

SARATOGA WATER MASTER PLAN, LEVEL I

Executive Summary

July 2019

Prepared for:

**Wyoming Water Development
Commission**

6920 Yellowtail Road

Cheyenne, WY 82002

Phone: 307.777.7626

Website: <http://wwdc.state.wy.us/>



And

Town of Saratoga

110 E. Spring Ave.

Saratoga, WY 82331

Phone: 307.326.8335



Authored by:

FORSGREN
Associates Inc.

849 Front Street Suite 201,

Evanston, Wyoming 82930

Phone: 307.789.6735

Website: www.forsgren.com

In association with:



1050 North 3rd Street, Suite E

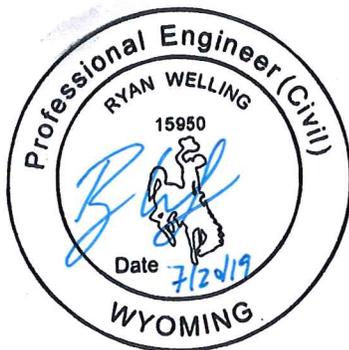
Laramie, Wyoming 82072

Phone: 307.745.6118

Website: www.westonengineering.com

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FORSGREN
Associates Inc.

849 Front Street Suite 201,
Evanston, Wyoming 82930
Phone: 307.789.6735
Website: www.forsgren.com

WESTON
GROUNDWATER ENGINEERING

1050 North 3rd Street, Suite E
Laramie, Wyoming 82072
Phone: 307.745.6118
Website: www.westonengineering.com

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1.0 Project History and Overview

The Town of Saratoga has been proactive in upgrading its water system in the past 20 years. Since the Town's last Level I water study was completed in 2003, with a supplemental Level II test well study completed in 2007, the Town has updated its water system dramatically with a switch from a surface water treatment system to a ground water supply system well field (2009). It was decided, in early 2018, with the Saratoga Carbon County Impact Joint Powers Board (SCCIJPB) and the Wyoming Water Development Commission (WWDC) that a Level I study of the system would provide the SCCIJPB with a more current understanding of their water system.

In general, the overall condition of the water system is dated and in need of updating. As with many municipalities in Wyoming, limited resources have allowed for the Town to replace or rehabilitate water system components on an as-needed basis rather than a preventative basis. This is not to say that the Town does not update its system (particularly with replacing water meters in 2013), but that this master plan can provide a "map/guide/priority list" for the Town in maintaining and updating its water infrastructure going forward.

The system serves approximately 990 service tap connections serving a present population of approximately 1,655.

2.0 Study Area

The Town of Saratoga is located in the southeastern portion of Wyoming in Carbon County. The Town is approximately 20 miles East of Rawlins, WY and approximately 20 miles south on Wyoming Highway 130 along the North Platte River.

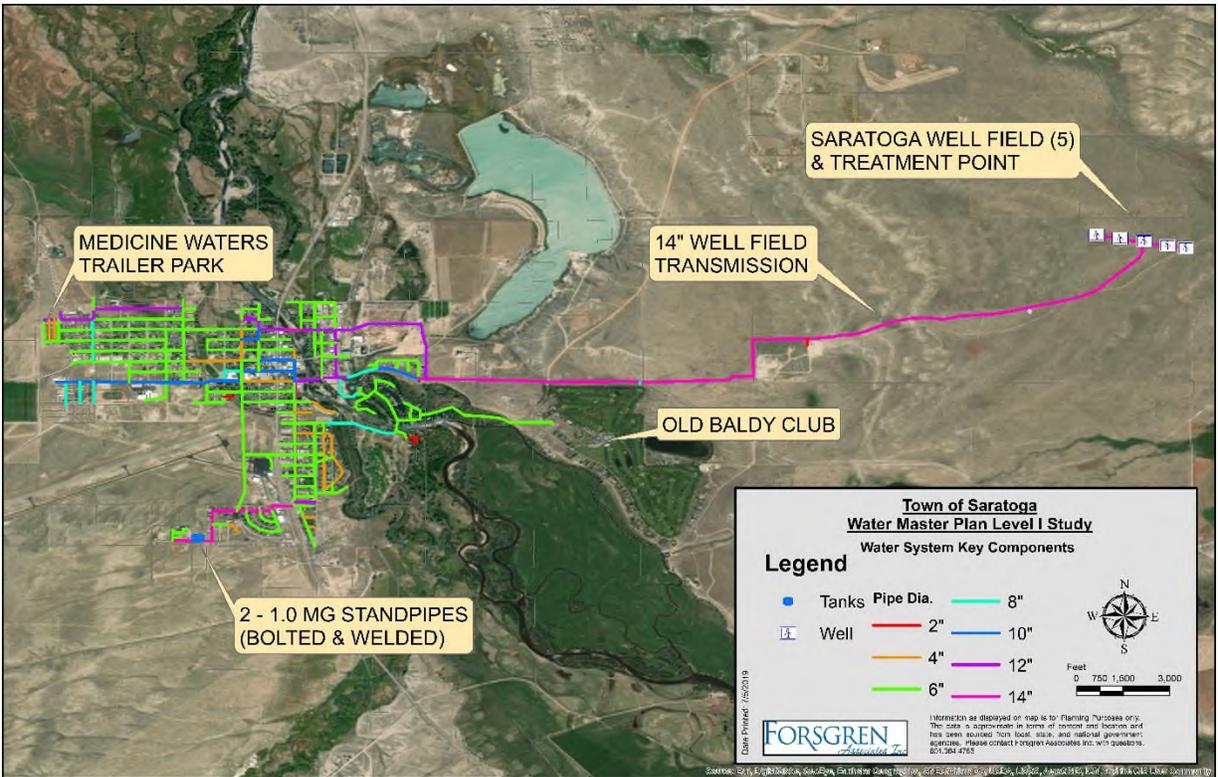


Figure ES.1 - Saratoga System Map

3.0 Master Plan Objectives

This Master Plan’s objectives included first analyzing current and forecasted water system supply and demands, storage, assessing (through onsite investigation) the condition of existing system components, and hydraulic modeling. Based on these objectives the analysis, priorities, lifecycles, and cost estimates were established and contained herein.

3.1 Present and Forecasted Population Served

According to the Wyoming:2010 Population and Housing Report, it was estimated that the Town of Saratoga had a population of 1,690 in 2010 and projected a 2019 population of 1,737. The 2017 population estimates from the US Census Bureau estimate the Town’s population to be approximately 1,655. Conservatively, this report uses the Wyoming: 2010 Population and Housing Report projections for a 2019 population of 1,737. The water system is forecasted to see an increase in population to 1,771 persons by the year 2049.

3.2 Water User Rates

The Town of Saratoga has a tiered rate schedule for both service connection fees and water supply fees, which are based primarily upon the size of the service line and usage (in gallons). The Saratoga/Carbon County Impact Joint Powers Board (SCCIJPB) has increased user rates

annually by 3.0% since 2011. Tables ES.1 and ES.2 below show the existing service connection fees and user rates respectively.

Table ES.1 Town of Saratoga Water Connection Fees

Town of Saratoga Service Tap Fees		
Tap Size	By Whom	Direct Cost
3/4"	Town	\$ 3,500.00
3/4"	Contractor	\$ 2,500.00
1"	Contractor	\$ 4,000.00
1-1/2"	Contractor	\$ 4,500.00
2"	Contractor	\$ 5,500.00
3"	Contractor	\$ 6,500.00
4"	Contractor	\$ 7,500.00
6"	Contractor	\$ 9,500.00
Fire Suppression Connection Fees		
Tap Size	By Whom	Direct Cost
2"	Contractor	\$ 1,500.00
4"	Contractor	\$ 1,500.00
6"	Contractor	\$ 3,000.00
8"	Contractor	\$ 5,000.00

Table ES.2 Town of Saratoga Water Usage Fees

2018-Residential Water User Fees					
Gallons Used Minimum	Gallons Used Maximum	Base Rate	Cost per 1,000 Gallons Over Minimum	Minimum Cost	Maximum Cost
0	7000	\$ 30.76	\$ -	\$ 30.76	\$ 30.76
7001	20000	\$ 30.76	\$ 2.75	\$ 30.76	\$ 66.51
20001	60000	\$ 66.51	\$ 3.09	\$ 66.51	\$ 190.11
60000	+	\$ 190.11	\$ 3.71	\$ 190.11	+
2018-Commercial Water User Fees					
Gallons Used Minimum	Gallons Used Maximum	Base Rate	Cost per 1,000 Gallons Over Minimum	Minimum Cost	Maximum Cost
0	7000	\$ 34.48	\$ -	\$ 34.48	\$ 34.48
7001	20000	\$ 32.50	\$ 2.75	\$ 32.50	\$ 68.25
20001	60000	\$ 68.25	\$ 3.09	\$ 68.25	\$ 191.85
60001	250000	\$ 191.85	\$ 3.71	\$ 191.85	\$ 896.75
250000	+	\$ 896.75	\$ 6.15	\$ 896.75	+

3.3 Water Supply Sources – Saratoga Well Field

The Town of Saratoga utilized treated water from the North Platte River (NPR) for meeting the needs of the users for more than 40 years. Treatment during periods of high turbidity during spring runoff and the drought of the 2000's affecting the availability of water from the NPR was challenging and it was determined that providing high quality water and meeting applicable regulations would require upgrades to the plant. Level I and II investigations were performed to determine whether upgrades to the water treatment plant or changing to a groundwater-based system would best serve the Town. A series of borings and exploration wells indicated that a groundwater wellfield in the North Park Aquifer east of the Town could meet the potable water needs of Saratoga. In 2008 and 2009 a Level III Project included the construction of three additional wells, the equipping of the five wells with pumps, and the construction of control buildings, chlorine disinfection facilities, and a 14-inch transmission line from the wellfield to the Town. The wells were put into production in early 2009 and the water treatment plant was decommissioned.

3.4 System Storage

The Town is currently served by two potable water storage standpipe tanks. A brief description of the tanks are as follows:

- **Welded Steel Storage Standpipe** – This 100' tall 1,000,000 gallon steel standpipe was constructed in the year 1979 and rehabilitated in 2005. The tank is constructed with a single inlet/outlet design and appears to be in relatively good condition. The entire distribution system pressures are controlled with the tank's water level in tandem with the below bolted steel storage standpipe.
- **Bolted Steel Storage Standpipe** – Similar to the welded storage standpipe, this tank is a 100' tall 1,000,000 gallon standpipe located approximately 60 feet to the west of the welded tank. This tank is constructed with a single inlet/outlet design and is in poor condition. Many of the bolted panels are leaking and there are structural concerns with the integrity of the tank. As mentioned above, this tank along with the welded tank controls the entire distribution system pressures with the tank's water levels.

3.5 Transmission Lines

The Town's water system is serviced by one main potable supply transmission line from the well field and three "distribution" transmission lines. These lines are as follows:

The Town's water system is serviced by one potable transmission line and three well supply transmission lines. These lines are as follows:

- **Well Field Transmission** – This 14-inch PVC transmission line runs west from the well field to the north of the landfill/transfer station and along Ryan Park Road (C.R. 504) until it connects with the eastern end of the distribution system on Pic Pike Road. There are multiple fire hydrants and air release valve stations along the transmission line. There are a few service connections on the transmission line with the most notable being the second (2nd) connection and an 8” master meter for the Old Baldy Club at the northeastern corner of the Club.
- **North Transmission Line** - This 12-inch PVC transmission line is a branch of the Well Field Transmission Line, branching from the 14” line to the north along the access road the cemetery. This line then cuts across the lumber mill and connects to the distribution system at East Rochester Street.
- **Airport Transmission Line** – This 6-inch cast iron transmission line was originally the outlet of the old Saratoga tank that no longer exists. This line begins at the intersection of Sunset Lane and Cougar Drive and veers northeast towards the airport running through residential property. The line continues north across the airport and connects to the distribution system at South 3rd Street.
- **Old WTP Transmission** – This 14-inch ductile iron line originally served as the primary transmission line from the old WTP (Water Treatment Plant) south along River Street and crosses State Highway 130 to the west towards the storage standpipes. Since the Town has moved from the WTP to the well field as the source of water, this line in essence is still a transmission line as it is the primary feed line for the tanks but serves dual purpose as a distribution line.

3.6 Pressure Zones

Currently there is only one pressure zone for the Saratoga water system and is controlled by the storage tanks’ water levels. There were originally 3 pressure zones but the pressure controlling stations were bypassed in 2011. As a result, individual pressure relief valves (PRV) were installed for all system users in excess of 70 psi normal operating pressures.

3.7 Existing and Future Per Capita Consumption

The water system experienced a production Average Day Demand (ADD), Maximum Day Demand (MDD) and Peak Hour Demand (PHD) over the years 2013 thru 2018 as shown in Table ES.3. When compared to the metered usage readings for the corresponding years, unaccounted water was 25.6% of the total production.

Table ES.3 Current Demands - Production

ADD (gpd)	MDD (gpd)	PHD (gpd)
462,031	1,196,955	2,310,154

Future demand estimates on the system for the year 2049 are shown in Table ES.4.

Table ES.4 Future Demands (year 2049)

ADD (gpd)	MDD (gpd)	PHD (gpd)
477,692	1,237,527	2,388,458

3.8 Water Rights

Water Rights Conclusions – The water rights of all five of the Town’s wells are fully adjudicated. Reports required by the State Engineers Office (SEO) in conjunction with the North Platte River Recovery Program were submitted by the Town for all years of operation except 2011. **The Town should continue to ensure that monthly reporting of water production and static water levels from each well are submitted to the SEO to remain in compliance with the conditions and limitations of the permits.**

4.0 Recommended System Improvements and Priorities

The basis of the water system analysis was to evaluate the condition of the water system as a whole and in terms of main system components. In general, the system performs adequately for the present and future demands of Saratoga but there are issues regarding system storage, water age, infrastructure age and operations. To address these concerns in the system, several methods were evaluated separately and in various combinations to produce recommendations for a more reliable water system. The recommended improvements from the Level I Study are prioritized and presented as follows in Table ES.5

Table ES.5 – Recommended Improvements

Priority	Description	Notes
1	Well Field Rehabilitation (7.1.12)	<i>Rehabilitation of the Wells could significantly increase the capacity of the wells and result in more shallow pumping water levels, increased production capacity and less dewatering of well screens.</i>
2	Decommission Bolted Steel 1.0 MG Standpipe and Install New 750K Tank along Transmission Line (7.1.1)	<i>Bolted Steel Tank has leaking deficiencies. As noted above, the location of the existing tanks is less than desirable. By installing a new tank along the transmission line, the Town retains its redundancy with storage while also providing redundancy by having storage on both sides of the river.</i>
3	Tank Mixers (7.1.2)	<i>A tank mixer will help with the stagnation in the Town's Storage Tanks as well as stabilize overall water age.</i>
4	System Flushing (7.1.3)	<i>A 120,000 gallon weekly flush (2.0 hrs @ 1,000 gpm) will reduce the Town's water age in the Tanks.</i>
5	SCADA Upgrades (7.1.5)	<i>Upgrades/Updates the Town's SCADA System will provide better operational control of the system and a more useable control for the system.</i>
6	Tank Operational Controls (7.1.4)	<i>Allowing for a wider range of operational controls on the system's storage and pumping will allow for better control of water age.</i>
7	Water Loss Program (7.1.10)	<i>The Implementation of a water loss program will allow the Town to better understand loss in the system, maintain more accurate records and develop priorities for system replacement/repair.</i>
8	Transmission Line Improvements (7.1.7)	<i>Updating existing transmission lines will provide the Town with a more reliable conveyance of system delivery.</i>
9	Distribution Line Improvements (7.1.6)	<i>Updating existing distribution lines will provide the Town with a more reliable conveyance of system delivery, address the issues of an aging system, reduce water loss, etc.</i>
10	Additional Metering (7.1.11)	<i>The installation of additional metering, specifically at locations in which the system is unmetered (parks, municipal buildings, etc.), will allow for a better accounting of water use in the system.</i>

5.0 Rate Impacts / Financial Capacity

Project costs (reflective of estimated 2019 construction costs with engineering and inflation), and rate payer impacts based on assumed funding scenarios are summarized in Table ES.6. Project loan payments are broken down by monthly cost per existing connection to determine the average potential rate impact. This table assumes that all matching funds would be borrowed and that the capital improvements in this study would be completed/constructed in 2021. If all the recommended projects were completed with the proposed funding scenarios, the total monthly rate impact per ratepayer would be \$42.49.

Table ES.6 – Project Rate Impacts

Item #	Description	Estimated Project Cost	ASSUMED FUNDING SOURCE			Monthly Cost per Ratepayer (Based on 990 current users)
			WWDC Grant (67% new Eligible construction)	SRF Loan (2.5%, 20-year)	Annual Payment	
1	Well Field Rehabilitation	\$185,599	\$124,352	\$61,248	\$3,929	\$0.33
2	Decommission Bolted Steel 1.0 MG Standpipe and Install New 750K Tank along Transmission Line	\$1,868,314	\$1,251,770	\$616,544	\$39,739	\$3.35
3	Tank Mixers	\$64,034	\$0	\$64,034	\$4,108	\$0.35
4	SCADA Upgrades	\$20,419	\$0	\$20,419	\$1,310	\$0.11
5	Transmission Line Improvements (WTP & Airport)	\$1,809,017	\$1,212,041	\$596,976	\$38,294	\$3.22
6	Distribution Line Improvements	\$4,790,819	\$0	\$4,790,819	\$307,317	\$25.87
7	Additional Metering	\$202,738	\$0	\$202,738	\$13,005	\$1.09
Monthly Cost per Ratepayer					Total	\$34.32