TOWN OF STAR VALLEY RANCH WATER MASTER PLAN UPDATE, LEVEL I

June, 2024

Prepared for:

Town of Star Valley Ranch
171 Vista Drive
Star Valley Ranch, WY 83127

Authored by:

FORSGREN Associates Inc.
849 Front Street Suite 201,
Evanston, Wyoming 82930
Phone: 307.789.6735
Email: rwelling@forsgren.com
Website: www.forsgren.com

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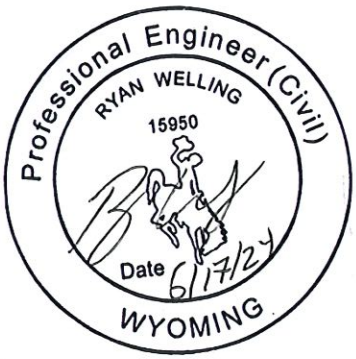

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849 Front Street Suite 201,
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Phone: 307.789.6735
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Star Valley Ranch Water Master Plan Level I Update
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FORSGREN Associates Inc.

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1.0 INTRODUCTION

1.1 Project History and Overview

The Town of Star Valley Ranch was formed in November of 2006 in part as a direct response to changing demographics to the area and the need to address serious water infrastructure problems. These problems included:

- Aging & Deteriorating Piping
- Limited Legal and Physical Water Supply
- Increasing Regulatory Requirements
- Population Growth
- Limited System Funding for Maintenance and Capital Improvements

Eighteen years later, the Town has taken major strides in developing a reliable and robust water system. Some of these improvements include establishing water system operating and maintenance avenues, additional storage, development of new water sources and redevelopment of existing sources and replacing nearly all of the distribution and transmission piping.

Even with all the Town's improvements to the water system over the past eighteen years there are still challenges to address both old and new. There is still a bit of old piping that needs replaced, regulatory regulations are increasing, and the Town has experienced a surge in growth. This updated master plan is intended to help the Town plan for the future of the system with regards to operations, maintenance, financials and capital improvements.

The system serves approximately 1,188 service tap connections serving an estimated present population of approximately 2,183.

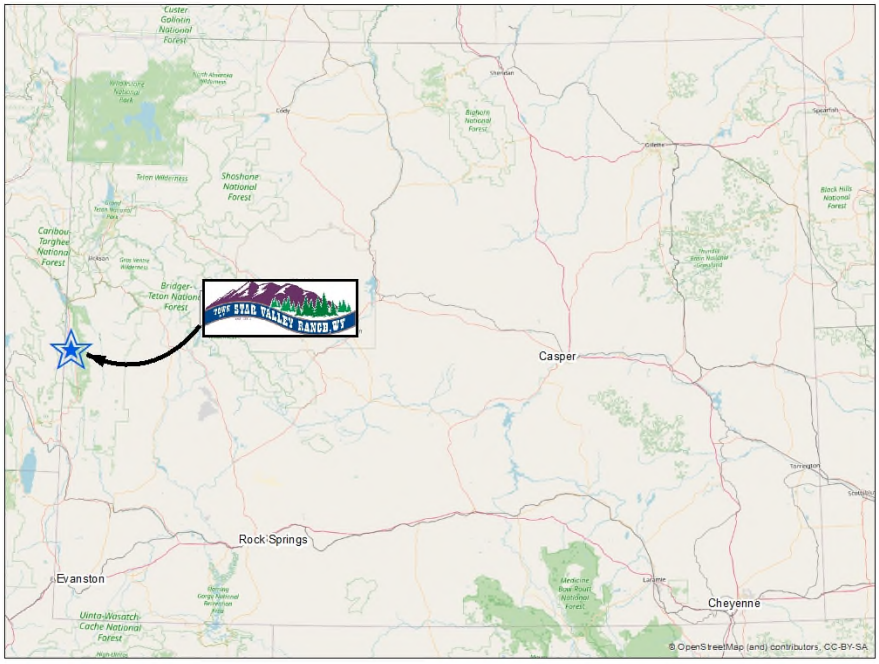

Figure 1.1 – Vicinity Map of Town of Star Valley Ranch, WY

1.2 Study Area

The Town of Star Valley Ranch is located in Lincoln County, Wyoming. Approximately 3 miles north of Thayne along Wyoming HWY 89 and 3 miles east the Town sits at the base of the Salt River Range located along the valley floor and extending into the mountains. The Town boundary encompasses approximately 2,040 lots.

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1.3 Project Sponsor

The sponsor of this study is the Town of Star Valley Ranch, WY. The format and presentation of this study is intended to be reflective of the Level I Study requirements of the Wyoming Water Development Commission (WWDC) as future capital improvement projects may require funding assistance through WWDC.

1.4 Master Plan Study Objectives

This Master Plan's objectives included first analyzing current and forecasted water system supply and demands, storage, assessing 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.

1.5 Previous WWDC Studies

- Star Valley Ranch Master Plan – Forsgren Associates – August 2008
- Star Valley Ranch Groundwater Level II Study – Weston Engineering Inc. – February 2009

Table 1.1 below tabulates the recommended water system improvements from the above mentioned WWDC studies, including the actions taken by the Town.

Table 1.1 Recommendations – Previous Studies

Study	By	Date	Recommendations	Implemented (Yes/No)
Star Valley Ranch Master Plan	Forsgren Associates	Aug 2008	Groundwater Development	Yes
-	-	-	System Storage	Yes
-	-	-	Rehabilitate Prater Canyon Tank Roof	Yes
-	-	-	Water Meters	Yes
-	-	-	Construct Transmission Line and Pump Station to Deliver Water from Green Canyon Tank (or new tank) to Prater Canyon Tank(s)	Yes
-	-	-	Construct Green Canyon Transmission Line for Fire Protection	Yes
-	-	-	Construct "Muddy String Road" Transmission Line to serve northwest areas from Green Canyon Zone	Yes
-	-	-	Distribution System Improvements	Yes
-	-	-	System Telemetry and Control	Yes
-	-	-	Re-Develop Prater Spring	Yes

2.0 EXISTING SYSTEM DESCRIPTION

2.1 General

The Town of Star Valley Ranch's water system is supplied by three (3) groundwater supply wells that are situated and integrated within the distribution system as well as a groundwater spring source east of the Town in the Bridger Teton Notional Forest (as shown in Figure 2.1). The wells pump directly into the water system, through 6"-8" water lines, which in turn supplies

water to the Green Canyon water storage tank. The Prater Spring source comes from a developed groundwater spring intake approximately 0.85 miles east of the Town and provides water to the upper pressure zones of the Town and the Prater Storage Tanks.

The system's distribution and transmission network consists of over 30 miles of 4" to 12" PVC piping. Most of the piping in the system is new and has been replaced or installed between 2009 – 2024, areas that have not been replaced are still original piping. There are currently 12 pressure zones controlled by 21 Pressure Control Valves (PRV/PSV). The system also consists of three concrete storage tanks totaling approximately 975,000 gallons and a booster station. The water system is controlled by a combination of both automated control and manual control. The major system components (wells, tanks, booster station) are controlled by an automated SCADA (Supervisory Control and Data Acquisition) system that monitors tank levels and controls well and booster station pumping. The system's pressure control valves are manually operated and controlled. An overview of the System is shown in Figure 2.1. In addition to domestic uses, the system also provided for fire flows. The existing system will be discussed in further detail in Section 3.0.

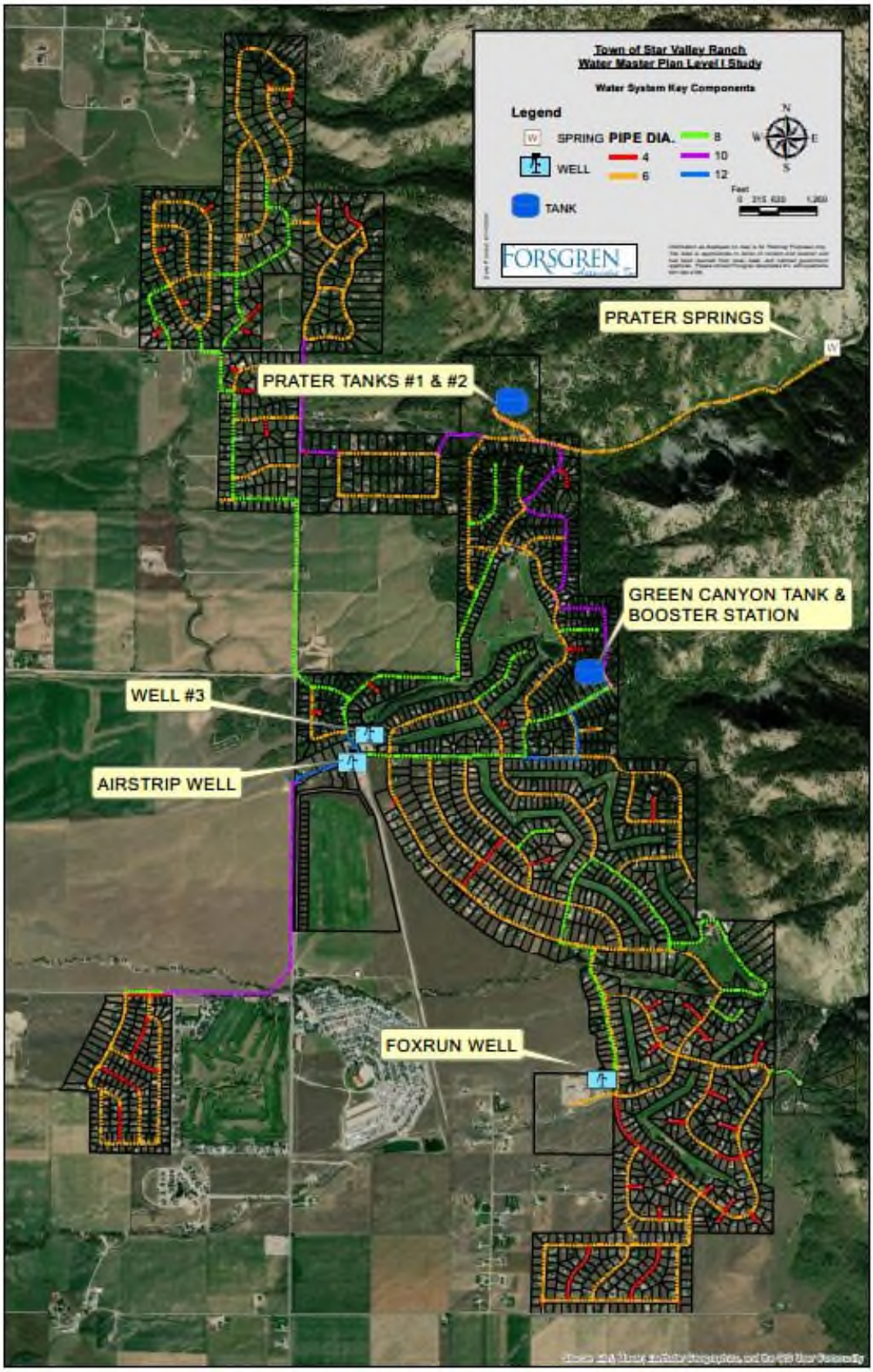

Figure 2.1 – TSVR System Map

2.2 Present Population Served

From the 2020 Wyoming Census Data, the Town of Star Valley Ranch had a population of approximately 1,866. Currently, population estimates for the Town in 2024 are approximately 2,183. This population represents a service count of approximately 1,188. There are approximately 2,040 total lots within the Town's developed boundaries meaning that there are approximately 852 undeveloped lots in the Town.

2.3 Population Forecast

Population forecasts as developed by the State of Wyoming were developed 2010 and thus were unable to foresee the massive increase in population that the Star Valley area has experienced in the last 5 years. For example, the Town's estimated current population of 2,183 corresponds to the forecasted 2024 population from the state at 1,690, a difference of approximately 500 people. This increase in growth has been due to a number of factors including the COVID pandemic which caused a migration from urban living to rural areas as well as overflow from the Jackson Hole area. As the Town has developed and improved its water system along with other aspects of governance, the Town has become a desirable location for a wide range of demographics. Originally the Town (prior to becoming a Town) was primarily a part-time seasonal residence for many but has shifted to more of a mix of full-time and seasonal residency.

For this report, the 2010-2040 Wyoming EAD Population Forecasts for Lincoln County will be used to demonstrate projected population growth for the Town for the years of 2024 through 2040. The population forecast for Lincoln County shows a moderate growth rate through 2040.

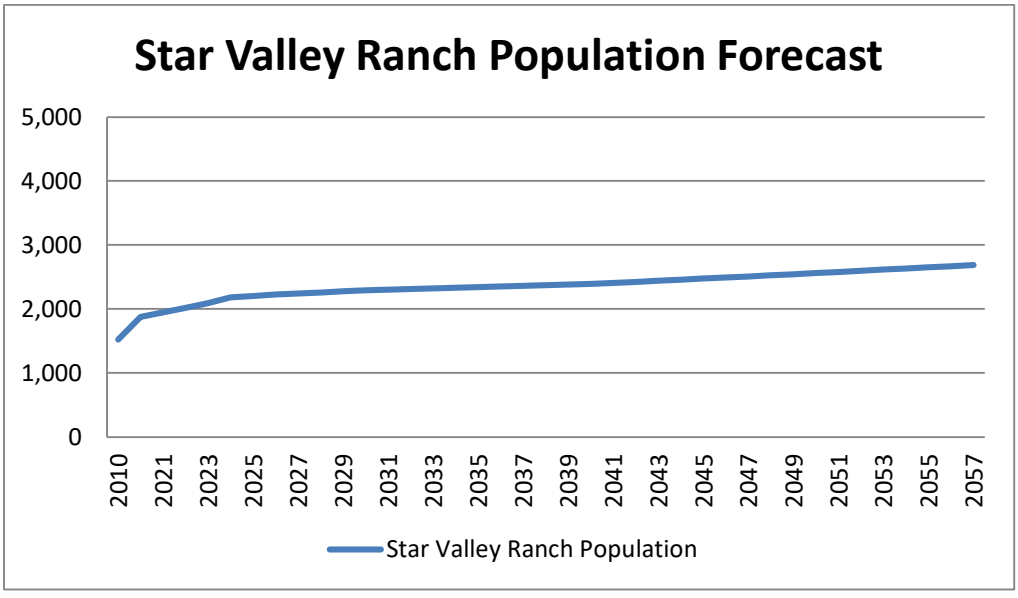

Figure 2.2 –Town of Star Valley Ranch Population Forecast – Wyoming Department of Administration and Information

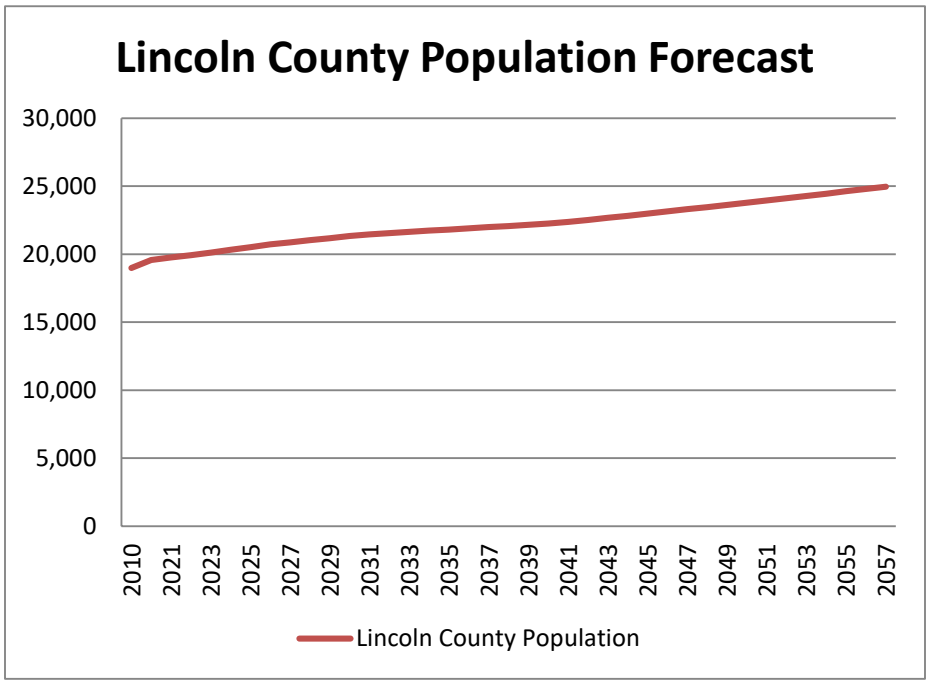

Figure 2.3 – Lincoln County Population Forecast – Wyoming Department of Administration and Information

The average year over year forecasted growth for Lincoln County for the years 2021 through 2040 is 0.69%. Using this growth rate, the Star Valley Ranch population forecasted through year 2054 is 2,633 as shown in Figure 2.2.

Currently the existing population of 2,183 reflects as 1,188 water system users. Using the growth rate numbers as a ratio of population to water users the projected 2054 system user count is 1,433. Based off of current Town Boundaries, the potential user count of the system or in other words system "Build-Out" is approximately 2,040.

For the purposes of this report the population projections estimated by the Wyoming Department of Administration and Information (2010-2040) and the year over year growth rate of 0.69% will be utilized for planning and development of recommendations. The "Build-Out" projection will be used as a comparison tool in the hydraulic modeling efforts, and system capacities but will not be used in the recommendations of this report.

2.4 Water User Rates

The Town of Star Valley Ranch charges a flat rate monthly service charge for each connection to the as well as a usage per gallon charge. The majority of the system's user connections are ¾-inch service connections but the Town does provide by ordinance/resolution a tiered rate for service line sizes through 4-inch. Tables 2.1 through 2.3 show the Town's water system

connection, base and usage rates. All data presented for system rates comes from the Town of Star Valley Ranch's Code of Ordinances – Chapter 54 and by Resolution No. 24-06-11-001.

Table 2.1 TSVR Water Connection Fee (Tap Fee)

Water Connection Fee (Tap Fee)		
Connection Type	Size	Price
Residential (Inside Town Limits)	3/4 Inch	$7,500.00
Outside Town Limits	3/4 Inch	$9,375.00
Commercial	3/4 Inch	$7,500.00
Commercial	1 Inch	$15,000.00
Commercial	2 Inch	$52,500.00
Commercial	4 Inch	$210,000.00

Table 2.2 TSVR Water Base Monthly Fee

Water Base Fee		
Connection Type	Size	Price (per Month)
Residential (Inside Town Limits)	3/4 Inch	$67.00
Outside Town Limits	3/4 Inch	$83.75
Commercial	3/4 Inch	$67.00
Commercial	1 Inch	$94.00
Commercial	1.5 Inch	$191.00
Commercial	2 Inch	$290.00
Commercial	4 Inch	$716.00
Residential Undeveloped Lot (Service Availability Fee)	NA	$28.00
Commercial Undeveloped Lot (Service Availability Fee)	NA	$46.00

Table 2.3 TSVR Water Usage Fee (per Gallon)

Usage Fee (Per Gallon Metered)	
In Town Limits	$0.00250
Outside Town Limits	$0.00312

The system also charges additional fees such as Turn On/Off Fees, Fire Suppression Fees, Late Payment Fees, Plant Investment Fee etc. These fees are shown in Tables 2.4 through 2.5 below.

Table 2.4 Plant Investment Fee

Plant Investment Fee		
Connection Type	Size	Price
Residential	3/4 Inch	$8,000.00
Commercial	3/4 Inch	$8,000.00
Commercial	1 Inch	$16,000.00
Commercial	2 Inch	$56,000.00
Commercial	4 Inch	$224,000.00

This Plant Investment Fee applies to new users to the system that are not currently within the Town's boundaries. This fee provides a source of funding to the Town to develop additional water source and storage capacities that may be required to serve this new area outside of the existing planning boundaries.

Table 2.5 Other Fees

Other Fees	
Turn On/Off Fee	$50.00
Excessive Wait Time for Service Call	$100.00 per Hour
Out-of-Hours Fee	$150.00 per Hour
Fire Suppression Fee	1/2 Regular Town Water Fee
Late Payment Fee	Greater of $5.00 or 1.5% for Each Infraction
Late Payment Interest	1.5% Per Billing Cycle
Return Check Fee	$30.00
Turn On/Off Violation	$750.00

2.4.1 Star Valley Area User Rate Comparisons

Table 3.3 below illustrates a comparison of water user rates in the Star Valley Area.

Table 2.6 Star Valley Area User Rates

Community	3/4" Base Rate	Base Rate Gallons	Cost per 1,000 gallons over Base Rate	Connection Fee
Nordic Ranches	$ 78.39	10,000	$ 1.60	$ 4,000.00
Etna	$ 35.00	14,000	$ 0.50	$ 5,200.00
Alpine	$ 24.00	-	$ 1.75	$ 3,000.00
Thayne	$ 34.75	30,000	$ 1.50	$ 3,000.00
Afton	$ 21.00	60,000	$ 0.35	$ 4,970.00

Comparison of water rates between communities is difficult to analyze because each system has differences in operation, ownership, population, production costs, etc. As discussed in Section 6.3.5, the American Water Works Association (AWWA) has developed a standard for average monthly residential water bills which is a factor of the Annual Median Household Income (AMHI) multiplied by 2.5% and divided by 12 months. The Town of Star Valley Ranch has an approximate AMHI of $82,647.00 so their theoretical monthly water bill, according to AWWA, should be approximately $172.00. Most municipal water rates in Wyoming and particularly the Star Valley Area have not been increasing with the rate of inflation. This is partially due to the State of Wyoming providing excellent funding grants and loans to municipal systems to keep rates down.

2.5 Existing System Components

The Town of Star Valley Ranch's water system primarily consists of three (3) groundwater supply wells, one (1) spring water source, three (3) concrete storage tanks, one (1) booster station, twenty one (21) pressure relief valves and approximately 38.5 miles of 2" to 12" transmission and distribution lines.

2.5.1 Water Supply Sources

- **Prater Springs:** This spring was originally developed in 1972 and were redeveloped in 2012. The spring surfaces from the side of the ill in a relatively well defined collection area. The collection system consists of a concrete collection box and cut-off walls and perforated collection piping.

  Yield: This spring has produced at a range of approximately 100 gpm to 400 gpm for the past three years. The high flows typically occur in the summer months and low flows occur in the winter months.

  Water Quality: This spring provides excellent water quality and is well situated at the collection area to prevent impacts of potential surface water influence.

- **Air Strip Well (Well #1):** The Air Strip Well was originally developed in 1993. In 2013 updates were made to the well casing and well house to address scaling issues and to bring the well house piping to EPA/DEQ standards. This well was drilled to a depth 545 feet and pulls water from the Salt Lake aquifer from stainless steel screens at intervals from 345 to 475 feet.

Figure 2.4 – Air Strip Well

Yield: As noted in the 2008 study, the well has a theoretical pumping capacity of 580 gpm but due to pump factor of safety and the casing size the well should be limited to a maximum of 325 gpm.

Water Quality: This well traditionally provides excellent an quality of drinking water well within the drinking water standards of EPA.

- **Fox Run Well (Well #2):** The Fox Run Well was developed in 2010. This well was drilled to a depth 500 feet and pulls water from the Salt Lake aquifer from stainless steel screens at intervals from 345 to 490 feet.

  Yield: This well has a pumping capacity of 300 gpm.

Figure 2.5 – Fox Run Well

Water Quality: This well traditionally provides excellent an quality of drinking water well within the drinking water standards of EPA.

- **Well #3:** Well #3 was developed in 2011. This well was drilled to a depth of 521 feet and pulls water from the Salt Lake aquifer from stainless steel screen at interval from 385 to 521 feet.

  Yield: This well has a permitted pumping capacity of 500 gpm. The well is capable however of producing 1,000 gpm. The permit should be updated to note this change.

Figure 2.6 – Well #3

Water Quality: This well traditionally provides excellent an quality of drinking water well within the drinking water standards of EPA.

2.5.2 System Storage

The Town of Star Valley Ranch has three (3) storage tanks totaling approximately 975,000 gallons of storage.

- **Green Canyon Tank:**
  This 400,000 gallon storage tank was constructed in 1985. It is an above ground, reinforced concrete tank that is situated to serve the lower pressure zones of the system as well as providing additional backup storage to the upper pressure zones by was of the Green Canyon Booster Station. This tank appears to reaching the end of its useful life. There are visible signs of leaking of the exterior of the tank and has recently become the subject of scrutiny from the EPA due to an increasing occurrence of Total Chloroform in testing samples. The Town has looked at the potential of lining the tank but due to the costs and expected life expectancy of the lining it appears to be more prudent to consider planning for a tank replacement project. This tank provides as the storage location for the water produced from the Town's three groundwater wells.

Figure 2.7 – Green Canyon Tank

- **Prater Canyon Tank #1:**
  This 175,000 gallon storage tank was constructed in 1977. It is a buried, reinforced concrete tank that is situated to serve the upper pressure zones of the system. The roof of the tank is a gravel ballast roof and has experienced structural damage due to weather conditions and equipment damage. As of today, the tank does appear to be in adequate condition especially considering its age but is nearing the end of its design life. This tank stores water directly from the Prater Spring water source.

Figure 2.8 – Prater Tank #1

- **Prater Canyon Tank #2:**
  This 400,000 gallon storage tank was constructed in 2010/11. It is a buried, reinforced concrete tank that is situated to serve the upper pressure zones of the system. This tank is located within 30 feet of the original Prater Tank (#1). This tank appears to be in good condition.

Figure 2.9 – Prater Tank #2

2.5.3 Disinfection and Treatment

The Town has hypo-chlorite solution disinfection facilities at each of the water source locations; Air Strip Well, Fox Run Well, Well #3 and the Prater disinfection building at the Prater Tank site location. Under normal operating conditions, the water quality of the source supply does not require treatment. Currently however, the Town is chlorinating the system due to repeated occurrences of Total Chloroform during routine testing samples at the direction of the EPA. It is anticipated that once some aging infrastructure (Vista Drive water main line, Green Canyon Tank) is replaced or rehabbed the Town will be able to return to no treatment in the system.

2.5.4 Transmission Lines

As illustrated in Figure 2.10 and as described below, this report recognizes five (5) transmission lines in the system.

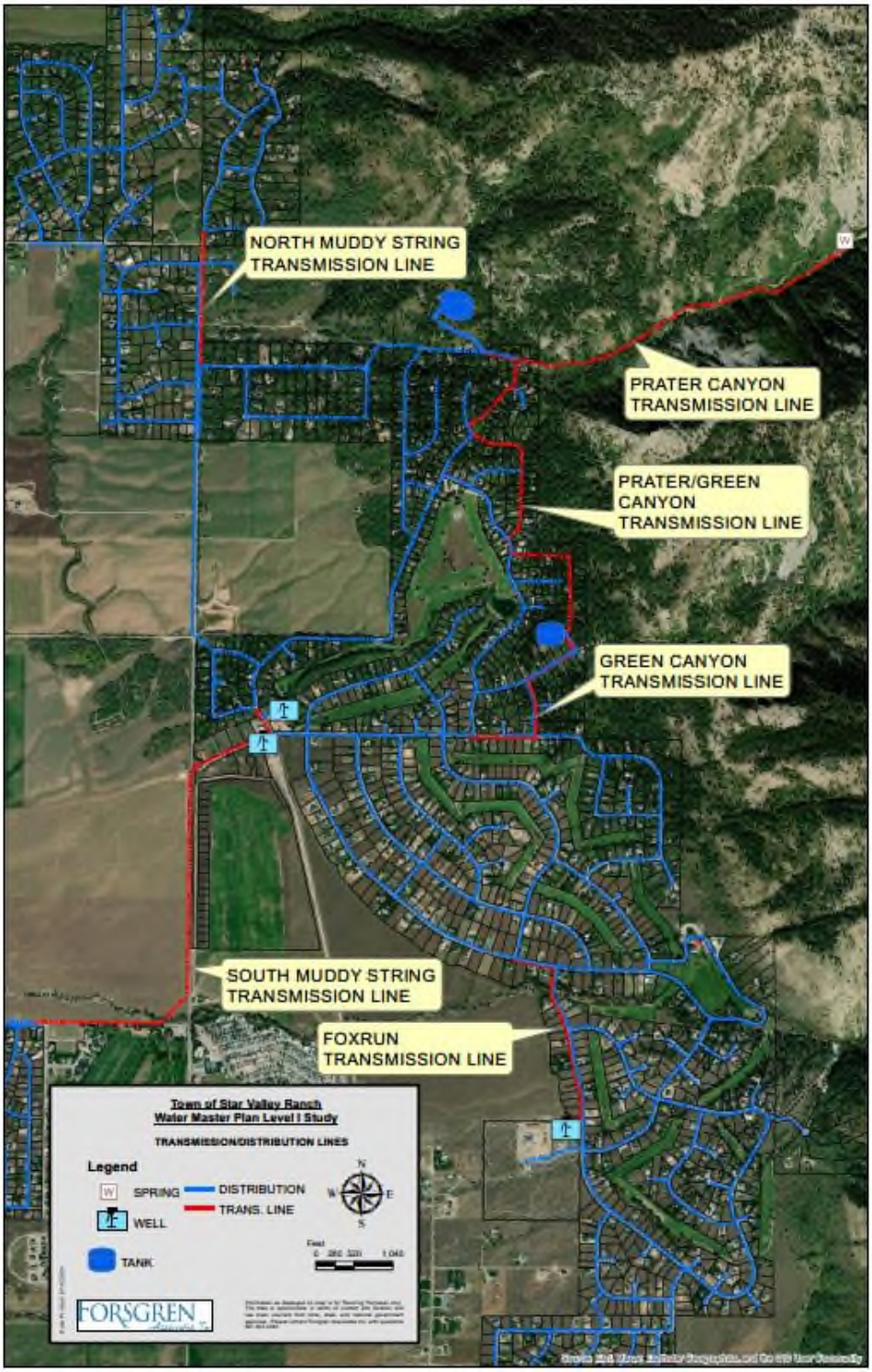

Figure 2.10 –TSVR Transmission Lines

- **Prater Canyon Transmission Line:**
  This transmission line consists of approximately 4,500 feet of 6" HDPE/PVC waterline conveying water from the Prater Spring Intake location to the Prater Tanks. Due to the elevation drop from the spring intake to the tanks, three (3) zeroing boxes are installed along the line to relieve the pressure buildup and control the flow into the Prater Tanks. I tis unknown as to when this line was installed thus it is assumed to be the original construction and likely installed prior to the building of the Prater Tank (1977). There are parts of this transmission line that have surfaced due to poor bury depths, spring runoff and road maintenance. The zeroing boxes also present a unique issue regarding maintenance and operation particularly in the winter months when snow depths increase. As shown in Figure 2.10 this line does extend beyond the Town limits and is primarily located on US Forest Service Land. Due to this, the Town does have a service agreement with the Forest Service to maintain their line but must notify and gain approval form the Forest Service Prior to any operations.

- **Prater/Green Canyon Transmission Line:**
  This 10" transmission line was installed in 2010/11 as a direct connector between the Prater Tanks and the Green Canyon Tank. This line is capable of providing water flow in both directions. The line can provide gravity flow from the Prater Tanks to the Green Canyon Tank and by way of the Green Canyon Booster Station from the Green Canyon Tank to the Prater Tanks.

- **North Muddy String Transmission Line**
  This 10" transmission line was installed in 2015 to provide redundant and increased flow capacities to the northern most portions of the Town. This line primarily consists of fused HDPE line installed along the east shoulder of Muddy String Rd. (CR 117).

- **Green Canyon Transmission Line:**
  This 12" transmission line was installed in 2009 and provides increased flow capacities from the Green Canyon Tank to the southern portions of the Town. This project was completed primarily to increase fire flow capacities.

- **South Muddy String Transmission Line:**
  This 10" Fused HDPE transmission line was installed in 2020 to provide an increase in available domestic and fire flow capabilities from the main body of the Town to Plats 4 & 5.

- **Fox Run Transmission Line:**
  This 8" PVC transmission line was installed in 2008 to allow the produced water from the Fox Run Well to be able to fill the Green Canyon Tank. Due to the location of the

well, a direct connection to the distribution system would have put the connection below a pressure control valve separating the Green Canyon Tank Pressure Zone from the lower pressure zone.

2.5.5 Green Canyon Booster Station

This booster station installed in 2011 is the lynchpin in the process of conveying water from the well sources to the upper zones and Prater Tanks. This booster station is located in the same location as the Green Canyon Tank and consists of a 30’ x 36’ building, three booster pumps (2 main pumps and 1 backup), piping and flow control valves. This booster station can be seen in Figure 2.11.

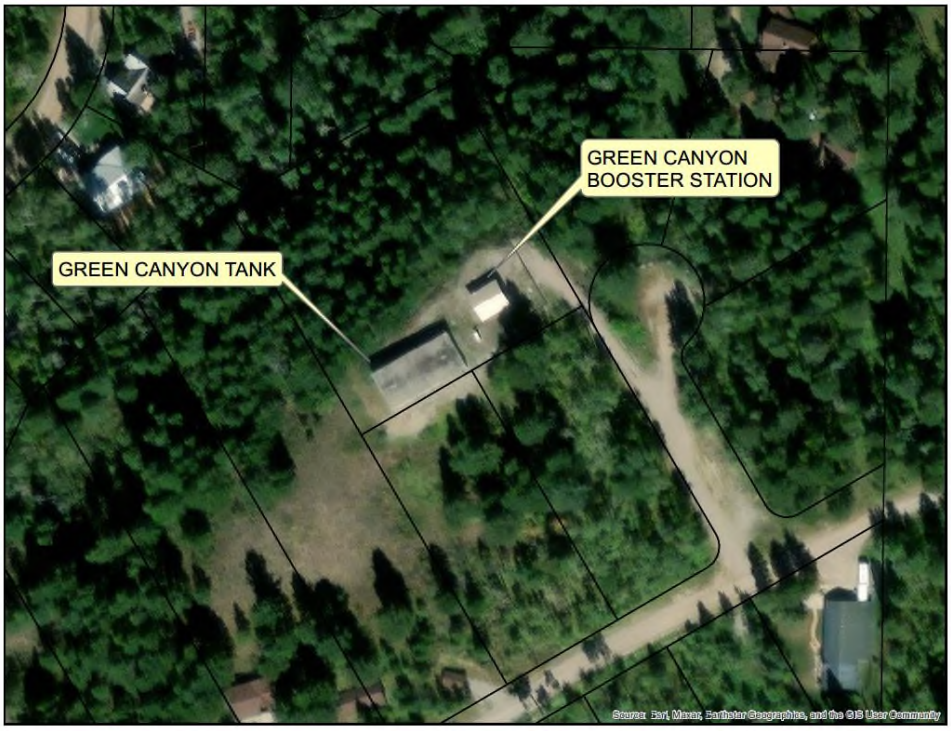

Figure 2.11 –Green Canyon Booster Station

2.5.6 Distribution System / Pressure Zones

As noted above, much of the system’s distribution lines have been replaced as part of the recommendations of the 2008 Master Plan. It is anticipated that most of the distribution system replacement swill be completed near the end of 2025. Figure 2.12 shows the distribution below and Table 2.7 illustrates the breakdown of distribution line diameter and length.

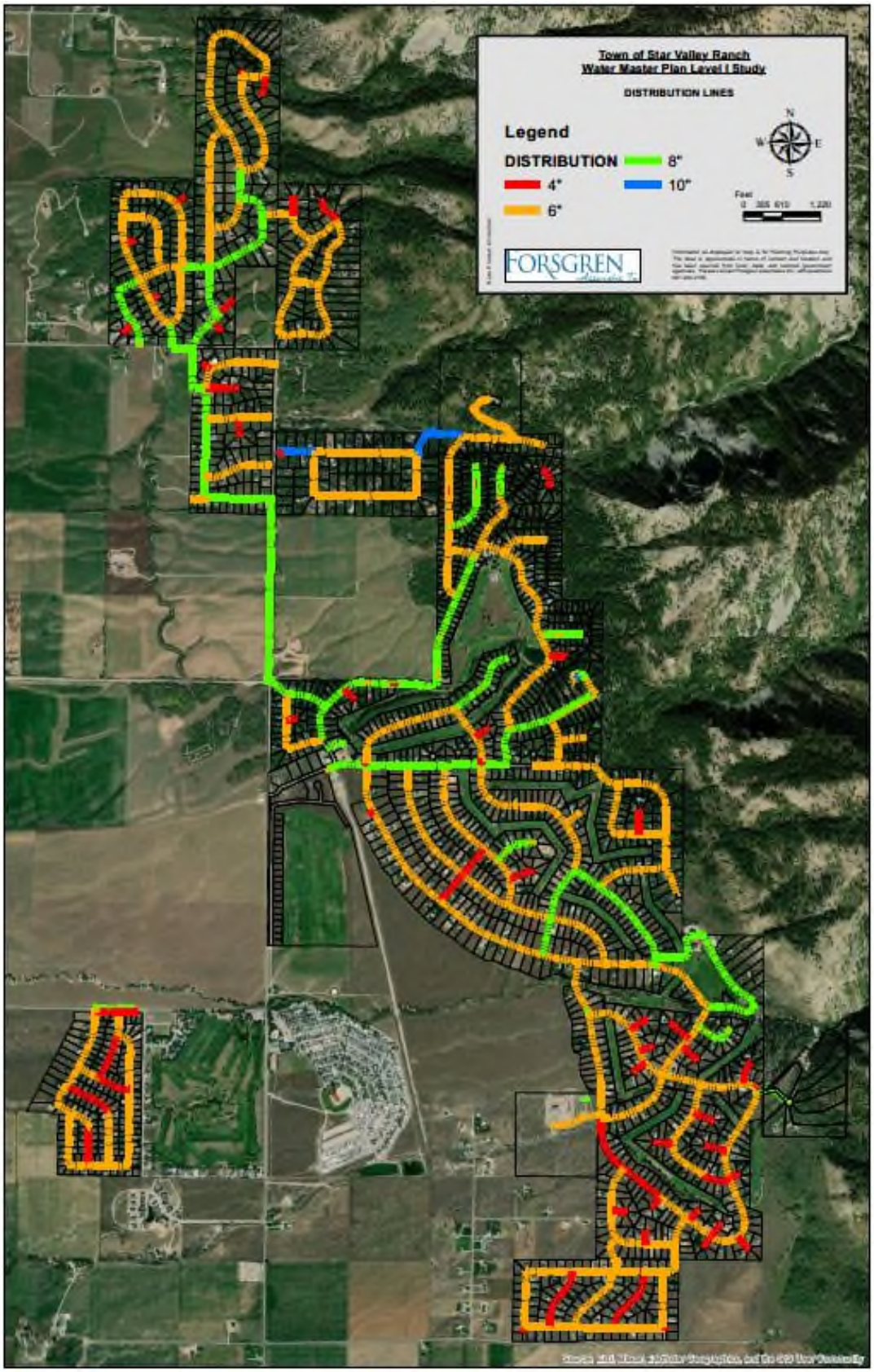

Figure 2.12 –TSVR Distribution Lines

Table 2.7 Transmission/Distribution Lengths

Pipe Dia	Distribution (FT)	Transmission (FT)
12"	0	4,688
10"	1,644	14,515
8"	37,832	4,484
6"	111,059	3,378
4"	19,353	0

In 2010, the Town conducted a water meter installation project installing approximately 1,000 water service meters. Since that project all service connections to the system are metered and recorded. These meters are Sensus radio read meters that allow for a streamline data collection for monthly water billing.

The original design of the water system did not include nor anticipate providing fire flow protection. Part of the design and replacement and development of most of the distribution and transmission system since 2008 has been to increase domestic flow capacities but also to provide fire flow capacities. Since 2008 the Town has installed approximately 214 fire hydrants as shown in Figure 2.13.

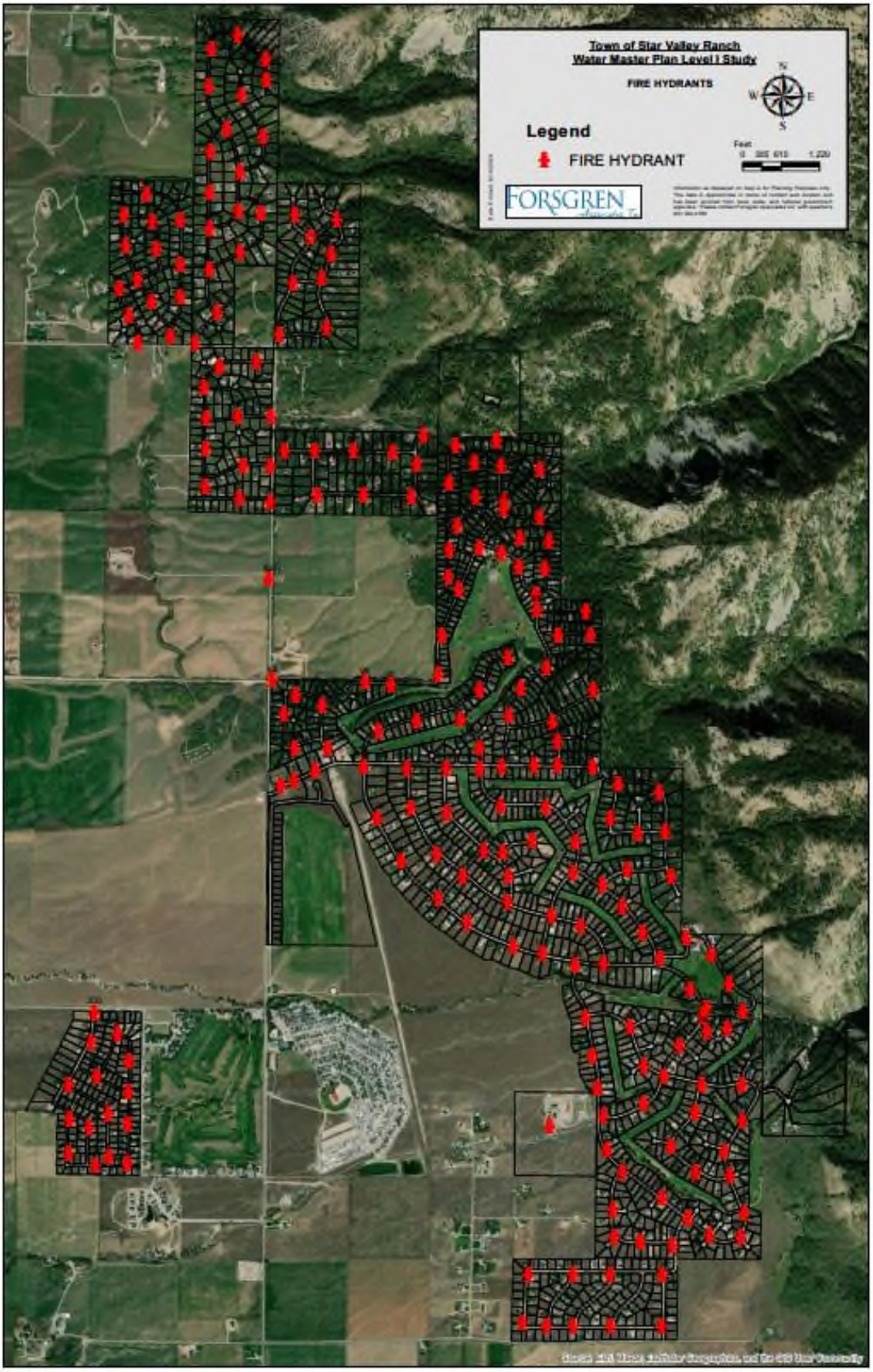

Figure 2.13 –TSVR Fire Hydrants

Most of the water system is controlled by the Town's SCADA system. With this system most of the vital functions (supply & storage) are automatically controlled based upon the parameters set by the system water operators such as water tank water fill elevations and the order in which the wells turn on.

- **Pressure Zones**

  Due to the geographic nature and layout of the Town of Star Valley Ranch, there are twelve (12) pressure zones controlled by twenty-one (21) PRV (pressure reducing valve) stations. These PRV stations are vital to the operation and success of the system in terms of pressure and capacity control. Nearly all of the original PRV stations have been replaced and additional PRV stations have been added to the system since 2008. Each PRV station has been equipped with a main pressure control valve (typically a larger valve) to control high demand flows (such as fire flows) and a bypass pressure control valve to control the normal everyday use flows. Figure 2.15 below identifies PRV locations and pressure zone locations. Table 2.8 below identifies each PRV station and their designed operating conditions.

Figure 2.14 – Typical PRV Station

	Elevations
Prater Tank	6800
Green Canyon Tank	6515

PRV Number	PRV Location	Upstream PRV Control	Plat	PRV Elevation	Modeled Pressures		
					U.S. Pressure	Pressure Reduction	D.S. Pressure Setting
1	Spruce Drive North	6. North Forest and East Forest	1	6514	94	49	45
2	Spruce Drive and Evergreen	6. North Forest and East Forest	1	6421	134	54	80
3	Aspen Way (Top)	6. North Forest and East Forest	2	6458	118	48	70
4	West Elkhorn and Muddy String	6. North Forest and East Forest	20	6304	184	103	81
5	Muddy String and North Forest	6. North Forest and East Forest	22	6300	186	111	75
6	North Forest and East Forest	Prater Tanks	22	6500	126.2	26.2	100
7	Vista West and Cedar Way	Prater Tanks	7	6485	132	52	70
8	Spruce Drive and Dogwood Drive (South Intersection)	6. North Forest and East Forest	2	6344.58	167	57	110
9	Cedar Drive and Cedar Way	Prater Tanks	7	6508.25	122	52	60
10	Aspen Way and Dogwood Drive	3. Aspen Way (Top) 8. Spruce Drive and Dogwood Drive (South) 2. Spruce Drive and Evergreen 1. Spruce Drive North	2	6296.05	140	72	68
11	Vista East and Green Canyon Drive	12. Vista East North	9	6305	141	49	92
12	Vista East North	Prater Tanks	7	6487	132	70	62
13	Last Chance and Hardman	15. Canyon Pines Drive and Vista West 11. Vista East and Green Canyon Drive 16. Vista West South Green Canyon Tank	17	6243	119	29	90
14	Middle Branch Drive and Cedar Creek Drive	15. Canyon Pines Drive and Vista West 11. Vista East and Green Canyon Drive 16. Vista West South Green Canyon Tank	17	6296	96	26	70
15	Canyon Pines Drive and Vista Drive	18. Green Canyon Drive and GC Circle	13	6336.11	113	33	80
16	Vista West South	9. Cedar Drive and Cedar Way 7. Vista Drive and Cedar Way	6	6320	139	49	90
17	Vista Drive and Muddy String	16. Vista West South 11. Vista East and Green Canyon Drive 15. Canyon Pines Drive and Vista West Green Canyon Tank	Comm.	6170	151	55	86
18	Green Canyon Drive and GC Circle	Prater Tanks	11	6463.7	143	83	60
19	Muddy String and Piute Drive	Green Canyon Tank 11. Vista East and Green Canyon Drive 16. Vista West South	20	6312.43	91	11	80
20	Cheyenne Circle	19. Muddy String and Piute Drive 5. Muddy String and North Forest 4. West Elkhorn and Muddy String	20	6221.46	119	19	100
21	CR 118 and Barberry Way	17. Vista Drive and Muddy String	4	6042	141	56	85

Table 2.8 PRV Control Settings

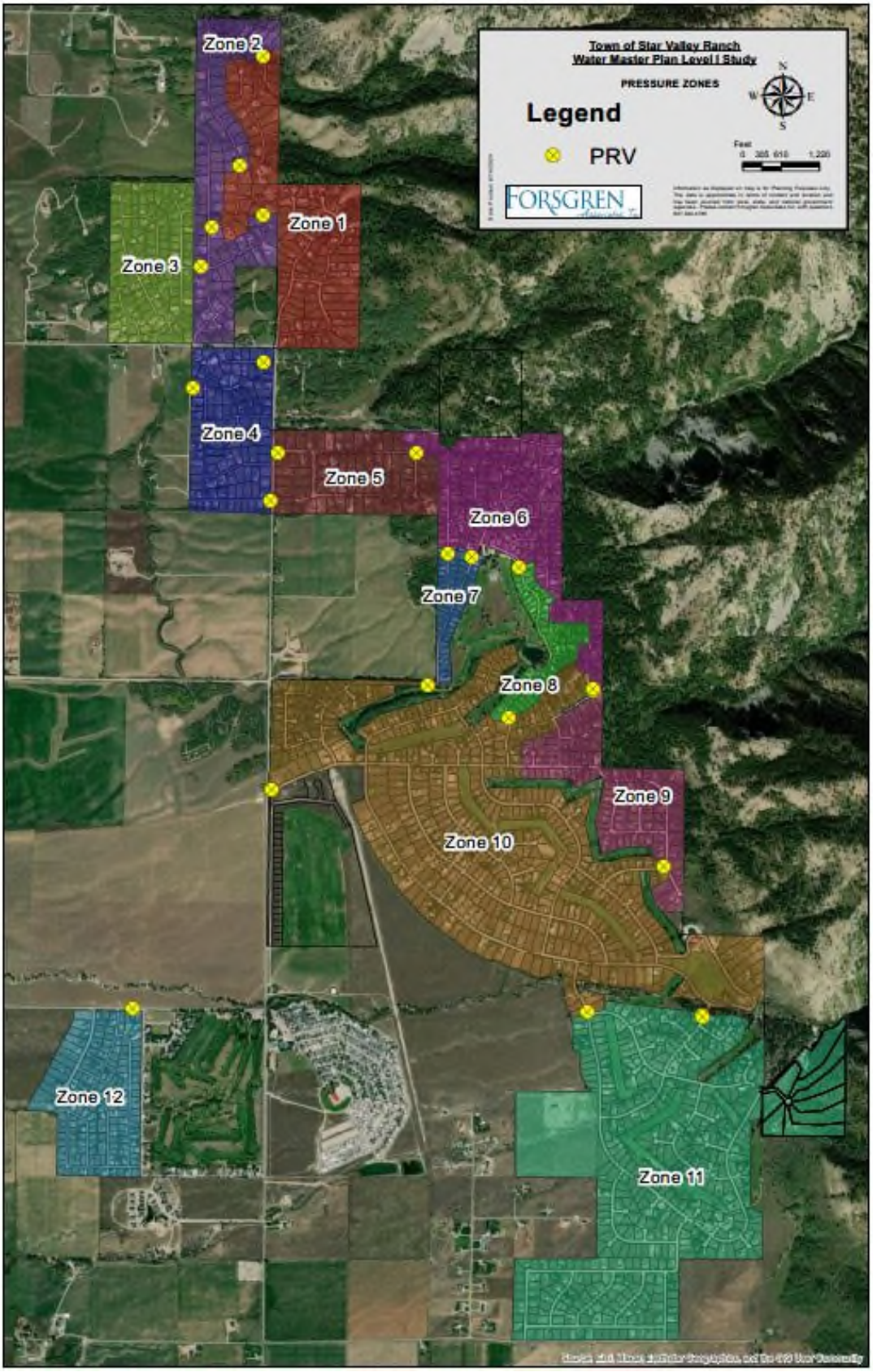

Figure 2.15 –TSVR PRV & Pressure Zones

3.0 WATER DEMAND AND SUPPLY

As noted in Section 2.5.6 the Town of Star Valley Eanch's water system is primarily controlled by the and monitored by the Town's SCADA system. This system automatically records and stores operational data including well/spring production, well meter readings, water levels and system pressures. The SCADA produces and records data on a daily basis which is useful in understanding high demand times. The Town also has meters on each service connection to the system and reads those meters on a monthly basis and has provided a total gallons per year meters for the past three years. This data is used in this study to determine the system demands.

3.1 Identification of Domestic Water Use

3.1.1 Existing Per-Capita Consumption:

The system is almost entirely a domestic water use system with the exception of a few commercial connections in the Star Valley Ranch Association's Club House(s)/Restaurant, Cedar Creek Grill and the Town Hall. To determine the system demands, the water production records provided by the Town for the years 2021-2023 will be used. Based upon the production records the water system experiences a production Average Day Demand (ADD) of 419,527 gallons per day (gpd) or 291 gpm over the three (3) year period. The Town's annual metered usage provided shows a metered ADD of 268,628 gpd to 187 gpm. The difference between the production and metered ADD, for the respective time periods, indicates that there is unaccounted water use or loss. The American Water Works Association (AWWA) recommends a production water loss of 10% or less and reports that the average water loss for municipal water systems is 16%. Comparing the production and metered ADD for the years 2021-23 the system shows unaccounted water loss/use at approximately 35.7% of production. Although 35.7% seems excessive, the Town does have unmetered usage in its hydrants and public works operations including water system replacement projects. The average loss of 35.7% equates to a loss of production of approximately 104 gpm, which is significant in relation to the production of just one of the wells. Additionally, since meters have been installed in the Town (both on the usage side and the production side) there has not been a major calibration effort made to verify the accuracy of the meters. Every mechanical meter, no matter how advanced, has some level of error in which water usage is typically not accurately accounted for (i.e. low flows less than 0.25 gpm on smaller meters) and a percentage of error in readings. With nearly one-third of the water production being "lost", it could be a major issue for the system with regards to production costs and infrastructure (well pumps) life cycles.

For the years 2021 thru 2023 a Maximum Day Demand (MDD) of 1,049 gpd was recorded on July 26, 2021. This is approximately 3.6 times the ADD of the system. For this report a peaking factor of 3.6 is used for calculating the design MDD, and a peaking factor of 5.0 is used for

calculating the Peak Hour Demand (PHD). Table 3.1 indicates the current ADD, MDD and PHD for the Town of Star Valley Ranch water system.

Table 3.1 Current Design Demands - Production

ADD (gpd)	MDD (gpd)	PHD (gpd)
419,527	1,510,297	2,097,634

3.1.2 Future Projected Demands

Based on the year over year growth rates as presented in Section 2.3 the Star Valley Ranch water system is estimated to serve approximately 1,433 users (residential service connections) in the year 2054. With a current user count of 1,188 the 2054 user count is an increase of approximately 20.6%. When the ADD is increased by 20.6% to project the 2054 population it results in a future ADD of 505,914 gpd for the system. Table 3.2 summarizes the estimated future system demands.

Table 3.2 Future Demands 2054 - Production

ADD (gpd)	MDD (gpd)	PHD (gpd)
505,914	1,821,290	2,529,569

For comparison purposes, the potential build-out of the system includes a total of 2,040 residential lots. There are currently approximately 1,188 users/lots connected to the system meaning a build-out would add an additional 852 users to the system demands. Based upon the current production demands the build-out scenario demands for the system are summarized in Table 3.3 below.

Table 3.3 Future Demands Build-Out - Production

ADD (gpd)	MDD (gpd)	PHD (gpd)
928,354	3,342,075	4,641,771

For comparison, utilizing the metered usage plus an additional 10% for operating/unmetered usage Table 3.4 thru 3.6 show the design metered demands.

Table 3.4 Current Design Demands – Metered Plus 10%

ADD (gpd)	MDD (gpd)	PHD (gpd)
295,491	1,063,766	1,477,453

Table 3.5 Future Demands 2054 – Metered Plus 10%

ADD (gpd)	MDD (gpd)	PHD (gpd)
356,337	1,282,812	1,781,683

Table 3.6 Future Demands Build-Out – Metered Plus 10%

ADD (gpd)	MDD (gpd)	PHD (gpd)
653,879	2,353,965	3,269,396

3.1.3 Water Production/Usage Costs

Utilizing the P & L financial statements and analysis provided by the Town Treasurer and the water usage production records Table 3.7 was formed.

Table 3.7 FY 2023 thru 2024 Production Costs

TSVR Water Production Costs				
Fiscal Year (July - June)	Water System Operating Costs	Water Production (gal)	Cost of Production per Gallon	Cost of Production per 1000 Gallons
2023	$797,499.00	100,517,042	$0.0079	$7.93
2024	$890,684.00	106,300,000	$0.0084	$8.38
Average	$844,091.50	103,408,521	$0.0082	$8.16

As shown in Table 3.4, the cost of water production averages approximately $0.0082 per gallon of water however not all of the operating costs are related to production. The Town is in a unique situation as most of their produced water currently comes from the Prater Spring Intake. Effectively this water is produced at zero cost notwithstanding the capital improvement costs associated with getting to this situation in developing the spring and transmission line. The cost to produce water essentially narrows down to the electrical costs of operating and maintaining the system groundwater wells, the operation of the backup generators, the costs of treatment (which under the typical operating scenario is not needed) and SCADA costs. Currently the costs to actually produce water are fairly minimal ($30,000 - $50,000 per year) as the system's wells are not continuously running to keep up with demands.

3.2 Regionalization Considerations

Regionalization opportunities are not covered under this study. Regionalization has been investigated by multiple studies for the Star Valley Area by the Wyoming Water Development Commission such as the Star Valley Regional Master Plan (WWDC, 2009).

3.3 Water Rights Review

Pertinent active water rights details are summarized in Table 3.8 and copies of the Permits, Statements of Completion, and Beneficial use forms are presented in the Appendix.

Conditions and limitations have been made part of the permits for the wells. The conditions and limitations of the SEO permits are as follows:

1. A meter acceptable to the State Engineer is required to accurately measure the total quantity of water produced from this well.
2. The beneficial use of water under this permit also requires that each of the water production facilities that serve the Town of Star Valley Ranch's Municipal Water Supply System have an individual meter acceptable to the State Engineer to accurately measure the total quantity of water produced from each of the Town's water production facilities.
3. An annual report shall be submitted to the State Engineer no later than February 15 of each year stating the total amount of water produced from this well and all other water production facilities used to supply water to the appropriator's Municipal Water Supply System each month during the previous January to December 31, twelve (12) month period.
4. The report shall identify the well by name, location, permit number and shall identify the type of meter used for the measurement.
5. The report shall contain at least two (2) semi-annual measurements of the static water level in the well and all other wells used to supply water to the appropriator's Municipal Water Supply System, as measured twenty-four (24) consecutive hours after pumping has ceased. The dates the measurements were obtained and the period of time this well and all other wells were "shut-in" prior to obtaining the measurements must be specified.
6. The State Engineer reserves the right, upon written request, to modify or waive all or any portion of these conditions and limitations.

Table 3.8 TSVR Water Rights Summary

Source Name	SEO Permit Number	Permit Status	Permitted Pumping/Flow Rate (GPM)	Priority Date
North Airstrip #1	U.W. 90328	Fully Adjudicated	500	11/30/1992
TSVR No. 2 Well (Fox Run Well)	U.W. 193033	Incomplete	300	2/11/2009
TSVR No. 3 Well	U.W.193487	Incomplete	500	8/2/2010
Prater Canyon No. 1	U.W. 13319	Fully Adjudicated	325	4/16/1971

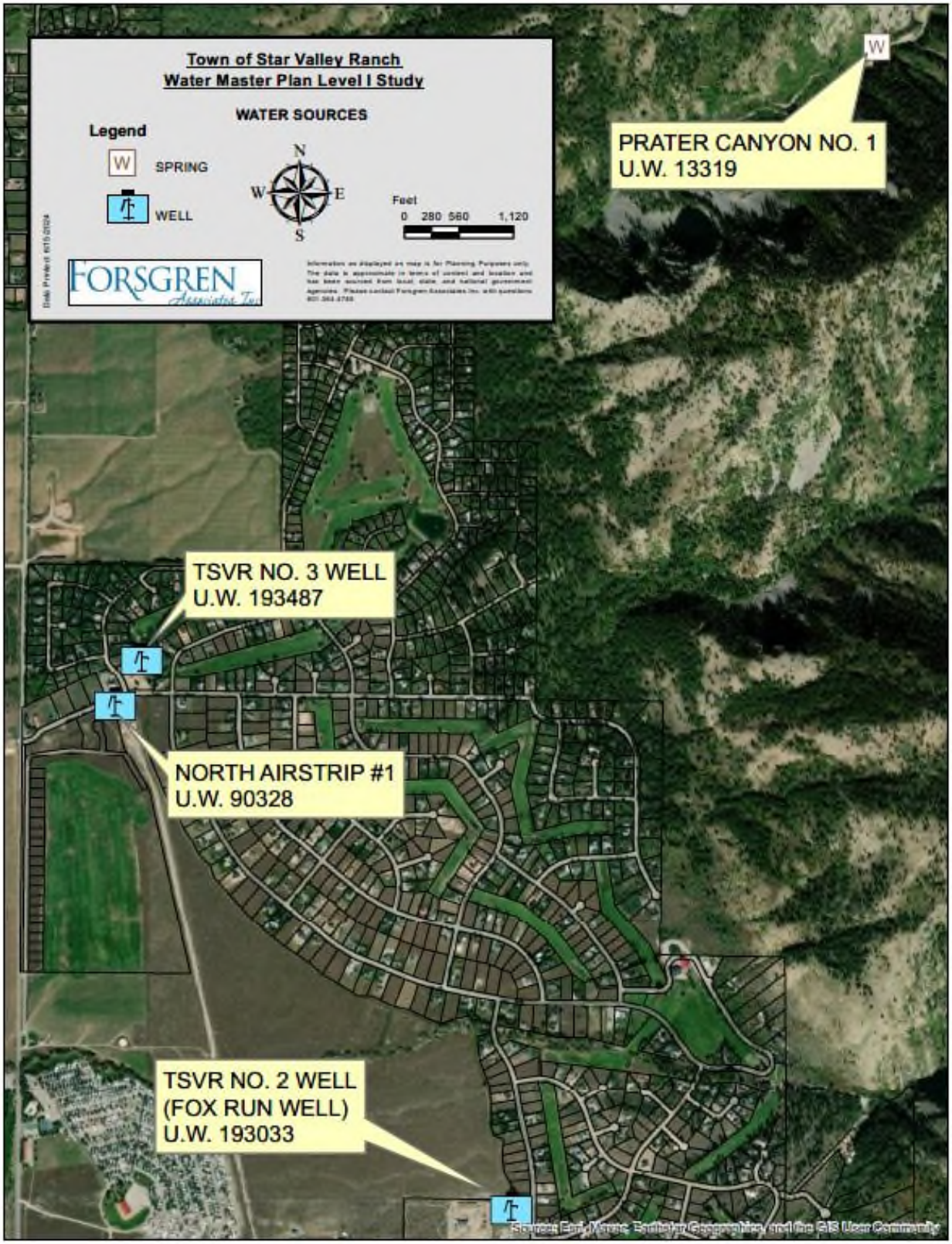

Figure 3.1 – Water Source Locations Map

4.0 SYSTEM MODELING AND GIS MAPPING

4.1 System Modeling

This master plan effort included updating the system-wide computer model of the Star Valley Ranch water system. In general. modeling of the water system showed that much of the infrastructure sizes and capabilities were capable of handling current and future demands, while several locations could use some updating to help remedy undersized lines, water age, etc. The results of the modeling will be discussed in further detail under this Section and Sections 6 and 7.

The system was modeled utilizing the most current Bentley WaterGEMS CONNECT Edition software with extended period simulations to analyze how the water system performed over an extended period. In addition, this model was used to evaluate the water age of the system particularly with relation to the three storage tanks. The diurnal curves used for modeling the demands on the system are shown in Figure 4.1. This curve is based off a typical diurnal curve from the AWWA M32 Manual. For clarification, a diurnal curve fluctuates the demands on a system based upon typical usage patterns (i.e. not as much water is in demand at 5:00 AM as is demanded at 5:00 PM. Figure 5.2 shows extended period simulation demands for the MDD on the system over a 168 hour or weekly period. This model will provide Star Valley Ranch with a "living" tool to evaluate current system operations and to plan for future growth. In order to ensure that this model was reflective of the actual system, the following tasks were performed:

- System Mapping and Documentation: Schematic system mapping showing pipeline sizes and location, and system components, were researched based on available GIS mapping, as-built drawings, field investigations, and input from system operators.

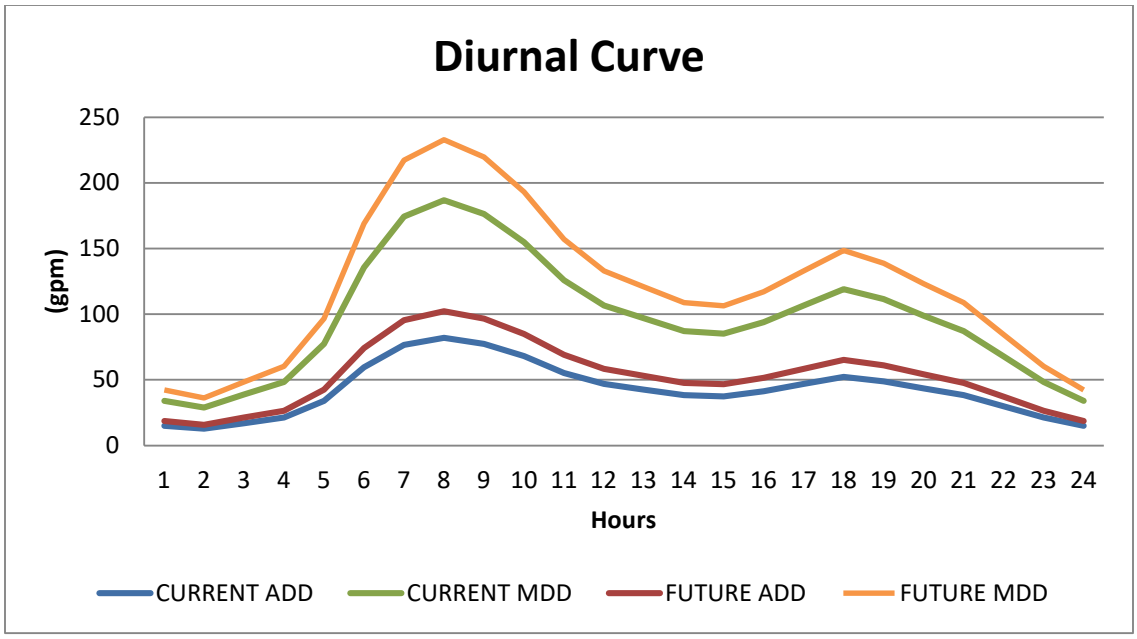

Figure 4.1 Diurnal Curve (Based on AWWA M32 Figure 2-12)

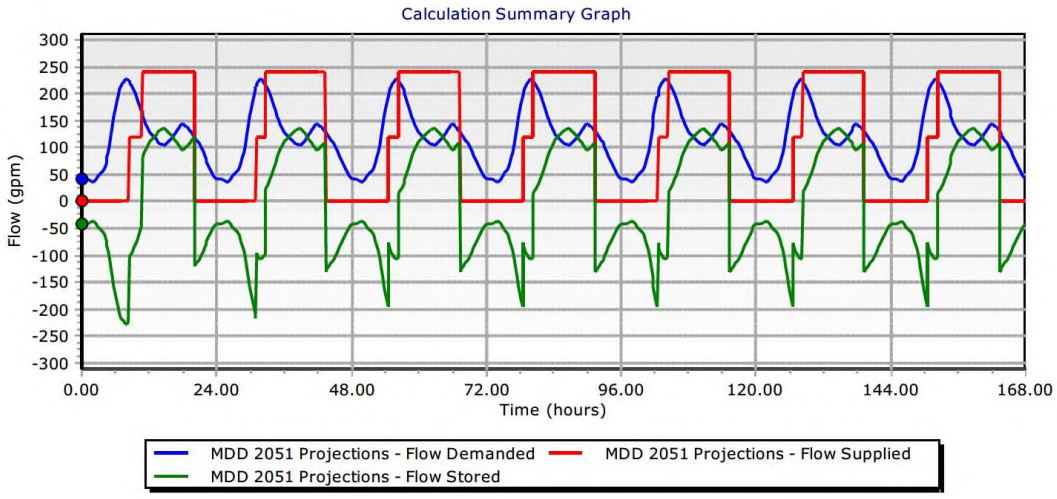

Figure 4.2 – Extended Period Simulation (EPS)

4.1.1 Water Model Calibration

- Update of the Water Model: The Star Valley Ranch water system does have an existing working model for the system. The basis of updating the model is to reflect the changes that have occurred in the system since 2008 and to analyze the system for current demands.

- Establishing Modeling Nodes: Each node or data point in a model must contain relative properties that are intended to reflect "real life" locations of water system components. One of the properties that is critical to accurate system evaluation is node elevation. This

is an important factor for determining not only the actual length of pipe between nodes but in determining the outputs of the system such as pressures and fire flows. The establishment of these nodal evaluations was primarily based upon topographic mapping and recorded system pressures.

- Pressure Control Valve Settings: The Star Valley Ranch water system's pressure are primarily controlled by the storage tank water elevation as well as the pressure settings at each of the twenty-one pressure control valves. The pressure setting as shown in Table 2.8 have been applied to the model.

- System Demands: In order to fully evaluate the system and how it reacts to particular scenarios system demands were placed that are reflective of the work completed in Section 3.1. These demands represent multiple scenarios for both current and anticipated future demands on the system such as the Existing Average Day Demand and the Future Maximum Day Demand.

- Operational Controls/SCADA Controls: These controls are other automatic operating conditions of the system that are set by system operators and implemented by the Town's SCADA system. This system controls when pumps turn on and off primarily based upon the hydraulic grade of the Town's water storage tanks. The controls of the system in the model are as shown below in Table 4.1.

Table 4.1 TSVR SCADA Controls – Model

Measured Component	Limit	Hydraulic Grade (FT)	Reacting Component	Action
Green Canyon Tank	<	6508	Well #3	On
Green Canyon Tank	< or =	6513	Well #3	Off
Green Canyon Tank	<	6510	Air Strip Well	On
Green Canyon Tank	>	6515	Air Strip Well	Off
Green Canyon Tank	<	6506	Fox Run Well	On
Green Canyon Tank	>	6511	Fox Run Well	Off
Prater Tanks	<	6795	Primary GC Booster Pump	On
Prater Tanks	>	6799	Primary GC Booster Pump	Off
Prater Tanks	<	6792	Secondary GC Booster Pump	On
Prater Tanks	>	6798	Secondary GC Booster Pump	Off

Multiple simulations using existing and future ADD, MDD and PHD were analyzed for the existing water system. In general, the modeling showed that all line configurations, sizes, and system components were adequate for current and future demands. Figures 4.3 and 4.4 show the system's pressures during the current and future MDD on the existing system respectively.

At first glance it may appear that Figures 4.3 and 4.4 are the same map but they are actually separate modeling events separated by 30 years of projected demands. The comparison of the two maps shows that the projected increase in demands by 2054 has a relatively minimal impact on the system and its serviceable pressures.

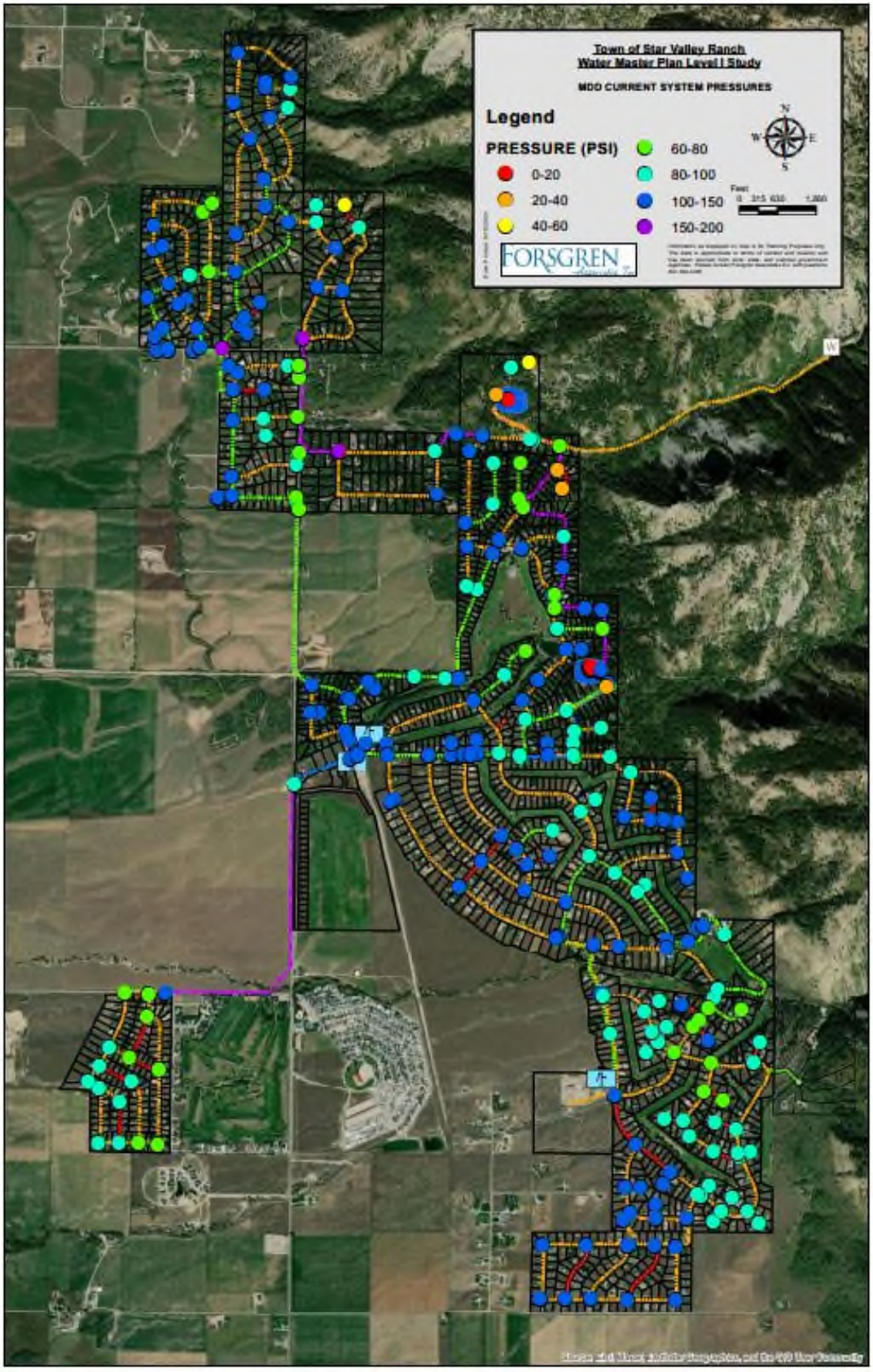

Figure 4.3 – Current MDD System Pressures

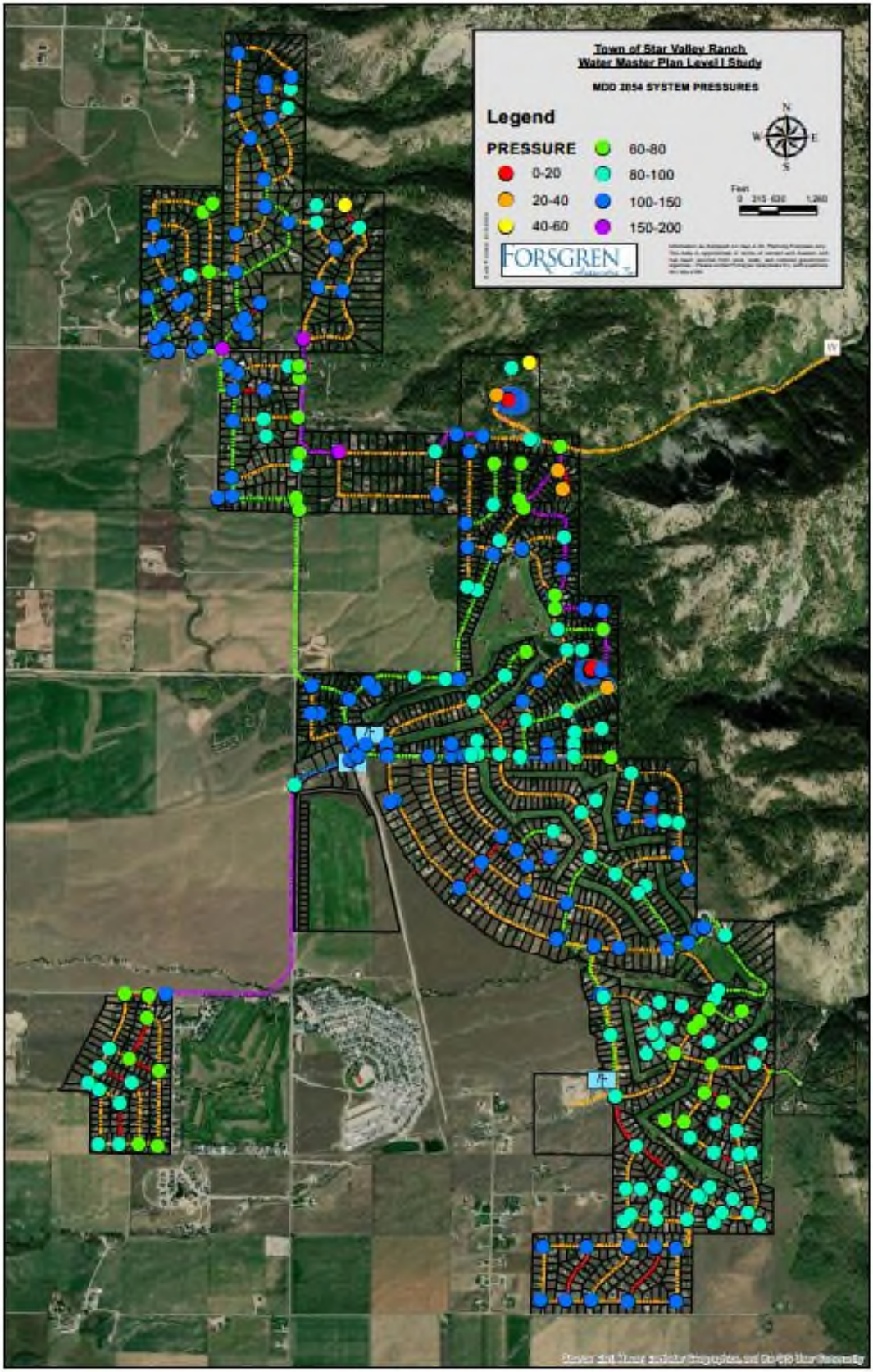

Figure 4.4 – Future 2054 MDD System Pressures

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4.1.2 Water Age Evaluations

Due to a growing concern throughout the state, the Wyoming Water Development Commission is requiring water age evaluations in master plans. This is a warranted concern and can potentially have a harmful effect on the domestic users of a system. The issue that the Town has with regards to water age is during the average demands (ADD) for the Green Canyon Tank. In an effort to see what operations could be done to help reduce the water age in the system, multiple modeling scenarios were analyzed. For each of these scenarios, the water age in the system starts at zero (0), which is not typical of a system but what we are trying to do with this effort is determine when the water age in the system stabilizes and reaches an equilibrium point. These scenarios look at a combination of different alternatives including the addition of tank mixers, flushing operations, alternative piping, etc.

Figure 4.5 below from the water modeling shows the water age results for the Prater Tanks while utilizing the ADD. As shown, the water age in the Prater Tanks stabilizes at approximately 25 hours. Based upon the modeling the water age in the Prater Tanks is not of concern.

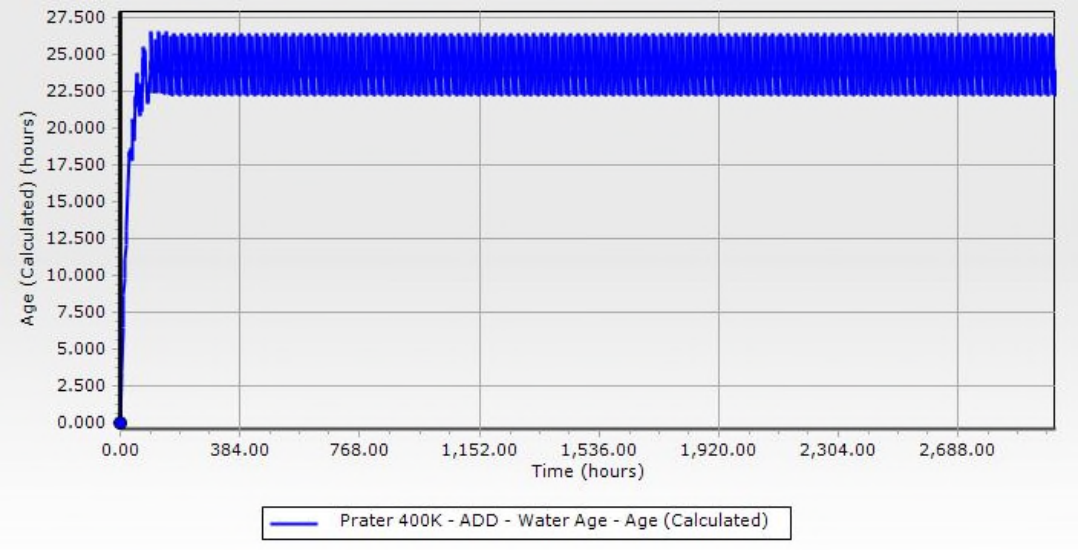
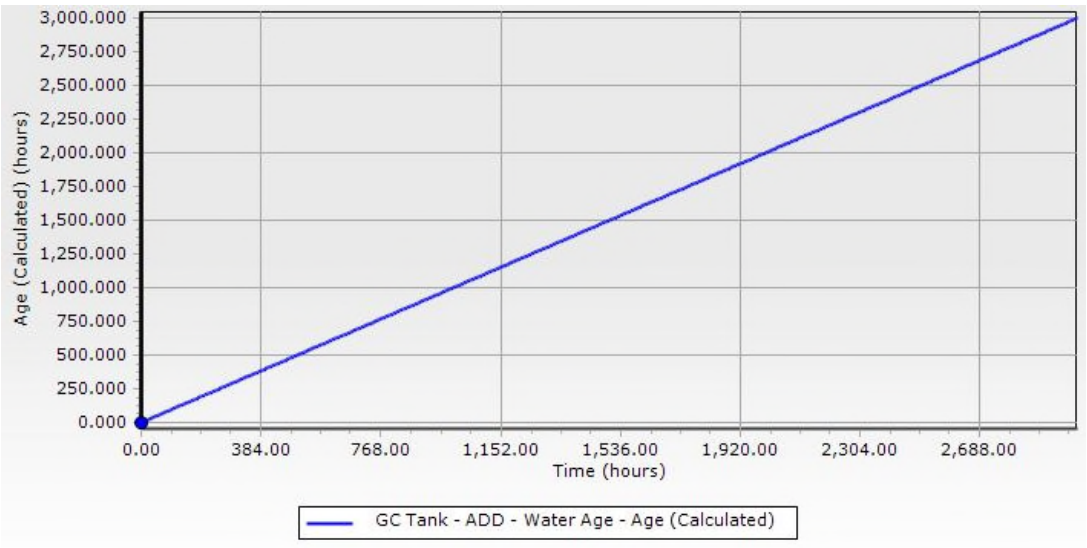


Figure 4.5 ADD Water Age – Prater Tanks

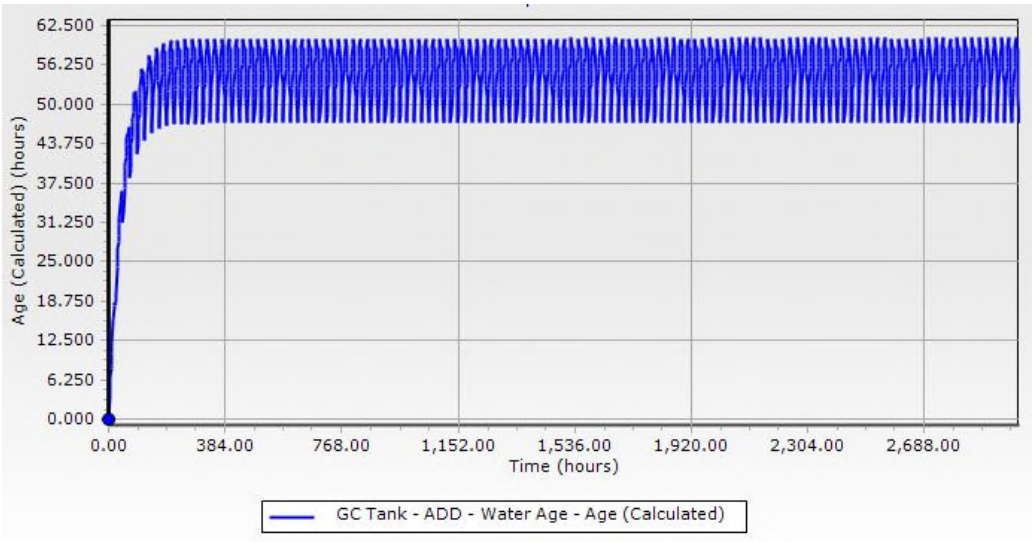
Figure 4.6 below shows the Green Canyon Tank under the same modeling scenario as above. As shown, in the 3,000 hour simulation the water age in the tank is 3,000 hours. There are many reasons for this but the most obvious reason is the lack of demand required on the average day. Typically, the water supplied from the Prater Springs is adequate to supply for the demands for the system. Where the Green Canyon Tank gets its turnover comes from pumping water to the Prater Tanks and higher demands on the system.



3000+ hrs

Figure 4.6 ADD Water Age – Green Canyon Tank (Existing System)

In an effort to stabilize the water age in the Tank multiple scenarios were conducted. The first scenario was to look at if there was any change in the water age during the Max Day Demands (MDD) Figure 4.7 shows those results. As expected, when the demands of the system exceed the supply capacity of Prater Springs the capacity of the Green Canyon Tank is utilized and as a result the water age stabilizes at approximately 55 hours.

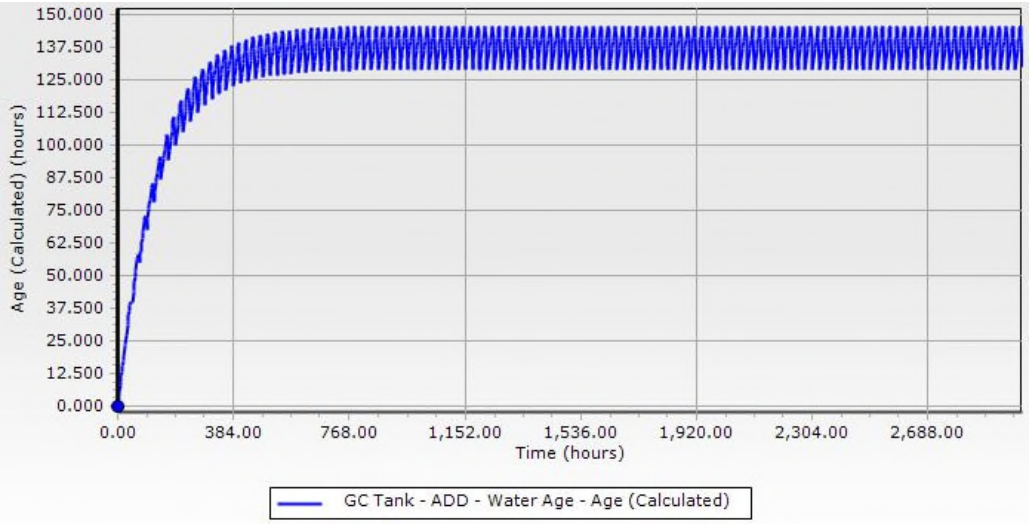


55 hrs

Figure 4.7 MDD Water Age – Green Canyon Tank (Existing System)

The second scenario looks at forcing the system to utilize the Green Canyon Tank capacity on the average day by some operational changes such as lowering the pressure settings on the PRVs that feed the lower pressure zones (Vista East – Lower, & Vista West – Corner) to limit the flow from the Prater Tanks to the lower zones. Additionally, this would require the 10” Prater/Green

Canyon Transmission line upstream of the Green Canyon Tank. Figure 4.8 shows the water age in the Green Canyon Tank under this scenario.

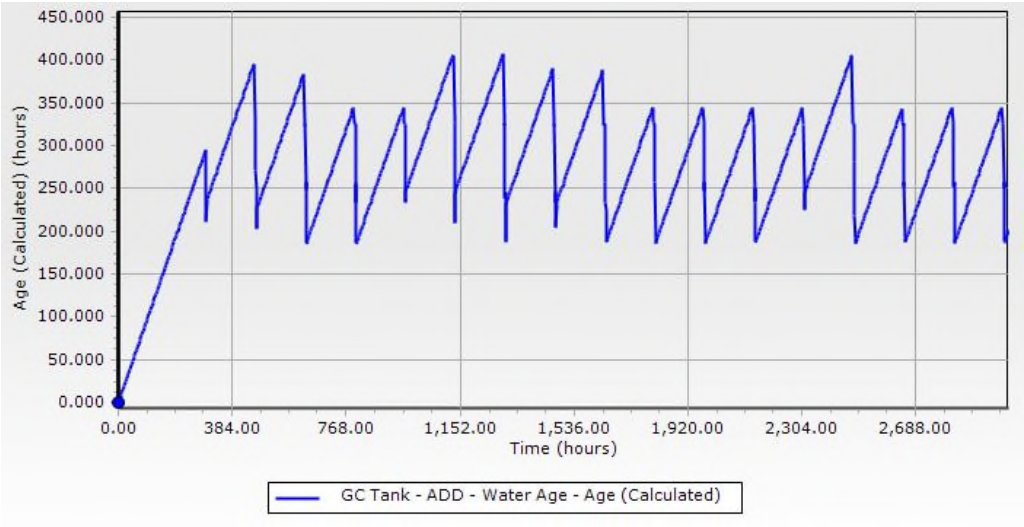


~135 hrs

Figure 4.8 ADD Water Age Green Canyon Tank – Prater Isolation

As shown in Figure 4.8 this does stabilize the water age in the tank but there are some downsides to this operating condition. Firstly, by reducing the flow from the upper pressure zones and forcing the utilization of the Green Canyon Tank this causes the Air Strip Well to almost continuously operate to keep up with the flow demands in the lower zones. Secondly, by reducing the pressure control setting in the PRVs and the isolation of the 10" transmission line it would create dead-end zones in the system which would in their own right accumulate high water age. Lastly, this would create an operational headache and constant monitoring of the system to alert system operators when operating conditions need to change to accommodate differing demand scenarios.

The most viable and least invasive scenario comes in the form of a weekly flush just below the Green Canyon Tank at the Hydrant located at the intersection of Green Canyon Drive and Star Peaks Way. Figure 4.9 shows the water age in the Green Canyon Tank in this scenario. This flush was modeled at 1,000 gpm for 1 hour once per week.



~300 hrs

Figure 4.9 ADD Water Age Green Canyon Tank – Weekly Flush

This flushing scenario does not need to be accomplished for the entire year. Based upon the demands of the system, the most viable and needed times to flush the tank would be from the months of November thru March (lowest flow months).

Conclusion: As Figure 4.6 shows, the water age in the Green Canyon Tank could potentially be cause for concern. As stated above, one of the major concerns of water age is the potential for disinfectant decay or byproduct formation. This report recommends systematic weekly flushing of the Fire Hydrant at the intersection of Green Canyon Drive and Star Peaks Way to reduce tank water. These recommendations will be described in further detail in Sections 5 & 6.

4.2 GIS Mapping and Database Creation

A GIS geodatabase for the water system has already been created and is continually maintained and updated as changes to the system occur. This effort has multiple purposes but in particular to assist with hydraulic modeling and analysis as well as to provide a manageable inventory of system components as well as system maintenance history.

The line work utilized in the modeling was created in ESRI's ArcGIS software. The source of the information was derived from As-Built records, hard copy maps, operator interviews and review of Wyoming DEQ's project records. The digitization of this information enables the line work to cartographically represent the water system as it has been constructed. Of course, no engineering design or dispute resolutions should be based upon the line work generated for this model. This is simply a graphic representation of what is in place. Actual location of the line work as it represents the real world location of the pipes and system features should be considered at a planning level, which is plus or minus 200 feet in location accuracy. The data, meaning the line work, is not intended to meet a survey grade standard.

The GIS base mapping information was sourced from the Lincoln County Office of Planning & Engineering. This data information in this report uses the following Coordinate System:

NAD_1983_StatePlane_Wyoming_West_FIPS_4904_Feet

As such, the same Coordinate System was integrated into the Star Valley Ranch Water System geodatabase. Both digitized mapping data and mapping-grade GPS information was used in the geodatabase creation. The GPS used for collection is the Trimble Geo7X, which has sub-meter accuracy. The system hydrants, hydrant valves, wells, meters and system valves were shot using the GPS unit with a data dictionary that matched the fields in the geodatabase.

An area base map has been created to maintain the water system inventory and contains the following layers:

- Water Source – Forsgren Created
- Water Storage – Forsgren Created
- Fittings – Forsgren Created
- Valves – Forsgren Created
- Hydrants – Forsgren Created
- Water Lines – Forsgren Created
- Parcels Shapefile – Lincoln County
- District Boundaries Shapefile – Lincoln County

Figure 4.10 shows an example of the GIS system data.

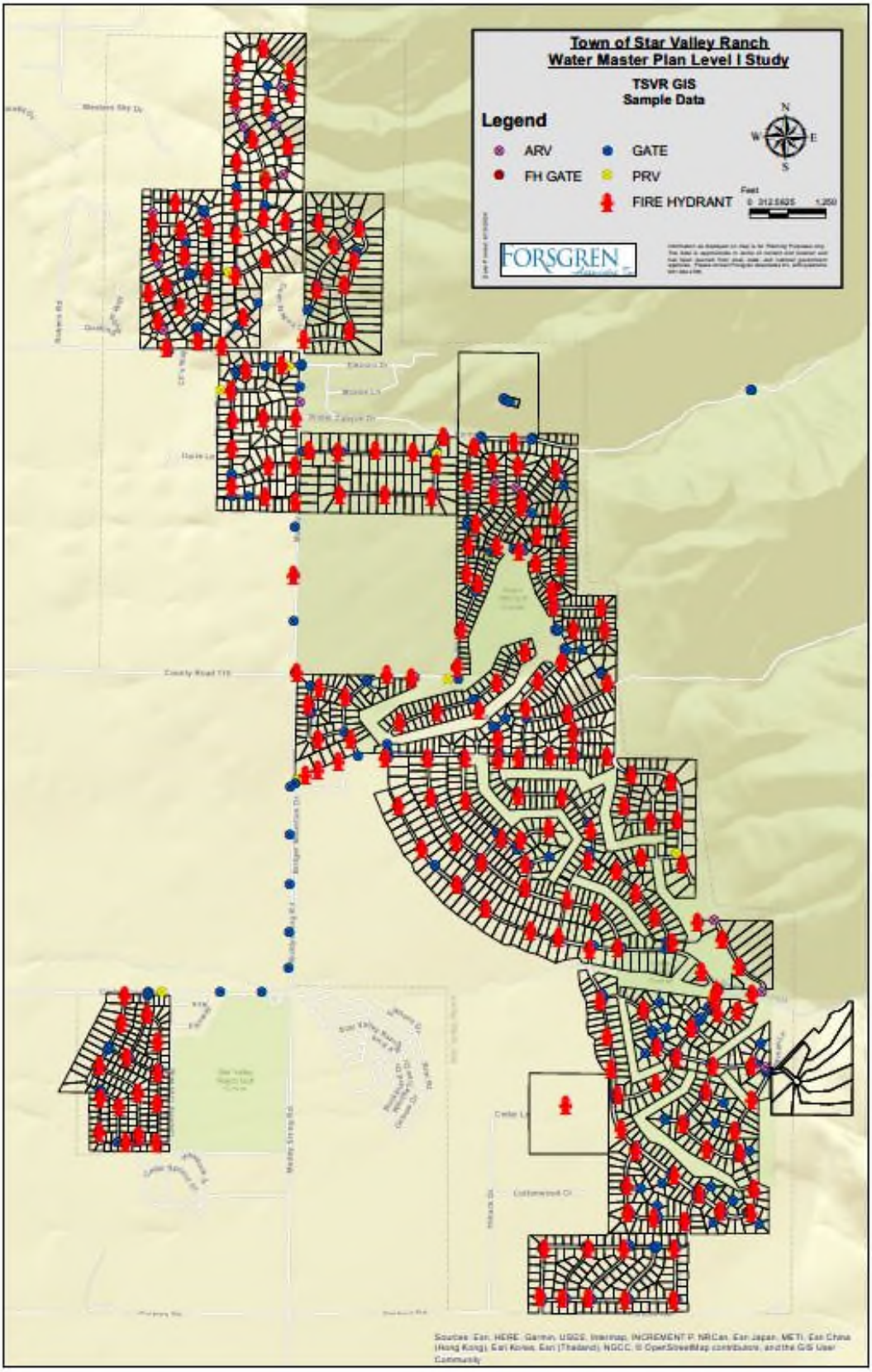


Figure 4.10 – GPS/GIS Data Collection

5.0 ALTERNATIVE EVALUATIONS

5.1 Design Criteria and Intent

When evaluating the needs of the Star Valley Ranch water system, three major concerns must be addressed as follows:

- Health and Safety: The ability to provide an adequate, safe drinking water supply that meets Wyoming DEQ-WQD regulations (WDEQ-WQD, 2012-REV) and USEPA safe drinking water standards is of primary importance.

- System Reliability: Events such as power interruption and line breakages are a normal fact of life. They should not, in our opinion, result in water service interruption to the community at large. Adequate reserve facilities and redundancy of critical system components can minimize that risk.

- Ability to Accommodate Growth: This criteria involves not only the magnitude of growth, but also the locations of that growth. As moderate growth is expected for Star Valley Ranch and Lincoln County in the foreseeable future this may not seem like a concern for the system, but growth projections are not always accurate. Understanding the adequacy of the water system under different demand locations and scenarios is important for current and future planning.

5.2 Fire Protection

Wyoming DEQ-WQD Chapter 12 regulations require that systems "maintain a minimum pressure of 20 psi at ground level at all points in the distribution system under all conditions of flow." This requirement includes fire demands under peak use conditions. Chapter 12 regulations also require that the minimum pipe size serving a fire hydrant be 6-inches (8" if line is over 250 feet and not looped).

Wyoming DEQ-WQD Chapter 12 regulations also state that "Water systems serving from 50,000 gallons to 500,000 gallons on the design average daily demand shall provide system storage equal to the ADD (average day demand) plus fire storage". The Town's current ADD of 419,527 gallon meets this requirement. In the future demand projections for 2054 and system buildout scenario the storage requirements for the Town with regards to fire storage are stated in Wyoming DEQ-WQD Chapter 12 as follows "Water systems serving in excess of 500,000 gallons on the design average daily demand shall provide clearwell and system storage capacity equal to 25 percent of the design maximum daily demand, plus added fire storage".

Fire flows for the Town were established in the 2008 Master Plan at 2,000 gpm for 2 hours which equates to a required fire storage of 240,000 gallons. Every location that the Town provides fire flow capacities meets the requirements from Wyoming DEQ with relation to pipeline sizing and distances. Figure 5.1 below shows the available fire flows for the Town's water system with current piping.

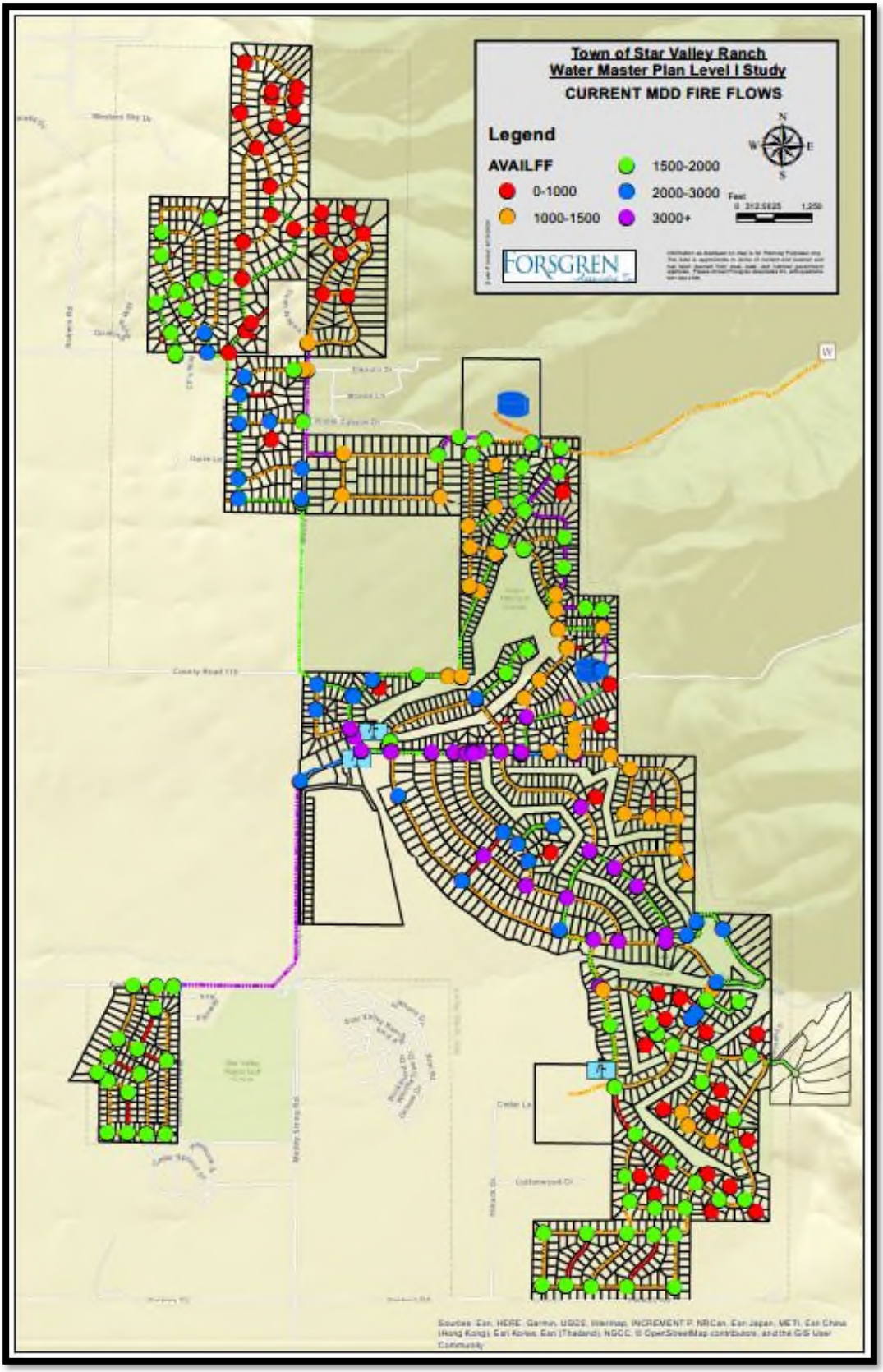


Figure 5.1- Current Available Fire Flows MDD w/Fire Flow (gpm)

FORSGREN Associates Inc.

As shown above, the current flow capacities of the hydrants in the system range from 750-3,000+ gpm.

5.3 Star Valley Ranch Supply and Storage Requirements

The Star Valley Ranch Water System, as stated in previous sections, is currently supplied from three (3) wells (Fox Run Well, Air Strip Well & Well #3) and Prater Spring, see Figure 3.1. The permitted capacities of the wells supplying the Star Valley Ranch system are discussed in Section 3.3 of this report.

Wyoming DEQ-WQD Chapter 12 Section 9.b.i states the following in regards to minimum system supply and storage:

> *The total developed groundwater source, along with other water sources, shall provide a combined capacity that shall equal or exceed the design maximum daily demand. A minimum of 2 wells, or 1 well and finished water storage equal to twice the maximum daily demand shall be provided. Where 2 wells are provided, the sources shall be capable of equaling or exceeding the design average daily demand with the largest producing well out of service.*

Table 6.1 shows how the existing Star Valley Ranch Water System supply compares to current and future demands on the system per Wyoming DEQ-WQD regulations stated above.

Table 5.1 - Wyoming DEQ Chapter 12 Section 9.b.i – Production Demands

Wyoming DEQ Chapter 12 Section 9.b.i	Current MDD (gpd)	Future 2054 MDD (gpd)	Current ADD (gpd)	Future 2054 ADD (gpd)	Wells and Storage (gpd)
Equal to or Exceed MDD (3 Wells Plus Prater Canyon)	1,510,297	1,821,290	-	-	2,340,000
2 Wells or 1 Well plus FWS = 2xMDD (3 Wells Plus Prater Canyon)	3,020,593	3,642,580	-	-	2,340,000
3 Wells or 1 Well plus FWS = 2xMDD (Well #3, Prater Canyon and Existing Storage)	3,020,593	3,642,580	-	-	2,163,000
ADD with largest well out of service (Wells #2 thru #5)	-	-	419,527	505,914	1,620,000

As shown in Table 5.1 the second requirement from Wyoming DEQ is not such that the combined capacity of all the water sources (wells and spring) does not equal or exceed twice the maximum daily demand. In evaluating for future demands it shows that the Town has a deficit of approximately 1.5 million gallons or 1,050 gpm. For this study it is recommended that the Town consider a combination of additional storage capacity and source production to make up that deficit.

For comparison to what this scenario would look like if the Town's unaccounted for water loss was at a maximum of 10% of its metered usage, and utilizing the demands shown in Tables 3.4 thru 3.6, Table 5.2 is shown below.

Table 5.2 - Wyoming DEQ Chapter 12 Section 9.b.i – Metered Demands Plus 10%

Wyoming DEQ Chapter 12 Section 9.b.i	Current MDD (gpd)	Future 2054 MDD (gpd)	Current ADD (gpd)	Future 2054 ADD (gpd)	Wells and Storage (gpd)
Equal to or Exceed MDD (3 Wells Plus Prater Canyon)	1,063,766	1,282,812	-	-	2,340,000
2 Wells or 1 Well plus FWS = 2xMDD (3 Wells Plus Prater Canyon)	2,127,523	2,565,624	-	-	2,340,000
3 Wells or 1 Well plus FWS = 2xMDD (Well #3, Prater Canyon and Existing Storage)	2,127,523	2,565,624	-	-	2,163,000
ADD with largest well out of service (Wells #2 thru #5)	-	-	295,491	356,337	1,620,000

As shown from Table 5.2 the current demand scenarios achieve compliance with this Wyoming DEQ Requirement while the 2054 projection still are not met, but are much less severe. The deficit in storage/water production in 2054 is approximately 400,000 gallons or 280 gallons per minute.

To note, these evaluations are established utilizing the permitted pumping capacities of the wells. As noted above, Well #3 has a permitted pumping capacity of 500 gpm but the well has the capacity of producing 1,000 gpm. If the permitted pumping capacity were to be updated the status of Table 5.1 would not change but all conditions under Table 5.2 would be satisfied.

5.3.1 Alternative Power Evaluations

As part of this report, Alternative Power at the wells is evaluated in terms of WyDEQ's requirements. WyDEQ Chapter 12 Section 8 (d)(iii) states "Where the finished water storage volume that floats on the distribution system is not capable of supplying the maximum daily demand, an alternative power shall be provided for the finished water pumps. The combined finished water storage and pumping capacity supplied by alternative power shall be adequate to provide the maximum day demand. Acceptable alternative power sources include an engine generator, engine drive pumps, or a second independent electrical supply." Currently, Well #3 is equipped with a stand-by emergency generator. Table 6.2 below summarizes the evaluation of the Star Valley Ranch water system to this regulation.

Table 5.3 Alternative Power – Star Valley Ranch

	MDD	FWS	Well #3 Existing Generator @ 500 gpm & Prater Spring @ 325 gpm	FWS Plus Well #3	MDD > FWS / Need For Alternative Power
Current	1,510,297	975,000	1,188,000	2,163,000	No
Future 2054	1,821,290	975,000	1,188,000	2,163,000	No
Buildout	3,342,075	975,000	1,188,000	2,163,000	Yes

As can be seen in Table 5.3 above, the current and future 2054 demands on the system do not mandate additional alternative power sources. Buildout demands will however require additional alternative power sources. In the context of this report and the life span of this report no additional alternative power sources are recommended.

5.4 System Storage

Section 13 of Wyoming DEQ-WQD Chapter 12 regulations require that "*Water system serving from 50,000 to 500,000 gallons on the design average daily demand shall provide clearwell and system storage capacity equal to the average daily demand plus fire storage" and "Water systems serving in excess of 500,000 gallons on the design average daily demand shall provide clearwell and system storage capacity equal to 25 percent of the design maximum daily demand, plus added fire storage.*

The Star Valley Ranch storage capacity is served by its three concrete storage tanks (Prater Tanks and Green Canyon Tank) totaling 975,000 gallons of storage. Utilizing the fire flow storage requirements as noted in Section 5.2 and evaluating for the Wyoming DEQ scenarios as noted above, Tables 5.4 thru 5.6 illustrate the existing Star Valley Ranch storage capacities for current and future demands.

Table 5.4 Current Storage Requirements - Production

System Storage Requirements	Gallons
ADD +	419,527
Fire Storage+	240,000
Total Needed Storage	659,527
Surplus Storage	315,473

Table 5.5 Projected 2054 Storage Requirements - Production

System Storage Requirements	Gallons
25% MDD	455,323
Fire Storage +	240,000
Total Needed Storage	695,323
Surplus Storage	279,677

Table 5.6 Build-Out Storage Requirements - Production

System Storage Requirements	Gallons
25% MDD	835,519
Fire Storage +	240,000
Total Needed Storage	1,075,519
Surplus Storage	(100,519)

As shown in Tables 5.4 thru 5.6, the Star Valley Ranch water system currently has enough storage capacity to meeting the Wyoming DEQ-WQD Chapter 12 Regulations for its current demands and project 2054 demands. At a buildout scenario this analysis shows that the Town will be short on storage capacity by approximately 100,000 gallons.

Utilizing the metered usage demands plus 10% of unmetered usage Tables 5.7 thru 5.9 show the required storage capacities versus existing capacities.

Table 5.7 Current Storage Requirements - Metered

System Storage Requirements	Gallons
ADD +	295,491
Fire Storage+	240,000
Total Needed Storage	535,491
Surplus Storage	439,509

Table 5.8 Projected 2054 Storage Requirements - Metered

System Storage Requirements	Gallons
ADD +	356,337
Fire Storage +	240,000
Total Needed Storage	596,337
Surplus Storage	378,663

Table 5.9 Build-Out Storage Requirements - Metered

System Storage Requirements	Gallons
25% MDD	588,491
Fire Storage +	240,000
Total Needed Storage	828,491
Surplus Storage	146,509

As shown in Tables 5.7 thru 5.9, under the metered usage demand scenario (plus 10% unmetered usage) the Town has a surplus of storage capacity through buildout.

5.4.1 Storage Concerns/Issues

As noted in Section 2.5.2 above, the original Prater Tank (175K Gallon Tank) and the Green Canyon Tank (400K Gallon) are reaching the end of their design life. Additionally, the Green Canyon Tank visibly shows signs of leaking and is a subject of concern for potential contamination by the EPA. It is this report's recommendation that the Town prepare to replace these tanks within the next 3-5 years. One alternative for replacement could be to just replace existing storage capacities one for one (i.e. replace the 175K Gallon tank with a 175K Gallon Tank) but other alternatives may prove to be of benefit. One such alternative would be to replace the Prater Tank (175K Gallon) with a larger tank and reduce the size of the Green Canyon Tank. The reasoning/rationalization for this alternative is multi-faceted such as:

- Capturing/Storing more of the “free water” produced from Prater Springs
- Prater Tank location has the capacity to serve the entire system (through PRV stations) without any pumping
- The Green Canyon Tank site is much more limited in available area to construct
- Address Wyoming DEQ Regulation Chapter 12 Section 9.b.i as noted in Section 5.3 above in which the Town has a deficit in source production capacity plus finished water storage.

Based upon the current system during Maximum Day Demands (MDD) Table 5.10 was formed showing the pumping operations of the system in number of hours operating and number of pump startups.

Table 5.10 Existing Storage - MDD System Pumping

Max Day Current	Hours Run	Turn Ons
Main Pump	159	2
Secondary Pump	62.25	5
Well #3	6	1
Fox Run	0	0
Air Strip Well	123	3
Totals	350.25	11

Modeling for the scenario in which the Green Canyon Tank was replaced with a 250,000 tank and the Prater Tank site capacity was increased to accommodate the production demands storage needs (850,000 gallons). Table 5.11 was formed.

Table 5.11 New Storage - MDD System Pumping

Max Day Storage Change	Hours Run	Turn Ons
Main Pump	162	2
Secondary Pump	64.75	4
Well #3	24	4
Fox Run	0	0
Air Strip Well	81.75	4
Totals	332.5	14

The difference in operations at first glance looks relatively minimal. The hours of operation reduced in the new storage scenario but the pumping startups increased. Even though the production hours appear to have decreased the actual production of water increased (though minimal) as Well #3 does produce a higher volume of water as compared to the Air Strip Well.

In either instance, the difference in operations is fairly minimal and tank sizing is likely going to be more determined by available space.

5.4.2 Storage Conclusions/Recommendations:

In summary, most of the storage requirements as based on the guidance from Wyoming DEQ are met for current demands (both production and metered usage). Future demands (30 year projection and buildout) however indicate that the Town needs to address a deficit in capacities (either in storage or supply). As noted in Section 2.5.2 both the Prater #1 Tank (175,000 gal) and the Green Canyon tank are nearing the end of their design life and are candidates for replacement. It is recommended in this study that replacement of water storage facilities are considered and sizing of those facilities conditional upon another recommendation in this report referring to unmetered water loss. Recommendations, conditional assessments and cost estimates are provided in Section 6.1.6.

5.5 Transmission and Distribution Piping

5.5.1 System Transmission Lines

As stated above, there are six (6) identified transmission lines which convey water from the supply into the distribution system, from the storage to the distribution system and between the storage locations. Figure 5.2 below shows the locations of these transmission lines. Each transmission line, apart from the Prater Canyon Transmission Line, was installed within the last 15 years and inspected by Forsgren and the Town. These transmission lines appear to be in good condition and not in need of replacement. The Prater Canyon Transmission line along with its corresponding “zeroing boxes” does appear to be reaching the end of its useful life due to the increasing difficulty to maintain and operate the zeroing boxes and valving as well as its poor construction standards. As noted above, this line in many instances has been visible on the surface along the access road. It should be noted that any maintenance or replacement of this line will require the Town to gain permission from the US Forest Service as part of the Town’s access agreement with them. This report recommends the replacement of the Prater Canyon Transmission Line, cost estimates have been prepared and can be found in Section 6.1.5.

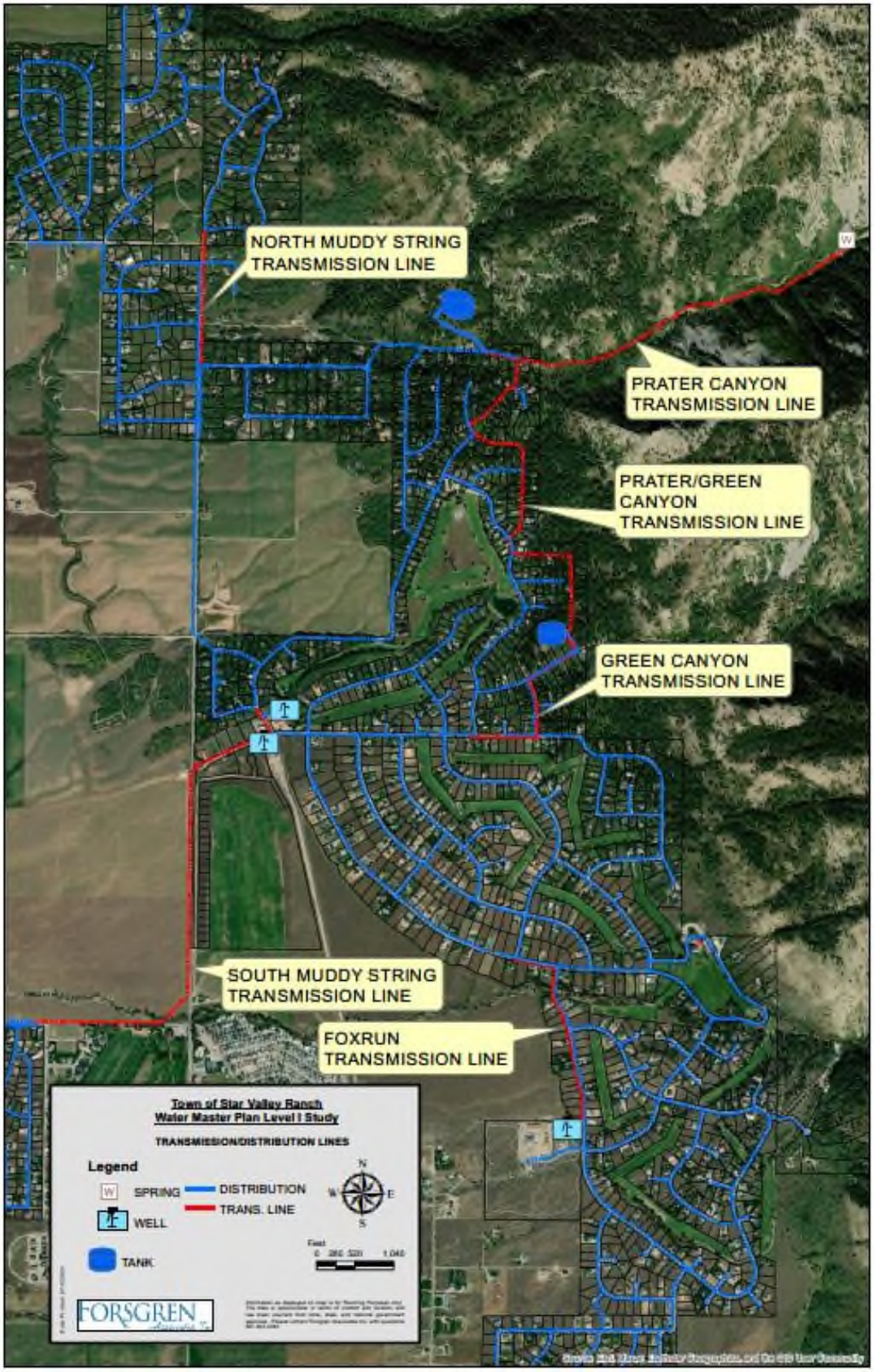


Figure 5.2- Transmission Lines & River Crossings

5.5.2 Green Canyon Booster Station Issue

In the fall of 2023 the Star Valley Ranch Water System experienced a major failure in the Green Canyon Booster Station. This failure was not a failure of the functionality of the design of the booster but occurred as an operating failure. To summarize the incident, the water system was shut down to fix a water leak and due to the lack of valving/knowledge of existing valving the water supply to the booster station was terminated. Upon the completion of fixing the water leak the water system was turned back on but the booster pumps in the booster station were not primed (removal of air and introduction of water) prior to turning them on. As the Prater Tank levels lowered and the SCADA system called for water from the booster station the pumps turned on and pumped air causing cavitation and destruction of the two main booster pumps. The backup pump was turned on but at the time that pump was leaking and in need of repairs and was inefficient in keeping up with the system demands.

Following this incident the Town has replaced the pumps and is operating as designed but it does raise a concern with prioritizing system funds with replacement/backup components. This report recommends that the Town put a higher prioritization of funding replacement components and fixing failed system components in a timely manner. This recommendation is not a capital improvement but an overall general recommendation for the system.

5.5.3 System Distribution Piping

The Star Valley Ranch water distribution system primarily consists of 4” thru 10” PVC waterlines, see Figure 2.12. As noted above, the distribution system is in good condition and is relatively new. Since 2008 most of the distribution system has been replaced from the Town’s original piping and the current water replacement project (Water Improvement Project 2023) will replace the remaining distribution system. Results from the system hydraulic modeling show that the water lines are adequately sized for current and future demands.

6.0 RECOMMENDATIONS AND COST ESTIMATES

6.1 Conclusions and Recommended System Improvements

Based upon the findings of this Master Plan Level I Study Update, the Star Valley Ranch Water System is in relatively good condition with relation to system components and a majority of its operations. This report does recommend several operational recommendations, administrative recommendations and capital improvement recommendations. Some of the capital improvement recommendations are conditional based off of the results of some of the operational recommendations. The sections below go into detail on each recommendation.

6.1.1 Water Loss Program – Operational/Administrative

As discussed in Section 3.1 above, there is a large difference (approximately 36%) in the metered amount of water that is produced versus what is billed/metered. Water loss could be occurring at many locations within the system but without data (loss of pressure, visible leaking) as well as the relatively new age of most of the transmission/distribution components a more administrative/operational investigation is warranted. As part of this master plan, it is recommended that the Town consider developing a systematic water loss program to, at a minimum, include the following.

1. Continue to collect and store water metered production data daily.
2. Compare metered monthly usage records against production records and accurately define the water loss percentage in the system.
3. Identify and record all unmetered use of the system water (i.e. flushing) and at a minimum estimate the amount of water used.
4. Systematically calibrate all meters within the system (on both production and usage). Meters can often have errors with recording water flows and should be regularly calibrated to ensure accurate data collection. This can be a benefit to the system operations such that meters accurately measure the amount of water produced/used and can be reflected in the monthly billing.
5. In-House Testing: At the Town's discretion, leak detection can be easily identified by operators in terms of individual water lines. By isolating individual waterlines (closing valves, and curb stops) and installing a pressure gauge, leaks on the isolated sections should present themselves quickly.

This report recommends that the water system implement a water loss program to better identify system water losses and method(s) of remedy. As noted in this report, the difference in the Wyoming DEQ regulations between the metered production demands versus the metered usage demands greatly effects the requirements of the system. Either by identifying that the current situation is accurate or is remedied, plays a major factor in the decision-making process and recommendations that result from this report. The costs associated with this recommendation are not considered capital improvement but as additional operational/administrative procedures.

6.1.2 Source Supply Recommendations - Administrative

As stated above in Section 3.3, the system sources are in good condition but there are a few recommendations pertaining to the supply system as a whole and for each individual well.

Overall System Supply: Annual reports of the sources should be submitted to the State Engineers Office (SEO) to meet the conditions and limitations of the permits. This recommendation does not qualify as a capital improvement project but it does however come with operational costs in terms of administrative labor/time.

Fox Run Well and Well #3: As noted in Section 3.3 the Fox Run Well and Well #3's permit status is listed as "incomplete" as opposed to "Fully Adjudicated". It is recommended that the Town resolve this issue with the State Engineer's office to "sure-up" the water rights for these sources. This is particularly important as to update the pumping capacity of Well #3 to its current capacities. This recommendation is not a capital improvement costs but additional administrative costs and anticipated consulting costs. Costs for these water source recommendations are shown below in Table 6.1.

Table 6.1 – Source Supply Additional Operational Costs

Description	Estimated Material Costs	Estimated Consulting Costs	Estimated Annual Costs	Total Costs
Source Water Right Permits (Permit Conditions and Limitations)	**$0.00**	**$0.00**	**$1,000.00**	**$1,000.00**
Fox Run & Well #3	**$0.00**	**$2,500.00**	**$500.00**	**$3,000.00**
Totals	**$0.00**	**$2,500.00**	**$1,500.00**	**$4,000.00**

6.1.3 Investing in Backup System Components - Administrative

As noted in Section 2.5.5, the issues that the Town faced with regards to the failure of the Green Canyon Booster Station in 2023 are of major concern. This report recommends that the Town continue to prioritize ensuring that the system components that are vital to operating the system are in proper working condition and that backup components are available. This includes, as noted, the pumps in the booster station as well as those in the wells. Though the well pumps are less vital on an individual level as there are three wells, it is still important to ensure that when each well is called upon during high demand scenarios that they are operational.

6.1.4 System Water Age Recommendations

As noted in Section 4.1.2 above, there is a concern of water age in the Green Canyon Tank. During low demand scenarios in which Prater Springs is able to accommodate the demands of the system the turn-over in stored water in the Green Canyon Tank is minimal. Based upon the analysis of Section 4.1.2 it is recommended that the Town consider flushing the hydrant at the intersection of Green Canyon Drive and Star Peaks Way on a weekly basis for 1 hour at 1,000 gpm. This flushing does not need to be accomplished all year round but during the months of low flow demands (November – March). This recommendation does not require any capital improvement, but it does however come with the potential additional cost of production as shown below in Table 6.2.

Table 6.2 – Annual Distribution System Flushing Cost

Weekly Flushing Cost				
Weekly Flush (gal)	Weeks per Year (November thru March)	Gallons Per Year	Production Cost Per 1,000 gallons (ref Table 3.7)	Total Annual Additional Production Cost
60,000	21	1,260,000	$8.16	$10,281.60

6.1.5 Prater Canyon Transmission Line Replacement - Capital

As stated in Section 5.5.1, the Prater Canyon Transmission Line is in need of replacement primarily due to the condition and construction of the line but also as a maintenance issue with regards to the zeroing boxes. This replacement would include the installation of new piping and the replacement of the zeroing boxes with PRV stations. As noted above, this line is located within the U.S. Forest Service and as such the Town will need to coordinate with them to gain permission to replace this line. Table 6.3 presents the anticipated costs to replace this line.

Table 6.3 – Prater Canyon Transmission Line Replacement

Town OF Star Valley Ranch Master Plan Level I Study Update					
Conceptual Construction Cost Estimate					
Prater Canyon Transmission Line Replacement					
Estimate Date June 2024					
Item #	Description	Units	Estimated Quantity	Unit Cost	Estimated Cost
WWDC ELIGIBLE PROJECT COSTS					
CONSTRUCTION COSTS					
1	Mobilization (5% Construction Costs)	LS	1	$42,000.00	$42,000.00
2	Exploratory Excavation	HR	10	$350.00	$3,500.00
3	Site Restoration and Cleanup	LS	1	$30,000.00	$30,000.00
4	Dust Control and Watering	LS	1	$10,000.00	$10,000.00
5	Traffic Control/Public Coordination	LS	1	$10,000.00	$10,000.00
6	8" PVC/HDPE Waterline	LF	1575	$70.00	$110,250.00
7	6" PVC/HDPE Waterline	LF	3400	$55.00	$187,000.00
8	Imported Pipe Bedding	LF	4975	$14.00	$69,650.00
9	6" Gate Valve W/Box	EA	5	$3,000.00	$15,000.00
10	8" Gate Valve W/Box	EA	2	$3,500.00	$7,000.00
11	6" Bends	EA	12	$700.00	$8,400.00
12	8" Bends	EA	6	$800.00	$4,800.00
13	6" Tee MJ	EA	2	$3,000.00	$6,000.00
14	8" Tee MJ	EA	1	$3,500.00	$3,500.00
15	6" Solid Sleeve	EA	6	$2,000.00	$12,000.00
16	8" Solid Sleeve	EA	2	$2,250.00	$4,500.00
17	1/2" Air & Vacuum Station	EA	4	$25,000.00	$100,000.00
18	PRV Installation	EA	3	$50,000.00	$150,000.00
19	Class "C" Street Repair	Ton	4975	$10.00	$49,750.00
20	Creek/Canal Crossing	LF	2	$10,000.00	$20,000.00
Cost of Project Components Total (subtotal #1)					$843,350.00
Construction Engineering Cost (subtotal #1 x 10%)					$84,335.00
Components + Construction Engineering Costs (subtotal #2)					$927,685.00
Contingency (subtotal #2 x 15%)					$139,152.75
Construction Cost Total (subtotal #2 + Contingency) (subtotal #3)					$1,066,837.75
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #1 x 10%)					$84,335.00
Permitting and Mitigation					$20,000.00
Legal Fees (Title of Opinion Only)					$0.00
Acquisition of Access and Rights of Way					$15,000.00
Pre-construction Costs Total (subtotal #4)					$119,335.00
TOTAL WWDC ELIGIBLE PROJECT COST					
Total WWDC Project Cost (subtotal #3 + subtotal #4) (subtotal #5)					$1,186,172.75
WWDC INELIGIBLE PROJECT COSTS					
					-
Additional Cost for Construction Engineering					$0.00
Additional Cost for Preparation of Final Designs and Specifications					$0.00
Total WWDC Ineligible Project Costs Total (subtotal #6)					$0.00
TOTAL PROJECT COST					
Total Project Cost (subtotal #5 + subtotal #6)					$1,186,172.75
MATERIALS ONLY TOTAL					
Materials Only Total Project Cost ((subtotal #1 + (subtotal #1 x 10%))					$927,685.00

6.1.6 Storage Considerations - Capital

As noted above, the storage capacity requirements of the water system is dependent on the system demands. Based upon the results of the water loss program recommended in Section 6.1.1 there are some conditional recommendations for storage facility replacement.

Scenario #1 – Metered Production Data is Accurate and Well #3 is Not Updated

Under this scenario Section 5.3 shows a storage shows a storage shortage of 1.4 Million Gallons or 1050 gallons per minute in the year 2054. For this instance it would be prudent of the Town to consider adding an additional 500 gallon per minute well to the system reducing the needed storage to approximately 550 gpm or approximately 800,000 gallons or additional storage. The cost of producing another 500 gpm well to the system, the replacement of the existing 400,000 gallon Green Canyon Tank and the replacement of the Prater #1 Tank with a 1,000,000 Gallon Tank is shown below in Tables 6.4 thru 6.6.

Table 6.4 – Green Canyon Tank Replacement – Scenario #1, #2, #3

Town of Star Valley Ranch Master Plan Level I Study Update					
Conceptual Construction Cost Estimate					
Green Canyon Tank Replacement - 400K					
Estimate Date June 2024					
Item #	Description	Units	Estimated Quantity	Unit Cost	Estimated Cost
WWDC ELIGIBLE PROJECT COSTS					
CONSTRUCTION COSTS					
1	Mobilization (Not to Exceed 5% of Bid Price)	LS	1	$ 50,000.00	$50,000.00
2	Incidental Excavation	HR	25	$ 350.00	$8,750.00
3	Site Restoration & Clean Up	LS	1	$ 25,000.00	$25,000.00
4	Excavation, Grading & Backfill	LS	1	$ 35,000.00	$35,000.00
5	400,000 Gallon Concrete Storage Tank	Gallon	400,000	$ 1.75	$701,200.00
6	Tank Hardware & Piping	LS	1	$ 65,000.00	$65,000.00
7	Disinfection & Testing	LS	1	$ 20,000.00	$20,000.00
8	8" Inlet Piping	LF	50	$ 70.00	$3,500.00
9	8" Waterline Outlet/Drain	LF	50	$ 70.00	$3,500.00
10	6" Drain & Overflow Piping	LF	50	$ 60.00	$3,000.00
11	Imported Pipe Bedding	LF	150	$ 20.00	$3,000.00
12	6" Solid Sleeve	Each	1	$ 550.00	$550.00
13	8" Solid Sleeve	Each	2	$ 600.00	$1,200.00
14	6" Bends	Each	2	$ 600.00	$1,200.00
15	8" Bends	Each	4	$ 650.00	$2,600.00
16	6" Gate Valves w/Box	Each	1	$ 3,000.00	$3,000.00
17	8" Gate Valves w/Box	Each	2	$ 4,000.00	$8,000.00
18	Overflow/Drain Outfall (Complete)	LS	1	$ 3,000.00	$3,000.00
19	24-Foot Chain Link Access Gate	Each	1	$ 7,000.00	$7,000.00
20	Chain Link Manway Gate	Each	1	$ 2,000.00	$2,000.00
21	Chain Link Security Fencing	LF	850	$ 85.00	$72,250.00
22	SCADA/Telemetry Control	LS	1	$ 10,000.00	$10,000.00
23	20,000 Gallon Temporary Storage Tank	LS	1	$ 50,000.00	$50,000.00
Cost of Project Components Total (subtotal #1)					$1,078,750.00
Construction Engineering Cost (subtotal #1 x 10%)					$107,875.00
Components + Construction Engineering Costs (subtotal #2)					$1,186,625.00
Contingency (subtotal #2 x 15%)					$177,993.75
Construction Cost Total (subtotal #2 + Contingency) (subtotal #3)					$1,364,618.75
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #1 x 10%)					$107,875.00
Permitting and Mitigation					$20,000.00
Legal Fees (Title of Opinion Only)					$0.00
Acquisition of Access and Rights of Way					$0.00
Pre-construction Costs Total (subtotal #4)					$127,875.00
TOTAL WWDC ELIGIBLE PROJECT COST					
Total WWDC Project Cost (subtotal #3 + subtotal #4) (subtotal #5)					$1,492,493.75
WWDC INELIGIBLE PROJECT COSTS					
					-
Additional Cost for Construction Engineering					$0.00
Additional Cost for Preparation of Final Designs and Specifications					$0.00
Total WWDC Ineligible Project Costs Total (subtotal #6)					$0.00
TOTAL PROJECT COST					
Total Project Cost (subtotal #5 + subtotal #6)					$1,492,493.75
MATERIALS ONLY TOTAL					
Materials Only Total Project Cost ((subtotal #1 + (subtotal #1 x 10%))					$1,186,625.00

Table 6.5 – Prater Tank Replacement – Scenario #1

Town of Star Valley Ranch Master Plan Level I Study Update					
Conceptual Construction Cost Estimate					
Prater Tank Replacement - 1.0 MG					
Estimate Date June 2024					
Item #	Description	Units	Estimated Quantity	Unit Cost	Estimated Cost
WWDC ELIGIBLE PROJECT COSTS					
CONSTRUCTION COSTS					
1	Mobilization (Not to Exceed 5% of Bid Price)	LS	1	$ 50,000.00	$50,000.00
2	Incidental Excavation	HR	80	$ 350.00	$28,000.00
3	Site Restoration & Clean Up	LS	1	$ 25,000.00	$25,000.00
4	Excavation, Grading & Backfill	LS	1	$ 35,000.00	$35,000.00
5	1.0 MG Gallon Concrete Storage Tank	Gallon	1,000,000	$ 1.75	$1,753,000.00
6	Tank Hardware & Piping	LS	1	$ 100,000.00	$100,000.00
7	Disinfection & Testing	LS	1	$ 50,000.00	$50,000.00
8	8" Inlet Piping	LF	50	$ 70.00	$3,500.00
9	8" Waterline Outlet/Drain	LF	50	$ 70.00	$3,500.00
10	6" Drain & Overflow Piping	LF	50	$ 60.00	$3,000.00
11	Imported Pipe Bedding	LF	150	$ 20.00	$3,000.00
12	6" Solid Sleeve	Each	1	$ 550.00	$550.00
13	8" Solid Sleeve	Each	2	$ 600.00	$1,200.00
14	6" Bends	Each	2	$ 600.00	$1,200.00
15	8" Bends	Each	4	$ 650.00	$2,600.00
16	6" Gate Valves w/Box	Each	1	$ 3,000.00	$3,000.00
17	8" Gate Valves w/Box	Each	2	$ 4,000.00	$8,000.00
18	Overflow/Drain Outfall (Complete)	LS	1	$ 10,000.00	$10,000.00
19	24-Foot Chain Link Access Gate	Each	1	$ 7,500.00	$7,500.00
20	Chain Link Manway Gate	Each	1	$ 2,500.00	$2,500.00
21	Chain Link Security Fencing	LF	500	$ 85.00	$42,500.00
22	SCADA/Telemetry Control	LS	1	$ 10,000.00	$10,000.00
Cost of Project Components Total (subtotal #1)					$2,143,050.00
Construction Engineering Cost (subtotal #1 x 10%)					$214,305.00
Components + Construction Engineering Costs (subtotal #2)					$2,357,355.00
Contingency (subtotal #2 x 15%)					$353,603.25
Construction Cost Total (subtotal #2 + Contingency) (subtotal #3)					$2,710,958.25
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #1 x 10%)					$214,305.00
Permitting and Mitigation					$20,000.00
Legal Fees (Title of Opinion Only)					$0.00
Acquisition of Access and Rights of Way					$0.00
Pre-construction Costs Total (subtotal #4)					$234,305.00
TOTAL WWDC ELIGIBLE PROJECT COST					
Total WWDC Project Cost (subtotal #3 + subtotal #4) (subtotal #5)					$2,945,263.25
WWDC INELIGIBLE PROJECT COSTS					
					-
Additional Cost for Construction Engineering					$0.00
Additional Cost for Preparation of Final Designs and Specifications					$0.00
Total WWDC Ineligible Project Costs Total (subtotal #6)					$0.00
TOTAL PROJECT COST					
Total Project Cost (subtotal #5 + subtotal #6)					$2,945,263.25
MATERIALS ONLY TOTAL					
Materials Only Total Project Cost ((subtotal #1 + (subtotal #1 x 10%))					$2,357,355.00

Table 6.6 – Additional 500 GPM Well – Scenario #1

Town of Star Valley Ranch Master Plan Level I Study Update					
Conceptual Construction Cost Estimate					
500 GPM Water Source Development					
Estimate Date June 2024					
Item #	**Description**	**Units**	**Estimated Quantity**	**Unit Cost**	**Estimated Cost**
WWDC ELIGIBLE PROJECT COSTS					
CONSTRUCTION COSTS					
1	Mobilization (Not to exceed 5% of Bid Price)	LS	1	$ 50,500.00	**$50,500.00**
2	Exploratory Excavation	HR	10	$ 350.00	**$3,500.00**
3	Site Restoration and Cleanup	LS	1	$ 15,000.00	**$15,000.00**
4	Dust Control and Watering	LS	1	$ 3,000.00	**$3,000.00**
5	Traffic Control/Public Coordination	LS	1	$ 3,000.00	**$3,000.00**
6	8" PVC Waterline	LF	4360	$ 70.00	**$305,200.00**
7	4" PVC Waterline	LF	20	$ 45.00	**$900.00**
8	Imported Pipe Bedding	LF	4380	$ 14.00	**$61,320.00**
9	8" Gate Valve W/Box	EA	9	$ 3,500.00	**$31,500.00**
10	4" Gate Valve w/Box	EA	2	$ 2,500.00	**$5,000.00**
11	8" Bends	EA	12	$ 800.00	**$9,600.00**
12	8"x8" Tee MJ	EA	4	$ 3,500.00	**$14,000.00**
13	8" Solid Sleeve	EA	2	$ 2,250.00	**$4,500.00**
14	4"x4" Tee MJ	EA	1	$ 2,000.00	**$2,000.00**
15	4" Solid Sleeve	EA	1	$ 1,750.00	**$1,750.00**
16	8"x4" Reducer MJ	EA	1	$ 2,250.00	**$2,250.00**
17	Fire Hydrant w/Valve and Tee	EA	6	$ 7,000.00	**$42,000.00**
18	1/2" Air & Vacuum Station	EA	2	$ 25,000.00	**$50,000.00**
19	Class "C" Street Repair	LF	4380	$ 10.00	**$43,800.00**
20	Creek/Canal Crossing	LF	2	$ 10,000.00	**$20,000.00**
21	Well Site Work and Reclamation	LS	1	$ 15,000.00	**$15,000.00**
22	Submersible Well Pump & Control	LS	1	$ 20,000.00	**$20,000.00**
23	4" Well Column	LF	500	$ 350.00	**$175,000.00**
24	4" Well Column Check Valves	EA	2	$ 2,500.00	**$5,000.00**
25	Pitless Adapter	LS	1	$ 15,000.00	**$15,000.00**
26	Water Level Indicator & Air Lines	LS	1	$ 5,000.00	**$5,000.00**
27	Well Disinfection & Testing	LS	1	$ 2,500.00	**$2,500.00**
28	Well House Structural	LS	1	$ 35,000.00	**$35,000.00**
29	Well House Mechanical	LS	1	$ 25,000.00	**$25,000.00**
30	Well House Meter	LS	1	$ 15,000.00	**$15,000.00**
31	Well House Electrical	LS	1	$ 65,000.00	**$65,000.00**
32	Hypo Chlorination	LS	1	$ 6,500.00	**$6,500.00**
33	6' Chainlink Fence	LF	220	$ 85.00	**$18,700.00**
34	16' Chainlink Fence	EA	1	$ 5,000.00	**$5,000.00**
35	3' Chainlinke Pedestrian Gate	EA	1	$ 2,000.00	**$2,000.00**
Cost of Project Components Total (subtotal #1)					**$1,078,520.00**
Construction Engineering Cost (subtotal #1 x 10%)					**$107,852.00**
Components + Construction Engineering Costs (subtotal #2)					**$1,186,372.00**
Contingency (subtotal #2 x 15%)					**$177,955.80**
Construction Cost Total (subtotal #2 + Contingency) (subtotal #3)					**$1,364,327.80**
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #1 x 10%)					**$107,852.00**
Permitting and Mitigation					**$20,000.00**
Legal Fees (Title of Opinion Only)					**$0.00**
Acquisition of Access and Rights of Way					**$0.00**
Pre-construction Costs Total (subtotal #4)					**$127,852.00**
TOTAL WWDC ELIGIBLE PROJECT COST					
Total WWDC Project Cost (subtotal #3 + subtotal #4) (subtotal #5)					**$1,492,179.80**
WWDC INELIGIBLE PROJECT COSTS					

Additional Cost for Construction Engineering	**$0.00**
Additional Cost for Preparation of Final Designs and Specifications	**$0.00**
Total WWDC Ineligible Project Costs Total (subtotal #6)	**$0.00**
TOTAL PROJECT COST	
Total Project Cost (subtotal #5 + subtotal #6)	**$1,492,179.80**
MATERIALS ONLY TOTAL	
Materials Only Total Project Cost ((subtotal #1 + (subtotal #1 x 10%))	**$1,186,372.00**

Scenario #2 – Metered Usage Data is Accurate and Well #3 is Not Updated

Under this scenario Section 5.3 shows a storage shows a storage shortage of approximately 200,000 gallon or 140 gpm. This scenario would allow for no additional supply source but an increase in tank capacity at the Prater Tank Site. Table 6.4 would be the same in this scenario and Table 6.7 below shows the cost for replacing the existing Prater #1 Tank with a 400,000 gallon tank.

Table 6.7 – Prater Tank Replacement – Scenario #2

Town of Star Valley Ranch Master Plan Level I Study Update					
Conceptual Construction Cost Estimate					
Prater Tank Replacement - 400K Gallon					
Estimate Date June 2024					
Item #	Description	Units	Estimated Quantity	Unit Cost	Estimated Cost
WWDC ELIGIBLE PROJECT COSTS					
CONSTRUCTION COSTS					
1	Mobilization (Not to Exceed 5% of Bid Price)	LS	1	$ 50,000.00	$50,000.00
2	Incidental Excavation	HR	80	$ 350.00	$28,000.00
3	Site Restoration & Clean Up	LS	1	$ 25,000.00	$25,000.00
4	Excavation, Grading & Backfill	LS	1	$ 35,000.00	$35,000.00
5	400,000 Gallon Concrete Storage Tank	Gallon	400,000	$ 1.75	$701,200.00
6	Tank Hardware & Piping	LS	1	$ 80,000.00	$80,000.00
7	Disinfection & Testing	LS	1	$ 35,000.00	$35,000.00
8	8" Inlet Piping	LF	50	$ 70.00	$3,500.00
9	8" Waterline Outlet/Drain	LF	50	$ 70.00	$3,500.00
10	6" Drain & Overflow Piping	LF	50	$ 60.00	$3,000.00
11	Imported Pipe Bedding	LF	150	$ 20.00	$3,000.00
12	6" Solid Sleeve	Each	1	$ 550.00	$550.00
13	8" Solid Sleeve	Each	2	$ 600.00	$1,200.00
14	6" Bends	Each	2	$ 600.00	$1,200.00
15	8" Bends	Each	4	$ 650.00	$2,600.00
16	6" Gate Valves w/Box	Each	1	$ 3,000.00	$3,000.00
17	8" Gate Valves w/Box	Each	2	$ 4,000.00	$8,000.00
18	Overflow/Drain Outfall (Complete)	LS	1	$ 8,500.00	$8,500.00
19	24-Foot Chain Link Access Gate	Each	1	$ 7,500.00	$7,500.00
20	Chain Link Manway Gate	Each	1	$ 2,500.00	$2,500.00
21	Chain Link Security Fencing	LF	500	$ 85.00	$42,500.00
22	SCADA/Telemetry Control	LS	1	$ 10,000.00	$10,000.00
Cost of Project Components Total (subtotal #1)					$1,054,750.00
Construction Engineering Cost (subtotal #1 x 10%)					$105,475.00
Components + Construction Engineering Costs (subtotal #2)					$1,160,225.00
Contingency (subtotal #2 x 15%)					$174,033.75
Construction Cost Total (subtotal #2 + Contingency) (subtotal #3)					$1,334,258.75
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #1 x 10%)					$105,475.00
Permitting and Mitigation					$20,000.00
Legal Fees (Title of Opinion Only)					$0.00
Acquisition of Access and Rights of Way					$0.00
Pre-construction Costs Total (subtotal #4)					$125,475.00
TOTAL WWDC ELIGIBLE PROJECT COST					
Total WWDC Project Cost (subtotal #3 + subtotal #4) (subtotal #5)					$1,459,733.75
WWDC INELIGIBLE PROJECT COSTS					
					-
Additional Cost for Construction Engineering					$0.00
Additional Cost for Preparation of Final Designs and Specifications					$0.00
Total WWDC Ineligible Project Costs Total (subtotal #6)					$0.00
TOTAL PROJECT COST					
Total Project Cost (subtotal #5 + subtotal #6)					$1,459,733.75
MATERIALS ONLY TOTAL					
Materials Only Total Project Cost ((subtotal #1 + (subtotal #1 x 10%))					$1,160,225.00

Scenario #3 – Metered Usage Data is Accurate and Well #3 is Updated

Under this scenario no additional storage or supply is needed but the Green Canyon Tank and Prater #1 Tank would still be replaced. Based upon the modeling analysis there is relatively minimal effect on the operations of the system by transferring more storage to the Prater Tank Site. However, based on available space to construct and the ability for the Green Canyon Tank to be an elevated tank (Prater Tank #1 must meet the same hydraulic grade as the Prater #2 Tank) it appears more prudent to reconstruct the Green Canyon Tank with a similar tank size while slightly increasing the capacity of the Prater #1 Tank to 200,000 gallons. Table 6.4 would be the same cost in this scenario and Table 6.8 below shows the replacement cost for the Prater #1 Tank.

Table 6.8 – Prater Tank Replacement – Scenario #3

Town of Star Valley Ranch Master Plan Level I Study Update					
Conceptual Construction Cost Estimate					
Prater Tank Replacement - 200K Gallon					
Estimate Date June 2024					
Item #	Description	Units	Estimated Quantity	Unit Cost	Estimated Cost
WWDC ELIGIBLE PROJECT COSTS					
CONSTRUCTION COSTS					
1	Mobilization (Not to Exceed 5% of Bid Price)	LS	1	$ 50,000.00	$50,000.00
2	Incidental Excavation	HR	80	$ 350.00	$28,000.00
3	Site Restoration & Clean Up	LS	1	$ 25,000.00	$25,000.00
4	Excavation, Grading & Backfill	LS	1	$ 35,000.00	$35,000.00
5	200,000 Gallon Concrete Storage Tank	Gallon	200,000	$ 1.75	$350,600.00
6	Tank Hardware & Piping	LS	1	$ 65,000.00	$65,000.00
7	Disinfection & Testing	LS	1	$ 20,000.00	$20,000.00
8	8" Inlet Piping	LF	50	$ 70.00	$3,500.00
9	8" Waterline Outlet/Drain	LF	50	$ 70.00	$3,500.00
10	6" Drain & Overflow Piping	LF	50	$ 60.00	$3,000.00
11	Imported Pipe Bedding	LF	150	$ 20.00	$3,000.00
12	6" Solid Sleeve	Each	1	$ 550.00	$550.00
13	8" Solid Sleeve	Each	2	$ 600.00	$1,200.00
14	6" Bends	Each	2	$ 600.00	$1,200.00
15	8" Bends	Each	4	$ 650.00	$2,600.00
16	6" Gate Valves w/Box	Each	1	$ 3,000.00	$3,000.00
17	8" Gate Valves w/Box	Each	2	$ 4,000.00	$8,000.00
18	Overflow/Drain Outfall (Complete)	LS	1	$ 8,500.00	$8,500.00
19	24-Foot Chain Link Access Gate	Each	1	$ 7,500.00	$7,500.00
20	Chain Link Manway Gate	Each	1	$ 2,500.00	$2,500.00
21	Chain Link Security Fencing	LF	500	$ 85.00	$42,500.00
22	SCADA/Telemetry Control	LS	1	$ 10,000.00	$10,000.00
Cost of Project Components Total (subtotal #1)					$674,150.00
Construction Engineering Cost (subtotal #1 x 10%)					$67,415.00
Components + Construction Engineering Costs (subtotal #2)					$741,565.00
Contingency (subtotal #2 x 15%)					$111,234.75
Construction Cost Total (subtotal #2 + Contingency) (subtotal #3)					$852,799.75
PRE-CONSTRUCTION COSTS					
Preparation of Final Designs & Specifications (subtotal #1 x 10%)					$67,415.00
Permitting and Mitigation					$20,000.00
Legal Fees (Title of Opinion Only)					$0.00
Acquisition of Access and Rights of Way					$0.00
Pre-construction Costs Total (subtotal #4)					$87,415.00
TOTAL WWDC ELIGIBLE PROJECT COST					
Total WWDC Project Cost (subtotal #3 + subtotal #4) (subtotal #5)					$940,214.75
WWDC INELIGIBLE PROJECT COSTS					
					-
Additional Cost for Construction Engineering					$0.00
Additional Cost for Preparation of Final Designs and Specifications					$0.00
Total WWDC Ineligible Project Costs Total (subtotal #6)					$0.00
TOTAL PROJECT COST					
Total Project Cost (subtotal #5 + subtotal #6)					$940,214.75
MATERIALS ONLY TOTAL					
Materials Only Total Project Cost ((subtotal #1 + (subtotal #1 x 10%))					$741,565.00

6.2 Priorities

Table 6.9 shows the recommended improvements/operations and priorities.

Table 6.9 – Recommended System Improvements

Priority	Description	Notes	Implementation Date
1	**Water Loss Program (6.1.1)**	***Vital to Complete to drive further recommendations***	***As soon as possible***
2	**Source Supply Recommendations (6.1.2)**	***Administrative Updates with the Wyoming State Engineers Office***	***2025***
3	**Backup System Components (6.1.3)**	***Town's prioritization of backup system components***	***As soon as possible***
4	**Water System Age (6.1.4)**	***The implementation of a weekly flush during low demand periods (winter)***	***Winter 2024***
5	**Prater Canyon Transmission Line (6.1.5)**	***Replacement of Transmission Line from Prater Springs to the System***	***2027-2030***
6	**Storage Considerations (6.1.6)**	***Dependent upon the results of priority #1. Determines sizing of tank replacements***	***2030-2035***

6.3 Economics

6.3.1 Estimated Capital Project Costs

Estimated costs for recommended capital projects are summarized in Table 6.10. These costs are reflective of estimated current construction costs and include engineering plus inflation as required by WWDC. All recommended capital improvement projects presented are either anticipated to occur in almost 20 years or on a conditional basis for which may not occur. Projecting timing of implementation or cost to the timing is relatively subjective.

Table 6.10 – Project Cost Estimates Summary

Item No.	Description	Estimated Cost (inclusive of engineering and inflation)
5	**Prater Canyon Transmission Line**	**$1,186,173.00**
6.1	**Storage/Source Replacement**	**$5,929,936.80**
6.2	**Storage Replacement**	**$2,952,228.00**
6.3	**Storage Replacement**	**$2,432,709.00**

6.3.2 Estimated Additional Operational Costs

Estimated operational costs for the recommendations listed above are summarized in Table 6.11 below. These costs do not include costs are associated with system operator's labor, only outside labor or materials.

Table 6.11 – Additional Operational Cost Estimates Summary

Item No.	Description	Estimated One-Time/Initial Costs	Estimated Annual Operational Cost or Per Each Cost
2	**Source Water Rights**	**$3,500.00**	**$500.00**
4	**Water Age Flushing**	**$0.00**	**$10,300.00**

6.3.3 Financing

- **WWDC Funding:** An assumption of 50% grant assistance for new construction from WWDC is used in this financial analysis based on discussions with WWDC staff and experience with other similar projects. Eligible project expenses include supply, transmission, and storage. Distribution piping, fire protection, land development, services/maintenance, meters and water quality projects are typically not eligible for WWDC funding participation.

- **USDA Rural Development:** The USDA Rural Development Services (RUS) program favors rural low-to-moderate income communities. Eligibility criteria for grant funding is based on population size and median household income levels. USDA-RUS makes direct loans and grants to build or improve essential public use facilities such as water and sewer facilities, storm sewers, and solid waste facilities. Applicants must have a population less than 10,000 with the legal capacity to borrow money and be financially sound and be able to manage the facility, and have satisfactory sources of income to pay costs of operating, debt services, and reserve. Loans can have up to a 40-year payback period, based on the useful life of the facilities financed. The loan interest rates are fixed and are based on the need for the

project and the median household income of the area to be served. USDA RD funding will require compliance with NEPA and other federal requirements

- **State of Wyoming Drinking Water Revolving Fund (DWSRF):** Portions of this project are likely eligible for DWSRF loan funding (for balance of the project not grant funded.) A DWSRF loan at 2.5% over a period of 20 years has been assumed. Although not shown in the finance options, recent loans from DWSRF have included up to a 25% principal forgiveness. DWSRF funding will require compliance with NEPA and other federal requirements.

- **Wyoming Business Council Grant:** This grant is intended to help cover the costs to communities in providing "business ready" and "community development" projects. Based upon the Lincoln County zoning of Star Valley Ranch it is not anticipated that the recommended projects would qualify as "business ready". The Community Development Block Grant (CDBG) however does provide funding for projects that pose a serious or immediate threat to the health or welfare of the community. It can be assumed that some of the recommended project would qualify. This grant is quite limited in the amount of funding it has available per year ($2.2 to $3.75 million) and takes into consideration low to moderate income communities. With the Town's AMHI being well above the state average it may be difficult to obtain this grant.

6.3.4 Existing System Financials/Budget

For this section the water systems financials are analyzed to ensure that the water system is financially self-supporting such that the revenues generated from the water system are sufficient to accomplish the following:

- Retire existing water related debt (principal and interest)
- Pay the costs for employees
- Pay the costs of materials, supplies, utilities, and outside services necessary to operate and maintain the water system and provide normal improvements and replacement requirements for the system
- Pay for administrative and overhead expenses
- Provide an emergency fund that annually accrues at least an amount equal to 1.5% - 2.5% of the operating expenses
- Provide a fund that accrues sufficient reserves to pay for major repairs and replacement that will be required during the life of any associated project

The Town's P & L Report was provided by the Town Treasurer for 2023, 2024 and the Budget for 2025. The 2023 and 2024 reports showed a surplus for the water system financial. Table 6.12 below provides a summary for those years.

Table 6.12 – Income vs. Expenditures Summary

	2023	2024	Averages
Operating Revenue			
Water Gallon Usage Fees	$ 225,691	$ 180,549	$ 203,120
Base Fee (metered lots only)	$ 552,789	$ 555,181	$ 553,985
Service Availability Fee (all lots)	$ 595,857	$ 611,967	$ 603,912
Late Payment Fees and Penalties (cash received, not billed amounts)	$ 18,084	$ 15,000	$ 16,542
New Service Connection Fees	$ 67,500	$ 75,000	$ 71,250
Interest Income and other misc	$ 96,738	$ 169,463	$ 133,100
TOTAL REVENUE	**$ 1,556,659**	**$ 1,607,159**	**$ 1,581,909**
Expenditures			
Water Administration	$ 141,226	$ 132,602	$ 136,914
Water Service & Operations	$ 303,493	$ 356,662	$ 330,077
Water Salary & Wages	$ 352,780	$ 401,421	$ 377,100
Subtotal Operating Expenses	**$ 797,499**	**$ 890,684**	**$ 844,092**
Loan Principal & Interest Payments	$ 621,895	$ 667,185	$ 644,540
Total Expenses	$ 1,419,394	$ 1,557,869	$ 1,488,631
System Surplus	**$ 137,265**	**$ 49,290**	**$ 93,278**

In general, the system is quite healthy with regards to covering its expenses with the revenue generated. Table 6.13 below shown the proposed budget for the fiscal year 2025.

Table 6.13 – Suggested NRW Revenue, Operations and Maintenance Budget

Water System Budget	2025
Operating Revenue	
Water Gallon Usage Fees	$ 204,545
Base Fee (metered lots only)	$ 564,408
Service Availability Fee (all lots)	$ 676,032
Late Payment Fees and Penalties (cash received, not billed amounts)	$ 15,000
New Service Connection Fees	$ 75,000
Interest Income and other misc	$ 111,000
TOTAL REVENUE	**$ 1,645,985**
Expenditures	
Water Administration	$ 139,390
Water Service & Operations	$ 336,052
Water Salary & Wages	$ 478,168
Subtotal Operating Expenses	**$ 953,610**
Loan Principal & Interest Payments	$ 655,511
Total Expenses	$ 1,609,121
System Surplus	**$ 36,865**

6.3.4.1 Funding Analysis Findings

Retire Existing Water Related Debt:

For all accounts and evaluation of the utility reports provided, The Town of Star Valley Ranch has been capable of paying its debts on time. The water system currently has nine (9) loan payments that have helped the Town nearly replace all of its water system. These loan payments will begin to become fully paid for by the year 2030.

Pay the Cost for Employees; Pay the Cost of materials, supplies, utilities, and outside services necessary to operate and maintain the water system and provide normal improvements and replacement requirements for the system; pay for administrative and overhead expenses:

As shown in Table 6.12 the Town is capable of paying for the costs of employees, materials and outside services as needed. Due to the uncertainty of the current economical climate it is important that the Town continue to monitor the costs of running the water system and to adjust rates as needed. These evaluation should include cost of living, material pricing, outside service pricing, etc.

Provide an Emergency Fund that annually accrues at least an amount equal to 1.5% - 2.5% of the operating expenses; Provide a Fund that accrues sufficient reserves to pay for

major repairs and replacement that will be required during the life of any associated project:

The Town currently has a reserve account that accumulates on an annual basis based upon surplus and system connections. Part of the funds in this account is currently being used matching funds to an ARPA Grant to replace the remainder of the water system distribution. After this commitment, the reserve account is approximately $700,000.00. It is recommended that the Town continue to build the system reserve as funds allow.

It is recommended that the Town also consider establish a separate emergency operating reserve to pay for emergency failures in the system such as failed booster pumps or well pumps. At a minimum this account should accrue 1.5% of the current operating expenses which annually is approximately $25,000.00.

Pay other costs as may be identified by the consultant:

Besides the projects and programs recommended herein this report, no other costs have been identified as a need for the water system.

6.3.5 Project Rate Impacts / Financial Capacity

Anticipated project costs and rate payer impacts based on five (5) funding scenarios are summarized in Table 6.14 thru 6.18. Project loan payments are broken down by monthly cost per existing system user to determine the average rate impact. Table 6.14 (Scenario #1) assumes no project funding is available and rate impacts reflect accruing funds for projects in two (2) years. Table 6.15 (Scenario #2) assumes a 50% WWDC Grant on eligible project components, a 33% WWDC 4% Loan (30 year term) and remaining non-eligible costs as self-funded. Table 6.16 (Scenario #3) assumes a 50% WWDC Grant on eligible project components and an SRF 2.5% Loan (20 year term) on remaining funding. Table 6.17 (Scenario #4) assumes a 50% WWDC grant of eligible project components and an USDA RUS 2.125% Loan (40 year term) on remaining funding. Table 6.18 (Scenario #5) assumes a 67% DWSRF 2.5% Loan (20 year term) and a 33% State or Federal grant. Municipalities on Wyoming have typically pursued a USDA RUS Grant, Mineral Royalties Grant or Wyoming Business Council Grant where applicable. The Mineral Royalties Grant however has been terminated and is no longer available to help fund these types of projects.

For the purposes of these tables, it is assumed that the capital improvements recommended in this study would be constructed/implemented beginning in 2024. Some recommendations in this study are not anticipated for approximately 20 years (additional storage) or are conditional recommendations but are included in these tables for comparison purposes.

Table 6.14 – Scenario #1 No Project Funding (Recover Funds From User Rates in 2 Years)

Item #	Description	Estimated Project Cost	ASSUMED FUNDING SOURCE	Monthly Cost per Ratepayer *(Based on 1188 current users)* To Raise Funds in 2 Years
			None - Costs Assumed By Town	
5	Prater Canyon Transmission Line	$1,186,173	$1,186,173	$41.60
6.1	Storage/Source Replacement	$5,929,937	$5,929,937	$207.98
6.2	Storage Replacement	$2,952,228	$2,952,228	$103.54
6.3	Storage Replacement	$2,432,709	$2,432,709	$85.32
Monthly Cost per Ratepayer			Total	$438.45

Table 6.15 – Scenario #2 WWDC Grant & Loan & Self-Funding Remaining

Item #	Description	Estimated Project Cost	ASSUMED FUNDING SOURCE				Monthly Cost per Ratepayer *(Based on 1188 current users)* Loan Payment
			WWDC Grant (50% Eligible new construction)	WWDC Loan (4%, 20-year) Eligible	Annual Loan Payment	Remaining Non-Eligible Cost Assumed By Town	
5	Prater Canyon Transmission Line	$1,186,173	$593,087	$593,087	$43,640	$0	$3.06
6.1	Storage/Source Replacement	$5,929,937	$2,964,968	$2,964,968	$218,168	$0	$15.30
6.2	Storage Replacement	$2,952,228	$1,476,114	$1,476,114	$108,615	$0	$7.62
6.3	Storage Replacement	$2,432,709	$1,216,355	$1,216,355	$89,501	$0	$6.28
Monthly Cost per Ratepayer						Total	$32.26

Table 6.16 – Scenario #3 WWDC Grant and SRF Loan

Item #	Description	Estimated Project Cost	ASSUMED FUNDING SOURCE			Monthly Cost per Ratepayer *(Based on 1188 current users)*
			WWDC Grant (50% new Eligible construction)	SRF Loan (2.5%, 20-year)	Annual Payment	
5	Prater Canyon Transmission Line	$1,186,173	$593,087	$593,087	$38,045	$2.67
6.1	Storage/Source Replacement	$5,929,937	$2,964,968	$2,964,968	$190,194	$13.34
6.2	Storage Replacement	$2,952,228	$1,476,114	$1,476,114	$94,688	$6.64
6.3	Storage Replacement	$2,432,709	$1,216,355	$1,216,355	$78,122	$5.48
Monthly Cost per Ratepayer					Total	$28.13

Table 6.17 – Scenario #4 WWDC Grant and USDA RUS Loan (Not Eligible)

Item #	Description	Estimated Project Cost	ASSUMED FUNDING SOURCE			Monthly Cost per Ratepayer *(Based on 1188 current users)*
			WWDC Grant (50% new Eligible construction)	USDA RUS (2.125%, 40 year)	Annual Payment	
5	Prater Canyon Transmission Line	$1,186,173	$593,087	$593,087	$22,159	$1.55
6.1	Storage/Source Replacement	$5,929,937	$2,964,968	$2,964,968	$110,777	$7.77
6.2	Storage Replacement	$2,952,228	$1,476,114	$1,476,114	$55,150	$3.87
6.3	Storage Replacement	$2,432,709	$1,216,355	$1,216,355	$45,445	$3.19
Monthly Cost per Ratepayer					Total	$16.38

Table 6.18 – Scenario #5 DWSRF Loan and Federal/State Grant

Item #	Description	Estimated Project Cost	ASSUMED FUNDING SOURCE			Monthly Cost per Ratepayer *(Based on 1188 current users)*
			Federal/State Grant 33%	SRF Loan (2.5%, 20-year)	Annual Payment	
5	Prater Canyon Transmission Line	$1,186,173	$391,437	$794,736	$50,980	$3.58
6.1	Storage/Source Replacement	$5,929,937	$1,956,879	$3,973,058	$254,860	$17.88
6.2	Storage Replacement	$2,952,228	$974,235	$1,977,993	$126,882	$8.90
6.3	Storage Replacement	$2,432,709	$802,794	$1,629,915	$104,554	$7.33
Monthly Cost per Ratepayer					Total	$37.69

The American Water Works Association (AWWA) has developed a standard for average monthly residential water bills which is a factor of the Annual Median Household Income (AMHI) multiplied by 2.5% and divided by 12 months. The Town of Star Valley Ranch has an AMHI of $82,647.00 which equates to an AWWA standard monthly bill of approximately $172.00. This is not to say that rates should be increased but that the current rates for the system are in line or below standard water rates.

In evaluating Tables 6.14 thru 6.18 it can be seen that Scenario #4 (Table 6.17) is likely the more user rate friendly. These tables illustrate the difficulty for small private rural water systems (even small municipal systems) to engage in major capital improvement projects. Should major infrastructure projects be planned and implemented it is recommended that user rates are increased in phases over time and reserve funds are growing annually to accomplish capital improvement/replacement projects.

6.3.6 Operational Cost Impacts

Operational Costs are summarized in Table 6.19. This table assumes that all operational costs would be incurred by the Town with no increase to consumer rates. These costs do not include operational labor expenses, they only include material and outside costs (i.e., consulting). It is assumed that the recommended operations would be implemented in 2024-2025.

Table 6.19 – Operational Cost Impact

Item No.	Description	Estimated One-Time/Initial Costs	Estimated Annual Operational Cost or Per Each Cost
2	**Source Water Rights**	**$3,500.00**	**$500.00**
4	**Water Age Flushing**	**$0.00**	**$10,300.00**

6.3.7 Ability to Pay

A water system's ability to pay for project funding in a timely manner is a key consideration for all funding sources that require payback. It is important that the Town be proactive in advancing specific financing plans for projects as it will put a higher priority on funding those projects in funding agencies eyes.

6.4 Project Permitting

The following permit requirements are anticipated for the implementation of the recommendations herein:

- **Wyoming DEQ-WQD Permit to Construct:** This permit is required for all water system projects. Wyoming DEQ-WQD will require final plans and specifications as part of the application and review process.

- **Right-of-way Acquisition**: It is likely that recommended improvements will be constructed within existing easements or rights-of-way controlled by the Town.

- **Lincoln County, Wyoming**: Waterline construction within Lincoln County right-of-way, will require a conditional use permit, temporary construction permit and right-of-way license agreement issued by Lincoln County,
    - 925 Sage Avenue, Kemmerer, WY, 83101, Phone – 307-877-2104 (County Engineer)

- **U.S. Forest Service Permitting**: Any project or maintenance on the Prater Transmission Line will require approval by the U.S. Forest Service.
    - Greys River Ranger District, 671 Washington St., Afton, WY 83110, Phone – 307-886-5300

Using Federal funds (SRF) for projects will trigger the need for NEPA clearances. This could involve a categorical exclusion (cat-ex), or more likely an Environmental Assessment with a likely Finding of No Significant Impact (EA/FNSI) if construction disturbances are limited to previously disturbed areas.