of increasing cost and complexity, these include:

- Approved Air Gap (AG).
- Pressure Vacuum Breaker (PVB).
- Atmospheric Vacuum Breaker (AVB).
- Double Check Valve Assembly (DCVA).
- Reduced Pressure Principal Backflow-Prevention Assembly (RPBA).

Each backflow device is briefly described below.

Approved Air Gap (AG)

An approved air gap is the unobstructed vertical distance through free atmosphere between the lowest point of a water supply outlet and the flood rim of the fixture or assembly into which the outlet discharges. These vertical separations must be at least twice the diameter of the water supply outlet, but never less than 1 inch.

In theory, an approved air gap is the best means of protection against backflow; however, it is not always practical and is vulnerable to bypass arrangements, such as connecting a hose between a water tap and its basin.

Pressure Vacuum Breaker (PVB)

A pressure vacuum breaker assembly consists of an independently operating, internally loaded check valve and an independently operating loaded air inlet valve located on the discharge side of the check valve.

Under normal flow conditions, the internally loaded check valve remains open, and the air inlet valve is closed. When back siphonage conditions develop, the internally loaded check valve closes. And, if this check valve is not fouled, it precludes the back siphonage of water from the PVB body and downstream piping.

However, if the check valve is fouled, the air inlet valve opens with the cessation of normal flow and allows air to enter the supply pipe through the fouled check valve, thus breaking the vacuum and not permitting back siphonage from the downstream piping.

The PVB is effective against backflow caused by back siphonage only and should not be used if back pressures could develop. The PVB should be installed in a vertical position at least 12 inches above all downstream piping and the highest fixture flood level rim, outlet, or highest point of water use.

Atmospheric Vacuum Breaker (AVB)

The atmospheric vacuum breaker is an assembly that performs similarly to the PVB. The AVB consists of a float check, a check seat, and an air inlet port.

During normal flow conditions, the float within the AVB seals against the air inlet. When a back siphonage condition develops, the cessation of normal flow permits the float to drop, thus opening the air inlet valve. If the float seals against the check seat, there is no back siphonage from the AVB body or downstream piping.

However, if the float check is fouled, then the air entering through the air inlet valve dissipates the vacuum through the fouled check valve, thus preventing back siphonage into the supply piping.

The AVB is effective against backflow caused by back siphonage only, and should not be used if back pressure could develop. The AVB should be used for protection against nonhealth hazards. Like the PVB, if used to isolate a health hazard, additional area or premises isolation may be required. The AVB should be installed in a vertical position at least 6 inches above all downstream piping and the highest fixture flood level rim, outlet, or highest point of water use.

Double Check Valve Assembly (DCVA)

The DCVA consists of two internally loaded check valves, either spring-loaded or internally weighted. During normal operation, the check valves open. If backflow conditions occur, the check valves will close tightly.

The DCVA is effective against backflow caused by back pressure and back siphonage and is used to protect the water system from pollutants that would not constitute an actual health hazard but that might be objectionable to the water supply.

Reduced-Pressure Principle Backflow Prevention Assembly (RPBA)

The approved reduced-pressure principle backflow prevention assembly consists of two independent action, approved check valves together with a hydraulically operating, mechanically independent pressure differential relief valve located between the check valves and below the first check valve.

During normal operation, the first internally loaded check valve creates a reduced-pressure zone between the two check valves; and under normal flow conditions, both check valves are open. The relief valve is held tightly closed by the supply pressure acting on a diaphragm within the relief valve.

In a no-flow or static-pressure condition, both check valves will close, and the supply pressure will hold the relief valve shut.

If the supply pressure drops, the relief valve will maintain a minimum pressure in the zone between Check Valve 1 and Check Valve 2 of 2 psi lower than the supply pressure by releasing sufficient water to maintain the required difference in pressure.

If the supply pressure becomes less than 2 psi, the relief valve opens, discharging the material in the reduced pressure zone to the atmosphere.

In the event that pressure increases downstream of the assembly, tending to reverse the direction of flow, both check valves in the assembly should close tightly to prevent backflow.

However, if the second check valve does not close tightly, leakage into the reduced pressure zone will increase the pressure, which will cause the relief valve to open. If the supply pressure drops to atmospheric pressure, or within 2 psi of the reduced pressure zone, the relief valve will open, creating an internal air gap. Any leakage past the second check valve would then be discharged through the open relief valve.

The RPBA is effective against backflow caused by back pressure and back siphonage. The RPBA is used to isolate health hazards and is used in locations where an approved air gap is impractical.

10.5.5 Selection of Backflow Prevention Device

Table 10-9 and Table 10-10 can be used as guides in selecting the appropriate backflow devices for individual cross connections and those needed for premises isolation. Premises isolation is needed in addition to individual equipment isolation when high-risk substances could backflow. WAC 246-290-490 places the following limitations on backflow prevention devices:

- If a cross connection cannot be eliminated, then:
    - An AG, RPBA, or reduced-pressure principal detector backflow prevention assembly (RPDA) shall be installed if the cross connection creates an actual or potential health threat or system hazard.
    - An AG, RPBA, RPDA, DCVA, or double-check detector backflow prevention assembly (DCDA) shall be installed if the cross connection is objectionable, but does not pose an unreasonable risk to health.
    - A PVB or an AVB may be installed where the substance that could backflow is objectionable, but does not pose an unreasonable risk to health and where there is no possibility of back pressure in the downstream piping.

- Backflow prevention assemblies appropriate for the degree of hazard, or air gaps, and in some cases both, shall be installed at the service connection or within the following facilities, unless in the judgment of the water purveyor and the department, no hazard exists: Hospitals, mortuaries, clinics, laboratories, piers and docks, sewage treatment plants, food and beverage processing plants, chemical plants using water process, metal plating industries, petroleum processing or storage plants, radioactive material processing plants or nuclear reactors, car washes, facilities having a nonpotable auxiliary water supply, and others specified by the department.

Any uncertainty in type of backflow prevention device required should be verified in the *Accepted Procedure and Practice in Cross Connection Control Manual* or through DOH.

All installed RPBAs, RPDAs, DCVAs, DCDAs, PVBs, and AVBs must be approved models included on the current list of backflow assemblies, approved for installation in Washington State. DOH currently defers to a comprehensive list of approved backflow assembly devices that is maintained and updated by the University of Southern California through an ongoing research and testing program. The latest information and link is provided through the DOH website.

Backflow prevention assemblies in service, but not listed, can remain in service provided they were on the current cross connection control list at the time of installation, are properly maintained, are appropriate for the degree of hazard, and are tested and successfully pass the test annually. The unlisted assemblies cannot be moved or require more than the minimum maintenance or be subject to replacement with a currently approved model.

10.5.6 Implementation Program

The cross connection control implementation program at the City of Sumner consists of the following elements:

- Cross connection control staff.
- Inventory of cross connections.
- Installation inspections.
- Backflow prevention device testing.
- Cross connection control ordinance.
- Public education and notification.

The current program and recommended improvements to each of these elements are discussed in the following paragraphs.

Cross Connection Control Staff

The City of Sumner Cross Connection Control Program is administered by the Public Works Department and supervised by the Operations Superintendent. The Associate City Engineer within the Development Services department is CCCS certified and reviews building permits and plans for cross connection control applicability. Risks and hazards associated with cross connections and assessed and recommended backflow prevention devices to be installed are a prerequisite for building construction approval.

Currently, the City has four licensed operator CCCSs who implement the field elements of the program, supplementing the responsibilities of the CCCS certified Associate City Engineer. An annual program summary report is prepared for, reviewed and endorsed by the CCCS-certified Operations Superintendent.

Inventory of Cross Connections

In 1988, the City began keeping detailed installation records of backflow prevention devices within a central database. All new industries and commercial establishments are required to install backflow prevention devices suitable for the health hazard. As each device is installed, it is entered into a backflow prevention database.

Columns in the database are provided for the establishment name, address, type of backflow device installed (RPBA, RPBD, etc.), model, size, serial number, manufacturer, location on premises, date installed, and date last tested. The database is maintained by a Development Services Technician who performs updates to keep system information current. The technician uses entered information to issue annual test report notifications, non-compliance follow ups, and review reports to validate tester and equipment used.

Installation Inspection

Under the City's current program, the property owner is required to hire a Certified Backflow Assembly Tester (BAT) to test all units after installation. One of the City's CCCSs witnesses and inspects the arrangement for compliance with all applicable codes and standards. Installation records are kept in the City's Cross Connection Control Database.

Backflow Prevention Device Testing

All backflow prevention devices in the City database are tested annually to assure proper operation. City BAT-certified operators perform testing on all City-owned devices. Devices must be inspected more frequently if test indicate repeated failures or the assembly was recently repaired. Procedure is as follows:

- The owner is notified in their water bill of the need for testing the backflow prevention device.
- The owner must hire a certified Washington State Backflow Prevention Device Tester to perform the test in accordance to manufacturers' standards and state codes. A list of certified testers is kept on file at DOH.
- Test results are sent to the City Public Works Department. The performance of the backflow prevention assembly is clearly noted as well as the certification status of the Tester. Information is cross-checked against notes made from City inspection by a CCCS certified operator during initial installation.
- The reports are checked for adequacy, the database is updated, and the test reports are filed.

Cross Connection Control Ordinance

The City of Sumner has enforcement authority for cross connection control through City of Sumner Ordinance 13.24.270, which states:

> "Backflow prevention devices shall be installed by the owner of the property being served when in the judgment of the city engineer the nature and extent of activities on the premises, or the materials used in connection with the activities, or materials stored on the premises

would present an immediate and dangerous hazard to health should a cross connection occur, even though such cross connection does not exist at the time the backflow prevention device is required to be installed. The type of protection device, its installation and periodic testing, shall conform to the provisions of the rules and regulations of the state Board of Health regarding public water supplies as set forth in WAC 248-54-500." (currently WAC 246-290-490).

A revised ordinance may be necessary to define in more detail the responsibilities of the City and the responsibilities of the customer, as well as meet the ten minimum elements of a program outlined within WAC 246-290-490. A new ordinance should have at minimum the following sections:

- Definitions
- Purpose
- Regulated Cross Connections
- Backflow Prevention Assembly Requirements
- Installation Requirements
- Access to Premises
- Annual Testing and Repairs
- Responsibility for Cost
- Termination of Service
- Effective Date.

At a minimum, the following provisions should be added to Ordinance 13.24.270 or to any new cross connection control ordinance:

- All tests, repairs, overhauls, and/or replacements of backflow prevention devices shall be at the expense of the building and premises owners. Reports on all testing and maintenance of backflow prevention assemblies shall be filed with the City of Sumner Public Works Department. If malfunctioning assemblies are not promptly repaired or replaced, the City of Sumner may deny or discontinue water service to the premises.
- Authorized employees of the City of Sumner with proper identification shall have free access at reasonable hours of the day to all parts of a premises or within buildings to which water is supplied, for the purposes of determining hazards due to cross connections, inspection, testing, or maintenance of backflow prevention devices. Water service may be refused or terminated to any premises for failure to allow employee access.
- All installed RPBAs, RPDAs, DCVAs, DCDAs, PVBs, and AVBs shall be approved models included on the current list of backflow assemblies approved for installation in Washington State and maintained and published by the Department of Health.
- Backflow prevention assemblies in service, but not listed, can remain in service provided the backflow prevention assemblies are listed on the cross connection control list current at the time of installation, are properly maintained, are appropriate for the degree of hazard, and are tested and successfully pass the test annually. When unlisted assemblies are moved or require more than the minimum maintenance, the unlisted assemblies shall be replaced by an assembly listed on the current approved model list.

Public Education and Notification

As an aid in the inventory program, forms can be prepared for each customer class encouraging identification and elimination of cross connections. Results of the inventory can be used to assess program effectiveness and identify possible cross connections and health hazards without entering the premises. Records for a few current industries not meeting CCCP standards have been used to initiate recent discussion and resolution for implementation of necessary protection measures and devices.

Inventory forms are especially useful for single and multifamily residences. Owners for this customer class should be requested to identify potential cross connections, which include:

- Hot tubs.
- Underground sprinkler systems.
- Auxiliary water supplies such as:
  - Wells.
  - Swimming pools.
  - Solar systems.
  - Swamp coolers.
  - Threaded faucets over utility sinks.
  - Boilers.
- Any place where a potentially harmful chemical or other substance is used in conjunction with the drinking water plumbing such as:
  - End of garden hose antifreeze flush kits.
  - Substances such as weed killers or fertilizers.

The customer should be informed of the purpose of cross connection control and the City's requirement and authority to prevent cross connections. Methods of notification include newspapers, bill stuffers, direct mailing, information distribution in schools and libraries, and on bulletin boards. Sumner public works staff has designated an appropriate annual agenda item at one City Council Public Works Committee to review the status of the City's CCC Program and consider improvements that may be implemented. Necessary resolution for any high hazard premises within the system that don't have adequate protection will also be discussed and decided upon.

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