CITY OF SOAP LAKE

GRANT COUNTY **WASHINGTON**

MINERAL WATER SYSTEM PLAN

G&O #17059
DECEMBER 2019

Gray & Osborne, Inc.
CONSULTING ENGINEERS

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MINERAL WATER SYSTEM PLAN

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EXECUTIVE SUMMARY

INTRODUCTION

The City of Soap Lake owns and operates a mineral water system which delivers the unique mineral water from Soap Lake to customers. The mineral water serves as a unique resource for the City in attracting tourists and businesses that seek out its well-recorded healing properties, which in-turn benefits the City economically. The City wants to continue to promote and grow its tourism industry by promoting the unique aspects of the lake and its water. The central component of this industry includes the local motels and spas which provide mineral water to visitors through the existing mineral water system. For local motels and spas, any distribution issues with the system can significantly impact revenues. To analyze the costs of improving the system and the economic benefits associated with the maintenance and development of the system, the City applied to the Community Economic Revitalization Board (CERB) to fund this plan.

PLAN GOALS

The purpose of this plan is to analyze the mineral water distribution system and establish capital improvement projects (CIP's) that will better distribute the mineral water in a more reliable, cost-effective manner, and provide potential development CIP's that could help the City grow its tourism industry by utilizing mineral water. The success of the mineral water system will continue to play a vital role in growing the City's tourism industry.

ORGANIZATION OF THE MINERAL WATER SYSTEM PLAN

The Soap Lake Mineral Water System is unique and may be the only publicly owned system in the US. As such, there is no template to follow like many other public facility planning documents. Where applicable, this plan is organized following a format similar to a Washington State Department of Health (DOH) domestic water system plan. The Mineral Water System Plan is divided into the following chapters.

CHAPTER 1 – DESCRIPTION OF THE MINERAL WATER SYSTEM

This chapter provides a brief history of the mineral water system, a description of existing mineral water infrastructure, a summary of City mandated mineral water polices and discussion regarding the City's water right certificate for mineral water use. It also provides figures showing the approximate locations of mineral water infrastructure.

CHAPTER 2 – BASIC PLANNING DATA

This chapter presents the basic planning data used to estimate Soap Lake's existing and future mineral water demands.

CHAPTER 3 – SYSTEM ANALYSIS

Basic planning data determined in the previous chapter is used to evaluate the capacities of existing mineral water distribution and storage infrastructure. A water rights analysis is also completed to determine if the City has adequate mineral water rights to meet projected demands. Important regulatory requirements concerning cross-connection control and required separations of potable and non-potable distribution piping is also discussed.

CHAPTER 4 – OPERATIONS AND MAINTENANCE

This chapter provides an operation and maintenance (O&M) program for the mineral water system. Recommended O&M activities and schedules for completing the activities are provided to ensure the mineral water system can function properly with minimal system interruptions.

CHAPTER 5 – CONSTRUCTION STANDARDS

This chapter provides reference to standards that govern mineral water utility construction.

CHAPTER 6 – CAPITAL IMPROVEMENT PLAN AND ESTIMATES

This chapter provides summaries, cost estimates and schedules for Capital Improvement Projects (CIPs) to improve the mineral water system.

CHAPTER 7 – CAPITAL IMPROVEMENT FINANCING

This chapter provides a summary of mineral water system revenues and expenditures from 2016 to 2018. It also identifies potential funding mechanisms the City could employ to complete CIPs. The analysis includes funding scenarios for CIP implementation and establishes a mineral water rate structure for the future.

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CHAPTER 1

DESCRIPTION OF THE MINERAL WATER SYSTEM

This chapter presents information on the purpose of this mineral water system plan, ownership and management of the mineral water system, system background data, the existing system facilities inventory, related planning documents, existing and future service areas and characteristics, and service area agreements and policies.

OWNERSHIP AND MANAGEMENT

A Mayor and City Council govern the City of Soap Lake. The mineral water system is owned by the City and operated and managed by City employees. The City's Public Works Director is Mr. Darrin Fronsman, and the City's Finance Director is Ms. Karen Dillon. The City's current mailing address and primary phone number are the following:

City of Soap Lake
PO Box 1270
239 Second Ave SE
Soap Lake, Washington 98851
(509) 246-1211

BACKGROUND

HISTORY OF THE MINERAL WATER SYSTEM

Soap Lake is a meromictic soda lake formed by the Missoula Floods located at the southern end of Grand Coulee. Its alkaline waters are rich with 23 different minerals. The healing powers of Soap Lake's mineral water was well-known to Native Americans long before contact with European American settlers. The area's development as a healing center and resort destination began at the turn of the 20th century with the arrival of the railroad. During this period, several sanitariums were built to treat patients with Buerger's disease, psoriasis, and other skin, circulatory and digestive ailments. Figure 1-1 shows the location of Soap Lake.

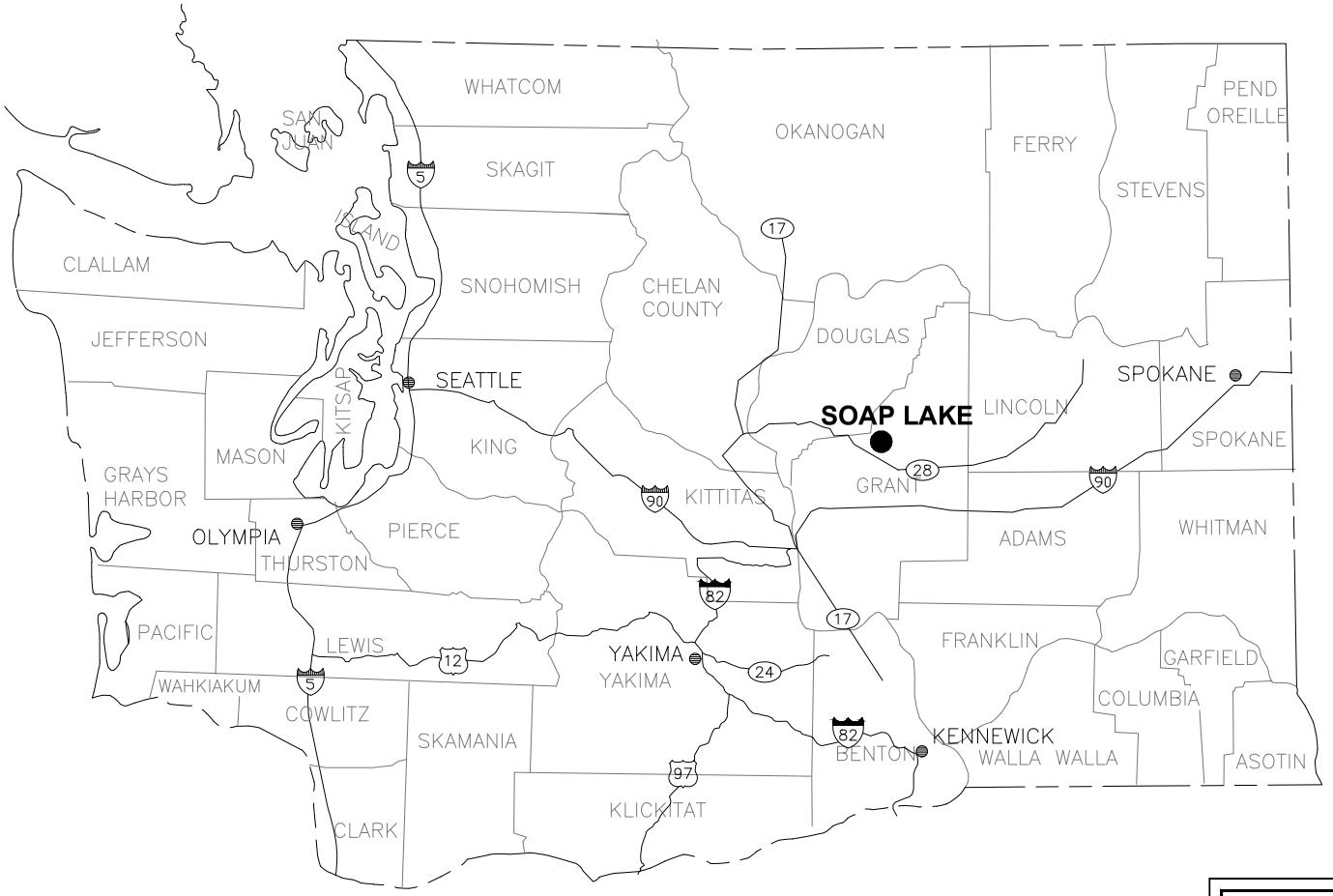
On June 5th, 1940, the City filed a water right application to use 1 cubic feet per second (cfs) of water from Soap Lake for "*Medicinal, therapeutic baths, and for swimming pools and such other uses as are incidental at a health resort"*. In response to the application, a water right permit was issued on August 30, 1940, with a certificate (Certificate No. 2302) being issued on September 19, 1945. The certificate states the purpose of use is for medicinal, therapeutic, baths, swimming, and all other uses incident to health resorts, the place of use is the Town of Soap Lake, and the peak instantaneous rate that can be diverted from the lake at any one time is limited to 1.0 cfs. The water right application, permit, certificate, and additional water rights information is provided in Appendix A.

It is not known when construction of the City's mineral water system began, but a system was in place and in use as early as 1928. According to information provided in the June 5th, 1940 water right application, a City owned mineral water distribution system consisting of a pump with intake pipe into the lake, distribution piping, storage tanks, and services to 170 commercial and residential customers had already been in place for 12 years at the time of the filing. A hand sketch of the point of diversion included in the application shows that the pump in use in 1940 was located in the same proximity as the current pump, at the southern end of Soap Lake just north of the downtown core. A Notice of Beginning of Construction submitted on September 4th, 1940 from the Town of Soap Lake to the State Division of Hydraulics indicated that construction of the mineral water system was 100 percent complete at that time. A June 11th, 1945 letter from the Town of Soap Lake to the Washington State Department of Conservation & Development stated that water was pumped from the lake to a reservoir, distributed into a water system similar to the water systems of fresh water, and services were connected to meters. Customers paid the town for use of the water. The locations of system distribution pipes, reservoir, and storage tanks was not included in these documents. Information provided in the application indicates the system was located within City street rights-of-ways.

Today, the City's mineral water system consists of a pump station with 2-inch Schedule 40 PVC suction line from the lake located at the north end of Aster Street, a 95,000 gallon concrete reservoir with metal roof located near the intersection of Scenic Drive and Woodland Street at the northeast corner of town, valves, and approximately 31,840 feet of distribution main consisting of Asbestos Cement (AC) commonly known as transite pipe, steel, Polyvinyl Chloride (PVC), copper and galvanized pipes ranging in size from 3/4-inch to 6-inches in diameter. The system does not have a telemetry system. The pump must be manually operated, and the level of water within the reservoir can only be determined by visual inspection and manual measurements. Figure 1-2 shows the mineral water system and the location of different pipe sizes used within the system. The City's zoning can be seen in Figure 1-3.

It should be noted that the total length of mineral water distribution pipe is approximate, as no construction plans exist for the system. The total length of pipe, pipe sizes, pipe materials and valve locations were determined from the City's street intersection utility maps and a hand-drawn map of the system, dated January of 1987. These maps are included in Appendix B. Upon review of these maps and construction plans that have been prepared for City utility and street improvement projects over the last 20 years, it is known that many of the mineral water distribution pipes in streets are located in a common trench with domestic water mains.

The history of improvements and expansion to the mineral water system since it began operation in the 1920's is not well established. What is known is as follows. The pump was replaced in 2017, following problems that were encountered during the winter of 2016 and 2017 in which the suction pipe from the lake froze and broke. In addition to a



CITY OF SOAP LAKE

MINERAL WATER SYSTEM PLAN

FIGURE 1-1

LOCATION MAP

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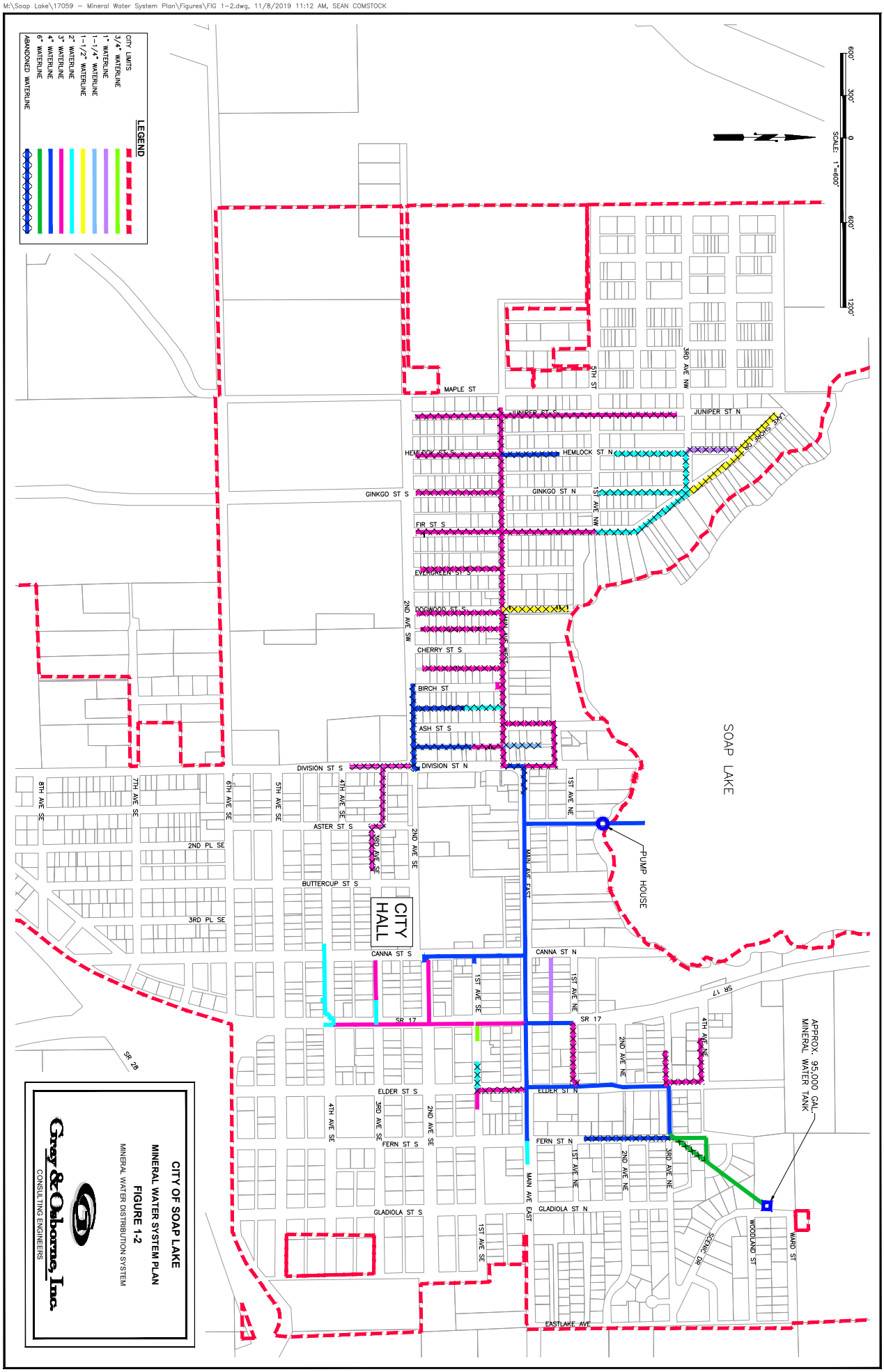
M:\Soap Lake\17059 - Mineral Water System Plan\Figures\FIG 1-1 (Soap Lake in WA).dwg, 6/18/2019 12:53 PM, KALEB SMITH

M:\Soap Lake\17059 – Mineral Water System Plan\Figures\FIG 1-2.dwg, 11/8/2019 11:12 AM, SEAN COMSTOCK



CITY OF SOAP LAKE

MINERAL WATER SYSTEM PLAN

FIGURE 1-2

MINERAL WATER DISTRIBUTION SYSTEM

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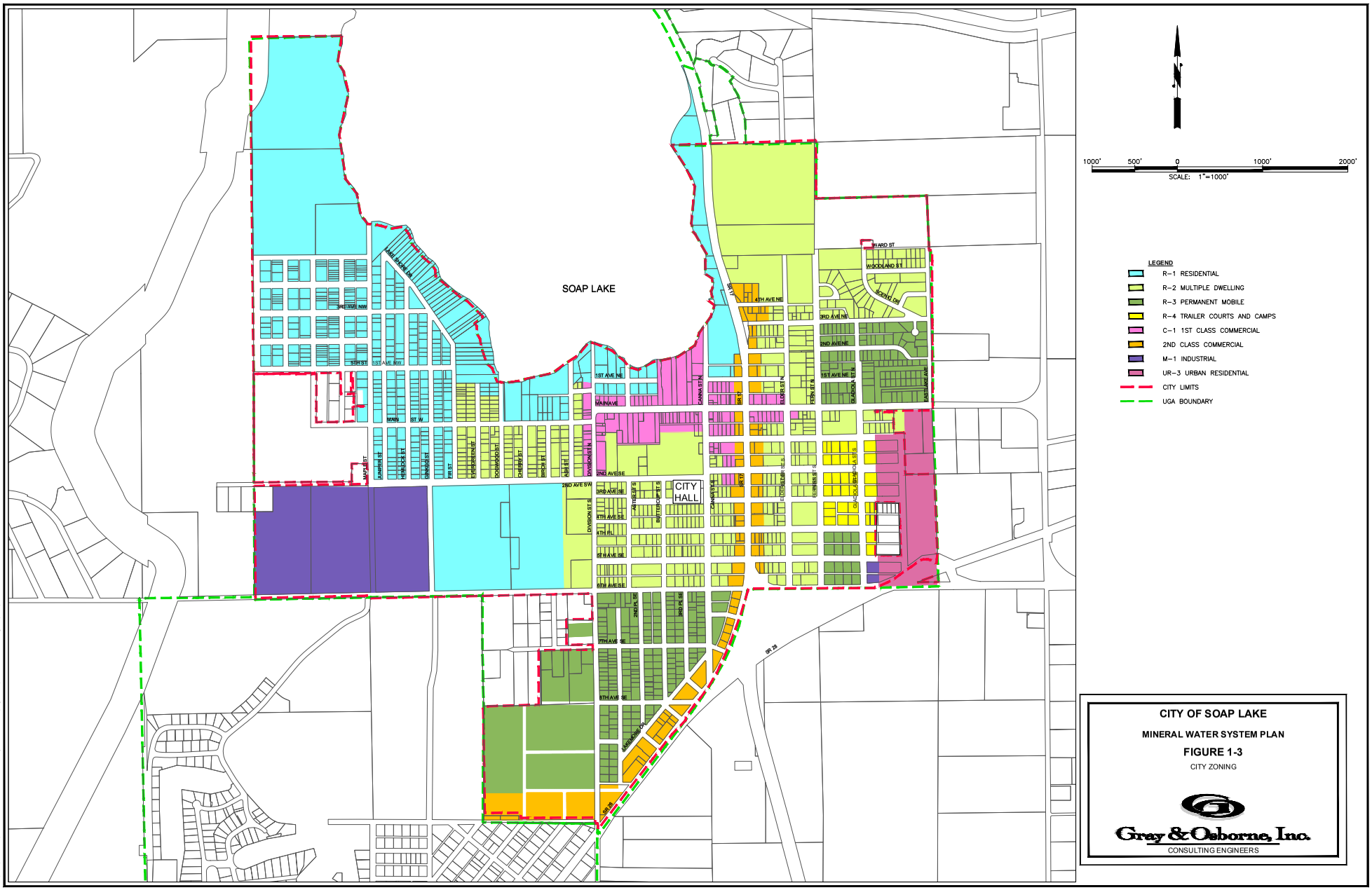


M:\Soap Lake\17059 - Mineral Water System Plan\Figures\FIGURE 1-3.dwg, 5/21/2019 11:19 AM, DAVID SORLAGAS

new suction line, pump and associated piping within the pump house, a flow meter was also installed. Based upon discussions with Public Works staff, the metal roof on the mineral water reservoir was constructed in recent years, although the exact date of this work is not known. The presence of asbestos-cement pipe, which was used extensively in the U.S. in the mid-1900's and PVC pipe which was first used in the U.S. in the 1960's, indicates that improvements to the distribution system have taken place since the 1920's. The "Soap Lake Mineral Water System Failure Report" dated January 26, 2017, noted that 3-inch AC pipe was replaced in the 1950's for both the domestic and mineral water systems.

Large portions of the distribution system are not operational at the present time. Due to extensive deterioration of piping and limited financial resources to carry out repairs and replacements, a great deal of the system has been taken off-line and abandoned in place. Mineral water service is no longer available to users west of Division Street. The mineral water main located in Main Avenue West just west of Division Street North was cut and capped during a road construction project in 2009 as shown in Figure 1-2. The main was exposed during the project and was found to be in very poor condition and had not been utilized in some time. Other mains which have been taken off-line and abandoned include mains located in Division Street South and 3rd Avenue SE, south of 2nd Avenue SW, and in 1st Avenue NE west of Elder Street North. It is not known when or how these lines were abandoned. The locations of the abandoned mains were determined from the previously mentioned map of the system, dated January of 1987.

GEOLOGICAL AND STORMWATER RUNOFF CHARACTERISTICS

The unique qualities of the lake's water may be at risk due to increased irrigation runoff, which could dilute the mineral content. Additionally, runoff may carry pollutants from urban or agricultural land use such as oils, metals, sediment, or nutrients, further degrading the quality of the lake.

Historically, the lake's salinity has been impacted by human activity. In the 1940's the Columbia Basin Irrigation Project was established in the greater Columbia River basin with the construction of the Grand Coulee Dam. This irrigation project, the largest of its kind in the United States, was developed to aid agricultural production in the area, diverting fresh water from the Columbia River at the dam. The lake experienced a marked decrease in salinity due to the additional freshwater runoff from irrigation in the area from several years of particularly wet weather and high rainfall during the early 1950's.

As a remedy, the Bureau of Reclamation initiated the Soap Lake Protective Works project, temporarily pumping directly from the lake during the winters to remove some of the excess volume in the upper layer and, as a long-term solution, installing a number of interception wells around the lake to remove groundwater. The principal components of the Protective Works are the FMX wellfield and the INY Wellfield. These wellfields each consist of three pumping wells in a manifold to a discharge header which discharges to

the Bureau of Reclamation West Canal to supplement the irrigation water supply for the Columbia Basin Project. The purpose of the Protective Works is to maintain the level of Soap Lake and the prevent groundwater from diluting or otherwise modifying the unique water chemistry of Soap Lake. The water level is maintained at an elevation of 1,078 feet.

The interception wells are pumped year-round, prohibiting groundwater from reaching the lake. As a result of this, the City notes relatively low levels of infiltration and inflow (I/I) within its sanitary sewer system. The interception wells remove the groundwater, which is low in salinity and would dilute the lake, prior to it reaching the lake, and they pump the water to the west canal where it flows downslope to the Columbia River Wasteway. The irrigation canals along the east and west sides of the lake also intercept much of the surface runoff from areas upslope before it can enter the lake.

It seems that a new normal of salinity was established in the 1950s, with the lake more diluted than previously noted, but the interception wells appear to have succeeded in maintaining the pre-irrigation water balance in the lake and lake salinity levels of the 1950's. It is unclear whether the lake could be restored fully to its pre-irrigation condition.

LOCAL INTEREST

A number of local groups are invested in the long-term quality of Soap Lake. The City's tourism industry is heavily reliant on the lake, as it attracts people from around the world looking to take advantage of the well-recorded healing properties.

The Soap Lake Conservancy is an organization run by citizens of the City dedicated to maintaining the lake's quality and improving the surrounding environment in order to protect the lake and bolster the City's economy. The group operates using membership fees and donations. The Conservancy worked with scientists at University of Washington in 2004 to study the levels and characteristics of the minerals in the lake. The group is partnered with the City and shares its information, research, and planning ideas with the City.

The City council recently founded a Lake Committee, which aims to address concerns about the water quality within the lake and potential pollution issues.

WATERSHED PLANNING

Soap Lake is located in Water Resource Inventory Area (WRIA) 42. In January 2015, the Department of Ecology issued an updated "Focus on Water Availability" for the Grand Coulee Watershed, WRIA 42. There is no watershed plan for the area.

INVENTORY OF EXISTING FACILITIES

The purpose of the mineral water system inventory is to establish the amount, type, and

capacities of the various components of the existing mineral water system. The City of Soap Lake obtains its mineral water supply from Soap Lake, a surface water source. The current mineral water system consists of a pump station, one storage reservoir, and approximately 6 miles of distribution lines.

SOURCE OF SUPPLY

The City's mineral water supply is obtained from Soap Lake through a pumping station located along the south shore of the lake near the north end of Aster Street. The mineral water pump station pumps water through approximately 200-feet of 2-inch Sch. 40 PVC suction line that extends into Soap Lake. Water is pumped by one 7.5 hp pump, capable of pumping at 50 gpm.

TABLE 1-1

Supply Source

Parameter	Pump Station
Status	Active
Date Constructed	Unknown (1)
Water Surface Elevation (ft)	1081
Inlet Depth (ft)	10 (2)
Rated Capacity (gpm)	50 @ 180 ft Head
Inlet Diameter (in)	2
Inlet Description	Sch. 40 PVC Pipe, Screened
Pump Type	Centrifugal
Pump Manufacturer	Cornell Pump Company
Pump Model Number	1WC-7.5-2
Pump Serial Number	216648 7.50
Motor Size, hp	7.5
Motor Manufacturer	Baldor-Reliance
Motor Speed (RPM)	3,450
Motor Voltage	208-230/460
Motor Serial Number	EJMM3219T

(1) It is known from water rights documents the mineral water system was in service by 1928. However, the date of initial pump station construction is unknown.

(2) The inlet pipe depth varies with lake levels.

STORAGE

The City of Soap Lake currently owns and operates one reservoir for the mineral water system which sits at the northeast corner of city limits at the north end of Scenic Dr. NE. The characteristics of this reservoir are shown in Table 1-2.

TABLE 1-2

Storage Reservoir

Reservoir	Date Built	Storage Capacity (gal)	Type	Depth (ft)	Length, Width (ft)	Base Elev. (msl)[(2)]	Overflow Elev. (msl)[(2)]
Raw Water	Unknown [(1)]	95,000	Buried Concrete	12	34	1195	1208

(1) It is known from water rights documents the mineral water system was in service by 1928. However, the date of reservoir construction is unknown.

(2) Base Elevation is determined from survey performed for the Soap Lake Water and Sewer (Phase II) Design and diagrams of reservoir levels from Councilman John Glassco.

Base Elevation is determined from a survey ground elevation of 1206 ft acquired for the Soap Lake Water and Sewer (Phase II) Design. Diagrams drawn by the City show the reservoir has a depth of about 11 feet from ground elevation, and since the reservoir is underground, the base elevation is determined to be at 1195 ft. Overflow Elevation is based on field measurement of the overflow pipe at the reservoir and is two feet above ground elevation. Storage Reservoir information used in determining these elevations is attached in Appendix C.

TREATMENT

The City does not currently provide treatment of its mineral water supply.

DISTRIBUTION

The majority of the City's mineral water distribution system consists of asbestos cement pipe, PVC, and Steel pipe. As previously mentioned, very little is known about when piping was installed. From the Soap Lake Mineral Water System Failure Report, it is known that 3-inch AC pipe was installed in the 1950's. The presence of PVC pipe indicates that other improvements must have been completed since at least the 1960's as that this type of pipe was not available prior to that time.

The overall condition of the distribution system is not well established. However, sections of pipe that have been exposed and cut during past construction projects have been found to be in poor condition. Some exposed pipes have been partially plugged with fine-grained lake sediments and mineral deposits. The intake pipe at the lake is elevated a couple of feet off the bottom of the lake with blocks, and is also fitted with a screen, but the screen has not been effective in preventing sediments from entering the system. Some of this material settles out of suspension in the reservoir, but some enters the distribution system, plugging pipes. The composition of the mineral water also seems to be corrosive to pipe materials as that some of the pipe exposed during construction has been found to be in a very fragile condition. This has been particularly true for individual service lines

to homes and resorts which are largely constructed of galvanized pipes. Accumulations of minerals on pipe walls has also been observed, further limiting pipe capacities. Based on these observations, and the age of the distribution system, it's thought the entire system needs replacement. The size and materials of the existing distribution system can be found in Table 1-3 below.

TABLE 1-3

Existing Distribution System

Water Main Size (in)	Pipe Type							Total Quantity (lin. Ft)	Percent of Total (%)
	Unknown	Copper	Steel	PVC	AC	C900 PVC	Galv.		
3/4	120							120	0.4%
1		850						850	2.7%
1-1/4				270				270	0.8%
1-1/2				1,330				1,330	4.2%
2			900	560	1,670		875	4,005	12.6%
3				3,260	12,690			15,950	50.1%
4			1,690	380	4,650	1,755		8,475	26.6%
6			840					840	2.6%
Total	**120**	**850**	**3,430**	**5,800**	**19,010**	**1,755**	**875**	**31,840**	**100%**
	0.4%	**2.7%**	**10.8%**	**18.2%**	**59.7%**	**5.5%**	**2.7%**	**100%**	

The mineral water distribution system is shown on Figure 1-2. The figure also shows the locations of mineral water mains that have been disconnected from the system and abandoned in place.

WATER RIGHTS

The City holds a water right certificate for the mineral water system, as summarized in Table 1-4.

TABLE 1-4

Water Rights

Priority Date	Instantaneous Withdrawal (cfs)	Purpose of Use	Place of Use
June 5, 1940	1.0	Medicinal, therapeutic, baths, swimming, and all other uses incidental at a health resort.	Town of Soap Lake

Relevant water right documentation is provided in Appendix A.

RELATED PLANNING DOCUMENTS

The following planning documents were used in the preparation of this Plan:

- 2018 City of Soap Lake Comprehensive Plan Update
- 2018 Water System Plan Update, City of Soap Lake
- 2019 Stormwater Management Plan Update, City of Soap Lake

MINERAL WATER SERVICE AREA CHARACTERISTICS

The City's mineral water service area is defined by the City corporate limits, which has an area of about 1.37 square miles. Zoning within the corporate limits include Residential, Multiple Dwelling, Permanent Mobile, Trailer Courts and Camps, 1st Class Commercial, 2nd Class Commercial, Industrial, and Urban Residential. A map indicating the City's corporate limits, UGA, and zoning designations is shown on Figure 1-4.

MINERAL WATER SYSTEM POLICIES

SERVICE AREA POLICIES

Title 13 of the Soap Lake Municipal Code (SLMC) establishes the adopted policies for water, sanitary sewer, and mineral water utilities. Chapter 13.28 provides the specific policies for the Mineral Water Service System, and is included in Appendix D. Following are a few key policies from this chapter:

- **SLMC 13.28.020(A) -** Inside City Limits. There exists a City mineral water system which delivers water drawn from Soap Lake to service locations within City limits. To be eligible for mineral water service, a property must be connected to the City's potable water system and remain so during the period of mineral water service.

- **SLMC 13.28.020(B) -** Outside City Limits. Because of the higher costs associated with the delivery of mineral water to users outside the City limits, there shall be no delivery from the City mineral water system to service locations located outside the City limits.

- **SLMC 13.28.030(E)** - The installation of mineral water service laterals from mains to the property line of the service location shall be required with the installation of infrastructure related to the platting of the property, water mains, streets, curbs, gutters, sidewalks and the like.

- **SLMC 13.28.030(E)** - Once a mineral water service lateral running from a mineral water main to a service location is installed and/or accepted by the City, ownership and responsibility for maintenance of that lateral from the property line to the main shall be the City's.

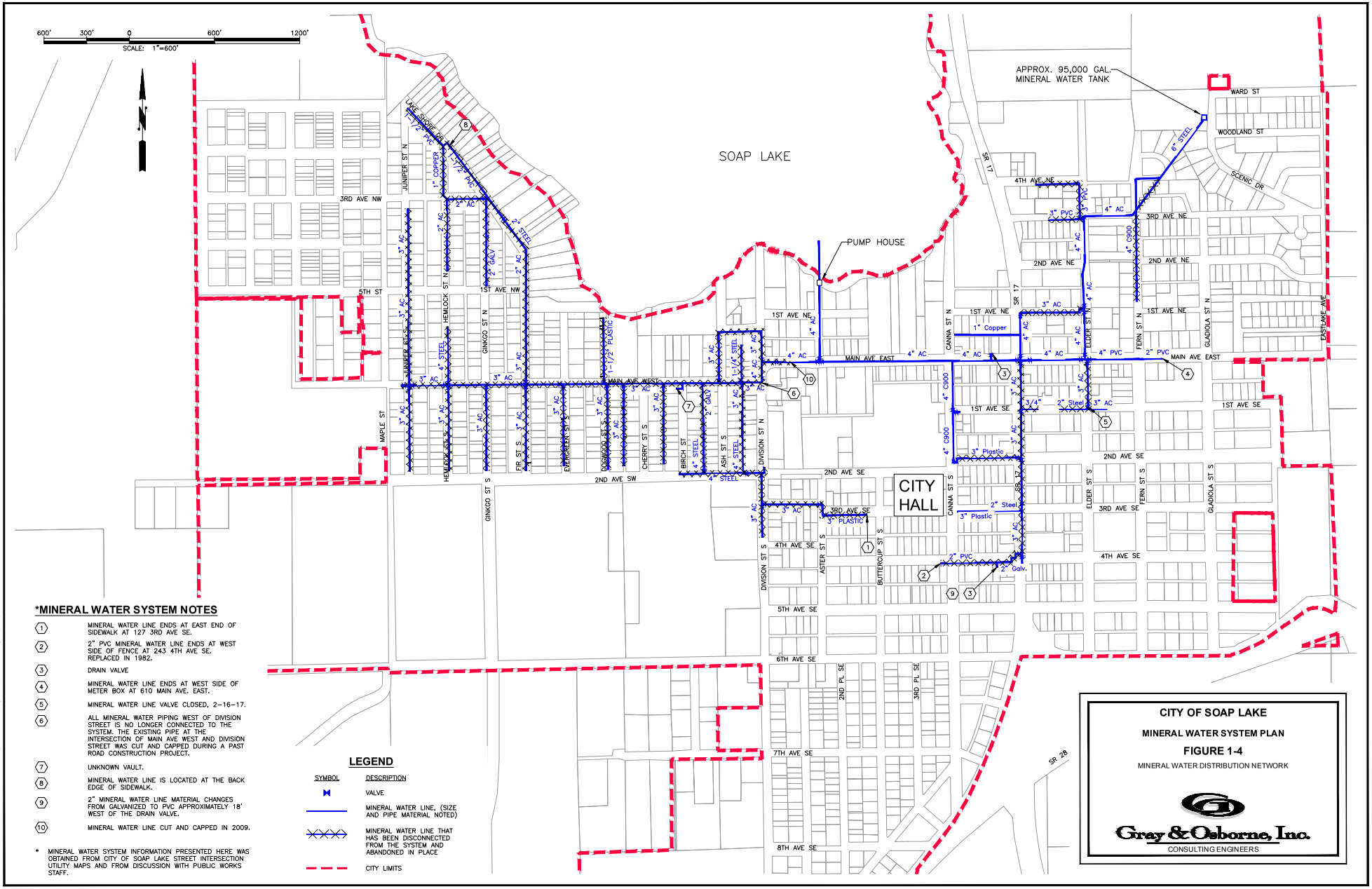
- **SLMC 13.28.080** - It is unlawful for any person whose premises are supplied with mineral water to furnish mineral water to additional premises unless such person first makes application in writing to do so and permission is granted by the City council.

- **SLMC 13.28.090** - When additional premises are connected or furnished with mineral water without the application prescribed in SLMC 13.28.080, the property owner served with the unauthorized service shall pay to the City two times the rate for the service provided as calculated by the City in its sole discretion.

- **SLMC 13.28.100** - When it is desired by the property owner to change the

location of the old service connection, a new service shall be placed only upon the owner making application and paying for a new tap at the actual cost involved.

- **SLMC 13.28.200** - Mineral Water Rates:
  - Turn-On Charge – The turn-on charge for a mineral water service is $20.00.
  - Connection charge for a single mineral water connection to the City's main is $250.00 together with the costs of materials and repairs to the infrastructure.
  - Inspection charge to inspect repairs or installations not performed by the City public works department is $50.00 per hour measured in quarter-hour increments with a one-hour minimum.
  - Monthly Service Fee - Residential connection serving one point of use is a single-family residence: $30.00 for the May-October billings, and $15.00 for the November-April billings.
  - Monthly Service Fee – Commercial connection for each point of use shall be $30.00 for the May-October billings, and $15.00 for the November-April billings.
  - Standby fee for availability of mineral water service at a property without any active service: $8.16 per month.



*MINERAL WATER SYSTEM NOTES

1. MINERAL WATER LINE ENDS AT EAST END OF SIDEWALK AT 127 3RD AVE SE.
2. 2" PVC MINERAL WATER LINE ENDS AT WEST SIDE OF FENCE AT 243 4TH AVE SE. REPLACED IN 1982.
3. DRAIN VALVE
4. MINERAL WATER LINE ENDS AT WEST SIDE OF METER BOX AT 610 MAIN AVE. EAST.
5. MINERAL WATER LINE VALVE CLOSED, 2-16-17.
6. ALL MINERAL WATER PIPING WEST OF DIVISION STREET IS NO LONGER CONNECTED TO THE SYSTEM. THE EXISTING PIPE AT THE INTERSECTION OF MAIN AVE WEST AND DIVISION STREET WAS CUT AND CAPPED DURING A PAST ROAD CONSTRUCTION PROJECT.
7. UNKNOWN VAULT.
8. MINERAL WATER LINE IS LOCATED AT THE BACK EDGE OF SIDEWALK.
9. 2" MINERAL WATER LINE MATERIAL CHANGES FROM GALVANIZED TO PVC APPROXIMATELY 18' WEST OF THE DRAIN VALVE.
10. MINERAL WATER LINE CUT AND CAPPED IN 2009.

* MINERAL WATER SYSTEM INFORMATION PRESENTED HERE WAS OBTAINED FROM CITY OF SOAP LAKE STREET INTERSECTION UTILITY MAPS AND FROM DISCUSSION WITH PUBLIC WORKS STAFF.

LEGEND

SYMBOL	DESCRIPTION
	VALVE
	MINERAL WATER LINE, (SIZE AND PIPE MATERIAL NOTED)
	MINERAL WATER LINE THAT HAS BEEN DISCONNECTED FROM THE SYSTEM AND ABANDONED IN PLACE
	CITY LIMITS

CITY OF SOAP LAKE

MINERAL WATER SYSTEM PLAN

FIGURE 1-4

MINERAL WATER DISTRIBUTION NETWORK

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M:\Soap Lake\17059 - Mineral Water System Plan\Figures\FIG 1-4.dwg, 6/18/2019 1:04 PM, KALEB SMITH

CHAPTER 2

BASIC PLANNING DATA

This chapter presents the basic planning data used to estimate Soap Lake's future mineral water demands. Mineral water demand projections are used in Chapter 3 to evaluate the adequacy of the City's existing mineral water system.

HISTORICAL DATA

The following sections provide historical population trends and a summary of active mineral water service connections.

HISTORICAL POPULATION, CONNECTIONS, AND USE

Figure 2-1 shows how the population of Soap Lake has varied since 1930. Population data for Figure 2-1 was obtained from the Washington State Office of Financial management (OFM). Census data indicates that the population of the City was 1,514 in 2010 and 1,535 in 2016.

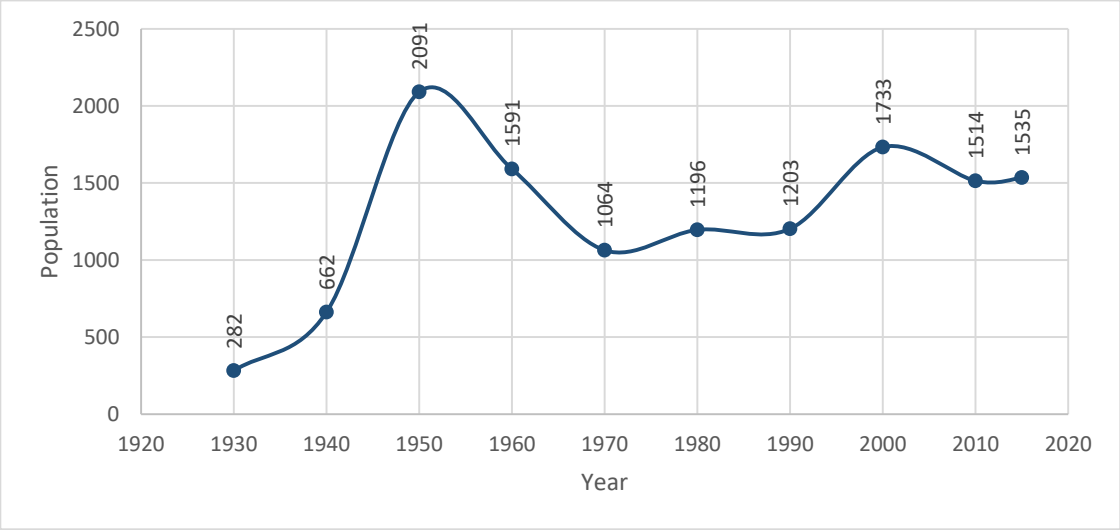


FIGURE 2-1

Historical Population

ACTIVE CONNECTIONS

As mentioned in Chapter 1, there historically had been as many as 170 commercial and residential mineral water customers when the water right application was filed in 1940.

Today, there are only 5 known active connections to the mineral water system. Table 2-1 provides information on the active connections.

TABLE 2-1

Active Connections

Customer	Address	Classification	No. of Units[1]
Linda Gustaveson	311 1st Ave SE	Residential	1
Linda Gustaveson (4-Plex Apartments)	22 S Canna St	Multi Family	4
Lesley Slough (Healing Water Spa)	318 E Main Ave	Commercial	1
Soap Lake Natural Spa & Resort – (Inn and Cottages)	236 E Main Ave	Hotel	28
Soap Lake Natural Spa & Resort – (Notaras Lodge)	13 Canna St. N.	Hotel	15

(1) For the apartment complex and hotels, the number of units refers to the number of apartments and rooms, respectively.

The mineral water system has no service connection meters. From the historical information learned from reviewing the 1940 water right application, it is thought that at one time some if not all of the services were metered. The City is currently installing meters on active service connections and they should be operational by late 2019.

COMMUNITY SURVEY ON POTENTIAL MINERAL WATER USE

In March 2018, the City of Soap Lake sent out a survey to its citizens with questions pertaining to the mineral water utility system. The survey asked residents if they:

- Had service;
- Wanted service;
- How much they would be willing to pay for service;
- How they would use mineral water (e.g. bathing, making Soap Lake products, etc.);
- And how frequently they would use mineral water (e.g., daily, weekly, etc.).

The purpose of the survey was to get a better understanding of existing use, to gauge interest in future mineral water system improvements, and to determine how much residents would be willing to pay for mineral water service if they don't already have service. The survey also asked respondents to provide their home or business addresses. Out of the more than 620 surveys sent out, the City received 120 responses. The survey was sent out in English, Spanish, and Russian languages to make sure that all members of the public would have an opportunity to respond. A compilation of the results is attached

in Appendix E along with a blank sample survey.

A summary of survey results is provided in Table 2-2. Figure 2-2 shows a cluster map of the locations of respondents who wanted mineral water service in their homes.

TABLE 2-2

Soap Lake Mineral Water Questionnaire Statistics

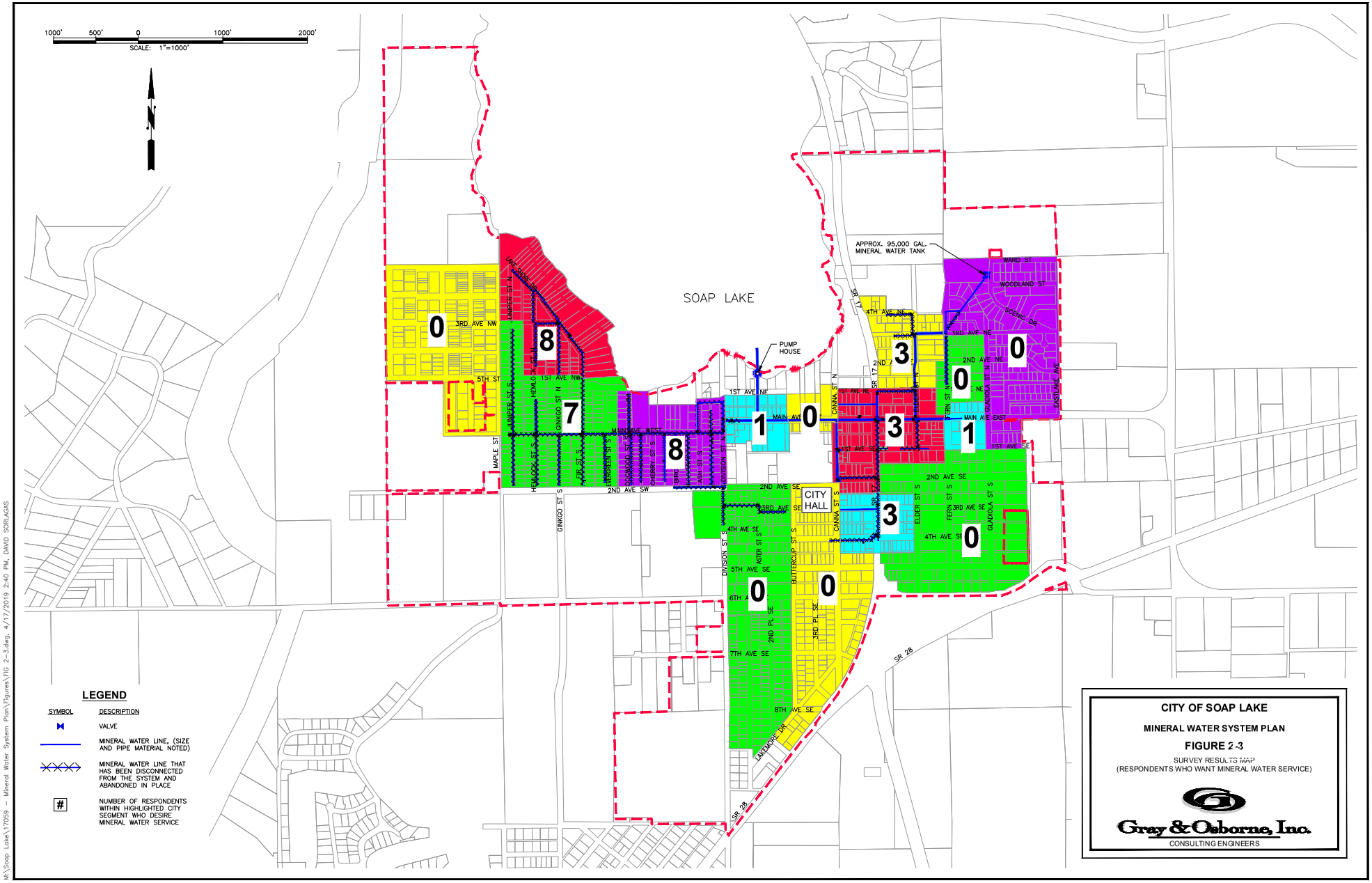
Question	Statistics
Total Respondents	120
Do you have mineral water connection?	49% responded YES
Do you want mineral water service?	33% responded YES
What are you willing to pay for Mineral Water service per month?	The median amount was $20
How do [or would] you use your Mineral Water service?	Most respondents said bathing
How often do [or would] you use your Mineral Water service?	The average use would be about 200 times per year or 4 times per week

Many respondents from the survey stated that their homes or businesses have mineral water service connections, but they are not able to use mineral water due to mainlines having been taken out of service. As mentioned in Chapter 1, mineral water is no longer available in several areas as the City has disconnected or abandoned failing distribution mains.

While many residents expressed interest in having mineral water delivered to their home or business, some also expressed interest in a new communal mineral water bathing facility, similar to a public pool. Those that voiced an interest in such a facility felt that it should be operated year-round and that pools be enclosed and heated so that they could be used in the winter. In addition to gaining a better understanding on the interest that exists in improving the system, how many residents want mineral water service, and how much they would be willing to pay for service, the survey was also useful in getting a better understanding of specific improvements that are desired; such as a communal facility. Other residents wanted to restore the historical extents of the mineral water system to serve all of the residential lots that were served in the past. Both the communal spa and restoring the mineral water system in its entirety are discussed as options in Chapter 6.

HISTORICAL PRODUCTION

Mineral water production data is limited; the City only recently began collecting and



LEGEND

SYMBOL	DESCRIPTION
⋈	VALVE
———	MINERAL WATER LINE, (SIZE AND PIPE MATERIAL NOTED)
××××	MINERAL WATER LINE THAT HAS BEEN DISCONNECTED FROM THE SYSTEM AND ABANDONED IN PLACE
#	NUMBER OF RESPONDENTS WITHIN HIGHLIGHTED CITY SEGMENT WHO DESIRE MINERAL WATER SERVICE

CITY OF SOAP LAKE

MINERAL WATER SYSTEM PLAN

FIGURE 2-3

SURVEY RESULTS MAP
(RESPONDENTS WHO WANT MINERAL WATER SERVICE)

Grey & Osborne, Inc.
CONSULTING ENGINEERS

M:\Soap Lake\17059 - Mineral Water System Plan\Figures\FIG 2-3.dwg, 4/17/2019 2:40 PM, DAVID SORLAGAS

documenting such information. A flow meter was installed at the pump station in early 2017 along with other improvements. This makes it possible to monitor the volume of withdrawal from the lake. Also, while there is no measuring gauge or mineral water telemetry system, the City has been keeping track of reservoir levels since January of 2017. This is accomplished by opening the access hatch to the reservoir and measuring the distance to the water surface. The reservoir is determined to be full once the water surface reaches to within 10-inches of the roof trusses.

The following sections provide summaries of pump station flow meter records and reservoir level records.

PUMP STATION FLOW METER RECORDS

Two flow meter readings have been recorded by the City since the flow meter was installed. Both readings were collected just after the pump was shut off. Table 2-3 provides the meter reading data, as well as pump start-up and shut-off times, if documented.

TABLE 2-3

Pump Station Flow Meter Readings

Pump Start-Up Date & Time	Pump Shut-Off Date & Time	Total Pump Run Time (Hrs.)[2]	Meter Reading at Pump Shut-Off (Gal.)
11/21/2017 at 4:30 pm	11/22/2017 at 12:00 pm	19.5	137,854
6/6/2018[(1)]	6/8/2018 at 4:30 pm	-	189,086

(1) The time of pump start-up was not documented on 6/6/2018.
(2) It was not possible to determine the pump run time from 6/6 to 6/8/2018 because the time of pump start-up was not documented.

From the flow meter data, it can be determined that approximately 51,232 gallons was pumped from the lake from June 6th to June 8th, 2018. The volume pumped between November 21st and November 22nd, 2018 can't be determined because an initial meter reading was not collected. However, measured reservoir levels can be used to estimate withdrawal, if it's assumed that water loss is minimal in piping between the pump station and reservoir.

RESERVOIR LEVEL RECORDS

Reservoir levels were periodically measured in 2017 and 2018 and drawn into a CAD diagram by the City (see Appendix C). When it was noticed that water levels were low in the reservoir through visual observation, the pump was manually turned on and allowed

to run continuously for several hours. According to the diagram, the reservoir was filled only five times between January 11, 2017 and July 8, 2018. A total volume of approximately 146,363 gallons was pumped to the reservoir during 2017, and about 47,298 gallons in the first half of 2018 (through July 8, 2018). The reservoir was only filled once during the first half of 2018; between June 6th and June 8th. As mentioned in the previous section, it was calculated that about 51,232 gallons was pumped during this time period based on flow meter readings.

Between the pump station flow meter records and the reservoir level records, there is a discrepancy of about 3,934 gallons depending on whether the flow meter or measured reservoir levels are used to determine the volume of water pumped. The reason for the discrepancy is unknown. It could be due to reservoir level measurement error or could be water that is lost through pipe leakage between the pump station and reservoir.

Figure 2-3 shows how much water was pumped to the reservoir and when, based on measured reservoir levels shown in the diagrams found in Appendix C.

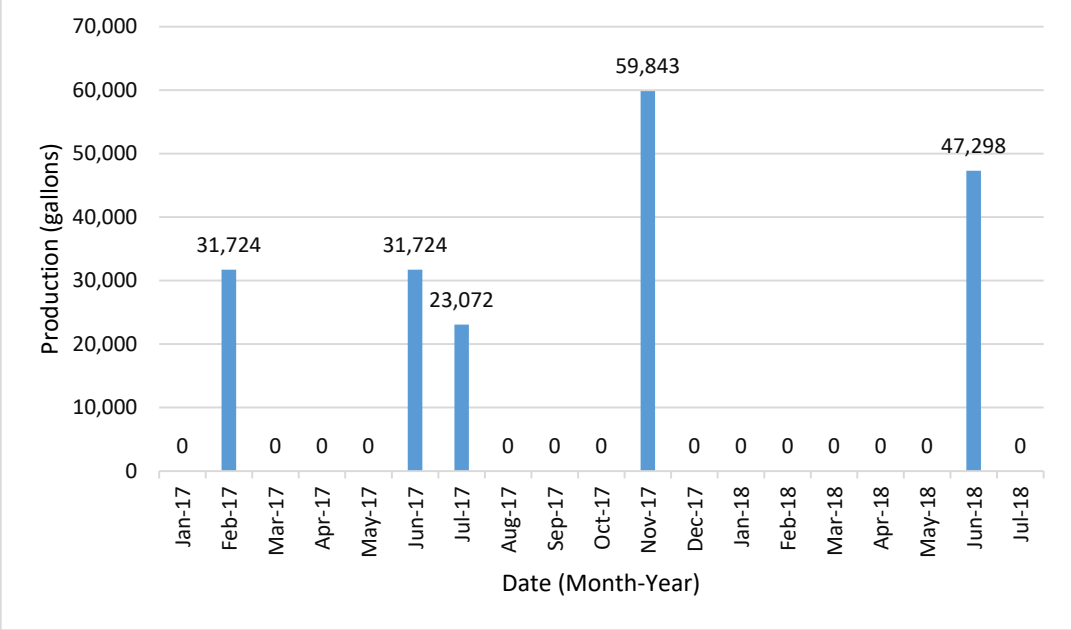


FIGURE 2-3

Approximate Water Pumped to Reservoir (January 2017 – July 2018)

HISTORICAL CONSUMPTION

As mentioned, the system is unmetered so it is difficult to document water consumption history. The reservoir levels recorded in 2017 and 2018 are the only known source of data that can be used to estimate historical consumption. Usage can be determined by

calculating the total volume of mineral water drained from the reservoir during the time period. However, it is not possible to determine total usage based on customer classification, (i.e. usage for single-family residential, multi-family residential, commercial, hotel, etc.) as would be typical in a water system plan for a metered domestic system. Table 2-4 provides total water consumption data for 2017 and for 2018 through July 8th from reservoir level records.

TABLE 2-4

Consumption History (2017-2018)

Time Period	Water Consumption (Gal.)	Water Consumption (GPD)
2017 (Jan. 11 to Dec. 31)	160,062	456
2018 (Jan. 1 to July 8)	88,395	499

It is important to note that the water consumption presented in the table does not necessarily represent actual use by customers. Some volume of water is most likely lost due to pipe leakage between the reservoir and customer service connections. It is not possible to calculate system leakage without having a way to determine exactly how much water was used by customers; meters would be needed to determine actual usage. Leakage is typically calculated by taking the difference between metered production and metered consumption for domestic water systems.

EQUIVALENT RESIDENTIAL UNITS AND AVERAGE DAILY DEMAND

Equivalent residential units (ERUs) are a way to express water use by non-residential customers as an equivalent number of residential customers. ERUs are calculated by first determining the average daily consumption per single family customer for a given year. This number is then divided into the annual consumption for each customer class (i.e. multi-family residential, commercial, hotel, etc.) to arrive at the number of ERUs for that class. ERUs are useful in evaluating existing use and in calculating estimates of future demand.

ERUs can't be calculated from actual usage data for the mineral water system because it isn't possible to determine consumption per customer class; services are not currently metered. To estimate ERUs for the system, it is first necessary to come up with estimates of average daily demand (ADD) per user classification. Following is a discussion of our assumptions used to estimate theoretical ADD per customer classification. Single-family, multi-family, commercial, and hotel will be discussed because existing customers fall within these classifications.

1. **ADD for Single-Family Residential**: Most survey respondents stated they would use mineral water for bathing at least every other day. The typical

modern (non-jetted) bathtub holds about 25 to 45 gallons of water depending upon the fill level (Biermayer, P. (2006) *Trends in Shower Design and Their Effect on Energy and Use*). For this analysis, it's assumed that 30 gallons would be used for each bath and one bath would be taken every other day.

Based on these assumptions, the ADD per single-family residence would be 15 gpd, (i.e. 30 gal./bath x 0.5 baths/day).

2. **ADD for Multi-Family Residential**: It's assumed that mineral water would be used the same in a multi-family residential unit as was assumed for a single-family home. One 30-gallon bath would be taken every other day. Based on these assumptions, the theoretical ADD would be 15 gpd/unit. So, as an example, the ADD for a 10-unit apartment complex would be 150 gpd, (10 apartments x 15 gpd/apartment).

3. **ADD for Hotels**: It's assumed that one 30-gallon mineral water bath would be taken each day a hotel room is occupied. The average hotel occupancy rate in the United States from 2001 to 2017 was about 61.5% (*Statista, The Statistics Portal*, 2018, Web. 23 Oct. 2018). For this analysis, an occupancy rate of 60% will be assumed. Based on these assumptions, the theoretical ADD would be 18 gpd/room, (i.e. 30 gal/bath x 1 bath/day x 0.60).

4. **ADD for Commercial**: ADD is very difficult to estimate without having actual metered data because mineral water could be used in many different ways at a business. The City's existing commercial user of mineral water is a day spa (Healing Water Spa and Gallery). The day spa provides facilities for customers to bath in heated mineral water (a jetted bathtub and footbaths) and they also utilize Soap Lake mud to manufacture skin creams which are sold at the spa. It's thought that future commercial businesses would likely utilize mineral water in much the same ways, and most likely be day spas.

   For this analysis, it's assumed the primary use of mineral water at a commercial operation will be for bathing, a jetted bathtub or whirlpool will be used for bathing, the average quantity of mineral water per bath will be 40 gallons, and on average, 4 customers per day will take a mineral water bath. Based on these assumptions, the theoretical ADD would be 160 gpd.

An estimate of ADD and the number of ERU's per customer classification can be estimated for existing customers based on these assumptions and estimates of use. The theoretical ADD per single family customer was estimated to be 15 gpd/ERU. This number can be divided into the annual consumption for each customer class to arrive at

the number of ERUs per class. Table 2-5 on the following page summarizes this information.

TABLE 2-5

Theoretical Estimated ADD and ERUs for Existing Customers

Classification	ADD (gpd)	Number of Units	ERUs	Percent of Total ERU's
SF -Residential	15	1	1	1.5%
Commercial	160	1	11	16.2%
MF - Residential	60	4	4	5.9%
Hotel	774	43	52	76.4%
Total	1,009	49	68	100.0%

As previously mentioned, it was estimated that approximately 160,062 gallons of mineral water was used over a period of about 50 weeks from January 11th to December 31st in 2017 based on reservoir water level measurements. Using the ADD for all users in the table above, the approximate usage over a span of about 50 weeks would be: (1,009 gpd) x (7 days per week) x (50 weeks) = 353,150 gallons. So, the calculated theoretical ADD based on our assumptions is very likely overly conservative and is greater than actual existing usage.

TABLE 2-6

Comparison of Consumption from Reservoir Levels vs. Assumed Consumption

2017 Water Consumption from Reservoir Measurements (gal.)	Theoretical Water Consumption from Assumed Usage (gal.)	ADD from Reservoir Measurements (gpd)	Theoretical ADD from Assumed Usage (gpd)
160,062	353,150	456	1,009

From a planning standpoint, it is often best to be conservative to account for unknowns. In the case of the mineral water plan, there is not a great deal of existing data that can be used to estimate future demand. Using a more conservative approach will help account for uncertainties and provide better assurance that infrastructure improvements will be sized to meet future demand. For planning purposes, the information summarized in Table 2-6 will be used to estimate projected future mineral water demand.

WATER PEAKING FACTORS

Water peaking factors are valuable in analyzing a water system to determine future water consumption values. The peaking factor is the ratio of the maximum flow to the average

daily flow in a water system. Peaking factors are typically calculated for Maximum Daily Demand (MDD) and Peak Hour Demand (PHD) in domestic water system plans. Peaking factors similar to those used in potable water systems were used for the flows in the mineral water system. The MDD represents the maximum consumption during any one day of the year, and is important in determining whether the water system source capacity and instantaneous water rights are sufficient to meet current and future demand. The PHD represents the maximum flow rate delivered by the distribution system on any single hour during the year, and is an important parameter in determining the amount of reservoir storage needed to make up the difference between the peak hour production requirement and the system's pumping capacity. The PHD is also important to consider when evaluating distribution system pipe capacities. Pipes should be of adequate size to convey the PHD flow rate.

The Washington State Department of Health (DOH) Water System Design Manual specifies how MDD and PHD are to be calculated for domestic water systems. From the manual, MDD can be calculated by applying a peaking factor of 1.3 (for water systems in Eastern Washington) to the maximum month's average day demand (MMAD). The MMAD is determined from monthly meter records. With the lack of any meters on the mineral water system, MDD can't be calculated using the guidance in the DOH manual. For most communities, the MDD ranges between about 160 to 220 percent of the ADD, with 180 percent being typical, (Linsley/Franzini/Freyberg/Tchobanoglous, "Water-Resources Engineering, Fourth Edition", Irwin McGraw-Hill, 1992). For this analysis, a peaking factor of 1.8 will be applied to ADD to determine MDD. The MDD for the mineral water system would be: (1.8 x 1,009 gpd) = 1,816 gpd, or about 1.3 gpm. A peaking factor of 1.8 will be used to determine projected estimates of MDD.

PHD is typically determined using diurnal water demand curves. Diurnal demand curves graphically show how water use varies per hour over the course of each day of the week, so can be used to determine the peak hour demand. These curves are established using actual usage data. With the lack of such data for the mineral water system, the DOH Water System Design Manual provides a means to estimate PHD using the following equation:

PHD = MDD x [(C)(N) + F] + 18 (Equation 5-1, DOH Water System Design Manual)

Where: **PHD** = Peak Hourly Demand, (gallons per minute)
C = Coefficient Associated with Ranges of ERUs
N = Number of ERUs
F = Factor Associated with Ranges of ERUs
MDD = Maximum Day Demand, (GPM/ERU)

The following Table 2-7 is used to determine values for C and F, (Table 5-1, DOH Water System Design Manual).

TABLE 2-7

PHD Factors Based on ERUs

Number of ERUs (N)	C	F
15-50	3.0	0
51-100	2.5	25
101-250	2.0	75
251-500	1.8	125
> 500	1.6	225

(1) Table 5-1, DOH Water System Design Manual

The total number of ERUs for the existing mineral water system was estimated to be about 68, (see Table 2-5). For the number of ERUs varying between 51-100, a value of 2.5 should be used for C, and a value of 25 should be used for F. The PHD for the mineral water system can be calculated as: (1.3/68) x [(2.5)(68) + 25] + 18 = 21.7 gpm.

For most community domestic water systems, the PHD ranges between about 225 to 320 percent of the ADD, with 270 percent being typical, (Linsley/Franzini/Freyberg/Tchoban -oglous, "Water-Resources Engineering, Fourth Edition", Irwin McGraw-Hill, 1992). So, in other words, a peaking factor of 2.7 could be applied to ADD to determine PHD. Using the calculated PHD of 21.7 gpm, the calculated peaking factor for the mineral water system would be: 21.7 gpm / 0.7 gpm = 31, (PHD / ADD, with ADD converted to gpm, i.e. 1,009 gpd / 1440 = 0.7 gpm). This factor is much higher than would typically be expected for a community water system. The high peaking factor for the mineral water system is due to the fact that the existing system is very small, and so great variability in instantaneous water usage would be expected, especially over short periods of time. For example, one customer might fill a bath tub at a rate of 3 gpm, whereas 5 customers filling bath tubs at the same time might use 15 gpm of mineral water, increasing the instantaneous mineral water usage by a factor of 5. Using this reasoning, the calculated PHD for the existing mineral water system of 21.7 gpm does not seem unreasonable. Equation 5-1 will be used to determine future estimates of PHD.

PROJECTED FUTURE POPULATION AND MINERAL WATER DEMAND

The following sections provide discussion on projected population and mineral water demand.

PROJECTED POPULATION

The City's future service area population is projected to grow at an annual rate of 1.5 percent, consistent with the 2006 Grant County Comprehensive Plan Update (p. 3-25). However, the City's 2009 Comprehensive Plan Update cautions that the County's growth

rate represents the highest rate allowed under the Growth Management Act, and that rate may not reflect true growth rates within Soap Lake. Consequently, the City plans to monitor actual growth during the planning period, and adjust as necessary.

Census data indicates the 2016 population of Soap Lake was 1,535. Assuming a 1.5% annual growth rate, the population of the city would be about 2,130 in 2038 at the end of the 20-year planning period.

PROJECTED BUILDOUT DEMAND

In general, comprehensive plans for municipal domestic water systems determine estimates of future water demands based on existing consumption, ERUs, and projected annual population growth rates. Projected water demands and ERUs are assumed to increase at the estimated annual growth rate of a city. Estimates of future demand are used to identify system improvements that are needed to meet demand (e.g. larger transmission mains, new reservoirs, new booster pump stations, etc.). Capital Improvement Plans can then be prepared to determine the priority level of improvements, schedule for completing improvements, and associated costs.

Because mineral water service is not required to be provided to every home and business in the City as is the case for the domestic system, and the choice to have service is at the discretion of the customer, existing usage and annual population growth rate can't be relied on to estimate future demand. Interest from the residents of Soap Lake, both residential and commercial, in using mineral water must be considered. The results of the survey are useful in gauging the public's interest in having mineral water service. As mentioned, of the 120 survey respondents, 40 expressed interest in receiving mineral water service to their home or business. For this analysis, it's assumed that this level of interest is representative of the community as a whole and that one-third (33 percent) of existing residents would like to have mineral water service. For the purposes of this Plan, serving one-third of the community will be considered the Buildout Scenario.

Along with customer interest in having mineral water service, the total number of existing single-family homes, multi-family units and hotel rooms in the City must be known. The number of existing businesses that could use mineral water for a commercial purpose must also be known. With this information, the projected demand to meet current interest in having mineral water service can be estimated if it's assumed one-third of customers would like to have mineral water service.

The City's 2018 Water System Plan provides the total number of water meters per customer classification, (Table 2-6, p. 2-6). This information can be used to estimate the total number of single-family residential homes in the City. From the table, there are 619 single-family water meters. If it's assumed that each single-family residence has one service line and meter as is most likely the case, then it can be assumed that there are 619 single-family homes.

From information provided by the City staff, it is known that there are 276 multi-family units in the City at the present time.

There are two hotels in Soap Lake, the Soap Lake Natural Spa & Resort and Masters Inn. Between the two hotels, there is a total of 60 rooms. Based on the results of the survey, it is known that the Masters Inn would be interested in having service. Projected demand for hotels will be calculated based on the assumption that mineral water will be available to all rooms.

The total number of commercial businesses that might want mineral water service is more difficult to determine. It can't be assumed that one-third of the total number of businesses want mineral water service, as that some businesses such as gas stations and grocery stores likely wouldn't have a need for service. Using the survey results is one means to determine commercial demand. Only one commercial business, the spa at 19 Main Street reported that they would like to have mineral water service. As previously mentioned, there is currently one active commercial mineral water connection. To meet current demand, it's assumed that mineral water service should be provided to a total of two commercial businesses.

Table 2-8 provides a summary of the estimated number of units, estimated ADD, and estimated ERU's to meet current interest from residences, businesses, and hotels in having mineral water service.

TABLE 2-8

Buildout Demand to Meet Current Interest in Mineral Water Service

Classification	Number of Units[1]	Estimated No. of Units to Meet Current Interest[2,3,4]	Estimated ADD (gpd)	Estimated ERUs
Residential - SF	619	206	3,090	206
Residential - MF	276	92	1,380	92
Commercial	-	2	320	21
Hotel	60	60	1,080	72
Total	955	360	5,870	391

(1) This column shows the estimated total number of units for the entire city.
(2) This column shows the estimated total number of units that would like to have mineral water service, assuming one-third or 33% are interested in service based on the results of the survey.
(3) It's assumed that the Masters Inn will also want mineral water service based on the results of the survey, and that all 60 rooms between the City's two hotels will have service for bathing.
(4) It's assumed that mineral water service should be provided to two businesses to meet current demand. The Healing Water Spa and Gallery is an existing customer, while the spa at 19 Main Street indicated they would like to have service in their survey response.
(5) It's assumed that one ERU equals 15 gallons per day.

POTENTIAL DEVELOPMENT DEMAND

When projecting future demands, it is also important to forecast potential future developments that could add demand to the mineral water system. During a meeting with City staff on December 4, 2018, three potential future developments were discussed. While there are no immediate plans to construct these developments, they would add significant demands to the system if they were to come to fruition. Following is a brief description of each development.

1. Community Facility – A community facility consisting of a heated pool and changing rooms is a development that could provide access to mineral water bathing to anyone in the city, regardless of whether or not they have mineral water service to their home or business. Such a facility might also promote winter tourism to the area. The City expressed interest in constructing a 'Roman Bath' style pool with bench seating around the entire perimeter. This pool would be similar to those at the Radium Hot Springs Mineral Pools in British Columbia, Canada, shown in Figure 2-4 below. It's thought that such a facility could be constructed at the City's West Beach Park, located on the lakeshore between Dogwood and Ash Streets. The City would own the land upon which the facility would be constructed and a private group would likely own and operate the facility in a public/private partnership. City staff stated that for volume calculations, it should be assumed that the pool will be 30 feet in diameter and 4 feet deep.

FIGURE 2-4

Mineral Water Pool at Radium Hot Springs, British Columbia, Canada

2. Wellness Center at McKay Hospital – The City expects that a new Veterans Administration housing development will be constructed on undeveloped lands south of the hospital. To better meet the needs of the future residents of this development, a new Wellness Center could be constructed at the hospital. One component of the center could be a mineral water bathing facility. Soaking in mineral rich baths can provide many health benefits including relief from skin conditions such as psoriasis, reduction of stress and anxiety, relief of chronic muscle pain from conditions such as arthritis, and improved blood circulation. Such a facility would be a very valuable resource for the hospital and veterans. There are no preliminary plans at this time for a wellness center, so it is unknown the size, number and type of baths that might be installed. For the purposes of this analysis, it will be assumed that 20 standards sized baths (i.e. 25 to 45-gallon capacity) would be installed at the center.

3. Hotel and Casino - A hotel and casino development could potentially be constructed on undeveloped lands on the west side of the lake, at the end of Lakeshore Drive. For the purposes of the analysis, the City stated that a 200-room hotel should be considered.

Table 2-9 provides a summary of estimated ADD and ERUs for each potential development.

TABLE 2-9

Potential Developments

Development	Estimated ADD (gpd)	Estimated ERUs
Community Pool Facility	235 (1)	16
Wellness Center	300 (2)	20
Hotel / Casino	3,600 (3)	240
Total	4,135	276

(1) Estimated ADD was determined for the Community pool by considering daily evaporation and assumed once a year draining and refilling of the pool. The calculated volume lost due to evaporation was determined to be 64,687 gallons/year (see calculations in Appendix F). The ADD due to evaporation could be calculated on a daily basis as: (64,687 gpy / 365 days per year)= 177 gpd. The total volume of the pool would be about 21,150 gallons, (i.e. 30' in diameter, 4' deep). If it's assumed the pool will be drained, cleaned and refilled once a year, the total volume broken down into a per day basis would be: (21,150 gal./365 days per year)= 58 gpd. The total estimated ADD would then be: 177 gpd + 58 gpd = 235 gpd.

(2) It was assumed that the Wellness Center would have 20 baths for mineral water bathing. Estimated ADD water determined using the assumed usage of 15 gpd/bath as was assumed for residential uses.

(3) It was assumed that the hotel would have 200-rooms, each with mineral water for bathing. Estimated ADD was determined using the assumed usage of 18 gpd/room as discussed earlier in this chapter.

SUMMARY OF PROJECTED DEMANDS FOR BUILDOUT AND DEVELOPMENT

Table 2-10 provides a summary of projected ERUs with these developments added to the ERUs summarized in Table 2-5. ERUs in Table 2-10 were calculated assuming one-third of existing residents want to have mineral water service and other assumptions as previously discussed.

TABLE 2-10

Projected ERUs – With Potential Developments

Classification	Estimated ERUs
Residential - SF	206
Residential - MF	92
Commercial	21
Hotel	72
Potential Developments	276
Total	667

Table 2-11 calculates the PHD projections for the mineral water system in the case of providing service to the one-third of the City that want mineral water service and development of the specified developments.

TABLE 2-11

Projected Mineral Water System Demands – With Developments

Scenario	ERUs (1)	Projected Average Day Demand (2)		Projected Max Day Demand (3)		Projected PHD (4)
		gpd	gpm	gpd	gpm	gpm
Buildout (5)	391	5,865	4.1	10,557	7.3	34
Development	276	4,140	2.9	7,452	5.2	30
Buildout + Development	667	10,005	6.9	18,009	12.5	42(6)

(1) From Tables 2-8, 2-9, and 2-10.
(2) Average Daily Demand (ADD) = ERUs * 15 gpd/ERU.
(3) Maximum Day Demand (MDD) is equal to ADD * 1.8. See discussion of peaking factor on page 2-9.
(4) PHD was calculated using Equation 5-1 from the DOH Water System Design Manual. Also see discussion on page 2-9.
(5) Buildout is defined as expanding service to one-third of lots within city limits. For more information, see the section entitled "Projected Buildout Demand" earlier in this Chapter.
(6) Note that the Projected PHD for the "Buildout + Development" scenario is not a sum of the Projected PHD's for the separate scenarios for "Buildout" and "Development." This is a result of Equation 5.1 in the DOH Design Manual.

CHAPTER 3

SYSTEM ANALYSIS

INTRODUCTION

The purpose of this chapter is to determine if the existing mineral water system facilities are able to supply sufficient quantity of water to meet existing and projected demands. Recommended improvements, project costs, and prioritization of recommended improvements are presented in Chapter 6 to address City preferences identified in this chapter.

FACILITY ANALYSIS

The following section evaluates the existing mineral water system facilities. They are analyzed based on their capacity, physical conditions, and performance capabilities relative to existing and projected growth conditions. Figure 1-2 in Chapter 1 shows a map of the City's existing mineral water system. An analysis of the system in regards to potential developments is provided at the end of the section.

WATER RIGHTS ANALYSIS

All appropriations of water for public use within Washington State must be made in accordance with existing water rights and the established procedures that govern their implementation and use. The City's water right for mineral water is discussed in Chapter 1. Table 3-1 compares the annual water rights with the Average Day Demand (ADD) and Peak Hour Demand (PHD) projections calculated in Chapter 2, Table 2-11.

TABLE 3-1

Water Right and Projected Analysis

Comparison	Average Day Demand (ADD)		Peak Hour Demand (PHD)	
	(acre-ft/yr)	(gpm)	(acre-ft/yr)	(gpm)
Water Rights	724.0	449.0	724.0	449.0
Buildout + Development Demands	11.2	7.0	67.8	42.0
Surplus/(Deficit)	712.7	442.1	656.3	407.0

(1) Since the Water Right does not specify an Annual maximum for water use, it is assumed that a constant rate is allowed, and therefore applies to both ADD and PHD

(2) 1 cfs = 449 gpm; 1 gpm = 1.61 ac-ft/yr

Based on the surpluses calculated for ADD and PHD, the original Water Right is

sufficient to meet any projected demands that the City may generate as a result of increased use and development for the mineral water system. However, as will be noted in Chapter 6 for the Spa Development capital improvement project, a water rights transfer may be necessary if the City were to apply for a new withdrawal point for a City-owned spa facility.

SOURCE OF SUPPLY ANALYSIS

For potable water systems, Washington Administrative Code WAC 246-290-222(4) requires source capacity to be sufficient to provide a reliable supply of water equal to or exceeding the Maximum Day Demand (MDD) at all times. The mineral water system operates in much the same way as a domestic system, so this requirement will be considered. Capacity of the mineral water pumping station is approximately 50 gpm or about 0.11 cfs. In Chapter 2, MDD for the existing system was calculated at only 1.3 gpm, while projected MDD was calculated to be about 13 gpm. Projected MDD was found assuming one-third of residents would be connected to the mineral water system and the three potential developments discussed in the chapter (i.e. Wellness Center, hotel/casino and community pool facility) were constructed and provided service. The City's water right certificate authorizes a maximum instantaneous rate of 1.0 cfs or 449 gpm which is much greater than the pump station capacity and projected MDD. The City has sufficient instantaneous water rights and a pumping capacity to exceed the projected MDD at all times.

Besides the requirements of WAC 246-290-222(4) the DOH Water System Design Manual recommends that systems wishing to provide a high level of reliability to their customers consider source criteria for emergency conditions. Some criteria items, such as one concerning fire suppression storage and another concerning a system's ability to meet the ADD with the largest source of water out of service are not applicable to the mineral water system. It is very unlikely mineral water would be used for fire suppression efforts and the lake is the only source of mineral water. Following is a summary of the criteria items that may be applicable to the mineral water system and so are worthy of consideration.

1. Meet the MDD with 18 (rather than 24) hours of pumping.

2. Provide two independent power feeds, or portable or in-place backup power unless the power grid meets the following minimum reliability criteria:

    a. Outage frequency average three or less per year based on data for the three previous years with no more than six outages in a single year. A power outage is considered a loss of power for 30 minutes or longer.

    b. Outage duration averages less than four hours based on data for the

three previous years with no more than one outage during the previous three-year period exceeding 8 hours.

Table 3-2 summarizes the City's mineral water system capacity with respect to the first recommendation. The City can reliably meet Criteria 1 using the existing source. However, the City's system does not currently provide backup power in case of a power outage. This may not be problematic to the mineral water system because the pump station is operated as needed about four or five times a year. Also, the reservoir has ample capacity to meet current demand for extended period of time. If demands were to increase substantially as projected in the "Buildout + Development" scenario explained in Chapter 2, backup power may be a more important consideration.

TABLE 3-2

Source Production Capacity Analysis

Criteria	Flow Req'd (gpm) (1)	Pump Station		Inst. Water Right	
		Flow Avail. (gpm)	Surplus (+)/ Deficit (-) (gpm)	Flow Avail. (gpm)	Surplus (+)/ Deficit (-) (gpm)
1. Meet MDD w/ 18 hrs Pumping	17	50	33	449	432

(1) Flow required = MDD x (24/18). Projected MDD is approximately 13 gpm, from Table 2-11.

The source of mineral water has a number of problems with regards to the suction piping and the pump station. First of all, the suction PVC pipe lays on the surface of the ground and is exposed to UV light, which degrades PVC, making it brittle and susceptible to failure. Additionally, the exposed PVC suction pipe has frozen in the winter and prevented mineral water use. One such instance of the pipe freezing was documented in the *Mineral Water System Failure Report* attached in Appendix B along with other Historical Mineral Water Documentation. However, the inlet freezing pipe issue may be alleviated by operational changes such as filling the tank during warmer periods and draining the inlet pipe when it is colder and at risk of freezing.

Due to the location of the suction pipe near the floor of the lake, it is possible that sediment can enter the mineral water distribution system and build up within the reservoir and pipes. Sedimentation and buildup can decrease the efficiency of the pump station significantly as the pump gets clogged.

STORAGE ANALYSIS

As mentioned in Chapter 2, the City considers the reservoir to be full once the surface reaches to within 10 inches of the roof trusses. The volume in the reservoir at this surface elevation is about 95,170 gallons. The existing storage volume is more than adequate storage for current and projected demands. In the future, projected demands may require

more regular use of the pumping station, but should not require any additional capacity at the reservoir.

Table 3-3 shows compares the existing reservoir volume to the different demand scenarios discussed previously in Chapter 2 for buildout, development, and both. For this analysis, it is assumed that the reservoir has an operational storage of 43,234 gallons, or 6 feet. At any reservoir level below this, the mineral water reservoir should be refilled.

TABLE 3-3

Storage Analysis for Projected Demands

	Buildout		Development		Buildout + Development	
	ADD	**MDD**	**ADD**	**MDD**	**ADD**	**MDD**
Demand (gpd)	5,865	10,557	4,140	7,452	10,005	18,009
Days Until Reservoir is Empty(1)	7.4	4.1	10.4	5.8	4.3	2.4

(1) This row calculates the amount of days it would take for the reservoir to empty according to the associated demand (i.e. 42,234 gallons / 5,865 gpd = 7.4 days until the reservoir would need to be refilled).

TRANSMISSION AND DISTRIBUTION

This section provides a discussion of the hydraulic modeling calibration and results, and the improvements resulting from the modeling.

Distribution System Hydraulic Analysis

A hydraulic model was developed for the City's mineral water system by creating an H_2ONet database of the distribution system and reservoir. H_2ONet uses a graphical interface loaded into AutoCAD to develop the water system grid and components. A linked computer model performs hydraulic calculations and returns output flows and pressures.

Model Background and Setup

The basic layout of the mineral water system is recreated within the model from historical maps and plans showing mineral water lines, including:

1. Street-Utility Intersection Map (unknown date)
2. Hand Drawn Mineral Water System Map (1987)
3. Water Distribution Improvement Plans (1995)

These documents are attached in Appendix B. Locations of distribution lines in these documents are approximate, and it is difficult to verify the exact locations of many of

these lines. However, these maps provide the best available information of the historical extent of the mineral water system, specifically the transmission of mineral water from the reservoir to the existing users within the downtown business district of Soap Lake. Existing pipe sizes were determined from these historical mineral water maps.

Important parameters of a water system model include the lengths, sizes, and elevations of pipes and their inverts. From these historical mineral water maps, Figure 1-2 in Chapter 1 represents what the determined pipe locations, lengths, and sizes are. Surface elevations were derived from City GIS information and topographic maps.

While the above maps do provide the diameter size of the pipes shown, they do not provide detailed information on lengths and elevations. This information is therefore assumed. Using modeling, we are able to determine the length of a drawn pipe segment using a to-scale basemap. Additionally, elevations were determined from survey completed for the Soap Lake Water and Sewer (Phase II) Design.

The model assumes that the mineral water system would see maximum flow demands projected in Chapter 2. The maximum flow demands projected was the "Buildout + Development" scenario, where one-third of the town would have mineral water demand, and three development projects would be constructed. These flows represent a conservative assumption of the largest demands the mineral water system could face in the future. Therefore, the model utilizes the "Buildout + Development" projected PHD value detailed in Table 2-11 of 42 gpm to analyze the distribution model.

Transmission and Distribution Piping

Distribution models are used to determine the adequacy of mineral water transmission lines with regards to their size and material for allowing adequate flow through the system. Pipe improvements are sized by modeling conservative, projected demands and installing adequately sized pipes to meet those projected demands. Despite this, projected demands calculated for the mineral water system are still extremely small. Even though this is representative of the use of the mineral water system the City can expect, it means that the analysis of the transmission and distribution modeling is not as useful. The model resembles an instantaneous look at the water system with demand distributed to resemble actual use scenarios the system could experience. In this instance, instead of distributing the "Buildout + Development" PHD demand (42 gpm) evenly to each node, it was split up in 5 gpm increments to 9 nodes (total 45 gpm) to represent 9 different bath users filling their bathtubs at 5 gpm.

The results of the model are provided in Appendix G. They show the flows and velocities in the pipes are very small. In the *Water System Design Manual (2009)*, DOH recommends a minimum velocity of 2 feet per second for all distribution lines to prevent sedimentation and stagnation within the distribution system. From the results, because usage is expected to be low, none of the pipe segments show a velocity above 2 feet per second. Generally, this could indicate the pipse are too small. However, based on the

historical information available, the pipes are already small – no bigger than 6 inches and mostly 3 or 4 inches. Therefore, as they are right now, the assumed pipe sizes are not an issue for the mineral water system. The existing pipes appear to be accurately sized for the larger demands projected in this Plan. Consequently, we recommend the City install blowoff assemblies on new transmission and distribution lines of the mineral water system and frequently flush each segment of pipe because regardless of the size of pipe, flow velocities will be insufficient to clean sediment from the pipes.

System Pressures

Distribution system models are also used to determine available pressures throughout the system given peak hour demands. In their *Water System Design Manual (2009)*, DOH sets a 30 psi minimum standard pressure at any tap within the distribution system. For the mineral water system, 30 psi should be an appropriate standard given the infrequent use of the system. It is possible that over time, scaling and sedimentation occurs within the distribution system and increases head loss, lowering pressure availability. As explained before, this problem can be mitigated by installing blowoff assemblies and providing maintenance flushing of the system.

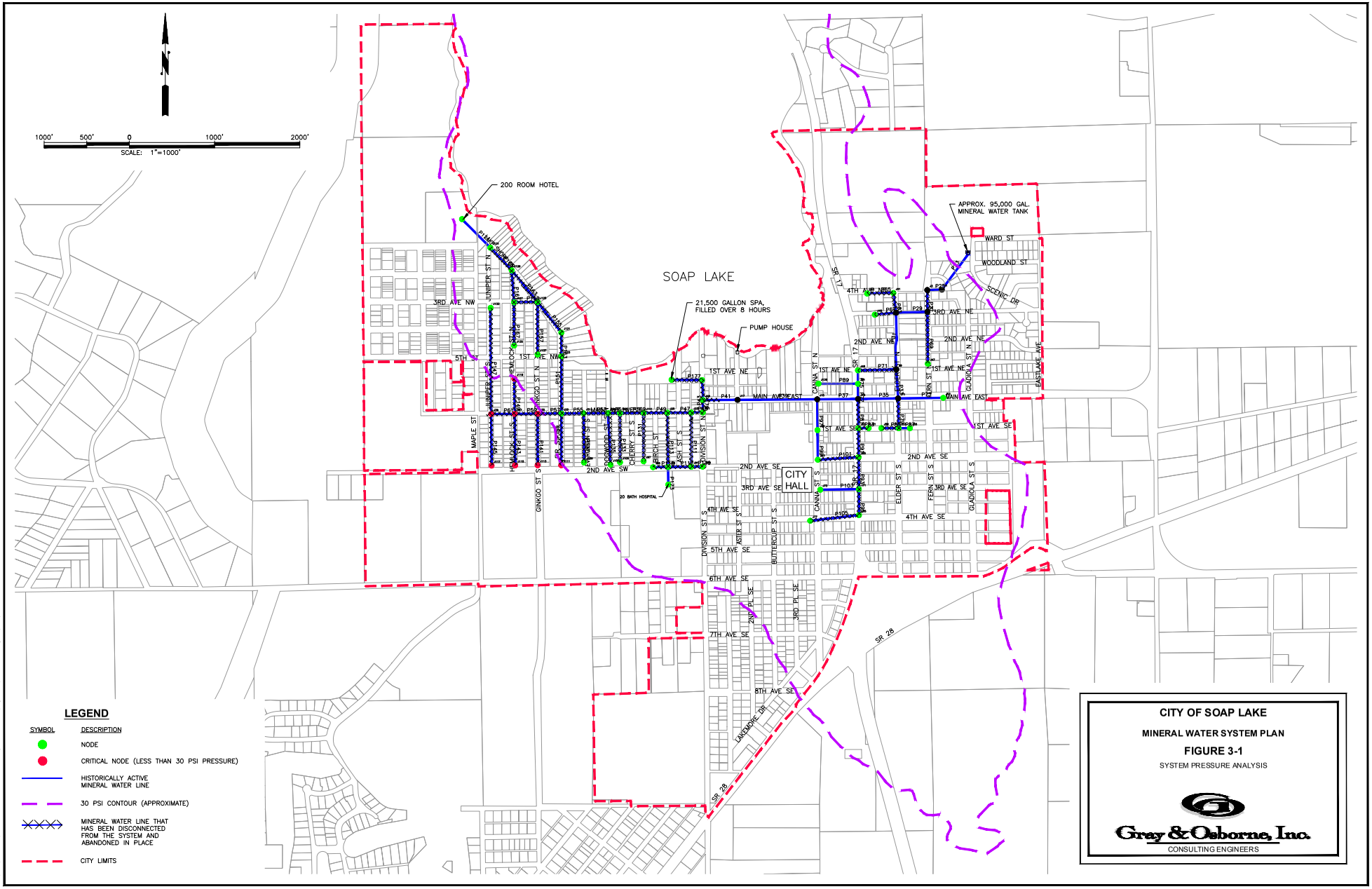
The results of the model are provided in Appendix G. They show that there are several nodes that exhibit pressures below 30 psi. Recalling that the reservoir has a base elevation of 1195 ft, a 30 psi minimum standard requires at least 70 feet of elevation difference to satisfy the pressure requirements, not including major hydraulic head losses in the distribution system (30 psi x 2.31 ft/psi = 69.3 ft). The modeling shows system pressures lower than 30 psi are expected at elevations higher than 1125 ft (1195 ft – 70 ft = 1125 ft). Therefore, certain sections of the City limits would have low pressures if the mineral water system were to be improved to serve them. Figure 3-1 shows the general locations of these areas with respect to the mineral water distribution system.

The low pressures, at about 22 to 29 psi, could be fixed if a new reservoir were installed at a higher base elevation or by another booster station to pump to areas at higher elevations. Capital Improvement Projects for these possibilities are included in Chapter 6.

Regulatory Analysis

The City's mineral water system was developed in the early- to mid-1900's and into the 1970s. It appears that in many cases the existing mineral water system piping was installed in the same trench as much of the City's potable water transmission lines. In between the early installation of the mineral water lines and present day, new regulatory requirements on water lines, treatment, and monitoring have been implemented. Applicable regulatory requirements are discussed in greater detail in this section.

Certain projects, such as the suction line improvements on the mineral water intake in Soap Lake, will require a number of permits. These requirements are discussed in



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Chapter 6 with respect to the capital improvement projects that require these permits. Permits that may be required include the Joint Aquatic Resources Permit Application (JARPA) from the U.S. Army Corps of Engineers, the Hydraulic Project Approval (HPA) from Washington State Department of Fish and Wildlife, and a Conditional Use or Substantial Development permit from Grant County per their Shoreline Master Program.

Department of Health (DOH)

Cross Connection Control

In email correspondence with the City, a representative of DOH has explicitly stated that cross-connection control devices be installed on all drinking water services to prevent cross contaminated water in private property facilities from entering the water distribution system. This email is provided in Appendix B. Per DOH, any services which are provided both mineral water and potable water should have backflow prevention on the potable water system to prevent cross-contamination with the mineral water. The City currently maintains a program to install check valves on drinking water service lines for properties that also have mineral water service.

The coexistence of both domestic potable water and non-potable mineral water services at many private properties within City limits can be problematic for business or homeowners because of cross connection issues. It is possible that someone may mistake the non-potable mineral water for the potable water when making new connections or perform plumbing, for example. Therefore DOH requires a certified operator and written protocol for protection of potable water from cross-connection of other non-potable services.

Department of Ecology (DOE)

The *Criteria for Sewage Works Design*, commonly referred to as the Orange Book, provides separation standards between domestic water and non-potable lines, such as sanitary sewer and irrigation pipelines. More specifically, Section C1-9 of the Orange Book standards details special requirements on the separation of potable water lines, reclaimed water lines, and sanitary sewers. According to C1-9.1.1, each of these lines must at least have a horizontal separation of at least 10 feet and a vertical separation of at least 18 inches between the bottom of the drinking water line and the crown of the sewer. An email from DOH regarding the required separation of mineral water system piping from potable water system piping can be found in Appendix B.

Department of Archeology and Historic Preservation (DAHP)

DAHP is Washington State's primary agency for monitoring historic preservation. In 2005 Executive Order 05-05 was signed by the Governor which required capital projects not undergoing a Section 106 review (National Historic Preservation Act) be reviewed to determine the potential impact to cultural resources. The review is required of all projects unless they are categorically exempt.

The City of Soap Lake has historically been deemed culturally sensitive to the Colville Tribes. As such, the City must do a cultural survey for all of its projects and must also do on-site monitoring of the construction. Typically, 75% construction monitoring within 250 meters of the lake and 40% between 250 and 500 meters. The construction monitoring costs approximately $8 pre linear foot of utility installation.

All projects considered in this Plan will include a cultural resource review and on-site monitoring.

Spa Facility

As will be discussed in the Chapter 6 for capital improvements, the City has expressed interest in developing a spa facility. There are a number of regulatory requirements on spa facilities in Washington State that may apply to the City's facility in accordance with WAC 246-260. Based on this WAC, the spa facility may be required to treat the mineral water of pH, turbidity, and disinfection. The spa may also require a recirculation tank for appropriate turnover circulation and to chlorinate consistently. Additionally, the proximity to the shoreline of Soap Lake may require the completion of either a Substantial Use Permit or a Conditional Use Permit under the Shoreline Master Plan for Soap Lake and Grant County. The cost of these requirements are included in the estimated cost in Chapter 6.

Mineral Water Discharge

After mineral water is used, the mineral water is currently drained to the City's sewer system and to the City's wastewater treatment plant. It is not clear how the composition of the mineral water discharge affects the operation of the wastewater treatment plant. The City has indicated that in order to ensure the sustainable use of the limited and unique aspects of the mineral water, they would like to consider a plan to recycle the mineral water back into the lake. To discharge water back to the lake would at a minimum require a new plumbing system in each house or business. It may also require a collection tank at each connection to collect the used mineral water so the City could pump out and haul by truck to discharge in the lake. Alternately, a new collection system might be required to convey the used mineral water to the lake. It is also possible the used mineral water may require treatment.

Although there is no specific regulation for the handling of mineral water waste discharge, a number of rules and statutes may be applicable, and ultimately, the regulatory agencies have final discretion on what rules apply and which they will enforce. One such rule they could apply is Chapter 173-201A, the WAC for Water Quality Standards for Surface Waters. This rule applies to any reclaimed water that would discharge to surface waters of the state. Though mineral water is not technically reclaimed water, a regulator could apply the reclaimed water standard if the City were to discharge used mineral water back into the lake. At that point, the City would be required

to treat their mineral water wastes from personal baths or the public spa to the same water quality standards set for reclaimed water. This type of treatment would likely require a treatment facility similar to the City's Wastewater Treatment Facility that operates separately to discharge back into the lake. If the City were to pursue discharge of used mineral water back to the lake, a report with costs of the new collection system and costs required for plumbing and tanks at each connection would likely be required. It is also anticipated that negotiations with regulatory agencies to allow the discharge of used mineral water back to the lake and to determine level of treatment if any would be required.

Alternatively, the mineral water may simply be connected to the sewer system where it would go to the City's wastewater treatment facility. If the spa facility is added to the mineral water system and discharges to the sewer system, this could have a significant impact on wastewater treatment. A study might be needed to determine the impacts of draining high pH and alkaline water to the wastewater treatment plant.

CHAPTER 4

OPERATIONS AND MAINTENANCE

INTRODUCTION

The objective of this Chapter is to provide an operation and maintenance (O&M) program for the City's mineral water system. Recommended maintenance activities and frequency/schedule for completing the activities will be discussed in this chapter. The O&M program will consist of the following elements: routine operating procedures, emergency response plan, safety procedures, cross-connection control, customer complaint response program and record keeping and reporting.

SYSTEM PERSONNEL

The City's mineral water personnel are listed below. The City's daytime phone number is (509) 246-1211. A comprehensive list of emergency phone numbers is provided later in this chapter in the emergency response plan. The current city staff responsible for the mineral water system are listed in Table 4-1.

TABLE 4-1

Mineral Water System Personnel

Name	Title	Certification	Phone
Darrin Fronsman	Public Works Director	WDM2, CCS, WDS	(509) 760-3738 (Cell)
Sean Meyers	WWTP Operator, On Call for Mineral Water System		(509) 246-1823 (WWTP)

OPERATION AND MAINTENANCE PROGRAM

There are several preventative activities that should be undertaken to ensure the proper operation and function of mineral water system components. Regular inspection activities should also be performed so that any problems with system components can be identified and corrective measures can be undertaken. Ideally, problems would be identified and corrected prior to the City receiving complaints from customers.

Table 4-2 lists the existing operation and maintenance practices used for the mineral

water system.

TABLE 4-2

Existing Operation and Maintenance Practices

Activity	Frequency
Record Flow and Reservoir Data	Every time the pump is run and the reservoir is filled.
Exercise Valves	Biennially
Inspect reservoir interior and exterior surfaces.	Annually

In addition to the existing O&M, Table 4-3 provides a list of recommended preventative and inspection activities as well as a frequency for completing the activities.

TABLE 4-3

Recommended Operation and Maintenance Practices

Activity	Frequency
Read Service Meters[1]	Monthly, except when covered with snow.
Clean Reservoir	Every 4 years.
Flow and inspect meters according to schedule.[1]	Annually
Inspect pump, controls and flow meter.	Annually
Inspect pump suction line in lake.	Annually, and during extended periods of cold winter weather.
Meter Re-Calibration[1]	Every 4 years.
Pipe Blowoff Flushing	Annually

(1) Based on a meeting with City staff on December 4, 2018, it's understood the City is planning on installing meters on active connections.

READ SERVICE METERS

Reading service meters monthly will allow the City to track mineral water use by their customers and develop a realistic rate structure and future rate increases for mineral water connections.

CLEAN RESERVOIR

Cleaning the reservoir every four years will help to prevent excessive buildup of sediment or undesired biological growth at the reservoir.

INSPECT METERS AND RECALIBRATE

Inspecting meters and recalibrating broken meters after they are installed will ensure meter reading is accurate and fair to customers of mineral water.

INSPECT PUMP STATION

Inspecting the pump, controls, and suction line frequently at the pump station is necessary because many potential problems. The pumps need to be inspected frequently to make sure that sediment has not built up and that the pump is running efficiently. Inspecting the suction line, especially during the winter months, is important to make sure the pipe does not freeze or break from exposure to cold or sun.

PIPE BLOWOFF FLUSHING

If the City chooses to install new mineral water transmission lines, it is recommended that they install blowoff assemblies to allow operators to flush mineral water pipes. As described in Chapter 3, the mineral water lines will need to be flushed to prevent sedimentation and stagnation within the system.

SUPPLIES AND SUPPLIERS

Table 4-4 provides a list of the types of materials the City would need to acquire to complete mineral water system improvements, and where these materials can be obtained. This information is also provided so that City staff will know who to contact to obtain replacement materials and for troubleshooting of system components.

TABLE 4-4

Supplies and Suppliers

Supply	Supplier	Phone
PVC Pipe	H.D. Fowler, Yakima	(509) 248-8400
Gate valves		
Service meters & setters		
Meter boxes		
Repair bands		
Dresser couplings		
Miscellaneous pipe fittings		
Electrical	K&N Electric, Moses Lake	(509) 765-3399

RECORD KEEPING

The City should keep records of pump meter readings, reservoir levels, service meters,

and backflow device inspections.

COMPLAINT RESPONSE

The City maintains customer complaint records to verify trends that may help the City improve service to its customers. Response to questions and complaints is typically verbal, either through a field visit or a telephone call. However, depending on the nature of the question or complaint, written response can also be given. Bimonthly City Council meetings, scheduled on the first and third Wednesdays of the month, are the main venue for public involvement in the mineral water system.

SAFETY PROCEDURES

All appropriate Occupational Safety and Health Administration (OSHA) and Washington Industrial Safety and Health Administration (WISHA) regulations are routinely followed during operation of the system. Operation and maintenance staff is trained in safety practices including confined space, first aid, and fall restraint. The City maintains fall equipment for inspecting reservoir hatches and screens, and confined space equipment for underground vaults.

CROSS-CONNECTION CONTROL

DOH has requested that the City install check valves on potable water service connections on all properties that also have mineral water service. The check valves on the potable water services will prevent mineral water from potentially flowing back into the City's potable water system in the event that there is a cross-connection within a home or business. DOH considers the mineral water to be non-potable.

SCADA AND TELEMETRY

As of the writing of this plan, the mineral water system is operated manually based on visual inspection of the reservoir level and manually turning on the pump at the lake. The current demand for mineral water is small enough such that the operations and maintenance outlined in this chapter should be sufficient. In the future, as demand for mineral water increases, these operations and maintenance practices may require more public staff time and work. When this is the case, it may be cost-effective to install SCADA and telemetry systems on the pump and reservoir in order automatically control the distribution system.

CHAPTER 5

CONSTRUCTION STANDARDS

CONSTRUCTION STANDARDS

The City uses their Construction Standards for water utilities for improvements to the mineral water system. The water utility standards are included as part of this plan in Appendix H.

CHAPTER 6

CAPITAL IMPROVEMENT PROGRAM

OBJECTIVE

The objective of this chapter is to present budgetary costs for Capital Improvement Program (CIP) projects to address system deficiencies that were identified in previous chapters. Chapter 3 shows that existing components of the mineral water system appear to be appropriately sized. However, the majority of the system is old and appears to be nearing the end of its useful lifespan. Much of the original distribution piping has already failed and been abandoned and it is likely that any remaining original system components will continue to fail and need to be abandoned or replaced. This chapter includes a number of CIPS to allow the City to choose different ways to operate the mineral water system to different service areas. It is ultimately the City's choice as to what the mineral water system service area will be and how much of the City is provided mineral water service. Finances and funding are likely to be important in any decisions and the following CIPs all include budgetary cost estimates. Alternatives for a few different levels of operation can be found later in the Chapter.

CAPITAL IMPROVEMENTS

Mineral water system deficiencies identified in previous chapters and from discussions with City staff and concerned citizens are summarized in the following sections. A map showing the location of each project (as applicable) is presented on Figure 6-1. Detailed planning-level cost estimates are provided in Appendix I.

The following naming codes are used to represent different components of the mineral water system that may require capital improvements to service users:

- SO: Source Improvements
- ST: Storage Improvements
- DS: Distribution System Improvements
- DV: Spa Developments

SOURCE IMPROVEMENTS

SO-1: Suction Line and Pump Improvements

This capital improvement would be constructed in conjunction with either SO-2 or SO-3, depending on which alternative is selected. The existing 2-inch Sch. 40 PVC suction line was installed in January of 2017 to replace the existing suction line which had frozen during an extended period of cold, snowy weather. The pipe is located above ground, supported by several large rocks near the lakeshore. PVC pipe is not intended for above-ground installation, and prolonged exposure to UV radiation will cause the pipe to

become brittle and deteriorate much faster than it would if it were buried. The pipe is also much more likely to freeze than if it were buried. This project will replace the existing suction line with a buried 2-inch or 4-inch PVC or HDPE suction line. The pipe will be buried at sufficient depth to protect the pipe from freezing. The portion in the lake will be anchored to support blocks and set above the bottom of the lake by an elbow to prevent sediment from entering the line. To prevent sediment from entering the system, the influent pipe would be tied to an anchor at its opening to weigh the pipe down in the lake such that the pipe lays below the water surface but above the lakes bottom.

This project will require permits from a number of relevant state and federal agencies, including, but not limited to, the U.S. Army Corps of Engineers (JARPA), Washington State Fish and Wildlife (HPA), and the Grant County Substantial Development or Conditional Use Agreement permit, depending on Grant county Shoreline Master Program rules.

Estimated Cost: $66,000

SO-2: Pump-house Improvements and Heating Installation

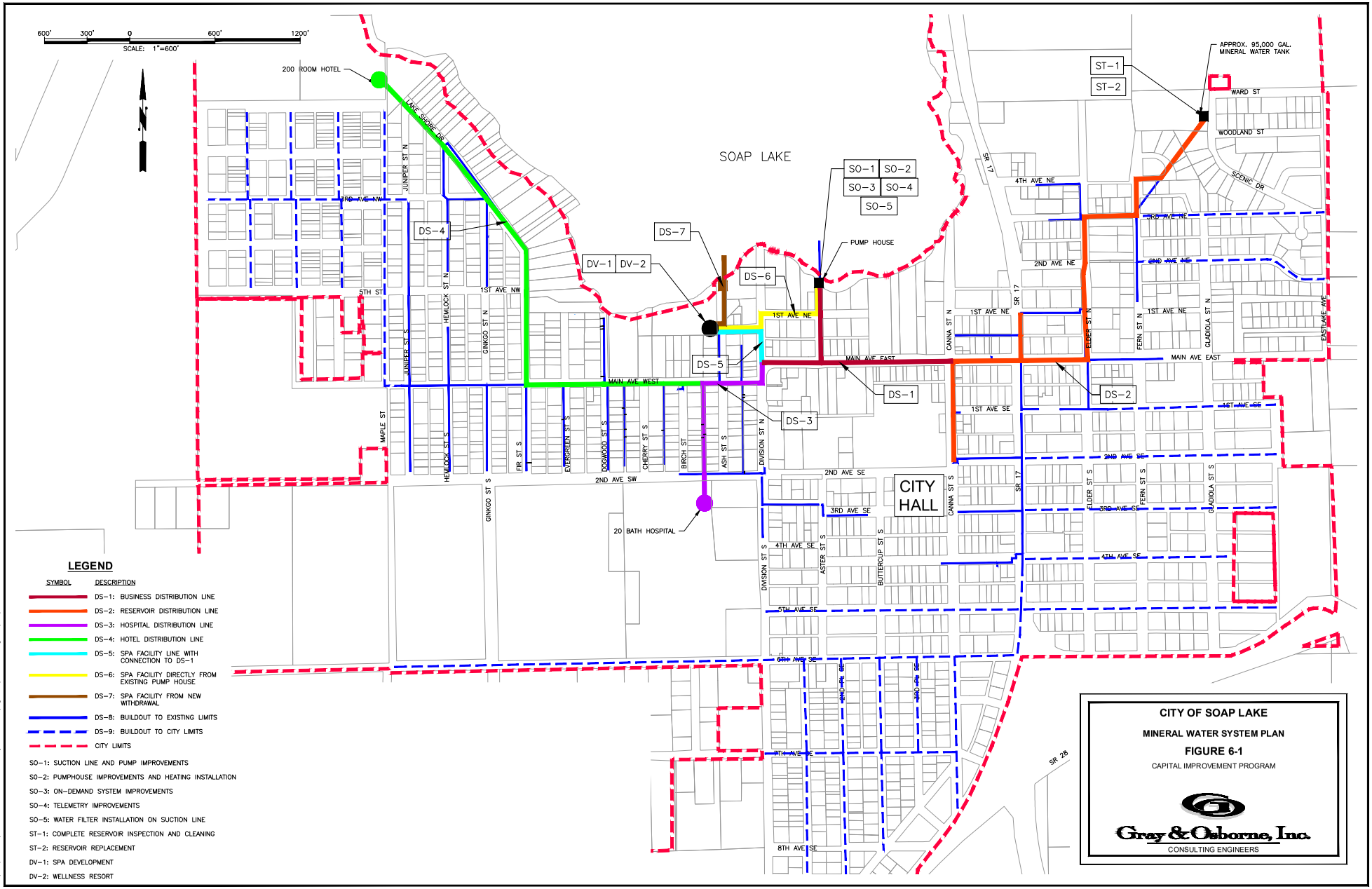
The existing pump-house requires replacement due to deterioration of the foundation and structure. The City has also indicated that a heating unit may be necessary to prevent freezing on the internal piping and pump equipment during the winter. If a heating unit is to be installed then the existing pump-house would not have sufficient space. A new 8-foot by 8-foot building will house the pump improvements and connection to the new buried suction line described in SP-1, and include the heating unit. It has been proposed that the new pump-house be incorporated in the lava lamp development, however, the estimate is for a separate pump-house at this time.

Estimated Cost: $78,000

SO-3: On-Demand System Improvements

This improvement is required if Alternative 1 is selected and an On-demand system is chose to serve businesses and a potential spa facility. This capital improvement project would be constructed in place of SO-2 because of significant changes to the design and operation of the pump-house required to distribute mineral water directly from the pump-house instead of the reservoir. A new pump and a VFD will be installed to vary flow to match varying mineral water demands. In place of the existing pump-house, a new pump-house will be larger at 10-foot by 10-foot to provide enough space for the added equipment and electrical controls. As a result, a significant amount of rock excavation may be necessary because of the location of the pump-house, and is therefore included in the cost estimate. Depending on the layout, a rock retaining wall may be necessary as well. The project would also install significant upgrades to electrical, telemetry, and instrumentation equipment.

Estimated Cost: $544,000



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SO-4: Telemetry Improvements
In the future, if demand for mineral water increases to a certain point, the City may be manually turning on the pump for several hours each day. At this point, SCADA improvements will be necessary. The City may have the option to incorporate new telemetry for the mineral water system into their existing potable water telemetry, however, this cost is for a new radio telemetry system and electrical improvements to the reservoir and pump-house. This project would install a pressure transducer with backup float controls and a visual gage on the outside of the tank. This system would also send notifications or warnings to operators if components of the system were not working or reservoir levels reach below or above a specified point. This includes getting power to the reservoir to power the SCADA improvements.

Estimated Cost: $68,000

SO-5: Water Filter Installation on Suction Line
If the improvements in SP-1 are insufficient to prevent sediment from entering the distribution system, this project will install a water filter on the suction line to prevent sediments from entering the system. A media filter or disk filter will be installed within an above-ground insulated water vault for ease of access, cleaning, and maintenance. These types of filters are effective at removing both sediment and organic materials from lake water sources. Filters can range from $4 a piece for replaceable filters, to $2,000 for washable filters.

Estimated Cost: $37,000

STORAGE IMPROVEMENTS

ST-1: Complete Reservoir Inspection and Cleaning
At the present time, the existing mineral water reservoir is not regularly inspected or maintained. As a near-term CIP, it's recommended that the reservoir be inspected at least once within the next 6-years. It is not known exactly when the reservoir was constructed, and despite the fact that it does not appear to be leaking, it is likely that some maintenance work is required to extend the life of the reservoir. Inspection of the reservoir will make it possible to determine what maintenance work is required. This can be performed by a company called Liqui-vision that does reservoir inspections in Washington State. The reservoir should also be cleaned of accumulated sediments with the inspection work, and can be done by draining the reservoir, vactoring sediments, and washing the reservoir. The City has indicated that the City owns a vactor and City staff could use it to clean the reservoir themselves. This cost estimate includes an item for cleaning in case the City chooses not to clean the reservoir with City resources.

Estimated Cost: $30,000

ST-2: Reservoir Replacement
Although it is not known exactly when the existing concrete mineral water reservoir was

constructed, it is very old and is showing signs of deterioration. There are noticeable cracks on the exterior of the above ground portion of the tank and the concrete appears to be spalling. This project involves the construction of a new 120,000 concrete storage reservoir adjacent to the existing reservoir. This is a standard volume of small reservoirs built by Mt. Baker Silos. The increased volume allows for oversizing of future development. The new reservoir would need to have a higher base elevation than the existing reservoir in order to provide adequate pressure to the west side of city limits as described in Chapter 3, *System Pressures*.

Estimated Cost: $496,000

DISTRIBUTION SYSTEM IMPROVEMENTS

Budgetary Pipe Installation Cost

A budgetary cost estimate was prepared for general pipe installation costs and can be found in the Appendix. The cost for installation of 2-inch, 4-inch, and 6-inch pipe is similar in terms of materials and labor so a cost estimate was prepared for a standard length of pipe to allow the City to determine budgetary costs for pipe extensions on a cost per foot basis. There may be some potential cost savings for replacement mineral water system pipe installation if the pipe could be installed in shared trenches with other utilities.

Estimated Cost: $250/LF

DS-0: Meter Installation on Existing Services

This project would install meters on active mineral water services. Installing meters on existing services is important for several reasons. It makes it possible to monitor actual use, determine estimates of distribution system leakage by comparing metered consumption to metered withdrawal from the lake, and calculate important water system parameters such as Average Daily Demand (ADD), Maximum Daily Demand (MDD), and Peak Hour Demand (PHD) from actual data, and monthly billings could be based on actual use rather than flat rates.

Estimated Cost: N/A (City to complete)

DS-1: Business Distribution Line

This project would install 1,900 linear feet of 4-inch pipe, extending from the pump-house to the existing businesses that rely on mineral water. The project would run on Main Avenue between Division and Canna Street.

Estimated Cost $464,000

DS-2: Reservoir Distribution Line
This project would replace 3,400 linear feet of 4-in. and 1,000 linear feet of 6-in. distribution pipe from the reservoir to the end connection of DS-1 at Main Avenue East and Canna Street North.

Estimated Cost $986,000

DS-3: Hospital Distribution Line
This project would install 1,500 linear feet of 4-inch pipe, extending from the Business Main Line Transmission Improvements (DS-1) to the existing hospital for mineral water use at a wellness facility associated with the hospital. The project would require street repair and would be completed in preparation mineral water baths being built at a wellness facility at the existing hospital.

Estimated Cost $365,000

DS-4: Hotel Distribution Line
This project would replace 3,800 linear feet of 4-inch pipe, extending from the Hospital Development Distribution Main Line Improvements (DS-3) to the site of a potential hotel and casino being built at the northwest corner of town limits. The project would require the street repair and would be completed in preparation of the potential hotel.

At this time this area of the City would be challenged to be commercially developed. The area is primarily zoned R-1 residential and would have to be rezoned to C-1 commercial. In addition, there are significant off-site transportation improvements. Those permits and improvements are not included in this estimate of costs. It is anticipated that those costs would be borne by the developer of such a property.

Estimated Cost $847,000

DS-5: Spa Facility Line with Connection to DS-1
This project would connect a new Spa Facility to some combination of other distribution system improvements including Distribution System Improvements DS-1 which would serve the downtown businesses.

Estimated Cost $202,000

DS-6: Spa Facility Line Directly from the Existing Pump House
This project would connect the existing Pump House directly to the location of a new Spa Facility. This project would not require the development of the previously mentioned distribution system improvements and could be constructed if the downtown business pipes are not replaced.

Estimated Cost $317,000

DS-7: Spa Facility Line from New Withdrawal Point and Pump House
This project would include a new pipe and pump station with new pipe running directly to a new Spa Facility. This project could be pursued if the City wanted to abandon the existing pump house and have a new pump station closer to the spa which only serves the Spa Facility. The City would need to get approval from Department of Ecology (DOE) for a new withdrawal point for their mineral water right. The Spa Facility would be located close to the shoreline of Soap Lake and a new withdrawal pipe and pump station would feed the spa facility. Doing so would constitute a "Transfer of Water Right" under DOE's regulations. The City has indicated that they do not want to pursue this option.

Estimated Cost $489,000

DS-8: Mineral Water System Buildout to Existing Limits
This project includes the installation of distribution lines to provide service to the previous extents of the mineral water system as determined by historical maps and drawings. This project represents the buildout to existing limits scenario that serves the historic extents of the mineral water system as it was in the past, which includes all residential interest determined from the Mineral Water System Questionnaire discussed in Chapter 2. The cost is developed by using a linear cost per foot of pipe for all construction items, from road repair and trench backfill to the pipe itself. Estimates from other pipeline projects suggest that rough estimate of mineral water distribution projects per length of pipe is about $250 per foot. The length of pipe to restore the historic extents of the mineral water system, not including pipe lengths of the other distribution projects mentioned within this chapter, is about 23,000 feet.

While the City would be responsible for the estimated cost of these improvements to extend distribution lines to services within City limits, property owners would be responsible for certain costs to establish cross-connection control and backflow prevention on the mineral water and potable water piping. As explained in the Chapter 3, in the section on Regulatory Analysis, DOH requires that check valves be installed on any potable water service where a property also contains mineral water service. However, that does not prevent cross-contamination of mineral water and potable water on property limits. A potential risk exists when potable drinking water physically cross connects with the mineral water line within private property limits. For example, one Soap Lake resident explained how mineral water and potable water lines connect at some point within their property, though they were not certain where. Another resident explained how after using mineral water, they would have to rinse their bath or sink with potable water for several minutes to flush out mineral water left in their plumbing. These issues could pose significant plumbing costs to property owners and is not represented in the below capital improvement cost.

Additionally, if demand was high enough for mineral water service at residential properties to justify this scenario, approximately 10,000 gallons of mineral water would be pumping out of Soap Lake every day as described in Table 2-11. Though this may be a small percent of the total volume of Soap Lake, over the course of a year, the usage could

negatively impact the conservation of the lake and the unique water chemistry of the mineral water.

Estimated Cost $5,750,000

DS-9: Mineral Water System Buildout to City Limits
This project includes the installation of distribution lines to provide service to entirety of the City of Soap Lake. This includes areas that have never previously been provided mineral water service. It is expected that two pump stations may be required to boost the pressure of water two areas of the system at higher elevations. As discussed in CIP DS-8 there will be costs for homeowners to install plumbing that are not included in these CIP costs. The budgetary pipe cost of $250 per foot was used for the buildout to City limit costs. The length of pipe to provide service to all of the City is approximately 38,000 lineal feet, not including pipe lengths of the other distribution projects mentioned within this chapter.

Estimated Cost $9,900,000

DEVELOPMENTS

DV-1: Public-Private Spa Facility
The City has expressed interest in a Private-Public spa facility near the lake to provide a year round bathing experience to residents. The spa facility could be funded and operated by a private entity willing to share an agreement with the City. The City would then provide the civil infrastructure improvements to serve mineral water to the spa facility.

The spa facility would have one 21,500 gallon bath that would overlook the lake at a prime viewing location. The Spa would have changing rooms and restrooms, an entrance office for administration, a massage center, and a supply and equipment building with a laundry room. The supply and equipment room would house a treatment system, bladder tank, and heating unit for the mineral water. The Spa Facility would require the installation of water and sewer line and connections to existing services for the restrooms at the facility, including a grinder pump lift station to pump sewage into the existing sewer system. A study of the impacts of the mineral water on the wastewater treatment plant may be necessary because of the large quantity of highly alkaline water that would be discharged.

In accordance with WAC 246-260, which regulates spa facilities, the public spa would be required to treat the mineral water for pH, turbidity, and disinfection requirements. Based on pH tests done for existing businesses, the mineral water has a pH of about 10 and would have to be treated down to a pH between 7.2 and 8 in order to meet the WAC. The spa would also require a recirculation tank for appropriate turnover circulation and to chlorinate consistently. Finally, the WAC also requires that turbidity be no higher than 0.5 Turbidity Units, and may require the installation of a filter to lower turbidity in the mineral water before use at the spa.

Depending on the location of the Spa Facility, the City would need to complete a Substantial Use Permit or a Conditional Use Permit under the Shoreline Master Plan for Soap Lake and Grant County. Figure 6-2 shows a potential location for the Spa Facility and its proximity to the 200-ft shoreline boundary. In the proposed location, the spa is located in a Public Recreation Conservancy designation, which, according the Shoreline Master Plan, has a stricter policy for management and may prevent the development of a spa facility at that location.

The City may choose a different location. In a Downtown Master Plan done in 2005 for Soap Lake, five potential sites were detailed for the location of a spa. This plan includes another potential location, shown in Figure 6-2, but does not make any recommendation of the potential spa location because the location would be partially dependent on the choice of a private developer. For more information on the Downtown Master Plan, see Appendix J. The potential sites are also detailed in Chapter 7, Economic Benefit Analysis.

Estimated Cost $3,703,000

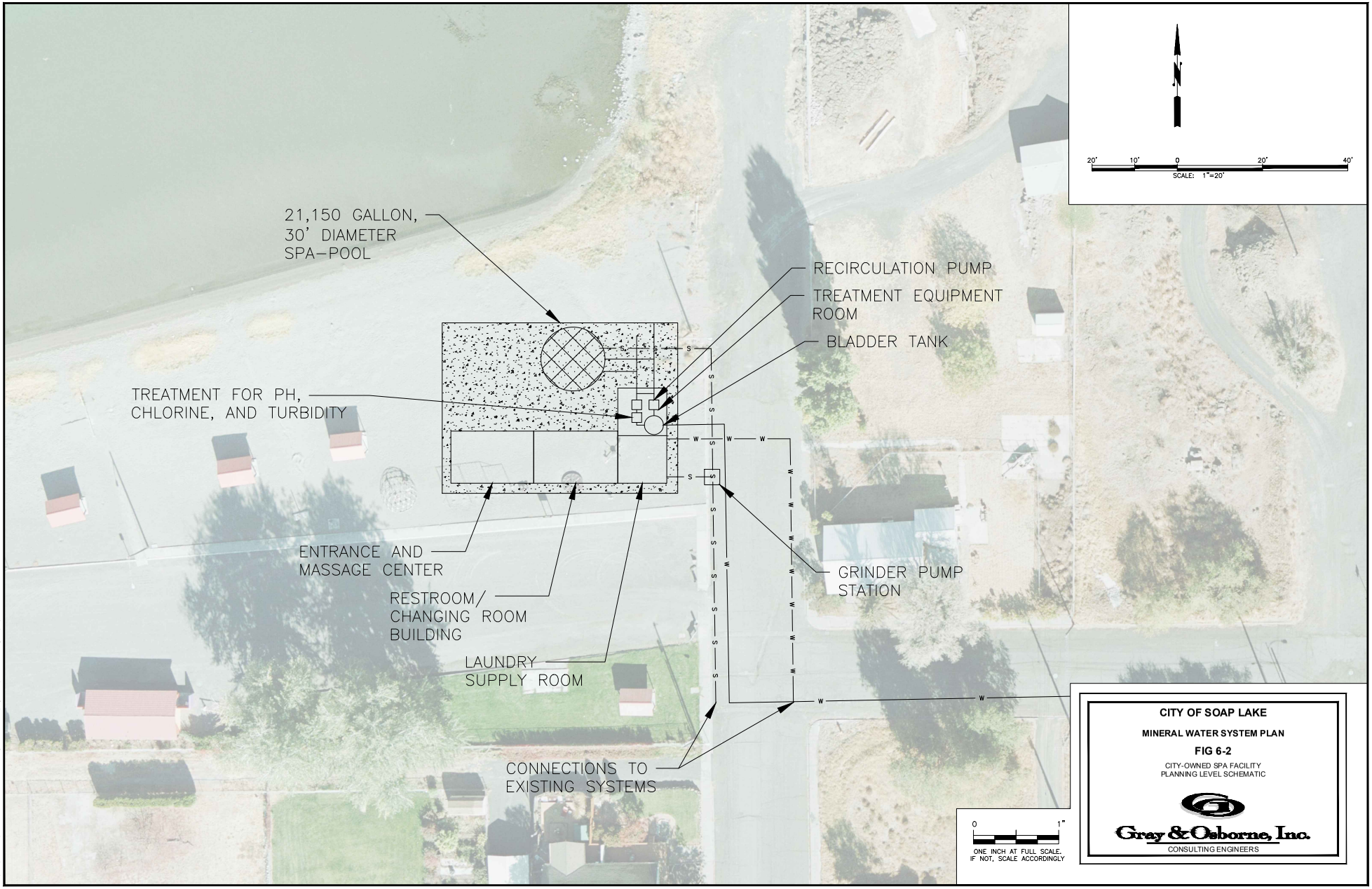
DV-2: Wellness Resort

In 2004 and 2005, the City of Soap Lake commissioned a Downtown Master Plan and a Spa Feasibility Report to determine long term economic objectives and viability of a spa facility. The Spa Feasibility Report details an ideal scenario for the developing a "Wellness Resort" that would include a hotel, restaurant, business meeting rooms, massage facility, spa, and pools. The facility had an original estimated cost of about $13 million in 2005, which is adjusted for inflation using the Construction Cost Index (CCI) for June 2019.

Estimated Cost $17,675,000

SERVICE ALTERNATIVES

The CIPs discussed in this chapter provide the City with budgetary costs to replace all or many different portions of the mineral water system. The size of the mineral water service could be expanded back to the original service area limits or beyond or kept closer to the existing limits to serve downtown businesses or key higher use connections. The mineral water system could continue to be operated by the City, be taken over to be operated by a private operator, or become a public-private partnership. Ultimately, the City needs to decide how to operate the system to what limits and who it will serve based on funding and potential connections and users. The following section includes some possible alternatives for different levels of service and tries to include CIPs which will most likely be included for each alternative.



CITY OF SOAP LAKE

MINERAL WATER SYSTEM PLAN

FIG 6-2

CITY-OWNED SPA FACILITY
PLANNING LEVEL SCHEMATIC

Grey & Osborne, Inc.
CONSULTING ENGINEERS

W:\Soap Lake\17059 – Mineral Water System Plan\Figures\FIG 6-2.dwg, 6/6/2019 9:39 AM, KALEB SMITH

Alternative 1 – Status Quo

This alternative would continue to operate the system as it is currently being operated. This alternative would not include any CIP repairs to the system and City crews would continue to provide any work required to keep the system running. Additionally, City crews could try to make any repairs or patches to get any of the abandoned portions of the system up and running again so additional customers could be added. This Alternative would buy the City some time to see if they can add more customers and obtain funding for future CIP projects. However, much of the old 1940s pipe is nearing the end of its lifespan and is expected to need replacement in the near future.

Alternative 2 – On-Demand Pumping System

This alternative seeks to serve downtown businesses on Main Ave East and potentially a spa facility to be located nearby. This alternative would abandon the existing reservoir and instead service would be provided by a new on-demand pump station utilizing a Variable Frequency Drive (VFD) to vary flow to match changing mineral water demands (SO-3). The new pump-house would be built in the same place as the existing pump-house. This alternative could also include improvements to the intake suction line (SO-1). This alternative would include replacement of the downtown distribution pipes (DS-1).

Alternative 3 – Maintaining Service to Downtown Business

This alternative preserves the existing system by improving the reservoir and distribution lines servicing businesses (DS-1and DS-2) that rely on mineral water in the downtown core area. This alternative would also include CIPs to improve and increase the reliability of the existing booster station (SO-1 and SO-2) and intake piping and pump house (SO-1 and SO-2).

Alternative 4 – Extending Service to Private Developments

Private Developers may come to the City with proposals for projects that use mineral water. A couple of potential developments, as discussed in Chapter 2, are returning mineral water service to the McKay Hospital for a Wellness Center, and a Hotel and Casino near the end of Lakeshore Drive in the northwest corner of the town. This alternative would require the construction of the business distribution lines (DS-1) and improvements to the pump-house and reservoir (SO-1, SO-2, and ST-1). The increased demand anticipated from these private developments would also require the installation of a telemetry system to automatically operate the pump and ensure demands are met (SO-3). This alternative could include new distribution piping to serve some of the larger users (DS-2, DS-3, and DS-4).

Alternative 5 – Buildout to Residential Properties Desiring Mineral Water

This alternative would serve residential properties throughout the City, based on the historical extents of the mineral water system and respondents to the questionnaire described in Chapter 2. The cost for this alternative is based on the total length of mineral water distribution pipe believed to have historically been active. This alternative requires all the same distribution lines as Alternative 3, and also requires the construction of a new reservoir at a higher elevation (ST-2). Service could be extended to the remainder of the City with optional pipe extension (DS-9).

Alternative 6 – New Spa Facility

This alternative connects a new private spa facility to the existing pump house with a new pipe (DS-6). The project also includes improvements to the pump station intake and building (SO-1 and SO-2). This alternative could be developed if the City chooses to focus on possible revenues generated by the spa facility with the City maintaining the pump station and piping and the spa being a private entity. Figure 6-2 shows a general layout of the potential Spa Facility.

Alternative 7 – New Spa Facility with New Withdrawal Point

This alternative installs a new withdrawal point and pump-house (DS-7) closer to the proposed spa facility location to try to save on total project cost as the system would likely only serve the spa. For this analysis, it is assumed the spa would be built on city-owned land at West Beach Park.

Alternative 8 – Private Entity Operation

This alternative turns the entire system over to a private entity to operate. This alternative would most likely need to include a spa facility and the owner of the spa would need to operate the system. It is likely that a new pump station would need to be constructed and depending on the location of the new spa and the pump station, it is possible that service could be provided to other connections in Town.

SUMMARY

The CIPs and service alternatives described in this chapter can be found in Table 6-1.

TABLE 6-1

Capital Improvement Projects

CAPITAL IMPROVEMENT PROJECTS			POTENTIAL SERVICE ALTERNATIVES							
No.	**Improvement**	**Costs**	**1 - Status Quo**	**2 - On-Demand System**	**3- Downtown**	**4- Private Developments**	**5- Buildout**	**6 - New Spa Facility**	**7 - New Spa with New Withdrawal**	**8 - Private Entity Operation**
Source Improvements										
SO-1	Suction Line and Pump Improvements	$66,000	**O**	**X**	**X**	**X**	**X**	**X**		
SO-2	Pump-house Improvements and Heating Installation	$78,000	**O**		**X**	**X**	**X**	**X**		
SO-3	On-Demand System Improvements	$544,000		**X**						
SO-4	Telemetry Improvements	$68,000		**O**	**O**	**O**	**X**			
SO-5	Water Filter Installation On Suction Line	$37,000		**O**	**O**	**O**	**O**			
Storage Improvements										
ST-1	Complete Reservoir Inspection and Cleaning	$30,000			**X**	**X**	**X**			
ST-1	Complete Reservoir Inspection and Cleaning	$30,000					**X**			
Distribution System Improvements										
DS-0	Meter Installation	$0	**X**	**X**	**X**	**X**	**X**			
DS-1	Business Distribution Line	$464,000	**O**	**X**	**X**	**X**	**X**			
DS-2	Reservoir Distribution Line	$986,000			**X**	**X**	**X**			
DS-3	Hospital Distribution Line	$365,000				**X**	**X**			
DS-4	Hotel Distribution Line	$847,000				**X**	**X**			
DS-5	Spa Facility Line with Connection to DS-1	$202,000								
DS-6	Spa Facility Line Directly from Existing Pump House	$317,000						**X**		
DS-7	Spa Facility Line from New Withdrawal Point and Pump House	$489,000							**X**	
DS-8	Mineral Water System Buildout to Existing Limits	$5,750,000					**X**			
DS-9	Mineral Water System Buildout to City Limits	$9,900,000					**O**			
Spa Developments										
DV-1	Spa Development	$3,703,000						**D**	**D**	**D**
DV-2	Wellness Resort (Incl. Hotel, Spa, Dining, and Pools)	$17,675,000								
COSTS	**REQUIRED CITY COST**		**$0**	**$1,074,000**	**$1,624,000**	**$3,602,000**	**$9,694,000**	**$461,000**	**$489,000**	**$489,000**
	OPTIONAL ADDED CITY COST		**$608,000**	**$105,000**	**$105,000**	**$105,000**	**$9,937,000**	**$0**	**$0**	**$0**
	DEVELOPER COST		**0**	**$3,703,000**	**$3,703,000**	**$3,703,000**	**$3,703,000**	**$3,703,000**	**$3,703,000**	**$3,703,000**
	TOTAL (ALL) COSTS		**$608,000**	**$4,882,000**	**$5,432,000**	**$7,410,000**	**$23,334,000**	**$4,164,000**	**$4,192,000**	**$4,192,000**

(X) = Required City Cost

(O) =Optional Added City Cost

(D) = Developer Cost

CHAPTER 7

CAPITAL IMPROVEMENT FINANCING

EXISTING RATES AND CHARGES

Soap Lake's mineral water rates are established by ordinance. As of now, there are no meters currently installed on service lines. Instead, customers are billed a flat monthly service fee. Both Residential and Commercial connections serving one point of use is $30.00 for May-October billings and $15.00 for November-April billings. Table 7-1 summarizes the rate schedule for Soap Lake mineral water service.

TABLE 7-1

Mineral Water Service Rates [(1)]

Classification	Monthly Flat Fee	
	May-October Billing	November-April Billing
Residential	$30.00	$15.00
Commercial	$30.00	$15.00
Turn-On Charge	$20.00	
Connection Charge	$250.00	
Inspection Charge	$50.00	
Standby Fee	$8.16	

(1) Source: City of Soap Lake, April 15, 2019. Municipal code, see Appendix D.

HISTORICAL FINANCIAL STATUS

Revenues and expenditures for 2016 through 2018 for the City's mineral water utility are shown in Table 7-2. The complete financial documentation is included in Appendix K.

TABLE 7-2

Mineral Water Utility Historical Revenue and Expenditures [(1)]

REVENUES	2016	2017	2018
Mineral Water Connection Fees	-		-
Utility Tax	-		-
Mineral Water Sales	6,724	9,415	7,793
Turn-On Fees	-	-	-
Investment Interest	-	-	1,700
Refund of Prior Expenses	-	-	647
Grant Payment Received (CERB)	-	-	6,958
Total Revenues	6,724	9,415	17,098

TABLE 7-2 – (continued)

Mineral Water Utility Historical Revenue and Expenditures [(1)]

EXPENDITURES			
Salaries	-	342	452
Benefits	-	129	167
Operating & Supplies	-	263	189
Professional Services	-	9,803	28,796
Insurance	-		-
Utilities	422	555	412
Repair & Maintenance	-	20,993	1,335
Total Expenditures	422	32,085	31,351
Net Operating Income	6,302	(22,670)	(14,253)
WATER UTILITY			
One-time Interfund Transfer [(1)]	126,666	-	-
Water Utilities	-	-	(858)
SUMMARY			
Income/Loss	132,968	(22,670)	(15,111)
Beginning Cash	-	-	161,832
Ending Cash	132,968	(22,670)	146,721

(1) 2016 Revenue and Expenses include a One-time Interfund Transfer from the Water Utility Fund. The Water Utility fund transfer was approved by the City Council due to inaccurate accounting of the Mineral Water Fund in prior years. A separate Mineral Water Fund was established for 2017 and the future.

FUNDING SOURCES

There are several outside funding sources available to the City if the need arises for larger projects. The funding source(s) selected for a particular project will depend on the status of the City's financial commitments, its capital and cash flow requirements, funding source availability, and the impact on the service rates and connection charges.

Grant and loan programs available through public funding agencies are summarized in Table 7-3. Following the table are brief descriptions of each program listed in the table, as well as descriptions of other financing options including revenue bonds, developer financing, general facility charges, and utility local improvement districts (ULIDs).

TABLE 7-3

Grant and Loan Programs

Agency	Program	Maximum Amount	Type	Application Cycle
Wash. State Dept. of Commerce	Community Development Block Grant, General Purpose	$750,000	Grant	June
Wash. State Dept. of Commerce	Community Development Block Grant, Planning Only	$24,000	Grant	June
Wash. State Dept. of Commerce	Community Economic Revitalization Board	$2,000,000	Loan	January
Grant County Economic Development Council	Strategic Infrastructure Program	N/A	Grant	Four times per year

COMMUNITY DEVELEPMENT BLOCK GRANT

The Community Development Block Grant program, administered by the Washington State Department of Commerce, consists of two programs that can be used to fund water system improvements. The first is the General Purpose Grant program, which allows applicants to request funds for design and construction of public facilities, community facilities, housing rehabilitation, or economic development projects that principally benefit low- and moderate-income persons.

The second program is the Planning-Only Grant program. This program supports a range of planning activities that lead to implementation of priority projects that benefit low- and moderate-income communities. Funding levels are set at a maximum of $24,000.

COMMUNITY ECONOMIC REVITALIZATION BOARD

Community Economic Revitalization Board (CERB) funding is available for public facility projects required by private sector expansion and job creation. Projects must support job creation or significant private investment to be eligible. Projects including construction, repair, reconstruction, or rehabilitation activities for items such as bridges, roads, water systems, storm sewers, and sanitary sewers are eligible. Eligible applicants include public entities such as cities, counties, towns, port districts, and federally recognized tribes. Interest rates vary between 1-3 percent with a 20-year term.

The Soap Lake Mineral Water System Plan is funded by the CERB Planning Grant, which seeks to determine priority projects that could result in eligibility for CERB construction funding of a public improvements. There are two grants that can be used for that construction funding. The Committed Private Partner Program grant supports public infrastructure projects if a private development or expansion is ready to occur and that the private development is contingent upon CERB funds. Another grant, the Prospective Development Program Overview grant, is for rural local governments who have an

economic feasibility study demonstrating that a private business development is likely to occur as a result of the public improvements. Both of these grants seek to create a significant number of permanent jobs or generate significant private capital investment.

GRANT COUNTY STRATEGIC INFRASTRUCTURE PROGRAM

The Washington State Legislature has established resources for funding public infrastructure projects that result in the creation or retention of jobs and/or businesses within Grant County. Eligible applicants for funding include cities, towns, port districts, and other local government jurisdictions. The requirements for eligibility of these funds are the fund finance public facilities in the State of Washington. Additionally per RCW 36.70A.040 the public facility must be either listed as an item in the officially adopted county overall economic development plan, or the economic development section of the county's comprehensive plan, or the City of Soap Lakes Comprehensive Plan.

REVENUE BONDS

Revenue bonds are tax-free bonds issued by a utility that are repaid by revenues from monthly service charges. In order to make revenue bonds marketable to investors, the bonds typically have contractual provisions for the utility to meet debt coverage requirements. The agency must show that its annual net operating income (gross income less operation and maintenance expenses) is equal to or greater than a factor, typically 1.2 to 1.4 times the annual debt service on all par debt. If a coverage factor has not been specified it will be determined at the time of any future bond issues.

DEVELOPER FINANCING

Developers typically fund the construction of extensions to the water mains to property within new plats. The same could be required of extensions to the mineral water system, especially in the case of new hotel or spa development. The developer extensions are turned over to the City for operation and maintenance upon completion. Developer extensions must be constructed to meet the requirements of the City's construction standards.

GENERAL FACILITIES CHARGE

In order to finance improvements of general benefit to the City, a general facilities charge may be adopted. General facilities charges are usually established as one-time charges assessed at hook up against new water customers as a way to recover part or all of the cost of existing and additional facilities constructed for their use.

The general facilities charge or fee is typically deposited into a construction fund for construction of mineral water infrastructure. The intent is that all new system customers will pay an equitable share of the cost of the system improvements needed to accommodate growth. Typical types of construction financed by the general facilities charge are general improvements that benefit the entire system, such as pump stations,

gravity sewer lines, force mains, and office and storage space.

UTILITY LOCAL IMPROVEMENT DISTRICTS

Another potential source of funds for improvements can be obtained through the formation of Utility Local Improvement Districts (ULIDs) involving a special assessment made against properties benefiting by the improvements. ULID bonds are further backed by a legal claim to the revenues generated by the utility, similar to revenue bonds.

Sewer system expansion is a frequent application of ULID financing. Typically, ULIDs are formed by the city or town at the written request (by petition) of the property owners within a specific section of the city or town's service area. Upon receipt of a sufficient number of signatures or petitions, and acceptance by the city or town council, the local improvement area is formed. Therefore, a sewer system is designed for that particular area in accordance with the city or town's sewer comprehensive plan. Each separate property in the ULID is assessed in accordance with the special benefits the property receives from the water or wastewater system improvements. A citywide ULID could form part of a financing package for large-scale capital projects such as sewer line extensions or replacements that benefit all residents in the service area. The assessment places a lien on the property that must be paid in full upon sale of the property. ULID participants have the option of paying their assessment immediately upon receipt, thereby reducing the portion of the costs financed by the ULID bonds.

The advantages of ULID financing, as opposed to rate financing, to the property owner include:

- The ability to avoid interest costs by early payment of assessments.
- If the ULID assessment is paid in installments, it may be eligible to be deducted from federal income taxes.
- Low-income senior citizens may be able to defer assessment payments until the property is sold.
- Some Community Block Grant funds are available to property owners with incomes near or below poverty level. Funds are available only to reduce assessments.

The major disadvantage to the ULID process is that I may be politically difficult to approve formation. The ULID process may be stopped if 40 percent of the property owners protest its formation. Also, there are significant legal and administrative costs associated with the ULID process, which increases total project costs by approximately 30 percent over other financing options.

ECONOMIC BENEFIT ANALYSIS

The development and improvement of the mineral water system will help existing and potential businesses in Soap Lake by increasing reliability and improving the experience. The mineral water system is intrinsically tied to the tourism and health industries in Soap Lake. Several existing businesses in Soap Lake rely on the mineral water for customers looking to relax or even to treat psoriasis and other ailments. Increasing the reliability of mineral water service and adding new spa options would attract new customers from Grant County and beyond. A large spa facility would be the only of its kind in Central Washington, making Soap Lake a special destination for tourists. The spa facility would entice visitors year round by having heated facilities for soaking in mineral water – as opposed to solely summer tourism for lakeshore bathing. It could also encourage overnight and multi-day visitors who stay in Soap Lake for wine country tours, recreational hiking, and more – benefiting lodging and restaurants in the area.

Soap Lake residents are typically older and retired, and income levels are generally below the state-wide average. In general, Soap Lake and the surrounding area are growing. The primary trade area for Soap Lake includes Ephrata, Stratford, and Coulee City – all within a 25-mile radius of the City. There are business opportunities to provide niche-oriented goods and services that fill needs currently unmet for these communities within the primary trade area.

There are a number of demographic and geographic targets that Soap Lake has a potential to attract. Demographic targets include spa-goers, healing seekers, heritage and cultural travelers, outdoor recreationists, families, and locals. Geographic targets include Seattle-Tacoma, Spokane, Portland, and British Columbia.

SPA FACILITY EVALUATION

The capital project that can have the largest economic impact on Soap Lake is the spa facility, detailed in Chapter 6 Capital Improvement Projects. The location of the spa facility is dependent on an agreement between the City and the private developer willing to fund and operate the spa. As of the writing of this plan, no private developer has been secured. The Downtown Master Plan determined five location alternatives for the spa facility, and this plan offers one more shown in Figure 6-2. Depending on the selected location, different combinations of improvements would be required, and the estimated total project cost can be calculated from the budgetary numbers provided in Chapter 6. Each spa location alternative requires different lengths of utility pipes for connections to potable water and sewer, land development construction as a result of different grading and subsurface conditions, and permitting requirements for different shoreline classifications.

The Downtown Master Plan located in Appendix J selects the two best locations from the five alternatives. What is labeled “Site 2” includes the Smokiam Park at the end of Canna Street, where existing Birch trees, a concession stand, and public restrooms are.

The other, "Site 4," consists of two parcels each with a different private owner along Main Avenue that extend to the lakefront.

While Site 2 is City-owned, in a central location, and uniquely located by utilities for future expansion to the spa facility site, the site may not be large enough without the removal of existing facilities and would take public land away from the broader public. The Development Master Plan considered Site 4 the best option because of the central location to downtown, the proximity to the lakeshore, the proximity to utility lines in Main Avenue East, and previous interest from both property owners. However, because the properties are privately owned, extensive agreement between the City and private owner would need to be met. For this reason, this Plan offers another alternative location owned by the City, West Beach City Park. As detailed in Chapter 6, Figures 6-2 and 6-3 show potential layouts for the spa facility in West Beach Park.

MARKETING OBJECTIVES

The City's economic marketing objectives will differ depending on the alternatives chosen from Chapter 6. For example, if the City decides to first improve the reliability of the distribution system to better serve downtown spa businesses, the City's marketing strategy would need to focus on advertising these businesses within their primary trade area. If a Private Developer were to fund a spa facility, that developer would hold marketing responsibility that would benefit the City as well. In general, the City holds the most responsibility to market the uniqueness of their mineral water system. However, the City is low on staff available that can invest time in completing the responsibilities of marketing Soap Lake to the tourism and health industries. A Public-Private partnership will share some of these responsibilities, but obviously there is no certainty when a private developer will be found.

In any case, the current and future marketing objectives for the City of Soap Lake are unchanged from those discussed in the Downtown Master Plan, attached in Appendix J. These objectives are as follows:

1. Encourage enhancement of existing businesses, products, services, and facilities to better serve target customer markets.
2. Improve the visitor information system for the Soap Lake area.
3. Create a strategic, highly targeted and effective marketing program for Soap Lake
4. Work with investors and developers to encourage and enhance spa facilities and amenities.
5. Improve business assistance and support systems for existing and new businesses and entrepreneurs.
6. Enhance events in off-peak seasons to increase business sales.
7. Enhance medical and retirement services in Soap Lake to meet the needs of local residents and healing-seekers.

8. Establish benchmarks (baseline data) and track results of economic development and marketing efforts to evaluate effectiveness of strategies and adjust as necessary.

These marketing objectives are intimately related to Soap Lake's mineral water system. The mineral water system provides a unique draw for tourists and residents, and if developed and improved according to this Plan, it can be a great marketing tool for the City. Many existing businesses in Soap Lake advertise the healing nature of the mineral water in promotions for their baths or products. By improving the mineral water distribution system, the City would be securing the livelihood of those businesses. In turn, the City can promote these businesses as part of the City's natural health brand. Additionally, an indoor spa facility can promote year-long tourism to Soap Lake by providing a way to experience heated mineral water baths in the winter.

The City contacted a number of destination hot spring and spa resorts to see how other locations are marketing their resorts and what type of uses are provided. Below are the questions and responses from the Fairmont Hot Spring Resort.

1. How do you market your spa now, and how did you market your spa for your Use as attraction to destination. **The spa is used as one of the main attractions to bring people in initially, but it is a small piece of what they do. They have other things such as RV Parks, Golfing, etc.**

2. How has your spa resort helped the greater township/city/area economically? **People come from all over; Idaho, Washington, Albert, Canada.**

3. How many employees does your business employ on average? **Average 300 employees.**

4. What is an average wage for these employees? **Grounds/Maintenance (current minimum) Lead/Supervisor ($15-20 per hour)**

5. What does a day pass to your spa cost? **$20 day pass. Unlimited entry for entire day.**

6. How many people use the spa per day on average? **Unknown**

7. What surprising expenditures should the City of Soap Lake be aware of in maintaining a mineral water spa? **Labor, changes in code (operations), day to day operations are not too expensive. Gravity fed system of mineral spa.**

8. What metrics do you use to quantify success in your business and operation? **Financials, Social Media, Guest Satisfaction**

ECONOMIC OUTCOMES

To assist in estimating the economics that could be created by additional hotels and businesses including a new spa facility, the City of Soap Lake contacted the Soap Lake Spa and Resort. The Soap Lake Spa and Resort is a business in Soap Lake with 45 rooms which advertises itself as a historic wellness destination and luxury spa resort dedicated to inspiring balance in life. Information on the existing business generated by the spa can be found in Table 7-4 below.

TABLE 7-4

Existing Business Economics

Question	Answer
Number of Average Employees	12
Average Wage of Employees	$14.50/hour – minimum wage
Cost of Day Pass to Spa	$10 to $15
Number of Rooms with Mineral Water	44
Estimated Percent of Business generated by Mineral Water	90%

The information on existing mineral water system spa and resort can be used to forecast additional businesses and growth potential for the mineral water system. The larger businesses discussed in Chapter 2 of the plan and identified from discussions with City staff can be found in Table 7-5 below.

TABLE 7-5

Larger Potential Mineral Water System Businesses/Users

Business	Size	Estimated Jobs Created
New Spa/Wellness Center	70 rooms	20
McKay Hospital Wellness Center	20 baths	5
New Hotel/Casino	200 rooms	55
	Total =	**80**

If the above large mineral water system businesses were connected to the system, it is estimated that up to 80 jobs could be created in the Soap Lake area. However, as most of these jobs are in the hospitality and service industry, it is estimated that they would minimum wage or lower wage positions. The estimated median hourly wage of the jobs created is $14.50/hour.

SUMMARY

While the creation of up to 80 jobs would be beneficial, the City does not currently have the required funds or customer base to upgrade the system as required to provide service to additional customers. The costs to upgrade the system are high and very dependent on what type of business would be connected and at which location in the City. It is likely that any major expansion or upgrades of the system would need to include private development funds where a private business such as a hotel or spa that wanted to connect to the system would need to participate in the required improvements to the system. At this time, the City of Soap Lake Council has decided not to act on the Capital Improvements discussed in Chapter 6. It is anticipated that the City will try to continue to operate the system as described in Chapter 6 as Alternative 1 – Status Quo. If a larger user such as a spa or hotel should approach the City about future connections, the Mineral Water System Plan can be used to determine the feasibility.