

Edl, Michele

From: Jason Linford [jlinford@sunrise-eng.com]
Sent: Monday, February 23, 2009 3:24 PM
To: Edl, Michele
Cc: 'Jared Gunderson'
Subject: RE: numbers clarification
Attachments: P__Driggs_00675 Driggs General Engineering_Cybernet_Driggs Future Water 6-2-08.pdf

Michele,
Sorry for the delay in getting back with you.

1. The difference in the numbers was due to an error and was corrected in one location but not another. The correct number for capacity should be 5245 gpm as shown in the table. This number should carry over to page 16 as well. The final report will have it fixed.
2. I do have a water model of the system. The model shows that the City is able to meet the current required capacity with the existing waterline sizes in place. However, as the City grows, we have identified future waterline sizes needed to meet future demands. The future waterline sizes do not affect the current waterlines. This is for areas where we anticipate more growth to occur. I have included a map that shows waterline sizes that are anticipated in the future. These waterlines loop out around the airport etc.

If you have any other questions. Please let me know.

Jason



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From: Edl, Michele [mailto:Michele.Edl@idwr.idaho.gov]
Sent: Wednesday, February 18, 2009 1:24 PM
To: jlinford@sunrise-eng.com
Subject: numbers clarification

Jason,
The bureau chief has reviewed your report and is more comfortable issuing the 2 licenses we have on hand.

We have some questions related to your draft report.

1) You cite two different capacity numbers. 5245 gpm (total in table page 11) and 4875 gpm (text on page 11, in last sentence before Sec 3.2.3)

The same two capacity numbers are given on page 16 (paragraph before FUTURE WATER STORAGE)
What do the difference capacities mean?

2) The Department would be interested in information from a model of the system capacity which is not just a total of the wells added together.

7/9/2009

We realize that historical valve information and line sizes may not have been available input into the model however, I need to ask "Do you have a model of the of system capacity which represents actual use?"

Thanks
Michele

PS A small correction: in the 3-column-text on page 7 the total gpm is correct but the total cfs is not. Total cfs is 15.17 not 14.17.
The error may be Lions Park

7/9/2009

Edl, Michele

From: Jason Linford [jlinford@sunrise-eng.com]
Sent: Wednesday, February 18, 2009 10:03 AM
To: Edl, Michele
Cc: 'Jared Gunderson'
Subject: Driggs Report
Attachments: Microsoft Word - Cul. Water Fac. Plan, 2008.pdf

Michele,
Attached is the report we spoke about. Please give me a call if you have any questions. I'll also send a map separately (the file size is larger).

Jason



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2/18/2009

DRIGGS CULINARY WATER FACILITY PLAN UPDATE 2008

PREPARED FOR:

CITY OF DRIGGS

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1.0 INTRODUCTION

The City of Driggs has been operating a water system for close to 100 years. The City's spring water right has a priority date of 1912. The City of Driggs started conveying water from the spring in a wooden pipe. Then, in about 1939 the wooden pipeline was replaced a concrete pipeline. All of this work was done by hand. Numerous upgrades and expansions to the system have been completed since 1912.

The City of Driggs completed a Culinary Water Facility Plan in March 2002. The Facility Plan recommended several upgrades to the system and a new 1.0 million gallon tank was constructed, a new 12-inch transmission line and installed, and a well house was completed for the High School well. Over the last six years, the City of Driggs has experienced high growth rates and increased demands to the water system. The City Council requested that the Facility Plan be updated so that the current and future status of the water system could be evaluated.

As outlined in the Table of Contents, this water system plan is organized with six sections, the first being the introduction. Information about the surrounding area is discussed in Section 2. Section 3 analyzes the users, usage, and physical elements of the current water system. Section 4 analyzes the users, usage, and identifies physical deficiencies of the water system in the next 20 years. Section 5 analyzes each deficiency and the financial impact of each area of deficiency identified in Sections 3 and 4. Funding options are also proposed in Section 5. In conclusion, Section 6 summarizes the results of the water system and provides recommendations to the City of Driggs. Supporting documentation and calculations for the Water Facility Plan are found in the Appendices. An update to the Environmental Assessment Document was not part of the scope of work.

1.1 SCOPE & PURPOSE OF STUDY

The purpose of this study is to provide a comprehensive plan for improvements to the City's water system until the year 2028. This includes an inventory and evaluation of the existing water rights, source, treatment, storage, identification of areas that require attention, preparation of preliminary designs and cost estimates for the preferred alternatives, and a user rate analysis and funding scenarios.

2.0 SUPPLEMENTARY EXISTING CONDITIONS

The purpose of this section is to provide the reader with a variety of background information on the project area and system boundary.

2.1 STUDY AREA & SURROUNDING AREA

The study area includes the present corporate limits of the City of Driggs and surrounding lands that may eventually become part of the City. The City is located along Idaho Highway 33 between Victor, to the south, and Teton, to the north. Potential areas of growth are to the north, south, east, and a somewhat limited area to the west of the City where future expansion of the water system can be accomplished inexpensively.

Geographically, the City of Driggs is located in a mountain valley in Teton County, Idaho. The valley is full of exceptional beauty and is an access to the Grand Teton mountain range, Teton National Forest, Grand Targhee Ski Resort, and Jackson Hole, Wyoming. This area attracts people from all over the world. Area and vicinity maps can be viewed in Exhibits 2.1.1 and 2.1.2. A detailed map of the area of impact can be viewed in Exhibit 2.1.3

Further discussion concerning the existing environmental conditions of the area can be found in the 2002 Culinary Water Facility Plan.

3.0 EXISTING WATER SYSTEM ANALYSIS

The basis for a discussion of the present needs of the water system focuses on the area served by the water system, the present number of users served, and the typical water usage presently experienced within the community. The condition and capacity of the water system elements in relation to the demands placed on the system are discussed in detail. Each of these elements must be evaluated in order to assure that the present system is adequate to meet the culinary water needs of the community and to project the improvements required in the future.

3.1 PRESENT CONNECTIONS & WATER USAGE

3.1.1 Connections

The City currently serves approximately 606 residential and 190 commercial connections. This number has increase dramatically from the 381 residential and 110 commercial connections in 2002.

3.1.2 Existing Water Usage

The City of Driggs has installed water meters on the residential and commercial connections within the City. This has allowed the City to keep detailed records of the use for all their customers on the water system. In this study, reference is made to Equivalent Residential Units (ERUs). One ERU is defined as the amount of culinary water supplied to an average residential connection. Because an ERU relates to the amount of water required for the average residential connection, use of this term allows commercial or other large water users to be equated to a residential connection.

To determine how much water is represented by an ERU, water usage is averaged for all residential connections. A review of the commercial connection water usage indicated that the 190 commercial connections use as much water as approximately 600 residential connections. The existing ERU's are shown as follows:

	<u>Connections</u>	<u>ERU's</u>
Residential	606	606
<u>Commercial</u>	<u>190</u>	<u>600</u>
Total	681	1,206

In Appendix III, meter reading data can be viewed to support the calculations presented above.

The month with the largest water consumption was recorded in August 2007. Over 62,264,000 gallons of water was consumed during this month. The equivalent residential use for August is shown below:

Peak Monthly Use: $62,264,000 \text{ gal} \div 1,206 \text{ ERUs} = 51,628 \text{ gal/ERU-month}$

Avg. Day Peak Month Use: $51,628 \text{ gal/ERU-month} \div 31 \text{ days/month} = 1,665 \text{ gal/ERU-day}$

Peak Day Use: $1,665 * 1.3 = 2,165 \text{ gal/ERU-day}$

Later in this Chapter, the existing system will be evaluated using the peak day use.

3.1.3 Existing Water Rates & Fees

On February 20, 2007 the City of Driggs adopted Resolution #221-07. This resolution established new water rates for the City. The following table summarizes the rates found in the resolution.

CITY OF DRIGGS WATER RATES & HOOK-UP FEES

Connection Size	Base Rate	Base Gallons	Excess Gallons	Hook-up Fees
3/4" Residential	\$23.10	10,000	\$0.52/1000	N/A
1" Residential	\$23.10	10,000	\$0.52/1000	\$1,785
3/4" Commercial	\$23.10	10,000	\$0.52/1000	N/A
1" Commercial	\$23.10	10,000	\$0.52/1000	\$1,785
1.5"	\$57.75	25,000	\$0.52/1000	\$4,095
2"	\$103.95	45,000	\$0.52/1000	\$7,350
3"	\$150.15	65,000	\$0.52/1000	\$16,590
4"	\$184.80	80,000	\$0.52/1000	\$29,505
6"	\$277.20	120,000	\$0.52/1000	\$66,465

During winter months all connections are able to consume double the amount of their base gallons, without paying excess usage rates. This benefit is provided to help prevent service lines from freezing. Connections served outside the City limits will pay 1.5 times the above rates.

The City may wish to consider measures to decrease the peak day use. These could include conservation letters or flyers included in the water bills, public education, and an increase in overage charges.

3.2 EXISTING WATER SYSTEM

3.2.1 Existing Water Rights

Water Rights play an important role in the City of Driggs' overall water planning process. According to Idaho Department of Water Resources (IDWR) and the Wyoming State Board of Control, the City of Driggs has 8 Water Rights Licenses, 2 Permits to appropriate Water, and 1 Notice of Claim to a Water Right, claim, and permit information. Copies of this information can be viewed in Appendix IV.

WATER RIGHTS, PERMITS, AND CLAIMS OF THE CITY OF DRIGGS

Water Right No./Source Name	Type	Priority Date	Status	Flow	Beneficial Use
11330 Spring	Right	Jun 28, 1912	Active	1.0 cfs	Municipal
7265 E Spring	Right	Jun 8, 1999	Active	1.5 cfs	Municipal
22-2132 Dalley Well	Right	Apr 13, 1949	Active	1.11 cfs	Municipal
22-07529 Tank Well	Right	Jul 30, 1987	Active	0.77 cfs	Municipal
22-13589 Huntsman Springs	Right	Sept 19, 2006	Active	1.1 cfs	Municipal
22-7814 Valley Center Well	Right	Jan 29, 2007	Active	2.0 cfs	Municipal
22-07530 Teton Creek	Right		Active	.94 cfs	Municipal
22-07698 Park Well	Permit	Feb 14, 1991	Active	4.5 cfs	Municipal
22-07790 H.S. Well	Permit	Feb 21, 1996	Active	2.25 cfs	Municipal

Note: Because the spring is located in Wyoming, the water rights for the spring are managed and appropriated by the State of Wyoming. Culinary Water Rights only are shown

Spring	2.5 cfs	or	1,122 gpm
Dalley Well1	1.1 cfs	or	493 gpm
Tank Well	0.77 cfs	or	345 gpm
Lion Park Well	4.5 cfs	or	2,020 gpm
Huntsman Well	1.11 cfs	or	500 gpm*
Teton Creek Well	.94 cfs	or	423 gpm
Valley Center Well	2.0 cfs	or	898 gpm
<u>High School Well</u>	<u>2.25 cfs</u>	<u>or</u>	<u>1,010 gpm</u>
Total	15.17 ~~14.17~~ cfs	or	6,811 gpm

*The Huntsman Well can produce more than 500 gpm and could be increased up to as much as 1,000 gpm when the water right have been consolidated and be taken from any source.

A community should have enough water right capacity to cover the usage demands on the day of maximum or peak use. As mentioned previous, the peak day demand for the system was calculated to be 2,165 gallons per ERU per day. Converting the peak day demand to gallons per minute is calculated below.

$$2,165 \text{ gal/ERU-day} \times 1,206 \text{ ERU} \times 1440 \text{ min/day} = 1,813 \text{ gpm}$$

From the calculations above, it is determined the existing water right capacity needed is 1,813 gallons per minute. By comparing the needed capacity (1,813 gpm) to the actual

capacity (6,811 gpm) one can determine that there is an existing water right surplus of 4,998 gallons per minute.

3.2.2 Existing Water Sources

The City of Driggs owns and operates eight water sources. These sources consist of one spring and seven wells. The spring had been historically Driggs' main source of water. However, as growth has occurred, the City has had to rely more and more on their wells. Three wells have been added to the system since 2002. These are the Valley Center Well, Huntsman Springs Well, and the Teton Creek Well. Exhibit 3.2.2 shows the location of all the City's sources.

SPRING: The spring is located in Teton Co. Wyoming. Driggs owns the 8.07 acre property on which the springs is located. North and west of the spring property is private property, most of which is an alfalfa field. To the south and east is Teton National Forest property. The spring was redeveloped in 2002 and is currently in good condition.

TANK WELL: Andrew Well Drilling constructed the Tank Well on July 31, 1987 to a depth of 260 feet. The well was drilled using permit number 701623. The method of drilling was rotary, with a 14-inch boring diameter. The construction of the well is 14-inch diameter steel casing for the first 166 feet, then, 10-inch diameter steel casing for an additional 89 feet, to a total depth of 255 feet. The top 40 feet is sealed with bentonite clay. At the time of drilling, the static water level was measured to be 129 feet below the ground surface. Soil conditions encountered during the boring process were typically gravels and boulders for the first 198 feet, then, firm and broken limestone to final depth of 260 feet.

There is no information on the well drillers report about the wells flow capacity. There has been some confusion on how much water this well will produce. The City staff has indicated that this well produces approximately 340 gpm. In Appendix V, a copy of well drillers report can be found.

HIGH SCHOOL WELL: High Plains Drilling constructed the High School Well on March 30, 1998 to a depth of 216 feet. The well was drilled using permit number 703104. The method of drilling was cable, with a 20 and 14 inch boring diameter. The construction of the well is 14-inch diameter steel casing from 2 to 130 feet. Then sixty feet of 10-inch diameter stainless steel screen was installed between 130 and 190 feet deep. The top 40 feet is sealed with bentonite clay. The static water level was measured to be 83 feet below the ground surface. Soil conditions encountered during the boring process were typically clay and gravels for the first 110 feet. Then gravel with sand was encountered to a depth of 196 feet. Between 196 and 216 feet clay with traces of gravel were removed. A pump test was conducted for 24 hours with the pump set at 150 feet. The results from the testing indicated 1,100 gallons per minute of water could be pumped with a drawdown of 68 feet. According to the City, this well was permanently equipped with a motor and pump capable of producing 1,100 – 1,350 gallons per minute. In Appendix V, a copy of well drillers report can be found.

LIONS PARK WELL: High Plains Drilling constructed the Lions Park Well on December 30, 1992 to a depth of 505 feet. The well was drilled using permit number 701925. The method of drilling was cable, with 20, 16, and 14-inch boring diameter. The construction of the well is 16-inch diameter steel casing from 2 to 362 feet. Twelve inch casing is installed from 171 to 375 feet, and then a 10-inch steel casing was installed from 350 to 505 feet. The top 40 feet is sealed with bentonite clay. The static water level was measured to be 40 feet below the ground surface. Soil conditions encountered during the boring process were typically clays and gravels for the first 330 feet, and then hard sandstone was encountered for the next 15 feet to a depth of 345 feet. Different combinations of gravel with clay were found for the next 160 feet, for a total depth of 505 feet. The well was air tested at depths of 350 and 505 feet deep. The well produced 200 and 400 gallons per minute at corresponding depths. According to Allen Wilder and test pump data from PumpTech, the Lions Park Well will produce 600 gallons per minute. In Appendix V, a copy of the well drillers report and test pumping data can be found. The water quality from the Lions Park Well currently satisfies the required standards. However, the levels of nitrates have been rising over the last few years. Typically, nitrates in groundwater come from runoff fertilizer use, leachate from septic tanks or erosion of natural deposits. The City staff is concerned that the nitrates are from an old abandoned landfill used years ago. Knowledge concerning this landfill is minimal to nonexistent, other than the fact that longtime residents of Driggs have commented to members of the City Staff that they remember using a public landfill in the area.

DALLEY WELL: The Dalley Well is the oldest of the City's wells. The water right for this well was issued on April 13, 1949. Therefore, the well must have been drilled prior to this date. Not much is known about this well. Neither the Idaho Department of Water Resources nor the City could find any records for this well. What is known about this well is that it is located on the southwest corner of the intersection of Ross Ave. and 5th Street, about 600 feet west of the High School Well. Due to the proximity and depth of construction (total depth 216 feet) of the High School Well, it is believed that the Dalley Well taps the same aquifer as the High School Well and would have encountered similar soil conditions during construction. City staff indicates that a new pump was installed in 1996 and a recent test showed the well produces approximately 400 gallons per minute.

Valley Center Well: The Valley Center Well was originally owned by Teton Valley Association, LLC. The well was turned over to the City of Driggs in 2007 and the City now owns and maintains it. The Well was constructed by Findlay Well Drilling in November of 2000. The static water level is at 40 feet and the depth of the well is 252 feet. The bore hole begins at 20 inch diameter for the first 60 feet and then 16 inch diameter the rest of the well depth. A Gravel pack was installed from 240 feet to 252 feet. The well was test pumped at 2,000 gpm with a draw down of 165 feet.

Huntsman Springs Well: The Huntsman Springs Well was constructed in 2007 by Denning Drilling. This well is located in the north east end of the Huntsman Springs Development and was given to the City by the developer. The well has a total depth of 280 feet with 10 inch steel casing to a depth of 244 feet. A 10 inch telescope 50 slot stainless steel screen was placed from 232 to 275 feet. Static water levels range from 45

feet deep to 20 feet below ground surface. The well log indicated mostly sand and gravel were encountered in the drilling process. The well was test pumped at 1,090 gpm and the draw down that occurred was 137 feet. Currently the well house and pump have not been constructed at this site.

Teton Creek Well: The Teton Creek Well as completed in January 2006. The well is located off State Line Road on the Idaho side. This well was constructed by a developer and turned over to the City as part of an agreement for the City to service all three phases of the Teton Creek Resort. The well is 302 feet deep with a 10 inch casing and has 70 feet of stainless steel screen install from 142 feet to 212 feet. The static water level was measured at 89 feet. The well was test pumped at 500 gpm for 24 hours. The total draw down was 31.8 feet. A well house was constructed in 2008 and the well was equipped with a 40 Hp pump designed to flow approximately 400 gallons per minute. The pump also equipped with a variable frequency drive set to start when the system pressure drops below a specified amount. The well pumps directly into the system and helps fill the existing 1.0 million gallon storage tan.

Bypass lines have been installed at the Lions Park and Tank Wells. The bypass lines will allow the wells to be pumped to waste without introducing the water into the system. The Tank Well bypass connects to the old 8" steel drain line used by the small square tank. This square tank was used prior to the 300,000 gallon tank and does not exist today. The Lions Park bypass is plumbed into the neighboring fire hydrant. As part of the 2002 water project, the High School well house was built. As part of the well house piping, a pump to waste line was installed as well as a pump control valve and chlorination equipment. A copy of the well drillers report can be found in Appendix V.

A design feature that concerns the City Staff with regards to their wells is the fact that there is not a way to monitor the water level in the wells and that it is difficult to determine which wells are operating at a given time.

It is important that a community develop enough sources of water and storage to meet the peak water usage demands. Earlier in the study it was determined that the peak usage for the system was 2,165 gallons per ERU per day. The capacities of all the water sources in the system are shown below, along with the system's total capacity. For comparison purposes, the water right capacity information from the previous section and the expansion capacity for each source is also provided.

<u>Water Source Capacity</u>		
Huntsman's Springs	=	500 gpm
Spring	=	1,122 gpm
Dalley Well	=	400 gpm
Valley Center	=	800 gpm
Tank Well	=	340 gpm
Lion Park Well	=	560 gpm
Teton Creek Well	=	423 gpm

High School Well	=	1,100 gpm
Total	=	5,245 gpm

A community should have enough water source capacity to cover the usage demands on the day of maximum or peak use. As mentioned previous, the peak day demand for the system was calculated to be 2,165 gallons per ERU per day. Converting the peak day demand to gallons per minute is calculated below.

$$2,165 \text{ gal/ERU-day} \times 1,206 \text{ ERU} \times 1440 \text{ min/day} = 1,813 \text{ gpm}$$

From the calculations above, it is determined the existing water source capacity needed is 1,813 gallons per minute. By comparing the needed capacity (1,813 gpm) to the actual capacity (4,875 gpm) one can determine that there is an existing water capacity surplus of 3,432 gallons per minute.

3.2.3 Existing Water Storage

The City of Driggs owns and operates two storage tanks. One tank was constructed in 1987 as part of a City improvement project. It is a 300,000 gallon concrete tank. All but the top 18 inches of the tank is buried. The tank is located a little over a mile northeast of the City limits in a county subdivision. Residential housing neighbors the site. The tank is connected to the transmission line that runs between the spring and the City. The other tank is 1.0 million gallons and was constructed in 2003. It is located in Wyoming and is completely buried. The tank was constructed so that 40 psi water pressure could be delivered at the Idaho Wyoming state line. Both tanks are in good physical condition and working order.

In determining the amount of storage required for a community several factors come into play. There are two main design criteria used to size water storage facilities. The first is the volume of needed storage to meet the peak demands on the system. This volume is used as a buffer, to supply the peak demands when the community's use is greater than what the source can provide. The second is determined by the required amount of fire flow.

The Uniform Fire Code states a system must be capable of supplying a minimum fire flow of 1,000 gpm for two-hour duration, for buildings that do not exceed 3,600 square feet. For buildings greater than the 3,600 square feet the minimum fire flow requirements increase accordingly with some up to 4,500 gallons per minute for four hours. The Fire Marshal can approve a reduction in required fire flow when a building is provided with approved fire prevention devices, such as an automatic sprinkler system.

In summary, the required fire demands range from 1,000 gallons per minute for two hours to 4,500 gallons per minute for four hours. Therefore, due to the range of required fire demands and the size and redundancy of the sources throughout the water system, it is recommend the City of Driggs size their fire storage facilities for no less than 2,000 gallons per minute for two hour duration.

The following calculations illustrate the current required water storage needs using the average day demand to meet peaking requirements. The calculations below are derived from guidelines set forth from State standards.

Existing Requirement:

Peak month daily demand	1,665 gal/ERUs-day * 1,206 ERUS	= 2,007,990 gal.
Fire Flow	2,000 gpm * 120 min.	= <u>240,000 gal.</u>
Existing Requirement		
2,248,000 gal.		

Existing Storage	= <u>-1,300,000 gal.</u>
Existing Storage Shortage	= <u>948,000 gal.</u>

According to the calculations above, there is an existing water storage shortage of 948,000 gallons. The IDAPA rules however, state that "The requirement for storage may be reduced when the source and treatment facilities have sufficient capacity with standby power to supply peak demands of the system". The City's spring source can be considered to decrease the required storage capacity. The spring's conservative flow of 900 gallon per minute (gpm) times 24 hours per day flow rate equals over 1,000,000 gallons of water per day. This amount of water added to the existing storage provides the required peak day storage for the system. IDEQ will have to approve the constant spring flow as a reduction in storage requirements.

3.2.4 Existing Transmission & Distribution Systems

The water conveyance system consists of two elements. The first element is the transmission line. The transmission line runs from the spring to the 1.0 million gallon tank and acts as both distribution line, serving pressure from the state line, and a transmission line, providing water to the 300,000 gallon tank. The other transmission line is from the 300,000 tank to the main downtown City area. The second element of the conveyance system is called the distribution system. The distribution system conveys the water to each connection and fire hydrant. In Exhibit 3.2.4 a map illustrating culinary piping system can be viewed.

Transmission Line

The transmission line is made up of two sections. The first section provides water from the spring to the new 1.0 million gallon tank and then on to the 300,000 gallon tank. The old 8-inch line was replaced in 2003-2004 with a new 12-inch HDPE pipe. This section is approximately 16,500 feet long. The line then continues after the pressure has been reduced. After the PRV (pressure reducing valve), the waterline is considered distribution piping.

The second leg of the transmission line, from the 300,000 gallon tank to the City, is 12-inch steel spiral welded pipe. The pipeline drops approximately 125 feet of elevation before it connects to the distribution system and is approximately 5,550 feet in length.

Distribution System

The distribution system is divided into three (3) pressure zones which are divided by pressure reducing valve (PRV) stations. The first pressure zone begins at the state line and ends at the 300,000 gallon tank location. The second zone begins at this tank and ends at approximately elevation 6180. The third zone begins at this elevation and extends west as far as there is distribution piping. Pressure zones #1 and #2 are fed by the spring and the Teton Creek Well. Zone #3 is fed by all of the remaining sources which pump into the system and eventually reach the elevation of the 300,000 gallon tank.

The majority of the distribution system is looped together in a grid pattern. The older portions of the system consist primarily of 6- inch pipelines. However, in a few areas of the City, there are old 2-inch lines connecting between 6-inch lines to complete looping needs. The backbone of the system is made with 14, 12, 10 and 8-inch pipes. These larger diameter pipes help convey the needed volume of water to all areas of the system. The backbone is located along Fifth Street and Ross Avenue. All newer subdivisions installed 8-inch or larger piping. As mentioned previously, Exhibit 3.2.4 is a map that illustrates the layout of the distribution system. All the pipes throughout the system are made of ductile iron, except for a few blocks that are PVC.

According to Idaho Standards, the distribution system shall be designed to maintain a minimum working pressure of 40 pounds per square inch (psi). In no case during fire flows plus peak day demands shall the system pressure be less than 20 psi. The normal working pressure in the distribution system should be approximately 60 to 80 psi.

As mentioned previously, the Uniform Fire Code states a system must be capable of supplying a minimum fire flow of 1,000 gpm for two hour duration, for buildings that do not exceed 3,600 square feet. According to Bret Campbell, Teton County Fire Marshall, the City should provide at least 1,000 gpm fire flow to the system as a whole and buildings that require more flow will be looked at on an individual basis.

A computer model of the distribution system was created and analyzed to determine if the system met requirements. In Exhibit 3.2.4.B a map showing the distribution system model can be viewed. The model was evaluated with water being conveyed from the 300,000 gallon tank and the High School, Lions Park, and Valley Center Wells, as well as the spring. The model indicates that 1,200 gpm fire flows can be met at all areas of the system. Tabular results of the water model are shown in Appendix VII.

3.2.5 Existing Water Treatment & Quality

Water Treatment

The City of Driggs has a sodium hypochlorite generation system at the spring to disinfect the spring water. The High School Well and the Teton Creek Well are equipped with chlorination equipment. Chlorination equipment at well sites that pump water directly into the distribution system does not meet the required 30 minute contact time. But, the chlorine does aid in the maintaining the chlorine residual level throughout the system. It would be beneficial to install chlorination equipment at all wells. This

would allow the operator the ability to maintain a constant chlorine level. Typically, a well house would need to be constructed to protect the chlorination equipment during the winter months.

Water Quality

Currently, the City is directed to conduct bacteria samples on a monthly basis. According to Idaho Department of Environmental Quality, The City of Driggs has not had a positive bacteria sample since November 16, 1999.

As mentioned above, chlorine is injected into the water for treatment. It is believed that the current clean sampling history is a product of the addition of chlorine into the system and proper sampling techniques.

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4.0 FUTURE WATER SYSTEM ANALYSIS

This section will analyze aspects of Driggs' future water users, water system needs, and proposed improvement alternatives to insure Driggs is capable of meeting their water needs for the next 20 years, until the year 2028. Along with the proposed improvement alternatives, conceptual designs for each preferred alternative will be presented. Each preferred alternative is carefully analyzed to identify the long-term water benefits, and hydraulics, preferred alternatives will then undergo detailed cost analysis in Section 5.0.

4.1 FUTURE WATER SYSTEM

As the City of Driggs grows, the service area of the water system and the accompanying water supply will logically be required to meet the demands of the growth. The discussion below identifies the projections for the service area, the population and the corresponding water use associated with this future growth.

4.1.1 Future Service Area

The lands within the present corporate limits of the City of Driggs allow for an increase in population density. Changes to the City's boundary could also provide for expansion of the future service area of the water system. Geographically and historically, growth will occur to the north, south, and east of the City first. According to the Resource Soil Scientist Office, immediately to the west of the existing City limits, the water table rises quickly and in most areas is less than five feet below the surface.

As growth pushes to the south of Driggs it is easier to meet required pressures and fire flows because the natural lay of the land is lower in elevation. However, this is not true to the north and east because of the increasing elevations.

4.1.2 Projected ERUs

Projecting accurately the growth of a community such as Driggs that has experienced a series of major economic fluctuations can be a challenging task. As was mentioned previously, Driggs has experience a dramatic increase in growth over the past five years. Doug Self, Driggs' Planning and Zoning Administrator, has directed that growth rates from the City's Wastewater Facility Plan be used in this Water Facility Plan. The projected growth rates are 5.8% through 2010, 4.5% through 2015, and 3.8% through the end of the planning period, 2028. It is recommended that growth rates be monitored and the Facility Plan be updated regularly to reflect the actual growth rates. If the actual growth rate is higher than projected, needed improvements will be required sooner. The opposite is true if the growth rate is less. A summary of the projected ERU's are shown below:

The number of ERUs expected in a future year, can be calculated using the compound interest formula, and inserting the projected growth rate, the existing number of ERU, and the 20-year planning period. The compound interest formula is shown below:

$$F = P (1 + i)^N$$

F = Future ERUs

P = Existing ERUs

I = Growth Rate

N = Planning Period of Years

The estimated number of future ERUs is calculated below. The calculations are based on the existing ERUs derived in Section 3.1.2, a the growth rates indicated above for the 20-year planning period:

$$F (2010) = 1,206 \text{ ERUs } (1 + .058)^3 = 1,428 \text{ ERUs}$$

$$F (2015) = 1,428 \text{ ERUs } (1 + .048)^5 = 1,806 \text{ ERUs}$$

$$F (2015) = 1,428 \text{ ERUs } (1 + .038)^{13} = 2,932 \text{ ERUs}$$

From the calculation above, it is projected that the total number of ERUs in the year 2028 will be 2,932. One of the keys to this study is to determine if each element of the water system will meet the additional demands created by the 20-year ERU projections. In the following sections these questions are answered.

4.2 FUTURE WATER RIGHTS

As discussed in Section 3.2.1, the total diversion rate allowed by the water rights is 14.17 cfs or 6,811 gpm. As stated previously, a community should have enough water rights to meet their peak day demands. By using the peak day demand established in Section 3.2.2 and the future number of ERUs (2,932) the future required water right capacity is calculated below:

$$2,165 \text{ gal/ERU-day} \times 2,932 \text{ ERUs} \div 1,440 \text{ min./day} = 4,407 \text{ gpm}$$

Comparing the above calculation with the capacity of Driggs' current water rights (6,811 gpm), yields a water right surplus of 2,404 gallons per minute. The above calculations indicate that the City of Driggs does not need to acquire additional water rights during the 20-year planning period.

4.3 FUTURE WATER SOURCE

The City of Driggs has a total of eight water sources. The capacities of each source along with a description of each source can be located in Section 3.2.2. The total source

capacity capable of being produced by the Driggs' sources is estimated to be 5,245 gallons per minute. Just like the water rights, a community should have enough source capacity to meet their peak day demands. In Section 4.2, Driggs future peak day demand was calculated to be 4,407 gallons per minute. Comparing the peak day demand (4,407 gpm) with the capacity of Driggs' sources (4,875 gpm), yields an excess of 838 gallons per minute by the year 2028.

4.4 FUTURE WATER STORAGE

The existing water storage needs were identified in Section 3.2.3. The first is peaking storage, which is based on the daily demand of the peak month on the system and secondly, fire storage. In the calculations below, the future storage requirement of the water system will be determined.

Future Requirement

Peak month daily demand	1,665 gal/ERU-day * 2,932 ERUs=	4,900,000 gal
Fire Flow	2,000 gpm * 120 min.	= <u>240,000 gal.</u>
Future Requirement		5,140,000 gal.

Existing Storage	=	1,300,000 gal.
Existing Spring Flows (used as storage)	=	<u>1,000,000 gal.</u>
Total Storage	=	2,300,000 gal

Future Storage Shortage	=	2,840,000 gal
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The calculations above show a future storage shortage of 2.9 million gallons by the year 2028. As mentioned previously the required storage is allowed to be reduced if the sources are able to provide peak demands to the system. Because most of the sources are wells, generators would have to be installed in order to reduce the required storage. This will be discussed later in this report.

4.5 FUTURE WATER DISTRIBUTION

In order to analyze the future needs of the distribution system, the computer model was modified and analyzed with the projected future demands. Zone #3 did not indicate any problems meeting future peak flows. This is because the majority of the City's water sources are located in this zone and are able to pump water into the distribution system as well as water being supplied by the 300,000 water storage tank. The water model indicated that Zones #2 and #1 would require improvements in order to deliver the required flows. These zones did not meet the future flow requirements because of insufficient water source. If the PRV stations were allowed the feed Zone #2, Zone #1 was not able to provide fire protection. If the PRV's were converted to pressure sustaining valves, valves that did not allow water to pass into Zone #2 in order to maintain pressures in Zone #1, then Zone #2 was not able to meet flow requirements.

Also as part of the future analysis, additional distribution lines were shown to be installed with recommended sizes in order to meet future demands. These lines were added to the expanding north and south areas of the City. These improvements, along with the future available fire flows can be viewed in Exhibit 4.5

As a note, the proposed lines in Exhibit 4.5 are not the only pipe sizes and routes that could be used to expand the water system. As the City grows, looping lines should be added with adequate capacity to meet future plans and build-out of the potential service area. As plans are developed, the model should be rerun with the proposed plans to insure proper sizing and location.

Section 5 will discuss alternatives in order for the system to provide adequate flows in Pressure Zone #1 and #2.

4.6 FUTURE WATER TREATMENT AND QUALITY

The existing water treatment analysis was completed in Section 3.2.5. The needs identified in that section were to install additional chlorination equipment in buildings at each well site. As long as the water quality does not change, the additional chlorination equipment will be the only needed item. Water quality test should continue as directed by IDEQ.

5.1.3 Water Storage

The water storage analysis revealed future needs of the water system. The future requirement showed a storage deficit of approximately 2.9 million gallons. As discussed above, this number can be reduced if water sources are able to provide peak flows. It is recommended that the High School Well and the Valley Center Well be equipped with generators to help reduce the future storage deficit. The possible reduction is calculated below:

High School Well $1,100 \text{ gpm} * 18 \text{ hours/day pumping} =$
 $1,100 \text{ gal/min} * 18 \text{ hr/day} * 60 \text{ min/hr} = 1,188,000 \text{ gal.}$

Valley Center Well $800 \text{ gpm} * 18 \text{ hours/day pumping} =$
 $800 \text{ gal/min} * 18 \text{ hr/day} * 60 \text{ min/hr} = 864,000 \text{ gal.}$

By adding the two totals together equates to a reduction of approximately 2.0 million gallons. The reduction will have to be approved by DEQ. It is estimated that a generator can be purchased and installed for approximately \$45,000 for each well site.

By reducing the required storage by 2.0 million gallons a storage tank of approximately 1.0 million gallons needs to be constructed. The estimated cost of a 1.0 million gallon tank is approximately \$1,130,000. A detailed cost estimate shown in Exhibit 5.1.3.

Zones #1 and #3 both have tanks that provide water pressure without having to pass through PRV stations. It is recommended that the new tank be located so that it can provide water flows to Zone #2. The location of the tank and associated piping will be discussed in the section below.

5.1.4 Water Distribution System

The primary need for the distribution system is to provide more water flow to Zone #2. A future water storage tank is also required and is recommended to provide storage for Zone #2. This can be accomplished in two different ways. Option 1; construct the storage tank at an elevation that would deliver required pressures to Zone #2 or Option 2; construct the storage tank in Zone #2 and pump from it into the system. These two options and required piping and water source are discussed below:

Option 1: In order to provide 40 psi at Zone #2 at storage tank would have to be constructed at the elevation approximately 6,400 ft. This elevation is located along State Line road north of Ski Hill Road and in Wyoming south of Ski Hill Road. Due to the difficulty of constructing the existing 1.0 million gallon tank in Wyoming, it is recommended that a proposed tank site be located north of Ski Hill Road. This would also require approximately 9,000 ft of 12 inch transmission line as well as a new source (well) in order to feed the proposed tank. The estimated cost of improvements for Option 1 is \$1,055,000. A detailed break down is shown in Exhibit 5.1.4.1.

5.0 DEVELOPMENT OF IMPROVEMENTS

The focus of discussions in the previous sections has been to educate the reader on the surrounding area and to analyze the existing and future needs of the water system. Throughout Section 3.0 and 4.0 areas of the water system were identified that need improvements. Section 5.1 discusses the needed improvements in more detail. Preliminary cost estimates accompany each analyzed improvement. In Section 5.2, a financial plan outlines potential grant and loan funding sources.

5.1 PROPOSED IMPROVEMENTS

In Sections 4.0 and 5.0, each major component of the water system was analyzed. This analysis included the physical condition and the ability to meet the existing and future needs of the City of Driggs. The result of this analysis is concluded below.

5.1.1 Water Rights

There are no existing or projected 20-year water right improvements for the water system. The only potential need would be to ensure the City obtain water rights to any additional source that may be developed or acquired. The City is currently in the process of consolidating their water rights. This will enable the City to draw water from any of their sources at any time with the ability to increase the capacity of a source if desired.

5.1.2 Water Source

The water source evaluation uncovered a couple of areas that could be improved. First, some of the existing wells are in need of improvements. Ideally, it would be beneficial to construct well houses around each well. Inside each well house, pump control valves would be installed. These valves would allow the following things to occur: 1) each time the well turns on the valve would automatically divert the first few minutes of water to waste. This eliminates any sand or stagnant water from entering the distribution system. 2) The valve can gradually introduce water into the system, eliminating the pressure surges that occur on the distribution system. It should be noted that this was done at the High School Well as part of the 2002 water improvement project.

An additional benefit of well houses is that chlorination equipment can be installed. This allows the system operator to maintain constant chlorine residuals in the system. The construction of well houses should be prioritized with the first being the Lyon's Park Well.

Although the evaluation of required gallons per minute indicated that the City would have sufficient flows for the future, the evaluation of the future distribution system indicated that additional flow is required in Zone #2. This will be evaluated more extensively below in the distribution system analysis.

Option 2: Option 2 consists of constructing the new 1.0 million gallon tank in Zone #2. The tank would be located at the elevation of the existing 300,000 tank which would eliminate the need for an additional well. The majority of the wells are located in Zone #3 and pump into the system, through the 12 inch transmission line, and fill the existing 300,000 gallon tank. A new tank at the same elevation would be filled at the same time and by the same sources. A booster pump station would be required to be constructed to pump from the new tank into Zone #2. The booster pumps would be equipped with variable speed drives so that only the water required would be pumped, thereby reducing operation costs. The proposed tank at this location would also provide storage for Zone #3. The existing tank is located at approximately 6,300 feet in elevation. The proposed new tank location would be north of the existing tank and would require approximately 3,800 feet of 12 inch transmission line. The estimated construction cost of the improvements for Option 2 is \$625,000. A detailed break down is shown in Exhibit 5.1.4.2. After evaluating the costs of Options 1 and 2, Option 2 is clearly the best alternative.

The future distribution model also shows possible future waterlines and sizes for the backbone distribution lines of the system. These waterlines should be installed by developers as the system is expanded. The proposed improvements will provide a minimum of 1,200 gpm fire flow to all areas of the water system.

Within the older areas of Driggs, 2-inch waterlines exist. The replacement of these lines is also a recommendation. It is proposed the replacement of these lines be completed as regular maintenance, using money from the budgeted Capital Improvement Fund. It is recommended that \$60,000 per year be budgeted for the replacement of 2 inch waterlines.

As the water system is expanded, it is important that the City Staff be able maintain, control, and monitor the system with the least amount of difficulty as possible. In order to accomplish this, it is recommended that a SCADA system be installed. This will allow the operator to establish the order the wells turn on and monitor the water elevation in all of the tanks. This can all be accomplished from one central location. The cost associated with this type of system is \$10,000 for the master location and \$7,500 for each remote location. It is recommended that all the tanks, the High School Well, Teton Creek Well, New Booster Pump Station, Valley Center Well, and Lyon's Park Well be included in the SCADA system at the initial start up. Other components can be added at a later date. The estimated cost to include the above mentioned components of the water system to a master location is \$70,000.

5.1.5 Water Treatment and Quality

In previous sections, discussion was made concerning the need for chlorination equipment at each well. The cost to install the chlorination equipment is minimal, but must be housed in a building. It was also discussed that each well should be able to pump to waste. The costs associated with a new building and piping is estimated to be approximately \$120,000.

5.2 POTENTIAL FUNDING SOURCES

Cities have two methods to legally accrue debt on a water system. The first method is through the sale of bonds, authorized through bond elections or local improvement districts. The second method requires a ruling by a judge. This method is known as judicial confirmation.

The recommended capital improvements cost a total of \$1,915,000. Several funding options are available for funding. The four primary sources of money are from USDA – Rural Development (RD), Idaho Community Development Block Grant (ICDBG), the State Revolving Loan Fund (SRLF), and the Idaho Department of Water Resources (IDWR). Grant monies are only available from ICDBG and USDA-RD. Each funding agency rates and ranks each application, to their specific funding agency criteria. Grant and loan money is then awarded to the highest ranked applications until the money runs out for that funding year. Then the ranking process is started over for the next year. This process is very competitive, due to the number of applications in the State versus the amount of money available.

Each funding agency has their own criteria and method for ranking projects. Listed below are some of the more critical funding criteria for each funding agency.

Idaho Community Development Block Grant (ICDBG)

- Provide grant money only
- Applicants are required to match at least ICDBG's grant with own contribution
- Allow "sweat equity" as cities contribution
- Requires Davis-Bacon wages to be paid on project
- Fund administrator recommended (typically, East Central Idaho Planning Development Association, ECIPDA, and the Development Company)

USDA Rural Development (USDA-RD)

- Provide loan and grant money
- Requires applicants minimum monthly water rates based on the Median Household Income of the community.
- Intermediate Rate Loans are given at 4.75% interest for 20, 25, 30 or 40 years
- Requires a bond election for loan
- Requires communities to meter each hook-up
- Must use RD loan money to qualify for grant money

State Revolving Loan Fund (SRLF)

- Provide loan money only
- Administered through Idaho Department of Environmental Quality (IDEQ)
- Loans are given at 4.75% interest for 20 years
- Requires a bond election or judge ruling for loan

Idaho Department of Water Resources (IDWR)

- Provide loan money only
- Administered through Idaho Department of Water Resources
- Loans are given between 5-6% interest for 20 or 30 years
- No bond election needed

Because it is extremely difficult to qualify for grant money, a SRF loan will be analyzed as the probable funding option.

5.3 ECONOMIC ANALYSIS AND END USER RATES

Debt service = \$167,248 per yr (20 years @ 4.75%) (includes debt reserve amount)

Monthly rate increase = \$11.56 (this amount is divided among the 1,206 existing ERU's)

However the new users should be responsible for the improvements because the existing system is in good shape. If the proposed improvements are paid by connection fees it would equate as the following:

*Debt service = \$167,248/year * 20 years = \$3,344,960 / 1,726 (new users) = \$1,938 per ERU.*

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

Based upon the analysis and evaluation of the preceding sections, the following conclusions are presented in regard to the Driggs Culinary Water System. The following improvements are based on a declining growth rate 5.8% through 2010, 4.8% through 2015, 3.8% through 2028, per year. The following items were identified as Driggs' culinary water needs for the next 20 years:

- Install back up generators on High School and Valley Center Wells
- Construction a new 1.0 million gallon water storage tank
- Install 3,800 feet of 12 inch transmission line
- Install a booster pump station
- Install a SCADA System
- Construct well houses for each well
- Install chlorination equipment at each well
- Replace 2-inch distribution lines

6.2 RECOMMENDATIONS

Based upon the findings of this study, Sunrise Engineering recommends the City of Driggs make the following improvements to their water system. These improvements are listed in order of highest priority improvements to the lowest.

1. Install back up generators on the High School and Valley Center Wells (\$90,000).
2. Build a 1.0 million gallon storage tank (\$1,130,000), transmission line and booster station (\$625,000) to provide future peak and fires flows to the entire system.
3. Install a SCADA System that will connect the existing and proposed water tanks, High School Well, Teton Creek Well, Valley Center Well, Lyon's Park Well, and new booster station to a master location (\$70,000).
4. The next priority is the construction of well houses at each of the well sites (\$120,000 each). This includes chlorination equipment be added to each well house as it is constructed.
5. When the capital improvement budget will allow, we recommend the City of Driggs start replacing the 2-inch looping lines in the City (estimated yearly budget amount \$60,000) At this time, the individual service lines should also be replaced and located at proper depths to prevent freezing.

6. As developments extend waterlines to the north, south, and east, it is recommended the City insist looping lines be installed as master planned. This will ensure that fire flows will be met in the outer edges of the City.

APPENDICES

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